bound to make it an issue in the next presidential campaign.

On 16 June, Clinton nominated **Greta Dicus** to chair the Nuclear Regulatory Commission (NRC). A radiation biologist, Dicus received an MS in the field from the University of Texas Southwestern Medical School. She has served on the commission since 1996. If confirmed by the Senate, she will succeed **Shirley Ann Jackson**, a condensed matter physicist who announced last January she would leave the agency at the end of June to become president of Rensselaer Polytechnic Institute (see PHYSICS TODAY, February, page 55).

Before joining the commission, Dicus was on the board of the US Enrichment Corp, which began life in 1993 as a government entity operating uranium enrichment facilities, including gaseous diffusion plants in Kentucky and Ohio, and went private in July 1998. The corporation provides uranium fuel to commercial power plants in the US and 13 other countries. As a corporate director, Dicus chaired the board's subcommittee on nuclear regulatory affairs. Before joining the company in 1994, she had been appointed by Clinton, when he was governor of Arkansas, to serve on the state's Low-Level Radioactive Waste Advisory Group and on the Central States Low-Level Waste Compact Commission. During that period, she was also Arkansas's liaison with the NRC.

At the Department of Commerce, **Cheryl L. Shavers**, a senior manager at Intel Corp, became under secretary for technology, the principal policy job for science and technology matters in the department. After receiving a PhD in solid state chemistry from Arizona State University, she acquired more than 20 years of experience in various engineering and managerial positions at such Fortune 500 companies as Motorola, Varian Associates, and Hewlett-Packard before joining Intel. At Intel, Shavers has been group manager of advanced technology in the technology and manufacturing operation and, most recently, senior manager of microprocessor products in the corporate business development division. She succeeded **Mary L. Good**, who resigned the job in June 1997 (see PHYSICS TODAY, July 1997, page 50).

Last February, Clinton announced that **Joseph Bordogna** would at last become deputy director of the National Science Foundation. Two years

## WASHINGTON BRIEFINGS

**NSF's Net Effect** When the allocation of Internet domain names began in 1995, the National Science Foundation, which had taken over operation of Arpanet from the Defense Advanced Research Projects Agency, designated a small Virginia company, Network Solutions Inc (NSI), to assign e-mail addresses ending in ".com," ".org," and ".net." NSI was allowed to collect a registration fee of $50 per year for each domain name and was required to deposit $15 of each payment into a strangely titled Intellectual Infrastructure Fund. The fund, in turn, was to be spent by NSF to support improvements on the existing network, new connections to the system, and R&D for the so-called Next Generation Internet.

By November 1997, NSF was ready to award some $23 million from the fund to upgrade high-speed network links at universities throughout the US. But the agency was prevented from making the awards by a lawsuit brought by four companies and nine individuals arguing that the money in the fund was simply a tax and that, under the US Constitution, only Congress can impose a federal tax.

In April 1998, a judge in the US District Court for the District of Columbia ruled that the $15 portion of each domain name fee was indeed a tax and therefore the fund was illegal. But the judge stipulated in his decision that Congress could authorize retroactively that the money collected was to be spent by NSF to advance the Internet (see PHYSICS TODAY, October 1998, page 70). By then the fund had accumulated nearly $62 million. Even before the litigation, the agency's division of advanced networking infrastructure and research had announced that it would accept proposals for Internet programs. Of course, in keeping with NSF practice, each proposal would be subject to peer review.

The first batch of awards was made last November, and the last was sent out in June. Among the nearly 100 award winners were the five campuses of the College of Rural Alaska, each serving small villages sprawled over 200 000 square miles, and accessible mainly by airplane. With a $500 000 grant, the colleges now can acquire satellite broadcasts that enable them to beam educational television programs into homes and classrooms and provide Internet access to the most remote regions of the state.

