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College of Biological Sciences

University of Minnesota

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CBS
FACTS



Overview

The College of Biological Sciences (CBS) is the fastest growing college at the University of Minnesota, with undergraduate enrollment topping 1,100, two new research buildings underway, and several new faculty hires in progress. CBS covers the spectrum of modern biology, from molecules to ecosystems.

CBS spans the Twin Cities, with departments, faculty, classes, and labs on both the Minneapolis and St. Paul campuses. On both campuses, biology is experiencing a boom: A new Molecular and Cellular Biology Building is underway in Minneapolis, while a Microbial and Plant Genomics Center is underway in St. Paul. Also in St. Paul, CBS has created Biodale, a “biotech mall” that provides researchers with one-stop-shopping support including state-of-the-art imaging, mass spectrometry, biotech, and advanced genetic analysis facilities.

Indoor facilities are only part of the story. CBS is also home to two unique “outdoor labs.” The Lake Itasca Forestry and Biological Station, located at the headwaters of the Mississippi amid 30,000 acres of pristine habitat in Itasca State Park, is a perfect location for field studies and hands-on learning about field biology. It is also a peaceful setting for total-immersion courses in neuroscience and molecular biology.

Closer to the Twin Cities is the Cedar Creek Natural History Area, world-renowned for the biodiversity research conducted there. Located at the confluence of three great biomes, Cedar Creek was one of the first sites in the U.S. to be selected by the National Science Foundation for funding of Long-Term Ecological Research. It is, according to *Nature* magazine, “... rapidly becoming one of ecology’s classic localities.” Cedar Creek

is also the site where telemetry (the study of animal behavior through radio tracking) was invented.

Biology doesn’t stay within the bounds of Minnesota, and neither does CBS. CBS faculty and students participate in classes, research projects, and collaborations in the Canadian Arctic, in Antarctica, and on every continent in between.



Departments, Centers, and Programs

CBS is organized into four departments: Biochemistry, Molecular Biology, and Biophysics; Ecology, Evolution, and Behavior; Genetics, Cell Biology, and Development; and Plant Biology. In addition, the college is affiliated with the Departments of Microbiology and Neuroscience.



CBS also includes the Advanced Bioscience Computing Center, Center for Biodegradation Research and Informatics, Biological Process Technology Institute (for trying out and scaling up new bioprocessing technologies), Caenorhabditis Genetics Center (supplying *C. elegans* strains to labs worldwide), Cedar Creek Natural History Area, General Biology

(an innovative and high-tech program teaching introductory biology to more than 3,500 University of Minnesota students per year), High Field Nuclear Magnetic Resonance Facility, Instructional Labs (which oversee all labs for St. Paul CBS courses, serving over 1,000 students per semester), Jane Goodall Institute's Center for Primate Studies (which houses all 38 years' worth of Jane Goodall's notes on chimp behavior from Tanzania), Lake Itasca Forestry and Biological Station, Imaging Center, Mass Spectrometry Consortium for the Life Sciences, Center for Microbial Genomics, and Center for Microbial and Plant Genomics.



History

CBS opened in 1965 on the St. Paul campus, bringing together the Departments of Agricultural Biochemistry (established 1887), Botany (established 1889), and Zoology (established 1887); a graduate genetics program; the Cedar Creek Natural History Area (established 1942); and the Bell Museum of Natural History (established 1872). The Department of Genetics and Cell Biology and the Department of Ecology, Evolution, and Behavior were formed in 1967, and in 1970 CBS took over management of the Lake Itasca Forestry and Biological Station (established 1909). The Biological Process Technology Institute opened in 1984.

CBS was an upper division college until it admitted its first freshman class—102 students—in fall 1997. Only three years later, the number of CBS freshmen has swelled to 243.

In 1998, the University completed a sweeping, faculty-driven reorganization of the biological sciences. The reorganization combined departments in CBS and the Medical School to eliminate duplication, forming the partnership departments of Biochemistry, Molecular Biology, and Biophysics and Genetics, Cell Biology, and Development. It also created a new Department of Neuroscience in the Medical School and strengthened the Department of Plant Biology, a joint department of CBS and the College of Agricultural, Food, and Environmental Sciences. Goals of the reorganization are to increase the University's national standing in biology and allow it to take full advantage of predicted upswings in federal and state funding for biology.

Also in 1998, University President Mark Yudof earmarked molecular and cellular biology as a key investment area to ensure the University's stature among the nation's top 10 research universities. The Minnesota Legislature has supported that initiative with funding for two new buildings, renovation of biological research facilities, and several faculty hires.

Academic Quality

The CBS faculty includes more than 20 teaching award winners and numerous recipients of research honors and awards, including membership in the National Academy of Sciences and American Academy of Arts and Sciences; appointments as Howard Hughes Medical Institute Associate Investigators, McKnight Distinguished University Professors, and McKnight Land-Grant Professors; and endowed chairs and professorships.



