a shortage of new discoveries in North America, have caused speculation about the size of the petroleum reserves available for production in the world. At the same time proposals to extend coal mining into new areas have led to objections from some of those people already living there. New and larger nuclear power plants may involve hazards unacceptable to many people. Alternative, renewable, sources of energy may involve large-scale civil engineering work.

This book provides a concise illustrated survey of these matters, paying particular attention to North American experience. However, the author is more concerned to relate his subject to the organization and government of different societies. He also discusses the ethical relationship between producers and consumers of fossil fuels and mineral resources. There is an interesting account of how decisions are reached on the exploitation of new fuel reserves, but this chapter is illustrated only by U.S. examples. Consideration of planning processes in western Europe might have led to very different conclusions.

This book is well illustrated and can be recommended as good bedside reading to geologists generally and especially to those working in industry.

H. C. POTTER

Brown (J. Coggin) and Dey (A. K.). *The Mineral and Nuclear Fuels of the Indian Sub-continent and Burma: a guide to the study of the coal, oil, natural gas, uranium, and thorium resources of the area.* London and New Delhi (Oxford Univ. Press), 1975. xx+517 pp., 63 figs., 6 pls., 25 geol. sketch-maps. Price £26·00.

The principal attribute of this book is that it gives a useful survey of the geographical distribution and geological occurrences of energy resources in the region. But the book suffers in two important respects. First, the delay in publication has rendered the statistics on reserves and production of energy resources of little consequence: second, the title of the book does not accurately reflect its contents. Without much reference to the region, the book attempts to act as an introductory textbook on topics ranging from the origin of coals through to their processing and gasification: from the chemical composition of petroleum and the origin of hydrocarbons through to the role of the geologist in petroleum exploration. Regrettably, the book carries out this instructional role poorly.

In the chapter on radioactive minerals (40 pp.) some details are given of prospecting methods and of types of occurrence of uranium and thorium in India.

It is a pity that due to circumstances, many of which lay outside of the author's control, the book cannot be recommended except as a general survey of energy resources of the subcontinent and Burma in which specific statistics must be treated with caution.

D. G. MURCHISON

Smith (D. G. W.), editor. *Short Course in Microbeam Techniques.* Edmonton (Mineralogical Association of Canada), 1976. v+186 pp., 74 figs. Price $ (Can.) 7.50.

This small book consists of six chapters written by authors who are all well known for their work in electron-probe microanalysis. The title is somewhat misleading as the book is essentially about electron microprobe analysis although there are very brief sections on S.E.M. (scanning electron microscopy) and the ion-probe analyser. There is, however, no mention of

other microbeam techniques such as S.T.E.M. (scanning transmission electron microscopy) or the laser microprobe.

The first three chapters deal with the techniques of microanalysis; the last three are all concerned with applications. J. C. Rucklidge describes modern microprobe instrumentation and includes short sections on automation and energy-dispersive analysis. The chapter by G. Springer explains the commonly used ZAF matrix corrections and, more briefly, the Bence and Albee alpha coefficient method, the limitations of which are pointed out. This chapter also includes two recent modifications that have been applied in the absorption correction. Chapter three by D. G. W. Smith contains a detailed description of the way that an energy dispersive system is selected and how it may be set up in order to produce quantitative analysis. All the important instrumental parameters are discussed in detail. G. Plant starts with a concise account of the disadvantages of mineral analysis based on separated fractions and describes the particular advantages of the electron microprobe. This is followed by reviews of selected papers under the headings of cathodoluminescence, mineral identification, mineral analysis, new minerals, rare earth elements in minerals, zoning in minerals, and chemical-bonding studies. There is also a brief description of some S.E.M. applications and a somewhat longer section on applications of the ion microprobe. D. B. Clarke reviews petrological applications using both qualitative and quantitative methods as examples. He deals with identification, zoning, reaction phenomena, geothermometry and geobarometry, and phase-equilibria studies among other topics. The final chapter by D. C. Harris is concerned with the economic applications of the electron probe. A short description of the types of investigation where the probe may be useful is followed by a more detailed treatment of four examples.

Placing the references at the end of each chapter has resulted in considerable duplication, which could have been avoided by putting them at the end of the book. There are seven short appendices the most useful of which deal with the selection of standards for mineralogical microanalysis. It is disappointing that there is no discussion of the sensitivity and accuracy of the analytical techniques.

A book of this size cannot give comprehensive coverage to such a large subject. However, it can be recommended as an introduction to the techniques and applications of electron-probe microanalysis and it is excellent value at its price. Some sections, in particular the chapter on energy-dispersive analysis, are more detailed and will appeal to the more experienced micro-analyst.

P. SUDDABY

Eberhart (J.-P.). *Méthodes Physiques d'Étude des Minéraux et des Matériaux Solides.* Paris (Doin Éditeurs), 1976. xiv+508 pp., 203 figs. Price F 580.00.

There are now available to the mineralogist and petrologist several texts (in English) dealing with the application of physical, chemical, and physicochemical methods to the investigation of minerals. The work under review restricts itself to purely physical methods and moreover to those involving X-ray, electron, or neutron beams.

Fundamental principles concerning electromagnetic radiation and particles, solid materials, and the interaction between them, occupy the first part (114 pages) of the book. This includes treatment of the phenomena of scattering, emission, and absorption. The second part (51 pages) describes the production and measurement of X-rays, electrons, and neutrons, and the third and major part (310 pages) describes the various methods. There are chapters on: X-ray diffraction including the Laue, rotating crystal, and powder methods; structure determination by X-ray and neutron diffraction; electron microscopy; electron diffraction; X-ray