The two parts of the book are respectively mainly physical and mainly chemical. In Part I several papers deal with experimental deformation studies and one of them constitutes an intriguingly fresh look at the subject of microcracks in natural rocks. A number of contributions deal with elastic and others with electrical and electromagnetic properties.

The papers of Part II are concerned with the crystal chemistry of minerals with special attention to the way this is affected by high temperatures and pressures. Techniques for obtaining crystal structural information at high P, T are described and the results of such experiments are discussed. One paper, of which the editor is a co-author, describes progress with the new technique of modelling crystal structures by which variations with pressure, temperature, and composition are predicted on the basis of prescribed interatomic distances (Distance Least Squares). A group of papers deals specifically with special features of iron- and other transition-metal-bearing minerals, particularly at high pressure.

While the above topics cover a wide variety of concepts and methods, coherence is provided in that each takes a further step towards a better understanding of the static and dynamic properties of rocks under crustal, upper mantle, and even lower mantle, conditions. The symposium and book reflects the increasing interaction between geologists, geophysicists, physicists, and chemists, and should therefore appeal to a wide range of scientists concerned with the Earth and Planets. Text and figures (with a few exceptions) are well-produced, and a useful subject index is provided. J. ZUSSMAN

Wyllie (P. J.). *The way the Earth works: An introduction to the new Global Geology and its revolutionary development.* New York and London (John Wiley & Sons), 1976. viii+296 pp., 134 figs. Price: cloth £7·95 ($15.90), paper £4·00 ($8.00).

As his title implies the author sets out to provide a new type of introductory textbook to geology, based on the plate tectonics concept. Specifically the text is intended to accompany a first-year university course in geology for students who may or may not propose to continue the subject beyond this level. It is the author's contention that the time has now arrived when newcomers to geology should start with plate tectonics, on the principle that all Earth Science is based on this unifying concept.

After an introductory chapter the author begins with the history of the development of the plate tectonics hypothesis. Subsequent chapters discuss the Earth's surface features, earthquakes and their relationship to plate tectonics, the geological cycle, earthquake waves and the interior of the Earth, the Earth's magnetic field and its history as preserved in rocks, polarity reversals and magnetic anomalies, sea-floor spreading, continental drift, and palaeomagnetism.

In an interesting chapter the author recounts the circumstances which led to the general acceptance of the plate tectonics hypothesis in 1966–7. He includes the salutary tale for Earth Science editors and reviewers of the rejection of L. W. Morley's paper relating magnetic anomaly patterns to polarity reversals as 'unfounded speculation', some time before the publication of the Vine–Matthews article. Throughout this section the author is at pains to give a fair summary of the basis of objections to the plate tectonics hypothesis by its major opponents.

Other major discoveries of recent years are treated in an anecdotal fashion, including the evidence for desiccation of the Mediterranean during the Miocene, and the identification of Minoan Crete as 'lost Atlantis', destroyed by the eruption of the island of Santorini. The serious theme of the book is further lightened by the humour the plate tectonics hypothesis seems to have inspired among Earth Scientists, including the plate tectonics version of the Nicene Creed. Also the unlikely tale of the migrations of the sooty hoodwink (*Oceanites*

erraticus), which once flew a longitudinal course from the Antarctic Peninsula to Spitzbergen across the site of the future Atlantic but developed an increasingly zig-zag course as the Atlantic opened beneath it.

In spite of these humorous touches the author's style is serious rather than popular and his presentation is commendably clear and straightforward. The text, set in double columns, is liberally broken up by specially prepared illustrations. These diagrams, particularly those illustrating geophysical concepts, are carefully explained in captions and in the text. A final chapter provides the now obligatory review of environmental geology and progress in earthquake prediction. The volume is rounded off by a useful list of popular plate tectonics references and an adequate index.

There are a few shortcomings in an otherwise successful exercise in the preparation of a new style of textbook: summaries appended to each chapter when the chapters are sufficiently short to be re-read if necessary; overconscientious cross-referencing to simple diagrams across several chapters; overaddiction to John Holden's fussily humorous sketches; and slapdash proof-reading on page 15. Also the book will prove to be too highly priced on this side of the Atlantic, in its present form, for the audience at which it is aimed, but it may be strongly recommended to school and college libraries. A. J. BARBER

Ringwood (A. E.). *Composition and Petrology of the Earth's Mantle*. London, New York, and Sydney (McGraw-Hill), 1975. xviii+618 pp., 153 figs. Price £19·45.

This important new textbook by Professor A. E. Ringwood of the Australian National University is in two parts, the first on the upper mantle and crust, and the second on the transitional and lower mantle.

The first part of the book is largely petrological in character, and starts with a review of the present state of knowledge of the lower crust. The author then considers the various sources of geophysical and petrological evidence on the composition of the upper mantle, including seismic wave velocities, Alpine-type peridotites, and ultramafic xenoliths. Chapter 5 is an account of Ringwood's pyrolite model of the upper mantle, which is rather taken for granted in the preceding chapter on the origin of basalt magmas. This is followed by a summary of the author's views on the constitution of the upper mantle, and by discussions of orogenic magmatism and the petrological evolution of the crust and upper mantle.

The second part of the book deals with the composition of the lower mantle and its dynamics and origin. The only direct evidence on the constitution of this region is geophysical, and present knowledge of the physical properties of the lower mantle is summarized rather briefly. Studies bearing on possible phase transformations in the region between 400 and 1000 km depth are discussed at length, including details of experimental techniques. Ringwood modestly refrains from referring by name to ringwoodite, the cubic polymorph of olivine, which was discovered in meteorites by Binns, Davis, and Reed, and which is very likely the main constituent of the mantle between 400 and 650 km. He uses the experimental data to construct a model of mantle compositions down to 1000 km. Below this level there is much more uncertainty, but variations in the mantle below this depth are tentatively attributed to further phase transformations rather than to a change in chemical composition.

The book concludes with a look at some broader aspects of Earth structure. In chapter 15 the dynamics of the mantle are discussed in relation to its phase transformations, with obvious implications for plate tectonics, and the final chapter of the book discusses the origin of the Earth in relation to the solar system as a whole. Great progress has been made on this important subject in the last 20 years.