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."

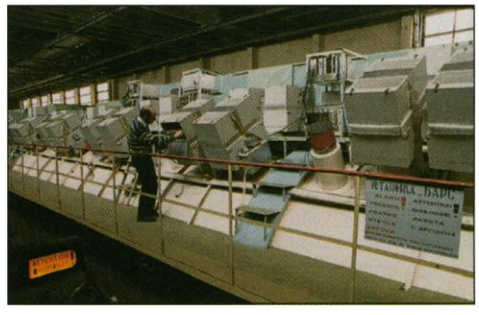
Whatever policies Colwell pursues as director, her colleagues say that she's well-prepared for the role. "She's accomplished everything that you can do as an academic," says Grimes. "She's aggressive in a nice way. She's convincing and articulate. And she's very hard to say no to."

–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.



SOVPHOTO/EASTPHOTO

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,

ITEP has close links with CERN, the European particle physics center in Geneva.

ITEP director Mikhail Danilov told *Science* that, in his view, transition into a joint-stock company would ruin the institute. It will come under the authority of the Ministry for State Property Management. "As a result, the institute will be managed by people who are incompetent in science and who are not worried about carrying out basic research," he says. And poor management may be the least of Danilov's worries. Because the ministry "sees its task as getting maximum possible profit from the real estate, I am afraid that many of the buildings will be sold off or let to commercial companies that have nothing to do with science."

The institute does already run several commercial programs, the largest of which is a center for proton beam therapy for cancer. But ITEP's proton accelerator is old and of no commercial interest, says Boris Saltykov, former science minister: "They can only use it for medical purposes." Last year, commercial projects earned ITEP just $5 million, while its debts far exceed this sum.

However, Yuri Lebedev, head of the department within the science ministry responsible for institutional reform and intellectual property, considers this reform to be important and timely. The majority shareholder of the new joint-stock companies will continue to be the state, he notes, and their new status will make it simpler for them to run commercial projects with investors as well as to deal with the state itself. Lebedev thinks the institutes' directors are opposing the change because it threatens to diminish their own positions. "In a joint-stock company, [the director] will be merely a manager, with his powers as master considerably reduced," Lebedev says.

Saltykov, on the other hand, says Danilov's fears are reasonable. "ITEP is not the right institution to be chosen as a top priority for the new approach," Saltykov says. "It is close to academic research, and they have very few commercial contracts." Danilov's hope is that the vague wording of Yeltsin's decree, which does not specify a timetable, will be their salvation and the changes will either not happen soon or will not happen at all.

–Andrey Allakhverdov and Vladimir Pokrovsky

Allakhverdov and Pokrovsky are writers in Moscow.

BIOPROSPECTING

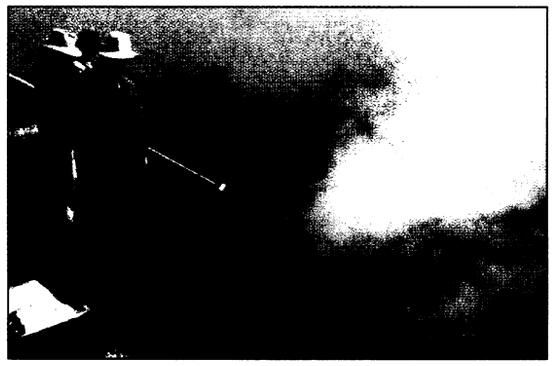
Lawsuit Targets Yellowstone Bug Deal

The National Park Service (NPS) was accused last week of allowing a company to exploit a unique natural wonder it is supposed to protect. Three nonprofit organizations sued to stop an agreement under which a biotech firm would collect microbes from Yellowstone National Park's hot springs in exchange for giving the park service a share of profits from any products derived from the bugs. Yellowstone managers defend the agreement, arguing that it could raise needed cash for safeguarding the park's rich biodiversity.

In August 1997, the park service announced that it would let Diversa, a San Diego–based biotech company, take samples of soil, water, and plants over the next 4 years in return for a one-time fee of $175,000 and royalties of up to 10% on any future sales (*Science*, 22 August 1997, p. 1027). Park managers see the deal—a cooperative research and development agreement (CRADA), under which the federal government allows a company to commercialize an idea or a product in exchange for a financial stake—as an extension of an existing permit system that allows researchers to collect samples.

But that's not how critics view it. It's "a major change in public policy," asserts Beth Burrows, director of The Edmonds Institute, an environmental organization based in Edmonds, Washington. Last August, the institute and the International Center for Technology Assessment (CTA), a Washington, D.C.–based information clearinghouse, petitioned the park service and its overseer, the Department of Interior, to halt the signing of the Yellowstone-Diversa CRADA, arguing that the government had failed to conduct an environmental assessment, as required by the National Environmental Protection Act. Their petition was rejected last January.

Now the two nonprofits have taken off the gloves. They and a regional organization called the Alliance for the Wild Rockies have filed a lawsuit against NPS and Interior in U.S. District Court in Washington, D.C. The organizations contend that the CRADA violates the Federal Technology Transfer Act, which states that such agreements are designed solely for companies to work with government labs. There are no government labs located in Yellowstone National Park, notes CTA's Joseph Mendelson III. The lawsuit also alleges that the CRADA violates laws that require national parks to be preserved in an unspoiled state and that call for environmental impact assessments on any proposed projects within park boundaries.



MICHAEL MILSTEIN

Bubble, bubble. Researchers toil, but commercial collecting agreements at Yellowstone are in trouble.

NPS officials defend the CRADA, arguing that this type of agreement is the best way to ensure that some profits from park resources are put toward conservation. Park officials are still sore over Taq polymerase, an enzyme found in a Yellowstone hot spring microbe. The enzyme, which helps drive the polymerase chain reaction, has earned hundreds of millions of dollars for the Swiss drug company Hoffmann-La Roche. Yellowstone has seen none of this windfall—and doesn't want to be shut out when the next hot commodity hits the market, says wildlife biologist John Varley, director of Yellowstone Park's Center for Resources. The park now grants about 25 permits a year to microbe hunters, and beginning this year, permit holders must agree to negotiate a CRADA with NPS should they wish to profit from their finds. The CRADA with Diversa is slightly different, because it was negotiated prior to any collection. Varley says an environmental assessment is being done, but insists that the impact from such CRADAs would be minimal because companies would collect only cupfuls of water or algae by the hot springs and would not be allowed to sample an area more than once.

But the CRADA allows Diversa to collect microbes, soil, water, rocks, minerals, and plants, without specifying how much or how often. And Varley admits it is unclear how the park will enforce the CRADA's terms, particularly as several more such agreements are expected. "We're not prepared to deal with it," he says. Libby Fayad, counsel for the National Parks and Conservation Association, a Washington-based independent watchdog group for national parks, also worries that the parks are ill prepared to track royalty payments.

One thing for sure is that the days of benign scientific exploration in the parks are over. "If you go to Smokey Mountain National Park and take a teaspoonful of soil, [will] you need a CRADA?" asks Ira Schildkraut, a microbiologist with New England BioLabs in Beverly, Massachusetts. The answer may depend on the outcome of the lawsuit, which could go to trial in the next several months.

–Elizabeth Pennisi