

COLLEGE OF BIOLOGICAL SCIENCES

2021 ANNUAL REPORT



COLLEGE OF BIOLOGICAL SCIENCES

UNIVERSITY OF MINNESOTA



A NOTE FROM DEAN FORBES

The last year was shaped in ways large and small by the pandemic. We started 2021 on a hopeful note as the rollout of vaccines began and case counts declined. In short order, the Delta and Omicron variants complicated the picture. Against that backdrop, the College continued to make progress on key priorities thanks to the dedication and resilience of faculty and staff.

We advanced our mission in critical ways, among them a sustained focus on diversity, equity, inclusion and justice. The College convened action teams to create blueprints for implementing recommendations made by a collegiate working group last year and launched a grassroots micro-grant initiative. Many of the best ideas come from the faculty and staff working in classrooms and labs every day. These micro-grants are intended to help get new efforts off the ground and support promising work in progress.

Our incoming class was the largest to date. Demand for our programs remains strong and our admitted students continue to be among the highest achieving at the University. This fall, we were able to welcome students back to campus for in-person classes even as we continued to navigate the complexities of schedules upended by school closures and the continued wait for a vaccine for the youngest children.

Research continued to flourish with expenditures exceeding \$29 million and CBS faculty among the most highly cited, particularly in our Department of Ecology, Evolution and Behavior. In fact, the University was ranked #2 in the world for ecology and environment research, making us the premier institution in the country for this area of inquiry with a critical mass of field-shaping research in the area of global change biology. We also launched the Dean's Research Program to ensure that our students have opportunities to spend time doing research alongside our outstanding faculty.

In addition, the College continued to make moves to position the University as a leader in the bioeconomy. We broke ground on a new facility that will support biomanufacturing innovation and worked to build our biotechnology education ecosystem with an eye to introducing a new major for undergraduates and continuing to grow our workforce development offerings.

An annual report helps us measure progress. It provides a snapshot of the collective activity of this College. While it cannot tell the whole story, it points to a shared sense of purpose even in a difficult time.

Valery Forbes

A handwritten signature in black ink that reads "Valery C. Forbes". The signature is written in a cursive, flowing style.

Dean, College of Biological Sciences

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2021 HIGHLIGHTS

Growing the research ecosystem

Research funding remained strong with more than \$29M in annual expenditures. Expenditures have increased steadily in recent years. In addition, the University was ranked #2 in the world for ecology and environment, #5 in biochemistry and #11 in biotechnology in 2021.* In addition, seven faculty members affiliated with the College were among the University of Minnesota faculty included in the 2021 Highly Cited Researchers list published annually by insight and analytics firm Clarivate Analytics.

Boosting undergraduate research opportunities

The Dean's Research Program was introduced in 2021 with an eye to providing undergraduates without prior research experience with a paid, mentored research opportunity. Between the summer and fall semester cohorts, 75 CBS undergraduates and 48 faculty members have participated in the program. CBS also launched a one-credit introduction to laboratory or field biological research for students with no prior experience.

Expanding our biotechnology footprint

CBS broke ground on a new state-of-the-art facility to support biomanufacturing innovation and amplify the University's role within the burgeoning bioeconomy. We also launched a new Biotechnology Education Ecosystem initiative that includes efforts to develop a new undergraduate biotechnology major that will emphasize skills development and capstone experiences.

Increasing support for DEIJ

CBS launched action teams to help translate recommendations into concrete steps the College can take to increase representation and recognition and expand inclusive teaching practices. CBS also introduced a DEIJ community of practice to ensure better coordination among units and help boost the impact of work already in progress. The group was tasked with distributing up to \$75,000 in funds to support strategic DEIJ efforts.

Celebrating a successful campaign

In 2021, the College successfully completed its record-breaking "Great Science at a Grand Scale" Campaign. CBS raised \$29M – 138% of the \$21M campaign goal – far surpassing the \$12M CBS raised as part of the "Campaign Minnesota," the University of Minnesota's last system-wide campaign.

* ShanghaiRanking's Global Ranking of Academic Subjects 2021 and Blue Ridge Institute for Medical Research

COLLEGE SNAPSHOT

BY THE NUMBERS

- 2,352 undergraduates
- 287 graduate students
- 100 postdoctoral researchers
- 149 faculty members*

DEPARTMENTS

- Biochemistry, Molecular Biology and Biophysics**
- Biology Teaching and Learning
- Ecology, Evolution and Behavior
- Genetics, Cell Biology and Development**
- Plant and Microbial Biology

FIELD STATIONS, INSTITUTES AND CONSERVATORY

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

SIGNATURE PROGRAMS

- Nature of Life Program
- Foundations of Biology Active Learning Courses
- Dean's Research Program
- Petri Dish Science Conversation Series
- Market Science Community Engagement Program

