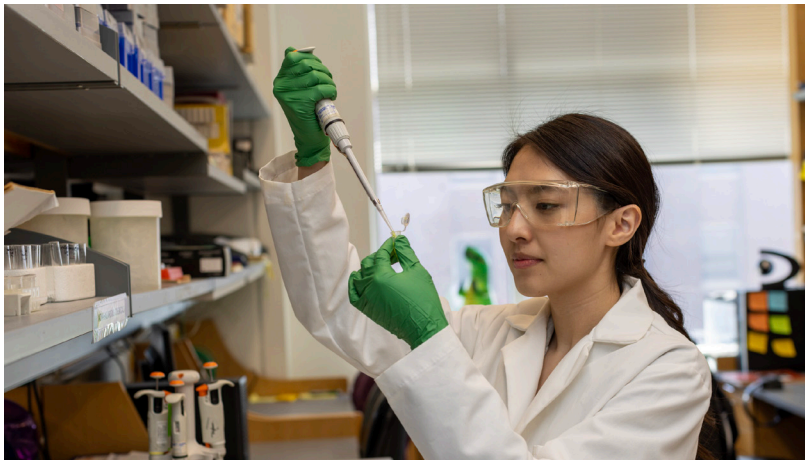
2023

COLLEGE OF BIOLOGICAL SCIENCES

ANNUAL REPORT



COLLEGE OF BIOLOGICAL SCIENCES

UNIVERSITY OF MINNESOTA

A NOTE FROM THE DEAN

This fall was my first at the College of Biological Sciences. Since arriving on campus last August, I have been a student of this college, learning as much as I possibly can about the place and the people. I've met hundreds of students, faculty, staff, alumni and supporters. I've toured our buildings, facilities and field stations. I've participated in numerous collegiate events. The level of commitment and drive I observed was truly impressive.

This document cannot capture the fine detail of all the ways we deliver on our mission every day. It does provide a snapshot of the scope of our activities and a sense of our priorities. It also offers strong evidence of our commitment to our students and to create a vibrant community that supports excellence in all its forms. To give just a few examples, in 2023 we celebrated 20 years of Nature of Life, our one-of-a-kind program for incoming students, continued to grow the Dean's Research Program and introduced a biotechnology minor.

There are some exciting developments on the horizon, as well. We will welcome new leadership in several departments, expand opportunities for recognition across the College and prepare to celebrate 60 years of CBS in 2025. The list goes on!

Thank you to every member of the CBS community for an excellent year. I look forward to even better things to come in 2024.

Saara J. DeWalt

Saara J. DeWalt

Dean, College of Biological Sciences
University of Minnesota

INSIDE

2023 HIGHLIGHTS

MARKING A NATURE OF LIFE MILESTONE

The one-of-a-kind program for incoming students, which begins with an immersive experience at Itasca Biological Station and Laboratories, marked its 20th year. Launched two decades ago, it continues to serve as a touchpoint for students and alumni.

INCREASING OPPORTUNITIES FOR UNDERGRADS

The College continued to expand research opportunities for undergraduates through the Dean's Research Program. By fall 2023, the College placed more than 300 students in paid positions with research groups working on a wide range of questions. The College also launched its biotechnology minor, which is designed to prepare students for careers in industry.

CELEBRATING FACULTY AND STAFF EXCELLENCE

In 2023, 12 faculty and staff received major professional, University or College awards including the Regents Professorship, the highest honor the University bestows on its faculty. Faculty continued to attract high levels of research funding at near record levels.

EXPANDING ACCESS TO ECOLOGICAL INSIGHTS

Cedar Creek Ecosystem Science Reserve kicked off construction on an Whitney and Elizabeth MacMillan Environmental Learning Center addition to the Lindeman Research and Discovery Center, which will support growth of K-12 programs. Cedar Creek's new Richard and Judi Huempfner Minnesota Ecology Walk opened to the public, offering visitors a new way to explore the three ecosystems that converge at Cedar Creek.

ADVANCING DIVERSITY, EQUITY AND INCLUSION

The College continues to build on the success of the CBS DEIJ microgrant program awarding nearly $75,000 to 17 projects. The 2023 CBS Inclusive Excellence Fellows program cohort of four faculty and staff developed their understanding of inclusive teaching practices and completed research projects on a range of topics from identifying early interventions for struggling students to making group work more equitable and inclusive.

CBS SNAPSHOT

BY THE NUMBERS

- 2,264 undergraduates
- 274 graduate students
- 258 staff members
- 67 postdoctoral researchers*
- 153 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

ACADEMIC PROGRAMS

- 8 undergraduate majors
- 14 undergraduate minors
- 6 graduate programs

FIELD STATIONS AND CONSERVATORY

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

SIGNATURE PROGRAMS

- Nature of Life
- Foundations of Biology
- Dean's Research Program
- Dean's Scholars
- Inclusive Excellence Fellows Program
- Petri Dish Science Conversation Series

INSTITUTES AND PROGRAMS

- BioTechnology Institute
- MnDRIVE Environment

* including faculty and staff in shared departments with Medical School appointments
** departments shared with the Medical School

UNDERGRADUATE STUDENTS

The College continued to attract some of the top students at the University of Minnesota. Here's an overview of CBS undergraduates, including the incoming 2023 class.

