

FRENCH 'SCIENCE OBSERVATORY' ISSUES FIRST VOLUME OF SCIENCE INDICATORS

Three years ago, amid growing concern about the international status of French science, France established the Observatoire des Sciences et des Techniques to develop quantitative indicators comparable to those produced by the National Science Foundation in the United States (see *PHYSICS TODAY*, March 1989, page 89). The foundation of OST coincided with an effort, initiated by research minister Hubert Curien, to also put more emphasis on more diversified evaluation and strategic analysis of French scientific activity and science policy instruments.

At the end of October OST published its first major volume of science indicators. The report identifies physics as one of the disciplines in which France excels and specifies five geographic areas in which physics activity is especially concentrated. Given the centralization of political and administrative authority that has been one of France's most distinctive features since at least the 17th century, it is hardly surprising that the greater Paris metropolitan area embraces three of those "poles." The Ile-de-France alone (Paris proper) accounts for nearly half of France's scientific publications, nearly half of its patents and 60% of industrial R&D, and half of the scientific collaborations entered into by French scientists outside Paris are with scientists located in the Ile-de-France.

It bears remembering, however, that Grenoble is also a major center of physics and engineering science in France (see *PHYSICS TODAY*, December 1986, page 65). The other pole outside the Paris area is Lyon.

European perspectives

Since De Gaulle, France has put great emphasis on boosting its scientific and technological performance: Except during Pompidou's brief interregnum, government expenditures on science have steadily increased at rates that are surely above international averages. As a result, the OST

report says, French science now has an impact—as indicated by citation rates—that is about equivalent to the global median (which of course is heavily weighted by the US). While some satisfaction in that achievement seems to be implied in the report, it may be safely assumed that the French will not be content with merely average attainments. And in two respects in particular, France has been outperformed by leading European rivals:

▷ In terms of quantity of scientific publications, Great Britain leads Europe, accounting for one-third of the total, while France and Germany each account for just one-fifth.

▷ In patents, German corporations are responsible for roughly half of Europe's filings in both Europe itself and the United States, while France and Britain are each responsible for a fifth of the filings.

Relative to population or GNP, Britain is almost twice as productive of publications as France, and Germany is more than twice as productive of patents as France.

Other perspectives

Overall, according to the OST report, France spends about 150 billion francs per year on scientific and technological research, and research employs about 300 000 individuals. France's greatest strengths are in physics, chemistry, mathematics and biomedical research, and the greatest relative progress during the 1980s was made in the geophysical and space sciences.

Although French corporations have increased funding for industrial research substantially in the last two decades, their total expenditures still are less than two-thirds of Germany's. Otherwise the report says that

University reforms

Beset by a sense of crisis, France's universities have been particularly affected by the new spirit of critical self-examination, which here too is coupled with a fervent desire to excel.

As part of a university reform program inaugurated two years ago, it was decided that France would double its number of doctoral students by the year 2000, hire about 5000 new university professors each year and build at least six new universities. At the same time, under the leadership of Vincent Courtillot, a geophysicist recruited by the Ministry of Education to preside over government support for doctoral studies and research, a system has been introduced in which each university's research plan is evaluated with input from peer reviewers (including foreign ones), and the ministry negotiates four-year contracts with each university guaranteeing a level of funding and detailing how

money will be spent. Previously universities received research money in block grants and had rather great discretion over disposition of funds.

The Ministry of Education has established special bonuses for university professors who excel both at training doctoral students and at doing innovative research, and according to Courtillot, 5000 such stipends averaging 30 000 francs per year for four years were awarded in 1990. New types of scholarships for PhD students have been created, which appear to be similar to US research and teaching assistantships, and thousands of such scholarships already have been awarded in the last two years.

Courtillot says that funding for university research and doctoral training has increased 30% in the last three years and currently is running at about 2.5 billion francs per year, excluding salaries.

France's industrial profile is on the whole similar to Germany's: Both countries are strong in machinery, transportation equipment, chemicals and pharmaceuticals, and both are weak in electronics.

The report notes that publicly funded nonuniversity research represents a relatively small part of total research funding in the United States (16%) and a large part in Europe

(37%), with Japan in between (with 25%). Within Europe, public funding for nonuniversity research grew strongly during the 1980s in France, decreased in Britain and held steady in Germany.

