

Their book is further written in a language which is easy to read. All the figures are easy to understand and many of them are original. In summary, the text by Mallory and Cargo can be used well in a course with many non-majors. Leet, Judson and Kauffman's book is written for science majors and geology majors. It is well written, rather complete in its coverage and gives extremely instructive examples and case histories. The photographs of outcrops and landscapes are impressive. Graphs are easy to understand and well done. Compton integrates principles with the discussion of specific areas and examples of scientific studies. He begins with surface processes and situations which

have not only geological but also environmental significance. This is clearly the most original of the three textbooks discussed here. A course based on this book might motivate students of geology who might be turned off by other textbooks. The colour photographs of outcrops, rocks and minerals would be especially helpful in a course without a laboratory part. Nevertheless, the data presented are detailed enough for the highest level introductory course.

In each of these three books I found some graphs and explanations similar to the ones I use in teaching. Selecting one of the three as a textbook would be a difficult choice. The decision would partly be based

on the kind of students who would predominate in the class. The other consideration would be how much one would be willing to adapt the course to the textbook. Compton's book would be best suited if course and textbook would coincide in the sequence of their treatment of topics. Leet, Judson and Kauffman's book could most easily be used in a course with a totally different sequence of lectures. Mallory and Cargo's book stands between the two others in this respect. □

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## Igneous petrology

S. A. Morse

*The Interpretation of Igneous Rocks.* By K. G. Cox, J. D. Bell and R. J. Pankhurst. Pp.450. (George Allen and Unwin: London, 1979.) Hardback £18; paperback £8.95.

AFTER half a century of near-starvation, students of igneous petrology are being presented with a succession of books that pay serious attention to phase diagrams. This book furnishes a square meal, devoting to phase diagrams more than thirty per cent of the text. And, joy of joys, at last we have a decent treatment of trace elements and isotopes, which occupy fifteen per cent of the text. The remaining half, liberally sprinkled with boldface where definitions occur, is taken up with such matters as intelligent classification, variation diagrams, fractionation, a respectable amount of petrography, experimental and controversial studies of natural rocks, volcanology, and plutonology (complete with flow equations). Appendices include directions for norm calculations and for plotting rock analyses in O'Hara diagrams. Exercises after each of the fifteen chapters are furnished with answers at the end of the book.

These blessings are not unmixed. Much space devoted to hypothetical phase diagrams could more usefully have been allotted to additional real ones with equivalent lessons as to their use. The quaternary projections may be overdone. The geometry of fractional melting is given short shrift, and its quantitative possibilities are mistakenly denied. Many readers will groan to find an unhappy treatment of variance which yields univariant points and divariant lines in 1-atm phase diagrams. Contrary to the

implications in the text, the isobaric restriction does rigorously reduce the variance by one, and this pitfall of nomenclature could have been avoided by use of an appropriate notation, such as  $F_p$ , to denote the restriction. Most of the classical phase diagrams are taken directly from the ancient literature without revision: we find albite melting variously at 1,120°C and 1,100°C rather than 1,118°C as determined by Greig and Barth in 1938. Kushiro's revision of Di-An-Ab is ignored except for being mysteriously ascribed to An-Ab. The incongruent melting of fayalite is not mentioned, nor is there any discussion of the role of oxygen in igneous fractionation. Carnegieite is said to "exsolve" on a reaction loop.

But one should not look a gift horse in the mouth. The text focuses on methodology and is offered to petrologists

of all ages. As an unintentional test of its utility, the review copy was thoroughly consulted, marked up and leaned upon during a recent seven-hour research conference, and it gave good service. The treatment of trace elements in the mantle and in magmas, and of radiogenic and stable isotopes, is a masterpiece of concise, clear erudition. Mantle isochrons and hydrothermal Taylor engines are not neglected. The text is plainly written throughout and easily accessible to students. In sum, this book is a most refreshingly welcome and, indeed, indispensable addition to the still pitifully small genre. □

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## Chestnuts of the '40s

Brian J. Skinner

*Exploration and Mining Geology.* By William C. Peters. Pp.696. (Wiley: New York, 1978.) \$26.50. *Economic Mineral Deposits.* Third edition. By Mead L. Jensen and Alan M. Bateman. Pp.593. (Wiley: New York, 1979.) \$28.75.

THE generation of mining and exploration geologists trained during the 1950s had the delightful experience of reading H.E. McKinstry's eloquent volume *Mining Geology* (Prentice-Hall: Englewood Cliffs, New Jersey, 1948). There were no successors to inspire students of the '60s and '70s, but it is probable that William Peters' new book *Exploration and Mining Geology* will fill the role for the generation of the '80s. The need for a successor to

McKinstry's volume has become acute; the profession has grown enormously as mineral production has increased; mining methods have become more complex; many new techniques of geochemistry and geophysics have been added to the modern prospector's arsenal; the sophistication of geological information has grown dramatically and the economic conditions of today are far removed from those of the 1940s when McKinstry wrote his book.

Peters does not share McKinstry's mastery of English and his wry wit but he has prepared an admirable volume that the advanced student will find both pleasant and informative to read and that will also serve as a reference for the practising geologist. Throughout, he emphasises the observational and practical while at the same time urging the reader to keep an open mind. With good reason; new ways of looking at old ideas have found a lot of ore. The heart of the book, and the place where Peters' extensive experience shines through, is a nine-chapter section discussing what mining and exploration