

COLLEGE OF BIOLOGICAL SCIENCES

2020 ANNUAL REPORT



College of
Biological Sciences
UNIVERSITY OF MINNESOTA

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2020 HIGHLIGHTS

Field-shaping faculty recognized for research

Eight faculty members affiliated with the College were among the two dozen University of Minnesota faculty included in the 2020 Highly Cited Researchers list published annually by insight and analytics firm Clarivate Analytics. Many of them are also associated with Cedar Creek Ecosystem Science Reserve, underscoring what an incredible community of investigators work there. In addition, three CBS faculty members were named American Association for the Advancement of Science 2020 Fellows in acknowledgment of excellence in their fields.

Anti-racism efforts underway

Over the course of fall 2020, the College convened two groups aimed at identifying actions that address and ultimately dismantle systemic racism. The Alumni Anti-Racism Council delivered its recommendations in December and the collegiate anti-racism working group finalized its recommendations in early 2021. The recommendations will inform a strategic plan that will guide collegiate efforts going forward.

Outreach moves online

With in-person engagement no longer possible due to the global pandemic, collegiate programs moved online. Market Science, Cedar Creek, the CBS Conservatory & Botanical Collection and the College's public programs pivoted in order to continue offering the broader community opportunities to engage. While challenging in some respects, this move expanded access to audiences beyond the Twin Cities, drawing interest from alumni and others around the country.

Creating more opportunities to connect

Supporting students during this challenging period has been paramount. In an effort to help connect students to alumni and provide informal mentoring, the College launched the Alumni Insights Career Exploration Series through which alumni from a wide range of fields shared information and advice with current students and recent alumni.

Fundraising success continues

The College had another outstanding year for fundraising with supporters giving a total of more than \$5 million. The Great Science at a Grand Scale Campaign continued its record-setting pace, exceeding its \$21 million goal and achieving \$25 million in FY20. In addition, the College launched the Cedar Creek Engagement Advisory Committee to engage key stakeholders and advance Campaign priorities relating to the research station. In addition, the College raised funds from alumni, faculty and staff to provide the graduating class of 2020, which was unable to participate in commencement, with five-year memberships to the University's Alumni Association.

A boost for biotech

This fall, the Department of Defense announced plans to headquarter the Bioindustrial Manufacturing and Design Ecosystem (BioMADE) Institute here at the University of Minnesota. This partnership positions CBS to play a central role in this emerging area of the bioeconomy. In addition, the BioTechnology Institute will expand its highly successful Biotechnology Resource Center (BRC). Both BioMADE and BRC will be housed in the new Microbial Cell Production Facility, which will break ground in 2021. The College also convened an Industry Advisory Group made up of alumni and industry stakeholders in biotechnology to advance corporate relations within the College.

COLLEGE SNAPSHOT

BY THE NUMBERS

- 2,249 undergraduates
- 286 graduate students
- 99 postdoctoral researchers
- 148 faculty members*

* including Medical School faculty in shared departments

ACADEMIC DEPARTMENTS

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

FIELD STATIONS AND CONSERVATORY

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

INSTITUTES AND CENTERS

- BioTechnology Institute
- UMN Lion Center

SIGNATURE PROGRAMS

- Nature of Life program (Itasca and on campus)
- Foundations of Biology active-learning courses
- Petri Dish Science event series
- Market Science community engagement program
- InSciEd Out STEM K-12 pipeline program

ACADEMICS

UNDERGRADUATE STUDENTS

TOTAL ENROLLMENT [fall 2020]

2,249 undergraduates enrolled

- 1,547 from Minnesota (69%)
- 632 students of color (28%)
- 83 international students (4%)
- 595 first-year students (NHS fall 2020)
- 53 transfer students (NAS fall 2020)

FRESHMAN STUDENTS [class of 2024]

595 NHS students enrolled from 8,546 applicants [fall 2020]

- 411 from Minnesota (69% of total)
 - 295 from Twin Cities Metro (49% of total)
 - 116 from Greater Minnesota (20% of total)
- 386 female (65%)
- 208 male (35%)
- 88 first-generation college students (15%)
- 9 international students (1.5%)
- 173 domestic students of color (29%)
- 92.3% average high school rank of 2020 freshman class

TRANSFER STUDENTS [NAS, fall 2020]

53 total

- 39 from Minnesota (74%)
- 30 female (57%)
- 23 male (43%)
- 19 first-generation college students (36%)
- 3 international students (6%)
- 20 domestic students of color (38%)

MAJORS

Number of students enrolled in CBS majors from 2016-2020

	Fall 2016	Fall 2017	Fall 2018	Fall 2019	Fall 2020
Biochemistry	268	340	429	406	389
Biology	419	677	831	851	849
Cellular and Organismal Physiology	-	-	9	46	87
Ecology, Evolution and Behavior	74	70	95	87	75
Genetics, Cell Biology and Development	220	269	256	245	244
Microbiology	105	125	136	118	101
Neuroscience	234	305	372	381	398
Plant and Microbial Biology	10	14	27	31	30

