

Book Reviews / Critiques

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Book Reviews / Critique

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Book Reviews

The Continental Crust and Its Mineral Deposits: A Volume In Honour of J. Tuzo Wilson

Edited by D.W. Strangway
*The Geological Association of Canada,
Special Paper 20*
804 p., 1980
GAC Members \$24.00,
non-Members \$30.00

Reviewed by A. Sutherland Brown
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This volume is the product of a symposium to honour J. Tuzo Wilson held at the University of Toronto in May 1979. The symposium and the volume have done this not only by the tribute of a significant volume but also by the subject matter much of which owes something to his work. D.W. Strangway, the organizer of the conference and the editor of the volume, is to be congratulated for both and especially for the speedy publication.

The volume contains a brief preface and 40 articles arranged in six parts as follows: (1) The Early Earth, 5 papers - 71 pages; (2) Evolution of the Precambrian Crust, 5 papers - 115 pages; (3) Vertical Geometry of the Crust, 5 papers - 104 pages; (4) Crustal Motions, 12 papers - 244 pages; (5) The Global View, 4 papers - 131 pages; (6) Ore Deposits, 9 papers - 179 pages.

By its title and content this volume must be compared to two predecessors. The three volumes nicely bracket the flowering of our contemporary understanding of the mechanics of the crust and upper mantle. The first volume published in 1955 was the "*Crust of the Earth*"; GSA Special Paper 62, a symposium edited by Arie Poldervaart. The second published in 1969 was "*The Earth's Crust and Upper Mantle*", a product of the Upper Mantle Project published by AGU and edited by P.J. Hart. The first volume, naturally enough, con-

centrated on the known data of the physics and chemistry of the crust and its evolution. Hypotheses or unifying concepts were minor but certain very important articles such as Hugo Benioff's were included that presaged the coming revolution in earth science. The second volume was an early product of that revolution but the impact was not overwhelming. The articles were still discipline and data-oriented and only a glimmering of plate tectonics was present. Curiously Tuzo Wilson was not an author in either volume although he clearly was highly involved in the Upper Mantle Project. The present volume reflects not only the full impact of plate tectonics but also the results of NASA space probes. It is principally concerned with interpretation.

The authorship of the Tuzo Wilson volume is distinguished and to a considerable degree is international. Nevertheless the volume is distinctly Canadian. This is reflected partly by a preoccupation with the Precambrian, cratons and early earth history, but more particularly by integration of the study of ore deposits and their origins in such a work. The latter were not mentioned in the earlier works. In this volume their inclusion not only in the final section but elsewhere enhances the whole and emphasizes aspects revealing of crustal evolution.

As might be expected in such a volume there is a tendency for the articles to be reviews or revised statements of earlier work but a significant number are stiffened with novel material.

Part 1, *The Early Earth*, emphasizes our ignorance of early earth history even with the knowledge gained by space probes. It also emphasizes the immense amount of donkey work to be performed before sound conceptual thinking can be done. Some agreement is apparent between Kaula, Russel and Jacobs on the early origin of the core. Shaw, in contrast to earlier models of Vening Meinesz and Hess contends the original crust was world-wide, thin and submarine.

Part 2, *Evolution of the Precambrian Crust*, also emphasizes the lack of agreement on fundamental principals, presumably because the known data do not discriminate. There are major uncertainties in regard to nature and extent of earliest crust, continental growth and

amount of recycling. Moorbath sharply differs from Fyfe, West and Shaw on these items and espouses late start to sialic crustal formation and continuous but slowing crustal growth. Likewise the two papers dealing on origins of granitoid rocks of the Archean crust take essentially opposite views.

Part 3, *Vertical Geometry of the Crust*, deals substantially with different current techniques and results of investigating the crust at depth. These are not substantially in conflict, in fact tend to support one another. Data accumulation and interpretation dominate structural interpretation.

Part 4, *Crustal Motions*, is the largest section. It celebrates the Wilson cycle in all its aspects and shows how very complex it can be: no simple cases here. Aspects considered range from paleontological through climatological, and earth's volcanic history to metallogenesis. In fact metallogenesis and/or petroleum genesis are stated or implied in most articles. Two Proterozoic cases are considered - one of which is left as only one possible interpretation and both would seem to have generated at most narrow oceans. The maximum width of the Iapetus ocean is considered. The collage of terrains from the Western Cordillera and their motions and origins are considered in two articles. Most of the articles exude confidence in their interpretations. What will the next decade bring?

