

Just Before the Origin: Alfred Russel Wallace's Theory of Evolution, by John Langdon Brooks, 1984, New York: Columbia University Press, 284 p., \$31.50.

In Just Before the Origin, Brooks constructs a detailed study of the conceptual development of Wallace's theories from the scant evidence available. Unlike Darwin, Wallace left us little documentation of the development of his thought. He did not keep the voluminous notebooks which enrich our understanding of the thinking at Down House. Thus Brooks is forced to extrapolate and piece together fragments from all available sources -- Wallace's published letters from abroad, articles and books, his journals, registry of consignments, species registry, daily register of insect collections, species notebooks and correspondence with colleagues. He uses this information to date the rise and fall of Wallace's hypotheses by linking theoretical papers with the time frame when relevant species were collected or when Wallace remained housebound due to bad weather or illness. This is arduous task but quite valuable.

Brooks focuses on four major theoretical papers Wallace wrote from 1855 to 1858 to uncover the paths his thought followed. While there are similarities to Darwin's conceptual development, the differences are more striking. Notable are the deliberateness with which he attempted to understand how species are formed and his emphasis on spatial and temporal distribution, rather than local adaptation.

Several important themes concerning Wallace's work are developed. First, Wallace set out intentionally to test the current hypotheses concerning the relationships between life forms, notably the work of Chambers, Lyell and Forbes. Thus, in contrast to Darwin, Wallace's work was focused on the problem of speciation from the beginning of his collecting career. Secondly, Wallace's views of species change are much more closely tied to concepts of geographical isolation by extinction of intermediate forms, than to natural selection. Brooks explicates Wallace's sophisticated view of the relationships of higher categories as entailing both geographic and geologic relationships. Brooks also treats Wallace's discovery of the disjunction of fauna in the Malay Archipelago, between islands to the north and west with affinities to the Asian mainland and the islands to the east which are allied with Australian fauna. Wallace's Line is seen as an unexpected by-product of these detailed studies of species distribution intended to shed light on mechanisms of speciation. Brooks argues as well that Wallace's connection to the Essay on Population by Malthus read some dozen years before, occurred because Wallace was puzzling over the disjunction between the Malay and Papuan races of humans. Malthus' thesis could account for the extinction of

intermediate forms, leaving the two quite different groups. Wallace also saw the power of this mechanism to improve members of a population, selecting those modifications which were of value in a changed environment. In contrast to Darwin, who directly transferred to analogy to animal populations, Wallace first drew out its implications for the human races he was studying and then generalized his thinking to include animal forms.

The second half of the book unfortunately follows the path of Arnold Brackman's A Delicate Arrangement: The Strange Case of Charles Darwin and Alfred Russel Wallace in arguing that Darwin did not admit the full influence of Wallace's work on his own theory of divergence and that Lyell and Huxley deliberately and maliciously stole Wallace's true claim to priority. However, the argument is convincing, and the Darwin notebooks and recent work by Darwin scholars do not support the thesis. Since the argument is purely circumstantial, one could just as easily argue that Wallace was influenced by a letter from Lyell explaining Darwin's work (Darwin vaguely refers to such a letter) and that this is why the Lyell and first two Darwin letters to Wallace are missing. Indeed, Brooks' argument in the first half of the book concerning the very different genesis of Wallace's thought negates his argument in the second part.

The conceptual development of Wallace's theory of evolution by natural selection is sufficiently different from Darwin's to merit its own scholarly analysis. Wallace has been comparatively neglected by historians of evolution, in part because of the lack of a rich lode of background information to mine. This study is a good step in the right direction. It whets the appetite for further analyses of Wallace, such as the relationship of his profession of surveying to his emphasis on spatial relations or to what degree his profession as collector focused his attention on principles of speciation.

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Natural History in America, 1609-1860, compiled by Andrea J. Tucher. Americana to 1860, No. 4. Garland Reference Library of Social Science v. 232, Garland Publishing Inc., New York and London, 9 x 12", 306p, 2 indexes. ISBN 0-8240-8965-0, \$50.00.

