

January 1991, with a grant from the International Development Research Centre, Canada. The objective was to find out which biotechnologies are ready to be taken to the 'unreached' and how.

The book has eight sections, of which the first one deals with integration of the traditional and the new technologies. The next four deal with the technologies themselves, and the remaining three concern the paradigm to be used, the social concern regarding some of the technologies in animal husbandry, and the management of the delivery system for the technology.

There were 41 participants, including M. S. Swaminathan, who chaired all the sessions, and who clearly was the guiding force behind the discussion. The search for the 'ready' technologies was in fact initiated to produce a work programme for the Swaminathan Foundation. The others were scientists, government and institutional officials, industry and university representatives, and international groups, a wide enough coverage, with the perhaps unfortunate (or inevitable?) omission of grassroots-level representatives of the 'unreached'.

The sections give the introduction by the chairman, followed by the text of the papers and then an apparently verbatim report of the discussions.

Among the technical reports, there are two types of papers 'Micropropagation technology' by Jitendra Prakash of Indo-American Hybrid Seeds gives an apt presentation with details of costs and equipment and how at least some plant tissue culture could be done at village level economically. The author backs it up with his experience in producing millions of plants and selling them. This is further elaborated in the section on biovillages.

Eapen George talks more generally but makes the points leading to the concept of bio-district, with different technologies for different villages. He elaborates on this in a later section.

Chamber's reaction to most of the papers is 'These are scientist's choices; have you consulted the unreached?' Though a valid question elsewhere, I do not consider this very relevant in this conference; because the objective was not to decide priorities for new tissue culture work, but to put to use existing knowledge. Certainly the landless would have understood nothing if the scientists

were to talk to them.

The other technical papers, on 'Biomass refineries' and 'Recombinant DNA' go off in different directions. The biomass refineries paper by Rexen does not seem relevant to India. The Indian farmer uses almost every part of jowar for his own food and for fodder etc. He says, 'Today sorghum [= jowar] stems are left in the field and considered of no value to the farmer.' He is therefore suggesting industrial use for this biomass. This makes no sense either in economic terms or social needs of the 'unreached'. His other ideas also would have carried more conviction if he had calculated even order-of-magnitude figures in suggesting fuel substitutes for diesel. The other technical papers discuss technologies and what they have the potential to do—not about how any of them can be harnessed now for the unreached.

In conclusion it is difficult to say whether the Swaminathan Foundation has a clear mandate on what to do for the unreached. At least they should know where to go for more help if they start such a programme for the unreached.

S. S. KALBAG

*Vigyan Ashram
Pabal
Pune 412 403
India*

The Human Brain. IBH Prakashana, V Main Road, Gandhinagar, Bangalore 560 009. 1988. 227 pp. Rs. 30.

The most marvellous creation known to mankind is the human brain with its enormous potentialities and structural complexity. From the basic vital functions like breathing to the highest philosophical and scientific thought, all reside in the brain. The human brain is the culmination of millions of years of evolutionary process. It is strange that human beings are themselves so unaware of this marvellous organ that they possess. It is necessary to eliminate such ignorance and this book serves the purpose well.

Beginning with an introduction of the basics, the authors deal with the cells of the nervous system and their methods of communication. This is followed by a

discussion on the growth, structure and function of the brain. The functions of the senses, thought and consciousness are discussed. The language is simple and could be followed by persons who have no biological background. The index at the end is useful. The book is recommended to all educated persons who like to know about the functioning of their own brain.

B. RAMAMURTHY

*The Clinic
27, 2nd Main Road
CIT Colony
Madras 600 004
India*

Neuroscience *in vitro*

Culturing Nerve Cells. Gary Banker and Kimberly Goslin, eds. Cellular and Molecular Neuroscience Series, The MIT Press, Massachusetts Institute of Technology, Cambridge, Massachusetts 02142, USA. 1991. 453 pp. US\$ 45.00.

Nerve tissue culture today offers almost unlimited flexibility to the seasoned neuroscientist who exploits its potential for the study of fundamental processes—biochemical or physiological—and its relation/behaviour with other cells or cell types. In order to begin nerve tissue culture experiments one needs a do-it-yourself manual that gives detailed recipes/protocols and the principles behind them.

