

FRENCH BOOST SUPPORT FOR SCIENCE AMID CONCERN ABOUT ITS STATUS

Active government support for science and technology is back in official favor since France's presidential and legislative elections last April, May and June. The elections gave François Mitterrand a second seven-year term as president and brought to power a new left-center government headed by socialist Michel Rocard, an occasional rival and occasional ally of Mitterrand. Thus ended two years of "cohabitation," a quaint term the French coined to describe the situation in which the socialist Mitterrand held the presidency, while the National Assembly was controlled by a center-right coalition headed by conservative Jacques Chirac. The elections also ended what was a relatively lean time for French science and, with it, French physics.

Chirac and his business-oriented constituents—more or less the same constituency that rallied to de Gaulle's successor Georges Pompidou—have tended to regard France's highly centralized scientific research establishment as a case of socialist centralism ("Jacobinism") run amok.

The centerpiece of the science establishment, the Centre National de la Recherche Scientifique (CNRS), now in its 50th anniversary year, was associated at birth with the leftist Popular Front government of the 1930s. Annoyed by the steady growth in funds CNRS has devoted to the

social sciences, and by the leftist orientation of much of the social research done under the aegis of CNRS, the Chirac government toyed with the idea of dismantling the organization.

For the Chirac conservatives—at least as they are caricatured by their socialist opponents—good science is the kind of science that shows up quickly as business profits; their idea of good science policy is an American-style business tax credit for investment in research. The conservatives enacted a supplemental tax credit during their tenure in office, building on a measure introduced by the socialists. Despite steady growth in the contribution of industry to French research in recent decades, the big French companies were relatively late to open laboratories, and an anti-science image still tends to stick to France's big business community and the politicians it supports.

The more moderate French conservatives, currently led by Raymond Barre (once a protégé and now a rival of Valéry Giscard d'Estaing), take a more charitable view of government-sponsored science. In fact, it was in the last year of Giscard's term, 1980, that the French government resolved to increase the proportion of the gross national product devoted to science from just over 2% to 3%. The socialists made that commitment their own during the five years they con-

trolled both the presidency and the National Assembly, 1981–86, and science policymakers who had been affiliated with Giscard approved, on the whole, of what they were trying to do. So did some Gaullists—namely those who appreciated that in science, as in so many other things, it was de Gaulle's arch-enemy Mitterrand and not de Gaulle's lineal descendants who had captured the general's spirit.

The result of last year's Byzantine four-stage election is that the socialists are now governing with support from moderate conservatives—an outcome, it seems, that favors strong government leadership of science, with the felicitous qualification that the government considers itself somewhat more strictly accountable for its science policies. Prime Minister Rocard, a moderate socialist with an American political style, is the son of a well-known electronics pioneer, one-time science adviser to the French Navy and elder science statesman, Yves Rocard. Michel Rocard's minister of research, Hubert Curien, is a crystallographer who began his career under the tutelage of Yves Rocard at the Ecole Normale Supérieure. A science policymaker's science policymaker, Curien served as head of CNRS (1966–73), head of the administrative council to the space agency CNES (1973–84) and as research minister in a previous socialist government (1984–86).

French funding for the natural and social sciences, 1978–88
(millions of francs, unadjusted for inflation)

	Nuclear and particle physics	Mathematics and basic physics	Physical sciences for engineering	Chemistry	Earth, oceans, atmosphere and space	Life sciences	Social and human sciences
1978	340.8	295.1	161.8	360.5	272.2	583.0	307.4
1981	487.0	424.0	281.5	576.9	436.9	925.2	498.9
1986	766.3	746.2	570.1	997.5	752.0	1633.9	893.4
1988	797.7	817.0	640.8	1103.4	808.0	1751.8	947.6
Average annual increase, 1978–88	8.9%	10.7%	14.8%	11.8%	11.5%	2.5%	11.9%

In mid-October, several months after taking office, Curien asked physicist Pierre Papon, head of CNRS in the previous socialist government, to chair a committee to study how the government might set up a kind of "observatory," or monitoring agency, that would report on the country's status and development in science and technology. Papon's committee finished its work in December, and although the committee's study has not been released at this writing, its general recommendations are known.

