to be widely available, but shop around between GB and the USA!

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Current Communications in Molecular Biology: Computer Graphics and Molecular Modeling. Edited by MARK ZOLLER and ROBERT FLETTERICK. Cold Spring Harbor Laboratory. 1986. 150 pages. $29. ISBN 0 87969 193 X.

Many current problems in Molecular Biology require an understanding of the three-dimensional nature of macromolecules. The dynamics of macromolecules adds yet another dimension, time, as another layer of complexity. The use of computers in the analysis of biomolecular data is already widespread: as a non-graphics worker in this area, I was very interested in this collection of extended abstracts from a meeting on Computer Graphics and Molecular Modeling held in December 1985 at the Banbury Center of Cold Spring Harbor Laboratory.

The book concentrates almost entirely on proteins: indeed a better title might have been 'Computer Graphics and Molecular Modeling of Proteins'. This area of research involves many fields: Molecular Biology, X-Ray Crystallography, Peptide Synthesis, Computer Science, and Protein Dynamics. This volume is an attempt to bring these diverse fields together. The problems discussed are: protein sequence homology, three-dimensional structure homology in proteins, molecular design of functional macromolecules, X-ray crystallography, and software for the analysis of the energetics and dynamics of proteins.

The development of powerful hardware and software for computer graphics in the last ten years has brought about a new era: structural models can now be fitted to X-ray data and 3-D models can now be accurately described, displayed and compared. The computer transforms the 3-D structure to a 2-D representation that is displayed on the VDU screen. The success of this representation depends on the resolution of this display, and on the quality of the techniques (e.g. shading, removal of hidden lines, range of colours) used to bring out the 3-D nature of the molecule. It is possible to view the 3-D structure from different angles and to zoom in and out at will. This requires considerable computer memory. At present these requirements restrict the use of computer graphics to mini-computers (although already a simple molecular graphics program is available for the IBM-PC and Apple II). Using present knowledge of protein structure and protein dynamics, some researchers, are attempting to predict structure and function, and are even considering designer molecules.

This slim volume contains two abstracts on Graphics Software, three on Computer Hardware, five on Structural Principles in Proteins, six on Protein Modelling, and three on Molecular Dynamics of Proteins. They range in length from just over a page to seven pages long. A smaller collection of articles would seem preferable to many extended abstracts. There is also a 27-page appendix listing Molecular Graphics Installations, including information on hardware and software.

The Graphics Software section gives an outline of two of the many graphics packages, although in effect others are mentioned in later abstracts. Most Graphics systems are running on Vax machines. I found two of the abstracts in the Computer Hardware section fascinating, especially M. E. Pique's 'Technical Trends in Molecular Graphics'. This is an excellent review of Molecular Graphics and of the current state of graphics technology. Pique also makes 'some tame predictions for the period 1986–1990'. It is clear that WIMP technology (Windows, Icons, Mice, and Pull-down menus) will become available for Molecular Graphics. Among many other interesting thoughts, Pique also feels that 'the one-dimensional pattern-matchers and the three-dimensional energy-modellers...' will keep on '... running separate horse races'. Ferrin and Langridge's contribution on 'The UCSF Computer Graphics Laboratory' was an interesting account of the development of their Graphics system over the last decade, including the MIDAS package (which models proteins and DNA). The third Computer Hardware article was on the future use of parallel computers in Molecular Graphics: possibly a little early to discuss this developing technology.

The next two sections (Structural Principles in Proteins, Protein Modelling) are essentially applications of Computer Graphics to the elucidation of protein structure. Eleven abstracts cover a wide range of approaches. The last section, on Molecular Dynamics of Proteins, contains three abstracts: These are essentially simulations. Karplus *et al.* apply a simple molecular dynamical model to active sites. Struthers *et al.* apply 'modern theoretical techniques to the development of improved antagonists of gonadotropin-releasing hormone'. I found it hard to envisage the use of computer graphics in such complex areas, especially in Levitt and Stern's abstract entitled 'Normal-mode Dynamics: Energy Calculations, Interactive Graphics, and Movies': – a 200-word and 2-tables abstract discussing a 16 mm film shown at the meeting!

Besides the sections quoted in the contents table and a one page introduction, there are no other attempts to bring together the nineteen abstracts: I would have liked to have seen an overview of each of the sections. In a book on computer graphics, there are only four colour photographs and only some relatively simple diagrams in the abstracts: it is, not surprisingly, a little difficult to grasp the power of this technology from (almost) words alone. It is a pity that

there is very little on DNA modelling. Some discussion on the contribution of Graphics to research in Molecular Modelling would be useful.

