# ON CONSTITUTION'S BICENTENNIAL, OTA EXAMINES EFFECTS OF SCIENCE

Amid all the celebration of the 200th anniversary of the US Constitution this summer, no public thought was given to science and technology. That's understandable. The Constitution doesn't mention those subjects. Despite this, the principles of the Constitution have proven resilient and responsive to the extensive social, cultural, economic and political changes wrought by advances in science and technology since 1787. The government's connection to science and technology has now been honored by an unusual source: the Congressional Office of Technology Assessment, which is known for its balanced, nonpartisan analyses of national issues. On 15 September OTA issued *Science, Technology and the Constitution,* a 19-page paper that ought to be required reading during this bicentennial year.

The theme of OTA's paper is stated at the outset. "The centrality of science and technology to American society argues that Congress and the courts will repeatedly be asked to reexamine constitutional principles in the context of new scientific knowledge and new technical capabilities," it asserts. Indeed, as science reveals more of the universe beyond the Earth and within the atom, the possibilities inside the human gene and the human brain, and as technology provides ways to explore these frontiers, enabling researchers to modify not just the environment, as mankind has always done, but the human body and its behavior and whole genetic heritage on a scale that is unprecedented, the Constitution is sure to encounter contentious new questions.

Among those asked by the OTA report: "How will world-shaking advances in human knowledge and capability change the context in which the Constitution's enduring principles of democratic governance and individual liberty operate? . . . Would 'electronic direct democracy'—public voting on issues by electronics—fit the constitutional concept of representative democracy? . . . Do national security regulations and export controls effectively negate the First Amendment protection for scientific communication? . . . Does a scientist have a constitutional right to do research on any subject? Or are there topics that should be forbidden knowledge? . . . Has technology undermined the province of the legislature to make and declare war?"

**Signing the Constitution.** This painting by Howard Chandler Christie depicts the scene in Philadelphia as 55 delegates invent a new framework of government.

OTA provides no answers to these provocative questions. Instead, it raises issues that the public will need to debate and decide, probably in the the next few years. Those decisions will likely affect some civil liberties and governmental concepts that the Founding Fathers struggled over, such as individual rights, national sovereignty and states' rights, the separation of powers, including the power to declare war, and due process of law.

To be sure, the OTA paper is nothing like the *Federalist Papers*, which set out the fundamental ideas for the new republic. Still, rethinking the Constitution to meet a brave new world in which science and technology overturn many 19th-century premises can be sobering. At times, concluded the OTA staff writers, headed by Vary T. Coates, such an exercise can also be disquieting.

## Rights and liberties

With increasing emphasis being placed on science and technology to advance the country's economic, social and military strengths, Americans may be giving up some rights and liberties they once took for granted. "A central theme in all areas of

science and technology is radical improvement in our ability to gather, store, combine and use information—especially information about people," the paper observes at one point. "This improvement is the result of continuing progress in such diverse fields of inquiry as computer science, molecular biology, chemistry and cognitive psychology. In some cases, this new ability to gather and use information raises troubling questions about the scope and protection of that sphere of personal autonomy and privacy that the Founding Fathers could assume was beyond the effective reach of the state."

In another section, the OTA group examines war and technological change as dynamic factors that have all but turned upside-down the Constitution's precept of a balance of power between Congress and the President. "War has been the greatest promoter of Presidential power, but until World War II this was usually temporary," says OTA. "More recently, the power, the range and the speed of modern weapons have favored a continued shift in power toward the Presidency." By passing the War Powers Resolution in 1973, at the end of hostilities in Vietnam, Congress sought to limit this Presidential authority. But it is once again a subject of controversy—over notification procedures for US military operations in the Persian Gulf.

OTA insists that the Supreme Court also is gaining power. "Never before in our history have so many aspects of daily life been subject to litigation, both over the respective powers of the President and Congress and over the relationship of government to the individual," says the OTA document. The Court is likely to be the last resort on problems emanating from technologies, such as toxic waste and electronic snooping. Not surprisingly, OTA says it is virtually certain "that technological change will place new and continuing demands on the courts to interpret the fundamental charter of American government."