CBS faculty have published numerous monographs and textbooks, including one of the most widely used genetics textbooks in the world. The CBS faculty also publishes approximately 400 journal articles per year. According to an August 2000 report by Essential Science Indicators, ecology professor David Tilman is the most-cited environmental author of the past decade, with a total of 1,222 citations of 15 of his papers. The September/October 1998 *Science Watch*, a journal published by the Institute for Scientific Information, ranked the University first in the country in scholarly impact in the category ecology/environment for the period 1993 to 1997 based on citations of scientific papers.

The fall 2000 CBS freshman class is one of the most highly qualified freshman classes of any college at the University of Minnesota, based on high school rank and entrance exam scores. Of the 54 percent of 1999 CBS graduates responding to a survey, 40 percent went on to graduate or professional school, while 80 percent of those employed full time were in positions related or somewhat related to their field of study.





Enrollment, Fall Semester 2000

	Men	Women	Total
Undergraduate	417	647	1,064
Graduate	109	140	249
Non-degree	12	21	33
Total			1,346

Minority Undergraduate Enrollment

Asian or Pacific Islander: 112

African American: 30

American Indian: 6

Chicano/Latino: 18

Total: 166

Minority Graduate Enrollment

Asian or Pacific Islander: 13

African American: 4

American Indian: 0

Chicano/Latino: 9

Total: 26

International Students

For fall 2000, CBS registered 24 international undergraduate students—representing countries including Ireland, Ethiopia, Canada, India, Kenya, Ukraine, China, Taiwan, Japan, Nigeria, Hong Kong, Korea, Egypt, and Mexico—and 32 international graduate students.



Degrees Granted

Students may earn undergraduate degrees in seven majors: biochemistry; biology; ecology, evolution, and behavior; genetics, cell biology, and development; microbiology; neuroscience; and plant biology. Approximately 250 students per year receive bachelor of science degrees from CBS.

The University's Graduate School offers 31 graduate programs in life sciences, not including professional programs such as veterinary science or medicine. CBS is closely affiliated with 9 of these programs, which graduated 45 students with advanced degrees in the 1999–2000 academic year. CBS also offers a professional Master of Biological Sciences program for those already in the workforce who want to upgrade or update their biological knowledge.

Tuition and Fees, 2000-2001

A full-time, Minnesota-resident CBS student (taking 15 credits) would pay \$2,200.50 per semester plus fees. Resident undergraduate students pay \$163 per credit for credits 1 through 12. Each additional credit over 12 is \$81.50. Nonresident undergraduates pay \$481 per credit up to 12, \$240.50 for each credit over 12.

Full-time, Minnesota-resident graduate students pay \$2,658.75 for 6 to 14 credits and \$443.25 for each credit over 14 per semester. Nonresident, full-time graduate students pay \$5,222.25 for 6 to 14 credits, \$870.50 for each credit over 14.

CBS Professional Master's Degree program students pay \$666 per credit (Minnesota residents) or \$999 per credit (nonresidents).

All full-time University of Minnesota students on the Twin Cities campus pay a \$238.22 student services fee per semester. In addition, CBS undergraduate students pay an Information Technology fee of \$159 per semester and \$23.25 per laboratory course.

Faculty/Staff

Tenured and tenure-track faculty:	121*
Civil Service and Bargaining Unit staff:	140
Academic Professional and Administrative staff:	101**
Graduate Assistants:	150
Undergraduate student employees:	134

* Includes all faculty members in the partnership departments of Biochemistry, Molecular Biology, and Biophysics and Genetics, Cell Biology, and Development.

** Includes postdoctoral fellows.

Accomplishments and Contributions

Recent headline-making research from CBS includes:

- The successful reconstruction of a 15 million-year-old fish gene to create a new and better DNA delivery system for gene therapy.
- Isolation of a bacterium that can degrade the herbicide atrazine, making it possible to clean up polluted farmland.
- Long-term research showing that too much nitrogen appears to reduce plant species diversity and that, as the number of plant species on a plot declines, the plot produces less total plant material and becomes much more susceptible to drought.
- Studies suggesting that long-term use of nicotine replacement products such as gum patches, inhalers, and nasal spray damages cells lining airways and blood vessels.
- Genetic engineering of the bacterium *D. radiodurans*, which can survive in high levels of radiation, to attack solvents like toluene and chlorobenzene (in which radioactive substances are commonly mixed), creating an agent to clean up radioactive spill sites.
- Studies showing that there is a social hierarchy among female chimpanzees and that the mortality rate of infant chimps is closely tied to the social rank of the mother.
- Discovery of a protein in the nematode worm *C. elegans* that may be related to humans' biological clocks.
- Development of new technology to obtain large segments of genetic code from bacteria and fungi and use them to make new chemicals that may fight cancer.
- Coaxing asexual yeast cells to mate, which will help identify the genes that make yeast a threat to humans.
- Successful reintroduction of peregrine falcons in the Upper Midwest after their near extinction.





