

## Temper out of time

J.S. Jones

**The Evolutionary Process: A Critical Review of Evolutionary Theory.** By Verne Grant. *Columbia University Press: 1985.* Pp. 499. \$40.

ONE of the pleasures of being an evolutionist is that one's colleagues are such a cantankerous lot. They have, of course, a great deal to be cantankerous about. Each one of Darwin's precepts — that there exists extensive genetic diversity which reflects variation in fitness, that most polymorphism is subject to natural selection and that the gradual accumulation of favoured variants leads to the origin of species — has been disputed since they were first stated, and molecular biology has given new heart to those whose chief pleasure is in attacking the Darwinian edifice.

This book treats evolutionary theory from the viewpoint of an author who has grown up with the subject. Grant comes from that generation of biologists, now almost extinct, which sees evolution in the context of a deep understanding of the world of living animals and plants rather than as experts in a newly invented (and somewhat nebulous) science of "evolutionary biology". He discusses many of the classics of the field; gene flow, population structure and patterns of speciation in *Drosophila*, industrial melanism, genetic load, adaptive radiation and human evolution. Many of his examples come from plants, with sequoias as exemplars of population structure, the origin of corn as an instance of the power of selection and the annual herb *Gilia* as an illustration of reproductive isolating mechanisms.

There is, too, space for the grinding of a few private axes. Kin selection has, apparently, only slight explanatory power and a great ability to cause confusion of thinking. The same is true of speciation in continuous populations. However, many of the book's themes are acceptable to the most conventional evolutionist: the vast majority of new mutations are deleterious, natural selection always has the last word in determining the fate of a newly arisen variant and macroevolution can be explained as the summation of many microevolutionary events.

For all the strengths of a treatment of this sort, the book suffers from its concentration on convention. Traditional explanations will, no doubt, explain many of the patterns of morphological evolution which we see in nature. However, most of the recent excitement in evolutionary theory has arisen from the discoveries of molecular biology. It is now clear that there is a staggering amount of genetic diversity in DNA structure and that, at

this level, some of the patterns of genetic differentiation among closely related species are very difficult to explain in terms of mutation and selection. Grant's subtitle is *A Critical Review of Evolutionary Theory*, but it is not easy to be critical in a review which omits many of the ugly facts which now threaten Darwin's beautiful theory. Molecular evolution does get a mention, but its wider implications are scarcely discussed. As a result the book conveys little of the genuine bad temper which is such an attractive feature of modern evolutionary biology.

This, then, is a gentleman's book, which deals largely with the controversies of yesterday. It may well be that these will be the controversies of tomorrow; but what is needed is a fuller discussion of their relevance to the discoveries of today. □

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## Views of the virus

P.J.G. Butler

**Virus Structure and Assembly.** Edited by Sherwood Casjens. *Jones and Bartlett: 1985.* Pp.295. \$45, £45.

VIRUSES are studied not only as interesting microorganisms in their own right, but also for what they can tell us about the host cells which they infect. Because many of them have small genomes, coding for few proteins (sometimes only three, including the coat protein for packaging new virions), they have to suborn many cellular functions for synthesis and even sometimes assembly of their components. Even in viruses with large genomes, such as bacteriophage T4 which codes for many enzymes, a fair proportion of the genes duplicate functions already available in the host cell and are inessential except in unusual hosts. Thus a virus-infected cell carries out many of its normal functions, but to a grossly exaggerated extent, and with a narrower range of products, which facilitates research into these processes.

There are many reviews of specific areas of virus structure and assembly aimed at specialist audiences, but no attempt has been made recently to cover the whole field in a single volume. A book such as the present one is therefore to be welcomed and it is all the more regrettable that it is in the area of all-round coverage that *Virus Structure and Assembly* is at its weakest; it is, perhaps, the difficulty of covering such a vast amount of information which has deterred others from attempting the task. The editor has gallantly contributed the two general chapters, "An Introduction to Virus Structure and Assembly" and "Nucleic Acid Packaging", himself. The second of these occupies a full quarter of the book, but despite its relative length I feel that it falls short of the mark. Inside Casjens's own areas of expertise the subject is well handled, but in dealing with less-familiar material he has resorted to a simple listing of published views with little attempt to assess their merits or significance.

The book contains several excellent chapters, which are both enjoyable and informative, but in the main these cover areas close to the editor's research interest (that is, bacteriophage). While I must declare an interest in the topic, it is inadequate to try to summarize tobacco mosaic virus, for which the most detailed information for any virus is available on both structure and assembly, in just four pages. In comparison, an entire chapter is devoted to the tailed bacteriophages, which also take large parts of two further chapters. While they demonstrate the power of genetic analysis, we have little understanding of their detailed interactions as there are no high-resolution structures known.

On the topics which are given adequate space this book does a good job, but it fails to meet the objective which the editor sets out in his preface; it would be wrong for anyone outside the field to be deceived by the title into thinking that it gives an overall picture of our knowledge of virus structure and assembly. It is, nonetheless, certainly worth reading. □

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*Ambiguous shapes: these two figures are each open to different interpretations according to whether they are mentally rotated 45° clockwise or 45° anticlockwise (one of them, for instance, can be seen as a man in a chef's hat or, alternatively, as a dog).*

*The illustrations are reproduced from the new paperback edition of Mental Images and Their Transformations, by R.N. Shepard and*

*L.A. Cooper, published by MIT Press price \$9.95, £9.95. For review and discussion of the issues raised by this line of research see Nature 301, 353 (1983).*

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