

New Terrain for a New Millennium

By Dr. Enriqueta C. Bond, BWF President

*In science the important thing is to modify
and change one's ideas as science advances.*

Herbert Spencer (1820-1903)
— *English naturalist, philosopher*

When one door closes another door opens.

Alexander Graham Bell (1847-1922)
— *American inventor*

One of the most gratifying aspects of being associated with a private foundation is our ability to identify opportunities and realign strategies to adapt to a changing environment.

The year 2000 has been a particularly exciting time for biomedical science and for the Burroughs Wellcome Fund. As we do every five years, we have been evaluating our existing programs in an exercise we call "terrain mapping." Through this process, we look for new opportunities where our grant dollars may be able to boost the careers of promising young scientists and to catalyze growth in particular areas of research.

In particular, we note that the complete sequencing of the human genome presents research scientists with an incredibly powerful tool for discovery. Yet to find useful information within this tremendous resource will require a shift in training that academic institutions must soon realign themselves to handle. Mining the human genome will require not only a foundation in biology, but also fundamental skills in computational methods, chemistry, mathematics, and materials and physical sciences.

At the same time, the emergence or reemergence of infectious diseases presents the world with a struggle that demands immediate attention. Infectious diseases are responsible for devastating human health in many developing and tropical countries and increasingly threaten even developed countries, as the emergence of the West Nile virus in the United States has amply demonstrated.

Similarly, the physician-scientist is at a crossroads. Changes in the financing of medical research and health care threaten to undermine further the translation of knowledge gained from basic research into

new or improved methods to treat or prevent diseases. Many physician-scientists, who play a critical role in identifying clinical questions and implementing advances in the basic sciences, have fewer financial resources and less time available for clinical studies, and they also face increased competition for access to patient populations for such studies. Support for researchers who pursue the vital link between basic and clinical research and train the next generation of investigators is more vital than ever.

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BWF Names Bernadette M. Marriott as New Vice President

Bernadette M. Marriott, Ph.D., is the new vice president of programs and communications of the Burroughs Wellcome Fund. She joined BWF on September 1.

Dr. Marriott comes to the Fund from Northern Arizona University, where she was vice provost for research and graduate studies, dean of the Graduate College, and professor of biology.

"I am particularly excited by BWF's approach in identifying interdisciplinary science contributions to health and by the primary emphasis on supporting undervalued areas of science, since I believe that these are areas in which private foundations can have great impact," Dr. Marriott says.

Dr. Marriott will oversee all aspects of planning, developing, evaluating, and managing program and communications activities at the Fund.

"We are delighted to have Dr. Marriott join the Wellcome family, and we look forward to the leadership and the scientific and administrative skills she will bring to the program," says BWF President Enriqueta C. Bond, Ph.D.



Dr. Bernadette M. Marriott

Dr. Marriott has a wealth of experience in scientific research and management. She was the first director of the National Institutes of Health's (NIH) Office of Dietary Supplements, which was established in 1994. She went to NIH from the Food and Nutrition Board, National Academy of

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BWF's Contact Information:

21 T. W. Alexander Drive
Post Office Box 13901
Research Triangle Park, NC 27709-3901
Telephone (919) 991-5100
Fax (919) 991-5160

www.bwfund.org

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And regardless of which direction research is headed, there will always be a demand for top-notch research scientists coming down the pipeline. These promising scientists must be able to envision a future in research, and that's where our career development programs make their mark. Consistently, we hear that our Career Awards in the Biomedical Sciences program provides young scientists with the freedom to choose their own research avenues and bolsters their ability to obtain an academic appointment. Our Board of Directors is united in its stance that BWF should not only continue, but should expand our support for outstanding young scientists throughout all of our program areas.

The board likewise felt that our support of middle school and high school students in BWF's home state of North Carolina merits not only continuation, but expansion. If we are to have a continuing flow of bright young people who choose science as a career, then we must give young people the opportunity to experience the thrill of scientific discovery. We will be continuing to offer our Student Science Enrichment Program, but will also explore ways to leverage our funds to champion science education and export successful science enrichment programs beyond our state border.