Nerve tissue culture has had a long incubation period between first report and application. P. Weiss (forties), C. E. Lumsden (fifties), E. R. Peterson (fifties and sixties) and many more laid the foundation. Although the techniques are over half-a-century old, the method itself has come of age in the last few decades. This was probably due to the absence of methods of defeating the 'bugs'. Antibiotics and Millipore filters have changed the face of nerve tissue culture since the mid-sixties, when more and more sterilized products (such as culture media, plasticware, incubators, etc.) began flooding the market. However, large doses of certain antibiotics were found undesirable for all neurobiological cultures, e.g. penicillin appli-

cation is a standard way of producing epileptic foci in the brain. On the other hand, a small amount of penicillin does good to PNS cultures (e.g. Schwann cell cultures) in studies of their interaction with other organisms (e.g. mycobacteria).

Reproducible and accurate methods have evolved over the last few years. A similar book edited by E. Giacobini entitled *Tissue Culture In Neurobiology* was published in 1980. But this was only a collection of important papers on nerve tissue culture.

The book under review is a long-awaited, lucid and informative manual on nerve tissue culture, and a must for every neuroscientist, especially neurobiologists, neuroimmunologists, neurophysiologists and, most of all, nerve tissue culturists. It contains all the necessary nitty-gritty needed for nerve tissue culture work, including illustrations, light and electron micrographs, recipes, flow charts and the phenomenal experience behind 26 contributors from the USA, the UK and Switzerland.

The book is divided into three sections, with a total of 15 chapters and a voluminous 36 pages of references. The first two sections (four chapters) are contributions of the editors, Banker and Goslin, both at the Department of Neuroscience, University of Virginia School of Medicine. These sections explicitly cover preliminaries such as 'getting started' and 'general principles' of different nerve cell cultures, their maintenance, and the merits and demerits of having them. The latter ten chapters

are by experts on different cultures of the central, peripheral and autonomous nervous system. Cell line cultures and model culture systems have been also considered separately (PC12 rat pheochromocytoma cell line, isolation of chick neurons for the study of axonal growth, nerve-muscle cell cultures from *Xenopus* embryos, etc). The book reads like a guided tour of the best (neuroscience) culture laboratories around the world and is definitely more than a mere amalgamation of several 'top of the line' publications. It would be correct to state that the details contained in this manual are much more than any materials and methods section of any one particular paper. However, the reader will miss two little ramifications quite important to him.

Although the potential use of nerve tissue culture, mostly for fundamental neuroscience research, is highlighted in a special section of each chapter ('applications'), each contributor would have enhanced the purview of his readers by including a paragraph solely devoted to applied neuroscience research, e.g. disease states associated with nerve cells of the central and peripheral nervous system, the use of nerve tissue culture in biotechnology, etc. Experiments performed by Carson's group at Scripps Clinic, La Jolla, California and many others around the world studied the effect of neuropeptides on cells of the immune system (monocytes, lymphocytes, etc.). These are some of the interesting applications which are still being ex-

ploited (see Devasia, *Curr Sci*, 1991, 60, 294).

Bunge and Wood of the University of Miami School of Medicine are two of the pioneers of 'myelinating central and peripheral nervous system' in culture. Their understanding of long-term CNS and PNS cultures has given a deep insight to medical scientists working on CNS- or PNS-related diseases such as multiple sclerosis, Guillian-Barre Syndrome, EAN/EAE, Lyme's disease and leprosy neuropathy (studied in great depth by Antia and others at the Foundation for Medical Research in Bombay).

Contributors have mentioned fluorescent tracer dyes with reference to 'anterograde and retrograde' labelling. These have been shown as high-quality black-and-white micrographs. In place of these b/w micrographs, colour micrographs would have not only added more lustre to the manual but would have also helped in better understanding of multiple colour labels.

In conclusion, this book will be of great help to the beginner at the bench as well as the experienced neuroscientist of the nineties, and probably tomorrow's biotechnologist.

P. S. GHASWALA

*R & D Laboratories
Bharat Serums and Vaccines Pvt. Ltd
534 Bombay Mutual Terrace Building
Sandhurst Road Bridge
Bombay 400 007
India*