"Natural History in America," the last in a series of four volumes of the collections of three Philadelphia Libraries, is of particular interest to historians of American science because, besides scientific monographs and periodicals, Andrea J. Tucher has included ephemeral items such as broadsides, pamphlets, prospects, circular letters, reports by learned societies, mining companies, and canal and railroad builders,

as well as travel accounts by interested amateurs. The titles alone bring to life the colorful history of a period during which America was, so to speak, for sale. For instance, William Penn, "Proprietary and Governor of Pennsylvania in America" sent letters to the Committee of the Free Society of Traders in London with a description of the land, "its soil, air, water, seasons and produce, both natural and artificial..." together with a catalogue of the "purchasers lots" (1683). A little earlier, the French Sanson d'Abbeville had sent maps and descriptions of America to Monsigneur Fouquet, the rather unscrupulous "surintendent des Finances" of Louis XIV of France. Plants, animals, minerals, and fossils of the New World were described more philosophically by Cotton Mather in 1721 in "The Christian Philosopher: A Collection of the Best Discoveries in Nature, with Religious Improvements." Many travel accounts describe both the useful and the beautiful in America although in the case of the numerous accounts on the Mississippi River and its source, the reasons were obviously more political than philosophical.

Soon European emigrants received advice and useful hints on how to settle in the New World. Jean Louis Bridel wrote for and against emigration in his "Le Pour et le Contre ou Avis a ceux qui se proposent de passer dans les Etats-Unis d'Amerique" (1803). Thereafter, natural history, that is the study of plants, animals, and minerals, as well as some useful medicine, became a major field of interest and was taught at American universities. Most naturalists were guided by the desire to reveal the Divine wisdom in nature. Hugh Miller wrote "The Foot-Prints of the Creator" and "The Testimony of the Rocks; or, Geology and its Bearings on the two Theologists, Natural and Revealed" (1857). P. Gosse published "Manifestations of the Divine Wisdom in the Natural History of Animals" (1857). Nevertheless, some naturalists seemed less influenced by Scriptures. For instance, Abraham Bradley wrote: "A Theory of the Earth, or, The Present World Created on the Ruins of an Old World wherein it is shewn from various phenomena that the Earth was first created at a period of the highest antiquity; that it was afterwards destroyed by a Deluge; and that after the Deluge, it was repopled by a New Creation of Men and other Animals" (1801). Indeed, this theory simply ignored Divine creation.

After the 1830's sprang up the American Philosophical Society, the Philosophical Association of Natural Sciences, the American Association for the Advancement of Science, and many more, with the result that American scientists felt less uneasy toward their European colleagues. They were, however, at first engaged in providing the American people with science made easy in compilations, synopsis, and translations of foreign works. Cotton Mather's "The Christian Philosopher" was reprinted in 1815 with the specifications: "the style made easy and familiar." Gould wrote the "Naturalist's Library...compiled from the works of Cuvier, Griffith, Richardson, Geoffrey, Lacepede,

Buffon, Goldsmith, Shaw, Montague, Wilson, Lewis and Clark, Audubon," with 400 engravings (1846). Ceran Lemmonier published a synopsis of natural history in 1839, and a catalogue of shells arranged according to Lamarckian methods was published in 1839 by John Jay. Furthermore, museum holders provided during the exhibit of the "great American Mastodon" a specialist to be in "attendance at all hours to answer the inquiries of visitors". Under these social conditions, the American "confidence in both their special national destiny and their capacity for mutual improvement through communal study" (cited by Tucher in her excellent Essay) payed off and produced Jeremiah and Stephen Van Rensselaer, Edward Hitchcock, Asa Gray, James Hall, Benjamin Silliman, and many others.

Historians of science will find Tucher's compilation extremely useful, in particular with the help of two excellent appendixes, one chronological, the other by subject matter. The entries, 2390, alphabetically arranged by author, are clear and done with librarian skill. The usual errors in the spelling of French, German, and Spanish works do not exist.

A drawback of this useful work is its relatively high price given the fact that it is not done in type set and lacks any reproduction of title pages or illustrations as compared to the recently published "Geology Emerging", a catalogue on the holdings of rare books in the field of geology at the University of Illinois at Urbana-Champaign, by Dederick C. Ward and Albert V. Carozzi. However, these authors omitted travel accounts, perhaps because there were too many, as well as periodicals, reports, etc., so that "Natural History in America" represents a valuable contribution for historians of science who are particularly interested in these subjects.