2,264
total number of undergraduates enrolled (Fall 2023)

- 1,231 from Minnesota (54.4%)
- 801 students of color (35.4%)
- 94 international students (4.2%)
- 598 first-year (NHS Fall 2023)
- 38 transfer students (NAS Fall 2023)

FIRST-YEAR STUDENTS [NHS, Fall 2023]

598 students enrolled

- 411 from Minnesota (68.7% of total)
  - 311 from Twin Cities Metro (52% of total)
  - 100 from Greater Minnesota (16.7% of total)
- 431 female (72.1%)
- 166 male (27.8%)
- 128 first-generation college students (21.4%)
- 25 international students (4.2%)
- 221 domestic students of color (37%)
- 90.4% average high school rank

TRANSFER STUDENTS [NAS, Fall 2023]

38 students enrolled

- 35 from Minnesota (92.1%)
- 25 female (65.8%)
- 12 male (31.6%)
- 11 first-generation college students (28.9%)
- 1 international student (2.6%)
- 16 domestic students of color (42.1%)

Class of 2027
AT A GLANCE

37%	52%	68%	90%
students of color	from the Twin Cities metro	from Minnesota	average high school rank

RETENTION AND GRADUATION RATES

First-year retention rates: 92.7% (UMTC avg. 88.7%)
Four-year graduation rates: 81.6% (UMTC avg. 67.2%)
Six-year graduation rates: 89.3% (UMTC avg. 80.8%)
Four-year graduation rates for Pell-eligible students: 73.1% (UMTC avg. 68.4%)
Six-year graduation rates for Pell-eligible students: 83.7% (UMTC avg. 77.2%)
Four-year graduation rates for domestic students of color: 86% (UMTC avg. 64%)
Six-year graduation rates for domestic students of color: 88% (UMTC avg. 73.4%)

14%

Amount by which the College's four-year graduation rate exceeds the University average

UNDERGRADUATE MAJORS

	Fall 2019	Fall 2020	Fall 2021	Fall 2022	Fall 2023
Biochemistry	406	389	411	400	429
Biology	851	849	948	962	919
Cellular and Organismal Physiology	46	87	99	85	81
Ecology, Evolution and Behavior	87	75	76	81	74
Genetics, Cell Biology and Development	245	244	235	230	208
Microbiology	118	101	89	78	82
Neuroscience	381	398	382	386	373
Plant and Microbial Biology	31	30	27	24	26
Total	**2,165**	**2,173**	**2,267**	**2,246**	**2,192**

DEGREES AWARDED

	2018-19	2019-20	2020-21	2021-22	2022-23
Biochemistry	92	87	85	79	80
Biology	176	188	173	158	181
Cellular and Organismal Physiology		2	15	23	37
Ecology, Evolution and Behavior	32	31	26	24	29
Genetics, Cell Biology and Development	70	74	71	76	72
Microbiology	38	32	27	32	18
Neuroscience	87	83	104	113	88
Plant and Microbial Biology	5	13	7	12	8
Total	**500**	**510**	**508**	**517**	**513**

STUDENT SUPPORT [2022-23 academic year]

Twenty professional staff members make up the CBS Student Services team, each contributing to the shared responsibility of advancing the College's mission and vision. Staff serve students in three functional areas: academic advising, career coaching and student engagement.

CBS Student Services saw continued growth in student usage with a total of 4,246 student appointments and 1,016 drop-in appointments across academic advising, career development and learning abroad.

UNDERGRADUATE RESEARCH

In addition to course-based research, more CBS undergraduate students gained research experience working with research groups across campus, through the U's Undergraduate Research Opportunities Program and through the College's Dean's Research Program.

Directed Research and Undergraduate Research Opportunities Program

CBS undergraduates worked with faculty and research groups in the College and beyond to design and carry out projects on a wide range of topics.

128 CBS student participated in directed research or studies projects
56 CBS students completed projects through the U's Undergraduate Research Opportunities Program (UROP)

Dean's Research Program

The Dean's Research Program gives CBS students the opportunity to earn and learn by matching them with a University research lab. Students are paid $15 an hour for up to 20 hours a week.

82 CBS students participated in the Dean's Research Program throughout 2023

LEARNING ABROAD

As learning abroad participation continues to rebound following the disruptions caused by the pandemic, 100 CBS undergraduate students participated in abroad activities during 2022-23. The majority of students (55) enrolled in programs of a semester or more in length, with students taking coursework, conducting research or engaging in internships. Students expanded their cross-cultural skills across the globe, including Australia, Ecuador, India, Scandinavia, Spain and South Korea.

FIELD BIOLOGY COURSES

Itasca Biological Station hosted seven field courses with 91 undergraduate and graduate students enrolled.

GRADUATE STUDENTS

ENROLLMENT

	2019	2020	2021	2022	2023
Biochemistry, Molecular Biology and Biophysics	90	90	88	90	81
Ecology, Evolution and Behavior	61	63	67	64	55
Molecular, Cellular, Developmental Biology and Genetics	53	56	54	63	68
Plant and Microbial Biology	45	47	47	48	43
Genetic Counseling (M.S.)	20	21	22	23	23
Microbial Engineering (M.S.)	10	9	9	9	9
Total	**279**	**286**	**287**	**297**	**279**

DEGREES AWARDED

	M.S.	Ph.D.
Biochemistry, Molecular Biology and Biophysics	1	20
Ecology, Evolution and Behavior	3	13
Molecular, Cellular, Developmental Biology and Genetics	0	6
Plant and Microbial Biology	1	10
Genetic Counseling	9	n/a
Microbial Engineering	2	n/a
Total	**16**	**49**

n/a – not applicable

EXTERNAL AND UNIVERSITY AWARDS

CBS graduate students received numerous fellowships, grants and awards, including the National Science Foundation Graduate Research Fellowship, University of Minnesota Doctoral Dissertation Fellowship, Integrative Biology and Physiology Inclusive Excellence Fellowship, 3M Fellowship, Agriculture and Food Research Initiative Predoctoral Fellowship, President's Student Leadership and Service Award, and the McElroy Trust Fellowship.

See the complete list of external, University and collegiate awards in the "In Detail" section at the end of this report.

THESES AND DISSERTATIONS

Graduate students produced 60 theses and dissertations in 2023.

See the complete list of theses and dissertations in the "In Detail" section at the end of this report.

FACULTY AND STAFF

CBS is home to field-shaping faculty widely recognized for their contributions to the sciences including five current National Academy of Sciences fellows.

