

# BIO SPEAK

A Newsletter for  
Biology Undergraduates



Indiana University

Department of Biology

## *Capturing Beauty* Photographing the Wildflowers of Indiana

From photographing wildflowers to lobbying the legislature, Kay Yatskievych has turned a passion for plants into a fulfilling career. The author of *Field Guide to Indiana Wildflowers* and current coordinating editor for the Missouri Botanical Garden (MBG) credits IU and the Department of Biology for giving her the scientific education necessary to achieve her goals.

Yatskievych developed a connection to plants as a child. "I grew up on a farm in Johnson County, Indiana, and from a very early age loved seeing both the cultivated



*Trillium grandiflorum*, photograph by Kay Yatskievych

and the wild plants that grew on the farm," said Yatskievych. "My mother and maternal grandmother were avid gardeners, and in addition to the acre or so of garden planted to provide most of our food, there were large flower beds around the outside edge of the lawn and scattered within the lawn."

Yatskievych purchased her first camera in 1976 while studying photography at the Herron School of Art and immediately began photographing plants. Her dissatisfaction with the available field guides prompted Yatskievych to begin planning her own wildflower guide. "I wanted to write a *Field Guide to Indiana Wildflowers* that would include all the wildflowers in Indiana and would have

many photos and drawings to make the guide usable by people who do not have botanical training." With this goal in mind, Yatskievych returned to college and enrolled in plant science classes at IU. "I felt that I needed to have a better scientific grounding to write the kind of authoritative treatment that I wanted the field guide to be," said Yatskievych.

Although saving time to work on the field guide, Yatskievych explored several careers along the way. Before she studied plant science at IU, she was an environmental lobbyist at the Indiana State Legislature. As a student, she developed her writing skills and knowledge of the publishing industry by working part-time with Dr. Lynton Caldwell, a retired professor of political science. These skills later helped her land a position at MBG as a coeditor for a nine volume series called the *Flora of the Venezuelan Guayana*.

Working on the field guide during her spare time, Yatskievych published *Field Guide to Indiana Wildflowers* in 2000. Today she continues to promote the preservation of plants by collaborating with Butler

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*Parnassia glauca*, photograph by Kay Yatskievych

### New Biotech Degree Prepares Students for Indiana Jobs

As researchers learn more about harnessing the power of biology, the business of biotechnology booms.

According to the Biotechnology Industry Organization, U.S. revenues from biotechnology increased from \$8 billion in 1992 to \$39.2 billion in 2003, and many analysts predict this trend will continue. Indiana, like many states, is capitalizing on this trend by attracting and retaining biotechnology industries, as well as health and life sciences industries.

What does this mean for you? **Jobs.**

"Indiana's health and life sciences industries will offer 45,000 job openings to Hoosiers over the next five years," according to a workforce gap analysis completed by BioCrossroads, a network of university, corporate, and community groups dedicated to accelerating economic development in Indiana.

In response to this surge in biotechnology and life sciences jobs, the College of Arts and Sciences (COAS) recently created the Bachelor of Science Major in Biotechnology. A joint program between the departments of biology and chemistry, this interdisciplinary degree is designed to prepare students for careers in biotechnology by teaching them the scientific background and practical research, communication, and teamwork skills.

According to Malcolm Winkler, professor of biology and director of the biotechnology program, biotechnology extends into multiple industries. "Biotechnology is the application of biological methods and principles to carry out applied research," explained Winkler. "What you're trying to do is use these principles and methods to well-defined ends, often very practical ends. Biotechnology is used throughout the biological industries and pharmaceutical industries; it's fundamental to pharmaceutical research, fundamental in research

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**“Sometimes people ask me what field I’d be in if not computers. I think I’d be working in biotechnology. I expect to see breathtaking advances in medicine over the next two decades, and biotechnology researchers and companies will be at the center of that progress.”**

**Bill Gates, *New York Times*, June 18, 1996**

### **Biotech degree con’t**

in bioremediation, where you’re trying to use biology to clean up the environment, and fundamental in chemical research, where you use biological molecules and biological processes in addition to chemical processes.”

The program will combine both the “depth and breadth of science” with an emphasis on practical application and real life experience. Students will take basic science courses in biology, chemistry, physics, and statistics as well as the COAS degree requirements for the first two years. As sophomores and juniors, students will take a biotechnology course taught by the biology and chemistry departments. Students will also take a required bioethics course, which will cover intellectual property and the social issues surrounding the field, such as the ethicality of stem cell research or cloning.

“When students come out of this program, they will be very well-versed in biotechnology and will have a lot of options; they can go to graduate or professional school, but also they should be competitive for jobs in biotechnology,” Winkler said.

To prepare future job hunters for the workforce, the new degree will supplement the coursework with practical experience. “Our goal is that this curriculum offers opportunities and exposure to real life situations not just an academic view of biotechnology,” Winkler emphasized. The program will include a seminar series, in which representatives from industry and other biotechnology programs will speak about their work and research, and students will be encouraged to participate in internships at companies and work in laboratories at IU.