Finally, because there is no European work other than by Cuvier and Lyell in the collections of the three libraries--Agricola, Leibniz, Descartes, Linne, Buffon, Maillet, Raspe, Saussure, Moro, even the English Burnet, Whiston, Woodward, John Ray, and most of all Hutton, are missing in the field of geology alone -- the holdings appear like a frozen image of American scholarship between 1600 and 1860, a period when naturalists found no time to study the history of the science they were using every day.

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The Dark Side of the Earth, 1985, Robert Muir Wood, George Allen and Unwin, London, 246 p.

On the cover paper this book is described as follows: "The Dark Side of the Earth is the first work to describe the extraordinary rich theatre of investigations and battles that led to the creation in the

1960's of a science of the whole Earth. Robert Muir Wood has observed and explored the revolution, both from within and from outside, as a geologist, geophysicist and petrologist, but also as a writer and historian of Science". This claim appears to me to be somewhat exaggerated; I recall other books published since 1970 (some cited in Wood's bibliography) which have covered as much of this "theatre of investigations and battles". Nevertheless, I found the book an interesting and comprehensive account of the evolution of ideas leading to the current concepts of plate tectonics and continental drift, told largely through biographical accounts of the principal actors on the scene. It is particularly good in the delineation of personalities involved in recent years, where the author has had the advantage of interviewing many of the prominent scientists.

However, the tone of the book is overly polemical to my taste. The author uses much space and some turgid and bombastic prose on a rather sterile and purposeless differentiation between Geology (pedantic, fuddy-duddy, and backward-looking, obsessed with detail) and Earth Sciences (forward-looking, with a world view). This is a straw man constantly belabored, finally assassinated in Chapter 9, "The Demise of Geology". I feel like Mark Twain, who is said to have commented on a premature account of his death "This report is greatly exaggerated". I am still willing to be described as a geologist, and I have yet to hear of any colleagues and peers describing themselves as earth scientists.

Should there be a second edition, I recommend some editorial scrutiny to eliminate minor but irritating blemishes. To call William Smith a "drainage engineer" is a gross denigration. "Bubble-gum quotations of the astronauts" with reference to Harrison Schmitt (p. 11) is also uncalled-for. On p. 20 William Lothian Green, 1819-1890 is described as "British vulcanologist and prime minister - I tried to recall a British prime minister of that name, only to discover on p. 22 that in 1880 he was prime minister of the Sandwich Islands. Wood refers to Chamberlin's "planetesimal theory" (p. 31, 56) which exists in Chamberlin's publications as the planetesimal hypothesis. Frank B. Taylor, we are told (p. 48), was born "in the very heart of the Cosmology Belt - Fort Wayne, Indiana". The Cosmology Belt appears to be an invention of the author. Sir George Hubert (p. 124) is Sir Hubert Wilkins. On p. 129 Maurice Ewing is described as firing small packets of gelatin on the sea floor - if true, an unproductive operation. On p. 195 we are told that "After Lyell, geologists shunned the study of earthquakes", yet on p. 197 Thomas Oldham and his son Richard, geologists on the Geological Survey of India are given credit for extensive studies of Indian earthquakes. Pity the poor geologists - they are dismissed on p. 206: "Plate tectonics cannot be seen through geological eyes".

The Dark Side of the Earth: an interesting book, a good read, but flawed by the author's biases.

