

sequences of DNA provide far more information on which to base prokaryote phylogeny than does morphology. It is already clear that shape, and to some extent biochemical properties (*e.g.*, ability to metabolize particular carbon sources) are unreliable guides. To me, the interesting question is to what extent prokaryotes (for example, metazoa) have arisen by a process of branching evolution, and to what extent they are temporary alliances of genes, or groups of genes, capable of horizontal transmission. The near-identity of the linkage maps of *Escherichia* and *Salmonella* suggests that the alliances cannot be all that temporary. If, as seems likely, large-scale phylogenies based on different molecules give the same phylogenies, then branching has been the main pattern in prokaryotes as in eukaryotes, although some fascinating cases of horizontal transfer are now well established.

Several papers, including one by Hans Krebs, apply to the biochemical organisation of cells the kinds of functional arguments which are familiar in functional anatomy and behaviour. In effect, one asks why—given the constraints of physics and chemistry—the observed structure or behaviour is an efficient one. Despite occasional abuse, the method has proved invaluable; I am too ignorant of biochemistry to say how useful it is here.

Combining the functional and phylogenetic approaches, Cavalier-Smith contributes a long chapter on the origin of the eukaryotic cell. He is unsympathetic to the symbiotic theory of eukaryote origins, essentially because there is no such theory. There is a theory of the origin of mitochondria, chloroplasts and, perhaps, of flagellae but not of the more universal characteristics of nuclear envelope, exocytosis and secretion, microfilaments and cytoplasmic motility, and of mitosis and the cell cycle. His suggestions are inevitably speculative, but I found them most stimulating.

Perhaps of greatest interest to geneticists are the papers dealing with the origins of heritable variation. Cullum and Saedler contribute a short but particularly lucid account of transposable DNA elements. As an evolutionist, I was particularly fascinated by the accounts by Min Jon *et al.* (influenza viruses), and by Turner and Cordingley (trypanosomes) of how parasites generate antigenic variability so as to escape the immune system of their hosts. In influenza viruses, the process involves both point mutation and less frequent incidents of horizontal gene transfer. In trypanosomes, although the detailed mechanism is still unknown, new antigenic proteins are produced by means of a controlled process of gene switching.

In conclusion, this volume will help to keep fur-and-feather biologists in touch with what goes on.

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ISLAND POPULATIONS. Mark Williamson. Oxford University Press, Oxford, 1981. Pp. xi + 286. Price £19.00 (Hardback).

Studies of island flora and fauna have, from Darwin and Wallace on, played a major part in the development of ecological and evolutionary theory. Recent work in this field has become theoretically and observationally sophisticated, but the literature is scattered and diverse. Professor Williamson's book provides a stimulating, critical and up-to-date review of the

subject. The style and content are analytical rather than encyclopaedic, and the reader gets a rigorous and mathematically informed introduction to the major phenomena and their theoretical explanations. Unusually, and beneficially, such a treatment is presented by verbal reasoning wherever possible, and the rigour is tempered by a naturalist's appreciation of the practical difficulties inherent in fieldwork.

There are four parts to the book. The first gives a straightforward account of the geophysical and biogeographical background, and describes those features of island life which require analysis and explanation. Of these, the section on dispersal is perhaps too summary, and the complex pattern of dispersal of bird families across the Pacific islands (pp. 40-42) is not related in the text to any relevant features of their biology.

The second part deals with the numbers of species on islands, and the various theories to explain them. The MacArthur-Wilson theory is considered in detail, as are some objections to it, and the theories are examined in the light of observations on natural and experimentally induced changes in island biotas.

The third part deals with evolution on islands, and especially on archipelagos. Pride of place is given to a detailed account of speciation in Hawaiian *Drosophila* as revealed by analysis of chromosome inversions; the pattern shows striking contrasts with that shown by conventional genetic distance measures. Many other examples are also discussed, and this section is very compressed. The reader without prior knowledge would find the section on Darwin's finches hard to grasp. Compression may occasionally mislead: on pp. 131-133 the critique of Berry's work on island house-mice seems to depend on founder effect being important only when alleles are lost from the founder population, rather than merely suffering a drastic but random change in frequency. Again, on pp. 148-149, the neat distinction between niche shift and niche width is obscured by the example given of change in the latter in *Hypericum perforatum*, where a niche shift has clearly occurred as well.

The short and final fourth part considers the structure of island communities in terms of interactions within and between trophic levels. Evidence for competition, in particular, is found wanting in many respects. Compression again occasionally obscures clarity, and it is not immediately obvious how the final table (p. 249) illustrates a reduced plant diversity in the Azores compared with the British Isles.

The book deserves a wide circulation. The occasional obscurities are far outweighed by a general clarity and readability which makes this important and developing subject accessible to a wide range of readers.

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