The Papon report

Three years ago, when Chirac's government took office, it dismissed Papon, a departure from the tradition that the directorship of CNRS was to be an apolitical job. One reason Papon was held in ill repute, even by some socialists, was that under his leadership professional employees of CNRS were given tenured civil service status, a move widely considered to have made CNRS too impervious to change. Nevertheless, the month he was dismissed, he spoke to us without rancor and with great enthusiasm about what he had been trying to do as CNRS director (PHYSICS TODAY, November 1986, page 95). Last month, newly installed as president of IFREMER (Institut Français de la Recherche pour l'Exploitation de la Mer), Papon again spoke to us with enthusiasm, this time about his report to Curien on the creation of a science observatory.

Papon said his committee had recommended and Curien had agreed to the establishment of an Observatory for Science and Technology with a permanent staff of 8-10 people which will:

- ▷ devise measures of national scientific activities comparable to the US National Science Foundation's science and education indicators
- ▷ produce an annual report on the indicators, with international comparisons
- ▷ do three or four special studies each year on topics such as research in selected industries
- ▷ produce indicators for specific programs such as space, high technology, defense research, and so on.

Papon explained that the science observatory will be not a government agency, per se, but a *groupement d'intérêt public*, a federation of agencies working together on a common project. This is a type of organization that was concocted by research minister Jean-Pierre Chevènement in 1982-83, a year after the veteran left-socialist leader conducted a "national colloquium on research." (Chevène-



Hubert Curien

ment is defense minister in the new government; Yves Sillard, Papon's predecessor as head of IFREMER, is in charge of the *délégation générale à l'armement*—roughly, defense research and production.)

Asked about what factors prompted Curien to establish the Papon committee, and what prompted the committee to recommend an observatory, Papon replied that something like the NSF indicators obviously was needed in France. Reflecting on some of the reasons why indicators are needed, he referred to abiding concerns about the effectiveness of French academic research and defense research. He said it is not clear how much aggregate spending there is in many key areas—materials science, for example. He mentioned that "bibliometric analysis" is needed to evaluate French science publications in an international context.

Science performance

Papon did not choose to philosophize or speculate about great historical themes, but everyone in Europe is acutely aware that 1992, the year in which all internal European tariff barriers are to be dismantled, is fast approaching. The French would dearly like for France to be well established as Europe's leader by that time. But if a nation's status depends primarily on its scientific and technological prowess, the French are finding plenty of reasons to feel concerned about their leadership prospects.

The Scientist, the weekly science newspaper published in Philadelphia, recently did a survey of European scientific publications and citation rates. This is a rough-and-ready measure to which many people such as Curien object, but it is the kind of bibliometric analysis that Papon ap-

parently has in mind. The survey found that France lags well behind Great Britain in terms of the volume of scientific papers, and that in terms of citation rates, it ranks behind Switzerland (Europe's leader), Sweden and Denmark (next), and Britain, Germany, The Netherlands and Belgium.

Last April, the month of the first-round presidential election, the French monthly *La Recherche* published an opinion piece by two scholars at the Ecole Polytechnique who complained that an academic spirit has been stifling French science. The piece contained a long litany of complaints about an educational system that leaves little room for personal choice, a rigid hierarchy of scientific values, a disdain for down-to-earth disciplines such as metallurgy and ceramics, a chasm between theorists and experimenters, an inability to come to terms properly with technologies of potential commercial value (for example fusion), and an absence (by comparison with Britain and the US) of scientific communication in the engineering community. Opening with a reference to the international high- T_c superconductivity fever, the two scholars said this fever was accompanied in France by a "wave of moroseness because one could not ignore that these new compounds were first developed by solid-state chemists here, without their remarkable electronic properties being discovered."

Similar complaints about French science were voiced two years ago in a book by Pierre Piganiol, the first delegate general for science and technology under de Gaulle and former director of research at St. Gobain. In *La Recherche Mal Menée* [Badly Managed Research], Editions Larousse, 1987, Piganiol said that the most prestigious engineering schools emphasize administration more than research, that university administrators are authoritarian and contemptuous of commercial values, and that government-supported research has been increasingly subject to political whim. Too much government money has been drawn into flashy big projects, Piganiol argued, such as the big space projects recent French governments have favored so highly. The result—a "brilliant façade" hiding a "decline of industrial creativity," as an OECD report on innovation in France concluded.