BACHELOR DEGREES AWARDED

Degrees awarded bachelor of science degrees by major in CBS from 2016-2020

	2016/17	2017/18	2018/19	2019/20
Biochemistry	116	86	92	87
Biology	187	204	176	188
Cellular and Organismal Physiology	-	-	-	2
Ecology, Evolution and Behavior	29	21	32	31
Genetics, Cell Biology and Development	85	72	70	74
Microbiology	39	30	38	32
Neuroscience	62	82	87	83
Plant and Microbial Biology	8	1	5	13
Total	526	496	500	510

RETENTION AND GRADUATION RATES

- First-year retention rate: 94.8% (UMTC avg 93.6%)
- Four-year graduation rate: 81.2% (UMTC avg 72.7%)
- Six-year graduation rate: 91.1% (UMTC avg 84.5%)
- Four-year graduation rate for Pell-eligible students: 76.1% (UMTC avg 62.1%)
- Six-year graduation rate for Pell-eligible students: 82.1% (UMTC avg 77.7%)
- Four-year graduation rate for domestic students of color: 81.8% (UMTC avg 58.7%)
- Six-year graduation rate for domestic students of color: 90.9% (UMTC avg 77.0%)

UNDERGRADUATE AWARDS AND RECOGNITION

The class of 2020 received a number of major awards. In addition, 61 graduating seniors were welcomed into Phi Beta Kappa, one of the most esteemed honors societies in the country. Recognition included:

- Astronaut Scholarship – *Macy Vollbrecht*
- Churchill Scholar – *Macy Vollbrecht*
- James A. Johnson Scholarship – *Jude Goossens*
- Gilman Scholars – *Issraa El-Khatib and Lulua Webo*
- 2020 Donald R. Zander Alumni Award for Outstanding Student Leadership – *Divya Alley, Meredith Song*
- 2020 President's Student Leadership and Service Award – *Divya Alley, Bridget Dillon, Ashley Fechner, Alex Finley, Benton Fry, Jude Goossens, Alex Rich, Meredith Song, Kassra Taghizadeh, Sangeitha Thayalan*
- University of Minnesota Scholarly Excellence in Equity and Diversity – *Issraa El-Khatib, Destiny Weaver, Xiangyi Xiong*

STUDENT SUPPORT [2019-20 academic year]

The College of Biological Sciences (CBS) Student Services team is made up of 18 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. As with all units, CBS Student Services quickly pivoted how it served students in mid-March 2020 due to the pandemic. Aside from COVID-19 response, a key theme of the year was understanding Generation Z and evolving services to meet their needs.

- CBS Student Services saw continued growth in student usage with a total of 3,328 student appointments and 1,014 drop-in appointments across academic advising, career development and learning abroad.
- Quickly and effectively converted student orientation programs to a remote format while maintaining a focus on community building, information sharing, and student preparedness for registration.
- With record-breaking student participation, the CBS Career Team held its third annual Life Sciences Graduate School fair, hosting 35 graduate programs from across the country.
- Redesigned CBS College Day to include an affinity space for new CBS Black, Indigenous, and students of color to build community, as well as sessions on academic success, wellness, and faculty research talks.

LEARNING ABROAD

Eighty-six students participated in learning abroad during the 2019-20 academic year. Of these, 22 students were abroad in spring 2020 and returned to the United States to complete courses remotely.

UNDERGRADUATE RESEARCH

Three-hundred-seventy-eight students participated in directed research/studies projects. They were mentored by 180 faculty members from across the University.

GRADUATE STUDENTS

ENROLLMENT

Two-hundred-eighty-six graduate students were enrolled in the College's six graduate programs in fall 2020.

	2016	2017	2018	2019	2020
Biochemistry, Molecular Biology and Biophysics	70	77	81	90	90
Ecology, Evolution and Behavior	61	60	69	61	63
Molecular, Cellular, Developmental Biology and Genetics	41	45	51	53	56
Genetic Counseling (M.S.)	16	16	20	20	21
Microbial Engineering (M.S.)	9	11	11	10	9
Plant and Microbial Biology	40	45	41	45	47

DEGREES AWARDED

	M.S. 2020	Ph.D. 2020
Biochemistry, Molecular Biology and Biophysics (Ph.D.)	2	11
Ecology, Evolution and Behavior (Ph.D.)	1	9
Molecular, Cellular, Developmental Biology and Genetics (Ph.D.)	0	4
Genetic Counseling (M.S.)	10	N/A
Microbial Engineering (M.S.)	3	N/A
Plant and Microbial Biology (Ph.D.)	0	4

EXTERNAL AND UNIVERSITY AWARDS

CBS graduate students received 60 fellowships, grants and awards, including several National Science Foundation Graduate Research Fellowships. **See the complete list of awards in the In Detail section of this report.**

THESES AND DISSERTATIONS

Graduate students produced 31 theses and dissertations in 2020. **See a complete list in the In Detail section of this report.**

PROGRAM REVIEW AND ACCREDITATION

The College of Biological Sciences is committed to ensuring operational excellence at all levels and periodically reviews each of its academic programs, centers and institutes by calling on experts outside of the University to advise us on each program's strengths and opportunities for improvement.