* including Medical School faculty in shared departments

** departments shared with the Medical School

STUDENTS

UNDERGRADUATE STUDENTS

TOTAL ENROLLMENT [Fall 2021]

2,352 undergraduates enrolled

- 1,622 from Minnesota (69%)
- 712 students of color (30%)
- 83 international students (3.5%)
- 694 first-year (NHS Fall 2021)
- 54 transfer students (NAS Fall 2021)

FRESHMAN CLASS [class of 2025]

694 NHS students enrolled from 4,151 applicants [Fall 2021]

- 483 from Minnesota (69.6% of total)
 - 364 from Twin Cities Metro (52.4% of total)
 - 119 from Greater Minnesota (17.1% of total)
- 515 female (74.2%)
- 179 male (25.8%)
- 143 first-generation college students (20.6%)
- 20 international students (2.9%)
- 255 domestic students of color (37%)
- 89.2% average high school rank of 2021 freshman class

TRANSFER STUDENTS [NAS, Fall 2021]

- 54 total
- 46 from Minnesota (85.2%)
- 41 female (75.9%)
- 13 male (24.1%)
- 21 first-generation college students (38.9%)
- 1 international student (1.9%)
- 16 domestic students of color (30.2%)

RETENTION AND GRADUATION RATES

- First-year retention rates 94.2% (UMTC avg 91.7%)
- Four-year graduation rates 81.2% (UMTC avg 72.8%)
- Six-year graduation rates 91.1% (UMTC avg 84.5%)
- Four-year graduation rates for Pell-eligible students 76.1% (UMTC avg 62.1%)
- Six-year graduation rates for Pell-eligible students 82.1% (UMTC avg 77.7%)
- Four-year graduation rates for domestic students of color 82.1% (UMTC avg 67.2%)
- Six-year graduation rates for domestic students of color 93.8% (UMTC avg 81.8%)

MAJORS

	Fall 2017	Fall 2018	Fall 2019	Fall 2020	Fall 2021
Biochemistry B.S.	340	429	406	389	411
Biology B.S.	677	831	851	849	948
Cellular and Organismal Physiology B.S.	-	9	46	87	99
Ecology, Evolution and Behavior B.S.	70	95	87	75	76
Genetics, Cell Biology and Development B.S.	269	256	245	244	235
Microbiology B.S.	125	136	118	101	89
Neuroscience B.S. (and double majors)	305	372	381	398	382
Plant and Microbial Biology B.S.	14	27	31	30	27

BACHELOR DEGREES AWARDED

	2017-18	2018-19	2019-20	2020-21
Biochemistry	86	92	87	85
Biology	204	176	188	173
Cellular and Organismal Physiology			2	15
Ecology, Evolution and Behavior	21	32	31	26
Genetics, Cell Biology and Development	72	70	74	71
Microbiology	30	38	32	27
Neuroscience	82	87	83	104
Plant and Microbial Biology	1	5	13	7
Total	496	500	510	508

STUDENT SUPPORT [2020-21 academic year]

The College of Biological Sciences Student Services team is made up of 19 professional staff members, each contributing to the shared responsibility of advancing the mission and vision of the college. Staff serve students in three functional areas: academic advising, career coaching and student engagement.

- During the 2020-21 academic year, all services were offered remotely, with advising and career appointments on Zoom, career workshops offered via webinar, and student engagement finding virtual ways to build community and offer student support.
- CBS Student Services saw continued growth in student usage with a total of 3,366 student appointments and 619 drop-in appointments across academic advising, career development and learning abroad. Throughout this time, staff supported students through what was undoubtedly a difficult academic year in so many ways.

LEARNING ABROAD

While COVID-19 restrictions and travel concerns affected participation, four students studied abroad and 14 students engaged in a new virtual internship program during the 2020-21 academic year.

UNDERGRADUATE RESEARCH

- 233 CBS student participated in directed research/studies projects, mentored by 151 faculty members.
- 71 CBS students completed projects through the University's Undergraduate Research Opportunities Program, mentored by 64 faculty members.
- 72 CBS students in 41 faculty research groups through the Dean's Research Program.

UNDERGRADUATE AWARDS AND RECOGNITION

CBS undergraduates received a number of major awards including a Gilman Scholarship, the President's Student Leadership and Service Award, and the University of Minnesota Scholarly Excellence in Equity and Diversity. In addition, 57 graduating seniors were also welcomed into Phi Beta Kappa this year.

