review the correlations between specific traits (life history characteristics) and allozyme diversity and explore their implications for conservation biology. Karron then relates patterns in genetic variation to the breeding systems of rare plants. Finally, Brown and Briggs, drawing on their Australian experience, address the thorny problem of how to sample wild populations (i.e. *in situ*) in order to 'capture' the appropriate genetic diversity required for *ex situ* conservation. The result is a set of simple guidelines for the selection of populations for sampling and selection.

The third section deals with the management and evaluation of *ex situ* conservation collections. Schaal and colleagues compare the methods available for assessing genetic variation, including: morphological examination, which is cheap and easy, but does not distinguish easily between genetic and phenotypic differences; allozyme electrophoresis, widely used by population biologists and offering deep insights into genetic variation, but which suffers from the fact that it is limited to genes encoding soluble enzymes; and DNA techniques which allow direct examination of the genome, but are sometimes, as yet, difficult to interpret and expensive to use. Eberhart and colleagues finally discuss methods for maintaining *ex situ* conservation collections of seeds, which usually contain a broader genetic spread than would be possible with collections of plants, including both conventional and low-temperature approaches. The importance of regular viability testing in such collections is stressed.

In the final section the theoretical knowledge and understanding summarized in the earlier papers is interpreted for the practice of conservation. This is a most valuable part of the book for those grappling on a day-to-day basis with the daunting task of attempting to stem the tide of destruction and extinction of plant species. Millar and Libby first deal with the issue of the conservation of widespread species, usually more diverse than rare endemics. Their five-point programme, combining *in situ* and *ex situ* strategies with reintroduction and habitat management, is a most useful contribution. Reisenberg then examines three case histories of rare plants in which hybridization plays a significant role in species biology. Studies of case histories are always rewarding, not least in this chapter.

Zoos, despite their recent bad press, have long played a significant role in animal conservation through captive breeding programmes. As a director of a botanic garden I am of course interested in such a role for botanic gardens. This issue is successfully addressed here by Templeton, who reviews the successes and failures of the approach to animal conservation and the lessons to be learned for plant conservation.

The last two papers are by the Editors. Holsinger and Gottlieb first seek to summarize and review the scientific evidence and theory from the rest of the book, placing it in the context of conservation practice. They then present a set of recommendations for biologically sound conservation programmes. The reader may not agree with all of their recommendations, but that they are set out in a lucid and logical way is a most valuable aid to clear thought on the matter. Finally, Don Falk, the Senior Editor, brings together those two factors that are all too often considered in isolation, namely biological and economic considerations. The models he offers provide much food for thought on what will become an ever-increasing component of conservation practice.

It is customary to hide at the end of a volume those bits that are of least interest to the reader. The present volume is the exception that proves this rule. The appendix, entitled 'Genetic Sampling Guide-lines for Conservation Collections of Endangered Plants', represents a major contribution to conservation practice and provides, for the first time, a set of sensible and logical rules to be followed by those who intend 'to capture a representative sample of the genetic diversity in a target species as they establish living collections of rare plants'. This section is already the most thumbed part of my copy of the book, as I suspect it will be for most people who obtain a copy.

And there is still more to come! In addition to a useful index, the bibliography of 850 entries represents, as the editors state, 'the most extensive compilation of research and writing on rare and endangered plants that has ever been published ... an invaluable resource for conservationists, ecologists, evolutionists and geneticists'. The appendix and bibliography alone are worth the £35 that this book costs. It is a must for all interested in plant conservation.

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*Human Cytogenetics: A Practical Approach, Volume 1: Constitutional Analysis* (second edition). Edited by D. E. ROONEY and B. H. CZEPULKOWSKI. IRL Press at Oxford University Press. 1992. 274 pages. Paper £22.50. ISBN 0 19 963287 1. Spiralbound £30. ISBN 0 19 963288 X.

The undoubted success of the first edition of this volume in the 'Practical Approach' series made it inevitable that a second edition would follow. That success reflects the wide experience of the editors in the practicalities of human cytogenetics, and their excellent choice of expert contributors, which has been maintained in the expanded and updated second edition.

The most obvious change is the removal of the chapter on 'Diagnosis of malignancy from chromosome preparations' and its development into a second

volume, which was reviewed in *Genetical Research*, vol. 61, p. 76 (1993).

