tectonic processes formed the Namibian Basin, and assumed that it filled with sediment as it formed. They concluded that the isotopic excursion took at least 10 million years.

This long duration "pretty well destroys" another explanation for the isotopic spike, says Hoffman—that the ocean overturned suddenly. That idea was proposed in 1996 by paleontologist Andrew Knoll, also of Harvard, and his colleagues, who suggested that the cap carbonate was deposited from carbonate-rich waters welling up from the deep sea. But such upwelling would have lasted less than 100,000 years.

Not everyone is ready to accept the idea of a frozen Earth. Prolonged isotopic excursions are unlikely, says Knoll colleague Dick Bambach of Virginia Polytechnic Institute and State University in Blacksburg, and require unusually strong data to back them up. And geochemist Martin Kennedy of the University of California, Los Angeles, also has carbon isotopic data from Namibia, but they show no deep productivity decline before the Namibian glacial deposits. His evidence "is very different than theirs," he says. Snowball Earth "is a novel and creative idea, but I don't think the data support it."

Furthermore, Kennedy argues that if Earth really was a snowball, strontium isotopes should respond too. The ratio of strontium-87 to strontium-86 in the oceans should have dropped as the glaciation cut off rivers enriched in strontium-87 by weathering of the continents, he says. But his unpublished data show that during the carbon excursion, the strontium ratio rose sharply, indicating more continental erosion, not less. "It's one of the greatest shifts in history," he says.

Hoffman offers a rebuttal on all points. Their carbon isotope data resemble other published records, he says. And Schrag says the strontium ratio would have been kept high, first by acid from undersea volcanoes dissolving strontium-bearing carbonate sediments, and later, after the glaciation, by greenhouse-induced weathering of continental rock. But Derry, who has worked with members of both groups, says that if the strontium data hold up, snowball Earth "has a problem." It remains to be seen whether this snowball can take the heat. **–RICHARD A. KERR**

RICK KOZAK; *FAR RIGHT*: AP PHOTO/KOJI SASAHARA

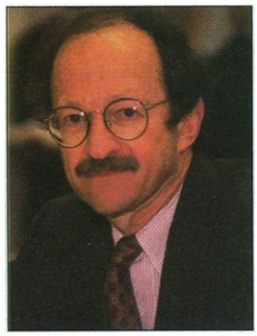
JADAVPUR UNIVERSITY

SHARING REAGENTS

NIH, DuPont Declare Truce in Mouse War

A contentious, 2-year legal wrangle that set molecular biologists against company lawyers ended last week when the DuPont Pharmaceuticals Co. of Wilmington, Delaware, agreed to relax the terms under which it allows scientists to share a popular type of laboratory mouse.

On 19 August, Harold Varmus, director of the National Institutes of Health (NIH), announced at a scientific meeting that NIH has hammered out a memorandum of understanding with DuPont that will make it easier to transfer genetically engineered mice from NIH labs to other nonprofit institutions. (The text is available on the Web at http://www.nih.gov/od/ott/cre-lox.htm.) The agreement lifts several restrictions DuPont had placed on the use of mice created with the company's patented "cre-lox" system—an efficient method of editing DNA at a specific site on the mouse genome. It is used chiefly to explore gene function. Varmus describes the pact as "a milestone in the cooperative relationship between academia and industry." And NIH staffers say they hope other companies will use the model to make patented research tools more accessible.



Just say no. Harold Varmus resisted DuPont's terms.

The flap over cre-lox mice began about 3 years ago. In an effort to tighten control over products on which it holds patents, DuPont began contacting researchers, asking them to sign an agreement that would limit their freedom to use and share the cre-lox technique (*Science*, 4 July 1997, p. 24, and 1 July 1994, p. 26). DuPont asked that anyone using cre-lox methods send the company prepublication copies of their scientific reports. The company also tried to acquire commercial rights to future inventions that might arise from experiments involving a cre-lox animal. In addition, DuPont's lawyers warned researchers not to share cre-lox mice with colleagues unless the recipient agreed in advance to DuPont's terms.

