narrow and defensible criteria," agrees George Leventhal of the Association of American Universities, a group of 63 major research institutions.

Presidential science adviser John Marburger unveiled the proposed policy last week at briefings for Congress and the higher education community. It flows from a 29 October 2001 presidential directive intended to stop foreign students and scientists from "abusing" the visa process by which they gain entry to U.S. educational institutions. (The U.S. Department of Agriculture has gone much further, declining to sponsor any new visas for foreign scientists to work in its labs. See *Science*, 10 May, p. 996.)

Roughly 175,000 students or scholars enter the country each year to carry out scientific work, says James Griffin, a Department of Education official who is coordinating the effort while on loan to the White House. Of those, he says, perhaps a few thousand will warrant a closer look under the new guidelines. "But that doesn't mean they will be denied entry," Marburger notes. Officials will look at what type of research they plan to pursue, where and with whom they will be working, and whether they will have access to specialized equipment of a sensitive nature.

The screening would be done by a new Interagency Panel on Advanced Science Security (IPASS), created by and composed of representatives from the major U.S. science agencies as well as officials from the State, Justice, and Commerce departments. "Combining science agencies with law enforcement agencies should make for a more rational and systematic review," says Hartl. University officials are also relieved that they will not have to decide which applicants warrant closer scrutiny. That will be the responsibility of either the State Department or the Immigration and Naturalization Service, although schools would be required to pass along information about significant changes in course work or research projects.

The co-chairs of IPASS will be appointed by Secretary of State Colin Powell and Attorney General John Ashcroft. Griffin says that the White House is weighing a suggestion from university officials to set up an expert committee to help IPASS define "uniquely sensitive" courses of study and areas of research.

A presidential directive spelling out how IPASS will operate is probably "a few months away," says Marburger. The announcement was made now, he says, to give the academic community plenty of time to react.

—JEFFREY MERVIS

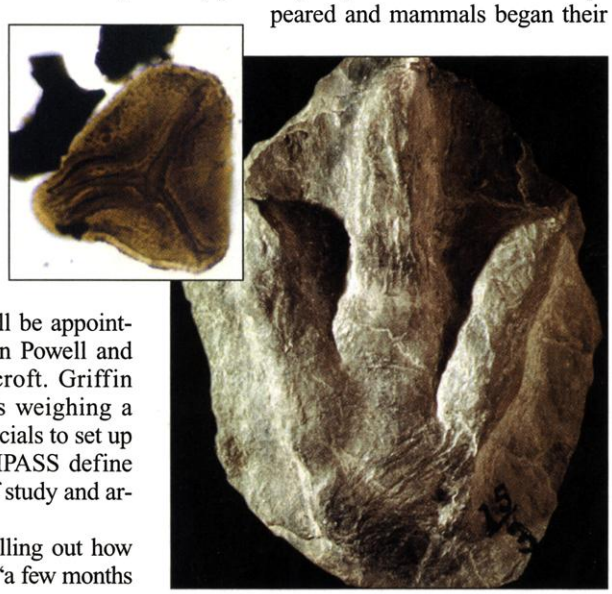
EVOLUTION

Did an Impact Trigger The Dinosaurs' Rise?

Large impacts would seem to be bad for dinosaurs. After all, a huge asteroid or comet ended the 135-million-year reign of the dinosaurs when it hit Earth 65 million years ago. But on page 1305, a group of researchers suggests that an impact also triggered the final rise of dinosaurs to dominance 200 million years ago. Proving that an impact is a two-edged sword will depend on demonstrating that a large body hit Earth at the very geologic instant that the dinosaurs' reptilian competitors abruptly died away and meat-eating dinosaurs came into their own.

By following fossil footprints, geologist Paul Olsen of Lamont-Doherty Earth Observatory in Palisades, New York, and his colleagues show for the first time that the final ascent of the dinosaurs was indeed abrupt, at least in eastern North America. And they now have a geochemical hint—although not yet proof—of an impact at the geologic instant that dinosaurs established their supremacy. "There was something interesting going on" 200 million years ago, says Olsen.

Linking evolution to impacts is a tough job. When researchers made the first impact-extinction connection in the 1980s, most of their colleagues were skeptical. But the case for an impact's wiping out the dinosaurs and numerous other creatures strengthened steadily following the discovery of high levels of iridium—an element rare on Earth but abundant in asteroids—in rock laid down at the boundary between the Cretaceous and Tertiary periods (K-T), when the dinosaurs disappeared and mammals began their



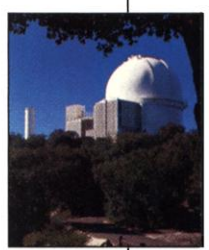
No mere coincidence? Fern spores (*inset*) marking a possible impact disaster immediately precede the first tracks of a new, bigger Jurassic dinosaur.