Program/Department	External Review Completed
BioTechnology Institute	2021
Genetics, Cell Biology and Development	2017
Itasca Biological Station and Laboratories	2016

FACULTY AND RESEARCH

FACULTY

Sixteen faculty members (two with primary appointments in the Medical School) were promoted and we welcomed three new faculty members in 2020.

FACULTY AWARDS AND RECOGNITION

In 2020, seven faculty received major professional, University or collegiate awards. [See the complete list of CBS faculty awards in the In Detail section of this report.](#)

PROMOTIONS, NEW HIRES AND RETIREMENTS

Promotions

- Yaniv Brandvain (PMB): Associate Professor with tenure
- Clay Carter (PMB): Full Professor
- Aaron Goldstrohm (BMBB-Med School): Full Professor
- Murray Jensen (BTL): Full Professor
- Peter Kennedy (PMB): Full Professor
- Jennifer Powers (EEB): Full Professor
- Yue Chen (BMBB): Associate Professor with tenure
- Mikael Elias (BMBB): Associate Professor with tenure
- Paloma Gonzalez-Bellido (EEB): Associate Professor with tenure
- Wendy Gordon (BMBB-Med School): Associate Professor with tenure
- William Harcombe (EEB): Associate Professor with tenure
- Forest Isbell (EEB): Associate Professor with tenure
- Suzanne McGaugh (EEB): Associate Professor with tenure
- Allison Shaw (EEB): Associate Professor with tenure
- Michael Smanski (BMBB): Associate Professor with tenure
- Heather Zierhut (GCD): Associate Professor with tenure

New hires

- Ian Macfarlane (GCD/Genetic Counseling)
- Katherine Furniss Smith (BTL)
- Meggan Craft (EEB)

RESEARCH

PUBLICATIONS

College of Biological Sciences faculty published nearly 450 studies and articles in 245 journals authored or co-authored by faculty with primary appointments in CBS, including the following high-impact journals:

- *Nature**: 24
- *Science*: 6
- *PNAS*: 8
- *Ecology Letters*: 6
- *Molecular Biology and Evolution*: 2
- *Genetics*: 3

*Including associated *Nature* journals

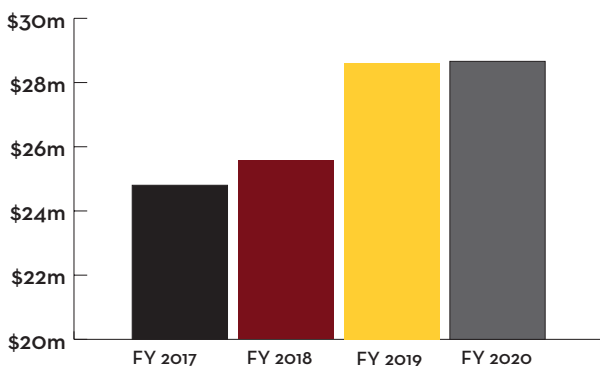
See the complete list of CBS faculty and staff publications.

ACTIVE GRANTS

The College had 339 active grant; 92 exceeding \$100,000 in expenditures. Major sources of funding included:

- \$ 28,658,230 (total sponsored research spend)
- \$ 12,225,433 NIH
- \$ 4,995,627 NSF
- \$ 2,921,482 Other federal agencies (DOE, DOD,DOI, etc.)
- \$ 1,417,274 LCCMR
- \$ 1,010,777 Other MN state agencies

Total annual expenditures from 2017-2021.



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. In 2020, the following interdisciplinary facilities and initiatives received over \$4.5M in annual CBS support:

- 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
- Biotechnology Resource Center
- Caenorhabditis Genetics Center
- Chlamydomonas Resource Center

In 2020, the College distributed more than \$100,000 to support interdisciplinary collaborations, events and symposia, including:

- Norwegian Centennial Chair Collaboration
- Emerge BioScience Program
- Moos Lecture Series
- Institute for Molecular Virology Symposium

RESEARCH AND LEARNING TECHNOLOGIES

- **Shifting to remote learning:** When the sudden move to remote instruction was announced in spring 2020, RLT refocused the entire team on supporting instructors. RLT provided Zoom workshops to over 100 instructors in three days, built new Canvas course content just before it was needed and assisted over 20 courses in developing online exams or exam alternatives. Throughout the summer and fall, RLT updated 25 courses to better fit remote instruction, managed a 1,500% increase in at-home lab kit orders and partnered with the Center for Online Biology Education to deliver a six-part digital teaching workshop series.
- **Supporting students:** Partnering with the CBS Instructional Labs, RLT provided emergency computing and connectivity equipment loans to any student taking a CBS course. To date, this has allowed over 25 students to continue to fully participate in classes.
- **Streamlining scholarship processes:** RLT rebuilt the process for accepting and reviewing scholarship applications. Data that previously took hours and hours to manually collect and organize is now automatically fetched from University data sources. The 2021 version will incorporate the review process and further reduce the time required to evaluate applications.

