elementary error of expecting a recessive homozygote always to be at a low frequency in a population and tend to die out (p. 91).

- (b) On p. 92 we find: "Stability in the direction of selection in a number of examples studied is enormous. Thus polymorphism for shell colouring has been preserved for 20,000 years in certain populations of the snail *Cepaea memoralis* in England. This was established by analysing layered Quaternary deposits containing the shells". How is it possible to have stability in the direction of selection and still retain genetic polymorphism? Perhaps he means stability in ambidirectional selection. He has also chosen the wrong character; shell banding survives in the sub-fossil material, but it is exceedingly difficult to determine the original colour of the shell.
- (c) Again on the Hardy-Weinberg law on pp. 103/104: "From a comparison of the data obtained with the theoretically expected, the predominance of the heterozygous phenotype 2 is obvious (table 5.3)". No it isn't! What is obvious is that there is a deficiency of heterozygotes among the observed data. Furthermore, when we know that the individuals in this class are heterozygotes surely it is better to call them genotypes and not phenotypes?

Elsewhere there are polemical statements, unguarded statements and inconsistent statements. For example:

- (a) P. 7. "The separate individual cannot be considered as a unit of evolution because it does not embody its own evolutionary fate". What about a self-fertile allotetraploid plant?
- (b) P. 7. "When it appears, every new species passes a stage when it is only a population (or group of populations) of the parent type, . . .". Neither of the parents of the first chicken was a chicken.
- (c) P. 8. "At the same time, a change in the genotypic composition of a population in itself cannot yet be called an evolutionary process". The change is evolution, what brings about the change in an evolutionary process.
- (d) P. 9. "The frequency of appearance of separate mutations is always relatively low, 10^{-4} to 10^{-6} per generation". Nonsense. Ignoring mutation from auxotrophy to prototrophy the sample mutation rates listed by Ayala, F.J. and Kiger, J. A. (Modern Genetics 2nd Edition, p. 675) range from 2×10^{-4} to 4×10^{-10} . Moreover, the word appearance is ambiguous.
- (e) P. 17. "Thus, a most important achievement was the study of features of protein polymorphism (Lewontin, Hubby 1966) that led to an explanation of the degrees of genetic variability in natural populations". We are still seeking the "explanation" and this remains one of the major outstanding problems of population genetics. Furthermore, the extent of protein polymorphism in humans was established by Harry Harris

and his colleagues independently and in parallel with the work by Hubby and Lewontin with *Drosophila*.

The writer of the blurb on the dustwrapper also has not helped. We read "American science has traditionally emphasized studying evolution at the molecular level"; a tradition all of 20 years standing! It goes on to state that the book " . . . reviews the basis for this (phenetic) approach and cites instances of collaboration between Soviet and American scientists using it. This largely ignores an enormous amount of observational and experimental field work of U.K. origin on the study of ecotypes. Further "The exciting new method discussed in Phenetics . . .". New? What were Clausen, J., Keck, D. D. and Hiesey, W. M. doing in their monumental work "*Experimental studies on the nature of species*" (1940-1958) if they were not studying the range of phenotypic variation revealed by several species of plants when examined in different habitats.

What we have in Yablokov's book is an attempt at combining some aspects of numerical taxonomy (without using numbers) with developmental biology (without reference to gene action or biochemistry). The result is a series of superficial anecdotes and a book of very little substance. I conclude that Yablokov believes he can solve complex problems in microevolution merely by redefining them in terms of phenes.

The book could be a good source of polemical statements suitable for essay topics in final honours examination papers.

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Genetic engineering 5. Peter W. J. Rigby (ed). Academic Press, London. 1986. Pp. xi + 158. Price £11.50, \$19.50 US PB.

The fourth volume of this well-received series represents the start of a new era, with the succession of Bob Williamson as editor by Peter Rigby, and a change of emphasis in the contents. In his introduction Peter Rigby states that the use of molecular biology has become widespread since the series was launched in 1981, with the availability of excellent laboratory manuals. Because of this the four volumes under his editorship will be devoted principally to the applications of genetic engineering to specific problems. Apart from this, the format is essentially unaltered, with a small number of detailed but well-organised and extremely readable articles. The present volume contains just three such articles: on "The regulation of gene expression of *E. coli* and its bacteriophage" (by C. F. Higgins), "Oncogenes" (Alan Hall) and "Genes of the immune system" (Michael Steinmetz).

