Book reviews

Ecology and Evolution of Darwin's Finches. Peter R. Grant. Princeton University Press, Princeton, NJ. 2000. Pp. 492. Price £14.50, paperback. ISBN 0 691 04866 5.

Being old enough to remember the era of vinyl record albums, in which record companies often repackaged the same songs in reissues which usually differed only in the album cover, I was transported back to those days by this book. Not because Peter Grant has suddenly become a country-and-western singer, but because Princeton University Press has copied the recording industry's tactics of the 1970s by reissuing his 1986 classic book on Darwin's finches, complete with new cover and the equivalent of 'liner' notes in a foreword by Jonathan Weiner.

The prominent billing of Weiner on the cover might lead the cynic to conclude that the Press reissued this book in part to try to cash in on the popular success of Weiner's *The Beak of the Finch* (Knopf, 1994), an account of Peter and Rosemary Grant's research written for a lay audience. This edition differs from the original only in having Weiner's three-page foreword (mostly taken from his book) and a new preface and 'afterword' by Grant. The afterword is written as a supplement to revise, correct, or elaborate on points in the original book, based on the Grants' and others' continuing research on the Darwin's finches. Being positioned in the back of the book, it requires a lot of flipping back and forth to find the original text and then match it with the relevant passages in the afterword. Only 24 pages in length, the afterword is too brief to fully discuss the many interesting issues it raises, although much of the updated information does not seem to appreciably alter the general conclusions in the original edition.

The new text does serve as a handy guide to the newer work on Darwin's finches that has appeared in the 13 years since the 1986 book was published. The first edition of *Ecology and Evolution of Darwin's Finches* was a classic study of evolutionary mechanisms at work in the Galapagos and how those mechanisms interacted with ecology to produce the fascinating diversity among this group of birds. This work continues to have a major impact on our understanding of microevolutionary processes. In Grant's added text in this edition, the following new empirical advances stand out. A molecular phylogeny of the Darwin's finches is now available, and it suggests that the group's mainland ancestor was a grassquit, possibly in the genus *Tiaris*. This work has also led to the splitting of the warbler finch clade (*Certhidea*) into two species, resulting in an increase from 14 to 15 of species of Darwin's finches. The group is much older than originally believed, with evolution within the group occurring over periods of time at least three times longer, and perhaps as much as seven times longer, than initially thought. The ancestral finches apparently fed on arthropods and berries, with seed-eating and associated heavier bills coming later. Additional field work has uncovered more examples of hybridization between species; in the

original book, Grant was unsure whether such hybrid offspring were at a disadvantage and thus whether hybridization was costly. Now it is known that hybrids survive and breed as successfully as non-hybrids, leading to the conclusion that there is no genetic incompatibility that weakens them. Grant suggests that speciation involves the origin of pre-mating barriers to gene exchange (song is important), with postmating (genetic) barriers arising only much later when interbreeding has ceased.

The classical view of evolution in the Darwin's finches (and endorsed by Grant in the first edition) is that of a Galapagos archipelago with numerous niches just lying there waiting for the arrival of the first colonists, which then blossomed into an extraordinary array of species. In the new text, Grant paints a much different picture. Palaeoclimatic data suggest that the Galapagos underwent repeated periods of temperature and wet-dry fluctuations, with resulting changes in the altitudinal distribution of vegetation. The first finches encountered a different and more restricted environment than the present one, and it gradually changed. Finch evolution occurred in response to climatically driven changes in addition to differences among islands in vegetation and food supply, and additional islands appeared. The discovery of substantial environmental change during the period of finch diversification is the single most important new result since the first edition of the book, in my opinion, and Grant highlights the need to better reconstruct palaeoenvironments as a key challenge in the future.

While a purist might wish for a completely revised edition of this book, having this 'annotated' reissue is the next best thing, as this will hopefully increase its odds of reaching a new generation of students of evolutionary biology. If you own the original, buying the reissue for the new 24 pages might not be cost-effective, but if you own neither and have any interest at all in evolution at any level, this book is essential reading.

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Techniques in Animal Cytogenetics. Paul Popescu, Hélène Hayes and Bernard Dutrillaux (eds). Springer Verlag, Heidelberg. 2000. Pp. 229. Price £44.50, hardback. ISBN 3 540 66737 7.