FACULTY PROMOTIONS, HIRES AND RETIREMENTS

Promotions

- Duncan Clarke,* promoted to full professor (Genetics, Cell Biology and Development)
- Michael Freeman, promoted to associate professor with tenure (Biochemistry, Molecular Biology and Biophysics)
- Yasuhiko Kawakami,* promoted to full professor (Genetics, Cell Biology and Development)
- Sarah Malmquist, promoted to teaching associate professor (Biology Teaching and Learning)
- Laurie Parker, promoted to full professor (Biochemistry, Molecular Biology and Biophysics)
- Daniel Schmidt, promoted to associate professor with tenure (Genetics, Cell Biology and Development)
- Emilie Snell-Rood, promoted to full professor (Ecology, Evolution and Behavior)
- Ya Yang, promoted to associate professor with tenure (Plant and Microbial Biology)
- Deena Wassenberg, promoted to teaching full professor (Biology Teaching and Learning)

New hires

- Sarah Eddy, associate professor (Biology Teaching and Learning)
- Emily Flynn, teaching assistant professor (Genetics, Cell Biology and Development)
- Lexy von Deizmann, assistant professor (Genetics, Cell Biology and Development)
- Adam Isabella,* assistant professor (Genetics, Cell Biology and Development)
- Ivan Radin, assistant professor (Plant and Microbial Biology)
- Pu Wang, teaching assistant professor (Genetics, Cell Biology and Development)

Retirements

- Georgiana May (Ecology, Evolution and Behavior)
- Neil Olszewski (Plant and Microbial Biology)

PRESIDENT'S POSTDOCTORAL FELLOWS HIRES

- Stephanie Santarriaga (Genetics, Cell Biology and Development)
- Chris Smith (Plant and Microbial Biology)

* Faculty in shared department with primary appointment in the Medical School

FACULTY AND STAFF SERVICE

Numerous CBS faculty and staff served on University-wide and collegiate committees. Members of those committees are highlighted below.

UNIVERSITY

2023-24 University Faculty Senate

- Mark Bee, James Cotner, Sharon Jansa, David Moeller, Anna Mosser, Jeffery Simon, Emilie Snell-Rood

2023-24 P&A Senate

- Kalli-Ann Binkowski, Sandy Mand, Colleen Satyshur

CBS Writing-Enriched Curriculum Liaisons

- Deanna Koepp, Max Kramer, Yaniv Brandvain

Accessibility Ambassador

- Kalli-Ann Binkowski

COLLEGE

Awards & Recognition Committee

Kyle Costa, Bob Evans, Laura Gammill, Kay Glasgow, Christina Kramer, David Matthes, Min Ni, Caitlin Potter, Jocelyn Richard, Alex Sobeck, Martin Wessendorf

Educational Policy Committee

Remola Awadallah, Keith Barker, Clay Carter, Anath Das, Mikael Elias, Gavin Fuchs, Tess Hallman, Lorene Lanier, Sarah Malmquist, Sandy Mand, David Matthes, Elizabeth Kalinowski Ohrt, Laurie Parker, Lily Pope, Tamar Resnick, Leslie Schiff, Nikki Letawsky Shultz

Consultative Committee

Tony Dean, Sara Eliason, Aaron Goldstrohm, Stephanie Grieb, Becky Hippert, Lance Janssen, Pavana Khan, Campbell Krusemark, Amanda Menon, Jeff Simon, Parker Smith, Dan Voytas, John Ward, Charlie Willis

Promotion and Tenure Committee

Bill Gray, Perry Hackett, Romas Kazlauska, Murray Jensen, Craig Packer

Scholarship Committee

Alfonso Araque, Daniel Bond, Antony Dean, Catherine Kirkpatrick, York Maharens, Tom Niehaus, Vaiva Vezys, Carrie Wilmot

Teaching Assistant Awards Committee

Ashley Breiland, Anath Das, Laura Gammill, Fumiaki Katagiri, Molly Kuhs, Vanessa Pompei

FACULTY AND STAFF AWARDS AND RECOGNITION

In 2023, more than a dozen faculty and staff received major professional, University or collegiate awards.

External awards and distinctions

- BBVA Frontiers of Knowledge Award – Marlene Zuk (EEB)

University awards and distinctions

- 2023 Award for Global Engagement – Jennifer Powers (EEB)
- Faculty Award for Excellence in Postdoctoral Advising – Jeffrey Gralnick (PMB) and Suzanne McGaugh (EEB)
- President's Award for Outstanding Service – LeeAnn Higgins (BMBB)
- University of Minnesota Distinguished McKnight University Professorship – Jessica Hellmann (EEB)
- University of Minnesota McKnight Presidential Fellow – Ya Yang (PMB)
- University of Minnesota Regents Professor – Sarah Hobbie (EEB)
- Vickie R. Courtney Award for Outstanding Service to University Senate Governance – Adam Sychla (BMBB)

Collegiate awards and distinctions

- John S. Anderson Leadership Award – Peter Tiffin (PMB)
- Stanley Dagley-Samuel Kirkwood Education Award – Brian Gibbens (BTL)
- John & Abigail Wardle Chairs in Microbial Ecology – Elizabeth Borer (EEB) and Peter Kennedy (PMB)

Hobbie receives University's highest faculty honor

Dr. Sarah Hobbie was recognized for her leadership and the impact she's had as a researcher and educator with the University's highest honor, the Regents Professorship. Her research addresses the influence of human activities on terrestrial ecosystems, from rising carbon dioxide and nitrogen deposition, to changing climate and urbanization. Dr. Hobbie is also an exceptional educator, advisor and mentor who designed and taught courses including a writing-intensive course in ecosystem ecology. She has mentored numerous postdocs, graduate students and undergraduates.