Many scientists balked. For example, Jackson Laboratories of Bar Harbor, Maine, a nonprofit research center that breeds and distributes mice to scientists around the world, negotiated for 2 years, but failed to reach an agreement with DuPont. The impasse prevented Jackson from distributing cre-lox mice, making it difficult for some scientists to acquire animals. Varmus, who had pushed for making new genetic tools widely accessible before coming to NIH, sided with Jackson in 1997 and joined in boycotting DuPont's terms. But after more than a year of negotiations, NIH and the president of DuPont's research labs, Paul Friedman, found common ground in June, according to NIH's director of technology

ScienceScope

NEXT STOP, LOS ALAMOS

New U.S. Department of Energy (DOE) Secretary Bill Richardson is taking scientific touring seriously. On 11 August, after just one day on the job, Richardson departed Washington on the first of several planned barnstorming tours partly designed to familiarize him with DOE's far-flung, $6 billion research empire, which includes dozens of labs. Early stops will include California's Lawrence Livermore National Laboratory and the Los Alamos lab in Richardson's home state of New Mexico.

Richardson is hitting the road.

Richardson said he wants the public to learn more about "the remarkable research" being done by department scientists and wants DOE to become the government's leader in studying climate change. He admits, however, to being "weak in the science and technology area," and says he will welcome advice from DOE's top science guru, Undersecretary Ernest Moniz, a physicist.

GETTING A GRIP ON ARSENIC

Bangladesh's arsenic pollution problem, which threatens the drinking water of more than 70 million people, will soon have the undivided attention of a new research center. The National Arsenic Mitigation Information Center (NAMIC), to open in Dhaka on 1 October with help from the World Bank and the Swiss government, will spend $1.5 million over 4 years to inform researchers and the public about the problem, which was first detected in 1993 after Bangladesh drilled thousands of deep wells in an effort to tap cleaner water (*Science*, 11 October 1996, p. 174). NAMIC will also fund scientists working to trace arsenic sources and develop new purification methods, efforts that could be key to a planned $44 million program to blunt the threat. The center, says World Bank hydrogeologist Babar N. Kabir, "is going to be critical for tackling the arsenic epidemic."

Arsenic poisoning victim

transfer, Maria Freire. They signed the papers in August.

Their agreement says that NIH scientists are free to share cre-lox mice with other nonprofit research labs, provided they sign a simple transfer agreement indicating the recipient won't give the material to anyone else and that DuPont keeps commercial rights. DuPont is not asking to preview publications, nor does it claim extensive "reach-through" property rights on second generation discoveries, as in the past. However, the company does insist that commercial uses of the technology must be covered by a license. DuPont also plans to retain strict control of the use of cre-lox genetic modifications in agricultural research and in the production of mouse embryonic and stem cells. The most significant aspect of the agreement, according to a Jackson Lab staffer, may be its universality: DuPont has said that all researchers who receive federal funding—not just those who work at NIH—will be covered by the liberal rules, effectively freeing up the nonprofit world.

–ELIOT MARSHALL

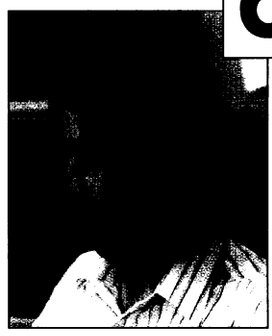
TECHNOLOGY TRANSFER

Small Businesses Get Extra Boost From NSF

Twenty years ago, the National Science Foundation (NSF) had the then-radical idea of providing federal funds to help budding scientist-entrepreneurs turn research findings into products. The idea grew into the government-wide Small Business Innovation Research (SBIR) program, now a billion-dollar operation spread across 10 agencies, that provides small companies with two rounds of federal support before they must stand or fall on their own. This month, NSF gave its portion of the program a new twist, adding a third round of funding for companies that aren't quite ready to cut the federal cord. The move is likely to rekindle debate over just how well the program is working in generating an economic payoff from federally funded research.