We took into consideration that after several years of substantial growth in our award programs due to the generous

\$400 million gift from the Wellcome Trust, BWF's sister philanthropy in the United Kingdom, we have now reached a steady financial state. After careful reflection upon our mission and goals, BWF's program staff presented the Board of Directors with a variety of potential avenues for our future, and recommended a scenario that we believed makes best use of our resources. The board approved a scenario that brings our programs into tighter focus. There are now five core program areas:

- Career awards
- Infectious diseases
- Interfaces in science
- Translational research
- Science education

In deciding on these focus areas, the board and staff had to make the difficult decision to eliminate or reshape some programs that BWF has supported for many years. This does not mean that we are abandoning particular fields of study, but simply retooling our programs to better fit the changing research environment. We also felt that we could be most effective as an organization if program staff could each focus on a particular program area, while simultaneously broadening the range of support we offer BWF awardees. In addition, the board felt strongly that we should spend more time evaluating the effectiveness of our existing grant offerings so that as an organization we are making continuous improvements in our programs.

Going forward, awardees will be offered additional opportunities to present their work and network with colleagues at convocations sponsored by BWF, as well as additional opportunities to obtain information on career development, support for collaborative research, and mentoring.

Following is a summary of new programs that will be offered, current programs that will be continued, and current programs that will be discontinued. Application deadlines also are listed, except for the programs still being developed.

NEW PROGRAMS**Interfaces in Science — an individual career award program**

(Under development for 2002)

This competitive award program will be designed to complement our Institutional Interdisciplinary Training Program awards, in that fellows from our training programs will be eligible and encouraged to apply. In addition, postdoctoral investigators who are not fellows in our training programs but whose work bridges biology and a physical or computational science also will be eligible. The program will be loosely modeled after our Career Awards in the Biomedical Sciences program, with variation to accommodate the special challenges that face interdisciplinary scientists. The program will be offered in alternate years from our Interfaces in Science institutional program.

ONGOING PROGRAMS**Career Awards in the Biomedical Sciences**

(In Honor of Gertrude B. Elion and George H. Hitchings)

Deadline: October 1, 2001

Clinical Scientist Awards in Translational Research

Deadline: September 1, 2001

Support for study of infectious diseases
(Reshaped program under development for 2002)

This program will be designed to encourage the study of human-pathogen interactions. It will encourage young

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Sciences, where she was responsible for planning and managing the research evaluation of national and international food and nutrition activities.

She has conducted studies on a variety of issues related to natural food supplementation and micronutrient requirements in humans and in nonhuman primates. Her studies have focused on the long-term feeding habits of nonhuman primates in natural habitats and in the laboratory, on recommended dietary allowances for humans, and on nutrient requirements for older Americans. She also has served on numerous

advisory boards and review panels for research support and scientific publications.

Dr. Marriott has lived and worked outside the continental United States in Iran, Scotland, and Puerto Rico, and she has conducted field research and taught in Afghanistan, Nepal, Panama, Puerto Rico, and Thailand. She speaks five languages.

Dr. Marriott received a Ph.D. in experimental psychology in 1976 from King's College, University of Aberdeen, Scotland. She then undertook research training in comparative medicine at the Johns Hopkins University School of Medicine. Her undergraduate degree in biology/immunology is from Bucknell University.

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investigators to use recently developed tools to pursue interesting new avenues of research, such as genomics and transgenic animal models. The goal will be not only understanding individual pathogens, but also shedding light on the overarching issues of how the human host handles infectious challenges.

Interfaces in Science**Institutional Interdisciplinary Training Program**

Deadline: April 10, 2000

(Awards for the 2001 series will be announced in November 2000)

This program will likely be offered again for the 2003 award cycle.

Student Science Enrichment Program

Deadline: October 15, 2001

DISCONTINUED PROGRAMS

(The deadlines listed are for the final series of awards)

Scholar Awards and New Investigator Awards in Molecular Parasitology; Scholar Awards and New Investigator Awards in Molecular Pathogenic Mycology; New Initiatives in Malaria Research

Deadline: January 16, 2001

(Programs will be reshaped for 2002)

New Investigator Awards in the Pharmacological or Toxicological Sciences

Deadline: November 1, 2000

BWF Research Travel Grants

Deadline: November 1, 2000

Visiting Professorships in the Basic Medical Sciences; Visiting Professorships in the Microbiological Sciences

Deadline: March 1, 2001

Programs in reproductive science

Deadlines vary: see below

BWF no longer will support reproductive science as a distinct focus area. However, we will continue support for reproductive science through the Career Awards in the Biomedical Sciences program. In addition, BWF will provide another two years of support for the Reproductive Scientist Development Program Junior Faculty Scholar Awards, which are funded and administered in partnership with a consortium of government, philanthropic, and professional organizations (application deadline: October 1, 2001). BWF also will support the training course "Frontiers in Reproduction: Molecular and Cellular Concepts and Applications," held annually at the Marine Biological Laboratory (application deadline: February 7, 2001).