Higgins recognized for outstanding service

Dr. LeeAnn Higgins received the University's President's Award for Outstanding Service for her contributions to the U of M. Dr. Higgins is a research assistant professor in Biochemistry, Molecular Biology and Biophysics and a member of the Center for Metabolomics and Proteomics. She has co-authored 76 original research papers and advanced research projects that have brought in millions of dollars of research funding while mentoring early-career scientists.

RESEARCH

In 2023, seven faculty members affiliated with the College were among the 30 University of Minnesota faculty included in the Highly Cited Researchers list published annually by insight and analytics firm Clarivate Analytics.

CBS leadership distributed funding for 15 equipment and infrastructure projects to support research across the College in a variety of labs on both campuses as well as field stations awarded in late 2022.

Multiple members of CBS participated in the UMN Research 2030 workshop hosted by the University's Research and Innovation Office (RIO). That workshop identified 14 research themes that the U of M considers critical research frontiers, with many aligning well with CBS researcher expertise. Some included biological interactions at all levels, health promotion and disease prevention, treatment and cures, biotechnology and biomanufacturing innovation, and climate resilience and action.

In addition to a diverse range of successful federal funding applications, a number of CBS researchers received funding through the MnDRIVE Environment Seed Grant and Norwegian Centennial Chair programs.

Throughout the year, members of the College also worked closely with RIO to establish the new Biotechnology and Biomanufacturing Innovation Center with Claudia Schmidt-Dannert as its founding director. Dr. Schmidt-Dannert is also director of the BioTechnology Institute.

PUBLICATIONS

College of Biological Sciences faculty published nearly 323 studies and articles in 177 journals authored or co-authored by faculty with primary appointments in CBS including the following high-impact journals:

- *Nature*: 24*
- *Science*: 1
- *PNAS*: 6
- *Ecology Letters*: 6
- *Genetics*: 2

*Including associated *Nature* journals

See the complete list of CBS faculty and staff publications.

ACTIVE GRANTS

The College had 281 active grants including 105 exceeding $100,000 in annual expenditures in 2023. The average grant expenditures over the past 5 years is $30.8 million. CBS researchers received awards from the National Science Foundation, the National Institutes of Health, Damon Runyon Cancer Research Foundation, the U.S. Department of Defense, the U.S. Department of Food and Agriculture, and other sources.

- $12,500,103 NIH
- $ 9,140,408 NSF
- $ 3,800,355 Other federal agencies (DOE, DOD, DOI, USDA, etc.)
- $ 1,209,289 LCCMR
- $ 345,863 Other Minnesota state agencies

Total: $32,676,596 (total sponsored research spend)

See the complete list of CBS faculty grants.

CBS SUPPORT FOR MULTI-COLLEGIATE INFRASTRUCTURE AND COLLABORATIONS

CBS provided critical financial and administrative support to shared research infrastructure and initiatives and multi-collegiate events that foster research collaborations. In 2023, the following interdisciplinary facilities and initiatives received over $2.9 million in CBS support including the BioTechnology Institute, the Caenorhabditis Genetics Center, Cedar Creek Ecosystem Science Reserve, the Center for Genome Engineering, the Center for Metabolomics and Proteomics, the Center for Plant Precision Genomics, the Characterization Facility, the CBS Conservatory & Botanical Collection, the Developmental Biology Center, Itasca Biological Station and Laboratories, MnDRIVE Environment, University Imaging Centers, University of Minnesota Genomics Center and the University of Minnesota Lion Center.

In addition, the College provided space for the Bell Museum collections, the Biotechnology Resource Center, the Caenorhabditis Genetics Center, the Chlamydomonas Resource Center, Electronic Instrumentation, the Machine Shop and the University Imaging Centers

In 2023, the College distributed more than $100,000 to support interdisciplinary collaborations, events and symposia, including the Norwegian Centennial Chair Collaboration, Big Ten Academic Alliance, Moos Family Speaker Series on Water Resources, Ronald McNair Postbaccalaureate Achievement Program, Institute for Molecular Virology Symposium and Midwest Geobiology Symposium.

DIVERSITY, EQUITY AND INCLUSION

The College continued to work to implement changes in the areas of recruitment and retention, incentives and recognition, and inclusive teaching.

- **Inclusive teaching.** The 2023 cohort of the Inclusive Excellence Fellows included four faculty fellows and one senior fellow. Participants completed projects on a range of topics including transforming the teaching assistant experience to understanding student grade gaps.
- **Faculty search process.** CBS HR continued to implement and pilot new processes including making sure job descriptions clearly articulate expectations related to diversity, equity and inclusion.
- **Awards and recognition.** The College reviewed and revised eligibility criteria and the nomination process ahead of the spring 2023 call for nominations for collegiate awards and increased communication to ensure all members of the community were aware of award opportunities.
- **Improved course site accessibility.** Research Learning and Technologies corrected over 4,300 accessibility errors across our 150 Canvas sites with a focus on empty links, alternative image text, color contrast, table headings and use, and appropriate headings for organizing course content.

CBS DIVERSITY COMMUNITY OF PRACTICE

The CBS Diversity Community of Practice (CBS DCoP) continued into its third year, welcoming new members and advancing diversity, equity, inclusion and justice efforts within the College. The community of practice includes one representative from each department and constituent group in the College. The DCoP met regularly over spring 2023 to discuss departmental DEIJ goals, lessons learned, progress and challenges. The DCoP led the review and awarding process for the second round of CBS Diversity, Equity, Inclusion and Justice (DEIJ) microgrants. DCoP members included Mohammad Alfayez, Sara Eliason, Michael Freeman, Katherine Furniss, Michael Huyen, Forest Isbell, Kit Leffler, Taz Mueller, Caitlin Potter, Emilie Richards, Simon Vergara Santibanez, Allison Shaw, Jonathan Schilling, John Ward and Stephanie Xenos.