Mitterrand's message

In its issues of 8 and 9 April last year, just before the presidential first round, *Le Monde* printed a long pro-

The Economist

VOLCKER'S SUMMIT GUIDE page 17-18
 BUSH TO WIN BY MINUS 2%? page 27
 THOSE SPECTACULAR EXPORTS page 82
 READY FOR EUROPE? page 54
 A survey of Turkey



The Economist of London, following last year's elections, portrayed Mitterrand as a golfer who had made good approach shots only to miss an easy putt. First he maneuvered the conservatives into a position of losing votes whether they associated with or dissociated from the right-wing National Front. But after winning a sweeping victory in the presidential election and dissolving the National Assembly, he carelessly said it did not much matter how big a margin his government won, and his party narrowly missed obtaining a majority.

grammatical statement by Mitterrand. In the section on the economy, which filled more than three full newspaper columns, Mitterrand reduced all problems and prospects to the country's performance in education and science. Opening with the problem of unemployment, which was known to be the electorate's most urgent concern, Mitterrand said flatly: "The countries that are most advanced technologically and that have a strong industrial base are those that have the least unemployment."

Mitterrand said that France had been slow to wake up after World War II, distracted by "mirages of growth" and slowed by outmoded ways of thinking, and that it only now was beginning to budge. What to do? "Educate people, promote research, and, thanks to these supports, modernize industry."

"Let us not fear, let us not criticize, the research that finds nothing," said Mitterrand, waxing rhetorical. "Out of the mass of investigations comes the discovery, the research that finds... Let us remember that the researcher, humble or celebrated, academic or marginal, is like the point of a diamond of a society eager to open superior forms of knowledge and thereby progress."

Waxing still more rhetorical, Mitterrand said: "Let us consider the world economy: What one sees there is a battlefield on which the enter-

prises are conducting a merciless war. Prisoners aren't being taken. Whoever falls, dies..."

In research, Mitterrand said all institutes, laboratories and grand research establishments should be encouraged. "Instead of this, after the new majority took power [Chirac's conservative coalition], dismal [sombres] cuts were made in civilian research, which fell 4%. As for appropriations to CNRS, which narrowly escaped being dismantled, they fell 3% between 1986 and 1988. The task of the next government will be to correct this tendency..."

In education, Mitterrand specified that at least 15 billion francs would have to be spent by 1992 to modernize instruction, revitalize teaching and upgrade equipment. He referred approvingly to a 1985 report from the Collège de France, which called for the abolition of traditional hierarchies between pure and applied science, general and professional education, and the work of the mind and manual labor.

Research and education

In the first Rocard government, immediately following Mitterrand's presidential victory, science was incorporated into a new superministry for education, research and athletics and put in the charge of the Socialist Party's secretary, Lionel Jospin. In the standard charts of cabinet

members, Jospin was listed first, which seemed to represent a sharp upgrading of science in the general scheme of things, almost comparable to what has happened in the USSR under Gorbachev. In hindsight, however, this may have been little more than a ploy Rocard used to maneuver a dangerous rival out the party secretariat.

In the second Rocard government, which was formed after Mitterrand dissolved the National Assembly and a two-round legislative election was held, research and technology were reestablished as a separate ministry under Curien, as in the earlier socialist governments, and Jospin's portfolio was restricted to education. This left Jospin in the somewhat thankless position of being in charge of the country's volatile universities and schools (a situation similar, perhaps, to Gorbachev rival Ligachev's position as secretary of agriculture).

The new director general of CNRS, appointed last summer, is a 53-year-old biologist named François Kourilsky, an expert on immunology who helped set up an AIDS research center in Marseilles in 1987. Kourilsky is a former vice president of the higher council for research and technology, France's highest science advisory committee, and he is widely respected both as a scientist and as a person who is sensitive to the scientific process. But the appointment of a biologist rather than a physicist to head CNRS is unusual and maybe raises questions about whether basic research in physics will benefit proportionally from increases in spending on scientific research and education. Detailed data on future physics funding are currently unavailable.

Immediately after taking office last May, Curien received a supplemental appropriation for 1988 of 1200 million francs. The 1989 civilian research budget, comprising the combined budgets of several ministries and agencies, has been increased by 3 billion francs, or 7.6%, to Fr 42.287 billion (see page 92). Of the additional Fr 3 billion, Fr 1 billion is going to space and Fr 0.7 billion to CNRS, a 7.9% increase.

The 1989 education budget has grown by Fr 11 billion, a rise of 5.6%, and France's 74 universities are slated for a 9.1% increase. The creation of 650 new teaching positions at universities is foreseen, as enrollments expand. Rocard and Jospin have said that university enrollments should double to about 2 million students by the year 2000.