BWF 24x7**Probing the Biochemical Pathways of Neuromuscular Diseases**

As a child, Jill Rafael watched the Jerry Lewis telethons for muscular dystrophy. Seeing the crippled children on television made quite an impression. Today, her goal is no less than to understand the origin and development of neuromuscular disorders.

"I thought it was so sad young children had to go through that," she says, recalling her telethon-watching days. So she did all that a six-year-old could do: she saved up her only income—her allowance—and sent it to Jerry Lewis and the children with muscular dystrophy.

Jill Rafael, now 30 years old, holds a Ph.D. from the University of Michigan and is an assistant professor of molecular and cellular biochemistry at Ohio State University School of Medicine. Her receipt, in 1999, of a BWF Career Award in the Biomedical Sciences has provided the funds to start her laboratory, as well to launch a new project that has already borne fruit.

She is studying Duchenne muscular dystrophy (DMD), which is an inherited condition that, when it strikes, usually is present at birth. The disease causes the degeneration of skeletal muscle fibers,

which are gradually replaced with fat and fibrous tissue. DMD usually leads to death before maturity, from either respiratory problems or heart failure.

Dr. Rafael is using mouse models to study the disproportion of abnormal skeletal muscle fiber in DMD. She hopes her research will eventually lead to the identification of the biochemical pathway for this abnormality. Such a discovery could lead to the development of new target therapies for the disease, she says.

The progression to heart failure among muscular dystrophy patients is understudied, Dr. Rafael says, and this is her second focus. Even when the skeletal muscle disorder in muscular dystrophy can be controlled, many patients will still die of heart failure. Not much is known about why this happens—"that's why we're studying it," she says.

In addition to these areas of study, Dr. Rafael is working in a fresh, new direction for muscular dystrophy research. In recent years, scientists have discovered a network of proteins at brain synapses, which are

Virtually every minute of every day, somewhere in the world a scientist is using Burroughs Wellcome Fund dollars to improve human health. Each month, in a new Web-based feature we are calling BWF 24x7, we will introduce you to a scientist, physician, or educator who is taking science in exciting new directions and bringing a fresh perspective to the research enterprise. These people are the members of our Burroughs Wellcome Fund family, and we hope you will enjoy meeting them.

The first of these features is included here, but check out www.bwfund.org for a new feature each month.

the sites at the ends of nerve cells where signals pass from one neuron to another. The function of these proteins, called PDZ domain-containing proteins, is to cluster channels and receptors at the synapses.

Dr. Rafael thought similar networks might also be present in skeletal muscles

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at the junction of the nerve and muscle. She set out to determine if these networks indeed exist, and if they would lead to new information about neuromuscular diseases and their causes.

The fact that the PDZ project is now under way is due, in part, to the financial backing she has from her BWF award, Dr. Rafael says. "The award has given me the freedom to start something completely novel," she says. And that is exactly what the PDZ project is: it began with an innovative,

new idea, which she then pursued with her BWF funding.

Without the award, Dr. Rafael says, she would have had to depend on obtaining federal funds from the National Institutes of Health. This would have made her work considerably more difficult, she explains, because researchers typically cannot obtain funding for a project without a significant collection of data already available. This would have forced a young scientist like Dr. Rafael to build on other scientists' existing work, instead of pursuing new ideas of her own.

Only a short while into the project, Dr. Rafael discovered four of these PDZ networks in skeletal muscle. Their existence might mean that these PDZ domains play a role in neuromuscular disease. And that may lead to a better understanding of these diseases—and possibly to new treatments.

"It would be nice to understand the pathogenesis of all neuromuscular disorders and to be able to treat them," says Dr. Rafael, who is now fulfilling the dreams of that six-year-old child.