CBS DEIJ MICROGRANTS

In 2023, the CBS DEIJ Community of Practice awarded 17 grants ranging from $500-$6,000 totaling more than $75,000 provided by the CBS Dean's Office. This second year of granting also included four external reviewers who provided feedback to strengthen the review process. The grants support projects across the College that advance diversity, equity, inclusion and justice. Read more about the 2023 funded microgrant projects here.

COMMUNITY GATHERINGS

CBS Student Services hosted a series of gatherings for undergraduate students with disabilities, international students, transfer students and commuter students, and also hosted meetings for students, staff and faculty who identify as LGBTQ+, women and BIPOC.

OUTREACH AND ENGAGEMENT

Outreach and community engagement happens in ways large and small across the College from K-12 and public programs at Cedar Creek Ecosystem Science Reserve, community engagement at Itasca Biological Station and Laboratories and much more. Here's a snapshot of some of the ways our faculty, students and staff connected with the community in 2023.

K–12 OUTREACH

Through a variety of efforts, the College connected with more than 5,600 K-12 students by bringing undergraduates to schools through SciSpark Scholars, on campus and at Cedar Creek field station.

- **3,212** – Students and teachers who visited Cedar Creek Ecosystem Science Reserve
- **2,400** – Number of K-12 students who participated in the SciSpark Scholars Program
- **265** – Middle and high school students who toured the CBS Conservatory & Botanical Collection
- **60** – Students who visited campus hosted by the Department of Biochemistry, Molecular Biology and Biophysics

COMMUNITY ENGAGEMENT

In addition to K-12 programs, the College reached thousands of community members through programs in the Twin Cities and greater Minnesota.

- **Market Science (summer 2023)**
  - 19 Market Science events at Midtown Farmers Market
  - 1,300 visitors interacted with Market Science volunteers at the markets
- **Cedar Creek Ecosystem Science Reserve**
  - 78 public programs throughout 2023
  - 2,129 community members visited Cedar Creek
- **Itasca Biological Station and Laboratories**
  - 5 scientist-led *Nature of Science* programs
  - 5 station open house tours
  - 7 "nature cart" activities at the Mississippi River headwaters
- **CBS Conservatory & Botanical Collection**
  - 1,000+ visits by community members

PUBLIC EVENTS

The College continued to engage the community through informal science-themed events highlighting research and faculty areas of expertise, reaching more than 300 people in fall 2023.

- Petri Dish: Signal and noise: Nature's underground networks and what they reveal
- Petri Dish: Fantastic plastic you: The impact of plastic on living things
- Author talk and Q&A with lion expert Craig Packer

FIELD STATIONS AND CONSERVATORY

The College's field stations and conservatory play an integral role as hubs for research, education and outreach. In 2023, field biology courses and research thrived at Itasca Biological Station and Laboratories. Cedar Creek Ecosystem Science Reserve kicked off construction of the Whitney and Elizabeth MacMillan Environmental Learning Center addition to the Lindeman Research & Discovery Center. The CBS Conservatory reopened to the public after the pandemic and continues to increase access to the collection.

CEDAR CREEK ECOSYSTEM SCIENCE RESERVE (CCESR)

Cedar Creek engaged in comprehensive strategic planning and continued vital work across its mission in 2023. Here are some of the highlights.

- Long-term research continued with funding secured from state, federal and philanthropic sources to launch new projects on mesopredators, fungal necromass, rare plants, global change and more.
- The station and its researchers employed more than 70 interns and technicians in 2023. They assisted in major data collection initiatives, including harvesting and processing more than three miles of vegetation, collecting nearly 1,000 gallons of soil, packing more than 3,200 soil and plant samples and analyzing them for carbon and nitrogen, and making detailed observations of birds, mammals, pollinators and more.
- Cedar Creek welcomed more than 3,000 K-12 students and their teachers from across the state to engage in hands-on, science field trips and in-classroom programs.
- CCESR celebrated the completion of the Richard and Judi Huempfner Minnesota Ecology Walk and kicked off construction on the Whitney and Elizabeth MacMillan Environmental Learning Center. The addition to the Lindeman Research and Discovery Center will provide new classroom spaces and bathrooms to support programming and research for all ages, abilities and identities.
- CCESR reached over 2,000 community members through its programming. This included bison viewing, summer bird walks, monthly Lunch With a Scientist lectures and small-group guided tours and hikes
- Reserve staff also worked to expand community-connected programs, partnering with organizations including Anoka County Parks and Minnesota Astronomical Society to offer a public paddling tour along Cedar Creek and solar viewing.

Check out the Cedar Creek 2022-23 annual report for more information.

ITASCA BIOLOGICAL STATION AND LABORATORIES (IBSL)

The station had a busy year, hosting 6,640 overnight stays by 28 groups. Key staff roles were filled giving a critical capacity boost and positioning the station to expand its activities in years to come. Here are some of the highlights.

- IBSL hosted seven field courses including four of its own offerings including mammalogy, ornithology, animal behavior and mycology. In addition, 531 incoming first-year College of Biological Sciences students visited the station for Nature of Life at Itasca. A dozen groups held academic retreats at the station, as well.
- The station provided research permits for projects of varying lengths — from a single day of sampling to multiple-week efforts. Several longer-term research projects on a variety of topics, from dragonfly emergence and migration to lake biogeochemistry, continued in 2023, as well. In addition to the core research projects, IBSL awarded five student research fellowships to pursue research projects at the station.
- Community engagement efforts in and beyond Itasca State Park continued with special attention to building relationships with Department of Natural Resources staff. IBSL partnered with the state park to offer programming to visitors including science activities at the Mississippi River headwaters.
- IBSL also continued to build relationships with Indigenous communities in neighboring White Earth, Red Lake and Leech Lake reservations. The station hosted high school graduates from Waubun High School supported by its American Indian Fund internship and hosted its annual wild rice camp.
- The station hosted the CBS Alumni Weekend in September, with help from our new Itasca Booster Club. Approximately 45 alumni, family members and CBS staff attended the annual event.