GRADUATE STUDENTS

ENROLLMENT

	2017	2018	2019	2020	2021
Biochemistry, Molecular Biology and Biophysics	77	81	90	90	88
Ecology, Evolution and Behavior	60	69	61	63	67
Genetic Counseling (M.S.)	16	20	20	21	22
Microbial Engineering (M.S.)	11	11	10	9	9
Molecular, Cellular, Developmental Biology and Genetics	45	51	53	56	54
Plant and Microbial Biology	45	41	45	47	47

DEGREES AWARDED

	M.S. 2021	Ph.D. 2021
Biochemistry, Molecular Biology and Biophysics	1	15
Ecology, Evolution and Behavior	n/a	6
Genetic Counseling	10	n/a
Microbial Engineering	3	n/a
Molecular, Cellular, Developmental Biology and Genetics	1	5
Plant and Microbial Biology	n/a	6

EXTERNAL AND UNIVERSITY AWARDS

CBS graduate students received 70 fellowships, grants, and awards including National Science Foundation and Smithsonian fellowships. 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 37 theses and dissertations in 2021. 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 149 faculty members, including Medical School faculty in shared departments. In 2021, seven faculty members affiliated with the College were among the University of Minnesota faculty included in the Highly Cited Researchers list published annually by insight and analytics firm Clarivate Analytics.

PROMOTIONS, NEW HIRES AND RETIREMENTS

Promotions

- Trinity Hamilton, promoted to associate professor with tenure (Plant and Microbial Biology)

New hires

- Kyle McCulloch, research assistant professor (Ecology, Evolution and Behavior)
- Maureen Cetera, assistant professor (Genetics, Cell Biology and Development)*
- Matthew Gill, associate professor (Genetics, Cell Biology and Development)*
- Xiao Dong, assistant professor (Biochemistry, Molecular Biology and Biophysics)*

* Primary appointment in the Medical School

Retirements

Three faculty members retired in 2021: Bonnie Leroy (Genetics, Cell Biology and Development), James Curtsinger (Ecology, Evolution and Behavior), David Marks (Plant and Microbial Biology), Michel Sanders (Biochemistry, Molecular Biology and Biophysics)

* Due to the pandemic, there was a hiring freeze and faculty were given extensions on their probationary period due to pandemic.

FACULTY AWARDS AND RECOGNITION

In 2021, five faculty received major professional, University or collegiate awards. See *the complete list of CBS faculty and staff awards in the In Detail section at the end of this report.*

RESEARCH

PUBLICATIONS

College of Biological Sciences faculty published nearly 463 studies and articles in 244 journals authored or co-authored by faculty with primary appointments in CBS including the following high-impact journals:

- *Nature*: 32*
- *Science*: 4
- *PNAS*: 13
- *Ecology Letters*: 6
- *Genetics*: 2

*Including associated *Nature* journals

See *the complete list of CBS faculty and staff publications.*

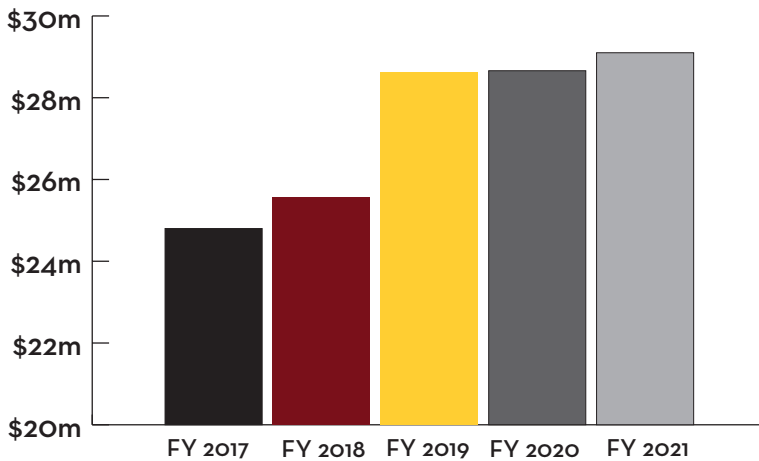
ACTIVE GRANTS

The College had 284 active grants including 79 exceeding \$100,000 in expenditures.

- \$29,107,001 (total sponsored research spend)
- \$12,995,524 NIH
- \$6,408,779 NSF
- \$2,810,582 Other federal agencies (DOE, DOD, DOI, USDA, etc.)
- \$718,204 LCCMR
- \$572,506 Other MN state agencies

See the complete list of CBS faculty grants.