— *This story was written by Megan Butler, Communications Intern*

Questions for Jill Rafael



Dr. Jill A. Rafael

BWF Award: 1999 Career Award
in the Biomedical Sciences
Affiliation: Ohio State University
School of Medicine
Academic Title: Assistant Professor
of Molecular and Cellular Biochemistry

Web site: www.med.ohio-state.edu/mcbiochem/Rafael.htm

When did you discover you wanted to be a scientist?

In seventh grade, I had a science teacher who taught us about genetics, and I thought that conducting genetic research on neuromuscular diseases was the best way that I could go about trying to help children with these diseases.

What has your BWF grant meant for your research?

It has given me the freedom to pursue novel areas of research into neuromuscular diseases and to acquire the preliminary data needed to apply for and be awarded grants from the NIH. Without this award, I would have had to continue only the exact line of research that I had been pursuing prior to starting my own laboratory in order to immediately apply for federal funding. It is so wonderful to have the opportunity to pursue new creative ideas when starting your own laboratory.

What is the best thing about your job?

The enthusiasm and dedication of my staff and students for the research that we do in the lab.

What is your philosophy with respect to your research?

I think it's really important to attempt to think of novel ways to approach scientific questions. Since the ultimate goal of what

I do is to cure diseases, I don't feel that it is productive for 20 different laboratories to be doing the exact same experiments. I also think that it is important in any workplace, including the laboratory, to provide a good atmosphere, since it is much easier to run a lab full of people who enjoy their jobs.

What kind of advice would you give a scientist just entering academic research?

I would say that students entering graduate school should carefully pick the lab in which they choose to do their thesis research. It is important to choose an adviser who has time for you and has your interests at heart. Although really large labs appear attractive, you may regularly interact only with a post-doc rather than the principal investigator of the lab. You also may miss important opportunities, such as learning how to write grant proposals and manuscripts, since these tasks often will be carried out by the post-docs in a large lab.

What area of science is in most need of new researchers?

Since enormous amounts of DNA sequence have been produced from the Human Genome Project and sequencing projects of other species' genomes, there is a real need for people who can create methods to analyze this data. Bioinformatics is certainly a growing field. However, there is always a place in both academia and industry for creative, enthusiastic people interested in any area of science.

What do you do for fun?

I love traveling and exploring new places. I also really enjoy outdoor activities like camping, hiking, canoeing, and gardening.

What is the best book you ever read?

I'm a Stranger Here Myself, by Bill Bryson, a year-long compilation of weekly newspaper columns by this travel writer who returned to live in the United States after spending most of his adult life in the United Kingdom. Since I spent three years living in the United Kingdom, many of Bryson's accounts seem very familiar to me.

Deadlines Approaching for Popular Training Courses

Three training courses for biological scientists and medical researchers, to be held in summer 2001 at the Marine Biological Laboratory, in Woods Hole, Massachusetts, have upcoming application deadlines. The courses are supported, in part, by the Burroughs Wellcome Fund.

The Biology of Parasitism course is designed for advanced graduate students, postdoctoral scientists, and independent investigators who seek training in modern approaches to the study of protozoan and helminthic parasites. The course will be led by Edward J. Pearce, Ph.D., associate professor of microbiology and immunology at Cornell University College of Veterinary Medicine, and by Christian Tschudi, Ph.D., assistant professor of internal medicine at Yale University School of Medicine. Dr. Pearce is a BWF Scholar in Molecular Parasitology, and Dr. Tschudi is a BWF New Investigator in Molecular Parasitology. Tuition is \$3,900 plus room and board.

The Frontiers in Reproduction course is an intensive laboratory and lecture course for independent scientists and physicians and advanced postdoctoral scientists who seek training in cellular, immunological, and molecular biological approaches to the understanding of reproduction. The course will be led by Joan Hunt, Ph.D., professor of anatomy and cell biology at the University of Kansas Medical Center; by Kelly Mayo, Ph.D., professor of biochemistry, molecular biology, and cell biology at Northwestern University; and by Gerald Schatten, Ph.D., professor of cell and developmental biology at Oregon Health Sciences University. Tuition is \$3,900 plus room and board.

The Molecular Mycology course is designed for advanced graduate students, postdoctoral scientists, and independent investigators who seek training in molecular methodologies for studying fungal pathogens important in human disease. The course will be led by John E. Edwards, Ph.D., chief of the Division of Infectious Diseases at Harbor-UCLA Medical Center; by P. T. Magee, Ph.D., professor of genetics and cell biology at the University of Minnesota; and by Aaron P. Mitchell, Ph.D., professor of microbiology at Columbia University College of Physicians and Surgeons.