NSF also provided $600 000 for the Gemini observatories to increase computer power and speed so that the data and images from the twin mountain top telescopes, one in Hawaii, the other in Chile, can be shared with astronomers at some 100 universities worldwide. In addition, awards went to the University of Michigan ($440 296) and UCLA ($354 479) to develop an architecture for a global Internet; the University of Illinois at Urbana-Champaign ($900 000) for a national computational science alliance; Columbia University ($1.1 million) for high-performance computing applications at CERN's Large Hadron Collider; and the University of California, Berkeley ($1.4 million) for state-wide research and education networking. The largest award ($7.8 million) went to MCI Telecommunications Corp, provider of NSF's very-high-performance Backbone Network Service (vBNS), a high-speed Internet service for university research.

As for NSI, the company received a warning from the Commerce Department on 9 July that it could lose its monopoly to assign and manage some of the most popular webaddresses if it doesn't open its lucrative business to competitors. NSF, for its part, no longer derives any funds from NSI's address registration business. That arrangement ended in March.

**NASA Dashes a Comet Landing** Spending caps agreed to by Congress and the White House are likely to have several scientific victims before fiscal 2000 begins on 1 October. One of these is NASA's $240 million Champollion spacecraft, which was to rendezvous with comet Tempel 1, anchor itself to the comet's nucleus, and drill into it to determine what it is made of and to validate the advanced technology for such a mission.

Under normal circumstances, NASA's $2.1 billion science program would be flexible enough to accommodate a project of this kind, especially because it was touted as part of the agency's New Millennium program. But unexpected costs are giving NASA officials conniptions. Delays to the $1.5 billion Chandra x-ray observatory, resulting partly from problems with the upper-stage rocket, will add $100 million to operating costs in the next few years. Repairs of the Hubble Space Telescope will require two shuttle flights instead of one and probably add $26 million. The $500 million Gravity Probe-B satellite, scheduled to reach orbit next year, is already $20 million over its budget. In addition, the anticipated cost of the Mars exploration project is rising.

Edward Weiler, head of NASA's space science office, says Champollion's design, prepared by the Jet Propulsion Laboratory, is certain to be applied to other missions, especially to a planned expedition to Jupiter's moon, Europa. And the agency

ago, Bordogna was on the verge of returning to the University of Pennsylvania after **Rita Colwell** was nominated for the job of NSF's deputy director. But when Jack Gibbons decided to leave his post as President Clinton's science adviser and director of the Office of Science and Technology Policy (OSTP), and Clinton picked Neal Lane, then director of NSF, to replace Gibbons, Colwell became the instant choice to head NSF, and Bordogna was coaxed to stay put at the foundation. Actually, Bordogna had been acting deputy director and chief operating officer of NSF since 1996, and for four years prior to that he had been assistant director for engineering at the agency, where he earned the reputation for being an outstanding manager. On 6 May, Congress gave him official recognition by confirming his nomination to the post.

After receiving a PhD in electrical engineering from the University of Pennsylvania, Bordogna spent the next 26 years there in teaching and research. From 1976 to 1990, he was director of the Moore School of Electrical Engineering and dean of the school of engineering and applied science.

Also at NSF, **William A. Blanpied**, senior international analyst in the division of international programs, got a plum posting to head the agency's Tokyo regional office, located in the US embassy there. In this capacity, Blanpied expects to expand the outlook of the office to include science and engineering programs throughout the Far East and perhaps as far as Australia and New Zealand. Blanpied's extensive international experience makes him a top choice for the post, where he can continue to analyze US and foreign science policies and assess opportunities for scientific cooperation abroad. He has served as NSF's principal staff liaison officer for the International Council of Scientific Unions (ICSU) and assisted OSTP in participating in the 1992 science policy ministerial meeting of the Organization for Economic Cooperation and Development, which resulted in establishing the OECD Megascience Forum. Since 1993, he has been the US delegate to the OECD's Group on the Science System and was elected its chair in 1996.

Blanpied got a PhD in physics from Princeton University in 1959 and held faculty appointments at Case Western Reserve, Yale, and Harvard Universities prior to joining NSF in 1976 as program manager for ethics and human values in science and technology.

