ment, says Simon Eidelman, a physicist at the Budker Institute. Although Eidelman thinks that the Brookhaven experiment is "extremely beautiful from the physics point of view," he says it's too early to tell whether there's a problem with the calculations, with experiments that feed into them, or with the Standard Model itself. "When and where all this will converge, I can't tell," he adds.

Eidelman might have to wait a while to find out: The muon collaboration has some more data yet to be processed that should bring the error bars down a bit, but the White House budget contains no funding to continue the Brookhaven experiments. Experiments that study the B meson, such as BaBar at the Stanford Linear Accelerator Center in California and Belle at KEK in Tsukuba, Japan, might help narrow down uncertainties in the theory. However, it will be at least half a decade before the Large Hadron Collider at CERN, the European particle physics laboratory near Geneva, shows for sure whether the Brookhaven result is the sign of new physics or just an interesting twist in the same old story.

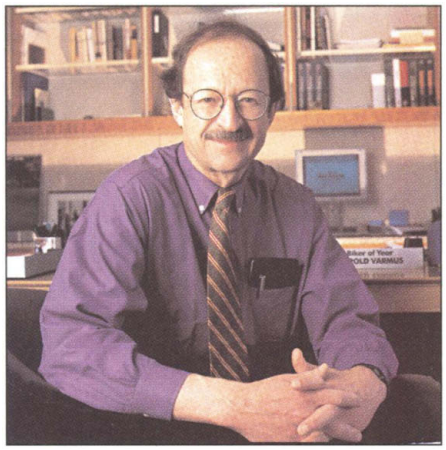
–CHARLES SEIFE

BIOMEDICAL RESEARCH

Panel Hears Ideas for Overhaul of NIH

Does the $23.5 billion U.S. National Institutes of Health need a major overhaul to trim its ever-growing fleet of 27 centers and institutes? Last week, an Institute of Medicine (IOM) panel that's begun investigating this question heard comments from current and former NIH directors. Two out of three said NIH would be better off if it were more centralized. But a former member of Congress who guided NIH funding injected a dose of reality, saying that "it is going to be a very daunting task" to overcome political pressures to maintain the status quo.

Congress asked for the study in a report accompanying a 2001 spending bill. Lawmakers wanted to find out "whether the current NIH structure and organization are optimally configured." The most prominent advocate of restructuring at that time was Harold Varmus, NIH director from 1993 through 1999. He spelled out his ideas in an article last year arguing that constantly adding new institutes, each with its own budget allocation, was becoming too cumbersome (*Science*, 9 March 2001, p. 1903). He called for reforming NIH into five institutes organized by disease group. In his plan, a sixth institute, "NIH Central," would house the NIH director and have much more power to shift funds among institutes than the director has now.



Nonproliferator. Harold Varmus thinks NIH needs fewer, not more, institutes.

Varmus explored his ideas with the IOM panel, which is chaired by former Princeton president Harold Shapiro and includes James Wyngaarden, another former NIH director (1982 to 1989). Varmus explained that, with 27 institute chiefs squeezed into a room, "it's very difficult to feel you're actually molding things." Administrators "got tired" of being pushed to do joint projects on zebrafish, mouse, and bioinformatics. "There is a serious misconnect between this checkerboard of institutes and how science is being done," Varmus said.

A leaner structure also received the support of Bernadine Healy, NIH director from 1991 to 1993, who suggested grouping NIH in four slightly different "clusters." Healy, however, thinks more institutes are fine; she even suggested two new ones for nutrition and rehabilitation. Current NIH director Elias Zerhouni didn't take a stand on restructuring. He asked the panel to think not only about "organizational change" but also "better management tools" to "optimize performance." He and others also suggested other questions, such as whether institute directors should have term limits.

Abolishing institutes is easier said than done. The same disease advocacy groups that have pushed to double NIH's budget over 5 years to $27.3 billion in 2003 also support their favorite institutes, and most institutes have congressional champions as well. Debra Lappin of the Arthritis Foundation reminded the group that "the American public owns the NIH." Redundancy, she suggested, could be a good thing, because consolidating could lead to "great orthodoxy" and "less competitiveness."