Part 5, *The Global View*, carries on to do just that, but continues the themes of complexity and variation in plate motions, thermal history, metamorphism at plate convergent margins, and metallogenesis in four articles by Dewey, McKenzie and Weiss, Miyashiro, and Rona. Two of these articles emphasize periodicity while the other two emphasize secular change related to thermal decay.

Part 6, *Ore Deposits*, deals with many aspects of ore deposits related to the continental crust but with an emphasis on massive sulphide deposits. Other articles treat uranium deposits through time; origin of nickel-copper sulphide deposits; ore deposits associated with granitoid rocks on the margins of the Iapetus ocean; ore lead isotopes, their sources and depositional environment; and

paleomagnetism in relationship to metallogenesis and petroleum genesis. Curiously, porphyry deposits receive scant attention. Several articles explicitly or implicitly relate deposition to the Wilson cycle at convergent or divergent boundaries. Others relate them to deep fractures of either old sutures or transverse to plate boundaries. Several articles describe an evolutionary development in deposit type related to secular change in thermal history or atmosphere while several note a marked periodicity. In fact one could say that recurrent themes throughout the volume are the Wilson cycle with a periodicity superimposed on secular change. Many articles note major changes recognizable as the major boundaries of earth history.

The organization of the volume is logical, the sequence satisfying, and few gaps or anomalous inclusions occur. The papers average less than 20 pages of which over three are abstract, resume, and references. Most papers are well illustrated by line drawings with some 5 to 10 per article. These are clear and meaningful but orientation of transverse diagrams is inconsistent. The half tones are not good and are only important in one article. There is no index, a common failing of symposium volumes. Some of the hyphenation is curious, "intrap-late" being the worst noticed. Typos are very rare but one article has some confusion and omission in the alphabetical reference list. In rare instances line spacing is inconsistent. All in all the format is of the usual pleasing style of GAC Special Papers, on good paper with a good, handsome binding.

The price of this volume is an incentive to buy it. It is hard to contemplate who, among geoscientists, could not benefit by owning and studying it. Even with the considerable emphasis on mineral deposits it is doubtful if the volume was aimed at economic geologists. Nevertheless the explorationist will find an array of ideas beneficial in the search for metals.

MS received April 21, 1981.

Physics of Magmatic Processes

Edited by R. B. Hargraves
Princeton University Press,
 585 p., 1980
 Cloth \$40.00 U.S., paper \$15.00 U.S.

Reviewed by Christopher M. Scarfe
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This book represents the proceedings of a conference held at Princeton University in 1977 to commemorate the fiftieth anniversary of a series of lectures Norman Bowen gave at Princeton in 1927. Those lectures formed the basis for Bowen's classic work, *The Evolution of the Igneous rocks*, published in 1928.

The present volume attempts to bring us up to date with that neglected, but important, aspect of petrology, the study of silicate melts and the physics of magma generation, transport and crystallization. Many of the ideas explored in this volume can be traced back to Bowen, and they record a testament to the profound influence that this extraordinary man has had on petrological thought for more than half a century.

There are 11 chapters in the book. The first chapter covers polymerization models for silicate melts (Hess) and three of the other chapters deal with melt properties such as viscosity and density (Kushiro), diffusion (Hofmann) and thermochemistry (Weill, Hon and Navrotsky). Two chapters are devoted to the theory (Dowty) and experimental aspects (Lofgren) of crystallization from melts, and two other chapters deal with magma genesis from the point of view of trace element constraints (Hart and Allègre) and from heat flow studies (Oxburgh). Two other chapters address the problems of magma transport (Shaw and Spera) and the remaining chapter discusses several physical and chemical processes thought to be important in the development of basic layered intrusions (Irvine). Many of these chapters include substantial review material; however, some provide insights not previously reported in the literature. All stimulate the reader to reconsider this rapidly expanding area of petrology.

There is no comparable book on the market at the present time. With a price of \$15.00 this book is an inexpensive reference text which will find its way onto the bookshelves of most petrologists at the graduate student and research levels.

It provides a worthy companion volume to *The Evolution of the Igneous Rocks-Fiftieth Anniversary Perspectives* edited by H. S. Yoder, Jr., Princeton University Press, 1979.