The OTA authors make no claim that the courts will become the great defenders of democracy as the government makes greater use of electronic sensors and biological screenings to intrude into private thoughts and behavior. This section of the OTA paper suggests that the Orwellian nightmare isn't fiction. Simply using some technologies infringes on civil liberties. Examples include monitoring worker practices and productivity, polygraph examinations and drug, alcohol and AIDS testing. The issue is examined in greater detail in another OTA report, *The Electronic Supervisor*, which came out on 21 September. As that report puts it, the uses of these technologies are controversial "because they point out a basic tension between an employer's right to control or manage the work process and an employee's right to autonomy, dignity and privacy."

## Challenges to sovereignty

In many circles it is already well known that the nation's sovereignty "is fundamentally challenged by the effects of extensive international transactions and transborder data flows, and by the necessity of multilateral cooperation to cope with environmental problems related to technology," says OTA's paper. "Federalism continues to change as effects of technologies continually override jurisdictional boundaries. Cooperation in using databases and communications systems could erode some of the checks and balances protecting separation of powers." The issue here is that transportation and communication technologies have extended the reach of the Federal government into spheres once dominated by the states and localities. The situation has grown worse with the coming of telecommunication satellites and transnational corporations, to the extent that the nation's ability to act as an autonomous sovereign is open to question.

While OTA speaks of corporate ownership and stock transactions altering the traditional concept of national sovereignty, it says nothing about transborder aspects of science—notably physics, in which scientists conduct their research collaboratively at places like Fermilab, CERN, the National Center for Atmospheric Research, Japan's KEK laboratory and the Cerro Tololo astronomy center, with little or no concern for national identity. While science and technology have crossed national borders fairly easily for centuries, with the exception of wartime, their increasing commercial and military importance has led to restrictions on both products and information.

## Threats to security

No part of the Constitution has been interpreted so broadly as providing "a bulwark against government intervention in the most basic elements of our democracy—the expression of thought, opinion and belief" as has the First Amendment, states OTA. But for all the First Amendment's "preferred position," the paper says, the Supreme Court has never interpreted the freedoms of religion, speech, press or assembly to be without limits. "Government can prohibit speech that threatens national security, that is obscene or that is an incitement to violence or to the overthrow of the government," the paper says. "This often involves a balancing of individual rights against the interest of government. . . . When the connection between science and technology is direct enough to pose a risk to national security or economic stability, the government may and does restrain scientific communications."

Actions of this sort, involving restrictions on open communication of scientific papers or on access to supercomputers and databases, have caused a rift between some in academic and commercial circles and the government (see PHYSICS TODAY, January 1987, page 51). The controversy rages over Defense Department controls on exports of science and technology with military or commercial potential. In justifying export restrictions, the Pentagon points to the Soviet Union's increasing difficulty in obtaining advanced US-made technology. But many US-based businesses complain that controls undermine their ability to compete in friendly foreign markets and cost them billions of dollars each year.

OTA's paper offers no solution to this squabble. However it may be resolved, the tension between national security and commercial competitiveness hardly seems like a constitutional problem. The controversy involves the First and Fourth Amendments, pertaining to free speech and arbitrary governmental power. Lurking behind the brouhaha, however, are the revolutionary changes in science and technology. It was put well by a recent report of the National Research Council, *Balancing the National Interest*. "Dramatic alterations in the economic and technological environment have created a need for a broader definition of national security, a definition that recognizes explicitly the importance of maintaining the economic vitality and innovative capability of the US," said the NRC report.

The OTA paper puts the case somewhat differently—in terms of scientific openness rather than commercial interest. It claims that the First Amendment "reflected the Founding Fathers' confidence, born of Enlightenment accounts of Galileo and Newton, that science is a beneficent force, not to be interfered with by government or by religious institutions. Yet there have been few judicial decisions

that address directly the implications of the First Amendment for the constitutional status of scientific research, and there are no court decisions that establish definitively a First Amendment right to conduct research on any topic, without limitation or restriction. The prevailing assumption is that scientific activity has general protection, subject to limitation where a clear national interest is involved."

It then goes on to state: "Even where prohibitions on research are not involved, however, science and technology may eventually raise constitutional issues. The Federal government is often the only source of adequate funding for scientific research in which industry has no interest. There is no constitutional right to government research funding. But objections to some areas of research, such as those involved in interspecies genetic exchange and perhaps someday human cloning, are sometimes rooted in values that are intrinsically religious in nature, yet not universally shared. Government restrictions on funding particular research projects in these sensitive areas may in the future be challenged as suspect under the establishment clause of the First Amendment or the equal protection clause of the Fourteenth Amendment."

