Extranuclear genetics

Extranuclear Genetics. By G. Beale and J. Knowles. Pp. 142. (Edward Arnold: London, 1978.) Paperback £5.95.

FEW areas of genetics have grown so rapidly and spread so pervasively as has extranuclear genetics in the short time since it achieved some measure of respectability. Whether one dates this from the discovery of DNA in extranuclear organelles or from the publication of the first textbooks to bring the wealth of the cytogenetical evidence for extranuclear hereditary systems to a wider audience makes no difference to the time-scale. It will, however, probably colour ones reaction to the balance of material and the historical perspective which Beale and Knowles present in their account of the subject.

The bulk of the material on extranuclear genetics *sensu stricta* is contained in three chapters devoted to mitochondria, chloroplasts and miscellanea, respectively. A further chapter on endosymbionts and viruses provides background information from extranuclear systems which may have evolutionary and certainly have phenomenalogical affinities with the hereditary systems located in mitochondria and plastids. A fifth chapter on plasmids resists the efforts of the authors to justify its presence. A brief introduction and conclusions complete the contents.

The authors deliberately chose to present a relatively brief resumé of recent work on *Chlamydamonas* because of the availability of up-to-date accounts. Their decision to give even briefer accounts of the extensive work on flowering plants, much of it published in German, is, however, more a reflection of the overall strategy of the presentation, with its main emphasis on the molecular and fine structure and a lesser supporting role fo rgenetic analysis. This emphasis shows up in many ways but probably the clearest is that of the total of 36 figures, 26 of which are electron micrographs; only one is a genetic analysis and that concerns an endosymbiont. There is a corresponding shortage or delayed description of the basic details of the life cycles of key organisms without which the genetical analyses are difficult to follow. For example, it is not until more than half-way through the chapter on mitochondria and after the sections on respiratory mutants and drug resistance that the timing of meiosis in yeast and the haploidy of the ascospores are first mentioned.

But it is not this imbalance but an overcautiousness in interpretation at times bordering on scepticism that concerns me most. The high point is where, with only two possible explanations, we are told that there are almost insuperable objections to both! Personally I find this depressing, others may well applaud it as scholarly. Indeed, *Extranuclear Genetics* presents a view of the subject that many and perhaps all recent converts and those coming into contact with it for the first time will find palatable and a more than adequate introduction. But I doubt whether many will find it stimulating.

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Energy concepts

The Concept of Energy. By E. J. Hoffman. Pp. 573. (Ann Arbor Science: Michigan, 1978.) £18.60.

LET it be admitted at once that this book does not exactly appeal to this reviewer. But it is clear that the author has specialised knowledge in the field. He has written on extractive distillation (1964) and on energy transformations (1970) and is known in the fuel industry. As a result, his treatment of the "mathematical origins of the concept of energy" seems to strive for a universality including philosophy and differential geometry, which the author cannot attain. The result is an uneven book with undue elaboration of the Joule–Thomson effect (28 pages) and enthalpies of mixtures (60 pages), and nothing is said about the economic assessment of alternative energy systems, the role of energy in biological systems or the reduction in status suffered by the energy concept at the hands of relativity theory. The references are mainly pre-1962 and there are doubts, which do not represent the scientific concensus, concerning relativity (p446) and the constancy of the Stefan–Boltzman constant (p432). Nevertheless, the considerable effort made by the author is not wasted as the book may prove to be rewarding reading for those with an interest in the specialised topics mentioned above.

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Phase transitions in solids

Phase Transitions in Solids: An Approach to the Study of the Chemistry and Physics of Solids. By C. N. R. Rao and K. J. Rao. Pp. 330. (McGraw Hill: Maidenhead, UK, and New York, 1978.) £18.15.

ALTHOUGH the subjects treated by Rao and Rao are fascinating, I found myself somewhat disappointed by the book itself. This survey of phase transitions in solids is impressively broad, covering topics such as crystal chemistry, nucleation and spinoidal decomposition, soft modes, and the modern theory of phase transitions. Perhaps as a result, the treatment of many topics is frustratingly incomplete and sketchy. The three paragraph discussion of the Peierls transition in one-dimension systems on pp 294–5, for example, is of little value to the uninitiated. Plots of the conductivity and resistance of KCP and TTF–TCNQ are shown, without a clear explanation of what is supposed to be going on. The authors refer rather mysteriously to a "giant Kohn anomaly", with no explanation of the physics. Platitudes and vague generalities apparantly taken from review articles are substituted for a critical evaluation of this field.

When the book discusses subjects in more detail, it often does so uncritically. For example, "Tizza's theory of lambda transitions" is described exhaustively, even though it is almost certainly wrong. As presented by Rao and Rao, it seems to be merely an *ad hoc* hypothesis leading to an infinite specific heat. Most lambda transitions, including the one in superfluid helium, have very singular but finite specific heats, a fact not known to Tizza when he proposed his "theory".

Notwithstanding its faults, this book is a useful source of references and information in the fields it attempts to survey. The numerous figures and illustrations of experimental data are stimulating, although not always clearly explained. I would not recommend this book for a course on the chemistry and physics of solids, as the authors suggest in the introduction. Were it not so prohibitively expensive, *Phase Transitions in Solids* might be worth acquiring as a reference for specialists.

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