

In *Geothermal Energy*, the author touches on every side of the subject. He is clearly an enormous enthusiast and it is his enthusiasm that carries the reader through the book. Indeed in some ways it may be viewed as part handbook and part evangelical tract for the cause of geothermal energy!

The book contains 357 pages of which about 60 are devoted to the general nature of geothermal areas and their geological setting, about 30 to geothermal exploration and drilling, about 160 to the techniques of exploitation and heat extraction at the surface, and about 30 to possible and actual applications of geothermal energy. The remainder is taken up with the index and bibliography (together 25 pages), wide-ranging discussions of problems of pollution, future patterns of world energy usage, and a host of other topics.

There is at present no other single book available with the scope of the present volume, although much of the material is to be found dispersed in an intractable diversity of technical publications. For this reason, if for no other, the book is a valuable one and will be widely used. The author adopts a no-nonsense, down-to-earth, practical approach to the subject which in places is excellent, but

occasionally leads to inaccurate oversimplification. He is at his best when discussing the practical problems and techniques of geothermal field exploitation. Elsewhere he may be idiosyncratic (for example, on page 46, "meteoric waters . . . is merely a 'snob' term for rainwater" — apparently *connate* water is acceptable); imprecise (for example, on page 85, ". . . temperature rises less rapidly than depth increases."), or even misleading (on page 44, ". . . and because of gaping cracks penetrating deeply into the mantle . . ."). This reviewer also feels that there is little point in devoting several pages to fanciful calculations of the total heat content of the Earth, even if the author does at the end emphasise that they are irrelevant to any assessment of exploitable geothermal reserves.

This is a valuable contribution to the literature of the subject. It should be on the shelves of scientific libraries. Its strength and weakness is that it is written by a slightly breathless, uninhibited enthusiast who perhaps oversells his product. □

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How to put your laboratory in order

R.C. Holloway

Laboratory Organization and Management. By F. Grover and P. Wallace. Pp.241. (Butterworth: Sevenoaks, UK.) £5.95.

To many readers of this volume, the thought that they are 'managers' may well be anathema, yet, whether we like it or not, laboratories will no doubt become more organised, like most other institutions. The authors press the point that good management (but not bureaucracy) is a deciding factor between a successful and a poorly organised laboratory. In the present financial climate no doubt this is relevant.

Two chapters, on laboratory planning and service departments, encompass a wide range of subjects in a comparatively short space. There are many practical and useful hints but one is left with the distinct feeling that one has passed over rather too much, too quickly. Certainly, the style tends towards the turgid, with lists sometimes posing as sentences.

Most of the rest is devoted to the fine detail of management. Nearly 30 pages are concerned with the selection and management of staff, from the moment a vacancy

occurs until the time when the appointee leaves the establishment. Choosing the right applicant is undoubtedly a critical matter and mistakes are often made through inexperience, but this chapter reads rather like a miniature course for personnel officers. Store management and laboratory administration are followed by management technique and function. Here we are introduced to forecasting, planning, organising, motivating, controlling and communicating, in considerable detail. As would be anticipated from the authors, the chapter on safety is a model survey of safety organisation and the hazards involved.

Of errors and omissions there are very few. A reference to Dr Hughes' booklet (p.145) on *Design of Radioactive Laboratories* refers to "ionic" instead of "toxic" substances and there is a strange juxtaposition of litres per hour and gallons per day on p.27. A word of warning on present doubts about the safety of biological recirculatory cabinets (p.174) would not have been amiss.

A wealth of material based on the authors' combined experiences is here available for all who wish to embrace the doctrine that management will prevail in the laboratory. So it might, but whether it will lead to better (and happier) laboratories remains to be seen. □

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Biological NMR

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Biological Applications of Magnetic Resonance. Edited by R.G. Shulman. Pp.595. (Academic: New York and London, 1979.) \$29.

BIOLOGICAL NMR has now reached the stage at which a burgeoning literature provides considerable problems both for those already in the field and for those hoping to enter it. The time is clearly ripe for good review articles, and if these articles are to be of maximum use they must be thoroughly up to date, critically selective in the literature reviewed and accessible to the reasonably knowledgeable but non-specialist reader. All of these requirements are admirably met in the volume under review, but in addition the editor has imposed a pleasingly practical direction on his contributors; for example, the lone article on EPR studies concludes with some brief notes on experimental design for biological materials, and that on ³¹P NMR in living tissue contains useful graphs of the pH-dependence of the chemical shifts of inorganic phosphate as well as design details of the special apparatus used in the experiments. An article on proton nuclear Overhauser effects begins with a very clear and minimally mathematical description of the nuclear Overhauser phenomenon, while one on the use of model compounds in the interpretation of the NMR spectra of haemoproteins starts with a clear table of the oxidation and spin states of iron and a brief qualitative introduction to the theory of hyperfine shifts in paramagnetic systems. Such concern for the non-specialist reader greatly enhances the usefulness of the book.

In all, the volume contains eleven articles averaging some 45–50 pages each. In addition to those already mentioned, they include reviews on hydrogen-bonded proton exchange and its effect on nucleic acid NMR spectra, on nucleic acid structural studies, drug-nucleic acid complexes, anti-body binding sites, multinuclear NMR of the structure of alkaline phosphatase, and the NMR of catalytic groups of serine proteases and of living *Escherichia* cells. All the authors are of high reputation and long experience in biological NMR, and the standard of articles remains high throughout. The volume is reasonably priced by modern standards and is highly recommended to anyone with more than a passing interest in the subject. □

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