Bill Clinton came to the White House with a scant track record in science. But after taking some early swipes at research projects, he's going out to applause

Clinton's Science Legacy: Ending on a High Note

For some scientists, the low point of Bill Clinton's presidency came on a January night in 1995. Delivering his annual State of the Union address to Congress, Clinton singled out a million-dollar study of "stress in plants" as he ridiculed lawmakers for concealing their "pet spending projects" in annual agency budget bills.

For an interview with President Clinton, see p. 2236.

Watching the televised speech with colleagues, one academic plant biologist remembers the "groans of disgust" that filled the room. "It was an infuriating cheap shot [at] an important field of research," says the scientist.

These days, however, plant scientists are a lot happier with their one-time antagonist. Clinton will "leave behind a very solid legacy of support for plant research" when his 8 years in the White House end next month, says Brian Hyps of the American Society of Plant Physiologists in Rockville, Maryland. "This Administration has been good for us."

Such praise, Washington policy watchers say, illustrates how the science community has warmed to the man about to leave the White House. Once perceived to be at best ambivalent about science policy, Clinton is now credited with steering the U.S. government's $80 billion R&D enterprise through one of its most perilous and productive decades (see timeline below).

Along the way, supporters say, Clinton and his science-savvy vice president, Al Gore, have won respect from researchers. They did so by facing down Republican congressional leaders who tried to slash science budgets, pumping record amounts of cash into basic research, and promoting pace-setting government policies on everything from information technology to the use of human fetal tissue in research.

The reviews are not uniformly good, however. Some science advocates believe the Clinton Administration stumbled in a number of areas, from efforts to coordinate the government's far-flung science bureaucracy to its bid to wring faster, cheaper, and better results from stagnating space and military research budgets. And they give mixed grades on international science issues, saying the Administration botched efforts to win Senate approval for a nuclear test ban treaty and abandoned a promising fusion power megaproject. Some advocates also question the Clinton role in obtaining huge increases for biomedical research (see graph), given that the Administration typically asked Congress for much smaller amounts.

But even critics agree that Clinton's term is ending on a much higher note than what many initially expected from the former Arkansas governor. "There's been a real evolution—science is no longer relegated to a political backwater," says physicist Michael

Advancing science. Clinton, with AAAS president Mildred Dresselhaus and then–science adviser Jack Gibbons, during his 1998 speech at the annual meeting.

CREDITS: (CLINTON) RICK KOZAK; (SPACE STATION) NASA; (DOLLY) AP PHOTO; (METEORITE) NASA

Science and Technology Highlights of the Clinton Era

January 1993—Clinton lifts ban on taxpayer-funded fetal tissue research

September 1993—Congress kills Superconducting Super Collider; Administration retools international space station

INTERNATIONAL SPACE STATION

November 1993—White House creates National Science and Technology Council and the President's Council of Advisors on Science and Technology

August 1994—"Science in the National Interest" issued

November 1994—Republicans capture Congress

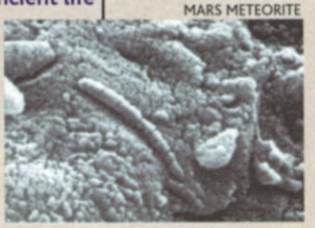
November 1995–January 1996—Budget battles shut NIH, NSF, and other science agencies

DOLLY

February 1997—Dolly cloned; Clinton launches review of U.S. policy

May 1997—Federal funding for human cloning banned

August 1996—NASA reports that Mars meteorite shows signs of ancient life



MARS METEORITE

Lubell, who teaches at the City University of New York (CUNY) and leads the American Physical Society's public policy program.

It's the economy, stupid

In retrospect, the science policy watchers and former Administration officials interviewed by *Science* divide the Clinton era into three phases:

- A honeymoon period in 1993–94, when the new Administration joined with a Democrat-controlled Congress to push for applied science initiatives aimed at reviving a lagging economy. At the same time, a commitment to eliminate the huge annual budget deficit ruled out major increases for basic research.
- A defensive era that began with the Republican takeover of Congress in November 1994. This period peaked with a 1995 budget confrontation that shut down key science agencies for weeks; it ended with the 1998 announcement of the first budget surplus in decades. The surplus triggered a new struggle over how to spend the flood of new funds.
- A stretch run in 1999–2000, with a strong focus on basic research. The Administration capitalized on a booming economy and emerging bipartisan support for fundamental research to gain record budget increases for the National Science Foundation (NSF) and an array of basic science initiatives—from plant genome studies to nanoscience.

