U.S. R&D SPENDING

Computing, NSF to Get Top Billing in 2000 Budget

An initiative to boost computing research is expected to be the science highlight of an otherwise lackluster fiscal year 2000 budget proposal that President Bill Clinton is preparing to send Congress on 1 February.

Administration officials have been warning for months that a harsh budget climate might freeze civilian research and development spending. But *Science* has learned that plans for the year beginning 1 October 1999 will include moderate increases for selected science agencies. Growth at the National Institutes of Health (NIH) would be minimal after a record-breaking increase in 1998, however, and military spending on basic research at universities could slump under the proposed budget, whose prospects are unusually fluid.

Although the request is still being fine-tuned, informed sources say the White House is expected to ask Congress to give the National Science Foundation (NSF) the largest percentage increase of any basic research agency—some 6%, or roughly $200 million, to nearly $3.9 billion. The budgets of several other major research agencies, however, would barely keep pace with inflation. Insiders expect Clinton to ask for a 2.2%, $328 million increase for the $15.6 billion NIH, for example, and about a 3%, $200 million increase for the Department of Energy's (DOE's) $7 billion research portfolio.

Bit player? A new initiative backed by Gore would boost funding for research in computer software, hardware, and networks.

At the Department of Defense, science lobbyists say the Administration may propose cuts in basic research that exceed 14%. The drop would come despite an overall rise in defense spending of $12 billion, to $296 billion, the first major increase in 15 years. Cuts in the military science budgets, which provide up to half the government funds received by university math and engineering departments, "would be a serious concern for the research community," says Michael Lubell of the American Physical Society in College Park, Maryland.

Clinton is scheduled to preview the budget next week in his State of the Union address. But a constellation of factors makes the outcome of this year's budget debate over R&D spending extremely volatile. The biggest unknown, analysts say, is how a sharply partisan Congress, already rent by impeachment, will decide to spend a budget surplus now expected to reach $76 billion. The White House has set aside the surplus, which appeared last year for the first time since 1969, to shore up the Social Security retirement system, which is predicted to become insolvent in the 2030s. Some Republicans, however, want to use a portion of the excess funds to provide a tax cut, but narrow GOP majorities in both House and Senate make such a rebate a long shot. A stalemate could throw open the door to a last-minute spending spree similar to the one last fall that produced a 15%, $2 billion increase for NIH and swelled other research budgets (*Science*, 23 October 1998, p. 598). "Failure to get a Social Security deal could open the spending floodgates," says one congressional aide.

Any move to spend some of the surplus on government operations, however, would require Congress and the Administration to take the politically risky step of openly exceeding spending caps imposed by the 1997 Balanced Budget Act. In 2000, the act limits total discretionary spending—the one-third of the overall $1.8 trillion federal budget not tied up in mandatory payments such as medical assistance to the elderly and interest on the federal debt—to $571 billion, $5 billion less than this year. Staying within the cap, says Lubell, "means tighter times for science," all of which falls within discretionary spending.

An additional complication is the expiration of a ban on moving funds between the military and civilian parts of the budget. The so-called "firewall" was erected several years ago to prevent Congress from transferring military funds to civilian programs at the end of the Cold War. Ironically, however, its abolition has raised the prospect that lawmakers intent on boosting military readiness could now raid more vulnerable civilian programs, including research budgets.

Despite the uncertainty, Administration officials seem ready to make a high-profile push for the new computing initiative—which is so far nameless but reportedly has the backing of Vice President Al Gore. The initiative, which will initially involve NSF, DOE, NASA, and the Defense Advanced Research Projects Agency, has its origins in an August 1998 report issued by a White House task force. It recommended that the government add $1 billion over 5 years to the estimated $1.5 billion a year it now spends on information technology research (*Science*, 21 August 1998, p. 1125). The panel said the increase is needed to revitalize basic research on software, hardware, and computer networks, and to maintain U.S. leadership in the field.

Although the White House budget request is likely to fall short of the $200 million the panel recommended, an expected $150 million in new funds for NSF would be "a very positive start," says computer scientist Ken Kennedy of Rice University in Houston, Texas, who co-chaired the panel. Congressional aides say their bosses are likely to respond favorably, although the plan's ties to Gore could be a problem for Republicans wary of giving the presidential candidate any campaign fodder. Indeed, aides say that "Gore's fingerprints" could imperil several marine science initiatives touted by the vice president at a major oceans conference last year and proposed by the National Oceanic

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and Atmospheric Administration.

Administration officials are expected to have few other new science initiatives to tout, however. At NSF, for instance, a request for $40 million toward a heavily instrumented $70 million jet to study the upper atmosphere was denied by White House budgeteers to make room for the computer initiative. In addition, agency officials have again shelved plans for a $25 million Polar Cap Observatory in northwest Canada after being thwarted for the past 2 years by Senator Ted Stevens (R–AK).

