Keeping Up With Rita Colwell

Judging by her frenetic life as researcher, administrator, and dealmaker, the president's choice to be the next director of the National Science Foundation is likely to make her presence felt, say her colleagues

Even as a graduate student in bacteriology at Purdue University some 40 years ago, Al Chiscon sensed there was something different about one of his fellow students. "She knew a lot more than I did, she could see meaningful relationships among things that didn't seem connected, she worked incredibly hard, and she could explain what she was doing both to other scientists and to a general audience," he says, adding: "She was also extremely active."

So Chiscon, now nearing retirement after a long career at Purdue as a professor of biology, wasn't a bit surprised when he heard last month that President Clinton had nominated his former labmate, Rita Colwell, to be the 12th director of the National Science Foundation (NSF). "She's so much more than a good scientist," he says. "I don't know how she does everything."

Colwell is simultaneously a prolific marine microbiologist, a national and international spokesperson for science, and an energetic dealmaker between government, academia, and industry. For the past decade, she has also headed the University of Maryland Biotechnology Institute (UMBI), a $40 million enterprise that includes separate centers for medical, agricultural, marine, and molecular biotechnology. The centers, spread across the state, are meant to pursue basic research that can be applied to economic development.

The 63-year-old Colwell will be taking over NSF as the $3.5 billion basic research agency basks in the glow of a proposed 10% increase for 1999 and promises of continued healthy growth. If NSF ends up with anything close to that figure, Colwell may have the luxury of starting new ventures or expanding current themes without having to cut back other areas. To materials scientist Peter Eisenberger, director of Columbia University's new Earth Institute and a former head of NSF's advisory committee for Mathematical and Physical Sciences, Colwell "is the right person at the right time."

Colwell herself declined to be interviewed before her nomination is taken up by the Senate Labor and Human Resources Committee, where she is expected to receive a sympathetic reception. (The White House has not yet formally submitted her nomination to the Senate, and it is likely to be several weeks before she takes up her new job.) In the meantime, say dozens of colleagues and policy-makers who spoke to *Science*, Colwell's lengthy track record in both the research and policy arenas offer broad hints about the qualities she brings to the job.

These people expect her to pay particular attention to fostering research across disciplines, improving science and mathematics education at all levels, and encouraging academic researchers to link up with industry. They also anticipate that biology and environmental studies will blossom under Colwell, who would be the first biologist to head NSF in the era of modern biotechnology. (William McElroy, a biochemist, was NSF director from 1969 to '72.) "She's a very gifted spokesperson for modern biology and its potential applications for human benefit," says Bruce Alberts, president of the National Academy of Sciences and a cell biologist. "She has had the vision to focus on important issues before they were generally recognized as such," including a concern for interdisciplinary science and the application of molecular techniques to taxonomic and ecological studies.

SAM KITTNER

Global view. Colwell's concerns extend to life around the planet, represented by these creatures in her Washington home.

Mary Clutter, head of NSF's biology directorate, says she'll be glad to see a fellow life scientist as her boss. But she's even more pleased that another novelty—Colwell's gender—has received so little attention. "I think it's a real milestone that the stories [on her nomination] didn't make a big deal of Rita being the first woman director. That's real progress," she says about Colwell, who 10 years ago was part of the first contingent of women to be accepted as members of the private Cosmos Club, a collection of prominent intellectual achievers in the Washington area.

Stalking cholera

Colwell has maintained an active research program even as she has climbed the administrative ladder at the University of Maryland over the past 2 decades, focusing on the cholera bacterium, *Vibrio cholerae*. Typically, her 25-person lab includes undergraduate and graduate students as well as a smattering of postdocs and visiting and foreign scientists. She serves as a revered mentor—"I'm 44 years old and I still consider myself to be one of Rita Colwell's students," says microbiologist Joseph Zelibor, a program officer at the National Research Council. And she has averaged 18 papers a year since 1981, according to the Institute for Scientific Information (ISI) in Philadelphia, with a 1-year high of 28.

"I'm amazed by how productive she is," says marine microbiologist Ken Nealson, director of a new astrobiology laboratory at NASA's Jet Propulsion Laboratory in Pasadena, California. "She knows how to get people excited by the science, and how to fund it." Microbiologist Jay Grimes, who managed Colwell's lab for several years and who now directs the Institute for Marine Science at the University of Southern Mississippi in Hattiesburg, says that one key to her success is the ability to spread the work around. "She's probably the most effective person I know in looking at something and delegating it to the right individual."

Her most heavily cited work, according to ISI, explores how pathogens can exist for long periods of time in a nonculturable but viable state. The work addresses the question of what happens to *V. cholerae* and other pathogens between epidemics, an important issue both for fundamental researchers trying to understand the life cycle of such microbes and for public health officials trying to prevent the next outbreak of the diseases they cause. Colwell is also collaborating with The Institute for Genomic Research (TIGR) to sequence the microbe's genome, a task expected to be completed later this year.

Her work has led her into more contro-

versial territory with a theory that links cholera outbreaks to global warming. Colwell and several colleagues have suggested that rising seawater temperatures may trigger an increase in the growth of zooplankton, which allows the pathogen to spread. In particular, she speculates that warmer seas were a contributing factor in a 1991 outbreak in Peru during an El Niño episode. Colleagues say it's an intriguing idea that could promote interdisciplinary work, for example, by introducing remote sensing to the field of bacteriology. But they note that a causal link has not been shown (*Science*, 7 November 1997, p. 1004).