Check out the IBSL 2023 annual report for more information.

CBS CONSERVATORY & BOTANICAL COLLECTION

In 2023, the CBS Conservatory opened to the public. The facility continued to expand support for courses and research, as well as engage with the broader community. Here are some of the highlights.

- The Conservatory hosted guided tours of the collection for more than 600 CBS students and provided plants for more than 1,500 students in CBS courses. It also served as a teaching resource for non-CBS courses and provided tours to students from outside the University of Minnesota.
- The Conservatory continues to leverage its living collection to contribute to botanical and conservation-based research. Several CBS lab groups conducted research in the Conservatory, including nectar sampling from flowers with unusual colors, genetic comparison of carnivorous plants in the genus *Drosera*, hyperspectral imaging of plant tissue to compare to herbarium specimens in Caryophyllales and evaluation of the evolution of organellar mechanics in the green algae lineage.
- Conservation work continues with research, acquisition and distribution of several species of high conservation value including *Amorphophallus titanum* (corpse flower) and *Brighamia insignis* (Ōlulu, or 'cabbage on a stick'). In addition, the Conservatory worked with the Minnesota Landscape Arboretum on *in situ* and *ex situ* conservation of *Escobaria vivipara* (ball cactus) resulting in hundreds of new cacti being planted in protected areas of western Minnesota.
- Hundreds of visitors made their way to the Conservatory in 2023. Staff offered tours to middle and high school students through programs like Appetite for Change, ATP-Bio, Urban Roots, Future Farmers of America, and outreach programs with the Department of Chicano & Latino Studies and the Department of Biochemistry, Molecular Biology and Biophysics.

ADVANCEMENT

Thanks to the generosity of many donors, this year the College celebrated philanthropic support at Cedar Creek Ecosystem Science Reserve with the dedication of the Richard and Judi Huempfner Minnesota Ecology Walk and kicked off the construction of the Whitney and Elizabeth MacMillan Environmental Learning Center. In addition, the College provided more scholarship and fellowship support to students than ever before.

DEVELOPMENT

In FY23, the College raised more than $3.7M through contributions from 428 donors. Below is a breakdown of gifts:

- 1 gift of $1M-$5M
- 1 gift of $250K-$999K
- 3 gifts between $100K-$249K
- 3 gifts between $50K-$99K
- 14 gifts of between $10K-$49K
- 59 gifts of between $1K-$9.9K
- 347 gifts of less than $1K

$3.7M
raised from 428 donors

SCHOLARSHIPS AND FELLOWSHIPS

The College awarded more than $1M in scholarships and fellowships, including 163 scholarships and 60 graduate fellowships. Fifty-nine of the scholarships were four-year awards to first-year students.

ALUMNI

The College continued to increase engagement through opportunities to participate in student-focused career panel discussions, alumni profiles, social events and publications. CBS alumni engagement was higher than the University average.

20,387
total living alumni

- **Alumni with B.S. degrees: 16,302**
- **Alumni with M.S. or Ph.D. degrees: 4,881**
- **Alumni living in Minnesota: 11,019**

Alumni recognition

Five alumni received CBS alumni awards in 2023. Read more about the recipients here.

- CBS Alumni Achievement Award: James Kirkpatrick and Gregory Pazour
- CBS Emerging Leader Award: Kevin Dorn and Xinci Tan
- CBS Alumni Service Award: John Twomey

Alumni and donor events

- 2023 Recognition and Appreciation Dinner
- Itasca alumni weekend
- Nature of Life peer mentor alumni happy hour

IN DETAIL

GRADUATE STUDENT AWARDS AND RECOGNITION

EXTERNAL AWARDS

- 3M Fellowship
  - Reed Jacobson (BMBB)
- Agriculture and Food Research Initiative Predoctoral Fellowship
  - Rebecca Fudge (PMB)
- Integrative Biology and Physiology Inclusive Excellence Training Program
  - Eric Queathem (BMBB)
- NIH Fellowship
  - Casey Eddington (BMBB)
- NSF Graduate Research Fellowship
  - Duha Vang (MCDB&G)
  - Briana Beatty (PMB)
- McElroy Trust Fellowship
  - Rocio Amaro Marquez (MCDB&G)
- Ruth L. Kirschstein National Research Service Award Individual Predoctoral Fellowship
  - Damien Rasmussen (BMBB)

UNIVERSITY AWARDS

- Bell Museum Natural History Award
  - Viviana Londoño (PMB)
- President's Student Leadership and Service Award
  - Taz Mueller (EEB)
- UMN Doctoral Dissertation Fellowship
  - Lauren Agnew (EEB)
  - Leslie Day (PMB)
  - Dongmin Kim (EEB)
  - Haiping Ouyang (BMBB)
  - Eduardo Perez-Pazos (EEB)
  - Hailey Sauer (PMB)
  - Krisna Van Dyke (MCDB&G)

COLLEGE OF BIOLOGICAL SCIENCES FELLOWSHIPS

Biochemistry, Molecular Biology and Biophysics

- Armstrong-Pothapragada Fellowship
  - Akash Kannan
  - Lidia Limón (Swanson)
  - Kitty Sompiyachoke

- Arnold H. Johnson Biochemistry Fellowship
  - Erynn Johnson
- Barnum Award
  - Mai Beauclaire
  - Nathan Feltman
- Bollum Memorial Award
  - Katherine Crone
  - Sofia Moraes
  - Haiping Ouyang
  - Amanda Rieffer
  - Shanley Roach
  - Frederik Sadler
  - Adam Sychla
- Edith Walters Jones and Robert Jones Award
  - Robert Connacher
- Gilliam Award
  - Sofia Moraes
- Hogencamp Award
  - Cher Ling Tong
- Huber Warner Fellowship in Molecular Biology Award
  - Mahima Devarajan
- James Koerner Award
  - Philip Woods
- Mary Dempsey Fellowship
  - Adrianna Hudyma
- Ross A. Gortner Fellowship
  - Sofia Moraes
  - Yi-Cheng Sin
  - Lambros Tassoulas
- Thomas A. Reid Award
  - S. Arad Moghadasi
  - Natalia Babilonia
  - Thomas Damato
  - Jolene Duda
  - Elise Dunshee
  - Benjamin Hanson
  - Louise Pitcher
  - Damien Rasmussen
  - Adam Smiley
- Victor A. Bloomfield Fellowship
  - Michael Anderson
  - Matt Pawlak
  - Adam Smiley