CREDITS: (TOP TO BOTTOM) NOAO/AURA/NSF; SARAH FOWELL; P. OLSEN

ScienceScope

Dimming Its AURA The National Science Foundation (NSF) has decided to let the Association of Universities for Research in Astronomy Inc. (AURA) run two major observatories for another 5 years despite criticism of AURA's long-term planning.

Last week NSF's governing board gave the green light to a contract with AURA to manage the National Optical Astronomy Observatories (below) and the National Solar Observatory. In the first-ever competition for a prize worth up to $216 million, AURA bested Research Corp., a private foundation in Tucson, Arizona, and the Universities Research Association Inc., which runs Fermilab for the Department of Energy.



Last year a National Research Council report faulted AURA for not preparing the groundwork for two instruments deemed essential for the field's progress: the Giant Segmented Mirror Telescope and the Large-Aperture Synoptic Survey Telescope. NSF has told AURA that it must do better at helping the U.S. community plan the next generation of telescopes.

"We have made it clear to AURA that this is not a carte blanche renewal," says Robert Eisenstein, the outgoing NSF assistant director for mathematics and physical sciences (see p. 1219). An external advisory committee will provide "an added level of scrutiny," he says.

Wait Till Next Month France has a new team of ministers overseeing research and higher education. But their tenure could be short-lived if the Socialists, as some analysts predict, win next month's parliamentary elections and replace them with their own appointees.

Researchers are keeping a close eye on the new health minister, Jean-François Mattei, a geneticist and parliamentary deputy from the Marseilles area. Two years ago Mattei mobilized researchers for a petition campaign against patenting of genes (*Science*, 23 June 2000, p. 2115), but he has also upset scientists by advocating strict limitations on human embryo research. Meanwhile, François Loos, a relatively unknown engineer and industry manager who helped run President Jacques Chirac's campaign, has been given day-to-day responsibility for French science within a new superministry for education and research headed by philosopher Luc Ferry.

"We are just holding our breath," says one Paris-based biologist about the upcoming elections.

Such statements may sting the home crowd, but they aren't being disputed. Members of the Swiss scientific community agree that their research programs are underfunded and offer few incentives to retain young talent. Last November, the Swiss Science and Technology Council launched a petition imploring the government to boost the research budget by 10% within 5 years. "The Novartis move is a very serious symptom of the downhill course of research in Switzerland," says Catherine Nissen-Druey, the advisory body's vice president. "It sends a message to young Swiss scientists that research is more promising in the U.S.A. than it is here." Nor is the Novartis move the first symptom of an ailing research community: Last summer, Switzerland's other drug giant, Roche, shuttered its once-vaunted Institute of Immunology in Basel (*Science*, 13 July 2001, p. 238).

Novartis hasn't turned its back on Switzerland entirely: Vasella says that all of the company's 1400 researchers in Basel will keep their jobs. It will also maintain its labs in the United Kingdom and Austria. But there's no getting around the fact that the European contingent will now be looking west for their marching orders. **–ANDREW LAWLER**

With reporting by Helena Bachmann in Geneva.

NEUROSCIENCE

Big Bucks for MIT Brain Center

CAMBRIDGE, MASSACHUSETTS—Just across the street from Novartis's new center (see previous story), another impressive research facility will break ground this fall, a $150 million academic complex devoted to neuroscience. That effort got a big boost last week, when the Massachusetts Institute of Technology (MIT) received $50 million—its largest contribution in history from a foundation—to jump-start one part of the complex: a learning and memory center led by Nobel laureate and biologist Susumu Tonegawa.

The money will pay for the new facility, additional faculty members, and an endowment for Tonegawa's center. But the gift won't clarify the fuzzy boundaries among the different pieces of MIT's neuroscience effort, which also includes a new institute led by fellow Nobel laureate and biologist Phillip Sharp, MIT's existing brain and cognitive sciences department, and an imaging institute. MIT officials say they are intentionally leaving the lines of responsibility blurred, and that the new neuroscience complex will allow the different groups to interact closely.

"MIT is taking a comprehensive approach to the study of the brain," says Robert Silbey, MIT science dean. And MIT president Charles Vest acknowledges "some conceptual overlap," saying it reflects not only the difficulty in drawing boundaries in an interdisciplinary field but also "some conceptual separation." At a 9 May press conference announcing the gift from the Picower Foundation based in West Palm Beach, Florida, Vest said that Tonegawa's piece of the brain pie will cover research from fundamental molecular neurobiology to systems neuroscience, whereas Sharp's institute will focus on systems, imaging, and computational neuroscience.