Europe as a whole produces about the same quantity of scientific publications as the United States, with Japan running a distant third. Among the European countries

France has the fewest scientific collaborations with the United States and the most with the rest of the world.

Those are among the findings contained in *Science et Technologie—Indicateurs 1992*, which can be obtained for 300 francs from Editions Economica, 49, rue Héricart, 75015 Paris, France.

—WILLIAM SWEET

SHOOTING AT UNIVERSITY OF IOWA CLAIMS FOUR PHYSICISTS, ADMINISTRATOR

On the afternoon of 1 November, during an early snowstorm, a former physics graduate student of the University of Iowa shot and killed three professors and a research associate in his department as well as a university administrator. The gunman, Gang Lu, then took his own life.

Among the victims were Christoph K. Goertz, a professor of physics; Dwight R. Nicholson, a professor of physics and chair of the department; Robert Alan Smith, an associate professor of physics; and Linhua Shan, a postdoctoral research investigator in the department. The university's associate vice president for academic affairs, T. Anne Cleary, was also killed. Miya Sonya Sioson, a student who worked part-time as Cleary's receptionist, was seriously injured and remains paralyzed from the neck down.

In the days and weeks following the incident, a kind of explanation has been pieced together about the events of 1 November and the motivation for Lu's actions, but many questions remain unanswered and unanswerable. It is generally believed that Lu, who had received a PhD in physics from the university in May and was considered one of the brightest students in the department, saw his attack as a means of settling grievances he had with certain people on campus, including all of those slain.

Tragic events

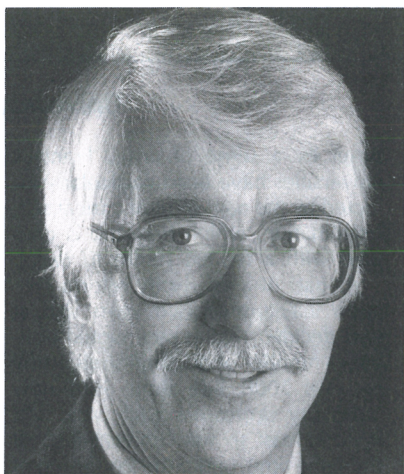
On the first day of November the members of the space physics theory group had gathered in Room 309 of Van Allen Hall, the building that houses Iowa's physics and astronomy department. Goertz and Smith, the group's leaders, were there, as were Shan and Lu, although Lu no longer had official ties to the group or the university. Such Friday afternoon meetings were a regular event for the group, which has been doing analytical and numerical studies of diffusion,

heating and acceleration processes in the boundary layers between large-scale regions.

At about 3:40 Lu stood up and quickly and deliberately shot Goertz, Smith and Shan, according to eyewitnesses, who were uninjured. Lu then walked down one floor and shot Nicholson, who was in his office. Returning to the third floor Lu shot Smith several more times. He then walked over to Jessup Hall, an administrative building, where he shot Cleary and Sioson. Although he visited at least one other site on campus, apparently in search of victims, his only other act was to shoot himself. The entire episode lasted about 10 minutes.

What motivated Lu to act as he did

is still a matter of speculation—and it goes without saying that there can be no rational explanation. He had apparently been contemplating his deed for months: Last May he filed for and received a gun permit and in July purchased the handgun used in the shooting. Several letters that Lu had written and addressed to news organizations and family members give some clues as to his motivation, according to news accounts of the event, although the exact contents of the letters had not yet been made public when this story went to press. Among Lu's grievances were his inability to find a job despite an excellent academic record, criticisms of his dissertation during his thesis defense, which Goertz, Smith and another



Christoph K. Goertz, professor of physics, did research on Jupiter's moon Io, electron beams in auroral field lines, the spokes of Saturn's B ring and the magnetospheres of Earth, Saturn and Jupiter. A native of Germany, he earned a doctorate from Rhodes University in South Africa in 1972 and came to Iowa the following year. He was senior editor of the *Journal of Geophysical Research—Space Physics*.



Dwight R. Nicholson, department chair and professor of physics, was a plasma theorist who studied Langmuir turbulence, stability properties, solitons, nonlinear phenomena and neural networks. He wrote a widely used textbook, *Introduction to Plasma Theory* (Wiley, 1983). He earned a PhD in plasma physics from the University of California, Berkeley, in 1975 and joined the Iowa faculty in 1978.