"Any attempt to eliminate individual institutes will meet probably very strong political resistance," former Illinois Representative John Porter told the group. However, he thought giving budget authority to a cluster director to move money around institutes within that cluster "is possible." This wasn't

ScienceScope

Science Cuts Coming? French Prime Minister Jean-Pierre Raffarin is considering major cuts to France's R&D budget, according to press reports last week. Finance ministry officials are thinking about cutting the $9 billion research account by 7.6% in 2003 to help the government make up for a slowing economy and deliver a promised tax cut, according to the daily *Libération*. But science minister Claudie Haigneré was reportedly campaigning against the idea, noting that the ruling party has also pledged to boost overall science spending to 3% of GDP by 2005. R&D spending currently accounts for 2.17% of GDP.

Anxious French researchers will know soon whether Haigneré's arguments fell on sympathetic ears: The budget proposal is due to be considered by the council of ministers on 18 September and then sent to Parliament for final approval.

Technically Sound Test Ban There are no major technical hurdles to verifying a global nuclear test ban treaty, a National Academy of Sciences panel concluded last week. The 11-member panel, led by Harvard University security expert John Holdren, concluded that monitoring technologies make it nearly impossible for cheaters to hide tests of even the smallest weapons, down to 1 kiloton. The findings undermine claims made by opponents of the 1996 Comprehensive Test Ban Treaty (CTBT), signed but never ratified by the United States.

Crater from 1962 blast.

The report, requested 2 years ago by Clinton Administration officials, arrives as nations prepare to gather in New York City next month to discuss ways to move ahead with the stalled CTBT, which can't take effect until it is ratified by the 44 states judged capable of building nuclear weapons. So far, 13 of those nations have refused. The Senate tabled the treaty in 1999 after a bitter debate, and the Bush Administration has no plans to revive the issue.

The report isn't likely to break the stalemate, observers say. But panelist Paul Richards, a seismology expert at Columbia University's Lamont-Doherty Earth Observatory in Palisades, New York, predicts that the treaty "will become politically salient again. And when it does, this report will be out there, ready to inform policy-makers."

Contributors: Adam Bostanci, Jocelyn Kaiser, Michael Balter, David Malakoff

CREDITS: (TOP TO BOTTOM) NIH; U.S. DEPARTMENT OF ENERGY

what he had in mind, Varmus said, but he acknowledged that panelists might be "forced politically to move away from the ideal world." The panel is due to deliver its report in September 2003. –JOCELYN KAISER

FOREST ECOLOGY

Satellites Spy More Forest Than Expected

Fifteen years after people began chomping on Rainforest Crunch to help save the Amazon, experts still don't have a good handle on exactly how quickly tropical forests are disappearing. Now on page 999, scientists describe an effort to fill that data void: one of the first studies to assess humid tropical forest with satellite data rather than on-the-ground measurements and guesswork.

The study's conclusion—that deforestation rates were 23% lower between 1990 and 1997 than has been estimated—doesn't change the need for conservation, says remote-sensing expert and study co-author Hugh Eva of the European Commission's Joint Research Centre in Ispra, Italy. Tropical forest cover "is still disappearing at incredible rates."

For climate change experts, however, the study, known as TREES, is making them rethink an important number: how much carbon dioxide land plants are absorbing. "It's a very big deal," because predictions of global warming rely on that number, says ecologist David Schimel of the National Center for Atmospheric Research in Boulder, Colorado.

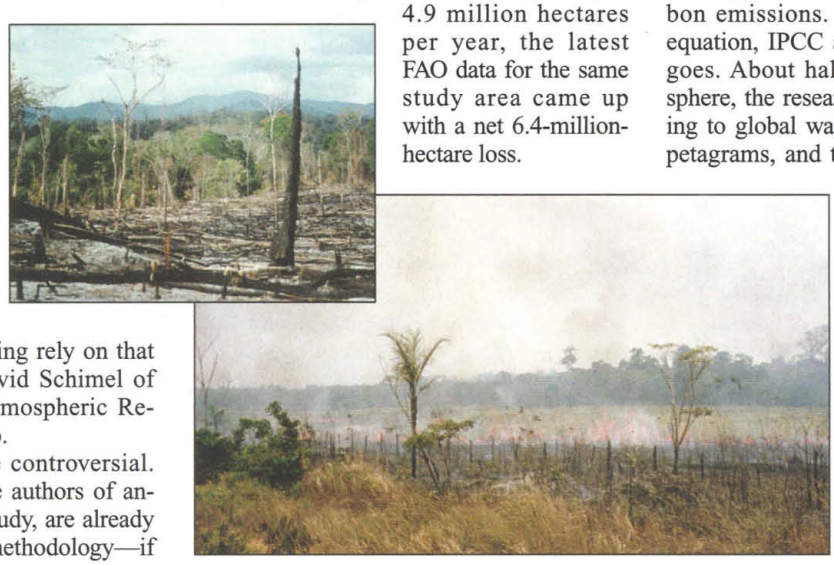
The study is sure to be controversial. Some experts, including the authors of another new remote-sensing study, are already picking apart the TREES methodology—if not its overall conclusions.

