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Book Reviews

Evolution in the Galapagos islands. R. J. Berry (ed.). Academic Press, London (for the Linnean Society of London). 1985. Price £12.50, $17.50 (US).

Between the existing books on the history of evolutionary theory, which necessarily refer extensively to the Galapagos, and those on the general natural history of the islands, of which two have recently been published (Perry, 1984 and Jackson, 1985), there is a niche open for an account of recent research into evolutionary processes in the archipelago. This book, which is the proceedings of a symposium held in December 1982 by the Linnean Society and the Darwin Foundation, occupies that niche partially but is too diverse to fill it adequately. Its evolutionary theme is very broadly defined, with the consequence that there is considerable overlap with the historical and general books mentioned above and, inevitably, omission of subjects important in current evolutionary research. The topics covered include the ideas of Darwin and his contemporaries, basic geology, ecological adaptations of the fauna and the effects of introduced animals. Amongst those excluded or inadequately treated are the plants, the terrestrial mammals and the evolutionary consequences of volcanism. This somewhat arbitrary selection of papers prevents the book from forming a coherent whole. Nevertheless, some of the component parts are of sufficient individual merit that it can be recommended to biologists interested in the Galapagos Islands, particularly as in recent years there has been only one comparable book emphasising evolutionary research (Bowman *et al.*, 1983).

The core of the book is a block of three papers on genetical processes (J. L. Patten), evolution of landbirds (P. R. Grant) and evolution of seabirds (D. W. Snow and J. B. Nelson), all of which are thorough, thoughtful and highly pertinent. Around this core are several other worthy papers, such as those on the land iguanas (H. I. Snell, H. M. Snell and C. R. Tracy) and the marine molluscs (M. J. James). The latter, which includes an interesting, if densely written, comparison of marine and terrestrial evolution, is particularly welcome; marine organisms of Galapagos have been much neglected both in research and in conservation (there is *still* no marine national park).

All the above papers stay within a narrow definition of the evolutionary theme. Widening the field of view, a case can also be made for the inclusion of papers which demonstrate how the study of introduced animals can serve evolutionary science. However, the definition has to become much broader as it is stretched to include the largely ecological content of papers such as that of W. N. Bonner on seals, or the learned and fascinating studies by F. J. Sulloway on Darwin's (mis)interpretation of the islands' fauna and by A. J. Cain on 19th century ideas about island biology and taxonomy. I would not criticise these papers *per se*, but a consideration of the subjects omitted shows that there are disadvantages in having such a broad scope.

The flora of Galapagos is virtually ignored, there being a discussion of Hooker's phytogeographic studies in 1847 and nothing else. Yet the flora contains classic examples of adaptive radiation (*e.g.*, the genus *Scalesia*), striking adaptations to local conditions (*e.g.*, the giant Opuntia cactus) and many other features relevant to evolutionary science. The summary by T. Simkin of the geology of Galapagos is, by his own admission, just an abbreviated version of his chapter in the I.U.C.N. book (*i.e.*, Perry, 1984). What is lacking here is a discussion of the evolutionary consequences of the geological situation, for example the influence of volcanic activity on extinction rates or on the composition of the flora on very active volcanoes like Fernandina. The archipelago's climatic past, especially the apparently periodic El Niño phenomenon, gets scant consideration (admittedly, the symposium came right at the start of the latest El Niño). In my view the book would also have benefited from the addition of a comparison of Galapagos with other archipelagoes, in respect of their evolution and evolutionary research, and also an introduction outlining the book's structure and indicating the areas of research in which progress has been made and the areas with potential for future research, especially those for which Galapagos is uniquely suitable. That would not only have given the book greater coherence but also have helped it to achieve one of its stated aims, namely the stimulation of research in the Galapagos.

Perhaps it is unreasonable to look for a high degree of organisation in the proceedings of a symposium and I should emphasise again the quality of several of the individual contributions. Another good feature is the comprehensive index, including both common names and scientific names of species, although I noticed a few errors (*e.g.*, the listing of rice rats both as *Oryzomys* and as *Dryzomys*). The perennial problem of the multiplicity of names for each island is lessened by cross-referencing in the index. However Española Island (also known as Hood) has here acquired a third name, "España", apparently derived from an erroneous map on page 79.