MS received June 16, 1981.

Basalts and Phase Diagrams

By S. A. Morse
Springer-Verlag, 493 p., 1980
 \$29.80

Reviewed by P. L. Roeder
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Our present understanding of magmatic processes is due in large part to systematic phase equilibrium studies conducted from 1910 to 1960. In the last twenty years there has been much less emphasis on the use of phase diagrams to model natural processes and I hope this book will help to rekindle interest in this important field. The author of this book demonstrates not only a clear understanding of the principles of phase equilibria as applied to systems of magmatic interest, but he has a knack for ferreting out general principles.

The first four chapters are a general introduction to the chemical description of basalts, the calculation of a CIPW norm, and the use of the phase rule as a way of understanding chemical systems. Chapters 5, 6 and 7 are used to introduce the so-called binary systems diopside-anorthite, anorthite-albite and diopside-albite. The systems are carefully chosen not only to demonstrate crystallization and melting processes for igneous rocks but to show how systems can deviate from ideal behaviour. Chapters 8 through 12 introduce the reader to the tremendous contribution phase equilibria have made to our understanding of igneous rocks. The author deals with equilibrium and fractional crystallization and also equilibrium and fractional melting. He stresses the use of phase diagrams as a vehicle to understand better the principles of magmatic processes. In most books on this subject the emphasis is placed on the path the liquid takes under various conditions of crystallization, but Morse places much more emphasis on "rock paths" and he often relates these rock paths to the kind of sequences found in layered intrusions. The author has been very liberal with his use of dia-

grams and there is often two or three diagrams of the same system, each diagram used to emphasize a different point. The serious student of petrology has little need for additional help because there are many excellent examples of paths of melting and crystallization.

Chapter 13 on layered intrusions gives the reader a chance to rest a little after a concentrated dose of phase equilibria and consider some natural examples. There are some sections where I feel the author has become too involved in complex phase equilibrium problems and the petrologic thread which runs through the text is sometimes lost. Chapters 14 and 15 involve a comprehensive tour through the nepheline-kalsilite-silica system, including a series of isothermal sections, paths of crystallization and solidus fractionation lines showing melting behaviour. Most authors shy away from dealing with the very complex parts of ternary and quaternary systems, but not Morse. I can imagine the author rubbing his hands in glee when given a chance to tackle a complex problem, such as crystallization of leucite solid solution in Petrogeny's Residua System. Chapters 16 and 17 deal with iron-containing systems and Chapter 18 describes the effects of high pressure on melting behaviour. In recent years I have become very confused by the experimental work conducted at high pressure on natural rocks, and I was happy to see the author step back and look at the effect of pressure on simple, but petrologically important systems.

This book is a necessity for any serious student of igneous petrology, although I have some qualms about its use as an upper level undergraduate text. The author writes very well in a unique personal style and the text is remarkably free of mistakes considering the complexity of the material which is covered. This is one of the few modern texts in which the author clearly demonstrates both an understanding of phase equilibria and an appreciation of both the usefulness and the beauty of phase equilibria as applied to petrological problems.

MS received May 21, 1981.

Origin of the Earth and Moon

By A. E. Ringwood
Springer-Verlag, 295 p., 1979
\$24.80

Reviewed by Rex Gibbons
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This book is a review, from the Ringwood "point of view", of the origin of the solar system, with particular emphasis on the Earth and its Moon. The book is divided into three parts, each containing four chapters. The text has a total length of about 250 pages. There are also 30 pages of references to cited literature and a 9-page, fairly comprehensive index.

There are numerous figures and tables throughout the book; for example, Chapter 11 contains 13 figures and 4 tables. However, there are no lists of tables and figures. Since there is a lot of cross-referencing from chapter to chapter, this would have been facilitated by such lists with page references. This becomes very obvious when you read Part I and try to find figures and tables in Part II.

Part I, called Composition and Constitution of the Earth, consists of three chapters reviewing the status of our knowledge of the structure and composition of the Earth and a short chapter summarizing the boundary conditions for the origin of the Earth.

Part II ("Origin of the Earth") could be more appropriately called the Evolution of a Solar System. Its first two chapters (5 and 6) review the hypotheses concerning the origin, structure and development of the universe, with particular discussions pertinent to the Earth, its Moon, and the rest of our solar system. Its other two chapters (7 and 8) review the different hypotheses concerning the accretion of the Earth and conclude that, subject to the confirmation of certain conclusions, the homogeneous accretion model "will become most attractive and consistent with a wide range of geochemical and geophysical data."