Dr. Mitchell is a BWF Scholar in Molecular Pathogenic Mycology, and Drs. Edwards and Magee are members of BWF's mycology program advisory committee. Tuition is \$2,100, which includes room and board.

<u>Course</u>	<u>Dates</u>	<u>Application Deadline</u>
Biology of Parasitism	June 7 - August 4	February 1, 2001
Frontiers in Reproduction	May 24 - July 1	February 7, 2001
Molecular Mycology	August 6-24	April 13, 2001

Each of these courses is limited to 16 students. Complete course descriptions and application forms, as well as information about scholarships, can be found on the MBL Web site at courses.mbl.edu.

News Notes

BWF awarded Life Sciences Research Fellowships to three researchers in 2000. The Fund supports the awards, which provide \$120,000 over three years and are open to U.S. and Canadian postdoctoral scientists, in partnership with the Life Sciences Research Foundation (LSRF). The awardees and their projects are:

Ryan B. Case, Ph.D.

University of California-Berkeley
Biophysical analysis of 13S *Xenopus* condensin

Su L. Chiang, Ph.D.

Harvard School of Public Health
Genetic approaches to identifying mycobacterial virulence genes

Douglas J. Guarnieri, Ph.D.

University of California-San Francisco
Characterization of a *Drosophila* neuropeptide receptor involved in ethanol-induced behavior

BWF will provide support for one more round of awards (the application deadline has passed, and the awards will be announced next summer). LSRF intends to continue the fellowships; contact LSRF at (609) 258-3551 or visit its Web site at www.lsrp.org.

• Nenad Ban, Ph.D., a 1999 recipient of a BWF Career Award in the Biomedical Sciences, was lead author of a research report highlighted on the cover of the August 11, 2000, issue of *Science*. Dr. Ban and his colleagues at Yale University

described construction of the first atomic-level structural map of a critical portion of the ribosome, the intercellular factory that builds new proteins, in the bacterium *Haloarcula marismortui*, a "salt-loving" organism found in the Dead Sea.

Producing this map is considered a major scientific achievement. Not only does it increase understanding of a key aspect of biology; it also may help guide the development of new antibiotics, and it contributes to the picture being developed of how life evolved in the earliest days.

Dr. Ban recently left his postdoctoral position at Yale to become a professor at the Institute for Molecular Biology and Biophysics, in Zurich, Switzerland.

• Kendall S. Powell, a graduate student researcher at the Salk Institute for Biological Studies, recently completed a summer internship as a reporter at the *Los Angeles Times*, supported by funding from BWF to the American Association for the Advancement of Science Mass Media Fellowship Program.

Mr. Powell covered such topics as the transplantation of cornea cells grown in the laboratory, the hunt for better drugs to fight cancer, and the development of new techniques that stimulate stroke recovery.

"The fellowship program has exposed me to a side of science that is rarely experienced by most bench scientists," Mr. Powell noted in a summary of his experiences. "I have learned so many things about journalism but also about the scientific process that I am both a better writer and a better scientist for my participation."

Making—and Measuring—Progress in Science Education

When Philip Glazier signed up for “The Mysterious Carolina Bay,” a summer program for high school students that is conducted by the Cape Fear Natural Science Academy, in Fayetteville, North Carolina, he had no idea what he was getting into. What he expected to be a relaxed four weeks of sloshing around in the bay with friends turned out to be a real “job.”

The job was to learn various water quality tests: running them, analyzing the results, and determining the status of different bodies of water. In addition, at the end of every day, Philip had to write a daily lab report summarizing the activities, test results, and conclusions. The result? He developed serious science skills and a blossoming appreciation for his watershed.

Three years later, Philip is still pursuing his newfound interest in science—as a chemistry major in college.

Philip’s experiences speak to the success of the Burroughs Wellcome Fund’s Student Science Enrichment Program (SSEP), which supported the Carolina Bay project. Since 1996, we have awarded SSEP grants totaling \$6 million to 46 organizations that reach more than 20,000 middle school and high school students across BWF’s home state of North Carolina.

Our guiding principle is simple: “the best way to get students involved in science is through hands-on, engaging activity.” The programs we fund share certain characteristics: they are generally based outside the school environment; they take place outside school hours (after school, on weekends, or during summer); and they are voluntary activities designed to motivate further learning.