Total expenditures



CBS SUPPORT FOR MULTI-COLLEGIATE INFRASTRUCTURE AND COLLABORATIONS

CBS provides critical financial and administrative support to shared research infrastructure and initiatives and multi-collegiate events that foster research collaborations. In 2021, the following interdisciplinary facilities and initiatives received over \$3.3M in annual CBS support:

- Cedar Creek Ecosystem Science Reserve
- Itasca Biological Station and Laboratories
- BioTechnology Institute
- MnDRIVE Environment (administrative support and space)
- 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 Federal Government Relations
- University of Minnesota Lion Center

In addition, the College provides space for:

- Electronic Instrumentation
- Machine Shop
- Biotechnology Resource Center
- Caenorhabditis Genetics Center
- Chlamydomonas Resource Center
- University Imaging Center
- Bell Museum collections
- BioMADE

In 2021, the College distributed more than \$100,000 to support interdisciplinary collaborations, events and symposia, including Norwegian Centennial Chair Collaboration, Emerge BioScience Program, Moos Family Speaker Series on Water Resources and the Institute for Molecular Virology Symposium

RESEARCH AND LEARNING TECHNOLOGIES

Promoting flexible work RLT continued to make changes to support working from alternate locations and at varying times. The computer subsidy program now funds a laptop for all eligible individuals and a trade-in program is available for anyone who used their most recent subsidy to purchase a desktop. Computer backup through CrashPlan has been optimized to improve success rates and reduce the load on home internet connections. RLT also created processes to make computers attached to research equipment accessible from off campus if a secure solution is available.

Non-credit course and conference support RLT made non-credit course registration for CBS available through the DestinyOne Registration System (DORS). DORS is integrated into the University's financial, learning management, and other computing systems to create a more seamless and easily repeatable process for engaging communities outside of the University. RLT has successfully piloted seven non-credit courses, workshops, and conferences and is now ready to work with others.

DIVERSITY, EQUITY, INCLUSION AND JUSTICE

Following the work of our collegiate and alumni anti-racism work groups in 2020, the College consulted with the Office of Equity and Diversity to review the recommendations and determine actionable priorities. CBS also established an infrastructure to support and encourage DEIJ efforts throughout the college, including departmental DEIJ committees, collegiate action teams and the CBS Diversity Community of Practice.

Action teams The College created DEIJ action teams to collect and analyze information, identify opportunities and implement next steps in three priority areas including:

- Increasing representational diversity through recruitment and retention strategies
- Aligning incentives and recognition as a reflection of our values
- Promoting and developing inclusive teaching practices

CBS DEIJ action teams are responsible for moving the CBS Anti-racism Work Group recommendations forward. Teams consist of approximately ten people and participation is open to all members of the College. Focus areas for action teams will be reviewed on an annual basis by the CBS Dean's Office.

CBS Diversity Community of Practice The CBS Dean's Office launched the CBS Diversity Community of Practice (CBS DCoP) in 2021 with the goal of connecting DEIJ efforts, and advocates, across units. The community of practice includes one representative from each department and constituent group in the College. The DCoP meets regularly to discuss departmental DEIJ goals, lessons learned, progress and challenges. The group will also focus on increasing internal communications related to DEIJ efforts to maximize resources and reduce duplication of work.

DEIJ micro grants The CBS Dean's Office has allocated \$75,000 of strategic initiative funds to support DEI micro-grants with the goal of recognizing and advancing the grassroots work happening throughout the college. The CBS Diversity Community of Practice was tasked with establishing an application and review process for awarding DEIJ micro-grants within the college. Microgrants encourage projects that align with the recommendations of the CBS anti-racism working group and the Office of Equity and Diversity's strategic priorities, which seek to (1) increase representational diversity; (2) improve campus climate; and (3) build, support and align partnerships.

Student affinity groups A total of 28 students participated in the CBS affinity groups in Fall 2021. Groups included a BIPOC Affinity Space, LGBTQ+ Affinity Space and Women of CBS Affinity Space. Each group met in-person once a month and offered students an opportunity to connect with their CBS peers and be in a community around shared identities. We also offered a virtual White Accountability Group in which White students in CBS met to discuss developing and integrating an antiracism lens to their lives.

Inclusive Science Education Fellows Launched in Spring 2017, originally with funding from the Howard Hughes Medical Institute (HHMI), 80 graduate students and postdocs in CBS have completed this semester-long program, including nine participants in Spring 2021. The goals of the program are to assist participants in developing a greater understanding of diversity and inclusion in the classroom and lab, engage in critical conversations with their peers about diversity and inclusion, and implement inclusive teaching and mentoring strategies in the classroom and lab.

OUTREACH & ENGAGEMENT

While we continue to adapt to a continually changing public health environment, community engagement remained an important priority for faculty, students and staff. In addition to activities happening within individual departments, faculty groups and externally funded projects, the College continued to invest in shared collegiate programming to provide access and opportunities for community engagement.