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Revolution in the Earth Sciences, Advances in the Past Half Century, 1983. Proceedings of a Symposium held at Carleton College, Northfield, Minnesota, April 14-16, 1983. Shelby J. Boardman, (Editor), Kendall/Hunt Publishing Company, 385 p., \$23.95

This volume is the outcome of a Symposium held at Carleton College, Minnesota in 1983 in honor of L. M. Gould, founder of the Department of Geology. The authors, who are alumni and faculty, record the geological experience and the development of new geological disciplines during the past fifty years. In this period entirely new disciplines have arisen, such as marine geology, isotope geology, and environmental geology, and even such traditional fields as sedimentary geology, mineralogy, petrology, structural geology, and geomorphology, show little resemblance to their state in the 1930's. The purpose of this book is to provide a historical perspective which documents development and/or changes. Several of the papers focus on current thinking within a specific field rather than on historical developments. Historically treated are the following subjects: experimental rock deformation, advances in high-pressure experimentation, changing perception of Archean tectonics, application of radiogenic isotopes to petrogenesis and geochronology, the origin and evolution of subsurface brines, Antarctic geology, submarine fans, pull-apart basins, invertebrate paleontology, hydrogeology, aquifer-simulation systems, and ore genesis.

This book can be used as a supplement in courses on the history of geology.

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Historical Events and People in Geosciences, 1985. Selected papers from the Symposium of the Interdivisional Committee on History of IAGA during the IUGG General Assembly, held in Hamburg, West Germany, 1983. Wilfried Schroder (Editor), Frankfurt am Main; Bern; New York: Lang, 220 p., \$20.85.

This interesting book is a symposium volume of selected papers presented before the Interdivisional Commission on History of

the International Association of Geomagnetism and Aeronomy held at Hamburg, West Germany, in 1983. It is part of a series known as European University Studies. The title of the book is broader than the coverage in the book: all papers relate to space physics and its subfields of geomagnetism and aeronomy.

The papers cover the themes of historical events and the scientists involved in those events that shaped modern thinking about geomagnetism and aeronomy. As the chairman of the IAGA Interdivisional Commission of History points out: getting financial assistance, publishing, and solving scientific problems has changed little since the 1900's. Further, that the spirit of international cooperation has at times been even more meaningful than it is currently. The papers range from solar terrestrial physics to solar wind, international polar research, gravimeter, geomagnetic observations, observatories, clouds, climatic records, and the earth's core. An interesting paper discusses Charles Lapworth's use of reports on the eruption of Krakatoa.

The papers range from abstracts and outlines to those which are complete with figures, and bibliography.

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History of Geophysics, C. Stewart Gillmor, ed.,
vi+149 pp., American Geophysical Union, Wash-
ington, DC, 1985, \$20.

Geophysics is not a monolithic discipline but an interdisciplinary network with many interconnections, paleomagnetism to tectonics, oceans to atmospheres, tides to earth wobble. The history of geophysics is likewise fragmented. This volume, the first in what the American Geophysical Union (AGU) hopes will become an annual series, tries to encompass it all, and the result is far from uniform. It is a book for libraries and archives, a reference and a source of specific insights which few will read cover to cover.

Some day the history of geophysics might be tidily classified and flowcharted, but that time is distant. Meanwhile geophysicists who feel that their stories are worth telling seek and find ways of putting them in print--often in popular accounts in EOS, the weekly journal of all AGU members, but also in more narrow professional journals, when editors and the occasion permit it. Much of "History of Geophysics" arose in this fashion: as might be expected, there is a wide range of subject, style, polish, rigor and level. And while the history of science generally means the history of ideas and of the research community, "History of Geophysics" also includes a section on

"Historical Geophysical Data and their Analysis", containing for instance George Siscoe's study of ancient auroras and solar cycles and W.L. Hamilton's analysis of cycles of volcanic eruptions.

There are three other sections. "Historical Aspects of the Geophysical Sciences" begins with William Back's overview of water lore among the American Indians, and it also contains (among others) accounts of how an after-dinner conversation in the home of James Van Allen (long before his discovery of the radiation belts) led to the International Geophysical Year, and of the first glimpses of the ionosphere during the early years of radiotelegraphy. A section "The Structure and Functioning of the Geophysical Sciences" includes somewhat abstract discussions (as distinct from anecdotal ones) of peer review, of the role of international meetings, of the glut of publications and of their rising cost. A final short section "Biographies of Geophysicists and Celebrations" covers more personal material and includes two obituaries.

Overall, "History of Geophysics" presents a diverse collection of studies and accounts on geophysics, often not on its technical aspects but on the geophysics community and on the way ideas, discoveries, organizations and publications arose. One may look forward to future volumes to continue this effort.