"I find it interesting but in need of testing," says Nealson. "There's also the $64,000 question of whether it will be useful. After all, we can't change the water temperature." Jody Deming, director of the marine bioremediation program at the University of Washington and a former student of Colwell's, says that "I don't know anybody who's jumping to prove it. But it makes sense, and I'm using it as a teaching tool to show how an idea from one field can be applied more broadly."

Whether or not the theory pans out, colleagues say it's a good example of the type of innovative thinking that they hope Colwell will bring to NSF. "NSF is a safe organization that doesn't handle interdisciplinary research [proposals] too well," says oceanographer Deming. "If anybody has the energy and the vision to make a difference there, it's Rita."

Swimming in a big pond

While keeping up the pace of her research, Colwell has also become increasingly visible on the national science scene. In addition to serving a 6-year term in the 1980s on the National Science Board, which oversees NSF, she has been president of the American Association for the Advancement of Science (which publishes *Science*), Sigma Xi, and the American Society for Microbiology. As president of UMBI, Colwell has been a vigorous advocate before the local, state, and federal officials that fund its work. Two years ago, for example, she wrangled a $3 million state grant to help lure virologist Robert Gallo, co-discoverer of the AIDS virus, to leave the National Institutes of Health and set up the Institute of Human Virology in Baltimore under UMBI's umbrella.

Colwell showed similar fund-raising skills in helping to create the Christopher Columbus Center, a novel, 3-year-old $160 million marine biotechnology research and education facility at Baltimore's Inner Harbor, built in part with earmarked federal funds. UMBI's Center of Marine Biotechnology (COMB), which she created and where she maintains her lab, occupies two-thirds of the space at the center. "The Columbus Center came about because I and two others had lunch with her one day," recalls Robert Embry, president of the Abell Foundation, a local philanthropy. "We were looking for opportunities to create a world-class scientific facility, and Rita had an international reputation as a scientist and an administrator."

Colwell's high-profile role in the Columbus Center has been a mixed blessing, however. In December, the private company that runs the center defaulted on some $6 million in loans. High costs and low attendance combined to wreak havoc on its budget, and its collapse also shuttered the innovative hands-on Hall of Exploration, where the public could see and interact with COMB scientists at work. Colleagues say that Colwell was unhappy with the center's approach to public education and its heavy investment in the hall, which Embry calls "tangential to my idea of the Columbus Center as a top-notch research facility." Instead, says J. Craig Venter, president of TIGR and a former Columbus Center board member, "she tried to get good scientists on the board, but she was frustrated by a lack of influence. I joined because of my interest in explaining science to the public, but I stopped going to meetings after it became clear that they were mostly interested in raising money to cover a budget that had gotten out of control." Colwell is now a member of a three-person board weighing the fate of the center.

UMBI officials say the problems at the Columbus Center haven't affected COMB's research. But the saga troubles some policymakers, who suggest that Colwell should take some responsibility for its problems. "She's an extraordinarily good salesman, and I'm sure that she'll be in there selling NSF just like she sold the state on the Columbus Center," says D. A. Henderson, an epidemiologist at Johns Hopkins University and a former White House science aide in the Bush Administration, who reviewed the project.

The $54 million in "pork-barrel" federal funding that the center received courtesy of an influential state delegation led by Senator Barbara Mikulski (D–MD) also raises questions in the minds of some researchers, who note that the money was carved out of the budgets of NASA and other federal research agencies. "As a Maryland scientist, she had no other choice," says Chris D'Elia, a longtime colleague who heads the state's Sea Grant program, about Colwell's behind-the-scenes lobbying. "There's no place in the federal government that would support research that crosses so many boundaries. And it has paved the way for some very good science. Still, as NSF director I would not encourage her to use that model. It would not be a good thing to do."

Whatever policies Colwell pursues as director, her colleagues say that she's well-prepared for the role. "She's accomplished everything that you can do as an academic," says Grimes. "She's aggressive in a nice way. She's convincing and articulate. And she's very hard to say no to."

–Jeffrey Mervis

RUSSIA

Physics Centers Forced to Go Private

MOSCOW—Times have been hard enough for Russia's science institutes since the collapse of the Soviet Union, but for some of the country's most prestigious physics centers they may be about to get worse. These institutes will soon be converted into joint-stock companies—enterprises which, at least at first, will be owned by the government—and they will receive no increase in government funds above the current subsistence level. Any additional funds must be won through commercial contracts.

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On the market. A spectrometer at the Institute of High-Energy Physics in Protvino.

This change is the result of a decree issued by President Boris Yeltsin last autumn stating that most state-run establishments—including research institutions—under the authority of federal ministries must become joint-stock companies. Because the Russian Academy of Sciences is independent of any ministry, its institutes will be spared, but several of Russia's best known physics institutes belong to the Ministry of Atomic Energy. These include the Institute of Theoretical and Experimental Physics (ITEP) in Moscow and the Institute of High-Energy Physics in Protvino.

Most of these institutes were established in the 1940s as part of the Soviet atomic weapons program, although many were not directly involved in weapons production. ITEP, for example, which was founded in 1943, focused on nuclear reactor technologies and later branched out into particle physics. Today,