Human and other chromosomes

Molecular Structure of Human Chromosomes: Chromosomes in Biology and Medicine. Edited by J. Y. Yunis. Pp. 336. (Academic: New York, San Francisco and London; 1977.) £17.40; $24.50.

THIS volume emphasises in respect of human chromosomes the recent advances in technology for the study of the eukaryote nucleus. A collection of nine chapters by different authors, eminent in different specialities of the subject, gives a comprehensive cover, even if with some overlapping.

The first three chapters, by Yunis *et al.*, Macaya *et al.* and Steffensen, respectively, deal with the study of human and other chromosomes at the molecular level. The fourth—by Creagan and Ruddle—is on human gene mapping using new methods, particularly by means of man/rodent somatic cell hybrids. This is by far the best chapter of the book for comprehensiveness, clarity, quality of tabulated information, and soundness of deductions. But what has it to do with the title of the book? A further three chapters, by Bahr, Rao and Dutrillaux, respectively, cover mainly the structure of chromosomes at levels between electron and light microscopy. Finally, chapters 8 and 9, by Pearson and Jones, respectively, deal with the comparative chromosomology of primates—the former on the basis of banding patterns and gene homologies, the latter on the basis of the kinds and distributions of repetitive DNAs.

Processing of heterogenous nuclear RNA, the bulk of which never gets out of the nucleus; chromosomal localisation of specific DNA sequences; human satellite DNAs; human gene localisation using RNA: DNA *in situ* annealing (I dislike the term "hybridisation") are all treated extensively and competently in the chapters on the molecular level of chromosome organisation. For readers who are not in this field, the treatment illuminates what has been done and how, and what could be done. It is still too soon to draw even a preliminary model on how chromosome structure relates to function.

Chapter 5, by Bahr on "Chromosomes and Chromatin structure", deals mainly with the 200-Å chromatin fibres, their folding and unfolding, and their relationship to chromomeres, to sister chromatid exchanges and to re-arrangements. The low magnification electron micrographs are fascinating. To the interpretations one could apply, for the time being, the Italian saying "se son rose fioriranno" ("if there are roses they will bloom").

Chapter 6, by Rao on premature chromosome condensation, (PCC), shows how an incidental observation made in the early stages of the study of somatic cell fusion led to interesting developments. PCC occurs in the chromosomes of an interphase cell when it fuses with a mitotic cell. It opens the way to the study, in interphase chromosomes, of the distribution of replicating segments and of some aspects of the induction of chromosome aberrations by radiation.

The introduction by Caspersson and his colleagues in 1970 of the banding techniques into human cytology has fostered a flood of major and minor variations: some add to the resolution of the human chromosomes, and others to the confusion. Chapter 7, by Dutrillaux on "New Chromosome Techniques" contributes more to the latter than to the former, in part at least on account of poor presentation. It does give, however, a good account on the quenching effect of BUdR incorporation on stainability, and its consequences on producing banding patterns, on making sister chromatid exchanges detectable, and so on.

The final two chapters are stimulating, clear, well written and informative. They discuss the light that banding patterns, distributions of homologous genes and distributions of repetitive DNAs throw on primate evolution.

This book is likely to be useful to outsiders or to people working on one approach to human chromosome structure and function, who wish to know something about other approaches. Abundantly obvious is its lack of unity in style, level and coverage, typical of the present plague of multi-author publications based on editorship without dictatorship.

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Liquid crystalline state

Liquid Crystals. By S. Chandrasekhar. Pp. 352. (Cambridge University: Cambridge, London and New York, 1977.) £18.

EVERYONE has now heard of liquid crystals and seen a liquid crystal display device. Few know very much about these materials, even physical scientists, although this situation is now changing quite rapidly. The liquid crystalline state of matter is very common—the fact that the number of known examples is not more than several thousand is probably only because more have not been sought or many have not been recognised. The past decade has seen a great upsurge of work in this area, particularly because of the increasing use of the materials in display devices but also because the time was ripe from a purely scientific point of view.

The use of the name liquid crystal is sometimes criticised and the word 'Mesophase' is often preferred. The hybrid name, however, is evocative of the mystery and attraction of the materials, but the mongrel offspring is more than simply a half of each parent. Indeed, both the liquid and the crystal aspects of behaviour are strong, but much of the interest and the usefulness of the materials resides in the essentially hybrid properties.

As is usual in a field of research at this stage of development, a variety of textbooks and monographs have recently appeared and there is necessarily some overlap among them. Professor Chandrasekhar's monograph is a valuable addition to this still small collection. It inevitably invites comparison on the one hand with the introductory textbook by Priestley, Wojtowicz and Sheng, and on the other hand with the elegant and unique monograph on the *Physics of Liquid Crystals* by de Gennes. They all have their place, in that the coverage, approach and level of treatment are significantly different.

Chandrasekhar's book is essentially an extended critical review, primarily of nematics and cholesterics. After a brief introduction (10 pages) there follows a chapter on 'Statistical Theories of Nematic Order' (84 pages) and 'Continuum Theory of the Nematic State' (89 pages). There is an extensive discussion of Cholesteric Liquid Crystals (88 pages) and the final chapter on Smectic Liquid Crystals' is the shortest (47 pages). This deals only with the smectic A and smectic C phases and does not reflect the extent of current interest and activity in the various smectic phases, but perhaps does reflect the current state of detailed understanding of them.

This is a physicist's book rather than a chemist's, and is certainly not one for beginners. One of the difficulties of working in this area is that many disciplines must be brought to bear on a problem and few scientists can be expert enough in all. In this respect Chandrasekhar's book will be a valuable addition to the libraries of those already actively working on liquid crystals as well as those contemplating the adventure.

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