Molecular Graphics is a rapidly growing area which will benefit as hardware costs continue to fall. This will make the technology more accessible. This collection of abstracts, however, is aimed mainly at those already working in this field and will have limited appeal outside it.

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Environmental Health Criteria 51: Guide to Short-Term Tests for Detecting Mutagenic and Carcinogenic Chemicals. W.H.O. 1985. 208 pages, Sw. Fr. 15, ISBN 92 4 15 41911.

The stated objective of this conveniently sized and priced book is to represent the views of the International Commission for Protection Against Environmental Mutagens and Carcinogens (ICPEMC) on the guidance which should be given in the field of short-term testing for mutagens and carcinogens with genetic activity. It is also stated that 'developing countries' '... provide the raison d'etre of the present document, which is offered in a spirit of helpfulness in the hope that it may enable short-term genotoxicity tests to be used in a reasonable manner' (p. 12).

All contributors are European, six from the United Kingdom and three from West Germany (one now working in The Netherlands). None has worked for any significant time, if at all, in a developing country. This omission from the experience of the contributors should not be underrated, although it is understandable since so few people working in genetic toxicology have had the privilege to visit, let alone work in, a developing country. In fairness, this reviewer has none of this experience either.

The value of this book lies in its succinct, uncomplicated summary of many aspects of genetic toxicology and moderate resistance to the temptation to overrate its status. Thus, '... any assessment of test results in terms of mutagenic or genotoxic hazard can be properly made only in the context of the whole toxicological profile of a substance and its use' (p. 12). As a summary and introduction to methods used in developed countries, this book is valuable and should legitimately find a market among the many practicing technologists in the field. It will also be useful to people in developing countries with an interest in environmental health, if only so they can be informed about lines of thought currently followed in their industrialized neighbours in a rapidly shrinking and complex world.

But – there had to be one – certain practicalities have been overlooked if this is intended to be a manual from which protocols may be written and used in developing countries. Why include a description of a dominant lethal assay? This is not cheap (a rat assay can cost £20000), uses large numbers of animals (say, 100 male rats or mice and 1600–2000 females from which 20000–30000 foetuses are killed) and provides very limited information. Such carnage needs better justification than is currently given for a dominant lethal assay on scientific grounds. Scientists and technicians alike do not – in my experience – relish dominant lethal assays and would rather not do them. Transpose these misgivings to a developing country and the rejection of this assay for widespread usage is a foregone conclusion.

Any mammalian cell mutation assay is going to be extremely difficult to conduct in a developing country, not only because of problems in justifying the expenditure on specialized equipment, but also because most of these countries are both hot and wet: delightful conditions for yeast and fungal growth, so establishing the opportunity for contamination of culture medium and leading to yet more expense as experiments are lost.

A different reason for detraction from the stated objective of the book is the prioritization process. Far be it from the likes of me to tell a developing country how its resources should be spent, but the local major problems requiring solution are likely to be identified already, at least in general terms. What remains is education, control and chemical analysis. It is known that burning any organic material generates mutagens, carcinogens, promoters, etc. It is known that fungal contamination of food is likely to leave that food tainted with toxins. It is known – or should be – what the toxic hazards are for chemicals first synthesized elsewhere and now being either imported or manufactured within the developing country.

A major problem in many countries is not establishing whether some esoteric chemical induces mutations in bacteria, but in reducing the concentrations of lead, mercury and cadmium in water from levels that in any industrialised nation would be totally unacceptable and considered highly dangerous. What is required is digestible information, as was pleaded for recently by Professor Darmansjah of Indonesia at the IV International Congress of Toxicology. In his country clothing dyestuffs may be used as food colours, mercury is used in spot removal cosmetics and is present at high levels in 'edible' fish, and there are around 500 hospital admissions each year for pesticide poisoning treatment. Such problems of control and the implementation of action based on currently available information extends to the pharmaceutical industry also (Richards, *BMJ* (1986), **292**, 1347–1348). The need is not for new information, at least not from short-term tests, but a knowledge of what to do with it. Having tempted these nations out of an equilibrium slowly changing over centuries and into the hurly-burly of a consumer society, we owe them the knowledge of how to deal with the hazards.

Some space is given to the selection, application and