antinuclear cause in France. Most of the press, including the Communist newspaper *L'Humanite*, condemned the marchers and supported the police, although some were critical of police tactics. *Le Monde* speculated that an antiecology movement might already be under way in reaction to the environmental campaigns. And even before the march, some supporters had pulled out because they feared that it would be violent.

Since the march, there have been a series of sporadic attacks against property of the French electrical utility, Electricité de France. A gasoline bomb was thrown through the window of an EDF office in Paris, a bulldozer on a construction site was damaged, and EDF offices were invaded by protesters for sit-in's. In counter protest, French electricity workers went on strike for 1 hour, issuing a statement deploring the attacks and saying that EDF staff "will not let themselves be insulted and will not accept working in unsafe conditions."

The Creys-Malville demonstration had been planned for more than a year by the French environmental groups, which have become increasingly vocal and effective in French politics. In the local elections in March, environmentalists standing for office as "Green Candidates" did remarkably well, polling up to 15 percent of the vote in the first ballot in some places. Like such campaigners elsewhere, the French environmentalists are predominantly young, many of them students, and some see them as the natural successors of the young people who brought France to a standstill in May 1968. They are outside the conventional political parties and they have a taste for direct action.

While the violence of the Creys-Malville demonstration was not officially encouraged by the organizers, neither was it condemned. Brice Lalande of the French branch of Friends of the Earth concentrated his criticism after the event on the local prefect, Rene Jannin, whom he accused of incompetence and xenophobia. The Malville committees which had helped to organize the demonstration affirmed their support for "all the demonstrators, whatever their political persuasion, nationality, or method of action may be."

So far, the German antinuclear movement has proved the most effective in Europe, both in the numbers of demonstrators it can call out and in the delays it has imposed on the nuclear program. The two demonstrations which established the movement as a real threat to the German Government's plans occurred at Whyl, on the Rhine, where demonstrators occupied for many months a site chosen for a nuclear plant, and at Brokdorf, on the Elbe Estuary, where violent clashes between police and demonstrators caused many injuries.

The German groups have been equally effective in their use of legal and planning procedures to block the building of nuclear plants. At the moment no less than eight nuclear plants are being blocked by legal objections, and difficulties in finding a site for the disposal of nuclear waste have been used by one court as grounds for stopping the building of a nuclear plant. The Government, however, has stood firm, declaring that its plan to provide Germany with 45 nuclear plants in the next 10 years is both correct and necessary.

Its convictions will face a political test at the party congresses of the Social Democrats and the Free Democrats later this year. These two parties, which make up the ruling coalition, include some nuclear doubters, and the antinuclear lobbyists will be campaigning at the party congresses to bring more over into the fold.

The fast breeder program is likely to be a key element in the arguments. It is the largest government-funded research and development program in West Germany and is in some disarray. The SNR-300 prototype, conceived in the mid-1960's and justified by some highly optimistic cost projections, is years behind schedule and grossly over budget. Allowing for inflation, the cost of the 300-megawatt reactor has increased fourfold since the first estimates were made in 1965, principally because of extensive changes in the design demanded by the German reactor safety authorities and the electrical utilities.

Since the SNR-300 was designed to be as "commercial" a prototype as possible, the electrical utilities were also consulted extensively on its design, and the changes they introduced further increased costs. According to a study of the SNR-300 which has just been completed by Otto Keck, a lecturer in science policy studies at the University of Ulm, the cost of building the SNR-300 will be 4800 DM ($2100) per kilowatt installed (prices quoted at the 1972 value of the DM) some eight times greater than a conventional thermal reactor would cost.

Thus the Germans have by a paradox produced a fast breeder which is "commercial" and at the same time hopelessly uncommercial. Keck concludes that the high priority given to the breeder program by the German government appears not to be justified, the economic prospects are dim, the benefits of government subsidy doubtful, and the likelihood is that it will be a commercial failure.

Critics of the Keck thesis argue that SNR-300 is not typical of the costs of a large commercial fast breeder, and say that Super-Phénix will cost only 50 percent more than a thermal reactor of the same size. If this target were to be met, then Super-Phénix would be economical on the assumption that uranium costs $40 a pound and enrichment costs $90 per kilogram of separative work, figures are not far out of line with present prices.

But Keck doubts that Super-Phénix is in fact fully commercial, in the sense that it could be licensed in the United States, for example. And he suspects that changes needed to make the design licensable would so increase its costs that it would become uneconomic at any foreseeable uranium price.

Arguments of this sort are relatively new on the European nuclear scene but are likely to gain greater prominence as fast breeder programs develop. And although less dramatic than storming the police lines at Creys-Malville, they could in the end prove more influential.

—NIGEL HAWKES

RECENT DEATHS

Louis F. Fieser, 78; professor emeritus of organic chemistry, Harvard University; 25 July.

Harold Glander, 54; professor of mathematics, Carroll College; 20 June.

Jacob F. Golightly, 56; professor of mathematics, Jacksonville University; 4 July.

Carye-Belle Henley, 78; professor emeritus of radiology, College of Medicine and Dentistry of New Jersey; 14 July.

George H. Houck, 75; professor emeritus of medicine, Stanford University; 5 July.

Louis M. Jorgenson, 93; professor emeritus of electrical engineering, Kansas State University; 26 July.

Joseph H. Keenan, 76; retired professor of mechanical engineering, Massachusetts Institute of Technology; 17 July.

Georges Ungar, 71; former professor of biochemistry, University of Tennessee Center for the Health Sciences; 26 July.