Ecology, Evolution and Behavior

- Darby and Geri Nelson Environmental Scholar Award
  - Ana Fávaro
  - Maria Park
  - Christopher Wojan
- David Tilman Fellowship in Ecology and the Environment
  - Mariana Cardenas
  - Abby Guthmann
  - Eduardo Perez-Pazos
- Donald and Elizabeth Lawrence Research Scholarship
  - Maggie Anderson
  - Simone Maddox
  - Laura Ostrowsky
- Elmer C. Birney Fellowship
  - Gabriele Ilarde
- Florence Rothman Research Fellowship
  - Sally Donovan
  - Katherine Krueger
  - Katie Polik
- Ray C. Anderson Fellowship
  - Maria Kalambokidis
- Richard and Judi Huempfner Research Fund
  - Maggie Anderson
  - Anya Auerbach
  - Zheng Oong
- Sigerfoos Fellowship
  - Alyssa Gooding
  - Rachael Kaspar
  - Chau Pham

Itasca Biological Station and Laboratories

- Tester Fellowship for Research
  - Aiym Bakytbaikyzy

Molecular, Cellular, Developmental Biology and Genetics

- Bryant Keller Award
  - Samuel Gonzalez
- Edward B Lewis Award
  - Alicia Wong
- Margaret A Titus Award
  - Tanner Hoog

Plant and Microbial Biology

- Bernard and Jean Phinney Graduate Fellowship in Plant Molecular Biology
  - Nathan Lewis
  - Tony Zmuda
- PMB Recruiting Fellowship
  - Daniel Bacher
  - Parikha Banga
  - Briana Beatty
  - Sara Endejan
  - Shengsong Guo
  - Derek Hunsaker
  - Alejandra Pérez-Enriquez
  - Christos Robertson
- PMB Writing Fellowship
  - Lucy Schroeder

THESES AND DISSERTATIONS

Biochemistry, Molecular Biology and Biophysics – Ph.D.

- Dongmei Chen | Advisor: David Bernlohr | "Identification of putative fatty acid binding protein 4 receptors on breast cancer epithelial cells"
- Sze Cheng | Advisor: Jeongsik Yong | "Investigation of the functional impact of mTORC1-regulated alternative splicing"
- Sol Choi | Advisor: Daniel Bond | "Unraveling the enigmatic dance of electrons: Extracellular electron transfer and sensing via periplasmic cytochromes"
- Robert Connacher | Advisor: Aaron Goldstrohm | "Regulation of mRNA stability by the RNA-binding protein Brat"
- Casey Eddington | Advisor: Meg Titus | "Exploring the mechanisms behind filopodia formation"
- Nathan Feltman | Advisor: Michael Smanski | "Engineering genetic incompatibility for genetic biocontrol of insects"
- Marcus Kelly | Advisors: David Odde and Wendy Gordon | "Crosstalk between adhesion molecules influences cell traction and migration"
- Yijia Li | Advisor: Edgar Arriaga | "Bioinformatics strategies to interrogate the hallmarks of aging in single-cells"
- Lidia Limón | Advisor: Wendy Gordon | "Genetically-encoded DNA labeling for applications with mammalian proteins via HUH-endonucleases"
- Arad Moghadasi | Advisor: Reuben Harris | "Determining mechanisms of resistance to clinical SARS-CoV-2 protease inhibitors"
- Sofia Moraes | Advisor: Reuben Harris | "Genetic conflicts with the host immune system shaped primate herpes virus evolution"
- Colin Pierce | Advisor: Romas Kazlauskas | "Towards novel enzyme functions: Insights from engineering promiscuous esterases and hydroxynitrile lyases in the hydrolase superfamily"
- Amanda Rieffer | Advisor: Reuben Harris | "Genome engineering technologies to characterize the AID/APOBEC family of nucleic acid mutators"
- Shanley Roach | Advisor: Ryan Langlois | "Local and systemic innate immunity in viral infection and transmission at barrier surfaces"
- Fredrik Sadler | Advisor: Sivaraj Sivaramakrisnan | "Autoregulation of G protein-coupled receptor signaling through the

third intracellular loop"
- Wakana Sato | Advisor: Kate Adamala | "Expanding the complexity of cell-free systems for synthetic cells"
- Judee Sharon | Advisor: Kate Adamala | "Inventing new tools for the synthetic cell toolkit"
- Adam Sychla | Advisor: Michael Smanski | "Design and control of self-spreading genetic elements"
- Lambros Tassoulas | Advisor: Lawrence Wackett | "Elucidating the biodegradation pathway for the pharmaceutical metformin in wastewater: Implications in human and wastewater microbiome"
- Chen Wang | Advisor: Eric Hendrickson | "Kinome-wide screens to identify novel regulators of DNA double-strand breaks repair"

Biochemistry, Molecular Biology and Biophysics – M.S.

- Christopher Deich | Advisor: Kate Adamala | "Towards the engineering of a synthetic minimal cell"

Ecology, Evolution and Behavior – Ph.D.

