

This issue

Biotechnology is the proverbial pot of gold at the end of the rainbow for India's molecular biologists, agricultural scientists and biomedical researchers. Rarely has an area been embraced so warmly by such a diverse group of scientists. The promise of today's biotechnology is impressive. The governmental support generated in India is a tribute to its practitioners' abilities to influence the corridors of power in the scientific establishment. What role is anticipated for biotechnology research in the context of the country's scientific development? What is the present status of research in molecular biology and related areas in India? This issue of *Current Science* highlights these questions, although it does not pretend to provide any answers.

Opinion

'Biotechnology is a silent revolution and has the potential to touch millions of people.' G. Padmanaban (page 510) begins on this sweeping note to assess the current scene in Indian biotechnology. He presents an optimistic and incisive analysis of achievements, problems and prospects, and pleads for a positive approach. P. M. Bhargava and Chandana Chakrabarti (page 513) reaffirm the importance of biotechnology, emphasize the dangers of ignoring this discipline in the context of development, but raise critical questions regarding the role of governmental agencies, specifically the Department of Biotechnology (DBT).

Institutions

A governmental perspective, presented by S. Ramachandran (page 518), lists the objectives and programmes of DBT, a department with a pivotal role in the development of this area in India. The phenomenal growth in activities related to biotechnology can be judged by the number of new and glamorous institutions that have sprung up in different parts of the country. Activities at three of these institutions, the National Institute of Immunology (page 528), the Institute of Microbial Technology (page 524) and the Astra Research Centre India (page 533), are described.

Education

Training of students and the generation of adequately prepared manpower is one of the important concerns of DBT. This area assumes importance in the context of falling standards and decaying facilities, even in the classical

disciplines, at our universities. The coordinated efforts of the University Grants Commission and DBT have set in motion several MSc programmes at various centres in the country. V. Sitararam (page 537) analyses the educational experiment at Pune, while V. V. Modi (page 540) describes the Baroda experience. The contents of biotechnology courses vary widely, depending largely on the predilections of the organizers: Kunthala Jayaraman (page 542) pleads for emphasizing the importance of bioprocessing.

Plant tissue culture and agricultural perspectives

The impact of plant tissue culture was brought out most vividly recently by the widespread approbation received for work on bamboo by the National Chemical Laboratory in Pune. A. F. Mascarenhas (page 547) evaluates the role of plant biotechnology in India. Some of the most promising applications of biotechnology are in the area of agriculture. V. L. Chopra and R. P. Sharma (page 543) specifically analyse the status of biotechnological approaches in crop improvement, while H. K. Das (page 551) discusses biological nitrogen fixation. The promise of recombinant-DNA technology in creating novel genotypes can, in principle, lead eventually to plants that are resistant to disease, pests and herbicides, and have enhanced nutritional quality—a kind of agricultural Utopia, which may indeed be a reality in the future.

The growing power of molecular biology

The amazing technological advances in molecular biology over the past few years have generated a bewildering range of strategies and procedures for studying diverse biological problems. Four reviews in this issue attempt to highlight some important areas. J. Gowrishankar and V. Radha (page 556) consider the use of recombinant DNA-based approaches in molecular-genetic analysis of human inherited disorders and in studies of function and regulation of genes in higher animals. They conclude with a tantalizing list of the 'largely uncharted area of human inherited diseases and syndromes in various Indian races and populations' and hold out the promise of future fruitful collaborations between clinicians and molecular biologists.

To geneticists and developmental

biologists, *Drosophila melanogaster*, the simple fruit fly, has provided a superb system for building much of the structure of modern biology. 'The well-developed nervous system and wide behavioural repertoire' of *Drosophila* now provide an excellent opportunity for analysing the interrelationships between gene expression, nervous-system development, and behaviour. K. Vijay-Raghavan, M. J. Palazzolo and V. Rodrigues (page 562) highlight the most recent methods that permit identification and analysis of a large number of important genes in *Drosophila*. The techniques described should have broader application in studies of gene expression in general.

Of the many techniques of contemporary molecular biology, none has captured the public imagination more than DNA fingerprinting, particularly its forensic applications. It is a long journey from the eccentric genius of Sherlock Holmes to the presumably incontrovertible evidence provided by the electrophoretic patterns of DNA fingerprints. This technique, complete with a DNA probe of local origin from the female Indian banded krait *Bungarus fasciatus*, is described by Lalji Singh (page 580).

Diseases caused by parasitic organisms remain a major health hazard in our country. Our present-day understanding of the molecular biology of parasites holds out the promise of eventually enabling us to combat these infections in a rational way. The complex immune responses of hosts to parasite infection and the devious mechanisms adopted by invading parasites to evade immune surveillance have been subjects of primary concern in molecular and cellular immunology. A. Bhattacharya, S. Bhattacharya and D. Sehgal (page 569) provide a comprehensive review of the molecular basis of immune response against parasites. They conclude optimistically that the 'development of strategies to modify immune response to kill the parasite may lead to reduction of the rate of parasitic infection' in the next decade.

A sampling of research

This issue carries six original papers (starting page 586) that are representative of research efforts in areas related to biotechnology and molecular biology. The reports range from production of transgenic zebrafish by microinjection of a growth-hormone gene to studies of the structural basis of gene expression *in vitro*.