

JULY 2001

BRYN MAWR COLLEGE

S&T

A quarterly newsletter on research, teaching, management, policy-making and leadership in **Science and Technology**.

INSIDE:

2. Symposium on Women in Science
4. Discovering How Taxol Works
6. The Mind of a Child
8. Changing Course to a Career in Medicine
11. Working at the Nexus of Law and Science
15. New Factors in the Chemistry Equation

KEEP US INFORMED:

Please send us your comments on this issue, ideas for future issues, and news about your professional interests and accomplishments.

Al Dorof, Editor
adorof@brynmawr.edu
info@brynmawr.edu
610-526-6525 (fax)

Barbara Spector writes on science and technology as well as business topics. She is the managing editor of Family Business magazine and former editor of The Scientist.

POLICY

Shaping Science Policy — International, National and Regional

By Barbara Spector

A LIBERAL ARTS EDUCATION teaches students to think critically, articulate their ideas clearly and analyze complex issues. So it's no surprise that Bryn Mawr alumnae with an interest in research have entered the science and technology policy arena. Here's a look at the careers of five graduates whose work has helped shape S&T policy on the international, national and regional levels.

White House Senior Adviser

Lori Perine '80 served in the White House Office of Science and Technology Policy (OSTP) from February 1997 until the Bush administration was installed, rising to the position of deputy associate director of technology. Today, she's president and CEO of Interprettech LLC, a consulting group that focuses on advancing innovation.

At OSTP, Perine was a senior adviser on technology issues and oversaw national policy and research initiatives in information technology, nanotechnology, transportation and energy. She helped gain support for federal R&D initiatives in industry, academia and Congress and worked closely with the President's Information Technology Advisory Committee and the President's Committee of Advisers on Science and Technology.

Translating R&D developments into national priorities often involved explaining emerging technologies and their impact on citizens' lives. "One of the problems of science and technology policy today is that it's very difficult for the scientific community to get the rest of the world to understand what it's talking about and why it's important," she says. Her position required an understanding of the total science and technology enterprise — "from R&D to commercialization," she notes. "You have to be aware of the entire context, and you have to be able to talk to a lot of people."

President Clinton's speeches incorporated some of her writings. "Those had to be very simple and very clear, yet make a strong point," she recalls.

Perine previously was senior policy adviser for technology to the Secretary of Commerce and a senior economist at the National Institute of Standards and Technology. Before her government service, she worked at the World Bank, where she focused on energy policy. *(continued on page 13)*



Lori Perine '80, president and CEO, Interprettech LLC.

Women in Science

Symposium on Women in Science: Exploring Critical Issues and Opportunities

by Dorothy Wright

HOW CAN SCHOOLS and colleges best use new learning technologies to advance girls' interest and education in science? What strategies succeed in breaking through barriers to women in start-up technology businesses? How should colleges prepare women who are not majoring in science and math to succeed in a world where literacy in these areas is a necessity of modern life?

These are among the timely questions that will be addressed by Bryn Mawr alumnae, members of the Association for Women in Science, educators, public-policy makers and business leaders participating in a Bryn Mawr College symposium titled "Women in Science: Opportunities in a Changing Landscape," scheduled for October 26–27, 2001. Co-sponsored by the College's Center for Science in Society, the symposium is designed to shed light on today's issues and opportunities for women in science.

"It is not the same world it was 25 years ago, when there were relatively few women pursuing advanced degrees and careers in the sciences," says Ruth Lindeborg '80, associate director of foundation and corporate programs at Bryn Mawr College, who is working with the faculty and alumnae to organize the symposium. "Indeed women have transformed science workplaces. But we are not where we should be today, as girls and women all along the pipeline disproportionately leave science education and careers. To facilitate change, we need a better understanding of current issues and challenges for women in science education and careers."

Identifying Common Ground

Participants in the symposium will identify common ground through an opening panel discussion among five distinguished women working in various science settings, including traditional corporations, govern-

ment research agencies and entrepreneurial start-ups. Moderated by Catherine Didion, executive director of the Association for Women in Science, the panelists will share their observations about their professional fields and workplaces.

"It is significant that this symposium is taking place at Bryn Mawr, which has fostered women's interest in the sciences," Didion says. "In the past, many institutions have seen scientists as being born rather than created. Yet for young women, having an opportunity to explore all avenues of interest and to see role models — including women of color — is critical. I hope this symposium will discuss some of these traditionally nonsanctioned pathways."

Panelists will include Maria-Luisa Maccacchini, president and CEO of Annovis Inc.; Priscilla Perkins Grew '62, professor of geology and former vice chancellor, University of Nebraska; and Anne M. Thompson '78, atmospheric chemist at the NASA Goddard Space Flight Center.

"The panelists will provide attendees with a view of the state of women in science and technology, identifying institutional changes and emerging opportunities — both where these have occurred and where they have not," Lindeborg says.

symposium

Workshops on Science Education and Careers

The symposium will offer eight workshops focusing on specific questions along two basic tracks — science education and science careers. The workshops will be convened by Maria Pellegrini and Maxine Lazarus Savitz '58, who will consider issues raised by panelists and elaborate on these questions. Pellegrini is program director at the W.M. Keck Foundation and

Dorothy Wright contributes news and feature articles on science, technology, engineering and general interest topics to a variety of publications, including Civil Engineering, Engineering News Record and Bryn Mawr Now.



Janice M. Hicks '80,
program director, National
Science Foundation



William Wulf, president,
National Academy of
Engineering

former professor of biology and dean of research in the College of Letters, Arts and Sciences at the University of Southern California. A member of the National Academy of Engineering and the National Science Board, Savitz is general manager for technology partnerships at Honeywell Corporation.

“The emphasis on workshops comes out of our goals to give participants concrete measures to bring back to their own workplaces and to collect participants’ recommendations about practice and policy that can be applied in science education at the pre-college and college levels as well as in workplaces,” Lindeborg explains.