- Jessica Burkhart | Advisor: Craig Packer | "The impact of oxytocin administration on social behavior in African lions"
- Shanta Hejmadi | Advisor: Keith Barker | "Everything, everywhere, all at once: Diurnal birds of prey as models for community assembly"
- Sean Keogh | Advisor: Jeffrey Simons | "From individuals to species: how natural selection and phenotypic plasticity shape ecomorphological evolution"
- Elihuruma Kimaro | Advisors: Michael Wilson and Jennifer Powers | "Forest and woodland regeneration dynamics and persistence in the human-modified tropical landscape of the Greater Gombe Ecosystem, Tanzania"
- Anthony Massaro | Advisor: Michael Wilson | "Cooperation, competition, and killing: Reproductive strategies of chimpanzees (*Pan troglodytes*)"
- Janine Mistrick | Advisor: Meggan Craft | "Effects of environmental factors on pathogen exposure and transmission in wild rodent populations"
- Joseph Rabaey | Advisor: James Cotner | "Small size, huge impact: Disproportionate effects of ponds on aquatic carbon cycling and atmospheric greenhouse gases"
- Tom Radomski | Advisor: Kenneth Kozak | "Understanding geographic ranges: From natural history, to theory, and back"
- Alexander Shephard | Advisor: Emilie Snell-Rood | "Developmental influences on stress-based responses to environmental change"
- Amy Waananen | Advisor: Ruth Shaw | "Fitness consequences of pollen movement and its dependence on spatiotemporal isolation: Field studies in *Echinacea angustifolia*"
- Megan Wilcots | Advisors: Elizabeth Borer and Sarah Hobbie | "Effects of nutrient limitation on carbon cycling and plant community composition"
- Amod Zambre | Advisor: Emilie Snell-Rood | "The role of developmental plasticity in sexual signal divergence"
- Max Zaret | Advisors: Eric Seabloom and Linda Kinkel | "Microbes, herbivores, and grassland carbon cycling responses to biodiversity loss and nutrient pollution"

Genetic Counseling – M.S.

- Perla Cortes Ruiz | Advisor: Ian MacFarlane | "Influence of genetic risk information in adolescent girls and young women from families with X-linked Adrenoleukodystrophy"
- Priyankar (Joy) De | Advisor: Ian MacFarlane | "Genetic counseling and testing experience of individuals with androgen insensitivity syndrome"
- Batoul Elbassiouny | Advisor: Ian MacFarlane | "Needs assessment of the genetic counseling profession in the Arab world: An interview-based study"
- Haley Fuoco | Advisor: Krista Redlinger-Grosse | "Genetic counselors' experiences working with incarcerated patients"

- Nila Khan | Advisor: Heather Zierhut | "The creation of an online training module for the Genetic Counseling Skills Communication Checklist (GCSC)"
- Delaney Pease | Advisor: Ian MacFarlane | "Exploration of professional development milestones of laboratory genetic counselors: A qualitative investigation"
- Inga Strinz | Advisor: Krista Redlinger-Grosse | "Supervisors' experiences with shared supervision in genetic counseling: A focus group study"
- Mariah Volesky | Advisor: Heather Zierhut | "Utilizing the Genetic Counseling Skills Checklist to assess cancer genetic counseling"
- Ellory Wolin | Advisor: Ian MacFarlane | "Exploring genetic counseling training programs' justice, equity, diversity, and inclusion curricula via course syllabi"

Microbial Engineering – M.S.

- Wen Cai | Advisor: Wei-Shou Hu | "A synthetic approach to produce recombinant adeno-associated virus (rAAV) in Chinese hamster ovary cells"
- John McFarlane | Advisor: Steven Bowden | "ToxIN-mediated resistance to and cell-free production of *Salmonella* bacteriophages"

Molecular, Cellular, Developmental Biology and Genetics – Ph.D.

- James Chamness | Advisor: Dan Voytas | "Improved methods of transgenic and viral reagent delivery for genome engineering in plants"
- Heather Hanson | Advisor: Lou Mansky | "Studies of virus-host interactions in human retrovirus replication"
- Tanner Hoog | Advisor: Aaron Engelhart | "Exploiting chaotropic salt-nucleic acid interactions for biotechnology and understanding the origins of life"
- Laura Johnson | Advisor: Linda McLoon | "Two novel mouse models to study the potential cause of nystagmus"
- Allison Keith | Advisor: Jakub Tolar | Expanding Paradigms of Recessive Dystrophic Epidermolysis Bullosa-Associated Cancer Development and Treatment
- Krisna Van Dyke | Advisor: Frank Albert | "Pleiotropy and epistasis in trans-acting expression quantitative trait loci hotspots"

Plant and Microbial Biology – Ph.D.

- Rafael Della Coletta | Advisor: Candy Hirsch | "Developing genomic tools to breed for climate-adapted plant varieties"
- Zacky Ezedin | Advisor: George Weiblen | "Contributions to floristics in New Guinea and species delimitation in the Wanang Forest Dynamics Plot"
- Joshua Havill | Advisor: Gary Muehlbauer | "Phenotypic and genotypic characterization of hop (*Humulus lupulus L.*) germplasm resources for powdery mildew resistance"
- Thomas Lake | Advisor: Dave Moeller | "Improving predictions of biological invasions with multidisciplinary approaches"
- Chaochih Liu | Advisor: Peter Morrell | "Biological problem solving through computation"
- Erika Magnusson | Advisor: Nathan Springer | "Mutator transposons in Zea mays impact transcriptional regulatory networks and underlying gene expression"
- Rebekah Mohn | Advisor: Ya Yang | "Polyploidy inference across time scales in the charismatic carnivorous plant genus *Drosera L.*"
- Cedric Ndinga Muniania | Advisor: Georgiana May | "Functional diversity of fungal symbiont communities and the impact of biotic and abiotic factors on their composition and assembly"
- Hailey Sauer | Advisor: Trinity Hamilton | "Small scale, big impacts: How sediment microbial communities influence the aquatic environment"
- Redeat Tibebu | Advisor: Dan Voytas | "Viral vector-mediated CRISPR-Cas9 gene editing for fundamental and applied plant research"