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Martin J. S. Rudwick, 1985. The great Devonian controversy: the shaping of scientific knowledge among gentlemanly specialists. University of Chicago Press. i-xxxi & 463 p. Hardbound, 7" x 10", single column format. \$39.95.

In previous years Martin Rudwick has written some good books and interesting articles, and his work has always been well worth reading. However, in the The Great Devonian Controversy he has crafted a magnificent work that will guarantee his position as a major contributor to the history of science!

Rudwick begins his book with an extreme statement and I am only mimicing his book in that regard; like Gaul, it is divided into three parts of unequal size. The first of 60 pages divided into three chapters is "Setting the Scene". In this, Rudwick first explains that he proposes to analyze the debate that surrounded the establishment of the Devonian system and he emphasizes the need for historians of science to consider not just a controversy, but the social setting in which it is laid. He chides current work and promises a great deal for his analysis. Next, he discusses briefly the main participants in the debate and the scientific organizations in and through which they interacted. Finally, he presents the concepts of stratigraphy so succinctly that it could serve as the text for a graduate seminar of the subject.

The meat and potatoes of the book comes next. 11 chapters containing more than 320 pages of text comprise "The plot unfolds", the story of a field investigation which began with the rocks in Devonshire and spilled over into France, Belgium, Germany, and Russia, before most participants were satisfied with the solution. The scholarship is exhaustive and fully documented, so that if anyone desires to argue with any particular point they can go back to all the relevant sources. One cannot help but stand in awe of the author's grasp of his material.

At the same time, the book is not pedantic, as shown by the following representative sentence: "Murchison was incensed at Greenough's intransigence; in his response the velvet gloves came off." However, the individuals involved wrote so much quoteable material that perhaps five percent of the narrative in places is from original documents. Martin Rudwick produces a chronicle of who was where, when, and, most importantly, what they thought at that time. The amount of working back and forth through the manifold sources required to produce this tome boggles the mind. To make all this data both crystal clear and interesting, as the author has done, is a remarkable feat.

It is not giving away any secrets to note that De La Beche and Murchison did not care for one another. De La Beche did indeed get a major geologic structure in Devonshire wrong, an error which Murchison and Sedgwick corrected. On the other hand, he was correct and they were quite wrong on the issue of concordance of strata. It is also not giving away any secrets to point out that in this drama Murchison has the dual roles of both heavy and hero. From reading this narrative it is easy to see how the subsequent feud between Sedgwick and Murchison began.

What is even more important in this narrative of the controversy is how Rudwick brings in all the personages, both the high and the low, and indicates the part each played in changing both the emphasis and the interpretation of the rocks through the years of argument. Although the subtitle mentions the term gentlemanly, the need to retain priority was never far from the thinking of any of the principals. Another subtheme, not as colorful but equally important, was the rise of stratigraphic paleontology as a study of faunal changes rather than index fossils.

The second section leaves one quite satisfied, but there is still more. Part three, of some fifty pages in two chapters, gives a thoughtful analysis of the Devonian controversy; it is, as titled, "The action analyzed". Rudwick demonstrates that the final solution to the age of the rocks in Devonshire was not a compromise, but a new approach. Finally, he harkens back to the importance of this episode as a case study of the way science really moves forward, in contrast to the way some scientists or historians of science think it moves forward. One could skip the entire chronicle of events in the main part of the book and still read these final two chapters with

profit. He does make good on all his remarks at the start of the volume.

Martin Rudwick has written elsewhere on the issue of the development of graphic presentation in geology. In this book, he has moved this field further forward by developing horizontal columnar sections to show the various interpretations of the ages of the rocks at various times. These are interspersed with some of the illustrations of the time. The maps are all clear and striking, and his diagrams of analysis are masterful. Just as the individual parts can stand alone on their own merits, the illustrative material does also. Incidentally, the author begins with a thumbnail sketch and illustration of all the participants, major and minor, and ends with a few appendices. There are no loose ends.

In my view this book is such an extraordinary achievement in the history of science, that the blurbs on the book jackets - a form of literature notorious for its excesses - do not do justice to this work. Anyone who reads this book will be the better for having done so.