The workshops will run through Saturday morning, after which participants will reconvene as a group to share reports on their deliberations.

“I am looking forward to the BMC meeting as a way to brainstorm for new activities to help change the status quo,” says Janice M. Hicks '80, program director of analytical and surface chemistry at the National Science Foundation, and one of the symposium’s planners. “Bryn Mawr is in a good position to provide leadership in educating academic administrators and leaders to create the kinds of changes needed to help advance under-represented groups in science. Perhaps we will find some catalysts for other segments — government, industry and professional societies — as well.”

Among the highlights of the symposium will be a keynote address by William Wulf, president of the National Academy of Engineering. The symposium will close with a national policy perspective on women in science and technology.

Renewing Connections and Sparking Change

The symposium’s planners (see sidebar) believe the event will help current alumnae and faculty participants renew valuable connections. “We’d like the symposium to serve as a springboard for additional opportunities for alumnae to provide their professional expertise for the benefit of the departments where their training began,” Lindeborg says. “We also hope to develop a professional affinity list to facilitate ongoing networking and discussion of women in science issues.”

To promote beneficial changes in science education and workplaces, the symposium’s proceedings will be posted on Bryn Mawr’s Web site, followed by a paper-based publication for public distribution. “If we truly have a national agenda for increasing the number of people moving into the science and technology fields, we need concrete ways to promote women among them,” Lindeborg says. “We believe the recommendations of our participants can facilitate change.

“Indeed we hope this is not the end, but the beginning of a conversation about these issues.” ■

Symposium Planners Represent Broad Perspectives

Bryn Mawr Faculty

Paul Grobstein,
*professor of biology
and director of the Bryn
Mawr College Center for
Science in Society*

Rhonda Hughes,
professor of mathematics

Elizabeth McCormack,
*associate professor of
physics*

Bryn Mawr Alumnae

Katharine Frase '79,
*director, World Wide
Applications,
Interconnect Products,
IBM Microelectronics
Division*

Janice Hicks '80,
*program director,
Analytical and Surface
Chemistry, National
Science Foundation*

Toby Horn '71,
*education and outreach
coordinator, Fralin
Biotechnology Center,
Virginia Tech University*

J. Pari Sabety '77,
*director, Technology
Policy Group, Ohio
Supercomputing Center*

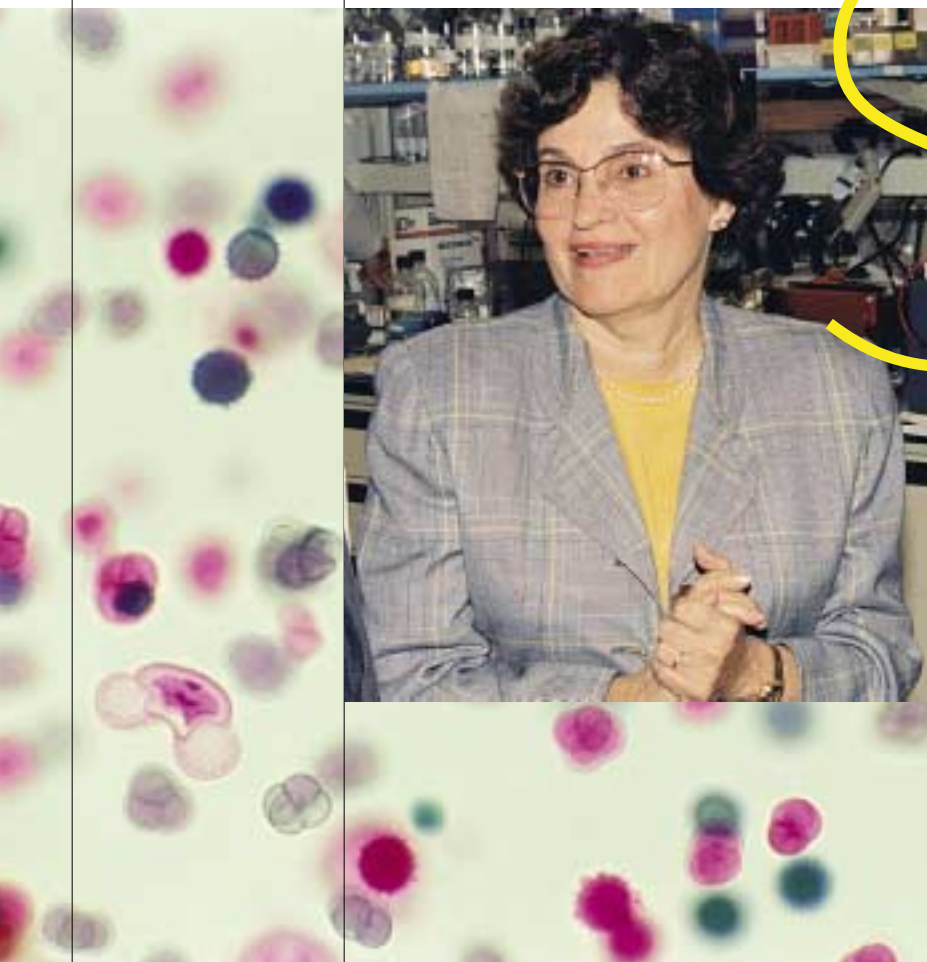
Lori Perine '80,
*president and CEO,
Interpretech LLC, and
former deputy
associate director of
technology, White House
Office of Science and
Technology Policy*

Julie Sheridan Eng '88,
*director of product devel-
opment, Agere Systems*

Taxol

Discovering How Taxol Works

By Karen Young Kreeger



SUSAN BAND HORWITZ '58 recalls a story about L. Joe Berry, one of her former biology professors at Bryn Mawr. About four years after she graduated, Horwitz and her husband dropped in at Bryn Mawr on their way back to the Boston area from a camping trip in the Appalachians. "As we were walking down the corridor talking, Dr. Berry yelled out from his office, 'Gee, that sounds like Susan Band.' My husband was shocked. He had been at Harvard where there were big classes and no one would ever do that."