My first impression on scanning the contents was of limited scope and appeal. This is certainly not the case. The three systems selected have been dissected in great

detail, and there is a lot to learn for those struggling with less well-characterised systems. For example, the oncogene studies deal essentially with the control of cell division and differentiation, and as such are clearly relevant to work on control of development of plants as well as animals. Similarly, the classic work on gene regulation on *E. coli* and its phage has formed the basis for models of eukaryotic gene regulation. Work in progress with plant and animal systems is now putting them to the test.

I can certainly recommend this book as informative and enjoyable reading for the novice as well as the devoted molecular biologist. Whether he will also wish to purchase a copy will probably depend on his precise range of interests.

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Haploids of higher plants *in vitro*. Hu Han and Yang Hongyuan. China Academic Publishers, Beijing; Springer-Verlag, Berlin. 1986. Pp. xi + 211. Price DM248.00. ISBN 3 540 16003 5.

Over the last decade Chinese scientists have been at the forefront of developments in plant tissue culture and its application in agriculture. This is particularly true for research on haploids. This book is, therefore, a timely compilation of advances made in haploid production techniques and utilisation in different laboratories in China, particularly those of the Institute of Genetics, Beijing, where many advances in this field have been made.

The book is divided into two parts—the first covering haploid production via anther and pollen culture and the second *in vitro* methods utilising the megaspore. Altogether there are 12 chapters covering methods of production in different species, and the utilisation of the products of these techniques, doubled haploids, in plant breeding, and in genetic and cytogenetic studies.

The first three chapters describe in great detail the influence of genotype, developmental stage, pretreatments, culture conditions and media on the induction of callus and the regeneration of plantlets. These chapters deal with rice (Chen Ying), wheat (Ouyang Junwen) and woody species (Chen Zhenghua) and provide clear, detailed protocols for the different species. These essentially summarise the conclusions of years of patient, hard work in getting the “cookery” right.

Chapters 4 and 5 describe the genetic variability observed in the products of anther culture in wheat (Hu Han) and in maize (Gu Mingguang). These authors review the types of chromosome aberrations observed and discuss possible causes. This is further explored at

the ultrastructural level in the next chapter by Huang Bin which describes in great detail the developmental events which occur during pollen development *in vivo* and *in vitro*. This first part of the book is concluded by three chapters describing how these techniques have been applied, and can be applied, to produce new varieties of rice, wheat and maize.

The second half of the book details with the culture of unfertilised ovaries, technologies which, as yet, are not as far advanced, particularly in terms of application, as anther culture. Although there are only three rather short chapters in this section, nevertheless, they give much interesting and useful information in an area of tissue culture which is proving a difficult nut to crack.

Overall, although essentially aimed at the specialist in this field the book contains much of interest to others. It is a nicely produced, and generally well written book with numerous good photographs and well stocked bibliographies. Since many of the original papers are relatively inaccessible to western workers because they were written in Chinese this book should prove a valuable source of information for researchers and plant breeders alike.

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Human chromosomes: Structure, behavior, effects (2nd Edition). Eeva Therman. Springer-Verlag, New York. 1986. Pp. xvi + 313. Price DM89.00. ISBN 3 540 96173 9.

This, the second edition of Eeva Therman's “*Human chromosomes*”, is a much expanded and rewritten version of the original book and brings the reader up to date with developments in this fast-moving field. The book is intended as an introduction to human chromosomes and will provide the reader with an excellent grounding in human cytogenetics and cytogenetics in general. It should appeal to a wide audience.

The 28 chapters each cover a clearly defined subject area and are further subdivided into smaller topics which aid clarity. The subject matter covers the history of cytogenetics, general cytogenetics, including chromosome structure and cell division, and more specific subjects areas such as double minutes and homogeneously stained regions, oncogenes, and the mapping of human chromosomes. At the end of each chapter there is an extensive reference list and a comprehensive index provides easy access to the material. The well planned layout of this book will make it particularly valuable both as a textbook for the student and as a reference book in the laboratory.

It is pleasing to find, in a book on human chromosomes, that reference is made throughout the text to research on plant and other animal species. My only disappointment is that the photograph of a normal