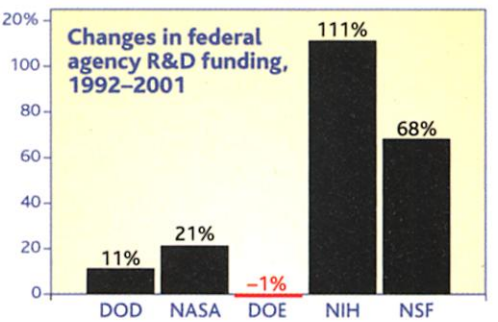
The contrast between how the Administration publicly argued for R&D in its first and last years is striking. Today's ringing endorsement of basic research was a mere whisper in the speech by then–presidential science adviser Jack Gibbons as he rolled out the Administration's first R&D budget. Although the White House supported basic research, Gibbons said at a 1993 press conference, economic problems and competition from abroad demanded linking federal science programs to industry and "giving greater attention to … assisting the transformation of science into things that provide us our jobs."

Over the next few years, that concept translated into nearly a dozen special funding initiatives, including bids to help the telecommunications, manufacturing, and biotech industries; to design better pollution-control equipment; and to build high-mileage, low-emission autos. "Very seldom has technology policy risen to that level of visibility," says Rick Borchelt, a former Gibbons aide now at the Department of Energy.

The job of pushing that agenda fell largely to two new White House panels: the National Economic Council, populated by high-profile economic thinkers, and the National Science and Technology Council (NSTC), which was supposed to harmonize the often-fractious federal agencies responsible for research. For a time, the two councils won over a Democrat-controlled Congress, and in August 1994 the NSTC issued a warmly praised report, "Science in the National Interest," drawn from a series of workshops held across the country. Then, in November 1994, the political landscape changed dramatically when Republicans won control of both the Senate and House of Representatives for the first time in more than 40 years. The party had historically opposed government assistance to the private sector, which included applied science programs. "Once the Republicans came in, it was all rear-guard action on technology," says David Hart, a technology policy scholar at Harvard University.

Shutdown showdown

The technology programs were not the only Administration-supported efforts under attack. A deficit reduction plan proposed by new House leader Newt Gingrich in 1995 called for reducing some science agency budgets by more than one-third, according to White House estimates. In speeches, Gibbons accused Republicans of "approaching science with all the wisdom of a potted plant. … Their science policy is right out of science fiction." The 1994 NSTC report, however, "helped build the case that basic research was not a frivolity," says M.R.C. Greenwood, a former head of basic sciences in the White House Office of Science and Technology Policy and now chancellor of the University of California, Santa Cruz.



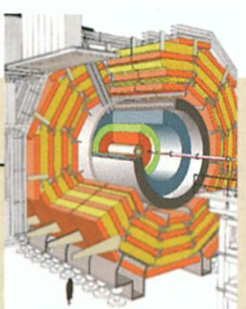
Favored child. The National Institutes of Health budget has far outpaced its sister science agencies during the last 8 years.

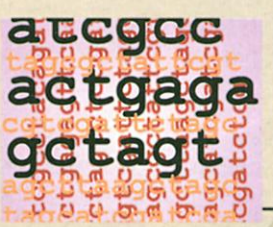
The budget standoff led to a 6-week shutdown of large parts of the government, including the National Institutes of Health (NIH) and NSF. At the same time, says a current Administration official who requested anonymity, the blowup set the stage for a bipartisan consensus on funding basic science. "Republicans and Democrats who were uneasy about the applied programs could agree that government should fund basic science that industry was unlikely to pay for," says the source.

Biomedicine's boom

That understanding laid the groundwork for what many analysts say is the major science policy development of the Clinton era: the

CREDITS: (TEST SITE) CORBIS; (LHC) CERN; (MARS CLIMATE ORBITER) JPL





August 1997—U.S. commits to role in Large Hadron Collider (LHC)

December 1997—Kyoto Treaty on curbing global warming

September 1998—U.S. leaves ITER fusion project

September 1998—House issues "Ehlers report" on national science policy

October 2000—NIH issues stem cell research guidelines

June 2000—Human genome sequence draft announced

January 2000—Clinton delivers major S&T address at Caltech

TEST SITE

September 1999—Space station assembly begins

October 1999—Senate rejects Comprehensive Test Ban Treaty

December 1999—NASA Mars missions fail

November 1999—Congress extends R&D tax credit for 5 years

MARS CLIMATE ORBITER

explosive growth of NIH's budget, which at more than $20 billion now dwarfs all other civilian science agencies.

Beginning in 1998, Congress responded to a lobbying campaign to double NIH's budget with the first in a string of major increases. Just how much credit the White House can take for the NIH gains, however, is in dispute. In a budgetmaking gambit to free up funds for other priorities, the White House typically asked for small increases for NIH each year, betting that Congress would up the request for this politically popular agency. As a result, NIH's growth "is a backhanded legacy for Clinton," says Steven Schier, a political scientist at Carleton College in Northfield, Minnesota.