The accompanying rearrangement of chapters in Volume 1 makes good sense, with a general introduction more logically placed, as does the inclusion of a separate chapter on 'Prenatal diagnosis and tissue culture'. The introduction of a chapter on the applications of cytogenetic investigations to clinical practice expands the scope of the volume as a whole, and the guidelines provided by John Wolstenholme and John Burn as to where to look (choice of tissues), how to look (choice of techniques) and what to look for in the major categories of referral should prove invaluable to newcomers and 'old hands' alike. It is unfortunate that the publication date precluded the inclusion of detailed information on the most recent developments in the molecular detection of fragile X – no doubt this will be covered in the third edition! The section on interpretation of findings in various types of prenatal diagnosis should be extremely useful.

The chapter on 'Microscopy, photography and computerized image analysis' by Alan Monk, John Swansbury and Denise Rooney makes the very valid point that training in the use of the cytogeneticist's most vital equipment is often sketchy, and Alan Monk provides an informative and practical guide to all aspects of microscopy in the first section, while John Swansbury and Denise Rooney share my belief that no matter how good computerized karyotyping may be 'traditional cytogeneticists are not yet redundant!' – especially when the quality of the initial chromosome preparations is poor!

The allocation of an entire chapter to chromosome analysis by non-isotopic *in situ* hybridization, in contrast to its five-page summary as a part chapter in the first edition, is a clear reflection of the changing world of human cytogenetics; the authors of this chapter provide a series of useful protocols for the various types of 'ish' and associated techniques, as well as outlining the underlying theory and some of the pitfalls which may be encountered. The good-quality photomicrographs included in this chapter are impressive.

In the same combined chapter in the first edition, flow cytometric analysis of human chromosome was given a brief airing. In the second edition this approach too warrants much more extensive coverage, ably provided by Brian Young.

The potential breadth of application of many of the new methodologies is brought into focus in the chapter by Hulten and colleagues on meiotic studies, in which protocols are provided for a range of molecular techniques applicable to human testicular preparations. Few routine diagnostic laboratories are in a position to undertake work of this type, but for anyone with time, appropriate facilities and access to suitable material this could be an interesting and challenging field in which to develop expertise.

The particular clarity of the print, with the use of highlighting rather than italics for most section headings, and an apparent improvement in the subsection numbering system make this much easier than the first edition to use as a reference text, while the spiral-bound format of the hard-covered volume makes for an ideal bench-top manual which should be included in any cytogenetics library.

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*Mechanisms of Eukaryotic DNA Recombination.* Edited by MAX E. GOTTESMAN and HENRY J. VOGEL. Academic Press. 1992. 215 pages. Price $55. ISBN 0 12 293445 8.

This book is a collection of articles derived from a symposium held at Columbia University in (I assume) 1989. It includes many interesting contributions on a wide range of topics but suffers from a lack of consistency of purpose. Some chapters are mini-reviews (e.g. the excellent chapter 10 by Stephen Mount on *Drosophila* transposable elements). Others (e.g. Chapter 1 by Roni Bollag and Michael Liskay on the ratio of sister-chromatic and intra-chromatic reciprocal recombination in mouse L cells) are research articles from the authors' laboratories. This random approach can sometimes be successful if the subject area is sufficiently tightly defined that a clear readership is identified. Unfortunately this is not the case here. What we have is a semi-random collection of topics defined by participation in the symposium. In addition we are not helped by the title, which suggests a focus on recombination *mechanisms* not present in the book.

To give an overview of the book's contents I shall briefly describe each chapter in turn. Chapter 1 is a description of experiments by Bolag and Liskay that argue for a preponderance of reciprocal sister–chromatid exchanges over intra-chromatid exchanges in mouse L cells. Chapter 2 describes experiments by Lin, Sperle and Sternberg, which reveal that double-strand breaks in both copies of extrachromosomal DNAs undergoing homologous recombination are necessary for high-frequency exchange. They argue therefore for a single-strand annealing model of recombination. Chapters 3 (by Zimmer, Wang, Wagner and Gruss) and 4 (by Rossant, Gossler, Moens, Skarnes and Joyner) deal with targeted homologous recombination in embryonic stem cells, but do not provide any insight into recombination mechanisms. The second of these articles seems particularly concerned with the position of the authors' research in June 1989, reflecting the competitive nature of this type of work. This is the sort of thing one might expect to hear in an oral seminar, but is it really of interest to the target readership of this