To Horwitz, this encounter exemplifies the kind of close relationships she cultivated during her undergraduate studies at Bryn Mawr. Over four decades later, Horwitz is now the Falkenstein Professor of Cancer Research at Albert Einstein College of Medicine in New York and co-chair of its department of molecular pharmacology.

Researching Anti-Tumor Drugs

One of Horwitz's most outstanding scientific achievements was determining how the anticancer drug taxol slows tumor growth. This effort encouraged the National Cancer Institute to pursue taxol as an antitumor drug and eventually led to the approval by the Food and Drug Administration of taxol in the treatment of ovarian, breast and lung cancers.

Horwitz started her research on taxol in 1976, about the same time she became interested in small molecules, particularly those of natural origin, and their use in treating disease. Taxol had been isolated from the bark of the yew tree and its structure determined. The fact that it had lengthened the lifespans of mice with some experimental cancers encouraged the NCI to look at taxol as a potential anticancer agent. In 1976, NCI wrote to Horwitz, asking if she would look at taxol's mechanism of action.

"The chemical structure of taxol is unique and it looked extremely interesting to me, so I said, 'Yes, please send me 10 milligrams,'" she recalls. "Within a month

Karen Young Kreeger is a science journalist who writes on biomedical and women's health topics, as well as careers in science. Her most recent work has appeared in BioScience, Genome Technology, Muse and The Scientist.

we knew that we had a very interesting molecule that was doing something to cells, which no one else had seen occur with a small molecule. It was very exciting.”

Specifically what Horwitz and colleagues found was that taxol binds to microtubules, which are part of the cytoskeleton of all cells. Microtubules are important to cell division, and when taxol binds to these structures, it paralyzes them, slowing dramatically the ability of the cell to divide.

A Bit of Serendipity

Horwitz’s work with taxol unexpectedly renewed her ties to Bryn Mawr. She has collaborated on the drug’s synthesis with a faculty member, Charles Swindell, a former chair of the Chemistry Department. “I happened to be glancing through the *Bryn Mawr Alumnae Bulletin* and I stopped at the word taxol, seeing that Swindell received a grant to work on the synthesis of taxol,” she says. “I gave him a call and of course he didn’t know that I had graduated from Bryn Mawr, but after a bit of introduction we became very good friends.” They published many papers together, some co-authored with Nancy Krauss ’91, a doctoral student who was studying with Swindell.

research

For the past three decades Horwitz’s lab — which currently numbers more than 10 people, from Ph.D. students to postdocs and visiting scientists — has been researching not only taxol and other potentially important anticancer drugs but also how tumors become resistant to drugs. “We’re looking for new drugs that would demonstrate efficacy in tumors different from those treated by taxol that would also be active in taxol-resistant tumors.”

Horwitz is also very active in the Albert Einstein Cancer Center, where she is the associate director for therapeutics. In addition, she was just elected president of the American Association for Cancer

Research, a large nonprofit professional organization with 17,000 members. “This is a new activity for me and I’m looking forward to it,” she says.

Balancing Professional and Family Life

After graduating from Bryn Mawr, Horwitz went on to Brandeis University, where she was in the first class of the newly formed graduate Department of Biochemistry. She received her Ph.D. there in 1963 for work on dehydrogenases, enzymes that modify sugar alcohols in microorganisms.

Of her graduate-school years, she says, “Lots of things happened to me besides getting my Ph.D.” She married, and she delivered twin boys five days after defending her dissertation. From there she took a number of part-time postdoc positions before her children entered grade school — at Tufts University Medical School, Emory University and the Albert Einstein College of Medicine, where she has been since the late 1960s.

“After I worked part-time for a couple of years, I realized that I had to make a decision because my children were going into the first grade,” she remembers. “Working part-time, I was paid miserably and it was clearly not going to get me anywhere. So I said to myself, ‘It’s now or never — either come back full-time or be part-time forever.’” She immediately accepted a full-time position and hasn’t regretted her decision one bit.

Horwitz is refreshingly open about how she melded her career in science with raising a family: “There’s no single way to do it. Each of us has to find whatever way we’re comfortable with, and follow the track that makes us happy and productive.” She attributes part of this attitude and confidence to her days at Bryn Mawr: “I think the feeling that women can be productive and be successful is imbued in you at Bryn Mawr.” ■

“We knew that we had a very interesting molecule that was doing something to cells, which no one else had seen occur with a small molecule. It was very exciting.”

Susan Band Horwitz '58,
Albert Einstein College of Medicine

Theory of Mind

The Mind of a Child By Lisa R. Bechler

IF YOU'VE EVER shaken your head in wonder at the way a child thinks, you're not alone. At one time or another, most parents will question their children's sometimes bewildering behavior. What's gotten into him? How did she know that? When did he learn to do that? Kimberly Cassidy, assistant professor of psychology on the Rosalyn R. Schwartz Lectureship at Bryn Mawr College, is pursuing answers to those questions.

A Passion for Research

Cassidy joined Bryn Mawr as a lecturer in 1993, after earning her B.A. in psychology from Swarthmore College in 1985, an M.S. in biology from Long Island University in 1989, and her M.A. (1990) and Ph.D. (1993) in psychology from the University of Pennsylvania. While attending Long Island University, she taught elementary school, but she ultimately decided to pursue her passion for research. "There's something aesthetically pleasing about the transformation from question to answer through the scientific process," she explains. "I find it intellectually elegant."

