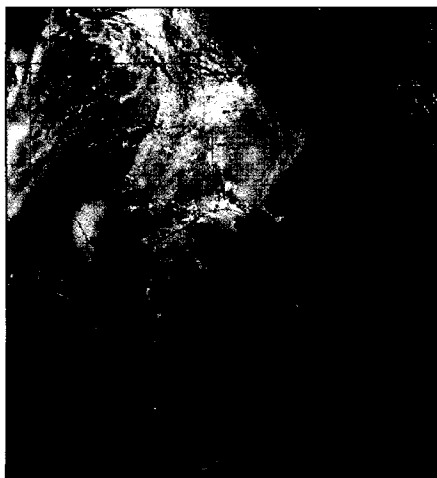


The study, reported on page 77 of this issue, has put a charge into veteran lightning researchers, who think it may hold an important new clue to the mystery of how thunderclouds generate lightning. "It's fascinating that smoky air could modify the [electrical properties] of storm clouds so readily," says meteorologist Charles Moore of the New Mexico Institute of Mining and Technology



Smoky skies. A vast plume of smoke from Mexican fires, seen by satellite on 14 May, sparked supercharged lightning in the central United States.

in Socorro. Adds atmospheric scientist Andrew Detwiler of the South Dakota School of Mines and Technology in Rapid City: "This is a wake-up call for those who thought they understood thunderstorm electrification."

The amped-up storms struck between 8 April and 7 June, when a pall of smoke from drought-related fires in southern Mexico drifted north and dirtied the air from Texas to Canada, especially over the southern Great Plains. Atmospheric scientist Walter Lyons and his colleagues at FMA Research Inc. in Fort Collins, Colorado, noticed unusual behavior in storms over the plains: They triggered huge numbers of "sprites"—ghostly red glows of excited nitrogen molecules often seen high above violent storms.

The team then checked data from the National Lightning Detection Network, run by Global Atmospheric in Tucson, Arizona, which tracks the location, charge, and strength of most bolts by monitoring the bursts of radio static they produce. The network data revealed that the lightning from smoke-enriched storms was stronger. "There were an abnormal number of positive cloud-to-ground flashes, and the peak currents [of those flashes] doubled," Lyons says. "That really startled us."

Researchers had never seen such widespread outbursts of positively charged lightning, which usually accounts for just 10% of all bolts. A garden-variety negatively charged bolt flickers on and off a few times

within its channel like an old neon sign. But a positive lightning stroke releases its charge in a sustained pulse that "looks like an arc welder," as co-author Earle Williams of the Massachusetts Institute of Technology in Cambridge puts it. Those bolts are more likely to damage electrical systems and spark fires. The Texas hill country had a severe fire season in May and June, Lyons notes, although scientists can't say for sure that supercharged lightning was a factor.

Nor do they know how the smoke boosted the rate and strength of the positive lightning bolts, Williams says. "Ordinarily we see negative charge close to the ground, but somehow these clouds have lots and lots of positive charge there." He and Lyons do suspect that the extra positive charge may arise because tiny smoke particles provide more nuclei around which cloud droplets condense. That makes the droplets smaller, which in turn may alter how they acquire electrical charge when they freeze into ice grains and are churned high in the thunderstorms.

Clearer answers could come from airplane studies of smoky thunderstorms, says Lawrence Radke of the National Center for Atmospheric Research in Boulder, Colorado. "It would be thrilling to have observations in these clouds to see what actually changes," Radke says. That will take another season of fires. In the meantime, "it's all speculation."

—ROBERT IRION

Robert Irion is a science writer in Santa Cruz, California.

GERMAN GENERAL ELECTION

Researchers Wary of Red-Green Coalition

German researchers were both buoyed and apprehensive this week following voters' surprisingly strong rejection of the long-running coalition led by Chancellor Helmut Kohl on 27 September. For the past 16 years, even during the tumultuous days of German reunification, scientists had enjoyed a relatively stable research environment under Kohl's Christian Democrat-led government. But early this week things looked certain to change as Social Democrat leader Gerhard Schröder began to form a new government that seemed likely to include the environmental-minded Green party.