But former NIH Director Harold Varmus goes further, saying that Clinton allowed him to speak freely about NIH's needs. "The White House tended to lowball us in budgets," he says, "but we were left unbridled to say what we really needed to say." Beyond budgets, Varmus says Clinton was willing to stand behind controversial policies—from lifting a ban on taxpayer-funded research using fetal tissue to this year's backing of rules allowing researchers to experiment with stem cells derived from human embryos.

NIH's success, however, also raised expectations in other disciplines. Gibbons spent much of his tenure touting how the Administration had protected basic research from the debt-reduction storm; new science adviser Neal Lane, appointed in February 1998, could turn his attention to the question of how to spend the newfound wealth. One answer, he has argued in a string of speeches, is to restore "balance" to the federal R&D portfolio by giving more money to the physical sciences, such as chemistry and physics, that have seen their budgets stagnate over the last decade.

So, while Gibbons touted the economic benefits of applied research to a somewhat skeptical Congress, Lane now emphasizes the long-term economic payoff of basic studies. By and large, federal lawmakers have been receptive to the idea, this year approving the most significant increases in years for NSF and for the basic science programs at the Departments of Energy and Defense.

The shift, says Harvard's Hart, represents the Clinton Administration's "tactical retreat to least common denominator politics" and a realization that the booming high-tech and pharmaceutical industries were ratcheting up their own R&D programs. Schier says it reflects "Clinton's masterful ability to reposition himself as political conditions shifted." But he warns that such flexibility "can produce a very variable policy record"—a view endorsed by critics of some Administration actions.

CUNY's Lubell, for instance, faults Clinton for failing to win Senate ratification last year of the 1996 Comprehensive Test Ban Treaty—an international nuclear nonproliferation pact supported by many physicists. The defeat, others say, resulted partly from the White House's failure to blunt claims by some scientists that current technologies would not allow adequate enforcement monitoring.

Similarly, some space scientists complain that Clinton allowed Al Gore and NASA Administrator Dan Goldin too much leeway in promoting the agency's "faster, cheaper, better" money-saving strategy, which may have contributed to the loss of several expensive Mars missions.

In addition, fusion fans blame the White House for not preventing Congress from backing out of ITER, a $10 billion international fusion energy project that had drawn cooperation from Japan and Europe. And engineers, mathematicians, and computer scientists funded by the Pentagon worry that post–Cold War research budget cuts—which drained up to 40% of the funds from their fields—went too far.

In an interview with *Science* (below), President Clinton defends the NASA strategy but concedes that the defense research budget needs a boost. And Administration officials note that, despite some flubs, they have achieved many of the R&D policy goals set back in 1993. Basic and applied research spending, for instance, are near all-time highs. Combined government and industry research investments have risen from 2.6% to nearly 3% of the country's gross domestic product, the Administration target set 8 years ago.

Similarly, the military's share of overall government R&D funding has fallen from 60% to 50%—another goal reached. And, in his only major science and technology speech—delivered last January at the California Institute of Technology in Pasadena—Clinton noted that his team's goal of wiring schools and universities to the Internet has been a huge hit.

Facts and figures aside, the speech also illustrated a different kind of presidential legacy: a personal embrace of science. Indeed, the man who once riled plant researchers by making a joke at their expense drew cheers when he proclaimed that "I've been spending a lot of time trying to get in touch with my inner nerd." **–DAVID MALAKOFF**

AN INTERVIEW WITH THE PRESIDENT

"I'd Like to See America Used as a Global Lab"

THE OVAL OFFICE—As one of only three 20th-century presidents to walk away after serving two full terms, William Jefferson Clinton could understandably be expected to dwell on his achievements over the past 8 years. But when he met with *Science* magazine on 6 December for a broad-ranging interview, the nation's 42nd president was more than happy to look ahead—at how science and technology were likely to change our world, and how he might continue to interact with the scientific community after he leaves office in January.

The interview took place at one of the most dramatic junctures in U.S. history: a month after the election for Clinton's successor had ended in a virtual tie, with the result still in doubt. Yet, for all the sound and fury taking place outside the Oval Office, the atmosphere within was serene and the interview subject perhaps a bit wistful.

On the move. *Science* Editor Ellis Rubinstein meets President Clinton in the Oval Office.

CREDIT: RICK KOZAK

What emerged confirms a portrait many people have painted of Bill Clinton: a polymath who rarely resorts to the platitudes we have come to expect from politicians—especially on the topic of science. Perhaps it should come as no surprise that the man many thought was entirely ignorant of—and uninterested in—science when he entered the White House should leave the nation's capital with a rich and nuanced view of many