

# REPORTS FROM NEW DELHI SYMPOSIUM

The VIIth International Biotechnology Symposium, held in New Delhi, India on 19–25 February 1984, gathered over 900 delegates from 65 countries. With nearly 400 scientific presentations covering almost all areas of biotechnology, the symposium obviously was many things to many people. The two reports below briefly review some of the highlights of the meeting.

## NEW TECHNOLOGIES FOR FERMENTATION, BIOLOGICAL CONVERSION

Although biotechnology is generally not a theoretical discipline, several researchers discussed important kinetic models. R. D. Tanner (Vanderbilt University, Tennessee) described use of non-constant parameters in the Monod model for growth kinetics. Dynamic phenomena such as hysteresis and oscillations can be described using variable maximum growth rate and cell yield parameters. His talk was followed by several interesting poster presentations. A. A. Esener (Delft University, The Netherlands) described the problems of estimating parameters in unstructured growth models and J. P. Barford (University of Sydney, Australia) analyzed the glucose effect in yeast in terms of the relative transport rates of sugar into the cell and into the mitochondria. I. W. Marison (Swiss Federal Institute of Technology, Lausanne) described a novel heat flux calorimeter for kinetic measurements.

N. W. F. Kossen reviewed the problems of reactor scale-up, then presented a scale-down procedure for simulating a large-scale bioreactor. C. L. Cooney (Massachusetts Institute of Technology) presented an overview on application of process control principles to fermentations,

and M. Reuss (Technical University of Berlin) emphasized the advantages of an integrated approach to biosystem optimization. There were also many interesting poster presentations covering the design, control, and use of bioreactors—in fact, too many to enumerate in this short report.

On the biological front, A. Mitsui (University of Miami, Florida) reported on developments in production of algae and photosynthetic bacteria. He claims that directly feeding nitrogen-fixing bacteria to fish enhances their food conversion efficiency. He also listed many of the biochemical products that have been obtained from photosynthetic organisms growing in waste streams and reported on photosynthetic hydrogen production. A. LeDuy (Laval University, Canada) described a combined photosynthetic system in which algae are used as a carbon source for anaerobic digestion and methane production. A group at the Food Technology Research Institute (Mysore, India) has developed an integrated poultry system that uses algae to produce both methane and a feed supplement from animal wastes.

Immobilized cell and enzyme systems were also popular topics. Researchers from Lund Institute of Technology (Sweden) described a hybrid

immobilized cell system for production of  $\alpha$ -keto acids. One cell type contains amino acid oxidase and co-immobilized algae supply oxygen for the catalysis. Other tricks for improving the oxygen supply in these systems include adding hemoglobin and perfluorochemicals to the medium and the use of hydrogen peroxide (Holst, Chemical Center, Lund). Several groups reported new technologies for producing high fructose syrup from starch feedstocks.

One wonders whether the breadth of biotechnology can be covered usefully by large meetings like this. After all, gene splicing techniques and computer controlled fermentation processes have little in common. Should meetings be organized around the goal of making all information available to all participants? In New Delhi there were few parallel sessions, so the large number of poster presentations were squeezed into time periods that were completely inadequate for a serious perusal. If this goal is to be achieved, the number of poster presentations will have to be drastically reduced—a particularly difficult political problem when representation of many countries and laboratories is desirable. Although the meeting may be remembered more for its quantity than its quality, there remains the lasting positive impression made by the Indian people.

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## MCAs, SEPARATIONS, AND BIOTECHNOLOGY'S FUTURE

Keynote lectures provide a speaker with a chance to synthesize, prophesize, and even fantasize. Werner Arber (University of Basel, Switzerland) asserted "There is nearly no limitation to potentially interesting applications for biotechnology."

However, he went on to say that we still lack essential knowledge of how a living cell functions on its own and in populations. He called on the scientific community to critically consider the short- and long-term consequences of recombinant DNA tech-

nology. Otherwise, he warned, expectations that have been set too high may not be fulfilled, damaging biotechnology itself.

A. E. Bussard (Institut Pasteur, France) reviewed the history and many current applications of monoclonal antibodies. Thanks to their exquisite specificity, monoclonals can be used to detect and titrate almost any immunogenic substance. For example, anti-interferon monoclonal anti-