DIVERSITY, EQUITY AND INCLUSION

In the wake of George Floyd's death last spring, Dean Forbes assembled a collegiate anti-racism work group charged with identifying the current landscape of diversity, equity and inclusion work in CBS and developing recommendations for advancing anti-racist policies and programs at the collegiate level. An alumni anti-racism council was formed in parallel to the collegiate group to discuss how race-related issues within the College impact students and delivered its [recommendations](#) in December 2020.

In addition to the contributions of faculty, staff and students, the College continues to support ongoing diversity, equity and inclusion efforts including:

- **HHMI Inclusive Science Education Fellows:** More than 80 graduate students and postdocs have completed this program since it launched in 2017. The program trains participants in how to engage in critical conversations about diversity and inclusion, and implement inclusive teaching and mentoring practices.
- **HHMI Faculty Fellows for Inclusive Excellence:** Creating inclusive classroom and lab spaces is paramount to the success of all students. Since 2016, more than two dozen faculty have participated in this year-long program, designed to help faculty build their knowledge and skills related to diversity, equity and inclusion.
- **Gopher equity trainers:** In fall 2020, seven CBS faculty members and postdocs participated in training and will host, along with peer mentors, sessions for first-year students to discuss diversity, equity and inclusion issues. All first-year students at the U will participate in the program.
- **Student affinity groups:** CBS Student Services offers opportunities for students to connect with one another through affinity groups, including the Black Students, Indigenous Students, and Students of Color Affinity Group, the International Students Affinity Group and the LGBTQ+ Students Affinity Group
- **SciSpark Scholars:** Through collaborative partnerships with local school partners, SciSpark Scholars connects University of Minnesota scientists with K-12 students throughout the Twin Cities to build sustained relationships. Focusing on long-term mentoring, classroom programs and teacher professional development, SciSpark Scholars provides a supported pathway into STEM careers for underrepresented students. In 2021, the College will pilot the first round of SciSpark Scholars summer interns, which will bring high school students from the St. Paul Public Schools into CBS research labs for a 10-week experience that engages students in authentic scientific research.
- **SEISMIC Collaboration:** The Sloan Equity and Inclusion in STEM Introductory Courses (SEISMIC) Collaboration is designed to tackle inequity and non-inclusion in STEM education by improving introductory STEM courses. Sehoya Cotner, associate professor in the Department of Biology Teaching and Learning, represents the University of Minnesota in the collaboration, which consists of 10 public education research institutions in the United States.
- **Culturally Responsive Undergraduate Science Education:** In fall 2020, a group of faculty members and teaching assistants (TAs) worked together to identify practices and set goals that support anti-racist approaches to teaching. Culturally Responsive Undergraduate Science Education (CRUSE) builds on a TA training program the College launched in 2017, but focuses specifically on tackling racism.

OUTREACH AND ENGAGEMENT

In the midst of the COVID-19 pandemic, the College remained committed to our mission of public engagement. Across the board, CBS pivoted programming to meet the demands of the socially distanced world while maintaining many of the core aspects of our signature programs.

OUTREACH

- **Market Science:** With access to community partners limited and in-person programming impossible due to the pandemic, Market Science focused on its digital presence. With the help of dedicated graduate students and a staff working board, the program developed a series of profiles of scientists that were posted to the program's social media channels and website. These profiles generated thousands of digital engagements throughout the season. In 2020, Market Science also established a new partnership with the Hennepin County Libraries that will allow the program to explore new avenues for content delivery once we can return to in-person programming.
- **Cedar Creek Ecosystem Science Reserve:** Cedar Creek started off the year with the normal array of field trips, in-school programs and adult learning opportunities (including a Master Naturalist certification course in January). With the pandemic, activity moved online in the form of synchronous and asynchronous online lessons, virtual tours, curated datasets, educational videos and interactive resources about Cedar Creek's research. Public programming shifted online as well, with the monthly Lunch With a Scientist lecture series and ecology book club transitioning seamlessly into live Zoom programs. Volunteers continued to assist with citizen science efforts online via the Eyes on the Wild trail camera project and in a limited capacity with woodpeckers, phenology and wildlife tracking on site. New artists in residence began projects, and staff took advantage of the relative quiet on site to break ground on a brand-new public trail!
- **Itasca Biological Station and Laboratories:** Itasca saw several new engagement programs and some old favorites run, despite the pandemic. The station continues working with students and teachers in the White Earth area as part of the White Earth & Itasca (WE & I) program. This year's projects focused on bluebird parasitology, statistical programming and career development, and for the first time the program was linked with another Itasca Station art-science program – Big River Continuum – through a community cohort led by Becca Dallinger working at Itasca. The Big River project involves indigenous women, water and the process of inquiry shared in science and art.
- **InSciEd Out:** The past year presented unique challenges for classroom engagement programming as teachers and school districts scrambled to adapt to changes in instruction and the uncertainty of school closures and distance learning. Through it all, the InSciEd Out program was able to provide classroom support for over 1,000 students in the Twin Cities area. We shifted programming to a digital platform where undergraduate students were able to connect with classrooms on a recurring basis. Undergraduates sent out a 2-3 minute videos introducing themselves to the teacher and students of their partner classroom. Once the initial videos were sent out to teachers, they were posted in the daily lessons and students watched them from home. Undergraduates then followed up with a video demonstration of some scientific phenomena (for example, the impact of diet on pollinator development), which allowed students to follow along. Students were also encouraged to ask their scientist questions through an interactive discussion board.
- **CBS Conservatory & Botanical Collection:** The CBS Conservatory was gearing up for a grand opening at the beginning of 2020 and held a successful preview party fundraiser for 145 guests before the pandemic

