Briefings

edited by DAVID P. HAMILTON

NSF Watchdog Plays Up Misconduct

The National Science Foundation's inspector general, Linda Sundro, apparently has a taste for high drama. At first glance, her most recent semiannual report* suggests that fiscal year 1990 was a banner year for reports of research misconduct, contract improprieties, and criminal investigations. For instance, Sundro reports that her office received 41 misconduct complaints this year—seven times as many as it did last year.

But a closer look at the report might justify second thoughts about the extent of NSF's misconduct problem. The most disheartening case summarized in the report involves the "sexual misfeasance" of a biological researcher at a foreign field site, who allegedly was involved in 16 incidents of misconduct with female graduate and undergraduate students "at the research site, on the way to the site, and in his home, car, and office." (The inspector general found these actions to be "a serious breach of research practices" and recommended denying the researcher NSF funds for 3 years.) Other examples mentioned in the report involved minor plagiarism and "alleged noncompliance with recombinant DNA guidelines."

The inspector general did receive 14 new allegations of criminal behavior or regulatory violations over the last 6 months—including two instances of suspected forgery, a case of alleged grant fraud, and possible conflict-of-interest violations. But even these turn out to be relatively mundane. The forgery cases, for instance, involved not data fabrication or financial chicanery, but "alleged forgery of NSF letterhead."

The inspector general's office is similarly zealous in pursuing its own interests. The first section of the report complains that NSF's 25-year-old building is "deficient in many respects"—including elevators so slow that "access to upper floors [where the IG's offices are located] is routinely delayed." Facilities must be improved "if we are expected to continue to manage our programs and operations effectively," the report states.

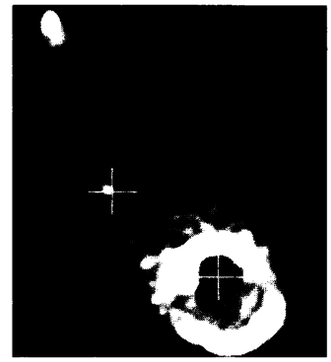
*Semiannual Report to Congress, No. 3, April 1, 1990—September 30, 1990. Office of the Inspector General, National Science Foundation.

Gazing Through a Gravitational Lens

Just 2 years ago, astrophysicists discovered the first "Einstein ring"—a distant arc of light predicted more than 54 years ago by Einstein's theory of relativity. Now scientists have found a second ring, and are using it to measure the mass of a distant galaxy.

Einstein rings are a rare type of gravitational lens, created when light or radio waves coming from a distant source are bent into a ring by the gravity of a massive object—such as a galaxy or black hole—on their way to Earth. The gravitational lens magnifies the image, allowing astronomers to see the original light source more clearly.

That's just what Glen Langston, an astronomer at the National Radio Astronomy Observatory, banked on when he and his colleagues used the radio observatories in Arizona and New Mexico to survey the sky. Not only did they discover the second ring, but they were also able to get a glimpse of its light source—a bright blue quasar some 2.8 billion light-years away.

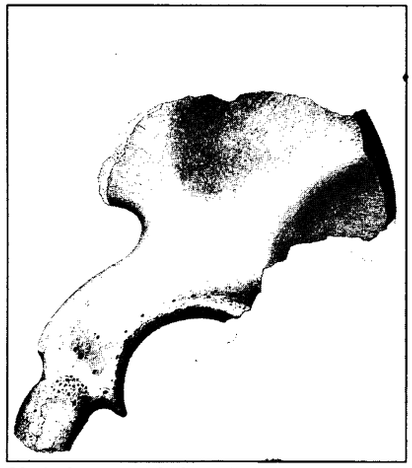


Ring around the galaxy. *A radio image of an Einstein ring.*

The object that bent the light coming from the quasar is an intervening galaxy that appears to have a mass of about 300 billion suns. Because that mass is between 8 and 16 times greater than the mass of the galaxy's visible stars, Langston's team suggests that the galaxy must contain a substantial amount of "dark matter"—invisible mass estimated to make up more than 90% of the universe.