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will put another comet project on its agenda, Weiler believes. For now, though, the European Space Agency's Rosetta mission has the comet field to itself.

Rosetta, a $1 billion spacecraft, is scheduled for launch on an Ariane 5 rocket in 2003 and will not reach its target, comet Wirtanen, until 2011. The craft will fly alongside the comet for two years, observing its activity as it approaches the Sun, and then place a robot lander on the comet's core to examine the material inside. ESA's previous comet mission, Giotto, flew past the nucleus of Halley's comet in 1986 and provided the first direct views of a comet's material. In announcing the Rosetta mission on 7 July, two days after NASA canceled Champollion, Roger Bonnet, ESA's science director, reminded his audience that NASA had missed out on Halley's last visit.

Even so, Weiler pointed out, NASA's Stardust mission is on its way to collect dust from the tail of comet Wild-2 in 2004 and bring the stuff back to Earth for closer analysis.

**Dynamic Economy amid R&D Danger Signs** In the 1980s, many studies of the US economy portrayed the technological leadership and international competitiveness of several industries as declining and as possibly endangered species. Rivals in Japan, South Korea, and Germany were gaining in product quality and net profits. In 1989, the MIT Commission on Industrial Productivity went so far as to characterize the problems in US manufacturing, from automobiles to semiconductors, as "systemic and pervasive." The long list of troubles, the MIT group lamented, included underinvestment in R&D and in new shop floor technologies such as robotic devices, as well as high interest rates and capital costs and poor precollege public schooling.

Today, a decade after the MIT report, almost every analysis of the US economy is in marked contrast to the gloomy diagnoses of the 1980s. The performance of a wide spectrum of US industries continues to surge for the seventh straight year, while many foreign economies and corporate competitors lag dismally. This resounding reversal was the subject of a forum on 28 June at the National Academy of Sciences, which also released two companion reports—"Securing America's Industrial Strength" and "US Industry in 2000: Studies in Competitive Performance." Both reports are available on the Internet (http://www4.national-academies.org/pd/step.nsf) and in book form from the National Academy Press.

"Our economy is the envy of the world," said the forum's keynote speaker, Rita Colwell, director of the National Science Foundation. Technological change is responsible for much of the nation's economic performance,she noted. "We're twice as productive as we were 40 years ago because of the innovations and discoveries that we've made in science, engineering, mathematics, and technology. We're using our resources smarter than before. We're seeing the fruits of these discoveries in today's Internet and biotechnology companies. . . . We have these opportunities today because of research that we did years ago. We will have even more exciting opportunities in the future because of research we're doing today." Colwell listed nanotechnology, genomics, and quantum computing among the innovations that will provide economic growth. She emphasized that research investments made by the government and corporations "shape our economic future through new knowledge that pays for itself again and again and again. . . . Industry now accounts for more than 65% of the nation's total R&D investment. The federal government is not keeping pace, funding only about 30% of the total investment."

But none of the forum speakers were ready to sing "Merrily We Roll Along." Instead, Dale Jorgenson, a Harvard University economics professor and chairman of the panel that prepared the reports, raised some warning flags. Although research support for such fields as computer science and medical research had increased in the 1990s, federal funding for other fields, including electrical and mechanical engineering, chemistry, mathematics, and physics had plunged by 25% to 50% from their 1993 levels. He noted that the reports also expressed concern about the lack of direction in federal policy on intellectual property, government inconsistency on corporate tax policies, and the inadequate supply of technically skilled workers.

The intense scramble to hire workers in information technology, for instance, has exhausted the number of H-1B visas for skilled foreign workers this year. The visas ran out less than one year after Congress increased the number of H-1B visas from 55 000 to 115 000. Today, immigrants account for at least one-third of the scientific and engineering workforce in California's Silicon Valley and occupy senior executive positions in about one-quarter of its new high-tech companies. Many have advanced degrees in computer science, engineering, and physics—fields in which the number of degrees granted by US universities to American students has been declining in the 1990s.

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