The Fourth Amendment, which was understood in 1787 to limit physical trespass and seizure of papers, effects and "things," came to extend to people and their privacy by a 1967 Supreme Court decision. The Court said that electronic snooping should be considered a form of search and seizure governed by rules and procedures based on historic safeguards but adapted to new technological capabilities. Today, virtually unlimited means, including space satellites, exist for electronic surveillance at almost no risk of detection by those being watched. At the other extreme of remote sensing is analysis of individual physical characteristics, such as fingerprints, blood, semen and genetic material. Examinations of these intimate elements, says OTA, "have been held not to violate the Fourth Amendment or other constitutional prohibitions against forced self-incrimination, if their disclosure is otherwise reasonable."

OTA's paper also comments on the expanding use of computers, databases and telecommunications technologies in law enforcement and in dealing with potential dissidence and political opposition, which are protected under the Fifth, Sixth and Eighth Amendments. These uses raise questions about due process. As the paper states, "Computer models and statistical analysis used to support judicial and administrative decisions may also be challenged on constitutional grounds, particularly if used in a predictive mode—say, what is the probability of an offender committing another crime if he or she is paroled?"

The problem here involves a whole lot more than pouring new wine into old bottles. Constitutional democracy is at stake, OTA suggests. In the next few weeks, OTA will publish four more papers relating to questions of equity and justice that were never raised by James Madison, Alexander Hamilton and other authors of the Constitution simply because they could not foresee the future. The first paper concerns science, technology, national security and open communication. Another examines how government has dealt with new technologies. The third is about biology-based technologies, medical intervention, public health and the Bill of Rights. The fourth is on criminal justice. Each in its own way is chockablock with uncertainties about current and future relationships between the government and the people. As OTA says at the end of its paper, "Strong legislative and judicial actions may be necessary to protect that sphere of individual, private activity that the Founding Fathers cherished and that the Constitution has always implicitly protected."

—IRWIN GOODWIN

# DOE SUBMITS 36 SSC SITE BIDS WHILE HOUSE SEEKS TO MICRO-MANAGE PROJECT

At 4 am on 1 September, New York officials were waiting for the Department of Energy to open the glass doors of the Forrestal Building. By 8, Oklahoma was there. Texas appeared just after the news media arrived and, in the classic tradition of the Lone Star State, unloaded 60 boxes of documents, weighing some 2400 pounds—which led two of the state's congressmen, known for their hostility on most issues, Representative Jack Brooks, a Democrat, and Senator Phil Gramm, a Republican, to exchange banter for the camera crews on the unsurpassed greatness of their state. So began the official competition for the site of the giant particle accelerator called the Superconducting Super Collider.

The SSC, which would hurtle two beams of protons in opposite directions around a 53-mile oval ring into collisions at 40 TeV in the center of mass, is figured to cost $4.4 billion in today's dollar values and possibly $5.3 billion when it is completed in 1996. But there's no certainty of this. Though President Reagan gave the machine his blessing last 30 January with the admonition "Throw deep" (PHYSICS TODAY, March 1987, page 47), Congress has yet to approve its construction. When the 1988 fiscal year began on 1 October, the fate of the SSC was as unsettled as the government's entire budget for the year. While an act of Congress saying there shall be an SSC isn't really necessary until the final decision on the machine is made in 1989, most everyone associated with it would be less nervous if it had formal backing now.

As it is, the research subcommittee of the House Science, Space and Technology Committee last June authorized $25 million for another year of R&D and refused to grant the Reagan Administration's request for another $10 million for construction items requiring long lead times. The committee's authorization bill contained language that would withhold Congress's authority to build the SSC—at least for fiscal 1988. The Senate appropriations subcommittee that has jurisdiction over energy programs proposed giving all $35 million to continued R&D, with the understanding that DOE would not begin construction.

In early August, however, action on the SSC took a new turn. Members of the House science committee, led by Manuel Luhan Jr, the ranking Republican on the committee, put together a coalition to support the President's request. After Luhan had enlisted more than 230 House members, enough to guarantee passage in the House, Robert A. Roe, the New Jersey Democrat who is chairman of the science committee, was persuaded by the numbers to overcome his reluctance to back such a costly project during a tight fiscal year. Within days, he and Luhan introduced H. R. 3228, a two-para-