In 1998, Cassidy applied for and won a tenure-track position at Bryn Mawr. "Kim had done some very interesting research, and we felt she'd be very compatible with our clinical developmental and school psychology programs," says Leslie Rescorla, Psychology Department chair and professor, who also directs the Child Study Institute at Bryn Mawr. The department's faculty members represent the areas of developmental, clinical, cognitive, biological and social psychology. Cassidy teaches both undergraduate- and graduate-level courses, and she offers ongoing research opportunities for her students. "By having a research program that students find

interesting, I've been fortunate to get a lot of undergrads involved in science," she notes. "They take that into the community, where they become proponents of science themselves."

A developmental psychologist with a focus on cognition and education, Cassidy maintains a keen interest in research with children. Bryn Mawr has easily accommodated her vocation. In addition to offering strong undergraduate and graduate programs, the College is home to the Phebe Anna Thorne School, which is directed by Marilyn M. Henkelman '71. The nursery school doubles as a real-world "lab" for student and faculty research while providing an important service for the public. Cassidy encourages her students to serve as teaching assistants at the school, giving them further opportunities for observation and research.

Theory of Mind

Cassidy's main research emphasis is on theory of mind, or the development of children's theories about the minds of others. In other words, Cassidy studies the way a child learns to understand how a person's behavior relates to her or his thoughts. In children, the ability to reconcile and even influence another child's behavior is premised on such understanding.

psychology

Investigating theory of mind involves studying the age when children acquire it, its relationship to language development, sources of theory of mind information (e.g., children's books), and the relation-

Lisa Bechler is a communications consultant for clients in the high technology, health care, pharmaceutical, financial services and higher education sectors.

ship between a child's level of theory of mind and her or his level of social behavior. "We believe theory of mind is important because it is core to getting along with others socially," explains Cassidy. "Autistic children, who have great difficulties in this area, have profound social impairment. This is one piece of evidence that theory of mind matters."

In another area of research, Cassidy looks at what children learn from the sound of language itself. For example, she studies the phonological differences between female and male names, and believes these differences may affect everything from female/male stereotypes to children's product marketing. To explore this theory, Cassidy conducted a study in which she gave identical tea sets to both boys and girls. One tea set was made by a company with a female-sounding name while the other was made by a company with a male-sounding name. "The kids preferred the tea set with the name that more closely matched their own gender," recalls Cassidy. "We're looking at these connections, and how they impact kids in the real world."

Committed to Kids

In addition to being admired for her teaching and research, Cassidy is highly regarded for her publication record. She has authored 14 articles, several of which were co-authored with Bryn Mawr students, for journals such as *Developmental Psychology*, *Cognition*, *Journal of Experimental Psychology: General*, and *Psychological Bulletin and Review*. "It's important to be a contributor to the field. For me, the work I do has practical applications for kids, so it can really make a difference." Cassidy's research has been supported by the Harry Frank Guggenheim Foundation.



Cassidy is also well-respected among her faculty peers. "Kim is a wonderful teacher. She's committed to helping her students and is a terrific colleague," says Rescorla. "She simply never lets you down."

When it comes to her family, Cassidy works hard not to let anyone down either. She is married to an environmental lawyer and has two boys, ages 18 months and five years. From the family pictures that cover her office and the excitement in her voice when she talks of her work with children, it's easy to see that Cassidy is in the right field. "I like that my research is with kids," she says. "You never know what they're going to say or do. It's completely captivating." ■

"There's something aesthetically pleasing about the transformation from question to answer through the scientific process."

Kimberly Cassidy,
assistant professor
of psychology

Medicine

Changing Course to a Career in Medicine By Lisa R. Bechler

"The postbac program provides a wonderful opportunity for career changers to take an intensive science curriculum. It's an excellent training ground for medical school."

Jodi Domsky,
program director

Lisa Bechler is a communications consultant for clients in the high technology, health care, pharmaceutical, financial services and higher education sectors.

WHETHER BY FATE OR FORTUNE, Francisco Aguilar took the road less traveled to become a doctor. When he graduated in 1993 from Georgetown University with a B.S. in business administration, he thought his career path was set and accepted a position with Chase Manhattan Bank. But three years later, he saw the writing on the wall. "I realized that I wasn't doing anything for anyone but myself," Aguilar recalls. "I'd been exposed to medicine through my dad, who's a doctor, and as an emergency medical technician in college. It felt like those experiences outweighed everything I was doing on a daily basis as an accountant."

Because he didn't have the premedical coursework to apply to medical school, Aguilar was unsure of his options. Then he heard about the Postbaccalaureate Premedical Program at Bryn Mawr College. Established in 1972, this program enables those who have not met their premedical requirements to take the courses they need for medical school. "The postbac program provides a wonderful opportunity for career changers to take an intensive science curriculum," says Program Director Jodi Domsky. "It's an excellent training ground for medical school."

An Intensive and Successful Program

Students like Aguilar who participate in the postbac program gain a solid foundation in the sciences, learning the core concepts, scientific methodology and key analytical skills they need for medical school. In just 12 months, postbac students complete their premedical coursework in general chemistry, biology, organic chemistry and physics, plus optional calculus and biochemistry classes.

To enrich the postbac year and enhance their knowledge of health-care practices and delivery systems, postbac students often volunteer at medical facilities throughout the Philadelphia region. "The



Loren Santow

Francisco Aguilar, University of Chicago Pritzker School of Medicine

program is about more than learning science," Domsky emphasizes. "While they're here, postbacs think of themselves as future physicians. They become involved in the field and gain a lot of exposure to physicians and the practice of medicine, both through volunteer opportunities and medically related activities offered through the program."

Bryn Mawr's Postbaccalaureate Premedical Program is highly selective, accepting just 50 to 75 students a year. It's also highly successful — more than 93 percent of Bryn Mawr postbac students who apply to medical school are admitted. The program is described in detail on the College's Web site at www.brynmawr.edu/postbac.