This book covers a wide range of techniques in cytogenetics from basic chromosome preparation from easily accessible tissues of man, other mammals, birds and *Drosophila*, through comprehensive banding techniques and *in situ* hybridization, preparation of meiotic chromosomes and amphibian lampbrush chromosomes to flow cytometry of mammalian chromosomes. Each chapter has some accompany-

ing background together with the key techniques used by the authors. These are simplified by having all the recipes for the media and solutions required in a separate appendix at the end. This improves readability and reduces the need for repetition.

However we found a number of problems. It is difficult to see who the book is aimed at. There is far too little discussion about the variables for a cytogenetic novice. For instance there is no emphasis on the importance of the initial fixation step for conventional chromosome preparation and the only discussion of the variability of colchicine/colcemid times and hypotonic treatment is given in the chapter on banding, rather than that on chromosome preparation. Even then the topic is buried in a section on GAG banding which starts out by describing it as an obsolete technique. Since important comments are often far removed from the step to which they refer the reader can never afford to dip only into the section they think they want. Further, because of the lack of adequate explanation for why most of the techniques work it cannot be used as a troubleshooting manual by the experienced cytogeneticist. With the notable exception of parts of the *Drosophila* and flow cytometry chapters, single methods are given for each technique which are not accompanied by references to alternatives or adaptations. Unfortunately, although the book has a 2000 publication date this is just for the English translation. The original French version was published in 1998 and was even then seriously out of date in some sections, particularly those relating to *in situ* hybridization. For instance there is insufficient detail of the range of probe types available and the necessary modification of techniques for these, inaccurate comments on the reliability and efficiency of digoxigenin and direct labelling, and no mention of simultaneous denaturation of target and probe or of the development of software packages for FISH. FISH on meiotic preparations is completely ignored.

We are very disappointed to give this book such a poor review but there are two other major problems. The translation from the French is variable with some sections being very difficult to read and some instructions almost impossible to understand (not helped by a general absence of diagrams), with occasional words and even one graph not translated at all. There are also large numbers of obvious typographical errors which leave one uncertain of the accuracy of anything unfamiliar. For instance the multiplication factor of 10^5 instead of 10^4 is given for a Malassez chamber, a term for a haemocytometer unknown to most English scientists.

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Techniques in Quantification and Localization of Gene Expression. Bruce K. Patterson (ed.). Birkhäuser Verlag, Basel. 2000. Pp. 150. Price DM 208.00, hardback. ISBN 0 8176 4034 7.

I must confess that I like protocol manuals. To me the sight of a well worn and battered copy of the voluminous molecular

cloning manual by Maniatis *et al.* sitting on a bench leaves me with a warm glow. *Techniques in Quantification and Localization of Gene Expression* certainly isn't voluminous; it comes in at less than 150 pages and this slim multi-author presentation has a much slicker look than your average techniques manual. Despite its lack of size it is still replete with plenty of methodology in the areas of *in situ* hybridization and immunolocalization. In some cases detail is somewhat lacking but each chapter is backed up with extensive reference lists.

Despite its rather broad sounding scope the book is actually very focused. As a developmental biologist my lab regularly uses *in situ* hybridization and antibodies as tools for visualizing patterns of gene expression. In truth there is not really much for me here, neither will there be much for those who use *in situ* hybridization as a tool in cytogenetic studies. However, if your interests lie in the application of these techniques to clinical diagnosis (especially if this requires the analysis of gene expression at the level of single cells) this is the book for you.

The book is divided into two main parts. The first section deals with general methodology including the use of flow cytometry as a tool for expression analysis. Other chapters include an introduction to the use of 'branched DNA technology' and there is what seemed to me a potentially very useful chapter on the immunostaining of cytokine-producing cells. An important theme of this section is the importance of processing specimens in such a way as to allow multiple analyses to be carried out (either *in situ* hybridization or immunostaining). The specific applications sections deals with various approaches to the analysis of clinical specimens for a number of different viruses, including Hepatitis C and HIV. Finally we are treated to Bruce Patterson's vision of the future where 'multiparameter *in situ* analysis' can be carried out on individual cells by either flow cytometry or scanning laser microscopy. This certainly isn't a book with something for everyone but if your field is diagnostics or immunology it is definitely worth checking out.

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PCR. M. J. McPherson and S. G. Møller. BIOS Scientific Publishers, Oxford. 2000. Pp. 288. Price £22.95, paperback. ISBN 1 85996 017 0.

The present volume builds upon the text *PCR* by Newton and Graham, issued previously by the same publisher. The book covers in detail the theory of PCR and many of its applications. Browsing through the table of contents and having a brief look at the 10 chapters of the book, it appears the authors have produced a fairly well organized text containing essentially everything a newcomer to the field might wish to find.