



CAREER DEVELOPMENT : ARTICLES



minority scientists network

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Following the Image

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When Ahna Skop (pictured left) met the president of the United States in early November at a ceremony honoring the winners of the Presidential Early Career Award for Scientists and Engineers--the highest honor bestowed on young scientists by the U.S. government--she was the only one the president spoke to.

President George W. Bush struck up a conversation with Skop--who is part Cherokee and was recognized for her innovative research and her mentoring of Native-American students--when he noticed a sticker of the Bushes' dog, Barney, on Skop's blouse. "I was being a goofy person. I put the sticker on, and the other faculty thought I was crazy," she says. "It turned out it was the only way to get him to talk to us."

Skop has built a career attending to details that other people pass over, whether it's cellular detritus, Barney stickers, or shy high school students. Focusing on the overlooked, she has found, can lead to important scientific discoveries, ignite conversations, and inspire outsiders to see the beauty in science.

SECRETS OF CELL DIVISION

Skop studies cell diversification, which begins with cytokinesis, the division of cells in an embryo. When everything proceeds smoothly, orchids and cougars and corals result. But cell division run amok can lead to cancers and birth defects. To understand how a single cell knows when, where, and how to divide, Skop studies the embryos of *Caenorhabditis elegans*, the roundworm.

When a cell splits in two, a small scar, called the midbody, develops briefly then disappears. Scientists long thought the midbody was a garbage dump, housing the discards of cell division. Walther Flemming, the biologist who discovered the midbody in 1891, suspected it was important but didn't have the tools he needed to look inside. According to John White, co-inventor of the scanning confocal microscope and Skop's Ph.D. adviser, Skop was the first to apply the modern techniques used to study proteins and genes to understanding the midbody.

The midbody turned out to be a very active place. "I found that all the stuff that was in this garbage can was actually important," Skop says. She discovered more than 100 new proteins active in cell division--proteins scientists now can study and use to develop new drugs for cancer and other diseases.

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At high school in Fort Thomas, Kentucky, Skop's ability to riff on others' ideas won science fairs. She would search the pages of *Scientific American* for projects, "put two and two together, and come up with something that people had never seen," she says. "I felt like I was being rewarded for my creativity and my thinking."

Skop comes from a family of artists who love science. Her father, Michael Skop, is a classically trained fine artist. He also taught anatomy, drawing bone structures by hand. Her mother, Kathy, is a ceramicist and art educator who teaches high school art classes. Kathy's love of dissection, discovered while she was in graduate school, informs her jewelry and ceramic designs.

During her education, Skop was exposed to many different art forms and to students from around the world. Lessons in everything from welding and sculpting to drawing and painting and a 2-month summer tour of the art museums of Europe instilled in her an appreciation of creativity and of her parents. "I'm really inspired by them, and [I] embraced their love for creativity in everything that one does," Skop says.

Skop's parents didn't know much about science, she says, but adds: "They knew that if I got a work study in a science lab, it would lead to something." In 1990, they sent her to Syracuse University in New York state, her father's alma mater, where she was introduced to *C. elegans* and majored in biology and ceramics--the pot-throwing kind, not materials science. From her freshman year, she worked in the lab of Professor Kevin Van Doren (now deceased). While still an undergraduate, she attended a *C. elegans* meeting at the University of Wisconsin (UW), Madison. "I just loved it. I thought it was a bunch of awesomely creative people and a lot of fun," she says. "It was that experience that changed my life."

FOLLOWING THE PICTURES

When it came time to move on to graduate work in 1994, Skop knew she wanted to stay with "the worm people" and study molecular biology. From her previous experience in Madison, she knew it was a great place to do science. But she didn't know who to study with. An image in her developmental biology textbook provided a lead.

"I saw a picture of the *C. elegans* embryo with the microtubules all lit up," she says. "It was the coolest thing." John White, who had just moved to UW Madison, had taken the picture. Skop decided to spend some time in his lab to see if she wanted to work with him. "I was scared shitless," she says. "But when I saw him doing all this live imaging on embryos, I said, 'This is it. This is like my art side.' I was really turned on by it."

White says Skop looks at the world quite differently from most scientists. "It means that she will probably make progress in fields where others do not because of her unusual insight," he says.