SciSpark Scholars The College continued to expand its K-12 engagement programming focused on creating more equitable and supported pathways into science for underrepresented students. With support from both the Richard M. Schulze Family Foundation and the Boston Scientific Foundation, Market Science created an equipment lending library to support student-driven inquiry projects in biotechnology. In collaboration with the ATP-Bio research center in the College of Science and Engineering, the program offered an online summer research program for ~25 high school students from St. Paul Public Schools and returned to in-classroom programming with three school partners across the Twin Cities.

Market Science In 2021, Market Science was able to return to nearly a full summer of in-person programming. With the support of an impressive cohort of undergraduate and graduate students, Market Science hosted 30 events reaching over 1,000 community members with engaging hands-on activities. Market Science also developed strong partnerships with the Minnesota Academy of Science and the University YMCA. Through these partnerships, the program began a new series of repeated experiences for summer school and after-school programming.

Cedar Creek Ecosystem Science Reserve Cedar Creek continued to be flexible in its program offerings, moving with relative ease between in-person field trips for K-12 students and adult learners, and regular open hours at the bison gazebo, hybrid Lunch With a Scientist programs, and online options including both synchronous webinars and classroom programs, and asynchronous digital learning resources and recordings. A total of 9,624 participants joined this array of programs in 2021. Cedar Creek continued active engagement through its online Eyes on the Wild trail cam project and launched a new online citizen project called Woodpecker Cavity Cam to provide easy opportunities for citizen scientists around the world to contribute to wildlife projects. Collectively, these two projects gained an additional 9,000 new volunteers in 2021.

Itasca Biological Station and Laboratories Despite COVID-related lodging restrictions, enrollment in field biology courses in 2021 was higher than it has been in 10 years. The station also continued its three-week internship program with local indigenous high school students, and its “Big River Continuum” art exchange project, funding two indigenous artists and an ongoing cohort connecting urban and rural artists and scientists. Finally, the station was able to renew its programming with the Department of Natural Resources inside Itasca State Park to again offer its Science in Nature scientist-led hikes with park visitors.

CBS Conservatory & Botanical Collection The Conservatory installed a public art piece in June with an art unveiling with 50 attendees. We welcomed 485 UMN students from 12 courses and four colleges, and toured 55 students from four peer institutions. Outreach through nine virtual tours reached 165 public visitors. The Botany Bus visited Webster Elementary and met with 50 third-grade students there.

Impact Exchange The College’s “engagement ecosystem” continued to extend its reach and provide opportunities for students and the public through science communication training (course- and workshop-based), the Science Communication Lab, the BioLine blog and newsletter, public programs including SciSpark, Petri Dish and Probable Meets Possible, and the Science Communication Lab. Petri Dish topics in 2021 included origins of life, urban nature, vaccines and systemic racism in science.

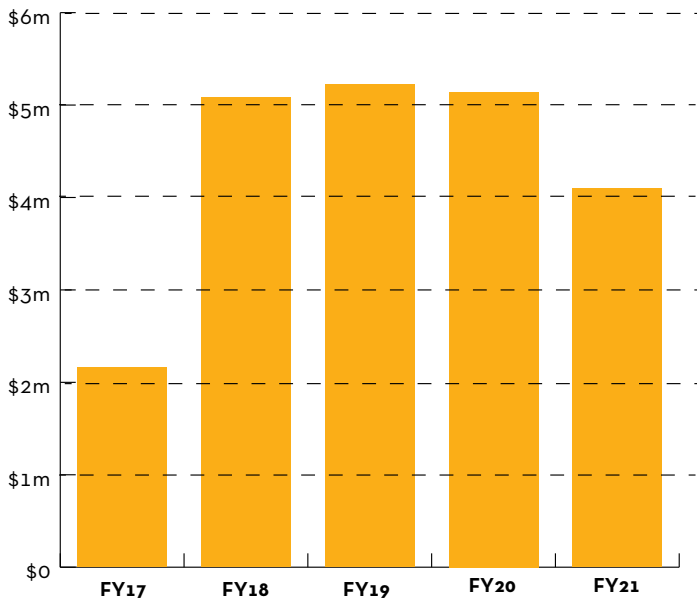
ADVANCEMENT

DEVELOPMENT

Fundraising for 2021 was dynamic, with \$4.1M raised from 513 donors. Below is a detailed breakdown:

- 2 gifts of \$1M or more
- 2 gifts of \$250K-\$999K
- 3 gifts between \$100K-\$249K
- 7 gifts between \$50K-\$99K
- 16 gifts of \$10K-\$49K
- 64 gifts of \$1K-9.9K
- 43 gifts of \$500-\$999
- 210 gifts of \$100-\$499
- 166 gifts of <\$100

GIVING HISTORY



SCHOLARSHIPS AND FELLOWSHIPS

In 2021, the College committed more than \$771,000 in scholarships and fellowships, awarding 123 scholarships – including 48 four-year freshman awards – and 41 graduate fellowships.

