

Downsizing Squeezes Basic Research at the USGS

The U. S. Geological Survey (USGS) has faced oblivion and survived, but for scientists at the agency the aftermath isn't going to be easy either. The call for abolishing the USGS in the Republicans' Contract with America has so far proved to be an empty threat. But researchers in the Geologic Division, where most of the agency's basic earth science research is done, are still facing an uncertain future: Agency officials, anticipating a congressional funding reduction in next year's budget, are preparing to eliminate hundreds of jobs. The eventual size of the layoff will depend on the agency's fate in Congress, but basic research won't be spared another source of pressure: a reorganization plan being pushed by the USGS's director, Gordon Eaton, who came on board a year ago.

The effect of Eaton's plan, as explained in a division document, will be to move the Geologic Division "from a position of 'patron of the sciences' to a mission-oriented organization that focuses more on program activities and meeting customer requirements and less on generic disciplinary issues within the earth sciences." Many fear the reorganization combined with the layoffs will deliver a disastrous blow to the agency's stature as a key source of data and basic research on topics from earthquakes to geologic dating.

Indeed, senior researchers who see the writing on the wall have already started an exodus. Last year, after 31 years of service, geochronologist and National Academy of Sciences member Brent Dalrymple left the USGS. The agency "was getting to be an almost impossible place to do decent research," he says. And others shared that frustration, he says, noting that "there was a time when the survey had 10 or 12 people in the National Academy. I think they'd be down to zero next month if Mary Lou Zoback [a geophysicist in the Menlo Park office] hadn't just been elected." In the Geologic Division, says Dalrymple, now dean of oceanography at Oregon State University, research "just isn't a priority anymore."

Eaton, himself a one-time academic and USGS researcher, agrees with critics that

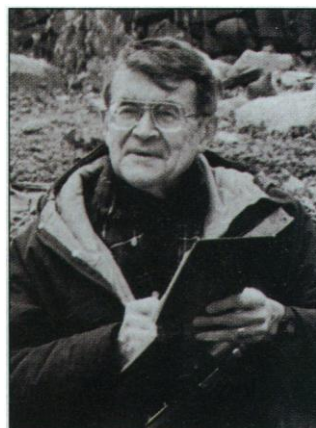
basic research "is an essential part of what we have to offer the nation." But observers note that Eaton inherited an agency under strain and is working to mollify a results-oriented Congress as best he can. And his remedy, many USGS observers tell *Science*, has been to accelerate a trend of squeezing basic research that began more than a decade ago.

In 1982, after some good years in the 1970s and early '80s, the Geologic Division had 3800 "full-time equivalents," or FTEs (funding equal to salaries for 3800 full-time employees), to do its work: map rock types, monitor volcanoes, understand how earthquakes damage buildings, assess how much oil and gas remain to be found, and explore the continental shelves, among other jobs. Then a period of slow funding growth accompanied by inflation set in. The USGS enjoyed some real increases in the 1980s, but they went largely to the customer-oriented divisions: the National Mapping Division, which used them to acquire state-of-the-art mapmaking technology, and the Water Resources Division, which applied them to assessing the nation's water quality. The Geologic Division

was getting along on much the same \$230 million per year or so. By 1987, attrition had reduced staffing from 3800 to 2700 FTEs, and two buyouts in the past year dropped it to about 2200. Meanwhile money for field work was dwindling, so even the people who remained felt squeezed.

Now officials at the USGS's national headquarters in Reston, Virginia, are taking aim at the Geologic Division again. They are poised to slash several hundred more scientific positions to bring total Geologic Division employment to about half what it was in 1982. They are assuming as a worst-case scenario that Congress will cut total agency funding by 20% in the 1996 budget. Although the eventual size of the layoff will

depend on congressional action that began only last week, notices that particular positions are being abolished will be served on 1 August, effective 1 October unless the layoffs are rolled back because of a less-than-disastrous outcome in Congress.



Keeping the customer in mind. USGS Director Gordon Eaton, who is reorganizing the agency to emphasize applied research.

While Geologic Division researchers wait for the ax to fall, they are watching their division be remade in the image of the Water Resources Division, or "waterized," as some say. The looming reorganization, which will be formalized shortly, will shift responsibilities for specific projects from the head offices in Reston to team leaders in the field offices, reporting to one of three regional geologists. This regional orientation has long been in place in Water Resources, where it allows for close coordination of more than 1000 coop-

erative arrangements between the USGS and state and local agencies.

The move toward that model accelerated last April when Eaton appointed Patrick Leahy—a 20-year veteran of Water Resources who has never supervised research—as Chief Geologist in charge of the division. And while some staffers welcome the shift of management responsibilities toward regional offices, others told *Science* that they are less enthusiastic about Water Resources as a model. Some of the skepticism stems from the fact that the water unit specializes in what geologist David Scholl, who is retiring to emeritus status from the Menlo Park office, calls "storefront science," in which "customers" such as cities or counties walk out the door with a specified "product," such as an evaluation of ground-water quality. Only about 10% of Water Resources' work can be called basic research, everyone agrees, while Geologic Division work may involve something closer to 50%.

And given the layoffs and reorganization in the offing, many observers presume that 10% basic research is the level USGS managers, who aren't talking publicly, are shooting for. That would be a "blueprint for bean-counting oblivion," according to economic geologist Paul Barton in Reston, another academy member who will soon be leaving the USGS. He and Dalrymple cite numerous cases in which basic USGS research turned out to be just the ticket for "customers" who may not have even realized they had a problem. In the early 1970s for example, USGS geophysicist Arthur Lachenbruch, who has recently retired, was studying how heat moves around in Earth's

"There was a time when the survey had 10 or 12 people in the National Academy." But research "isn't a priority anymore."
—Brent Dalrymple

crust, just because he thought it was interesting. Over lunch one day, he heard from colleagues that engineers were planning to bury the Alaska oil pipeline in permafrost. Lachenbruch realized, when no one else seemed to, that the heat from fluid friction within the pipe would surely melt the permafrost and wreak disasters on Alaska. The seemingly irrelevant researcher quickly convinced the engineers, and the pipeline was elevated above the permafrost.