shut down in-person activities. In addition, the Conservatory welcomed 245 public visitors and one K-12 tour group, and was able to reach more than 5,000 people through the Como Orchid Show and eight talks given for various garden clubs or retail stores about the new Conservatory. During the pandemic a segment about the Conservatory aired on Grow with Kare 11 and the Conservatory was also featured in *Northern Gardener* magazine. The Conservatory hosted six virtual engagements and was able to provide virtual tours for 185 visitors in this new format. An artist was chosen to create a piece of public art that would signal the entrance of the Conservatory and a new artist in residence began to work with the collections.

- **Science Communication Lab:** Despite the challenges presented by COVID-19, the Science Communication Lab achieved several important goals related to science communication training, K-12 engagement and strategic partnerships. Here are some of the highlights.:
 - The Lab offered BIOL 5701: *Surveying the Field: Science Communication and Public Engagement* in spring 2020. The course is being offered again in spring 2021 as a two-credit graduate seminar (*Science Communication: A Primer for Biologists*)
 - Graduate students and postdocs were invited to participate in the Bioline Bootcamp in fall 2020. BioLine is a research-focused blog that launched this fall, which provides CBS researchers with opportunities to hone their science communication skills. The four-part workshop series was designed to support writers interested in contributing to the blog.
 - The lab began a partnership with the Louis Stokes North Star STEM Alliance and the CBS Dean's Scholars program to create science communication workshops for undergraduates. Lab interns will help develop and deliver these workshops in spring 2021.
 - Lab members developed and delivered three science communication workshops (data visualization, storytelling and design principles) for high school seniors at the School for Environmental Studies (SES). Students were also offered coaching through the science communication coaching lab. Preliminary reporting from SES indicates that approximately 110 students attended the 45-minute workshops; 16 students watched the recording of an additional workshop they weren't able to attend in person; 21 students participated in a small-group coaching session.
 - After focusing on developing new writers in 2019, we expanded participation in the lab by onboarding four new designers and several graduate students/postdocs. The teams worked collaboratively on animated explainers, story maps, training materials and curriculum development. Leveraging funding from broader impact dollars, internal partnerships and small grants, we were able to enrich the lab experience by creating teams that spanned disciplines and career levels.
 - The SciComm Lab worked with the Tiffin Lab to develop the Symbiosis-in-Schools urban evolution and ecology curriculum. In 2020, we held focus groups with area high school science teachers, drafted the curriculum and conducted a small pilot.

PUBLIC EVENTS

The College continued to offer opportunities for the public to engage with research through its signature Petri Dish series as well as the Probable Meets Possible series organized in collaboration with the Bell Museum. The move online made it possible to expand the geographic reach of these events and engage alumni and others located outside the Twin Cities. Topics for spring and fall 2020 Petri Dish included aging and cannabis. Probable Meets Possible topics included water, microbes, origins of life and environmental technologies. Events attracted between 80-120 attendees.

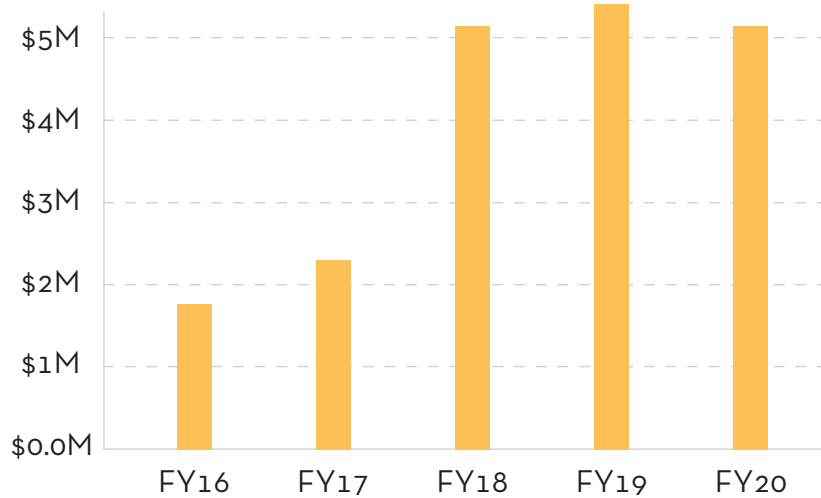
ADVANCEMENT

DEVELOPMENT

At the end of FY20, the Campaign for the College of Biological Sciences was at 120% of its \$21 million goal. Here is a breakdown of gifts:

- \$5.1M raised from private donors
- 728 donors gave gifts that included:
 - 1 gift of \$1M or more
 - 3 gifts of \$250K-\$999K
 - 2 gifts between \$100K-\$249K
 - 5 gifts between \$50K-\$99K
 - 19 gifts of \$10K-\$49K
 - 61 gifts of \$1K-9.9K
 - 53 gifts of \$500-\$999
 - 317 gifts of \$100-\$499
 - 267 gifts of <\$100

GIVING HISTORY



SCHOLARSHIPS AND FELLOWSHIPS

In 2020, the College committed more than \$625,000 in scholarships and fellowships, awarding 110 scholarships, including 36 four-year freshman awards and 30 graduate fellowships. For the 2020-21 academic year, 123 students have four-year scholarships.

PANDEMIC-RELATED STUDENT SUPPORT

The pandemic upended many students' lives and forced them to confront job loss and unstable family finances. Through the CBS Student Emergency Fund, and several other University funds, we were able to provide emergency grants to 35 CBS students who received an average of \$500-\$800 for expenses such as rent, food, gas, internet service, utilities and medical expenses.

ALUMNI RELATIONS

Here's a snapshot of the CBS alumni community in 2020:

- Total alumni: 18,691
- Alumni with B.S. degrees: 14,814
- Alumni with M.S. or Ph.D. degrees: 4,344
- Alumni living in Minnesota: 10,517
- Alumni engaged in FY20*: 62%

* Through all means, including publications, events, etc.

In 2020, the College continued to engage alumni online in a variety of ways, including public programs such as the Petri Dish and Probable Meets Possible. In addition, we launched two new initiatives outlined below:

- **Alumni Mentor Network:** While the pandemic prevented most in-person events, around a dozen alumni who volunteered for the Alumni Mentor Network did participate online in a new series. The Alumni Insight Career Exploration Series was offered for the first time in fall 2020 and featured careers in health-care, industry and fields at the intersection of science and society.
- **Alumni Anti-Racism Council:** As part of a larger effort to identify and address systemic racism and bolster inclusion, the College created the CBS Alumni Anti-Racism Council. The group, made up of recent BIPOC alumni, met over the course of the fall semester and delivered their recommendations in December 2020.

COMMUNICATIONS/MARKETING

CBS faculty and the College received 70+ media mentions, including in national, local and University publications. Stories touching on CBS research and areas of expertise appeared in *The New York Times*, BBC News, *National Geographic* and *Smithsonian* among other high-profile news outlets and publications.

- "Yes, this cuttlefish is wearing 3-D glasses" *The New York Times*
- "Cuttlefish: 3D glasses used to find out how they see" BBC News
- "Grow with Kare: The U of M's new conservatory" KARE 11
- "The Great Lakes depend on ice. This winter, they barely froze." *National Geographic*
- "New Guinea has greatest plant diversity of any island in the world" *The Guardian*
- "U of M to fund more CWD research in Minnesota's deer herds" Minnesota Public Radio

FINANCIALS

FY20 OPERATING BUDGET

The College's FY20 operating budget included \$ 99,783,466 in expenditures.

Largest sources of revenue:

- \$29,848,073 tuition and fees
- \$24,826,854 state appropriation
- \$28,658,230 external faculty grants and contracts
- \$3,121,894 private gifts and endowment income

IN DETAIL

FACULTY AWARDS AND RECOGNITION

- **Blue Planet Prize** – Dave Tilman, Professor, *Ecology, Evolution and Behavior*
- **American Association for the Advancement of Science Fellow** – Elizabeth Borer, Professor, *Ecology, Evolution and Behavior*
- **American Association for the Advancement of Science Fellow** – Jessica Hellmann, Professor, *Ecology, Evolution and Behavior*
- **American Association for the Advancement of Science Fellow** – Nathan Springer, Professor, *Plant and Microbial Biology*
- **Ecological Society of America Fellow** – Jennifer Powers, Professor, *Ecology, Evolution and Behavior*
- **Presidential Award of the Crop Science Society of America** – Dan Voytas, Professor, *Genetics, Cell Biology and Development*
- **Morse-Alumni Distinguished Teaching Award** – Deena Wassenberg, Associate Professor, *Biology Teaching and Learning*

