start-up company in 1979: a patent for the production of human growth hormone (HGH) by bacterial synthesis. The product, administered to short children to speed up growth, has earned hundreds of millions of dollars. To cover up the deed, Seeburg—who is now acting director of the Max Planck Institute for Medical Research in Heidelberg—admitted in court that he has published false "technical" data on how Genentech staffers cloned the DNA sequence it patented.

Seeburg gave this shocking testimony on 20 and 21 April in the U.S. District Court in San Francisco, appearing as a witness for UC in a civil suit against Genentech. Alleging that Genentech has been violating UC's own patent on growth hormone, the university is asking the court to award damages of about $400 million, according to a UC attorney. This is what UC would have earned, the university calculates, if Genentech had paid HGH license fees. In addition, the university is asking for triple damages, on grounds that Genentech's actions were "willful."

Genentech, which began to present its own evidence on 3 May, denies that it infringed the UC patent. Although company officials declined to comment, trial transcripts indicate that their attorneys denied that they took or encouraged anyone to take material from UC labs. And Genentech has summoned witnesses to attack Seeburg's testimony—including Seeburg's former co-worker, David Goeddel, a postdoc at Genentech in 1978 who is now chief executive of Tularik, another South San Francisco biotech firm. In opening comments to the jury, however, Genentech attorney John Kidd acknowledged that "there's no dispute that Seeburg brought some material [to Genentech]. We don't argue with that. It was his material. … He was entitled to bring that. That's what postdocs did in those days." But Kidd insisted that "the evidence will show that we did not [use it]."

Human growth hormone. Genentech and UC are battling over rights to a genetically engineered version.

Although this trial of competing HGH patent claims has been stewing for many years, Seeburg's testimony still came as a surprise. Seeburg, a German expert in neural genetics who came to UCSF to learn about DNA cloning in the 1970s, had upheld the Genentech line on HGH until recently. On the witness stand, however, he said that for many years he has been "walking a tightrope" between truth and falsehood. When questioned under oath in the past, he said, he had "not been forthcoming" in saying that the DNA clone on which Genentech's patent is based "was obtained at Genentech." True, it came from bacterial clones grown at Genentech; but he said he failed to reveal that the source of the clones was his former lab at UCSF.

Seeburg explained on the stand that Genentech hired him in September 1978 because he was a leader in a productive HGH cloning project in Howard Goodman's lab at UCSF. UCSF failed to offer him an academic job that fall, so he went to work at Genentech for $40,000 a year, with health benefits and a chance to buy stock at 30 cents a share. Before leaving the university, he, his UC colleague John Shine, and Goodman applied with the university for a patent on a DNA sequence for human growth hormone they jointly discovered. (UC was awarded the patent in 1982; they are co-inventors.) At Genentech, Seeburg worked with Goeddel and others to replicate and extend this work, aiming to get a more complete sequence that could be put in bacteria for mass production. But he and Goeddel were frustrated by poor source tissue and many failures, Seeburg said.

To speed up the process, Seeburg testified, he decided to use the material he had developed at UC. Seeburg testified that he and a colleague made a visit to the Goodman lab at about 11 p.m. on 31 December 1978. He took many samples, including a clone containing a partial human HGH sequence, and returned quietly to Genentech, "out in the industrial district of South San Francisco." Seeburg recalled that out of the dark, "a highway patrol screeched up in front of us as we were getting out." The police officer asked what they were doing, Seeburg recalled: "We said, 'We are scientists.' But the officer laughed and said, 'You don't look like scientists.'" Still, he let them go.

Later, Seeburg testified, he and Goeddel used the UC clone in the development of Genentech's HGH sequence, for which the company obtained a patent in 1982. They also published a paper on this work in *Nature* in 1979 which, Seeburg testified, contains information on how they cloned the DNA using a plasmid (called PHGH31) which "never existed." Seeburg claimed that he remained silent about all this because he and Goeddel had an agreement not to reveal what they had done, and "I wanted to honor it."

Goeddel, who was still giving testimony as *Science* went to press, denied that he and Seeburg had ever agreed to remain silent about

ScienceScope

AIDS Windfall Microsoft CEO Bill Gates and wife Melinda have made the largest single philanthropic donation ever for AIDS research. This week, the couple announced that they will contribute $25 million over the next 5 years to the International AIDS Vaccine Initiative (IAVI). The New York–based group will use the bulk of the money to set up three new international AIDS vaccine development teams and fund two existing groups working on vaccines for Kenya and South Africa. The gift will also support applied research, advocacy, and clinical trials. The landmark gift—which will double IAVI's budget to nearly $50 million—"will allow us to significantly accelerate the scientific effort," says president Seth Berkley.

The private group's war chest is still dwarfed by the $200 million vaccine program run by the National Institutes of Health. But the iconoclastic IAVI hopes to approach the problem from a novel angle, serving as a crucible to mix academics from both wealthy and poor countries and industry members with innovative ideas.

Dollars and Sense University officials will get the chance later this month to tell the White House what they think of its new draft report that attempts to clarify the sometimes strained partnership between government and academia. Although the report is filled with such paeans to research "as an investment … guided by peer review," the real issue for universities is likely to be money. In particular, academic officials want the government to spring for a larger share of the overhead to support federally funded research on campus. "I would hope that there will be a major push for additional resources," says Nils Hasselmo, president of the Association of American Universities, who nonetheless sees the report as a vote of confidence in university-based research.