From an applicant's perspective, the program is an attractive choice for several reasons. It is one of the few programs that can be completed in 12 months — typically, one academic year plus one or two summers.

The College's reputation for academic rigor is equally important. "Bryn Mawr is recognized for its strong science program, and postbacs know they're going to have full access to that," says Domsky. "Also, many highly respected medical schools are familiar with our track record and the caliber of the students we attract. That can work to a student's advantage when applying."

Bringing Fresh Perspectives to Medicine

Tripler Pell completed the postbac program in spring 2001 and is headed for Brown University School of Medicine this fall. She credits the program with helping her understand and appreciate the sciences in a way she had not before. "I had never been a science student in the past and it was a little daunting to jump in," she admits. "Bryn Mawr offers a very supportive environment. The people here really want you to succeed." A big part of that support comes from Domsky, her staff and the faculty, all of whom provide individual advising and ongoing assistance to postbac students throughout the year.

Pell graduated from Harvard University in 1996 with a B.S. in modern European history and received an M.S. in history of medicine from Oxford University in 1997. After completing her studies, Pell worked as a research assistant at Boston Medical Center and Harvard's Department of Anthropology. She had also volunteered with the International Physicians for the Prevention of Nuclear War and Doctors Without Borders. These experiences led Pell to pursue a career in medicine.

Pell is one of many postbac students who took advantage of the consortial option, which enables students to attend medical school directly after completing the postbac program. Bryn Mawr has consortial arrangements with nine top medical schools. According to Domsky, consort schools welcome applications from Bryn Mawr postbacs. "They're interested in the bright, intellectually curious, nontraditional student who has pursued other interests, had experience in the real world and taken time to think about what they want from life," says Domsky. "These students usually have a unique perspective when they get into their clinical years and are dealing with patients."

Good Medicine

Nathan Congdon, assistant professor of ophthalmology at Johns Hopkins University School of Medicine and Public Health, illustrates the appeal of such nontraditional students. Before entering the postbac program, Congdon earned an A.B. in Chinese and Arabic language and literature from Princeton University in 1985, and an M.A. in classical Chinese literature from Cambridge

University in 1987, which he attended on a Marshall Scholarship. He also traveled extensively throughout Europe and Asia, spending a year in Taipei, Taiwan, to study Chinese. Once back in the United States, Congdon made the choice to pursue a career in medicine. "I wanted to go back to China and contribute in a way that went beyond just being able to talk to people," he says.

Congdon completed the postbac program in 1988 while serving as a teaching assistant in Chinese at Bryn Mawr and Haverford Colleges. At Bryn Mawr, he also met his wife, Ana. "That had to be the most valuable experience I had at Bryn Mawr," he says with a chuckle, then adds, "The postbac program taught me how to manage my time and my stress levels. Those are key survival skills, especially because I'm usually rushing around every second of the day." Following Bryn Mawr, he went to medical school at Johns Hopkins, graduating in 1993 with an M.D. and M.P.H. Following medical school, Congdon completed a residency at Johns Hopkins and a fellowship at the Wills Eye Hospital in Philadelphia.

For the last three years, Congdon has taught, practiced and conducted research at Johns Hopkins, where his clinical specialty is glaucoma and his research interests include cataract prevention, Vitamin-A deficiency and the epidemiology of glaucoma

(continued on page 10)



Jim Roesse

Tripler Pell,
Brown University
School of Medicine

Changing Course

(continued from page 9)



Nathan Congdon, Johns Hopkins University School of Medicine and Public Health

in Asia. Congdon has published in numerous medical journals, including *Archives of Ophthalmology*, *Ophthalmology*, *Investigative Ophthalmology & Visual Science*, *The British Journal of Ophthalmology*, *Bulletin of the World Health Organization* and *The American Journal of Clinical Nutrition*. His work takes him regularly to Asia, Africa and Latin America, and he also volunteers for a blindness-prevention program in Baltimore. At home, he enjoys spending time with his one-year-old daughter, Amelia.

Human Kindness

Andrew Fisher is a physician whose commitment to medicine started and continues right here in Bryn Mawr. With his B.A. in psychology and anthropology from Harvard University (1973), Fisher initially went into policy research and development in Canada before recognizing his true calling. He returned

home to complete the postbac program in 1976, and earned his M.D. from the University of Rochester Medical School in 1981. Today, Fisher is a partner in his father's former medical practice in Bryn Mawr, where he serves the local community, including Bryn Mawr faculty members. "It's great to be able to get to know a group of people and work to help them."

medicine

For Fisher, Aguilar, Pell and Congdon, the decision to become a doctor was made only after they had diverse life experiences outside of medicine. And though they completed the postbac program years apart from one another, all share a common goal — to make a difference in the lives of their fellow human beings. It is Pell, perhaps, who best summarizes this commitment: "I want to be useful. I want to help people. To me, that's more important than any book or body of research I could ever produce."

Thanks in part to the Bryn Mawr postbac program, she and other students will have a chance to do just that. ■

POSTBACS RECONNECT

Over the years, former postbacs can lose touch with one another due to the sheer intensity of their academic and career pursuits. But Avery Grauer, postbac class of 1996, is hoping to change that. As she completes her M.D. at Yale University this spring and prepares for her residency in internal medicine at Yale next fall, she has been working with the Bryn Mawr Alumnae Association to establish a way for postbacs to reconnect with each other and the College. "I've come to realize what an incredible experience the postbac program was, and I feel it's important to give back to a place that's done so much for me."

Through an online newsletter or similar paper-based bulletin, Grauer hopes to create a venue for graduates to keep in touch with one another, donate their time and support to the College, and create networking opportunities in the cities where they will be attending school or working. "The idea is to reach out and reconnect people on multiple levels," she says. "I think good things can come of that."