People like Lachenbruch "see problems in ways other people can't," says Dalrymple, and are thus a crucial component of an organization like the USGS. "Even though you're downsizing, there has to be some critical mass [of basic research] you maintain. I

don't know what it ought to be, but it probably has to be larger than 5 or 10%."

Eaton disagrees. In a reply to concerns expressed in a letter from Barton, Eaton argued that "the 10 to 12% of [Water Resources Division] staff who do basic research (as opposed to data-gathering and analysis) strike a balance that, if applied to [the Geologic Division], would provide more than ample room for" work like Lachenbruch's. And some staffers see the paring of research in many parts of the Geologic Division as inevitable. One scientist who has shuttled between research and management at headquarters argues that it is proper for the Geologic Division to focus more on understanding local processes, such as volcanic

eruptions or landslides, and less on basic research and the broad geologic mapping that some traditionalists still view as the core of the division.

"We're not a basic research organization," says the staffer. "We have to show more impact on society, policy, or economics. Some have come to feel they can do science for science's sake and have lost touch with the underlying rationale of why the taxpayers should pay their salary." Applied science and gathering fundamental knowledge "are not separate," he notes; "it's a matter of balance." Finding the right balance, and retaining the right people to make it work, will be the challenge.

—Richard A. Kerr

GENETICS RESEARCH

NIH's "Gay Gene" Study Questioned

Two years ago, geneticist Dean Hamer of the National Cancer Institute published a study of 40 pairs of brothers—all gay—reporting that their sexual orientation was influenced by their genes. Family pedigree data indicated that the men had inherited a factor for gayness from their mothers. Hamer and his team zeroed in on the X chromosome (passed to males only by their mothers), scanning it for genetic markers that the gay men might have in common. Based on these linkage studies, Hamer concluded he had found a gay genetic factor at the tip of the X chromosome (*Science*, 16 July 1993, pp. 291 and 321).

This report—offering the first molecular evidence that human sexual orientation might be determined genetically—sparked controversy, and lots of it. But in recent months Hamer's work has begun to face more serious technical questions—one in a confidential setting, the other in public. The confidential investigation is being carried out by the Office of Research Integrity (ORI) in the Department of Health and Human Services. And in a more public forum, the research is also being questioned by George Ebers, a neurogenetics researcher at the University of Western Ontario in London, Ontario, who is trying to confirm Hamer's result. Although Ebers says his research is similar to that of the National Institutes of Health (NIH) team, so far, he told a gathering at Cold Spring Harbor Laboratory in March, he hasn't replicated Hamer's finding.

News of the ORI inquiry broke on 25 June when the *Chicago Tribune* reported that a former junior member of Hamer's lab at the NIH had raised questions about Hamer's research. According to the *Tribune*, the postdoc, a co-author with Hamer who did gene mapping studies in his lab, triggered the ORI inquiry in March 1994 when she challenged unspecified methods of data selec-

tion. NIH declines to comment. Lyle Bivens, ORI's director, says his office only conducts investigations at NIH after NIH has completed an inquiry, but he didn't discuss this case: "We cannot confirm or deny the existence of any investigation."

Hamer also declines comment. But two geneticists contacted by *Science*, both intramural researchers at NIH, confirm that ORI is investigating Hamer's work. Both de-



Drawing fire. Dean Hamer, leader of the NIH team that found a locus for gay behavior on the X chromosome.

manded anonymity. ORI is looking into allegations that Hamer "selectively reported his data," according to the *Tribune*. Another question that may have prompted an inquiry, says an NIH researcher, is: How did Hamer select subjects? There is little consensus within the scientific community on the best way to identify gay members of a family; women, for example, may be more reliable informants than men. It is not clear whether ORI's investigation focuses on Hamer's 1993 paper or on a follow-up study on a new group of 33 pairs of gay brothers (*Science*, 16 June, p. 1571). One of Hamer's co-authors on the second paper, geneticist Stacey Cherny of the University of Colorado, Boul-

der, says this still-unpublished research supports Hamer's original finding, but with a lower level of statistical significance.

As the confidential ORI investigation moves forward, a general debate on Hamer's findings is taking place in public, sparked by Ebers and George Rice, collaborators at the University of Western Ontario. Ebers says he agrees with Hamer's view that gay behavior is probably inherited, but sees no reason to focus linkage studies on the X chromosome. About 4 years ago, Ebers says, he began to look into the genetics of gay behavior "as a matter of personal curiosity." With Rice's help, he collected data on more than 40 pairs of gay brothers—the number Hamer studied. But unlike Hamer, Ebers found no evidence that gayness is passed from mother to son—"not even a trend in favor of X-linkage."

Hamer, in an e-mail response to *Science*, says Ebers' "research design is very different than our own and cannot be interpreted to either refute or confirm our findings." Ebers and Rice may have missed the X-linkage, according to Hamer, because "they made no effort to select families that display the maternal pattern of inheritance," and thus diluted the critical genetic information in a sea of noise. Hamer notes that different groups studying complex genetic traits often reach different conclusions.

Ebers doesn't think that his selection of subjects biased the conclusions. But he does sympathize with Hamer's discomfort at the criticism he's getting, and he notes that the whole matter should be regarded as "an open question," requiring "a lot more work to sort it out." Hamer, for his own part, doubts there would be a fuss "if we were working on any topic other than homosexuality."

—Eliot Marshall