BIOTECH 85 EUROPE

ICI'S FUNGUS FEASTS ON CYANIDE POLLUTION

GENEVA—"We looked around for the biggest manufacturer of cyanide in Europe and came up with ICI," said Chris Knowles, telling a Biotech 85 audience about the arrangements through which his fungal process for cyanide degradation has been patented and now is being developed commercially. It all began, the University of Kent researcher explained, with the observation that although plants synthesize the poison on a massive scale (to defend themselves against insects and fungi), it does not accumulate in the environment.

Knowles argued that the microorganisms responsible for breaking down cyanide might be exploitable in pollution control. The breakthrough came when he and his colleagues studied strains of fungi insensitive to cyanide released by cyanogenic plants; these fungi produce an enzyme (cyanide hydratase) which converts the poison to formamide. Laboratory tests with both crude and immobilized mycelium indicated that solutions carrying at least 2500 ppm of cyanide could be broken down continuously for several weeks, yielding effluent containing less that 0.05 ppm of the poison.

ICI's agricultural division improved the process, based on a species of *Gibberella*, secured patents, and is now poised to have a product on the market this year. "We are probably talking about tens of millions of dollars of revenue from this process in North America, Europe, and Japan," says Peter Rogers, head of ICI's biochemical group.

The company has been given a Royal Society of Arts' Award for Pollution Abatement Technology. While ICI continues to perfect the fungal hydratase system, Knowles and his colleagues (financed by the U.K. Science and Engineering Research Council) are trying to evolve a process capable of degrading cyanide that is bound tightly in complexes with nickel, copper, and other metals. One promising candidate is a strain of the bacterium *Pseudomonas fluorescens* isolated from a mudbank very close to the Billingham works of the giant chemical company.—**Bernard Dixon**

Biotech 85 was organized by Online Conferences Ltd. (Pinner Green House, Ash Hill Drive, Pinner, Middlesex HA 2AE, U.K.) who also publish the proceedings.

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SCLEROGLUCAN USED IN ENHANCED OIL RECOVERY

GENEVA—Within about two years, scleroglucan made in submerged aerobic culture by a *Sclerotium* species should be on the market as a thickening agent for enhanced oil recovery (EOR). A linear chain of D-glucopyranose units crosslinked into a structure of average molecular weight under 1.5 million, scleroglucan will compete with—and in some ways be superior to—the xanthan bioploymer currently employed for EOR. Making these claims during Biotech 85, Alain Donche said oil companies that have already tested the polysaccharide have achieved excellent results. Donche is project manager responsible for developing the product at Elf Aquitaine (Paris).

The non-ionic "Actigum CS" is stable in the presence of salts; 500-day trials at 90°C in sea water show that it is relatively insensitive to high temperature. Like xanthan, it has high shear resistance, remaining viscous after the extremely strong mechanical shearing employed to remove it from fungal mycelium. Long-term core flooding tests also indicate that Actigum circulates freely, with good non-plugging characteristics.

Additionally, scleroglucan has the advantage that the pH of the culture falls to about 2.5 during the first few hours of fermentation. Together with the reduced oxygen flow attributable to rapidly increasing viscosity, this means that sterility is not a major problem. Because contamination is unlikely, Donche said, it is even possible to consider establishing the fermentation on-site in an environment less strictly controlled than would otherwise be necessary. At the same time, he and his Elf Aquitaine colleagues are assessing the marketing of scleroglucan as a powder, much more suitable for long-range transportation than the concentrated solutions in which xanthan is produced at present. —**BD**

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DENMARK MOVING TOWARD BIOTECH REGULATION

GENEVA—If, as seems likely, Denmark becomes the first nation in Europe to legislate on environmental, agricultural, and related aspects of biotechnology, that country's disagreeable experience with the humble cow parsnip will have played a small part. In a paper presented at Biotech 85, Ole Münster from the Danish Ministry of the Environment cited this plant as an example of what can happen when foreign or exotic species are introduced into environments ill-fitted to receive them. Cow parsnip was originally used for ornamental purposes but is now out of control as a weed with no natural predators.

Conscious of the need to avoid similar or worse problems with genetically engineered organisms, the government set up a committee in October 1983 which has been conferring with a wide range of biologists (but none so far with industry) before producing a report suggesting regulatory measures. Münster told the conference that the document should be ready by the middle of this year. All interested parties—including industrial concerns—will then be invited to submit comments before firm proposals are formulated and debated in the Danish Assembly.

Münster described his committee's work as a "balancing act" between the promotion of biotechnology and the prevention of adverse consequences. "On the one hand, the government has a responsibility for protecting health, environment, and nature by setting up production conditions under which industry may work with genetically engineered organisms," he said. "On the other hand, government should stimulate industrial production so that society may benefit from the huge potential for the improved production of goods based on these techniques."

In response to criticism from the floor that international rather than national regulation was required, Münster insisted that—as with acid rain—individual countries should take the first steps in setting standards. —**BD**