ALUMNI RELATIONS

In 2021, the College continued to engage alumni online through the CBS Alumni Career Insights Exploration Series. We offered three sessions in the spring and three in the fall with panels made up of three alumni for each. We also hosted two panel discussions for graduate students. We launched career-focused affinity groups on LinkedIn, which have steadily grown over the past year in numbers. In addition, several alumni were the subject of Alumni at Work profiles. A small group of alumni gathered at Itasca Biological Station and Laboratories for the annual Itasca Alumni Weekend.

Here's a snapshot of the CBS alumni community in 2021:

- Total alumni: 19,251
- Alumni with B.S. degrees: 15,322
- Alumni with M.S. or PhD degrees: 4,411
- Alumni living in Minnesota: 10,760

Alumni recognition

- Outstanding Achievement Award: John Liu
- Alumni Achievement Award: Darby Nelson and John Liu
- Emerging Leader Award: Mindi DePaola and Sarah Knutie
- Alumni Service Award: Geri Nelson and Joshua Leonard

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 *The New York Times*, *The Atlantic* and *Smithsonian* among other high-profile news outlets.

Here are a few of the high-profile media mentions:

- The Best Kind of Aging Brain (*The Atlantic*)
- Who Runs the World? Squirrels! (National Public Radio)
- This Frog's Lungs Work Like Noise-Canceling Headphones (*Smithsonian*)
- Did a Cuttlefish Write This? (*The New York Times*)
- As winters warm, Minnesota lakes are losing ice (Minneapolis Public Radio)

FINANCIALS

FY21 OPERATING BUDGET

The College's FY21 operating budget included \$95,343,598 in expenditures.

Largest sources of revenue:

- \$29,306,561 tuition and fees
- \$25,056,204 state appropriation
- \$29,107,001 external faculty grants and contracts
- \$7,729,106 indirect cost revenue related to sponsored grants
- \$2,613,637 private gifts and endowment income

IN DETAIL

FACULTY AND STAFF AWARDS AND RECOGNITION

- National Academy of Sciences Fellow - Ruth Shaw, Professor, Ecology, Evolution and Behavior
- McKnight Distinguished University Professor - Trinity Hamilton, Associate Professor, Plant and Microbial Biology
- McKnight Land-Grant University Professor - Kate Adamala, Assistant Professor, Genetics, Cell Biology and Development
- Morse-Alumni Distinguished Teaching Award - Clarence Lehman, Professor, Ecology, Evolution and Behavior
- Outstanding Contributions to Graduate and Professional Education - Scott Lanyon, Professor, Ecology, Evolution and Behavior
- John Tate Award for Excellence in Undergraduate Advising - Jenna Parks, Assistant Director of Academic Advising

GRADUATE STUDENT AWARDS AND RECOGNITION

External Awards

- 3M Science and Technology Doctoral Fellowship - Rachael Kaspar (EEB)
- Bayer Fellows Graduate Assistantship - Clair Wootan (PMB)
- Cargill Fellowship - Yimao Huang (BMBB)
- NSF Graduate Research Fellow Program - Sara Donovan (EEB)
- NSF Graduate Research Fellow Program - Aaron Lee (PMB)
- NSF Graduate Research Fellow Program - Teresa Mccarrell (PMB)
- NSF Graduate Research Fellow Program - honorable mention - Hailey Sauer (PMB)
- NSF Graduate Research Fellow Program - honorable mention - Lucy Schroeder (PMB)
- Smithsonian Fellowship - Sean Keogh (EEB)
- Smithsonian Fellowship - Tom Radomski (EEB)
- Smithsonian ForestGEO Fellowship - Zacky Ezedin (PMB)

University Awards

- Bell Museum Dayton Fellowship - Abby Guthmann (EEB)
- Bell Museum Dayton Fellowship - Kavindya Pathirana (PMB)
- Bell Museum Dayton Fellowship - Tom Radomski (EEB)
- Bell Museum Simons Foundation Fellowship - Zacky Ezedin (PMB)
- Creating Inclusive Cohorts Fellowship - Anahi Cantoran (PMB)
- Creating Inclusive Cohorts Fellowship - Alexandria DeRusha (PMB)
- Doctoral Dissertation Fellowship - Anna Bennett (PMB)
- Doctoral Dissertation Fellowship - Rafael Della Coletta (PMB)
- Doctoral Dissertation Fellowship - Sarah Hammarlund (EEB)
- Doctoral Dissertation Fellowship - Cedric Ndinga Muniania (PMB)
- Doctoral Dissertation Fellowship - Aamod Zambre (EEB)
- Edward Silberman Fellowship - Erin Mittag (EEB)
- Interdisciplinary Center for the Study of Global Change Fellowship - Chau Pham (EEB)