Law & Science

Working at the Nexus of Law and Science By Barbara Spector



AS A POLITICAL SCIENCE major at Bryn Mawr College, Ursula Bartels '79 was inspired by the political philosophy courses of Stephen G. Salkever, Mary Katharine Woodworth Professor of Political Science. Her role model was Bryn Mawr's former president Mary Patterson McPherson. The life sciences? They were far from her mind.

"I was not a science person at all at Bryn Mawr," says Bartels, who took geology to satisfy her undergraduate science requirement. Her passion was student government. After graduating with a degree in political science, Bartels worked as a paralegal and entered law school at the University of Virginia a year later. Today, she helps researchers navigate one of science's most crucial frontiers — the nexus between research and the law.

Diversity of Views

As vice president and general counsel of Boehringer Ingelheim Corporation, Bartels, 43, is responsible for all legal affairs at its five U.S. subsidiaries and is legal counsel and corporate secretary to the board of directors. Boehringer Ingelheim, headquartered in Germany, is the world's largest privately held pharmaceutical company. The company's products target many disease areas, but it focuses especially on respiratory and AIDS medications. In 1999, it reported revenues of about \$4.6 billion. Bartels enjoys investigating the cutting edge of both law and science. "Part of the fun of this job is that I'm working with an underlying substantive topic that is challenging," she says.



Paul F. Korker

Ursula Bartels '79, vice president and general counsel, Boehringer Ingelheim Corporation

While she didn't do molecular biology or immunology research in college, Bartels developed skills that have served her well in her career. "When I was at Bryn Mawr, I learned how to think and ask questions — how to have an open mind toward a diversity of views," she says. A stint as a researcher for a former general counsel to the Food and Drug Administration, Richard Merrill, sparked her interest in food and drug

(continued on page 12)

Barbara Spector writes on science and technology as well as business topics. She is the managing editor of Family Business magazine and former editor of The Scientist.

Law and Science

(continued from page 11)

law. A call from a headhunter in 1988 brought her to SmithKline Beecham (now Glaxo SmithKline). She joined Boehringer Ingelheim nearly two years ago.

Science Outpaces the Law

From her office in Ridgefield, Conn., Bartels leads a team of attorneys who every day face a fundamental dilemma: “Science is clearly evolving a lot faster than the law,” she says. “The law has to scramble to catch up.”

One gray area involves patient privacy issues. “We’re living in the information age, in which anything you want is available on the Internet,” Bartels notes. Another issue yet to be resolved is whether pieces of the genetic code can be patented. Although biomedical research organizations are pressing forward with patent applications, the courts have yet to determine whether the patents will hold up, she says.

law

“Business is all about taking intelligent risks,” Bartels asserts. “If you only did things that were safe, you wouldn’t get anywhere.” Her department educates research staff about the potential legal pitfalls that inevitably accompany scientific progress. Lawyers sit in on scientific meetings and discuss with company researchers the necessity of patenting the assays or processes used in their investigations.

One of her department’s more routine functions is developing contracts for Boehringer Ingelheim’s funding of academic research and determining which institutions will own the rights to the products of experiments Boehringer Ingelheim supports. “The critical thing is the contact among the scientists,” Bartels stresses. When researchers collaborate, “kinetic things happen,” she says. “The idea from a business standpoint is to be able to harness that.”

Global Business, Multinational Law

The fact that Boehringer Ingelheim is a global corporation also poses challenges for the legal department. Company researchers, seeking to simplify procedures, would like to have a purchase-order template they could use to contract for all supplies. Corporate attorneys, on the other hand, recognize that a contract that is valid in the United States may not apply in Belgium. “We have to explain that you can’t use a single purchase order all around the world,” Bartels says. “The world is struggling to get to a place where the law is as globalized as business is.”

Bartels and her staff of 15 attorneys — several of whom have advanced degrees in science — draw up contracts with biotechnology company partners that deal with the details of screening assays and combinatorial chemistry techniques. Her department frequently must provide legal input to Boehringer Ingelheim’s sales and marketing staff on the language used in product claims to ensure compliance with FDA regulations. Through meetings with company researchers, she’s had plenty of science lessons. “Often they want to start at Level 1,000, and you have to start at Level 1,” she says. “I tell them that I need to ask a lot of questions, and I hope that they won’t mind.”

Her nonscientific background has its benefits. When Boehringer Ingelheim goes to court with a patent-infringement case, for example, she’s able to see the scientific evidence the way a juror might see it — which helps frame arguments and prepare trial exhibits that lay out the science in an understandable way.

Bartels’ work takes her to Europe four times a year to meet with top officials at the company’s headquarters in Germany’s Rhine Valley. When she’s not traveling, her days start between 7:15 and 7:30 a.m., a schedule that enables her to make phone calls to Germany during business hours in Europe. She tries to leave the office by 6:30 p.m. to have dinner with her partner, Laura Zucker, and their three children, ages eight, six and two. “I’m not sure I could do this job if I were a single mom,” she says. ■

Shaping Science Policy

(continued from page 1)

Promoting International Accord

Tamae Maeda Wong '84 is program director in the Division for International Organizations and Academy Cooperation at the National Research Council (NRC), the working arm of the National Academy of Sciences and the National Academy of Engineering. She manages U.S. participation in international unions representing astronomy, chemistry, crystallography, mathematics, optics, physics and radio science. The unions facilitate global collaboration — for example, by negotiating universal standards and fostering worldwide interactions for scientific progress. The United States participates in the unions via national committees, which Wong manages.

policy

“You want scientists in any discipline to be able to freely interact,” she explains. In the realm of scientific inquiry, “national boundaries make no sense.” On the other hand, governments have security concerns, which often lead to the establishment of laws and regulations that impede the ability of researchers — and their work — to cross international borders.

Because of concerns about scientific espionage at the Department of Energy, for example, it can take weeks for a researcher from a sensitive country such as India — which has recently become a nuclear-weapons power — to obtain clearance to attend a conference at a national laboratory.

