Apart from the article by Harris, there is virtually no mention of geophysics. This is a pity, as much geophysical work relevant to the title of the book has been accomplished, especially in southern Africa. One might have expected references to the several seismological papers pertaining to the thickness and structure of the African crust. Also lacking is a review of the continental drift of Africa. Only Cox makes considerable mention of this, and many will question the reconstruction in his Fig. 6, which is in disagreement with the computer fit of the continents by Smith and Hallam and the earlier reconstructions of du Toit. It is also strange that there is only one reference to Gregory's monumental work and no reference to the many papers by G. J. H. McCall on the volcanism of East Africa. For all this, the book is clearly going to be a valuable reference work for many years to come, though be it an expensive one.

R. W. GIRDLER

Solid State Physics

A Quantum Approach to the Solid State. By Philip L. Taylor. Pp. xii + 322. (Prentice-Hall: Englewood Cliffs, NJ, October 1970.) \$13.95.

THE author's purpose is to mitigate the problems of graduate students in experimental physics "who only begin to understand the theory of their experiments after they have been performed—often too late to modify their apparatus in the light of what they learn". The author has been largely successful in this aim and also in providing a broad and quick (but necessarily shallow) survey for theoretical students before they become immersed in the mathematical detail of their own specialty.

The book begins with a short semiclassical introduction to the idea of an elementary excitation, and then proceeds through second quantization to a quantum mechanical discussion of various topics in the theory of solids. The chief mathematical tools used are second order perturbation theory and, when necessary, the equation of motion method with the random phase approximation or a similar approximation.

The strength of the book lies in its treatment of phonons, the electron-phonon interaction and superconductivity to which it provides an excellent introduction. The treatment of electrons is much weaker, the discussion of the dielectric constant being rather clumsy and the chapter on band theory scant. This is not a very serious drawback, however, because there are many excellent discussions of band theory available elsewhere. There is virtually nothing on magnetism. This is a more serious imbalance. The book, however, ends

well with an adequate chapter on transport theory and a very good introduction to the theory of Green functions for single particle systems, using simple models to illustrate the chief points. This is a good pedagogical approach. The author has had the courage, also, to tackle certain advanced problems such as the Kondo effect and the Josephson effect. He presents clear and readable accounts of these problems.

The book is rather too copiously illustrated with diagrams, many of which are trite. Fig. 1.6.1, for example, illustrates no more than the sphericity of the Fermi sphere. I would have no hesitation in recommending the book to any beginning graduate student if it were not for the price; it is probably too expensive for most British graduate students but my review copy shall see heavy use.

ROY JACOBS

Aspects of Thin Films

Thin Film Physics. By O. S. Heavens. Pp. vii + 152. (Methuen: London, November 1970.) 40s.

ONLY in the past few years have suitable techniques been developed to allow extensive exploration of the influence of the substrate on the growth and properties of vacuum deposited solid films. As more emerges of the vagaries of surfaces, there should be little surprise at the discordance of many past experimental results and theories relating to very thin films. Fortunately, many of the technologies exploiting thin films in such fields as microcircuitry and optics have been able to use films of sufficient thickness to be largely uninfluenced by the substrate surface microstructure. For the most part this monograph relates to such films, and in this area it serves its purpose fairly well despite a lack of references, including that to the only significant and recent text on this subject¹. In those parts dealing with the growth, structure and physical properties of very thin films where reliable experimental data are at a premium and theories are more esoteric than exoteric, there are frequent warnings of the speculative character of an interpretation, but again very limited references. There are curious lacunae, as though the author had deliberately omitted mention of some major works. For example, I found no mention of the nucleation studies by Pashley *et al.*; nothing to connect Simmons with current theories of tunnelling through dielectrics, nor mention of positive ion deposition and proton scattering. When I first read this text I was reminded of a bit of verse by Ogden Nash,

"I think it would suit me nicely,
If I knew one tenth of the little I know."

Indeed, how little of this did I know,

but what I do know is that it falls far short of meeting the implications of its title, and even of the much more limited brief adopted by Professor Heavens inside its covers.

D. W. STOPS

¹ *Thin Film Phenomena*, Chopra, K. L. (McGraw-Hill, 1969).

Theoretical Statistics

Nonparametric Techniques in Statistical Inference. Edited by Madan Lal Puri. Pp. xiv + 623. (Cambridge University: London, November 1970.) 204s; \$32.50.

THE proceedings of the first International Symposium on Nonparametric Techniques in Statistical Inference, held at Indiana University in June 1969, are contained in this substantial book. It consists of about 36 papers delivered there, together with brief, formal discussions of some of them. In effect, therefore, this is equivalent to a volume of a learned journal and, as such, almost impossible to review. Nearly all the papers are severely technical and only of interest to specialists in the field. Two exceptions are a paper by G. E. Noether (pp. 607–612) on the teaching of elementary statistics (which surprisingly has no discussion), and an expository paper by Ronald Pyke (pp. 21–37) on asymptotic results for rank statistics.

The appearance of this volume prompts me to reflect on the state of nonparametric statistics today. The subject deals with practical situations where the usual, normal theory models do not reasonably apply, and where some simple procedures based on ranks can give equally effective, if not better, answers. Indeed, there are some practitioners, notably in the field of psychology, who think that statistics is entirely nonparametric. In other words, real, data-handling situations provided the stimulus for this subject. It is natural, and even desirable, that from such beginnings mathematicians should become involved and produce theoretical results. These, in turn, could justify and extend the statistical techniques. But it is certainly not desirable for the subject to become as theoretical as these proceedings suggest. I do not see anywhere in the 600 pages reference to any data, to real situations in which the theory could be used, or even any indication that the authors were aware of practical problems. Most of the papers are concerned with limit theorems, unaccompanied by a study of the rapidity of approach to the limit. I do not criticize this work as such. I merely say that development along these lines is one sided and inefficient. The sponsors of the project, the Air Force Office of Scientific Research (USA), may have benefited from the work. They would have done far better to have invited some practitioners along, even if they could have asked only awkward questions.

D. V. LINDLEY