“We know that companies want internships; they want people with experience,” Winkler advised. “They want people who know what working in a company is like, who have experience with the kind of science that’s done, and who have the communication and teamwork skills.” Winkler



Professor Malcolm Winkler will serve as director of the new biotechnology program. *Photo by Ashley Mattingly*

also notes that many companies use internships as a recruitment tool and that a summer internship could lead to full-time employment. The COAS Career Development Center will set up the internships, and students will receive course credit for both paid and unpaid internships.

After shaping the curriculum for the bachelor’s degree, Winkler plans to establish a master’s degree in biotechnology. Students in the program can opt to stay an extra year and complete a master’s or take classes from the master’s program as electives during their senior year.

**“Our goal is that this curriculum offers opportunities and exposure to real life situations not just an academic view of biotechnology.”**

### **Professor Malcolm Winkler**

For students interested in the legal and financial side of biotechnology, Winkler also hopes to establish joint programs with the School of Law and the School of Business. “Biotechnology is a mixture of science, law, and business,” said Winkler. To make informed decisions about acquisitions or to sell products, employees need to understand both the science and finances involved. “Your responsibility to your company is to tell the good from the bad – what is a real opportunity, do you want to buy this technology, do you see faults with this technology – because they’re going to try to sell it to you,” Winkler said.

Winkler and the School of Law are working out a tentative plan, where after taking three years of biotechnology courses and three of law courses, students planning a career in patent law can graduate with a bachelor’s and law degree in six years. “People in the legal divisions have to be able to read scientific law and patents. If you read one of these scientific patents, there’s a huge amount of sci-

ence in it. . . They have to be able to make evaluations about whether this represents new and unique research that is patentable. It doesn’t mean you have to have a Ph.D. to do this, but you have to have scientific training. The goal of this 3 plus 3 program is to provide that training in law,” Winkler said.

According to Winkler, who worked at Eli Lilly for four years as a research advisor before coming to IU, biotechnology students can look forward to a fulfilling and potentially lucrative future; the majority of the job openings are for people with bachelor’s and master’s degrees in science, a trend also noted in BioCrossroad’s Workforce Gap Study. “In companies, people with bachelor’s and master’s degrees are hired as professional scientists, and they’re usually called research associates. . . Research associates perform an extremely important job in companies; they’re the people who do much of the bench science, the implementation. . . The careers in industry for people with bachelor’s and master’s can be really good careers.”

Once established in a company, Winkler adds, research associates often have opportunities to explore other positions and advance within the company. “The people who are research associates have a lot of



Stacy Thompson, a senior biology major and part-time employee for Cook Inc., discusses job opportunities with a student at the 2004 Biology Career Fair. *Photo by Ashley Mattingly*

opportunities in most companies to learn and expand their skill sets; there are usually training courses; there are opportunities to

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## Capturing Beauty con't

University's Friesner Herbarium to develop the *Annotated Checklist of the Vascular Flora of Indiana* and contributing to the formation of the Indiana Native Plant and Wildflower Society.

Over the years, Yatskievych's passion for plants and photog-

raphy has grown. She has shot more than 35,000 slides and published in magazines like *National Geographic*. You can find many of her slides at [www.discoverlife.org](http://www.discoverlife.org), an online, interactive nature guide that is still being developed.

"Far and away my favorite thing to do is photograph plants," said Yatskievych.

"Nothing makes me happier than being out in nature with a camera. This also fulfills my desire to contribute in some way, for I believe that good photographs enable others to identify plants, and when people know

more about plants they are more likely to want to see them preserved."

For students interested in

## Kay Yatskievych

pursuing a career in plant research, Yatskievych recommends joining organizations and attending meetings that focus on plant research. "This puts them in personal contact with people in the field so that they can ask more specific questions about things that they are interested in," said Yatskievych.



A collage of Kay Yatskievych's photographs for *Field Guide to Indiana Wildflowers* (from the left: *Calla palustris*, *Mitella diphylla*, *Campanulastrum americanum*, and *Cypridium reginae*)

## Begin your plant science career at the IU Herbarium

Before she created *Field Guide to Indiana Wildflowers*, Yatskievych learned the flora and fauna of Indiana by working at IU's herbarium. "[While working at the herbarium], I realized what an irreplaceable treasure an herbarium is," said Yatskievych. "If lost, the specimens that reside there – some hundreds of years old – could never be recollected."

According to Dr. Eric Knox, the curator at the herbarium and a research scientist, an herbarium is a natural history research museum that keeps dried, preserved specimens. "Ultimately, these preserved specimens tell us more than what is written about the plants," said Knox. They offer researchers a view into the history of the organism – when it was first introduced, how it spread, and how it changed over time – and provide a point of comparison with other specimens.

Knox noted that working at the herbarium would prepare students for careers in academics, education, and park and recreation management. Students at the herbarium perform curatorial activities, like mounting specimens, managing loans, and checking the collection for accuracy.

