Genetic engineering

Frost damage trial halted

Washington

FIELD testing of bacteria genetically engineered to reduce frost damage to plants has been set back. The University of California at Berkeley announced last week that an experiment involving the release of genetically-engineered bacteria into the environment (*Nature* 22 September, p.262) would be postponed until next year. The announcement came after Jeremy Rifkin, a Washington-based activist who opposes genetic engineering, threatened to seek a temporary restraining order against the university to halt the experiment. Rifkin had earlier filed suit against the National Institutes of Health (NIH), claiming that the NIH Recombinant DNA Advisory Committee failed to consider all the risks of the experiment, which it approved last spring.

The experiment, which would have been the first in which genetically engineered organisms are released deliberately to the environment, is designed to test the ability of the genetically altered bacteria to protect plants against frost damage. Normal strains of the bacteria, *Pseudomonas syringae*, excrete a protein that serves as a nucleation site for ice formation on the plant at temperatures slightly below freezing. In the genetically engineered strain, synthesis of this protein has been inactivated.

Dr Steven Lindow, principal investigator for the experiment along with Dr Kickolas Panopoulos, said last week that only two weeks of favourable weather remain this fall at the field site in Tulelake in northern California. "We're in a no-win situation", he said. A ruling on the motion for a restraining order could not come in time for the experiment to be carried out before heavy frost sets in. The altered bacteria are expected to provide protection down to 23°F, but temperatures below that are expected soon.

Lindow said that the university's legal counsel was "quite willing to defend the experiment", but that practical considerations dictated postponement. The researchers hope that Rifkin's suit against NIH will be resolved by next spring. The decision to postpone the experiments keeps the university from becoming directly involved in the legal action.

Lindow and Panopoulos have for three years conducted field trials of chemically-mutated bacteria similarly deficient in the ice-nucleation protein. Those tests demonstrated that introduction of a large population of protein-deficient bacteria can confer frost protection by displacing the native bacterial population. They also showed, Lindow says, that the experiments are basically safe; the altered strain lived only about three months before the native bacteria reasserted themselves, and did not spread to nearby plants. According to

Lindow, individual bacteria deficient in the ice-nucleation protein occur naturally in the environment as a result of mutations induced by ultraviolet light. He adds that the genetically engineered version is likely to be safer than the chemically mutated version because the process is more specific, deleting only the specific gene and not altering others. No permission was required to field-test the chemically

mutated bacteria.

Rifkin meanwhile has obtained depositions from several more scientists opposing the experiments. Peter Raven, director of the Missouri Botanical Garden and professor of botany at Washington University in St Louis — and a member of the National Academy of Sciences — argues in a deposition that "the environmental impact of these bacteria on natural plant populations might be severe". He argues that the experiments should not go forward without further review of their ecological consequences. **Stephen Budiansky**

Swiss science policy

The law enters the arena

Berne

SWISS science — normally a rather private (and successful) affair — stepped cautiously into the political arena last week. The cause: the passage through the federal parliament of Switzerland's first "law for research", which requires the federal government to define a policy for science. On the surface, the law is anodyne enough, but it has a hidden significance: scientists in Switzerland are submitting themselves to political will in order to ensure themselves of financial support, while politicians are becoming aware that science may provide a key to economic recovery.

The deal may work: at least, in the short

Research and development spending per head

Switzerland	£178
West Germany	£137
USA	£123
Sweden	£113
Netherlands	£102
France	£93
Japan	£86

Values are in pounds sterling per inhabitant for 1979, from Schweizerischer Handels- und Industrie-Verein, research and development report 1980.

term it may work for the scientists. For also being debated last week was the federal budget for science and education (largely a matter of grants to the regionally-controlled universities), and it seems this budget will show a modest increase on last year. This would be a boon. The (Swiss) National Science Foundation (NSF), a nominally private institution which supports most basic science (and humanities) in Switzerland, suffered a 10 per cent real cut in funds in 1980, and has barely held constant since. Next year (1984), at least a 2 per cent real increase in NSF funds seems certain, and a group of parliamentarians (the committee on science and education) is pushing for a 13 per cent increase to SF 174 million (£56 million), the sum actually requested by the foundation as a bargaining position earlier this year. The final figure will be decided in December and although it may not reach 13 per cent, it should be good for NSF.

On the other hand, this new-found political interest in science should result in

a politically-determined policy: in other words, some fields unattractive to politicians should eventually feel the pinch. However, the federal government still has no minister of science (or of education, which is controlled, kindergarten to university, by the cantons), and its policy will still largely be influenced by the advice it receives from the Swiss science council (a body of the grand old men of science). This body also liaises with NSF and with the other principal institution in Swiss science policy, the office for science and education (under the ministry of the interior). These three will thus effectively determine Swiss science policy as at present. However, in the past this job may have been easier than it will be now.

Before the 1980 shock, scientists in Switzerland more or less got what they asked for. As a result, Swiss spending on research and development rose to some SF 3,000 million — £1,000 million — of which three quarters was spent by private industry, a sum which made it the highest national research and development spend per head of population in the world (see table). Swiss scientists, however, claimed this was only what they needed. Now, however, they are not likely to get exactly what they need (the 13 per cent on the NSF budget). So the National Science Foundation (in consultation with the other bodies) has made choices, and the politicians have been impressed. This has been the political trade-off. Certain fields will "level off", a code for constant funding in current Swiss francs, or in other words a real fall according to the current rate of inflation (around 2.5 per cent).

Fields threatened with "levelling-off" in the NSF funding request are many, but tend to cover the more outmoded aspects of modern sciences, such as "classical aspects" of algebra, geometry and analysis in mathematics, homologous series in chemistry or "conventional" research in cell biology. Singled out for support are "centres of excellence" in a somewhat shorter list of subjects. All good stuff for the political paymasters, no doubt, and a chance, perhaps, for NSF to do some useful weeding. **Robert Walgate**