This year, BWF’s Board of Directors has been evaluating the results of the Student Science Enrichment Program to consider funding strategies and next steps.

As part of this process, we have produced a report titled “Science is for Kids.” Our hope is that this report, which is available on BWF’s Web site (www.bwfund.org/special_reports.htm), will focus attention on unmet needs in science, mathematics, and technology education; encourage the development of quality hands-on science enrichment programs; get more young people excited about the process of inquiry and discovery that is science; and attract quality applicants to SSEP activities.

BWF used several approaches to assess the program, including a formal evaluation by an independent research firm. The evaluators found that SSEP is “alive, well, and flourishing,” giving students an inoculation of science and infusing them with enthusiasm. More than 80 percent of the participants said they liked the program and would recommend it to a friend—high praise for this age group. In terms of achieving the program’s goals, students’ responses were highest on nurturing enthusiasm (88 percent) and lowest on fostering career interest (52 percent).

The evaluators did identify areas for improvement. They noted, for example, that content is linked to students’ daily lives, but there are still many missed opportunities to make such connections; that content varies widely, and it sometimes is so complex that it’s not clear whether the students truly understand; and that there is sometimes a tendency to lead students to the right answers, rather than allow them to understand what’s going on.

The “Science is for Kids” report also highlights some of BWF’s other activities focused on improving the environment for science education in North Carolina. As but one example, BWF has supported the Education Future Center, based at the North Carolina School of Science and Mathematics (NCSSM). The center is

the result of a dynamic partnership among diverse stakeholders, including foundations, universities, community colleges, businesses, and state agencies. These partners have joined with the school to expand and support collaborative efforts to develop innovative technology applications and services. In this way, BWF’s initial grant to the center has leveraged additional support totaling over \$20 million.

Among its activities, the center uses the fiberoptic “North Carolina Information Highway” that connects a number of schools across the state. Each “cyber campus” receives innovative advanced curricula, enrichment opportunities, teacher training, and technology assistance. This initiative is enabling NCSSM to reach out to remote areas across the state, electronically connecting students and teachers with the best educational resources in science and math. It also is helping to support current teachers and to prepare new teachers to use technology to enhance learning in the classroom.

Looking ahead, BWF will be working to identify—or develop—a “science champion” for North Carolina. There now is no single voice advocating for the importance of science in the curriculum; no organization drawing attention to the issue in a strategic way; no group pulling the resources together to generate collective action.

As we envision it, the science champion would spearhead such activities as collecting data to identify science education challenges and successful solutions; helping decision makers and stakeholders understand the urgency of the issues related to science education; building bridges between schools and informal opportunities for science education; seeking new ways to attract and keep science education teachers; helping teachers make better use of existing resources and stay up-to-date in their fields; using technology as a catalyst to provide access to information, people, and resources; and building collaborations among scientists and educators.

BWF has a unique opportunity to make this vision real. By doing so, we will make science more accessible, more fun, and more interesting for the next generation of North Carolina students. It’s a big challenge—with an equally large reward.

VISIT BWF’S WEB SITE:

- BWF 24x7: a new monthly profile featuring BWF awardees.
- 2001 award series brochures in .pdf format for viewing and downloading.
- Interactive application cover sheets that can be filled out on-line and printed for submission.
- Special report: *Proceedings of the February 2000 Conference on K-12 Outreach from University Science Departments.*
- BWF annual reports, previous newsletters, and much more!

www.bwfund.org

Getting Students Jazzed about Science

Kenneth Cutler is a man of education—not only his own, but also that of every student who walks into his classroom. Mr. Cutler lives by the philosophy that any dedicated student deserves the right to pursue even the most demanding academic goal. And he is applying his principles in his life's work as a teacher and a mentor to ensure the right to quality education for every young mind.

Always an advocate for education, Mr. Cutler is especially compelled to ensure educational opportunities for the disadvantaged. That was a belief he was exposed to by his own mentor, Dr. Herman G. Cooke, when he was at Elizabeth City State University, Elizabeth City, N.C. And Mr. Cutler is following in his mentor's footsteps to provide opportunities in science for disadvantaged minorities.

Mr. Cutler, who teaches ninth grade physical science and molecular biology at Hillside High School in Durham, N.C., is the coordinator for Project SEED (Summer Educational Experience for the Disadvantaged), which is sponsored in part by the American Chemical Society (ACS) and by the Burroughs Wellcome Fund through our Student Science Enrichment Program.

