

# Meteorites

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## Geochemistry

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by W. S. Fyfe

*Oxford University Press, 107 p., 1974.*  
\$6.75

Reviewed by Denis M. Shaw  
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This concise book, written by one of the world's foremost geochemists, will be of most use to other professionals, particularly chemists, wishing to learn something of the scope, achievements and limitations of academic geochemistry (applied aspects are excluded).

Chapters 1 and 2 define the scope of geochemistry and present a succinct and elementary statement of what is known about the physical nature and the solid earth. Modern geochemistry is interpreted as the "integration of chemical and geological approaches to . . . the earth and solar system".

The next two chapters summarise salient aspects of minerals and rocks, including elements of structural mineralogy and petrology. One might quibble that a list of common rock-forming minerals should include (p. 10) carbonates and chlorite, and that to say that the moon has the same minerals as the earth (p. 23) ignores the important absence of water.

Chapter 5 continues the discussion of the nature of the solid earth and also provides a cosmochemical synopsis related to earth evolution. Notable omissions are nebular accretion theory and lunar evolution, the former being of particular interest to chemists.

Chapter 6 is the longest, with 29 pages, and includes examples of probably all the main applications of physical chemistry to mineral formation. The treatment is necessarily qualitative but Fyfe indicates clearly how the quantitative constraints apply and, perhaps more importantly, what practical factors often prevent their application (e.g., inadequate thermochemical data). The aragonite-calcite equilibrium diagram is unfortunately impaired by incomplete labelling of curves (p. 47).

Chapter 7 discusses the nature of ore-forming fluids and the chemistry leading to formation of metallic deposits. Chapter 8 is a good discussion of atmospheric and hydrospheric evolution, with a little on life. Chapter 9 is a brief statement of evolution of the earth: it apparently begins on p. 98 but there is no heading.

At the technical level, Professor Fyfe has not been well-served by his publisher. Spelling mistakes were noted on p. 36, 47 and typographical ambiguities or errors on p. 39, 40, 45, 48, 68, 91. Two of the illustrations (p. 26, 31) are unsatisfactory, the first by a misleading caption and the second by obscurity of detail: Figure 4.3 is repeated on p. 98 for no apparent reason. Has Clarendon Press no copy-editors?

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by John T. Wasson

*Springer-Verlag, New York, 316 p.*  
1974.

\$31.10.

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Research on meteorites, which had accelerated greatly during the decade prior to 1969, fell temporarily into a decline in the following five years, as the attentions of meteoriticists were diverted to the study of returned lunar materials. Now that the first flush of enthusiasm for the spoils of the Apollo missions has abated, attention is returning to the more varied and no less interesting bits of extraterrestrial matter which fall, unbidden, to the earth's surface. This little book should provide a strong stimulus to former meteoriticists to return to the fold, as well as serving as an excellent introduction for petrologists, geochemists and others who wish to acquaint themselves with the essentials of the field.

The author describes his work as "an introduction to meteorite science and a handbook on meteorite classification". As he admits, the book is quite brief and many interesting details are left out or dealt with quite succinctly. For example, detailed descriptions of the petrology, mineralogy or metallurgy of meteorites are given short shrift, while theoretical models of meteorite genesis are also dealt with rather curtly, albeit quite penetratingly. Its short summaries of research into stable, radiogenic and cosmogenic isotopic variations, trace elements, and shock features should be excellent guides to the uninitiated through these complex fields. To some extent Wasson makes up for his brevity through the lengthy list of references (filling 35 pages). Indeed, many of the chapters read like annotated bibliographies.

Perhaps as significant a contribution of this text as its review of past research is its up-to-date summary of meteorite classifications, including some novel features proposed here for

the first time. Wasson's classification system synthesizes schemes derived from studies of chondrites, irons, carbonaceous chondrites and achondrites, and may perhaps help us better to understand the complex interrelations between the various meteorite classes. The last 150 pages of the text consist of lists of classified meteorites, allowing one quickly to identify the class of most recognized meteorites.