Natchez Man Gets Younger

Ever since its discovery in a Mississippi River bayou in 1845, the battered pelvis of a 16-year-old male, known as "Natchez man," has puzzled anthropologists. Physician Montroville W. Dickeson found the fossil along with the bones of extinct mammals, including ground sloths, mastodons, horses, and bison, prompting him to declare that it was a Pleistocene pelvis. That put humans on the map in North America some 15,000 years ago—3000 years before most scientists thought likely.



Natchez pelvis. *From an 1889 illustration.*

In the last century, many scientists tromped down to the bayou to study the pelvis, including the famed British naturalist Sir Charles Lyell, who thought the bone had fallen into the swamp from nearby Indian graves. But tests of fluorine content conducted in 1895 showed that the pelvis was as mineralized, and therefore probably as ancient, as the bones of the Pleistocene ground sloth found nearby.

Most anthropologists "didn't know what to make of it," says Ted Daeschler, collections manager in vertebrate biology at the Academy of Natural Sciences in Philadelphia, now home of the pelvis. It remained forgotten until this year when an inquiry from University of Pennsylvania anthropologist John L. Cotter prompted Daeschler to dust off the pelvis and send it, along with the ground sloth bone, to the University of Arizona Accelerator Mass Spectrometer for radiocarbon dating. The results, completed last month: ground sloth, 17,840 years old (±125 years); Natchez man, 5580 years (±80 years). Says Daeschler: "It sort of puts the issue to rest. Natchez man's archaic, but not paleo."

What Next for the Energy Labs?

Militarily speaking, the Soviet Union has packed up its toys and gone home. The rationale for the Strategic Defense Initiative has largely collapsed. And even the threat of war in the Persian Gulf doesn't seem likely to create a need for new strategic nuclear weapons. So what's a conscientious secretary of energy to do with a $6-billion laboratory system built in part to ensure that weapons of mass destruction use up-to-the minute technology?

The answer: Seek a "strategic vision" for the labs. Last month, the Department of Energy named an 8-member task force to figure out how best to make use of what Energy Secretary James Watkins calls "the tremendous intellectual resources" in federal facilities such as the Los

Alamos, Lawrence Livermore, and Brookhaven National Laboratories.

DOE officials concede that the task force starts off with at least one foregone conclusion: that the labs will continue to exist. "It's not an exercise in smashing the system and deciding what to do next," says one. Instead, the committee is charged with formulating "management principles" for Watkins that will allow the labs to address future energy, economic, environmental, and national defense needs. The committee intends to release an interim report next May and a final report in October.

Brown Ousts Staffer From Committee

He hasn't yet officially assumed his position as the newly elected chairman of the House Science, Space, and Technology Committee (*Science*, 14 December, p. 1508), but Representative George E. Brown, Jr. (D-CA) is already stirring things up. The first casualty: committee staff director Robert C. Ketcham, who has announced he will be stepping down at Brown's request.

Brown notified Ketcham of his decision to bring in a new executive director on 13 December. According to Ketcham, Brown intends to fill the staff director's position with someone of "national stature" in the science and technology arena. Ketcham, who served as the committee's general counsel from 1974 through 1989, apparently falls short of the mark in Brown's view because he lacks the proper scientific credentials.

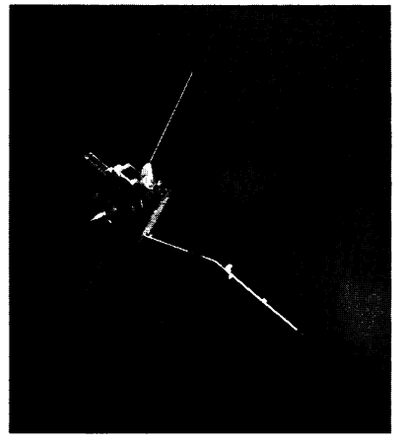
Just who might measure up? Brown reportedly has interviewed John Gibbons, the director of the Office of Technology Assessment. Also on Brown's list of candidates, sources say, is Radford Byerly, Jr., a physicist now at the University of Colorado who worked on the staff of the subcommittee on space science and applications from 1975 to 1987.