For his work in science education, Mr. Cutler recently received the 2000 Presidential Teaching Award, which is administered by the National Science Foundation. The nation's highest honor for K-12 mathematics and science teachers, the award recognizes exemplary work both inside and outside the classroom.

Mr. Cutler received \$7,500 for the award, to be used for science education at his discretion. He says he is planning to support Hillside's annual science fair and to implement new technology in the school's science laboratories. He also is considering using some of the money to help pay for going back to school to earn a doctorate in education, with a focus on science and mathematics.

In addition to receiving the Presidential Teaching Award, Mr. Cutler was one of 10 teachers this year to receive the State Farm Good Neighbors Award, which granted him \$5,000 to be donated to the educational institution of his choice. Mr. Cutler plans

to give the money to the Academy of Science and Mathematics at Hillside.

"To get both of these awards this year, I was humbled," Mr. Cutler says.

Mr. Cutler has been with Project SEED since 1991, and he currently coordinates the local section of the program for the American Chemical Society, which developed the program to target underrepresented minorities who historically lag behind other students in science proficiency. Project SEED places economically disadvantaged students in a "real world" science environment, such as university laboratories, for a summer "hands-on" research experience. Working in the labs as paid researchers, students put to use a number of experimental techniques and methods.

It was Mr. Cutler who suggested that ACS seek funding from the Fund. He attributes the increasing success of the program's past three years to the BWF funding, which has enabled students to go on field trips, to attend and participate in poster sessions, and to present their work at major scientific meetings and other venues. These experiences have brought a science career to life for the SEED students, he says.

"It's one thing for students to get exposed to science," Mr. Cutler says. "But when they put together papers and presentations,

plus stay in a nice hotel and get all the perks and equipment, it makes it that much more successful."

In fact, since BWF has been funding Project SEED, all of its graduating students have gone on to major in science in college. Four of this year's graduates even have full academic scholarships. Mr. Cutler says his ultimate goal is for every graduating student in the program to receive a full academic scholarship to study science in college.

Past Project SEED students tell Mr. Cutler that they simply did not know these types of opportunities existed for them in the scientific field. The experience gives them the drive and the confidence to pursue such a demanding field, and their laboratory mentors confirm that.

"These scientists told them, 'yes, you can do this for a living,'" Mr. Cutler says. And that, he adds, is the point of the program.

The success of Project SEED is apparent every time Mr. Cutler takes his students to science fairs, symposiums, and poster sessions held in places like New Orleans and Washington, D.C. Their group is consistently the largest delegation of minority students at these gatherings, and Mr. Cutler says that watching them in action has been the most pleasant thing of all.

— *This story was written by Megan Butler, Communications Intern*

BWF in Profile

The Burroughs Wellcome Fund is an independent private foundation dedicated to advancing the medical sciences by supporting research and other scientific and educational activities. Within this broad mission, we seek to accomplish two primary goals—to help scientists early in their careers develop as independent investigators, and to advance fields in the basic medical sciences that are undervalued or in need of particular encouragement.

BWF has an endowment of approximately \$700 million, and we award approximately \$35 million in grants annually in the United States and Canada. We channel our financial support primarily through competitive peer-reviewed award programs. These programs encompass five major areas: career awards, infectious diseases, interfaces in science, translational research that links basic and clinical research, and science education. The Fund makes grants primarily to degree-granting institutions on behalf of individual researchers, who must be nominated by their institutions. To complement these competitive award programs, we also make grants to nonprofit organizations conducting activities intended to improve the general environment for science.

BWF is governed by a Board of Directors composed of distinguished scientists and business leaders. The Fund was founded in 1955 as the corporate foundation of the pharmaceutical firm Burroughs Wellcome Co. In 1993, a generous gift from BWF's sister philanthropy in the United Kingdom, the Wellcome Trust, enabled us to become fully independent from the company, which was acquired by Glaxo in 1995. BWF has no affiliation either with the company now known as Glaxo Wellcome or with any other corporation.

Science: Reaching beyond Universities

A part of the duties of all scientists, mathematicians, or engineers is to provide for the health of their disciplines by encouraging the next generation of professionals....It is then natural that science professionals should be concerned about how science and mathematics are taught in the K-12 classrooms. The question is not, "Why should scientists support K-12 education?" The question is, "How, and to what effect?"