Part III ("The Moon and Planets") consists of one short chapter (26 pages) on the terrestrial planets (Mars, Venus, and Mercury), asteroids and meteorites, and three chapters (92 pages) on the constitution, composition and origin of the Moon. Here, the author clearly espouses the point of view that the Moon was derived from the Earth's mantle subsequent to core formation. In Chapters 10

and 11, he details the relevant evidence that he has been able to marshal, especially that concerning siderophile and volatile element geochemistry. In Chapter 12, this evidence is considered relative to three main classes of hypotheses for the origin of the Moon. In conclusion, the author states that: "There is, as yet, no general consensus concerning the origin of the Moon". However, in his opinion, "the geochemical evidence uniquely requires that it was derived, in some way, from the Earth's mantle subsequent to core formation."

In review, it is obvious that this is a Ringwood book. The author makes his point of view clear and proceeds to marshal all the supporting evidence available. To this end, I consider that he has done a very thorough job.

However, I believe the book could have been organized better. Much of Part II should have probably come before Part I. Maybe Chapters 5, 6, and 9 could have been put into a Part I. The present Part I plus Chapters 7 and 8 could form a Part II on the Earth. Chapters 10, 11, and 12 could form a Part III on the Moon. Presently, it is too much like a collection of chapters rather than a book.

Another criticism concerns the editing. Obviously, the editor used a very light pen. The text contains numerous errors in spelling, punctuation, and grammar and many examples of turgid prose and inconsistent usage, all of which distract the reader. The most consistent inconsistency is in usage and abbreviations for measurement units, especially on figures and tables. From chapter to chapter, the author goes from "bars" to "atmospheres", °C to °K, etc. Commonly, a figure caption uses one spelling and the figure another, for example, kbar and kb. One gets the impression that many of the figures were collected from other publications and not redrafted for this book. It is unfortunate that everything was not standardized to S.I. metric and the figures redrafted accordingly.

I do not have any major criticisms of the author's review of the "science" but, again, I'll be a bit picky about some minor inconsistencies. For example, in Part I, with reference to subdivisions of the Earth, page 3 has the Moho at 30 to 50 km beneath most continents and 10 to 12 km beneath most oceans whereas pages 6 and 7 give the same depths as 35 to 45 km and 7 km, respectively. There are also inconsistencies throughout, in both text and figures, concerning the depths of other subdivisions and respective seismic velocities. I could make other similar criticisms about detail. However, since this book is an overview, and since the author himself considers it a refer-

ence work for graduate students and professionals and not a text for undergraduates, these criticisms can be overlooked and blamed on insufficient care and editing in the publication process.

Therefore, in conclusion, I recommend this book as an important reference work that should be part of your library if you are a professional interested in lunar and planetary science. If you are an academic, you will find some of the chapters quite useful in your teaching. However, I do not recommend the book as a text in itself.

MS received May 26, 1981.

Geysers and Geothermal Energy

By John S. Rinehart
Springer-Verlag, 223 p., 1980
\$19.80 (U.S.)

Reviewed by Paul M. Clifford
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The past decade has seen a substantial surge of interest in the use of heat from the earth. Under the whip of increased oil prices, numerous detailed technical investigations have been carried out, culminating in such publications as the U.N. Symposia on Development and Use of Geothermal Resources. For the less technically minded, there have appeared several books giving a general view of geothermal resources and their uses.

Rinehart's book is the most recent of this 'overview' type. But it is heavily biased to anecdotal accounts of geyser activity, in particular. Chapters 1, 3, 6, 7 and 8 all deal with geysers and geyser complexes from a wide range of geographical locations, most of which the author has visited. In this respect, the book is more informative than other similar publications. In addition, Chapter 3, dealing with "Fundamentals of Geyser Operation", presents an interesting but very simple series of calculations to do with boiling, heat transfer and discharge. Rinehart uses these to develop models of geyser activity which in turn are used to help explain different patterns of activity observed in the field. Chapter 5, "Chemistry of thermal waters", gives a classification of hot spring waters related to the type of 'hot ground' in which they are sited, but is virtually mute regarding the accumulated data on stable isotope stu-

dies, beyond a cursory remark on the low proportion of juvenile water in geyser discharges. The obverse of this chemical coin, namely, mineral deposition from such discharges, is also rather briefly handled in five pages of Chapter 7.