Sharp's institute, which has been slow to set a research agenda (*Science*, 24 August 2001, p. 1418), held its first major meeting this week with a heavy emphasis on molecular biology; many papers were devoted to neural stem cells and genetic neuroscience as well as imaging. Sharp doesn't see a boundary problem between his group, the imaging institute, or that of Tonegawa. "It's healthy overlap," he asserts.

The Picower gift to Tonegawa's center, which will be renamed the Picower Center for Learning and Memory, will disburse $10 million a year over 5 years, giving new clout and personnel to Tonegawa's efforts to understand the molecular basis for learning and memory. Thirty million dollars of the gift will go toward the complex, $12 million will be allocated to four new faculty positions, and the remaining $8 million will be used to establish an endowment.

This amount is far smaller than the $350 million pledged to Sharp's McGovern Institute for Brain Research. But that pledge provides only $5 million a year for the first 20 years, half of what Tonegawa will receive in the first 5 years. The complex will be ready in 2004 or 2005.

–ANDREW LAWLER

Better mousetrap. Barbara Picower, left, Jeffry Picower, center, and Norman Leventhal, MIT class of 1938, examine an experiment designed to test mouse memory at Tonegawa's institute.

CREDITS: (TOP TO BOTTOM) JEFF MILLER/UNIVERSITY OF WISCONSIN, MADISON; DONNA COVENEY/MIT

ScienceScope

Patented Cells An ethics advisory group last week recommended that the European Commission (EC) oppose patenting embryonic stem (ES) cell lines unless they have been modified for specific industrial applications. The European Group on Ethics' proposal, if adopted, would put the EC at odds with U.S. policy, which granted a patent covering both the technique the University of Wisconsin's James Thomson used to derive ES cell lines and any lines thus derived. Stem cell policies vary widely across Europe.

A spokesperson for the Wisconsin Alumni Research Foundation (WARF), which holds the patent on Thomson's derivation technique, says WARF is reviewing the panel's report but adds "the European Union seems to believe that [our ES cell lines] occur in nature. This is not the case."

The panel argues that unmodified lines derived from ES cells "are so close to the fetus or the embryo from which they have been isolated" that patenting them represents "commercialization of the human body." The panel also backed the use of "compulsory licenses" in situations where the public good required access and proposed a European Union registry of unmodified ES cell lines.

Innovation Plus Brazil is preparing legislation to strengthen ties between academic scientists and industry. Although both sectors support the idea, neither thinks the proposal will turn the country into a technological powerhouse.

The plan, drafted by the Ministry of Science and Technology, would allow universities for the first time to license discoveries to industry, give companies access to public research facilities, and provide greater protection for intellectual property. "We want to give universities greater flexibility," says the ministry's senior executive, Carlos Américo Pacheco.

Roberto Nicolsky, a physicist at the Federal University of Rio de Janeiro and head of a high-tech business coalition, would like the bill to go further and subsidize companies willing to take risks. And the president of the Brazilian Society for the Advancement of Science says the government's priorities are askew. "We must first strengthen our infrastructure of basic and applied research," says biochemist Glaci Zancan.

Pacheco agrees that reforms in basic science are needed. "But we cannot wait for them," he says. In the meantime, he says, the proposal is "a huge advance for public universities."

sent the problem graphically by etching a map of London onto a glass chip. They then covered the etched part of the chip with another piece of flat glass to create a network of pipes. They also fixed tiny electrodes to the chip so that they could apply a voltage to various locations.

The researchers then pumped low-pressure helium into the chip through open channels along one edge and filled the pipes. Using the electrodes, they could then apply an electric voltage between two points on the chip. The electric field would then guide an electric discharge along the shortest route between the two points, making the helium glow like a fluorescent tube just along that route. The answer to the problem literally lights up. The team members say the method can at present be used to find the way out of a maze and the shortest route between two points, but they hope to develop it for the more complex TSP and network flow problems. "We had really good fun doing this," Manz says.

Manz concedes that the technique has limitations, such as the fact that once a layout is etched onto a device it cannot be changed. But the team hopes to scale up to much more complex problems soon. "With present knowledge about plasma discharge in narrow capillaries, we can assume to be able to work with 5-micrometer capillaries instead of the current 250-micrometer channels in this example," says Manz. This would allow them to stud a 6-cm^2 chip with 1 million electrodes, providing $2^{1,000,000}$ routes across the chip.