On the positive side, the Social Democrat Party (SPD) has promised significant increases in the federal budget for research and higher education, with emphasis on rebuilding the uni-

versity system. But some scientists feared the possible effects of a coalition with the Green Party—which attracted 6.7% of the vote—because the Greens have opposed some forms of genetic engineering and nuclear power research.

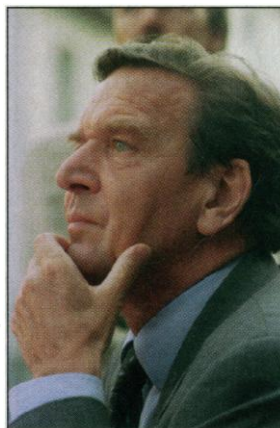
Biologist Hubert Markl, president of the Max Planck Society, and biochemist Ernst-Ludwig Winnacker, who heads the basic-research granting agency, the Deutsche Forschungsgemeinschaft (DFG), both told *Science* that they were generally optimistic that the Social Democrats—especially if they directly control the research ministry—will strongly support basic research, perhaps even beyond the 5% increases currently slated for next year's Max Planck and DFG budgets. But both scientists also expressed concern about possible policy disputes in some areas of research if the Greens become junior partners in the ruling coalition.

"I would foresee difficult discussions with the Greens relating to both atomic-energy research and the applications of biotechnology to crops and food products," says Markl. For example, he says, some Green politicians might criticize research at the Max Planck Institute for Plasma Physics on the feasibility of fusion energy. And Winnacker—a veteran of Germany's genetic-engineering battles of the 1980s—says he worries about the Greens' strong criticism of certain aspects of biotech research.

As *Science* went to press this week, the SPD was engaged in coalition talks and deciding who would head the government ministries. Edelgard Bulmahn, the SPD's "shadow minister" for research who has been the party's chief parliamentary spokesperson on science issues, told *Science* that the research and education ministry "is very important to the Social Democrats. We agree on the importance of scientific research for Germany's future." Bulmahn says an SPD-led coalition would seek a "significant increase" in the research and education budget over the next 5 years and would block any effort by

the Greens to further restrict genetic-engineering research: "We would never agree to any major changes" in biotechnology policies, she says, but added that the Social Democrats might go along with the Greens' idea of sponsoring more research on the potential risks of certain genetic engineering methods.

Manuel Kiper, a member of parliament who is the Greens' chief science spokesperson, says his party recognizes "the need for strengthened basic research." Whereas he says the party would like to see greater



Promises. Schröder pledges more funds for science.

CREDITS: (TOP) NASA GODDARD SPACE FLIGHT CENTER; (BOTTOM) F. HELLER/ARQUIV

emphasis on environmental research, Kiper adds that "we reject the idea of a political steering of science." And he says that, although the Greens "are critical of genetic engineering, we do accept the necessity of certain gene-technology methods, especially in basic medical research."

—ROBERT KOENIG

Robert Koenig is a writer in Bern, Switzerland.

House Report Takes Middle Ground

The United States must commit to "stable and substantial" funding for basic research if the country is to prosper in a post-Cold War world. That's the main conclusion of a much-anticipated congressional report* released last week by Speaker Newt Gingrich (R-GA) and members of the House Science Committee. Although some observers predict the report will help politicians to focus on the problems facing the scientific community, critics



Key report. Local students "unlock" the new report by Rep. Ehlers, left, while Speaker Gingrich and George Brown look on.

say its three dozen recommendations offer few fresh insights into such thorny issues as guidelines for participating in international projects and improving science education.

In June 1997, Gingrich asked committee member Representative Vern Ehlers (R-MI), the first research physicist elected to Congress, to take a fresh look at U.S. science policy (*Science*, 4 July 1997, p. 28). Ehlers's charge was to write a sequel to "Science: The Endless Frontier," the 1945 report by engineer Vannevar Bush that has guided U.S. science policy for decades. Ehlers pledged to "keep it simple" and to avoid the mistakes of an earlier panel that labored in the mid-1980s on a massive report

that was never completed. And he kept his word: "Unlocking Our Future" was delivered on time and at a relatively concise 70 pages.