Interdisciplinary Dissertation Fellowship - Alexander Shephard (EEB)
Leadership in Equity, Inclusion and Diversity (LEID) Fellowship - Mounica Kota (EEB)
UMII-MnDRIVE Fellowship - Chaochih Liu (PMB)
UMII-MnDRIVE Graduate Assistantship Award - Molly Kuhs (EEB)

College of Biological Sciences Fellowships

Biochemistry, Molecular Biology and Biophysics

Armstrong-Pothaprgada Fellowship - Judee Sharon
Arnold H. Johnson Biochemistry Fellowship - Erynn Johnson
Barnum Award - Fredrik Sadler
Barnum Award - Adam Sychla
Bollum Award - Arad Moghadasi
Carr-Peterson Award - Caitlin Walker
Edith Walters Jones and Robert Jones Fellowship - Cher Ling Tong
Huber Warner Fellowship in Molecular Biology - Sze Cheng
Ross A. Gortner Fellowship - Kun-Hwa Lee
Ross A. Gortner Fellowship - Amanda Rieffer
Thomas A. Reid Award - Andrew Rajczewski
Victor A. Bloomfield Fellowship - Jason Jones
Victor A. Bloomfield Fellowship - Evan Kalb
Victor A. Bloomfield Fellowship - Marcus Kelly
Victor A. Bloomfield Fellowship - Maria Ramirez

Ecology, Evolution and Behavior

Carol H. and Wayne A. Pletcher Graduate Fellowship - Charlotte Devitz
Carol H. and Wayne A. Pletcher Graduate Fellowship - Taz Mueller
CBS Dean's Distinguished Graduate Fellowship - Chau Pham
Charles Peter Sigerfoos Graduate Fellowship - Abby Guthmann
Charles Peter Sigerfoos Graduate Fellowship - James Peyla
Charles Peter Sigerfoos Graduate Fellowship - Aamod Zambre
Darby and Geri Nelson Environmental Scholar Award - Lang DeLancey
David Tilman Fellowship in Ecology and the Environment - Janine Mistrick
David Tilman Fellowship in Ecology and the Environment - Megan Wilcots
Donald and Elizabeth Lawrence Research Scholarship - Maggie Anderson
EEB Diversity Fellowship - Saumya Gupta
EEB Diversity Fellowship - Katherine Krueger
EEB Excellence Fellowship - Chau Pham
EEB Excellence Fellowship - Christopher Wojan
Elmer C. Birney Fellowship - Rachel Pain
Florence Rothman Research Fellowship - Eduardo Perez Pazos
Ray Anderson Zoology & Genetics Fellowship - Emma Roback
Richard and Judi Huempfer Research Fund - Maggie Anderson

Itasca Biological Station and Laboratories

Itasca Director's Research Fellowship – Talia Michaud

Molecular, Cellular, Developmental Biology and Genetics

Bryant Keller Award – Pavana Khan

Carol H. and Wayne A. Pletcher Graduate Fellowship Honorable Mention Award – Patricia Claudio Vasquez

Edward B. Lewis Award – Krisna Van Dyke

Margaret A. Titus Award – Lauren Sundby

Perry B. Hackett Award – Minu Bhunia

Robert K. Herman Award – Matthew Zinselmeier

Plant and Microbial Biology

Bernard and Jean Phinney Graduate Fellowship in Plant Molecular Biology – Redeat Tibebe

Bernard and Jean Phinney Graduate Fellowship in Plant Molecular Biology – Trevor Weiss

Carol H. and Wayne A. Pletcher Graduate Fellowship – Ariadna Mondragon Botero

CBS Dean's Distinguished Graduate Fellowship – Aidan Harrington

THESES AND DISSERTATIONS

BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOPHYSICS – Ph.D.