Intended and inadvertent modifications of discharge patterns are described in Chapter 9 (what some people won't do to tempt the tourist!), while Chapter 10 discusses exploitation. Both natural and induced flow systems are dealt with. It may come as something of a surprise to readers just how much is being done with lower grade sources to support greenhouses, fish farms and direct, non-electric power, use in industry.

Having recently seen the New Zealand geothermal areas, this reviewer has a livelier appreciation of what can be done with earth heat. It is not entirely 'clean', environmentally, but it comes close. This book expands the view of geothermal resources that most of us have, and, in that sense, is of interest. Against this, set the relatively low level of discussion of discharge mechanics generally, the near neglect of recent isotopic work, and the brief treatment of uses of geothermal resources, and you have a small book recommended best as a quick general reconnaissance of the field.

MS received June 12, 1981.

Barrier Islands - from the Gulf of St. Lawrence to the Gulf of Mexico

Edited by Stephen P. Leatherman
Academic Press, Inc., 325 p., 1979
\$19.00 (U.S.)

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This book stems from the proceedings of a coastal research symposium which was organized for the Geological Society of America (Northeast Section), and the Society of Economic Palaeontologists and Mineralogists (Eastern Section), and held in Boston on March 9, 1978. The symposium was dedicated to the memory of John H. Hoyt, one of the leading researchers on modern barrier-islands during the 1960s. The volume contains 12 papers dealing with the morphology, dynamics and stratigraphy of various

Holocene barriers from the Gulf of St. Lawrence to the Gulf of Mexico.

The first two papers, by M.O. Hayes and S.B. McCann, are overview and review papers respectively. M.O. Hayes' paper is a concise summary of his, and co-workers previous published works on the world-wide relationship between systematic barrier-island morphologic variations and variations in tidal and wave-energy regime. However, included in the rehash of "Hayesian" theory, is an important suggestion with respect to the revamping of the microtidal-mesotidal classification of tidal range. The paper by S.B. McCann is a well-written and much-needed synthesis of the barrier-island research studies that have been conducted for the past decade in Maritime Canada.

The other 10 papers deal with specific barrier-island segments and cover a range of topics from aeolian dynamics to geobotany. The two Canadian studies describe the measurement of aeolian sand transport in the Tabusintac barrier system, northeast New Brunswick (P.S. Rosen), and the mechanism of landward sand transport in the transgressive Malpeque barrier system, Prince Edward Island (J.W. Armon). An interesting contribution is the paper by P.J. Godfrey, S.P. Leatherman, and R. Zaremba, which demonstrates the relationship between barrier-beach topography and regional variations in vegetation along the coastal barriers of Massachusetts and North Carolina. W.J. Cleary and P.E. Hosier also utilize geobotanical controls to interpret the environmental controls (in particular washover events) during evolution of the North Carolina coastline. In a study similar to that of Armon, J.J. Fisher and E.J. Simpson use photogrammetry to measure the volume of sand contained in washover fans and tidal deltas in the transgressive barrier-islands of Rhode Island. Two papers describe three-dimensional stratigraphic studies of transgressive barrier deposits along the Delaware coast (J.C. Kraft, E.A. Allen, D.F. Belknap, C.J. John, and E.M. Maurmeyer), and Core Banks, North Carolina (T.F. Moslow and S.D. Heron, Jr.). Three papers deal with the controls on origin and development of barrier-islands: the papers by S.D. Halsey and G.F. Oertel demonstrate the role of pre-Holocene topography in governing the present barrier-island configuration along the coasts of Delmarva Peninsula and Georgia, respectively; the paper by E.G. Otvos, Jr. discusses the role of emerging bars in the origin of barrier islands on the north-central coast of the Gulf of Mexico.

In total, the volume is a curious mixture of reviews, and both regional and site-

specific studies. Such a mixture is to be expected from a symposium volume, but the quality of the contributions also varies from outstanding to marginal. Geologists and geomorphologists not working in the field of modern marginal-marine sedimentation will not be familiar with trends and theories presently prevailing in barrier-island research; thus they will want this volume if only for the papers by M.O. Hayes, S.B. McCann, and E.G. Otvos. However, most workers active in this or related fields will find (with the exception of the papers by P.S. Rosen, P.J. Godfrey *et al.*, and T.F. Moslow and S.D. Heron) they are already familiar with much of the material presented in the other papers. University and institute libraries will include this volume in their earth science collection, and well they should. However, individuals should be more selective in their book buying and utilize their library card, or send for author reprints.