Next the researchers hope to find a way to control the opening and shutting of channels on the fly. That would enable them to create a variable chip that could solve a range of problems by changing the network each time to represent a different maze, map, or network layout. "The new digital wave of technologies has opened up a variety of possibilities that will be very hard to surpass," Manz acknowledges. Still, he says, "this technology would benefit from open-minded engineers with a good feeling for where the future lies in computing."

Whether glass chips can rival a digital computer remains to be seen. "There is no doubt that [this is] a clever piece of work," says computer scientist Paul Purdom of Indiana University, Bloomington. "It is an interesting physics problem to determine whether it can be made to work more rapidly than a traditional computer." Beebe thinks racing a digital computer is pointless. But "I'll bet there are other applications ... that none of us have thought of yet," he says.

–DAVID BRADLEY

David Bradley is a writer based in Cambridge, U.K.

CREDITS: (TOP TO BOTTOM) TOM AND PAT LESSON/PHOTO RESEARCHERS; JEFF LEPORE/PHOTO RESEARCHERS

ENDANGERED SPECIES ACT

Cherished Concepts Faltering in the Field

Scientists at the U.S. Fish and Wildlife Service (FWS) thought they had finally won a measure of respect from their peers after adopting two major revisions in their approach to endangered species: setting aside critical habitat, and taking a big picture, or whole ecosystem, view in writing recovery plans. Now they must be feeling like the Rodney Dangerfields of ecology. A clutch of papers in the June issue of *Ecological Applications* suggests that FWS's new approach is faltering. At stake is the success of a series of high-profile initiatives, including the agency's ambitious plan for protecting the Florida Everglades and its 68 imperiled species.

Postcards from the edge. Unlike the peregrine falcon, the Florida panther remains in grave danger.

Not that the old modus operandi—essentially viewing an endangered species in a vacuum—was a smashing success. Of roughly 1000 species listed in the United States as endangered, only 13—including the American peregrine falcon and the American alligator—have rebounded enough to warrant removal from the list. For years, sympathetic voices blamed this disappointing record on a welter of litigation that siphoned away FWS funding for implementing recovery plans. "They're getting eaten alive by the day-to-day issues," says James Michael Scott, a University of Idaho, Moscow, zoologist who works extensively with FWS. Critics, however, have derided the agency's grip on current science.

For a sweeping review of protection strategy, FWS and the Society for Conservation Biology launched a massive data-crunching project in 1998 involving more than 300 people at 19 universities. An army of students led

ScienceScope

Eisenstein Leaves NSF The head of the National Science Foundation's biggest directorate surprised colleagues last week by stepping down from the job. Sources say he felt he had lost the confidence of NSF director Rita Colwell.

Robert Eisenstein, assistant director for mathematics and physical sciences (MPS), announced that he plans to spend the next 12 months on professional leave at CERN, Europe's particle physics laboratory near Geneva. A nuclear physicist, the 60-year-old Eisenstein joined NSF in 1992 and has served for 4 1/2 years as head of MPS, a $920 million program that funds several large facilities as well as providing grants to individuals and groups.

"His departure leaves MPS with a big hole to fill," says chemist Billy Joe Evans of the University of Michigan, Ann Arbor, chair of the directorate's advisory committee. "Bob has done a great job, and his departure was totally unexpected."

NSF officials declined to comment on Eisenstein's decision. But Evans says that NSF deputy director Joseph Bordogna told the committee that the agency "is moving toward having a 5-year term limit for [assistant directors]." According to Evans, Bordogna also noted that NSF's widespread use of rotators—academics who come to Washington for a few years—strengthens NSF's management by allowing it "to change course quickly."

Eisenstein, who remains on NSF's payroll, called his NSF stint "a wonderful scientific opportunity." At CERN he will join a team planning the installation of Atlas, one of four detectors for the Large Hadron Collider.

Next Up The longtime director of the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, has agreed to do double duty for the beleaguered parent organization.

Last week, Smithsonian Institution secretary Lawrence Small named Ira Shapiro as the new interim undersecretary of science, a job embroiled in controversy since Small announced his plan last spring to reorganize Smithsonian research. Shapiro succeeds Dennis O'Connor, who is headed for the University of Maryland (*Science*, 12 April, p. 235).

A search committee will hunt for a permanent replacement for O'Connor, who has also served as acting director of the National Museum of Natural History.

Contributors: Mari N. Jensen, Michael Balter, Xavier Bosch, Cassio Leite-Vieira, Jeffrey Mervis, Elizabeth Pennisi