However, the tepid reaction of many veteran policy watchers suggests that the report may still have fallen well short of its mark. "It's an excellent and welcome statement on behalf of basic science, but it falls short of breaking new ground," says Lewis Branscomb, a science policy analyst at Harvard University Kennedy School of Government in Cambridge, Massachusetts.

To be sure, the report does not call for a radical overhaul of the country's approach to supporting science. "The message of this report is that, while not exactly broke, America's science policy is nonetheless in need of some important maintenance," says Representative James Sensenbrenner (R-WI), chair of the House Science Committee. In fact, the panel's ranking Democrat, Representative George Brown (CA), complains that the report's biggest flaw is that "it fails to take on some of the issues I think are most important to the future health of the scientific enterprise," including the need to support engineering and the social sciences and to ensure that all Americans benefit from research advances.

One of the report's more novel suggestions is a proposal to revamp the peer-review system to encourage "creative ... speculative" studies. "There are no rewards for risky science: It is too important to publish," the report quotes one postdoc as saying. But its solution—a new granting process that "depends on peer-review but takes into account the speculative nature of the proposed research"—is seen as lacking sufficient detail to be useful. The report "tries to have it both ways," says one analyst.

Although many recommendations echo a variety of past reports—expanding public-private research partnerships, improving the use of science in the courts and regulatory agencies, and strengthening science and math education at all levels—others tackle issues fresh on the minds of the science committee. For instance, a call for "a clear set of criteria for U.S. entry into, participation in, and exit from an international scientific project" appears to be rooted in the debate over three recent projects: the Large Hadron Collider now being built at Europe's high-energy physics laboratory in Geneva, the moribund International Thermonuclear Experimental Reactor, and the international space station. The focus on developing such "clear, predictable ground rules" for international projects is welcome as scientists grapple to un-

ScienceScope

SPACE SCIENCE ISN'T FUN ANYMORE, GINGRICH SAYS

Most Americans may be fascinated by space exploration, but U.S. House Speaker Newt Gingrich (R-GA) says America's space bureaucrats have made it dull. "One of NASA's major achievements" has been "making space as boring as possible," the pugnacious politician charged last week at a Capitol press conference unveiling a new science policy report (see story on left). Reeling off a litany of complaints, Gingrich said the agency had become "cumbersome" and sponsors projects that are "the opposite of what you want good science to be." He also took some sharp jabs at the international space station, calling the oft-delayed project "an absolute disaster."



NASA officials declined an opportunity to respond to the attack. But House legislative staff said Gingrich's remarks could foreshadow more trouble from House Republicans for NASA officials, who have watched their budget shrink in recent years and are currently trying to talk Congress into paying for a \$660 million space station bailout. Gingrich's rhetoric, one aide says, "sent a pretty unsubtle message."

BIOLOGIST NAMED RUSSIA'S SCIENCE MINISTER

The appointment of a physicist-turned-molecular biologist as Russia's new science minister could help the nation's natural scientists gain a bigger slice of the funding pie. Last week, Prime Minister Evgeny Primakov tapped Mikhail Kirpichnikov, 53, a veteran science administrator, for the top policy post despite opposition from some physicists and chemists, who currently garner the lion's share of Russia's science spending.

Kirpichnikov earned his doctorate at the Moscow Physical and Technological Institute before taking up a career in molecular biology at several prestigious institutes. Despite working for years as a wonk, Kirpichnikov has kept one foot in the research world, heading a lab in the Russian Academy of Sciences' Bioengineering Center. His background, says Mark van Montagu of the University of Gent in Belgium, could signal rising fortunes for Russia's struggling young biotech industry.

Contributors: David Malakoff, Jeffrey Mervis, and Andrey Allakhverdiv

* "Unlocking Our Future: Toward a New National Science Policy," interim report, House Science Committee (www.house.gov/science/science_policy_report.htm)