MS received May 19, 1981.

Microfossils

By M. D. Brasier
George Allen and Unwin, 193 p., 1980
Cloth \$27.50; paper \$14.95

Reviewed by L. E. Fåhraeus
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Generally speaking I came away with a good impression of this new addition to the slowly growing field of textbooks on micropaleontology. The book is well written with clear and lucid prose, technical where necessary, but blissfully free from unnecessary technical jargon. It is prolifically illustrated with generally good and instructive line drawings. There are no photos.

The book is divided into two parts - dealing respectively with the procaryotes and the eucaryotes. The procaryote part deals with the blue-green algae (7 pages) and the bacteria (3). The eucaryote part includes dinoflagellates and ebridians (9), acritarchs (5), silicoflagellates and chryomonads (4), diatoms (6), coccoliths (6), green and red algae (7), spores and pollen (20), tintinnids and calpionellids (3), radiolarians and heliozoans (9), foraminifera (32), ostracodes (25), chitinozoans (3) and the conodontophorids (12).

The chapters on spores and pollen, ostracodes and, in particular, the foraminifera, stand out as being the most comprehensive and instructive. The general and technical information about these groups is far superior to that of the other groups. In the chapters on diatoms and coccoliths we find several interesting references but examples and discussions are lacking. But at least Dr. Brasier did write (p. 42) that "Few groups rival diatoms for breadth of the potential application" - entirely my sentiment; a pity that they and some of the other groups did not receive more space in the book. With the conodontophorids, my own group of speciality, the section on classification is out of date. Dr. Brasier acknowledges the existence of multi-element taxonomy but gives the reader the by now totally outdated classification of Hass *et al.* (1962) in the *Treatise on Invertebrate Paleontology*. A major drawback is the almost total lack of charts showing examples of biozonations for each of the groups dealt with.

Each chapter dealing with the organisms includes, where applicable, sections on anatomy and morphology, very broadly outlined phylogeny, geologic application, suggestions for further reading and "hints for collection and study".

The book includes a very useful appendix on preparation of different types of samples - from collecting in the field to the slide ready for study. A 10 page long bibliography and two indexes, one systematic and one general, end the book.

The book is generally very well edited and proof-read, with very few errors and inconsistencies, but there are some. In the table of contents some of the page references for foraminifera and most of those for the ostracodes are one page number too low. In the bibliography the use of italics is somewhat inconsistent. On page 97 we read both planktonic and benthic. This dual usage of the "-onic" and "-ic" endings also occurs elsewhere in the book. For someone who has always argued for the shorter, and linguistically correct ending this is a bit annoying, particularly so when in the bibliography Barnes and Fåhraeus (1975) are credited with having written a paper on the "... nekto-benthonic habit of Ordovician conodontophorids", which we have not done; we wrote on their nekto-benthic habit.

The strong points of the book are the easy-going lucid language, the numerous generally very good illustrations and the sections on foraminifera, pollen and spores, ostracodes and the appendix and bibliography. The weak points are the short-changing of some of the other

groups and the lack of charts showing stratigraphic distribution of some of the major taxa in each group.

I certainly recommend the book to the interested amateur, the appendix on preparation methods being particularly useful, and to the non-specialist paleontologist who wishes to have a ready source for his survey lectures on microfossils. I also recommend the book for undergraduate teaching. At the graduate level it will probably serve best as a good complement to the more advanced and, unfortunately, more expensive "Introduction to Marine Micropaleontology" edited by B. U. Haq and A. Boersma (Elsevier, 1978).

MS received May 19, 1981.

Geological Association of Canada
Association Géologique du Canada

The Continental Crust and Its Mineral Deposits

Edited by D. W. Strangway
Geological Association of Canada
Special Paper 20

Proceedings of a conference held in May 1979 in Toronto, Ontario to honour J. Tuzo Wilson. Papers in the volume are presented under the following headings: **The Early Earth, Evolution of the Precambrian Crust, Vertical Geometry of the Crust, Crustal Motions, The Global View, and Ore Deposits.**

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