

Gibson's claim that the sensory input does not need to be supplemented by results of mental processes such as inference, which most psychologists assumed and still assume to be the case. Tree stumps afford sitting on, Gibson argued, and (more radically) "postboxes afford letter mailing" (p.139). At this point most psychologists either give up in despair or, like Foder and Pylyshyn, accuse Gibson of using the term so loosely as to make it meaningless.

How can one begin to evaluate such an extensive and controversial legacy? Reed, who is clearly very sympathetic to Gibson's ideas, explicitly refrains from an objective assessment on the grounds that the book "is a biography, not a critical essay" (p.7). That is a great pity, in my view, although quite consistent with Gibson's own characteristic style of simply ignoring "traditional research where it was not germane to his concerns" (p.281). To Reed's justification of this strategy — "Why crowd out the relevant for the sake of the irrelevant?" — the answer must surely be "Who is to judge what is relevant?". Elsewhere in the book, Reed defends Gibson's failure to mention Hubel and Wiesel's studies of the responses of visually driven cortical neurons on the grounds that they are "irrelevant" (p.138), but again he offers no justification for the claim. Finally, Reed also has the annoying tendency to treat Gibson as a figure as important in the development of scientific thought as Newton, Darwin and Einstein and to relegate all others to seeming irrelevance. For example, "Among all the great students of perception from the Greeks onward, Gibson was the *only* one who did not allow his commitment to scientific understanding to obscure the need to explain the meaningful aspects of perception" (p.183). Or "Nothing that was pertinent to a theory of perception was left out of Gibson's books" (p.138). Such claims only serve to alienate the sceptics.

Gibson's work deserves closer analysis as an alternative way of thinking about the nature and function of perception. The possibility of an ecological (computational) theory was the essence of his position and as such is clearly worthy of investigation. Computational theorizing offers the possibility of rigorously testing what are often dismissed as hand-waving ideas about the 'availability of information', while the largely sterile debate about the appropriateness of using the computer-based concept of 'representations' is best forgotten. Reed's book provides a detailed and scholarly account of the career of one of the most fascinating figures of twentieth-century psychology, and as such it deserves to be read. □

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Viral diversity

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RNA Genetics. Edited by Esteban Domingo, John J. Holland and Paul Ahlquist. CRC Press: 1988. Vol. I pp. 217, Vol. II pp. 249, Vol. III pp. 260. \$425. Distributed in Britain by Wolfe Medical £323.

MORE than 25 years ago, RNA was identified as an elusive messenger that transferred genetic information from DNA to protein. Since then it has emerged as a remarkably versatile molecule of complex structure and function, and is now widely regarded as the forerunner of DNA in the pre-biotic soup. The broad title of this three-volume series therefore leads one to expect a comprehensive treatment of this fascinating macromolecule. On closer inspection, however, it turns out to be an umbrella for a collection of 32 brief reviews which deal almost exclusively with RNA viruses. This could be regarded as perfectly fair, because only viruses use RNA as their genetic material. Nonetheless, a feeling of mild dissatisfaction is inevitable.

The broad theme at the heart of the series is a consideration of the genetic diversity of RNA viruses, how that diversity is generated, and what consequences it may have for virus evolution and disease. As underpinning, the first half of the contributions are devoted to describing the replication strategies for most of the recognized RNA virus groups. Viruses of bacteria, yeast, fungi and of course animals are represented, but there is particular emphasis on plants, with chapters on viroids and satellite viruses as well as more conventional infectious agents. The DNA-containing hepadnavirus and cauliflower mosaic virus groups are also covered along with the retroviruses, on the grounds that they replicate through an RNA intermediate, and these articles pave the way for Boeke's excellent review of the molecular biology of the closely related retrotransposons.

This is an impressive collection of chapters which ought to provide the teacher and advanced student, if not the expert, with a convenient and comprehensive source of information on basic mechanisms of replication; indeed the only serious omission I noted was of a section on the bunya and arenaviruses, whose unusual 'ambisense' genome arrangement should have ensured their inclusion. However, although most authors have opted, in the limited space available, for a broad overview of their subject (there is a particularly good contribution in this category from Coffin on retroviruses), others have produced much more specialized reviews. The opening chapter, for example, presents

a rather inaccessible mathematical treatment of the kinetics of Q β RNA replication, while another concentrates on the detailed characteristics of plant virus RNA-dependent RNA polymerases, which are of very limited interest.

The remaining chapters deal with genetic variability among the RNA viruses, an important subject in light of the notoriously mutable nature of RNA virus genomes. In most of the contributions the emphasis once again is on specific virus groups, and where genetic differences can be related to particular biological characteristics such as antigenicity or pathogenicity — as for the influenza and reoviruses — they are generally informative. More stimulating, however, are the chapters dealing with broader aspects of RNA virus heterogeneity. For example, there are good accounts of RNA recombination among the positive-strand viruses, and of the generation and possible biological significance of defective interfering viruses.

A consideration by Domingo and Holland of the error-prone nature of RNA virus replication provides a useful introduction to an exposition by Eigen and Biebrecher of the 'quasispecies' theory of genome structure and its consequences for evolution and darwinian selection of RNA genomes. Finally, the evolution of RNA viruses is considered further in an interesting chapter by Zimmern, who advances the notion of genetic 'modules' that may have been shuffled around between different RNA virus groups and may have given rise to unexpected genetic similarities.

The different approaches adopted by different authors impose a rather uneven quality on *RNA Genetics*, which will undoubtedly limit its appeal. There are chapters here to satisfy expert and student alike, and so these volumes would still represent a useful acquisition for the virologist's departmental library. But who's going to pay £300 for them? □

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New in paperback

- *Tilings and Patterns: An Introduction*, by Branko Grünbaum and G. C. Shephard, a corrected reprint of the first seven chapters of the authors' earlier book of 1987. Publisher is W. H. Freeman, price is \$26.95 (to be published in Britain in June, £18.95). The original volume (simply entitled *Tilings and Patterns*) was reviewed in *Nature* 326, 553 (1987).
- *Mindwaves: Thoughts on Intelligence, Identity and Consciousness* edited by Colin Blakemore and Susan Greenfield. Publisher is Basil Blackwell, price is £9.95, \$16.95. For review see *Nature* 330, 297 (1987).
- *Evolution: The History of an Idea*, by Peter J. Bowler, a revised edition that is also available in hardback. Publisher is University of California Press, price is p/bk \$15.95, h/bk \$48. For review see *Nature* 311, 587 (1984).