GRADUATE STUDENT AWARDS AND RECOGNITION

External Awards

- 3M Science and Technology Doctoral Fellowship – James Payla (EEB)
- Foundation for Food and Agriculture “Future Leaders for Food and Agriculture” Fellowship – Kelsey Peterson (PMB)
- Hopsteiner Doctoral Fellowship – Joshua Havill (PMB)
- Lewis & Clark Fieldwork Grant, American Philosophical Society – Zacky Ezedin (PMB)
- National Science Foundation Graduate Research Fellowship – Taryn Mueller (EEB)
- National Science Foundation Graduate Research Fellowship – Dyonishia Nieves (EEB)
- National Science Foundation Graduate Research Fellowship – James Payla (EEB)
- National Science Foundation Graduate Research Fellowship Honorable Mention – Charlotte Devitz (EEB)
- Torrey Botanical Society Graduate Student Research Fellowship – Zacky Ezedin (PMB)

University Awards

- Alexander & Lydia Anderson Grant – Rafael Della Coletta (PMB)
- Bell Museum Dayton Fellowship – Anya Auerbach (EEB)
- Bell Museum Simons Fellowship – Sam Weaver (EEB)
- Bell Museum Natural History Award – Zacky Ezedin (PMB)
- Doctoral Dissertation Fellowship – Evan Ellison (PMB)
- Doctoral Dissertation Fellowship – Jaclyn Noshay (PMB)
- Doctoral Dissertation Fellowship – Craig See (EEB)
- Doctoral Dissertation Fellowship – German Vargas Gutierrez (PMB)
- Doctoral Dissertation Fellowship – Pu Wang (EEB)
- Interdisciplinary Center for the Study of Global Change Fellowship – Mariana Cardenas (EEB)
- Interdisciplinary Doctoral Fellowship – Sean Keogh (EEB)

- Itasca Director's Research Fellowship – Hailey Sauer (PMB)
- MnDRIVE Fellowship – Rafael Della Coletta (PMB)
- Philip C. Hamm Memorial Graduate Scholarship – Melissa Pastore (EEB)
- Philip C. Hamm Memorial Graduate Scholarship – Shan Kothari (PMB)
- Torske-Klubben Fellowship – Rachel Pain (EEB)
- UMN Carolyn Crosby Grant – Cedric Ndinga Muniania (PMB)
- UMN Diversity of Views and Experiences Fellowship – Teresa Mccarrell (PMB)
- UMN Graduate School International Thesis Research Travel Grant – Zacky Ezedin (PMB)
- UMN Graduate School International Thesis Research Travel Grant – Ariadna Mondragon Botero (PMB)
- UMN Graduate School International Thesis Research Travel Grant – Laura Toro (PMB)

College of Biological Sciences Fellowships

Biochemistry, Molecular Biology and Biophysics

- Thomas Reid Award – Thomas Smiley
- Thomas Reid Award – Louise Pitcher
- Thomas Reid Award – Jolene Duda
- Thomas Reid Award – Alina Zdechlik
- Armstrong-Pothapragada Fellowship – Rebecca Goldblum
- Armstrong-Pothapragada Fellowship – Adam Sycla
- Armstrong-Pothapragada Fellowship – Naomi Widstrom
- Victor Bloomfield and Elsa Shapiro Fellowship – Jason Jones
- Victor Bloomfield and Elsa Shapiro Fellowship – Maria Lopez Ramirez
- Victor Bloomfield and Elsa Shapiro Fellowship – Lie Phung
- Victor Bloomfield and Elsa Shapiro Fellowship – Caitlin Walker
- Cargill Fellowship – Yimao Huang
- Ross and Esther Johnson Fellowship – Erynn Johnson
- Jones Fellowship – Cassidy Tompkins
- Huber Warner Fellowship – Cody Fisher
- Boyer-Peter Award – Tim Heden
- Ross A. Gortner Fellowship – Eric Aird

Ecology, Evolution and Behavior

- Darby & Geri Nelson Environmental Scholar Award – Craig See
- Donald and Elizabeth Lawrence Research Scholarship – Lang Delancey
- David Tilman Research Award – Tyler Seidel
- Florence Rothman Research Fellowship – Sean Keogh
- Elmer C. Birney Fellowship – Taz Mueller
- Ray C. Anderson Fellowship – Amy Waananen
- Carol H. and Wayne A. Pletcher Graduate Fellowship – Megan Wilcots
- Carol H. and Wayne A. Pletcher Graduate Fellowship – Jessica Burkhart
- Carol H. and Wayne A. Pletcher Graduate Fellowship – Lata Kalra

Itasca Biological Station and Laboratories

- Itasca Graduate Research Fellowship – Hailey Sauer

Plant and Microbial Biology

- Phinney Fellowship – Jaclyn Noshay
- Phinney Fellowship – Evan Ellison
- Carol H. and Wayne A. Pletcher Graduate Fellowship – Shanta Hejmadi

THESES AND DISSERTATIONS

BIOCHEMISTRY, MOLECULAR BIOLOGY AND BIOPHYSICS – Ph.D.