The most disappointing chapter is that devoted to mineralogy, hardly more than an incomplete listing of minerals found in meteorites, while the chapter on petrology of chondrites and other silicate-rich meteorites fares only slightly better. Considering the enormous advances in these fields since Mason's 1962 text, it is unfortunate that we have here only a compact outline of such a rich area of investigation. However, Wasson again presents abundant, annotated references that should permit the interested reader to pursue these topics in greater depth. Overall, this book is an essential text to anyone involved in meteoritics, and a superb reference text for the interested outsider.

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## **Geology and Paleontology of Southeast Asia (Volume 13)**

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Edited by T. Kobayashi and  
R. Toriyama  
*University of Tokyo Press, 183 p., 1974.*  
\$36.00  
(Distributed by International Scholarly  
Book Services, Inc., Oregon).

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This volume is part of a major pioneering work on a much neglected region. The work is of great importance and interest to paleontologists in general and to geologists working in the area.

The major geological reconnaissance survey of Thailand, Vietnam, Singapore, Malaysia (Malaya), Philippines, parts of Indonesia (Borneo), and Taiwan was begun in 1962 as part of the Columbo Plan for Southeast Asia. The work has been carried out jointly by the respective national geological surveys and Japanese geologists who were sponsored by the Overseas Technical Cooperation Agency, Tokyo. The continuing series of publications to date includes 13 volumes with 135 separate contributions (total of 3047 pages, 395 plates), all in well-edited English and almost exclusively written by Japanese authors. Most of the articles (118) deal with paleontology and are found under the subheading "Contributions to the Geology and Paleontology of Southeast Asia", while 17 papers deal with structural geology, sedimentology, stratigraphy, petrology and isotope geology.

The first two volumes (1964, 1966) are, in fact, only compilations or a series of "instant reprints" of articles published no more than a year earlier in several other Japanese journals, some well-known as the Japanese Journal of Geology and Geography, others rarely available in our libraries, e.g., Memoir of the Majiro Gokuen Woman's Junior College. T. Kobayashi alone is responsible for the first volume, with R. Toriyama joining him from the second volume onward. The

papers are well introduced and illustrated, with particular attention given to the photogravure plates which are of good to excellent quality. Thus, reprinting the articles has certainly proven valuable to the non-Japanese reader because of their immediate availability.

Beginning with volume 3 (1966), all articles are original. The reproduction of the photographic plates is done by the more economic halftone screen technique; they are satisfactory in volume 3 and good to excellent in all later volumes. My only substantial criticism of the otherwise well edited series is the general lack of abstracts or brief summaries and the absence in several titles of higher-level chronostratigraphic and taxonomic names, posing difficulties to the reader not familiar with the local geology or particular taxon.

According to taxon, period and country, the number of paleontological articles (v. 1-13) mainly dealing with these subjects is as follows:

Algae: 3 Paleoz.-Mesoz. of Thailand; 1 Paleoz. and 3 Cenoz. of Philippines.

Higher Plants: 4 Paleoz., 4 Mesoz. and 3 Cenoz. of Thailand; 4 Paleoz. and 3 Mesoz. of Malaya.

Larger Foraminifera: 7 Paleoz. of Thailand; 1 Paleoz. and 3 Cenoz. of Philippines.

Other Foraminifera: Cenoz.: 1 Borneo and 1 Philippines.

Porifera: 1 Mesoz. of Malaya.

Coelenterata: 1 Paleoz. of Malaya.

Bryozoa: Paleoz.: 3 Malaya, 10 Thailand

Mollusca: Mesoz.: 6 Thailand, 4 Malaya; 3 Vietnam, 1 Philippines, 1 Singapore, 1 Borneo; Cenoz.: 2 Philippines, 2 Taiwan; Recent: 2 Thailand.

Brachiopoda: Paleoz.: 7 Thailand, 4 Malaya.

Arthropoda: Paleoz.: 6 Malaya, 1 Thailand; Mesoz.: 1 Borneo; Cenoz.: 1 Thailand.

Graptoloidea: 1 Thailand.

Conodonts: Paleoz.: 1 Thailand, 4 Malaya; Mesoz.: 2 Malaya.

Pisces: Cenoz.: 1 Thailand.