- Studies of the effects of ultra-violet light on the organic matter in Lake Superior.
- Studies of the extent to which monarch butterflies encounter corn pollen in nature to help determine whether Bt corn is a threat to monarchs.
- Using gene shuffling (a.k.a. “evolution in a test tube”) to engineer bacteria to synthesize novel carotenoids (important nutrients for humans and animals).

CBS’ commitment to sharing biology with the community includes:

- Collaborations with industry through the Biological Process Technology Institute.
- Plant biology workshops for elementary school teachers.
- Two multimedia applications developed by General Biology staff—UGather™, a database manager, and UPresent™, a presentation program—which are available free on the Internet.
- Animal Biology Camp for 4th- to 6th-grade students each summer in collaboration with the Science Museum of Minnesota.
- The Life Sciences Summer Undergraduate Research Program, which pairs high-ability students from throughout the country with faculty mentors to prepare students for graduate school.
- “Little Things that Run the World,” a weeklong summer course on microbes for 9- to 11-year-old kids.
- “Monarchs in the Classroom,” a two-week summer workshop for Minnesota K-8 teachers and the Monarch Monitoring/Field Research Program, for middle and high school teachers and students from four states.

Financial Information*

	1998-99	1999-2000	2000-01 estimated
State appropriations	10,230,111	9,373,310	9,657,501
Tuition and fees	5,814,008	5,982,774	6,311,827
Sponsored grants and contracts (all research funding)	13,585,945	14,325,256	14,755,000
Indirect cost recovery	1,410,473	1,478,119	1,556,895

* Does not include funding from partner units for partnership departments.

Private Support



CBS raised \$1.04 million during fiscal year 1999-2000 from alumni, friends, corporations, and foundations as part of the University’s four-year, \$1.3 billion fund-raising effort, Campaign Minnesota.

Campaign priorities include scholarships and fellowships to recruit and reward the best and brightest undergraduate and graduate students; endowed professorships and chairs to attract and retain stellar faculty; and funding for facilities and technology needed to keep pace with cutting-edge biological teaching and research. Support for Campaign Minnesota will help secure the college’s—and the University’s—preeminence in the 21st century.

CBS Leadership

Robert Elde, Dean

Kathryn Hanna, Associate Dean for Faculty
and Academic Affairs

Judd Sheridan, Associate Dean for Research
and International Programs

CBS Advisory Council, made up of civic and business
leaders and alumni

CBS Department Heads and Directors

Biochemistry, Molecular Biology, and Biophysics

David Bernlohr

Genetics, Cell Biology, and Development

Brian Van Ness

Ecology, Evolution, and Behavior

Robert Sterner

Plant Biology

Kathryn VandenBosch

Biological Process Technology Institute

Kenneth Valentas

Cedar Creek Natural History Area

David Tilman

General Biology Program

John S. Anderson

Itasca Biology Program

David Biesboer

CBS-Affiliated

Department Heads

Microbiology

Ashley Haase

Neuroscience

Timothy Ebner



Alumni

CBS has more than 7,600 living alumni, represented by the Biological Sciences Alumni Society (BSAS). The BSAS board of directors coordinates several activities such as pairing CBS undergraduates with alumni mentors, hosting an annual alumni weekend at the Lake Itasca Forestry and Biological Station, and co-hosting the annual CBS Career and Internship Fair. CBS alumni receive *Frontiers*, the college magazine.

Well-known alumni include:

- Josephine Tilden, 1895, the first woman scientist at the University of Minnesota, world-renowned for her studies of pacific algae
- Edward Lewis, '39, hon. D.Sc. '93, winner of the 1995 Nobel Prize in Medicine
- Raymond Lindeman, '41, pioneer of modern ecosystem ecology and freshwater studies, author of "the most significant formulation in the development of modern ecology"
- Thomas Reid, '42, former director of research at 3M and founder of its Life Sciences Sector laboratories
- Myron Brakke, '43, '47, inventor of density gradient centrifugation, now used in every biochemistry, molecular biology, cell biology, and virology lab in the world
- James Hogle, '72, who solved the structure of the polio virus
- Susan Berget, '74, whose discovery that genetic information is fragmented throughout the gene led to the 1993 Nobel Prize in Medicine
- Paul Boyer, hon. D.Sc. '96 and CBS faculty member for more than 15 years, winner of the 1997 Nobel Prize in Chemistry