It helps that she's brilliant at the bench. "She has a wonderful knack for getting experiments to work," White says. When they don't work, she instinctively understands how to tweak the parameters to get back on track. This skill has given her the confidence to tackle "complicated, far-out" experiments, like her doctoral research that uncovered the role that secretion plays in cytokinesis, which she did in White's lab, and her investigation of the midbody during her postdoc. "It was all fairly groundbreaking stuff," White says.

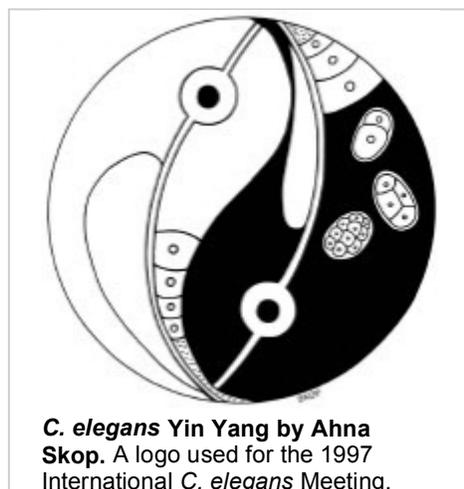
Another image, this one on the cover of *Nature*, sent Skop to the University of California (UC), Berkeley, for a postdoc. "I wanted to isolate the midbody and see if there were proteins in there," she says. "I went all over the world asking to be in people's labs. And a lot of people said, 'No.'" Rebecca Heald, a young cell biologist at UC Berkeley and the author of the *Nature* paper, said yes.

It was a leap of faith for Heald, who was just getting her lab off the ground, and for Barbara Meyer, the geneticist at UC Berkeley who also took Skop into her lab. Neither studied cell division, but each had some of the tools Skop needed to answer the questions she had already decided to address. Skop also collaborated with John Yates of The Scripps Research Institute in San Diego, California, who helped her sequence the midbody proteins.

"Ahna was unique in that she already knew what she wanted to do," Heald says. "That she was able to characterize the proteins functionally was very impressive." Skop published her work in the 2 July 2004 issue of *Science*, and her image of Chinese hamster cells caught in the act of division landed on the cover. "For her, that's the ultimate goal, not just for the status of a cover image on a sexy, high-profile journal but rather that this is a beautiful image that people are going to see," Heald says.

Today, a 3' x 4' enlargement of Skop's *Science* cover hangs in the lobby of the Genetics-Biotechnology Center building at UW Madison, part of an exhibit Skop created to highlight the artistry and diversity of the work done in the department.

Skop herself occupies a nearby office. After her postdoc, Skop applied for a position in human genetics at UW Madison. "She's not a human geneticist, so she didn't get the job," says Michael Culbertson, chair of the Genetics Lab



at UW Madison. But her big, global approach impressed the department so much that they created a new position. "There are radical changes in the way genetics is practiced," Culbertson says. "Older faculty members don't know how to do this." In order to provide students with the latest science, departments have to bring in assistant professors with newer expertise.

Skop and others of her generation are having an impact on the department. "At faculty meetings, we have broader, deeper discussions of issues. We have enough women on the faculty that they actively participate. I think we come to better decisions," Culbertson says. "I really like it."

INSPIRING OTHERS

Once back in Madison, Skop let educators at the local Indian reservations know that she was willing to host student visits to her lab. A steady stream of high school students has flowed through ever since. "I'm not this nerd who sits in a lab all day," she says. "I'm friendly. I make videos of embryos dividing, and we're understanding how nature works. It's easy to grasp. The kids start to relax and ask questions. And by the end of the day, they're totally excited."

Skop still finds time for her outreach and her art. She continues to curate an art show at the biannual *C. elegans* meetings, something she started doing while in graduate school. "It's a nerd art show, but it's become a highlight of the meeting," she says. Skop draws a lot of worm art and submits it to the shows, but her current passion is cake decorating. "I took a class to make my wedding cake, and it's my new art form for the moment," she says. "I think if I wasn't a scientist, I'd be a chef."

Juggling all those projects is hard work, Skop says. But she's passionate about them, no matter how idiosyncratic they may appear to others, so she makes time to fit them in--and she believes they have helped her career. "When I went on the job market, everyone knew that I did the art show," she says. "It stood out. A lot of faculty want a colleague who's going to be fun and a good scientist. I think if you have a passion for something, do it, and eventually it will pay off down the line."

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Images. Top: University Press, University of Wisconsin-Madison. Middle: Courtesy of Ahna Skop.	DOI: 10.1126/science.caredit.a0800010

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