Ulysses: All Shook Up

Word emerged last week that the Ulysses space probe, heading for a polar orbit of the sun, has the shakes. The 370-kilogram spacecraft, which was provided by the European Space Agency as part of a joint mission with NASA, was working fine as it left Earth orbit. But when engineers extended an 8-meter antenna in early November, the entire vehicle began to oscillate.

NASA's latest headache: The radio dish Ulysses uses to communicate with Earth is swinging slightly off target, says project scientist Edward Smith of the Jet Propulsion Laboratory. If the oscillations keep up during crucial parts of the mission, data would be lost—"a fairly serious problem," says Smith.

Mission engineers think a phenomenon called solar pumping lies at the root of the problem. Like most spacecraft components, the 8-meter antenna tends to expand where it absorbs sunlight and to contract where it's shaded. Ulysses is rotating five times a minute about an axis defined by the troublesome antenna, which is pointing away from the sun. Now partially shaded by the spacecraft, the antenna's uneven heating is affecting the rotational motion, causing the craft to "nod"—similar to a spinning top with a bent pin sticking out of it.



If NASA is lucky, however, Ulysses' oscillation may take care of itself. As the probe's trajectory takes it farther from the sun, both the intensity of sunlight falling on the antenna and the degree to which it is shaded will lessen, presumably reducing the oscillations. Indeed, the nodding has diminished somewhat since early November, and Smith says that within the next few weeks the problem may be under control. Would that more of NASA's problems proved to be self-correcting.

Pinning Down Sequencing Costs

How much does it cost to sequence a single base pair of DNA? The question lies at the heart of the controversy over the Human Genome Project, whose ultimate goal is to sequence all 3 billion base pairs of human DNA. But despite all the uproar over the project's cost, it turns out that no one actually knows how expensive sequencing is.

Estimates range from pennies a base up to $10 or so. In their 5-year plan for the genome project, published earlier this year, the National Institutes of Health and the Department of Energy estimated the cost at $2 to $5 a base, including DNA preparation and salaries. Then genome officials at NIH and DOE tried to get a firmer fix on the number by inviting in several big sequencing groups to talk about their costs. Their conclusion? Sequencing now costs a mere $1 to $2 a base—apparently a phenomenal improvement.

Way too low, replied members of NIH's genome advisory committee. "$1 to $2 is a dangerous estimate," said genome project director James Watson. "If you use that, you'll find the cost is going up." Stanford biologist David Botstein agreed: "No one has the vaguest idea [what sequencing costs], and that should be our position."

But genome officials are determined to nail down this figure. They have recently hired a fiscal consultant who will make the rounds of the big sequencing labs over the coming months, calculating current costs and developing a model for tracking costs as they drop over time. Such information cannot help but be useful, since the genome project's 5-year goal is to reduce the cost to 50 cents a base. If you don't even know how to measure the cost, it's hard to tell when you've arrived.

GAO Finds Weapons Labs Vulnerable...

...but not to post–Cold War budget cutting, as you might think. Instead, the General Accounting Office reports* that Department of Energy weapons facilities are natural targets for terrorist attacks, espionage, and theft, yet they suffer from "recurring" security problems.

DOE does not train or manage its security forces well and often fails to correct known security problems, says the GAO. For instance, when DOE conducted an unannounced test of security guards at the Los Alamos National Laboratory at GAO's request last April, 78% of the force "lacked one or more of the skills needed to arrest, apprehend, communicate, or survive in an adversarial situation." When guards found themselves in hazardous situations, simulated invaders often "killed" them or a "hostage" and "escaped" with classified documents or government property. A total of 24 guards and hostages was "killed" during this testing. Furthermore, "DOE inspections between 1985 and 1989 identified similar and recurring problems at Los Alamos and eight other facilities, yet DOE rated six facilities satisfactory, two marginally satisfactory, and only the Argonne National Laboratory as unsatisfactory," according to the report.

**Potential Security Weaknesses at Los Alamos and Other DOE Facilities*, General Accounting Office, GAO/RCED-91-12, October 1990.