

math department is sexist and the machinery of due process at Berkeley is rigged."

Recently, the controversy has begun to grow into a discussion of the tactics female mathematicians who feel they have been discriminated against should use. Lenore Blum of the Mathematical Sciences Research Institute, an independent research center associated with Berkeley, who is a founder of AWM, wrote a 24-page account of the Harrison case called "Breaking the Silence." Blum's account is bitterly critical of Harrison, Harrison's closest supporters, and their tactics. She writes that those skeptical of Harrison's claims "became targets of charges of sexism, and this created an atmosphere of fear and intimidation...in these times, accusations of sexual discrimination...are loaded and deadly serious, as Harrison supporters well knew."

In a letter to Ratner, written in response to her letter in the *Examiner*, and submitted to the AWM newsletter, mathematician Mel Rothenberg of the University of Chicago writes: "Much of the anger in your letter seems to flow from the fact that Harrison and her supporters waged a vigorous public and legal campaign to reverse a departmental decision. There are mathematicians who feel that such activity is improper and somehow unprofessional. I don't agree. Such campaigns, while sometimes unpleasant and disruptive of academic tranquillity, are a legitimate way of coming to grips with serious social issues. To characterize them generically as forms of intimidation or harassment is to deny the legitimacy of any forms of social protest."

Yet while the opinions were sharp, the combatants were few, according to Berkeley

provost Christ: "The number of people voicing disagreement with the decision is quite small." In fact, the majority of the math department seems eager to move on. More than 20 department members sent Harrison messages welcoming her back. Among those who stayed out of the fray, opinions vary widely, as *Science's* interviews show. Some resent the university for keeping the process secret, others resent Harrison for dragging the department through a grueling battle and for not "going where they love her," as one mathematician put it. Others said they "admire her courage" and are "elated that she's back." Most, however, simply want to put the heat of the controversy behind them and get back to their theorems.

—Paul Selvin

Paul Selvin is a postdoc in chemistry at UC Berkeley.

## NUCLEAR POWER

### Superphénix Set to Rise Again

PARIS—Superphénix, France's seemingly jinxed fast breeder reactor, which has not produced a single kilowatt of energy in more than 3 years, looks set to rise up next year like the mythical bird it is named after. The \$5 billion reactor, the largest fast breeder in the world, has just been given the seal of approval by a public commission ordered by the government to look at the pros and cons of restarting.

It still has hoops to jump through: a safety check and approval from the ministries of industries and environment. But the consortium of French, Italian, and German power utilities that run the plant are confident they can get it running by next summer. The Superphénix that rises out of the ashes will, however, be a different species of bird from the one planned 20 years ago. The consortium plans to turn the reactor into a "de-breeder," one that will incinerate more plutonium than it produces and so eat into Europe's plutonium stockpile.

In 1973, when work on Superphénix began, planners foresaw continued growth of nuclear power and a consequent shortage of uranium. Fast breeders were the solution: A core of uranium and plutonium is surrounded by a blanket of nonfissile uranium-238, "waste" from conventional reactors. Fast neutrons emitted from the core as it burns transform the uranium-238 into fissile plutonium-239, which can be used as reactor fuel. As the reactor generates power, it "breeds" more fuel than it consumes.

Superphénix, the first commercial-scale fast breeder, was built at Creys-Malville on the Rhône River near Lyons and was fired up in September 1985. Two years later it was temporarily shut down after it sprung leaks in its liquid sodium cooling system. Other inci-

dents followed, culminating in the collapse of a turbine hall roof during heavy snow in December 1990.

By May last year, repairs and alterations had been carried out and the reactor was ready to fire up again. But Pierre Bérégovoy, then France's socialist prime minister, put plans for the plant on hold. Europe's nuclear politics had changed: Fewer conventional reactors were being built and uranium was in plentiful supply; environmental groups warned of the dangers of transporting and reprocessing plutonium, which is not only highly poisonous but is the stuff that bombs are made of. Bérégovoy established a commission to investigate the benefits of restarting the plant and the proposal to use Superphénix to incinerate plutonium.

Getting a fast breeder reactor to debreed is not that difficult. "In fact," says Jeffrey Lewins of Cambridge University's engineering laboratory, "you have to make an effort to make it breed; it's simpler to make it consume." The rate of breeding is governed by the relative quantities of uranium and plutonium in the core and the amount of uranium-238 in the blanket. If the blanket is completely replaced by a steel container, the core will burn more plutonium than it creates. Calculations by Superphénix staff and the Atomic Energy Commission indicate that a "plutivorous" fast breeder could incinerate 15 to 25 kilograms of plutonium while producing 1 billion kilowatt-hours of electricity—scarcely enough to make a dent in the tonnes of plutonium produced by Electricité de France's reactors each year.

The technological fix of burning up waste in a nuclear furnace has not won over envi-



Debreeder. Superphénix's core.

ronmentalists, who have condemned the commission's recommendation to give Superphénix the go-ahead. Former environment minister Ségolène Royal emphasized the continued risks involved in transporting and reprocessing plutonium. Greenpeace denounced the secretive nature of the investigation, calling it "a parody of democracy."

The Superphénix consortium is anxious to get the reactor back on line. The annual cost of upkeep and repair of the idle plant and salaries for its 700 staff may reach \$140 million this year, 20% more than if the plant was running normally. If restarted, the existing core and a second one ready on the shelf will generate electricity worth \$1.3 billion.

By French law, a nuclear plant that has been shut for more than 2 years must gain safety approval again as if it were new. But its owners are confident that a new-look Superphénix will soon take flight. The project's assistant director, Alain Roux, predicts: "We'll be ready to raise the bars in June next year."

—Alexander Dorozynski

Alexander Dorozynski is a science writer living in Paris.