President Clinton unveiled the report (whitehouse.gov/WH/EOP/OSTP/html/rand/contents.htm) last week at a belated ceremony to honor the 1998 National Medal of Science and Technology winners. The report is even more tardy: A 1996 presidential directive set a target date of 30 April 1997; now the Administration hopes for a final report by year's end. A 25 May hearing is the first of three scheduled by the President's Council of Advisors on Science and Technology.

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of a small spending boost, appears to be carrying the day. "It feels like we have come in from the cold," says molecular biologist Britt-Marie Sjöberg of Stockholm University.

An affable 34-year-old Social Democrat with graduate training in economics, Östros has been busy since last fall's election trying to formulate how the state, which funds less than one-third of all research done in the country, should interact with other sectors. The government's relationship with basic scientists has been especially touchy, as the amount of money going to universities and the basic research councils has decreased, despite an overall rise in R&D spending. Last fall, a committee of parliamentarians added new tensions with a report, called Research 2000. It called for a welcome increase in basic research but suggested scrapping the current system of funding research through a multitude of research councils and mission agencies. It also argued that politicians should control the management of independent foundations that focus on applied research (*Science*, 20 November 1998, p. 1401).

Warming trend. Science minister Thomas Östros sees "good climate" between scientists and government.

Last month, as part of his first official response to Research 2000, Östros announced that the government intends to boost the current $1 billion basic research budget by $8.4 million next year and by a total of $93 million by 2002. And in a 45-minute interview with *Science*, Östros made it clear that he is sympathetic to scientists' concerns over Research 2000. "Only researchers can guarantee the scientific quality of their work," he said. "We know that the free search for knowledge is important in the long term." Earlier this spring, in another conciliatory move, the government reestablished a scientific advisory group and appointed immunologist Hans Wigzell, head of the Karolinska Institute, as its science adviser.

"I feel that there is a good climate and an emerging dialogue [between scientists and the government]," Östros told *Science*. "It is not a goal in and of itself, but it's not good to live with conflicts for too long." The research community seems to agree. Zoologist Dan-E Nilsson of Lund University, the driving force behind a lobby group to support basic research called the "professors' council," says Östros's efforts to reach out to the community have eliminated the need for the informal council.

Not everyone is pleased with the increased emphasis on basic research, however. "A small country like Sweden cannot afford putting its money on basic research and hope to reap economic benefits of a breakthrough every 30 years," says Kurt Östlund, executive director of the Royal Academy of Engineering, adding that most economic growth has come from applied science. But Östros doesn't buy that argument. "If you look at research mostly as a way to support current economic activities," he says, "there is a risk that you only end up conserving those parts of industrial life that are doing well at the moment."

Östros declined during the interview to discuss how the mechanism for funding research should be reorganized, saying only that a working group will investigate different options and that the current discussion would feed into a new policy to be issued next year. But he seems to have accepted the criticism of Research 2000's plan to replace the current multitude of state funders of research with four discipline-oriented research councils, which would fund both basic and applied research. "I am in sympathy with the thought of joining mission-oriented and basic research," he said. "At the same time, there are strong opinions and worries, even within the government. I don't expect radical changes, but I do hope to simplify the system."

He also made it clear that he opposes the plan's suggestion to scrap the university's obligation to maintain strong links to society at large in addition to its duties of research and education. And he signaled his agreement with those who felt Research 2000 failed to acknowledge the importance of multidisciplinary research, pointing in particular to the need for greater understanding of environmental problems and for work "at the interface of people and technology."

Östros hopes to close the book on a largely political debate over management of the independent foundations that focus on applied research, saying he believes that scientists as well as policy-makers should be represented on their advisory boards. "It is important to bring the fight to an end," he says.

Although he doesn't promise to resolve the chronic problems of inadequate funding and squabbling over the share of grant money spent on overhead, Östros says he's looking forward to the give-and-take. "I like the dialogue with the research community, which is where I have my own roots," he says. "I think it's a fascinating world."

–ANNIKA NILSSON AND JOANNA ROSE

Nilsson and Rose are science writers in Stockholm, Sweden.

ScienceScope

Educational Payoff For years, the National Science Foundation (NSF) has been pushing research-intensive universities to place more emphasis on teaching in a drive to raise scientific literacy. Now, NSF director Rita Colwell wants to back this philosophy with some cold cash, by boosting the salaries of faculty members who are superstars in the classroom as well as in the lab. "The idea is to significantly reward those who teach intro courses as well as those recognized as exemplary teachers," says Colwell, who has broached the subject with professional societies and, last week, with Congress at a hearing on improving precollege science and math instruction.

Several schools already fatten faculty paychecks to reward teaching prowess. But Colwell says a similar NSF program could have a bigger payoff: By improving the quality of instruction given to nonscience undergrads, some of whom go on to become tomorrow's policy-makers, it could build public support for science. She's hoping to put something together later this year.

Land No! A new report from marine researchers has some practical advice for ship captains seeking to prevent exotic stowaways hidden in ballast tanks from invading U.S. waters: Flush those critters into the briny deep. The study, mandated by Congress and prepared by a government-appointed task force, tackles a growing ecological threat: introduced species that displace native organisms. In the United States, for instance, experts believe the Asian zebra mussel (above) slipped into the Great Lakes decades ago in ballast tanks. It has since caused billions of dollars in damage by clogging pipes, disrupting fisheries, and driving out native shellfish.

To prevent similar invasions, U.S. officials now ask captains to exchange their ballast waters in midocean, where they are unlikely to pick up organisms that can survive in harbor waters. But in case they don't, the report concludes that ships can safely flush their ballast tanks almost anywhere more than 200 kilometers offshore. Now it's up to captains to follow the advice.

Contributors: Jon Cohen, Jeffrey Mervis, David Malakoff