Overall this is a valuable publication, despite the fact that the title is merely a description of a common theme, rather than a clear focus for the organisation of a balanced collection of papers.

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Genetic consequences of nucleotide pool imbalance. Frederick J. de Serres (ed.). Plenum Press, New York and London. 1985. Pp. x+523. Price $69.50 US.

Usually there are several good reasons for consigning a symposium-linked volume such as this one to the obscurity of a top shelf or worse. The reasons have to do with lax or non-existent editing, the time elapsed since the actual meeting, and the ephemeral data of many contributions.

However, it is difficult to level such criticisms at this particular volume which consists in the most part of a well-written series of chapters connected by a common theme and placed in wider perspective by contributions from Haynes, Mathews, Drake, Glickman and Holliday.

"Genetic Consequences of Nucleotide Pool Imbalance" arose out of a conference of the same name held in 1983. The theme proves to be an extremely unifying one, bringing together contributions from the fields of DNA precursor production, mechanisms of DNA synthesis and repair and the genetic consequences of pool imbalance in a variety of bacterial, fungal and mammalian cells. It is a general finding that disturbance to DNA precursor metabolism resulting in the presentation of an inappropriately balanced cocktail of deoxyribonucleotide triphosphates results in cell-killing and mutation. Much of the volume is preoccupied with showing that precursor imbalance can arise from the use of antimetabolites, excess nucleosides or base analogues—all situations that have long been known to generate genetic instability. It is a pity, therefore, that recent data on reinitiation of *S* phase with consequent gene amplification following precursor synthesis inhibition by hydroxyurea post-dated the meeting. Such information strongly reinforces the view advanced in this book that precursor synthesis is intimately connected with the actual replication mechanism.

Precursor synthesis and the complex role of the key enzyme ribonucleotide reductase are reviewed extensively, and I found these topics especially useful since they underpin many of the other contributions. There are excellent chapters by Reichard, Mathews, and Melamede and Wallace, and, despite the still controversial and speculative nature of DNA replicase complexes and facilitated precursor channelling, these ideas will stimulate the search for useful mutants with which to dissect mechanism. One personal disappointment was the lack of any information on the possibility that there are distinct precursor pools for DNA repair. Unifying repair and replication demands has not been attempted in this volume except to register that the pool serving repair can be depleted by inhibitors (Snyder) and that pyrimidine auxotrophs of *Ustilago* are UV sensitive and have difficulty in completing repair (Holliday).

DNA repair is, of course, likely to make far fewer demands on precursor production than replication and several excellent contributions on the thymineless state from bacteria to mammalian cells reinforce how important it is to maintain an adequate pyrimidine pool. Failure to do so results in DNA degradation, chromosome aberrations, cell-killing, and a wide range of genetic changes. The stressed situation is very complex, however, and the excellent chapter by Little on yeast corrects the impression that the thymineless state is entirely understood. Nevertheless the analysis of useful yeast and mammalian cell mutants promises to open up the field. My experience is with mammalian cells and I particularly appreciated the mutant analysis of Seno and of Meuth and their colleagues which reveals the enormous and complex genetic instability associated with mutations in the DNA precursor pathway.

More than anything else this work should help us to understand that mutation is the result of an extremely complex series of cellular perturbations and that it is not enough to consider simply DNA damage and repair capabilities. Now it is essential to realise that precursor pools can shift dramatically after exposure to genotoxic agents resulting in reduced replication fidelity and increased possibilities of mutation.

This is an enjoyable, thought-provoking and useful volume. Inevitably there is unevenness among the contributions but the general standard is good and most authors have removed blinkers and allowed themselves to relate their work to wider issues. There are several good perspective chapters, that of Haynes being especially helpful. Good meetings do not invariably generate good books. This one has and it should be made widely available to provide a glimpse into a complex and fascinating field.

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