- Xiaotong Lu (Advisor: Sharon Murphy) – *Analysis of nicotine metabolites in three ethnic groups*
- Sami Chu (Advisor: David Thomas) – *Studies of the super-relaxed state and interacting-heads motif in beta-cardiac myosin*
- Willow Coyote-Maestas (Advisors: Daniel Schmidt and Chad Myers) – *Domain insertion scanning to study and engineer ion channels*
- Rebecca Goldblum (Advisor: Melissa Gardner) – *The role of oxidative stress in remodeling the cardiac microtubule cytoskeleton*
- Rebecca Haugen (Advisor: Aaron Goldstrohm) – *Analysis of the Pumilio repression mechanism and its impact on the transcriptome*
- Jason Jones (Advisor: John Lipscomb) – *Structural enzymology of soluble methane monooxygenase protein-protein interactions*
- Komal Joshi (Advisor: Daniel Bond) – *Redox potential controls electron transfer through the inner membrane of Geobacter sulfurreducens*
- Ang Li (Advisor: David Thomas) – *Spectroscopic probes of cardiac calcium regulation and therapeutic design*
- Michael Lopresti (Advisor: Douglas Mashek) – *The role of lysosomal acid lipase in hepatic cholesterol metabolism and non-alcoholic fatty liver disease*
- David Nedrud (Advisor: Daniel Schmidt) – *Programmed mutagenesis and high-throughput methods to study protein recombination and epistasis*
- David Stagg (Advisor: Peter Crawford) – *The role of hepatocyte D-hydroxybutyrate dehydrogenase in ketone body metabolism and liver health*
- Cassidy Tompkins (Advisor: Wendy Gordon) – *HUH-endonuclease mediated protein-DNA bioconjugation*
- Anja Touma (Advisor: Sivaraj Sivaramakrishnan) – *Dissecting transient protein interactions implicated in cardiovascular disease: G protein-coupled receptors and cardiac myosin-binding protein C*
- Caitlin Walker (Advisor: David Bernlohr) – *On the role of allosteric cooperativity in the regulation of protein kinase A and its implications in disease*

- Hsin Yeh (Advisor: Jeongsik Yong) – *Functions and mechanisms of mTORC1-mediated post-transcriptional regulations*
- Alina Zdechlik (Advisors: Daniel Schmidt and Wendy Gordon) – *Engineering adeno-associated virus for receptor-mediated gene delivery*

ECOLOGY, EVOLUTION AND BEHAVIOR – Ph.D.

- Saumya Gupta (Advisor: Mark Bee) – *Information processing in complex environments: Insights from treefrog communication*
- Rachel Olzer (Advisor: Marlene Zuk) – *The costs (and benefits) of standing out: Alternative reproductive behavior and novel trait evolution in the Pacific field cricket*
- Craig See (Advisors: Sarah Hobbie and Peter Kennedy) – *Drivers of root and fungal litter decomposition: implications for soil carbon cycling*
- Monica Watson (Advisors: Georgiana May and Kathryn Bushley) – *The effect of abiotic and biotic factors, symbiont exchange between host species, and host migration on fungal symbiont community composition and diversity*
- Sarah Winikoff (Advisor: Jacques Finlay) – *Agricultural wetland restoration: The role of sediment removal, hydroperiod and time on restoration outcomes*

MICROBIAL ENGINEERING – M.S.

- Maia Clipsham (Advisors: Larry Wackett and Alptekin Aksan) – *Use of machine learning to predict the desiccation tolerance of bacteria*
- Nathan Hoekstra (Advisor: Mikael Elias) – *Characterization of a novel quorum quenching enzyme and determination of autoinducer signal receptor specificity*
- Marissa Quijiano (Advisor: Brett Barney) – *Borosin foray: Expanding a family of fungal autocatalytic -N-methylating RiPP natural products*

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

- Hyunkee Kim (Advisor: Rita Perlingeiro) – *Development of genome engineering strategies in induced pluripotent stem cells to enable autologous transplantation for Duchenne muscular dystrophy*
- Keehun Kim (Advisor: Sivaramakrishnan) – *Development of an accessible cell-free assay for the purpose of studying the structural mechanisms underlying GPCR ligand molecular efficacy*
- Morgan Meissner (Advisor: Louis Mansky) – *Studies on the molecular determinants of human retrovirus diversity*
- Michael Pickett-Leonard (Advisor: Jakub Tolar) – *Identification of novel genes and compounds for the development of precision therapeutics for dystrophic epidermolysis bullosa and associated cutaneous squamous cell carcinoma*
- Michael Zaiken (Advisor: Bruce Blazar) – *Adaptation and innovation of anti-cancer epigenetic targeting therapeutic strategies for the treatment of murine chronic graft vs host disease*

PLANT AND MICROBIAL BIOLOGY – Ph.D.

- Michael Maher (Advisor: Daniel Voytas) – *Methods for the generation of genetically engineered dicotyledonous plants using developmental regulators*
- Claire Milsted (Advisor: Changbin Chen) – *Reproductive and somatic functions of RAD51A and BRCA2 genes in maize*
- Jaclyn Noshay (Advisor: Nathan Springer) – *Connecting variation in genome structure and chromatin composition in *Zea mays**
- Molly Tillman (Advisor: Jerry Cohen) – *The auxin biosynthesis metabolic network*
- German Vargas Gutierrez (Advisor: Jennifer Powers) – *Understanding the role of plant hydraulic traits in ecological processes*