The new government recognizes that France's underfunded and overly

French civil R&D budget, 1989 (fiscal and calendar)

Ministry	Millions of francs		Change (%)
	1988	1989	
Research and technology	21 431	23 184	8.2
Industry	4 804	4 980	3.7
Space and telecommunications	7 030	7 943	13.0
Education	1 654	1 722	4.1
Transportation	2 705	2 703	0.0
Other ministries	1 685	1 755	4.2
Total	39 309	42 287	7.6
Agency			
CNRS	8 955	9 662	7.9
Atomic energy (CEA)	6 555	6 556	0.0
Space agency (CNES)	5 425	6 453	18.9
Agronomic research (INRA)	2 190	2 337	6.7
Health and medical (INSERM)	1 607	1 728	7.5
Cooperation and development	1 236	1 302	5.3
Oceanographic research (IFREMER)	796	792	-0.4
Research and development (ANVAR)	784	934	19.1
Foreign affairs R&D	801	814	1.6

elitist university system is in need of reform, but understandably the government is treading carefully. "Our country does not need a new university law or a new quarrel," Rocard has said; what it needs is "pragmatism, effectiveness and serenity." An attempt by the conservative government in 1986 to introduce very modest student fees and somewhat stricter admission standards led to widespread protests, which cost Alain Duvaquet, the minister of research, his job. In 1984, an effort by the socialist government to curtail the rights and privileges of private and parochial schools led to the biggest grassroots rebellion since 1968 and provoked the resignation of another minister. Chevènement had to be brought in to repair the damage, which he did with dispatch and great skill, issuing a popular national appeal for a renewed emphasis on discipline, effort, patriotism and the "basics."

The Tonton factor

Mitterrand's lieutenants, assembled during his long march to power and his years as president, are strong personalities—brilliant, unpredictable and adroit, able to take principled stands and able to change principled stands. But none beats the grand master himself. The French like to think of him as "Tonton," a term they use to describe an uncle who is "seventy-one and wise but a little fuzzy and takes long, solitary walks," according to Jane Kramer, *The New Yorker's* Paris correspondent. They like to see him, Kramer goes on to say,

as "the Mitterrand of the campaign posters, taking a 'Mitterrand Generation' baby by the hand and leading her off into a balmy and untroubled future. Tonton is the kind of uncle who will sacrifice narrow politics, and even private dreams, to restore the country to all his nieces and nephews."

In his programmatic statement published in *Le Monde*, Mitterrand quoted, with amusement but also

approval, somebody as having said that science should be "the favorite child of the republic." No doubt it is nice for French scientists to be embraced this way by Tonton. But the more alert of them will also remember what Tonton's embrace can mean.

In the late 1970s Mitterrand entered into an electoral alliance with the French communists on the basis of a common program, carried that alliance to victory, and entered into a coalition government with the communists over almost hysterical objections from other western governments; within a few years the communists were virtually dead as a serious political force in France.

In the mid-1980s Mitterrand insisted over the objections of his most sincere lieutenants on a change in the electoral laws to a system of proportional representation. The result was that the number of seats in the National Assembly held by Jean-Marie Le Pen's anti-immigrant National Front promptly went from zero to 35. Now, four years later, Le Pen is virtually dead as a serious political force.

Mitterrand says that research should be France's favorite child and that research will help France win a merciless economic war in which no prisoners are taken and only the successful survive; French researchers will want to think carefully about what that means.

—WILLIAM SWEET

APS COUNCIL APPROVES PHYSICS PLANNING COMMITTEE

Meeting in San Francisco on 13-14 January, the council of The American Physical Society voted to establish a 14-member "physics planning committee" with a startup appropriation of \$50 000. The APS council endorsed in principle the idea of such a committee last October, after an *ad hoc* committee on priorities in physics recommended the establishment of a strategic planning committee (see *PHYSICS TODAY*, December 1988, page 89).

The revised charge for the new committee is somewhat different from the one recommended by the *ad hoc* group, in that references to "strategic" planning and to the composition of the committee are deleted. The new committee is:

▷ To create a forum within the physics community for broadly assessing the current activities, new opportunities and future directions of physics;

▷ To provide a meeting ground for various disciplinary physics advisory committees in order that they be more fully informed of each other's activities and of the implications of their decisions for other areas of science and for education;

▷ To create links with other scientific societies so that planning for physics research can be carried forward in the broadest possible scientific context;

▷ To develop a balanced plan for physics in the context of the nation's scientific and technological needs so that the officers and council of the APS can respond effectively to requests from the Congress, the administration and the research agencies for assistance;

▷ To report its activities annually to the president and council of APS.

The physics planning committee is established for a period of four years,