Wong's responsibilities include ensuring that news about the U.S. committees' activities is disseminated to scientists at the grass roots. To ensure free information flow, her office interacts with U.S. professional societies on matters related to international activities. It also addresses major issues such as chemical-weapons treaties to ensure that a review of such international accords is grounded in good science.

Wong, who earned her Ph.D. in materials science and engineering from the University of Pennsylvania, began her career at NRC in 1992 as a staff officer in

the Board on Chemical Sciences and Technology. She is the former editor of the Association for Women in Science's magazine.

She relishes her role in building the infrastructure that enables science to progress. “Some people may call it ‘bureaucracy,’ but the system needs to be in place in order for U.S. science to work at an international level,” she says.

Capitol Hill and the Private Sector

Gemma Flamberg '85 is a legislative analyst in the Office of Legislative Policy and Analysis (OLPA) within the Office of the Director of the National Institutes of Health. “Even where NIH is not in a regulatory role, the private sector looks to NIH for guidance on key policy issues,” she notes.

OLPA's mission is “to facilitate and enhance the relationship between NIH and the Congress; advance NIH legislative priorities; and ensure that the NIH community receives essential information, advice and guidance regarding developments in the Congress that affect NIH,” explains Flamberg, who focuses on bioethics and technology transfer issues.

Flamberg attends congressional hearings and analyzes newly introduced legislation to determine how it might affect the agency. “We frequently provide technical assistance to congressional staffers as the legislation is modified,” she says. “I typically respond to several inquiries a day from congressional staffers. These run the gamut from simple questions — such as, ‘What is NIH's budget for diabetes research?’ — to more complex questions that might require me to explain the legal parameters for conducting human embryo research and fetal tissue research.”

Flamberg earned a law degree from American University and worked for the Office of the General Counsel at the Department of Health and Human Services before joining NIH. “We are at a point where our scientific ability has outpaced our ability as a society to grapple with difficult moral and ethical issues,” she says. “We may be able scientifically to clone a human being, but we can't figure out whether we want to, or ought to. The way this dilemma plays out on Capitol Hill is fascinating, and extremely exciting.”

(continued on page 14)



Tamae Maeda Wong '84,
program director, National
Research Council



Senta Raizen M.A. '45,
director, National Center
for Improving Science
Education



Pari Sabety '77, director
for technology policy,
Ohio Computing Center

Shaping Science Policy

(continued from page 13)

Educating the S&T Educators

Senta Raizen, M.A. '45, is the director of the National Center for Improving Science Education, which promotes change in policies and practices for science, mathematics and technology education. It aims to bridge the gaps among research, policy and practice in curriculum development, teaching and learning, and assessment.

“Policy isn’t just an application of research; it’s influenced by people’s values,” Raizen says. As an example, she cites the use of student test scores to assess teacher accountability. Tests are only one way to measure students’ capabilities. They don’t assess students’ motivation to continue their studies, their in-depth knowledge or their ability to do sustained work or apply their knowledge to unfamiliar situations. Assessment of such additional factors is “complicated and costly” and therefore not a priority of policy-makers, she notes.

Raizen, a former Sun Oil Co. chemist who’s also certified as a high school chemistry teacher, began her involvement in science education in the 1960s as a National Science Foundation program officer dealing with curriculum improvement.

“One of the problems of science and technology policy today is that it’s very difficult for the scientific community to get the rest of the world to understand what it’s talking about and why it’s important.”

Lori Perine '80

Currently, she leads an NSF-funded project studying induction and support programs for beginning teachers in five countries. In other nations, new teachers spend less time in the classroom and meet regularly to share their experiences, she notes. In the United States, by contrast, “we tell the new teachers, ‘Sink or swim.’” Because seniority determines classroom assignments, new teachers often face situations that impede success.

Raizen is an adviser to several major education studies, including the Third International Mathematics and Science Study (TIMSS). She headed a study

sponsored by the U.S. Department of Education and wrote reports dealing with science-education curriculum, teaching and assessment reform as well as numerous books and articles. She’s led major evaluation efforts and national education policy forums.

E-Commerce Policy-Making

Pari Sabety '77 directs the Technology Policy Group (TPG) at the Ohio Supercomputer Center. The group addresses legal and policy challenges arising in a “networked society” supported by pervasive computing devices and electronic commerce.

TPG coordinates E-Com Ohio, a landmark effort to use national benchmarks to measure the readiness of Ohio’s businesses and citizens to adopt e-commerce (www.ecom-ohio.org). TPG’s Privacy Series Conference (www.privacy2000.org), in its third year, is one of the top privacy conferences in the United States, where business leaders and policy-makers discuss new approaches to privacy issues with academics, chief security officers, attorneys and other experts. Sabety notes, “Today, information can be gathered on consumers’ every click and financial transaction on the Internet; we should all be concerned about how it is shared and used. Tomorrow, with the advent of pervasive computing, companies will have the power to collect extremely intimate information on sensory preferences, eye movements, usage patterns and cognition details of human behavior. To protect citizens’ rights, we must redefine the human boundaries of privacy and autonomy.”

From 1987 to 1991, Sabety served as economic development policy adviser to former Ohio Gov. Richard Celeste. In the governor’s office, she witnessed first-hand “the transformational power of technology to change an economy — from the way factories operate on the plant floor to the relationships between companies and their suppliers and customers.” After Celeste left office in 1991, they founded a consulting firm, Celeste & Sabety, which focused on technology as a driver of economic development in states and regions as diverse as California, Nebraska, Long Island, San Diego, St. Louis, Denver and New Jersey. Sabety’s e-mail address is sabety@osc.edu. ■

Chemistry

New Factors in the Chemistry Equation

By Karen Young Kreeger

TWO NEW ASSISTANT professors joined the Bryn Mawr chemistry faculty last fall, and the department now spans the broad spectrum of the field's disciplines, from biochemistry and organic chemistry to inorganic and physical chemistry, as well as covering a wide range of basic research projects with applications from novel materials to fighting industrial pollution to designing drugs.