The source of most estimates of global forest loss has for years been the United Nations' Food and Agriculture Organization (FAO). Its foresters estimate trends by pooling data from more than 200 countries, but these reports are notoriously inaccurate. Countries don't use comparable techniques, and many lack the expertise or resources to do it rigorously (*Science*, 23 March 2001, p. 2294).

Aiming for more reliable results, TREES, led by Frédéric Achard of the Joint Research Centre, applied a sampling strategy to remote-sensing data for humid tropical forests. (The researchers did not look at dry tropical forests, which cover less area and are being deforested more slowly.) They could have randomly sampled the entire forest. But to improve their accuracy, they sampled mainly where they thought deforestation is happening.

To do this, they first identified deforestation "hot spots" using global maps they assembled from early 1990s low-resolution satellite data and by consulting with local and regional experts. Then they selected 100 sampling sites, statistically weighting them so more fell in hot spots. They compared high-resolution, before-and-after images of these 100 patches—representing 6.5% of the world's humid tropical forests—and calculated how much forest had been lost. Finally, they extrapolated these results to estimate the global deforestation rate for forests of this type.

Between 1990 and 1997, the TREES team found, the world lost an average of 5.8 million hectares of humid tropical forest each year—an area twice the size of Maryland—give or take 1.4 million hectares. The highest percentage deforestation rates were in Southeast Asia, followed by Africa and South America. Whereas TREES found a net annual loss (after counting regrowth) of 4.9 million hectares per year, the latest FAO data for the same study area came up with a net 6.4-million-hectare loss.



Going, going ... A new remote-sensing study gives firmer numbers for humid tropical forest loss from burning and clearing.

David Skole, for one, finds the study's approach less than convincing. "I dispute that they got the right hot spots," says Skole, a remote-sensing expert at Michigan State University, East Lansing. By relying on maps from the early 1990s, he says, the study likely missed areas where deforestation began later. Christel Palmberg-Lerche, chief of FAO's Forest Resources Development Service, says her group also sees problems with how TREES found the hot spots.

Skole is a co-author on another new satellite forest study. Led by Ruth DeFries of the University of Maryland, College Park, it is based on a global set of low-resolution images. DeFries uses an algorithm that calculates the amount of forest cover within each coarse pixel from its color and the time of year. The study, which is under review, also finds that the FAO forest loss estimates are too high for the 1990s, but it gets different results for each continent than TREES did. "The regional differences indicate that we still don't have a definitive answer," says another co-author, ecologist Chris Field of the Carnegie Institution of Washington at Stanford University.

Despite such uncertainties, Field and others say the two studies will help resolve a mystery known as the "missing sink." The Intergovernmental Panel on Climate Change (IPCC), the expert group that has concluded that human activities are contributing to global warming, currently draws on studies based on FAO data to calculate how much carbon is released by burning and clearing tropical forests. The group assumed that such deforestation added 1.6 petagrams of carbon (or 1.6×10^{15} grams) to the atmosphere each year in the 1990s. This carbon, plus 6.3 petagrams mainly from fossil-fuel burning, makes up total human-caused carbon emissions. On the other side of the equation, IPCC adds up where this carbon goes. About half of it stays in the atmosphere, the researchers say, likely contributing to global warming. Oceans take up 2.3 petagrams, and the rest—another 2.3 petagrams—has been assumed to be absorbed by temperate forests.

The puzzle is that ground-based inventories of regrowing temperate forests have not found enough vegetation to absorb 2.3 petagrams of carbon. If emissions from deforestation are smaller than estimated, however, then this sink must be smaller, too. Both the TREES team and the DeFries group estimate land-use emissions at about 1 petagram of carbon. This doesn't take care of the entire "missing sink," says ecologist Richard Houghton of the Woods Hole Research Center in Massachusetts, but "you're getting there." The new estimates could change the results of climate models, says Schimel.

These two studies aren't likely to be the last word. Achard and others say that what's needed is for experts in each country to help assemble a wall-to-wall, high-resolution satellite map. Falling costs for images and computers should make this feasible, notes Achard. Until then, scientists still won't be sure just how fast the tropical forest is vanishing. –JOCELYN KAISER

CREDITS: HUGH EVA