Congress created SBIR in 1982 and modeled it after the original NSF experiment. The program—which is funded by a controversial 2.5% "tax" on the R&D budgets of all major research agencies (*Science*, 17 May 1996, p. 942)—awards up to $100,000 for a feasibility study of a potential product, called Phase 1, and up to $750,000 for additional research on a prototype, called Phase 2. The law stipulates that Phase 3, the company's entry into the marketplace, must occur without the help of government funding. Now, NSF has tinkered with those rules by adding a component, dubbed Phase 2b, that allocates an additional $100,000 for 12 more months to companies that have lined up investors willing to put up at least $200,000. NSF, which currently limits Phase 2 awards to $400,000, is testing the idea with four companies this year and plans to expand it to more than 100 next year using money from its existing SBIR pot.

The rationale, say NSF officials, comes from a survey that found most fledgling companies aren't ready for the free market after only 2 years of federal support, and that a small percentage of the companies aided by SBIR generate most of the jobs and revenue. "SBIR is not working as well as it should," says Kesh Narayanan, head of NSF's industrial innovation division, who conceived the extended funding idea. "We wanted to find ways to encourage more companies to take the next step [toward commercialization]."



Green for green. New award helps Alan Kinnersley run field tests of Auxein's plant metabolite.

AUXEIN CORP.

SBIR's supporters generally regard NSF's new twist as fine-tuning an already worthy activity. "Our commercialization rate is much higher than most university technology transfer programs," says Dan Hill of the Small Business Administration, which coordinates the government-wide program and approved NSF's experiment. "I don't see the additional federal support as a crutch, but rather as a way for a company to do more R&D while it lines up investors. And since NSF is buying more research, it's a win-win situation for both parties," adds Hill.

However, others say that NSF may be giving the companies a little too much nurturing. "It's extremely tricky to find the right balance between federal incentives and the commercial sector," says Tom Moss, head of the Government-Industry-University Research Roundtable at the National Academy of Sciences. And Harvard University economist Josh Lerner says that successful companies tend to use SBIR as seed money to attract private investors and that "it's not healthy for companies to avoid the need to go out into the market."

One company participating in NSF's pilot program, Polatomic Inc. of Richardson, Texas, is also looking at the government as a primary customer. The company received $100,000 from NSF based on money it has lined up from NASA's Jet Propulsion Laboratory in Pasadena, California, to help it develop an instrument called a vector/scalar laser magnetometer, which can measure a planet's magnetic field from orbit. "We didn't want to restrict the source of their outside funding," says Narayanan. "As long as it's for the benefit of the federal consumer, what does it matter who's putting up the money?"

Polatomic's chairman, industrial physicist Bob Slocum, says that the company hopes someday to have customers besides NASA and the Navy, which is interested in using it on submarines. Slocum adds that a modified version of the device should also appeal to private companies, who could use it to identify mineral and oil deposits, locate toxic waste sites, and detect buried explosives. But geophysicist John Connerney of NASA's Goddard Space Flight Center in suburban Maryland, which builds a different type of magnetometer for space observations, sees the new injection of federal funding as a sign that the company hasn't really built a better mousetrap. "If Polatomic was truly a commercial business, I would think they would have identified paying customers by the end of Phase 2," says Connerney, who in the past has reviewed SBIR proposals for NSF.

Another grantee, Auxein Corp. of Lansing, Michigan, says it needs the additional funding to conduct more field trials of a plant growth stimulant based on the natural hormone gamma aminobutyric acid, which acts as a neurotransmitter in animals. Chief scientist Alan Kinnersley says the company has lined up $2 million from three investors and found another company interested in becoming the exclusive distributor for its use in horticulture. But sales have fallen short of projected levels. "We have faced an uphill battle educating people about what AuxiGro can do," he explains, "including a 30-year history of biostimulants that have failed to live up to their promise."

Narayanan says he doesn't expect dramatic results from Phase 2b. But he says the SBIR program needed a boost. "We had two choices," he says. "We could sit back and hope for the best. Or we could try something new."

–JEFFREY MERVIS

MAGNETIC RESEARCH

Los Alamos Magnet Leads the Field

It shrieks like Godzilla, harnesses the power of 80 diesel locomotives, exerts a force strong enough to crumple the strongest reinforced steel beams, and now it's open for business. Today, officials at the Los Alamos National Laboratory in New Mexico are scheduled to cut the ribbon on a new magnet