This is the premise of a conference and related activities organized by the Science House, a learning outreach program based at North Carolina State University and supported, in part, by the Burroughs Wellcome Fund.

The Conference on K-12 Outreach from University Science Departments, held in February 2000, focused on what its organizers

called the "increasingly complicated and challenging connections among universities, K-12 schools, and the scientific enterprise."

The goals of the conference—which brought together scientists, educators, community leaders, and program directors of university outreach programs—were to examine what scientists in North Carolina are doing to support K-12 science, to learn about exemplary programs in other states, and to provide a vision for the development and dissemination of science outreach initiatives.

The conference was organized around a number of key themes.

For example, one theme focused on what scientists can do to support K-12 education in their communities. Among the suggestions, scientists can involve students in research

projects or bring up-to-the-minute learning materials to classrooms.

A second theme focused on the recipients of outreach programs. Here, it was widely stressed that the next generation of scientists must include racial, ethnic, and gender groups now under-represented in the field. Representatives of programs that work with African-American, Hispanic, and female student populations described their approaches to help achieve equity in the science classroom and eventually the scientific workplace.

The conference organizers have now published a 166-page Conference Proceedings, which is available on BWF's Web site (www.bwf.org/special_reports.htm).

"In preparing these Proceedings, we provide a record of how North Carolina university science departments support K-12," the organizers concluded. "As in any good scientific investigation, we hope [the report] will be used as data for future research and development to improve science, mathematics, and technology learning."

Following on the success of this conference, BWF has made an additional three-year grant to the Science House, for more than \$270,000, to support efforts to carry out the steps identified to enhance K-12 outreach from university science departments.

New Effort to Help Hearing-Impaired Students with Science and Mathematics

The Shodor Education Foundation, which holds a science-education grant from the Burroughs Wellcome Fund, recently received \$450,000 from the National Science Foundation to extend Shodor's SUCCEED (Stimulating Understanding of Computational Sciences through Collaboration, Exploration, Experiment, and Discovery) program to hearing-impaired students.

The foundation, based in Durham, N.C., established SUCCEED with a BWF Student Science Enrichment Program (SSEP) grant in 1997. Shodor received another SSEP grant extending the program in 2000.

The original SUCCEED program was developed to bring computer technology from professional science and mathematics laboratories to the classrooms for central North Carolina students and teachers, providing them with an interactive, hands-on learning experience in mathematics and science.

U.S. Congressman David Price, in whose district the foundation is located, announced the NSF grant at a press conference on June 26. In making the announcement, Rep. Price emphasized that it is important not to neglect hearing-impaired students during this time when computer sciences and technology are advancing so rapidly.

"The grant gives \$450,000 to develop the SUCCEED program to make sure no child is left behind in the technology age," he said.

The new SUCCEED-HI program—the HI stands for "hearing-impaired"—will develop signs for the complex technical terms associated with the computing field. Such signs are not currently in the sign language vocabulary, according to Robert Gotwals, computational science director at Shodor. The program also will create a format, to be used in classrooms, that will effectively integrate computational sciences into the curriculum of hearing-impaired students.

"We want to put these tools in the hands of all students, and this NSF grant makes that possible," Rep. Price said at the press conference.

The Shodor Education Foundation is a nonprofit education and research institution dedicated to incorporating computational sciences into classroom curriculums so that as many students as possible have access to more sophisticated learning tools. Shodor's philosophy is that students exposed to the computer and communication tools will have a better and more interdisciplinary understanding of mathematics and the sciences.

"The Shodor Education Foundation is developing and implementing effective uses of technology in education at all levels," said Rep. Price. "They are using their expertise to make sure children with hearing impairments participate fully in the digital era."

— *This story was written by Megan Butler, Communications Intern*

FOCUS

This newsletter is published quarterly by the Burroughs Wellcome Fund, an independent private foundation dedicated to advancing the medical sciences by supporting research and other scientific and educational activities.

Send comments to:

FOCUS editor
Burroughs Wellcome Fund
Post Office Box 13901
Research Triangle Park, NC 27709-3901
Telephone (919) 991-5119
Fax (919) 991-5160
E-mail: khede@bwfund.org

Information about BWF and our award programs is available at www.bwfund.org.