Susan A. White, associate professor of chemistry and chair of the department, says the research and teaching skills of the two new faculty members mesh well with the research interests of other faculty and the courses offered to students. White's own area is RNA biochemistry, specifically RNA structure, stability and protein binding.

Focus on Enzyme Inhibitors

William P. Malachowski, assistant professor of chemistry, arrived at Bryn Mawr from the University of New England in August 2000. He's a synthetic bioorganic chemist whose research focuses on the interface between organic chemistry and biochemistry. Last year he taught two courses in organic chemistry and plans to teach general chemistry next fall as well as a topics course in modern medicinal chemistry.

Malachowski's research has been published in the *Journal of Biological Chemistry* and the *Journal of Organic Chemistry*, and his work has been funded by the National Science Foundation and the National Institutes of Health.

The central research theme of his lab is the development of enzyme inhibitors, molecules that block what an enzyme normally does. For example, most drugs are enzyme inhibitors. "Right now I have two projects that work to develop methods of generating these inhibitors," he says.

One project focuses on developing beta-lactam protease inhibitors. Most antibiotics in use today are beta-lactam antibiotics, such as penicillin. More recent examples are the protease inhibitors used to treat AIDS and other diseases such as cancer, rheumatoid arthritis and pulmonary embolisms. "At this point we haven't focused on any one ailment," he says. "This work has general applications."

His approach is to test his methods for designing molecules on chymotrypsin, a well-characterized protease located in the gastrointestinal tract. "If we can show a way of designing a molecule that will inhibit chymotrypsin, then it could be applied to other enzymes in the same class." From there a pharmaceutical company could pick up on his basic concepts and apply it toward a commercial process.

His second research interest involves synthesizing another type of molecule called alpha-aminophosphonic acid, which is used to make inhibitors of proteases and other enzymes. Although there are methods to make this type of inhibitor, none has been routinely adopted. Malachowski is developing more efficient and easier ways to make this molecule. "There are a lot of ways to make it, but we're looking to improve it," he says.

Connecting with Surface Chemistry

Edward Wovchko is Bryn Mawr's newest assistant professor of physical chemistry. He came straight to Bryn Mawr after earning a Ph.D. at the University of Pittsburgh in 1998. After a year of teaching physical chemistry and general chemistry, he took on courses in inorganic chemistry. He became a tenure-track faculty member in September 2000. Wovchko's research has recently appeared in the *Journal of Physical Chemistry* and *Langmuir*. (continued on page 16)



RNA Biochemistry

Susan A. White, associate professor and chair of the Chemistry Department



Synthetic Bioorganic Chemist

Assistant Professor
William P. Malachowski



Photocatalytic Pathways

Assistant Professor
Edward Wovchko

A quarterly newsletter on research, teaching, management,
policy-making and leadership in **Science and Technology**.

S&T

New Factors

(continued from page 15)

Wovchko points out that he is “interested in nanotechnology and plans to investigate surface reactions on substances such as nanotubes,” but he currently specializes in analyzing chemical processes that occur on the surfaces of high-area materials. He uses spectroscopy and ultrahigh vacuum techniques to examine reactions between two phases, gas and solid. The surface chemical processes he studies involve materials such as aluminum oxide, silica, porous silicon and calcium oxide, which function as supports in automotive catalytic converters, industrial catalysts and semiconductor-device fabrication, and as adsorbents for hazardous pollutants such as chlorocarbons.

“We’re also searching for synthetic routes using heterogeneous photocatalysts and are investigating the thermal destruction of hazardous molecules on solid adsorbents,” Wovchko explains. “I’m particularly drawn to the area of catalysis because of its immense impact in commercial synthetic processes.”

He is attempting to devise a heterogeneous catalytic process that will incorporate ultraviolet light as an energy source. His interest in photocatalytic pathways may one day be applied to solar-based chemical technologies and environmental clean-up methods.

Team Chemistry

Wovchko and Malachowski have joined a distinguished faculty with wide-ranging interests in chemistry. Frank B. Mallory, the W. Alton Jones Professor of Chemistry, studies organic photochemistry — the use of nuclear magnetic resonance spectroscopy to view interactions among organic molecules — and “graphite ribbons.” “In the last several years he has involved students in a project inspired by materials

science and nanotechnology to make designer molecules,” says White of Mallory’s graphite ribbons, which are made of long strings of benzene rings.

Professor Michelle M. Francl, who specializes in computational and theoretical physical chemistry, studies chemical structure and reactivity using computers in a burgeoning area called computational chemistry. Of particular interest to her group is the development of methods for assigning Class III atomic charges to certain molecules. Francl works with students on projects ranging from protein structure to organic reaction mechanisms.

Associate Professor Sharon J. Nieter Burgmayer is focused on metalloenzymes, which are widely distributed throughout nature and are important in organic reactions critical to the health of many organisms.

chemistry

Because the metalloenzymes are difficult to study in nature, Burgmayer and her students use synthesized models of coenzymes to study how they behave.

While the department members are clearly dedicated to advancing their research, White emphasizes that aspects of all their scientific investigations make it into the classroom, so students, as well as science itself, benefit from the creativity and ingenuity of the College’s chemistry faculty. ■

Karen Young Kreeger is a science journalist who writes on biomedical and women’s health topics, as well as careers in science. Her most recent work has appeared in BioScience, Genome Technology, Muse and The Scientist.



Metalloenzymes

Associate Professor
Sharon J. Nieter Burgmayer



Designer Molecules

Frank B. Mallory,
W. Alton Jones Professor
of Chemistry



**Computational
Chemistry** Professor
Michelle M. Francl