

Part 2 covers many topics in depth. Four papers on controlling elements in maize show that we are on the verge of a breakthrough on this classical problem. The genetic symbolism here seems unnecessarily difficult, but is less baffling than that for flower colour instability in *Antirrhinum*, where the reader has to grapple with *pal-rec-low-act*; and one remains to be convinced that the two agents in this case deserve the name "controlling elements". Two papers on the enormous amount of repeated DNA sequences in cereals, giving recent data and models, complete the studies on higher plants.

Ten papers on *Drosophila* include repetitive statements about middle repetitive DNA, but present much new information on "nomadic gene families", some elements of which have been implicated in particular unstable gene mutations; but the number and variety of these nomads leaves one surprised that they do not have a more dramatic effect on the general mutation rate. Nine papers describe transposable elements (some apparently artificially created by UV treatment) and dispersed gene families in yeast, and provide a counterpoint to the *Drosophila* nomads. Of more interest are the papers on the mating type switch mechanism in yeast, where two "real" genes (coding for active proteins) maintained in silent locations, replace each other with high frequency in a third, active site by a process of gene conversion.

A section on "Retroviruses as Insertion Elements" presents recent work and includes a persuasive argument that these viruses actually evolved from transposons. The integrated virus DNA, however, has acquired an extra transposition mechanism, enabling its RNA transcript to be reverse-transcribed into DNA and inserted elsewhere in the genome. It is fortunate for the host cell that the reverse transcriptase does not treat other messenger RNAs in the same way! Finally, eight papers on "Rearrangements in Antibody Genes" contain so much new and illuminating information that one can only recommend them for a week-end's study. The reader will also find speculations inserted at intervals throughout the book, and we can look forward to following their survival times in the next year or so.

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MOLECULAR AND CELLULAR ASPECTS OF MICROBIAL EVOLUTION. SOCIETY FOR GENERAL MICROBIOLOGY SYMPOSIUM 32. M. J. Carlile, J. F. Collins and B. E. B. Moseley (Eds). Cambridge University Press. Pp. +368. Price £27.50.

The symposia of the Society of General Microbiology have a deserved reputation for making recent advances available to a wider readership. The latest volume, on evolution, will be of particular interest to geneticists. Two questions need answering. First, are the papers written so as to be comprehensible to non-specialists? In general, the answer is yes. I had little difficulty in following most of the chapters, although there is some unevenness; for example, Min Jon *et al.* in an otherwise fascinating article on influenza viruses, have failed to resist the temptation to reproduce lists of bases which no doubt mean more to the cell which translates them than they do to me.

Second, what topics are discussed? Several papers deal with questions of prokaryote phylogeny. Amino acid sequences of proteins and base

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