- Eric Aird (advisor: Wendy Gordon) – *Novel precise genome editing technologies*
- Elizabeth Fay (advisor: Ryan Langlois) – *Innate immune control of virus replication and transmission*
- Szu Hsu (advisor: Michael Smanski) – *Rational engineering of microbial biosynthesis for therapeutic compound production*
- Adak Karamafrooz (advisor: David Thomas) – *Cyclic AMP dependent Protein Kinase A (PKA) mutant associated with Fibrolamellar Hepatocellular carcinoma: Structure, dynamics and in cell studies*
- Wendy Leung (advisor: Anja Bielinsky) – *DNA replication and telomere maintenance require PCNA-K164 ubiquitination*
- Megan McCarthy (advisor: David Thomas) – *Fluorescence based approaches to study CAM-RYR structural interaction*
- Fredarla Miller (advisor: Michael Freeman) – *Borosins: The biosynthesis of ribosomal-N-methylated peptide natural products*
- D’anna Nelson (advisor: James Ervasti) – *Skeletal muscle microtubule organization and stability is regulated by the dystrophin-glycoprotein complex and cortical actin*
- Lev Ostrer (advisor: Arkady Khodursky) – *Identification and characterization of pleiotropic high-persistence mutations in the beta subunit of the bacterial RNA polymerase*
- Lien Phung (advisor: David Thomas) – *Insights on muscle myosin relaxation states and actin-based drug discovery*
- Susanna Stroik (advisor: Eric Hendrickson) – *The impact of nucleases on telomere maintenance and ultrafine bridge resolution*

ECOLOGY, EVOLUTION AND BEHAVIOR – Ph.D.

- Noah Gettle (advisor: Michael Travisano) – *Causes and consequences of evolutionary innovation: An experimental approach to evaluating assumptions and predictions in macroevolutionary theory*
- Alexander Harkness (advisors: Yaniv Brandvain and Emma Goldberg) – *Theoretical evolutionary genetics of plant mating systems and self-incompatibility*
- Tyler Imfeld (advisor: Keith Barker) – *Testing predictions of adaptive radiation in the passerine avifauna of the Americas*
- Siddharth Iyengar (advisors: Elizabeth Borer and Eric Seabloom) – *Sensitivity of grasslands to rainfall variation: The role of resource colimitation*
- Kaitlin Kimmel (advisors: Forest Isbell and David Tilman) – *Impacts of drivers of global change on community structure and ecosystem functioning*
- Rachel King (advisors: Peter Reich and Sarah Hobbie) – *Evaluating relationships between plant traits and nitrogen use to help predict species’ responses to climate change*

- Mayank Kohli (advisors: Elizabeth Borer and Eric Seabloom) – *Herbivores and pathogens mediate grassland responses to global changes*
- Melissa Pastore (advisors: Sarah Hobbie and Peter Reich) – *Impacts of global changes on leaf-level physiology of plant functional groups and ecosystem carbon storage*
- Maria Portales Reyes (advisor: Forest Isbell) – *Recovery of grassland plant communities after cessation of nutrient enrichment*

MICROBIAL ENGINEERING – M.S.

- Aaron Pauleon (advisors: Sebastian Behrens and Satoshi Ishii) – *Metagenomic survey of denitrifying woodchip bioreactors: Carbon and nitrogen cycling under varying temperature and flow regimes*
- Kevin Ramrattan (advisor: Sebastian Behrens) – *Electrochemical stimulation of denitrification in woodchip bioreactors and wetlands*
- Abigail Sarne (advisor: Kathryn Fixen) – *Uncovering an alternative electron transfer pathway to nitrogenase*

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

- Ashley Arthur (advisors: Margaret Titus and Melissa Gardner) – *MyTH4-FERM myosin-based filopodia initiation*
- Paul Atkins (advisor: Daniel Voytas) – *Quantification and mechanistic analysis of plant genome editing outcomes using nanopore sequencing*
- Ryan Nasti (advisor: Daniel Voytas) – *Developing methods to overcome the bottlenecks in plant gene editing*
- David Owen (advisor: Michael Farrar) – *Development of regulatory T cells capable of maintaining immune homeostasis*

PLANT AND MICROBIAL BIOLOGY – Ph.D.

- Shan Kothari (advisor: Jeannine Cavender-Bares) – *Blinded by the light: The functional ecology of plant-light interactions*
- Sean O'Mara (advisor: H. Corby Kistler) – *Trichothecene transport in the phytopathogen *Fusarium graminearum* and trichothecene production in the entomopathogen *Beauveria bassiana**
- Anthony Schmitt (advisor: Clay Carter) – *Insights into the hormonal regulation of nectar production and the antimicrobial characteristics of nectar proteins*
- Jason Thomas (advisor: Clay Carter) – *Understanding and engineering the molecular regulation of nectar production in field pennycress (*Thlaspi arvense*)*