

Magnetic models

Experiments on Simple Magnetic Model Systems: A Survey of their Experimental Status in the Light of Current Theories. (Taylor and Francis Monographs on Physics.) By L. J. de Jongh and A. R. Miedema. Pp. 269. (Taylor and Francis: London, August 1974.) £4.00.

FORTY years elapsed between the discovery of superconductivity and the advent of a theoretical model describing the effect. A much greater period had passed at around the turn of the century when Weiss introduced the first theoretical model to account for another cooperative phenomenon, ferromagnetism. Since that time, increasingly complex and subtle models have been developed to allow more accurate calculations of thermodynamic quantities near phase transitions. The simplest models, restricted to one or two-dimensional crystal lattices, enable exact calculations and may seem to provide merely a playground for the theoretician. But those models now have, in fact, a relevance to the real world. Advancing technology has facilitated the identification and preparation of single crystals containing chains or layers of paramagnetic ions, isolated by distances of the order of tens of Angstroms, which, therefore, have a magnetic quasidimensionality of one or two.

A large part of this book is devoted to a review of the measured properties of such compounds and, although it is not easy reading, it provides an invaluable, and what must be an almost exhaustive, reference catalogue of these materials—the index to substances contains approximately 200 entries. The fitting of theory to experiment by judicious choice of the exchange constant is impressive in many cases.

There remain, however, some areas in which the available experimental analogues do not yet approximate closely enough to the models to confirm some theoretical predictions. An example of this is the two dimensional Heisenberg model, in which long-range order must be absent at finite temperatures: the expansion approach of the high temperature series suggests that the susceptibility will diverge at a finite temperature. The problem is resolved by identifying this temperature not with the normal phase transition but as a transition (the Stanley–Kaplan transition) to a state of infinite initial susceptibility with zero spontaneous magnetisation. Real materials deviate from the ideal because of the presence of anisotropy from single ion or dipolar contributions. Competing anisotropies can, however, be made to cancel, al-

though usually at a single temperature only. The best approach, therefore, seems to be to use a series of compounds in which the varying degree of deviation can be determined, then to extrapolate to the ideal. The authors believe that the evidence so obtained suggests that Stanley–Kaplan temperatures may exist.

In a final section a number of special topics are considered, including neutron diffraction and spin-wave theory.

This book, a reprint of *Advances in Physics*, 23, contains an elegant and concise review of the properties of the theoretical models of magnetic systems, and a comprehensive body of experimental data relevant to those models. As such, it is a useful addition to the library of the research worker in solid state magnetism. **W. O'Reilly**

Insect behaviour

Experimental Analysis of Insect Behaviour. Edited by L. Barton Browne. Pp. viii+366. (Springer: Heidelberg, Berlin, New York, 1974.) \$15.40.

THIS volume originates from a symposium entitled "Experimental Analysis of Insect Behaviour" which formed part of the 14th International Congress of Entomology held in Canberra in 1972. The 25 contributions to the book include several not actually delivered at the symposium and some that are modified versions of the original papers. Most are written in the form of reviews, some of which are speculative,

emphasising particular areas of research, and some of which are of a more general nature.

Appropriately, because he addressed the closing plenary session of the Congress on "The emergence of behaviour", J. S. Kennedy's paper—"Changes of responsiveness in the patterning of behavioural sequences"—sets the tone of the volume by summarising his interpretation of flight and settling responses in *Aphis fabae*. The final paper, by Dingle, also deals with insect flight in the context of "The experimental analysis of migration and life history strategies in insects" and it is refreshing and encouraging to find many ecological concepts aired in such physiological company. Topics included in the intervening 23 papers include reproductive behaviour, feeding, several aspects of the insect nervous system and neural mechanisms, and hormone-mediated behaviour. Many of the papers are useful appraisals of recent work and concepts in the experimental analysis of insect behaviour, and it is convenient to have them so readily available.

Unfortunately, the editor has made little attempt to arrange the papers to present and develop an underlying theme, or to summarise the forward-looking approach that the symposium was, presumably, convened to stimulate. Indeed, the volume—reproduced from typescript—can only be considered as a 'book' in so far as it is bound between boards. **T. Lewis**



Burial tombs of Tasmanian aborigines. From *Biogeography and Ecology in Tasmania*. (Monographiae Biologicae, vol. 25.) By W. D. Williams. Pp. 498+122 figs. (Junk: The Hague, 1974.) Dfl 140.