

## POLLUTION CONTROL

**BACTERIAL REMEDY FOR ACID RAIN?**

LONDON—*Thiobacillus ferrooxidans* could help reduce acid rain in the U.K. and cut back the politically troublesome export of this pollutant to other parts of Europe. According to studies by Tony Atkins and colleagues at University College (Cardiff) and North Staffordshire Polytechnic (Stoke-on-Trent) the bacterium has considerable potential in removing sulfur from newly mined coal.

The organism converts sulfur-bearing pyrites into sulfuric acid. About a fifth of the million tons of coal normally brought to the surface in Britain each year is composed of

very fine particles, mixed with both pyrites and shale. The researchers believe that *T. ferrooxidans* should vastly speed up flotation separation of the various constituents. Mixing raw coal with water and oil in a tank normally forces oil-coated coal particles to the top, leaving shale at the bottom. But pyrites also tend to accumulate in the coal-containing froth. Although sulfur is removed by oxidation, this takes several days—making the procedure expensive and barely economic. By pre-treating coal with *T. ferrooxidans*, however, Atkins had found that he can boost the oxidation of pyrites considerably in laboratory-

scale experiments.

The bacteria also produce phospholipids which cling to the remaining particles of pyrites. These become hydrophilic and fall quickly to the bottom of the tank with unwanted shale. Supported financially by the National Coal Board and the Science and Engineering Research Council, Atkins and his team are now planning to commence pilot plant trials of a process they believe will drastically reduce the amount of sulfur in coal burned at Britain's power stations, and thus the amount of acid rain precipitated onto forests and watersheds.

—Bernard Dixon

## INTELLECTUAL PROPERTY

**BRITISH INITIATIVES BOGGING DOWN**

WARWICK, England—A year after Mrs. Thatcher announced that the National Research Development Group (the NRDC, now part of the British Technology Group or BTG) was to lose its "first rights" claim to discoveries made on U.K. campuses, the universities are still in limbo, unsure about what freedom they enjoy to take out patents in their own right and to choose partners with whom to negotiate the exploitation of intellectual property.

This was one of several complaints voiced recently by Professor Roger Whittenbury about the adverse effect of government inaction and austerity on the development of biotechnology in Britain. He was speaking during a conference organized by the University of Warwick and the Licensing Executives Society. Although Whittenbury and his colleagues in the Biological Sciences Department at Warwick have shown conspicuous vigor in attracting grants currently worth nearly £5 million (£1 million of it from overseas companies), he believes that greater urgency and activity are required from the government to help Britain's biotechnologists meet the challenge from Japan and the U.S.A. Referring to cuts in both Research Council and university support, Whittenbury said: "U.K. academics consider the present financial misery, leading to the slow throttling of research at the leading edge of molecular biology, is inevitably preventing them from providing their 'dues'—novel information—needed to receive the essential 'grapevine' information from abroad necessary to aid their own research."

Exacerbating the problem was "the

lukewarm embrace of biotechnology by industry." This was inexplicable to academia, among whom Britain numbered "some of the most eminent at the enabling end of the science which drives biotechnology." Universities could only respond, as in the centers established at Warwick and in places such as Cranfield and Leicester, by trying to create "a base from which industry can eventually benefit." While some of these ventures might fail, the success of others would indicate the principles to be incorporated in a second wave of developments. "And by that time U.K. companies may well have decided to risk associating themselves with university biotechnology ventures in greater numbers."

Unexpectedly echoing some of Whittenbury's criticisms was Roy Dietz, head of the Biotechnology Unit established by the DTI (Department of Trade and Industry) two years ago. While insisting that the government's record in promoting biotechnology was good, he concentrated on what remained to be done, at the risk of giving the impression of more brickbats than bouquets. "The NRDC's performance in technology transfer, for example, was 'patchy,' with income arising largely from a few spectacular successes such as the cephalosporins. And although the BTG's loss of rights over academic research was made known in 1983, the promised announcement of mechanisms to encourage the protection of intellectual property is still awaited." The Science and Research Council (SERC) Biotechnology Directorate has won wide respect for its active, entrepreneurial approach.

"But the SERC, like all Research Councils, is suffering from constraints in funding, and biotechnology is not well placed to fight its corner. The bulk of SERC's funding goes to its own laboratories in expensive branches of physics, each defended by an established lobby. An interdisciplinary subject like biotechnology, with modest capital requirements, finds it hard to sieze a greater share of the diminishing cake."

In Europe, Dietz warned, there is a collision course with agricultural policy. "Biotechnology's feedstocks are on the wrong side of a tariff barrier," he said. "And its products, such as sweeteners and single cell protein, are in direct competition with agricultural products, for which the European market is controlled. There is a good case for European biotechnology industry to press jointly for changes, but it would be idle to think that they will come easily since some very delicate balancing of interests is required." Dietz also reminded his audience about U.K. industrialists' complaints that the Department of Health made little use of its influence through purchasing policy to help British firms—particularly in diagnostics, where biotechnology was well placed to address large markets. Introduction of Celltech's monoclonal blood grouping reagents had been a good example of "more enlightened public purchasing policy." Here the DTI had intervened to purchase reagents because although Celltech envisaged its main sales overseas, there was little prospect of their being achieved until successful home use had been demonstrated.

—Bernard Dixon