Congress isn't likely to add funds for such projects. But lawmakers can be counted on to find extra funds for NIH, seen by pinched budgetmakers as having earned several years' worth of increases last year. With strong backers in key positions on the appropriations committees and broad support from a host of lobbying groups, who are calling for another 15% increase, NIH's budget traditionally emerges from Congress fatter than it arrived—no matter which party is in power. This year is likely to be no exception, although some legislators question whether biomedical bureaucrats could effectively spend another major windfall. "A 15% increase [for NIH] would be an even larger victory this year" than last, says a congressional aide. **–DAVID MALAKOFF**

With reporting by Jeffrey Mervis and Eliot Marshall.

PALEOANTHROPOLOGY

Did Early African Hominids Eat Meat?

Food is one of modern humans' all-consuming passions—and that was perhaps even more true for our early ancestors, who had to work much harder for their calories. But exactly what delicacies tempted the early hominid palate has long been a subject of debate, fueled by the fact that anthropologists had to infer ancient diets from indirect evidence such as tooth wear and jaw and tooth shape. Now on page 368, researchers use a clever new method based on the chemical makeup of teeth to determine the kinds of food an early hominid ate in African woodlands 3 million years ago.

Paleoanthropologist Julia Lee-Thorp of the University of Cape Town in South Africa and graduate student Matt Sponheimer of Rutgers University in New Brunswick, New Jersey, examined carbon isotopes in the tooth enamel of *Australopithecus africanus*, a small-brained hominid that walked upright but was probably also at home in the trees. Researchers thought that this species subsisted on forest fruits and leaves, but the isotopic clues show that it ate a varied diet, including either grassland plants or animals that themselves fed on grasses.

Other researchers are excited about the work. "The data are just fascinating," says paleoanthropologist Margaret Schoeninger of the University of Wisconsin, Madison. Adds paleoanthropologist John Kingston of Yale University: "This [direct analysis] is what we want to see." Many theories of human origins invoke a switch to a meat-rich diet to explain the sudden swelling of brain power in our own genus, *Homo*; the new data raise the possibility that meat-eating is not the exclusive province of *Homo* but a strategy adopted by more primitive species too.

The isotope analysis offers a glimpse into ancient animals' diets and habitats, because different kinds of plants use carbon slightly differently. Trees, bushes, and shrubs, called C_3 plants, select against the heavier isotope, carbon-13 (^{13}C), when they convert carbon dioxide into sugars and tissues. C_4 plants such as tropical grasses and sedges, on the other hand, use ^{13}C more easily and have more of it in their tissues. Herbivores incorporate the isotopic signature of these plants into their bodies, and meat eaters absorb the signature of their prey.

To find out what *A. africanus* ate, Sponheimer and Lee-Thorp compared the carbon isotope ratios of four hominid specimens with those of 19 other creatures found in a bone-filled cave about 325 km north of Johannesburg. The data fell into three clusters. One group of animals, including a three-toed horse and a warthog, had relatively high ratios of ^{13}C to ^{12}C, marking them as grassland feeders. Another group, including a rhinoceros and an impala, had low ratios and probably got most of their food from the forest. In the middle were the scavenging hyenas—and the hominids. Thus *A. africanus* must have gotten at least some food from eating grass, grass seed, or the meat of grass-eating animals. "Maybe their hearts and homes were in the trees," says Sponheimer, "but their bellies were tied to the open areas."

And they may have been filling those bellies with meat, although they lived half a million years before the first known meat-eating humans. The tooth wear patterns of *A. africanus* lack the telltale scratches of a grass eater, so the isotope data suggest that it ate some sort of grass-eating animals, says isotope geologist Paul Koch of the University of California, Santa Cruz. No one is suggesting australopithecines ate like the clawed hyenas, but they could have hunted small animals or scavenged already-dead carcasses, he says.

Schoeninger accepts the isotope ratio data but is not so sure that *A. africanus* ate meat. She notes that the early hominids thought to have eaten meat, 1.8-million-year-old *Homo* specimens found in East Africa, had much smaller teeth and chewing muscles. To her, *A. africanus*'s big teeth and powerful jaw suggest that it mainly ate nuts, cracking them open with its teeth. The extra ^{13}C could have come from grass seeds or grass-eating insects, she says. Isotopic ratios of other elements, such as oxygen or strontium and calcium, might eventually separate the carnivores from the herbivores, she says.

Open wide. Tooth enamel from *Australopithecus africanus* (*top*) found in a South African cave (*above*) reveals this early hominid's diet.

Whatever they were eating, the work shows that *A. africanus* spent some time in open areas rather than in dense forests, although it was apparently adapted for climbing. And clearly the hominids were willing to try a range of foods: They had a wider range of isotope values than all but one of the other animals. These hominids, although they may not have been our direct ancestors, apparently possessed one of the key traits of our lineage, says anthropologist Jeffrey McKee of Ohio State University in Columbus: "They were adaptable. They weren't specialized animals." **–GRETCHEN VOGEL**

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