The herbarium is housed in room 130C of the Smith Research Center at 10th Street and Bypass 46. For more information about the herbarium or to view the collection, contact Knox at 855-5007 or visit [www.bio.indiana.edu/resources/herbarium/herbarium.html](http://www.bio.indiana.edu/resources/herbarium/herbarium.html).



Yatskievych studies a specimen at the IU Herbarium. Photo courtesy of Kay Yatskievych

## Beyond the Classroom Biology Major Travels to the Tropics

Whether planting trees in the Atherton Tablelands or snorkeling above the coral reefs in Panama, Kimberly Newhard, an IU biology major, adds adventure to her education.



Newhard and her classmates enjoy the sunset while camping in the Corcovado area of Costa Rica. Photo courtesy of Kimberly Newhard

For the past two years, Newhard has spent her summers traveling abroad, studying tropical ecosystems, and soaking in different cultures. "I've had the chance to travel all over [Costa Rica], and I've seen wet forests, dry forests, cloud forests, mountains, dolphins, poison dart frogs, the Pacific and Caribbean mar, and I've also had the chance to snorkel and see coral reef in Panama," said Newhard.

To help fund these trips, Newhard has applied for and received the Sears Crowell scholarship the past two years. The scholarship honors Professor P. Sears Crowell, a former member of biology's faculty, and is open to junior, senior, or graduate-level departmental majors enrolled in an internship program or class at a field station.

In 2003, Newhard traveled to the Atherton Tablelands in Australia to participate in a research program with the Center for Rainforest Studies. "In Australia, I researched a powerline corridor which passed through the station's forest. In my project I had to work with about four or five other students from all over the United States to create a proposal to restore the natural habitat. This restoration would make it suitable for more animals to pass through and promote gene flow and diversity," said Newhard. While in Australia, Newhard also visited the Daintree Rainforest of North East Queensland, a World Heritage site with the most complex tropical rainforest ecosystem in the country.

Continuing her focus on tropical ecosystems, Newhard spent this past summer in Monteverde, Costa Rica, studying

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## Tropics con't

whether or not insects can detect toxicity from *Bufo marinus* toads (Cane toads) and later helping an IU graduate student with her research on *Hyla pseudopuma*, a meadow tree frog.



Kimberly Newhard explores the forests of Tortuguero, Costa Rica, with the help of her guide, Bill Sambola. Photo by Irene Newhard

For Newhard, traveling gives her the opportunity to explore other cultures and perspectives. "I love meeting people from all over the world and learning what they think about world issues," remarked Newhard. "Coming to Costa Rica allowed me to learn Spanish and to be involved with one of the most advanced countries in the world as far as conservation. I've met researchers that I've only read about in books, and I've had a chance to talk with them and learn about their research projects."

## BIOSPEAK

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## Short on Cash? Apply for Farris Funds.

Unexpected expenses? Want to take an off-campus class but don't have the cash? If you need financial help, apply for money from the department's Farris Undergraduate Biology Fund.

### Who's Eligible to Apply

Undergraduates who meet the following criteria may apply:

- can demonstrate financial need;
- have a grade point average of 3.5 or higher;
- are an undergraduate at the IUB campus, and
- have a declared major in the Department of Biology

### How to Apply

To apply for Farris Funds, compile an application that includes the following:

- A cover letter that describes your circumstances and includes a budget;
- Proof of need. Have the Office of Student Financial Assistance submit a letter verifying your financial need, or authorize the release of your financial records.
- A résumé; and
- A letter of support from a faculty member submitted under separate cover.

Give your application to Biology's Development Officer, Kathy Wyss, in Jordan Hall 120. She will forward your request to the Biology Honors and Scholarship Committee for consideration. Applications will be accepted throughout the academic year and for as long as funds remain available.

## Biotech degree con't

go off in areas that they're interested in, like if they want to get away from the bench and maybe go into regulatory or legal more," Winkler said.

The size and mission of different biotechnology companies also offers different opportunities to job searchers. "In the industry, there are two kinds of companies: the bigger more established companies like Eli Lilly, and the small start-up biotech companies," Winkler said. "They usually have very different environments. The bigger established companies tend to have a lot more people, a lot more well-defined areas that they work in. In some ways, they can be more bureaucratic . . . The smaller biotech

companies are trying to make a splash, find new things quickly and get them to market. So it's a really different kind of environment – kind of a rip-roaring, got to find this tomorrow because we only have so much cash kind of environment. . . So there are a lot of opportunities, not only with subject area but also with what kind of company you want to work for."

Students can enroll in the program now and can graduate with the degree in the spring of 2008. If you have questions about the Biotechnology degree, please contact Mary Ann Miller in the Undergraduate Advising Office or visit [www.bio.indiana.edu/undergrad/degrees/biotech\\_description.html](http://www.bio.indiana.edu/undergrad/degrees/biotech_description.html).

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