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Creation and Evolution: A Positive Policy for Public Education, C. Gordon Winder, Horizon Audio, R. R. #2, Thorndale, Ontario NOM 2PO, Canada, tape only, \$5.00.

As the creationist/evolutionist debate continues to simmer beneath the ruling of Judge Overton (Science, 1982, v. 215, p. 934-943), Winder laments the necessity for past and present acerbity, and casts forth Isaiah 14:29 as a peace offering: "for from the serpent's root will come forth an adder, and its fruit will be a flying serpent."

Over the millennia Biblical scholars have allegorized the serpent as the Assyrian empire and, overall, judgment as having been passed on Philistia. Yet Winder claims that this passage could be refocused as a statement on speciation, and, I might add, seemingly a punctuated one at that. For in one generation a terrestrial reptile has produced a flying reptile-- hence, documented evolutionary change, sans details. Winder asks that if such can be culled from the Scriptures, would not creationist and evolutionist be reconciled to an ending of their bitter struggle? For creationists could then lay claim to a scriptural passage that outlines the basic principle of an orthodox science; contemporary evolutionists would then be permitted to argue over the details.

As Winder well knows, allegories, be they clothed in the myths of literalism or liberalism, have the all-too-familiar seductive mannerisms of primary symbols. If we wish to allegorize Isaiah 14:29 as a statement of the principle of evolution, might we also wish to consider Luke 6:44 or James 3:12 in a similar fashion?

Furthermore, are either creationists or evolutionists prepared for the much more demanding allegorical task suggested by Hezekiah's destruction of the bronze serpent (2 Kings, 18:4; see also Isaiah 30:6 and Numbers 21:4-9)? And would they then wish to enter into that ever-foreboding gnostic realm of John 3:14?

As much as one might wish to empathize with Winder's concerned, compassionate, and thoughtful commentary, recall that the irony of history also sidetracked the likes of Lot and Saul, and presumable irony, as well as wrath, is still at large in this world. Human understanding seems to demand the tension of a Herclitus or, all too often, the more thoroughly obvious dissection of a Marduk. The lot of the mediator is a sorry one.

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COMMENT

In Howard Ross Cramer's very interesting account of "Geological Education in Georgia Before 1861" (*Earth Sciences History*, Volume 4, Number 1, 1985, pp. 17-25) there is a minor error which perhaps should be noted. On page 17 he has quoted John Bartram on the subject of George Whitefield's ability to raise funds for his orphanage, giving as his source our biography of John Bartram. His quotation is correct, but we attributed it to Benjamin Franklin rather than Bartram.

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INTERESTING PUBLICATIONS

Since the start of this journal, Editor Gerald M. Friedman has prepared this column. Contributors wishing to list recent books and papers of interest to our membership please send them to the Editor.

Andrews, Sarah, 1985, On clarity of thought:
Edwin D. McKee and the science: *Jour. Sedimentary Petrology*, v. 55, p. 774-776.

Ashworth, William, 1985, Theories of the earth, 1644-1830, the history of a genre: An exhibition of rare books from the history of science collection: Linda Hall Library, Kansas City, MO, 68 p.

Bedin, S.A., 1985, Thomas Jefferson and American vertebrate paleontology: Virginia Division of Mineral Resources, Charlottesville, VA, Publ. 61, 26 p.

Berreby, J.-J., 1985, Petroleum before the petroleum industry. Its uses in and around the Mediterranean since antiquity: *TOTAL Information*, no. 101, p. 7-12.

Blakey, E.S., 1985, Oil on their shoes: Petroleum geology to 1918: Tulsa OK, American Association of Petroleum Geol., 191 p.

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Bruderer, Willy, 1985, The epic adventure of petroleum, CFP: From Abu Dhabi to the Sahara: *TOTAL Information*, no. 100, p. 34-38.

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Hobbs, C. R., Jr., 1985, The Virginia Division of Mineral Resources, 150 Years of Service: *Rocks and Minerals*, v. 60, no. 4, p. 182-189.

Heonstine, R.S., Jr. and Weissinger, Sheila, 1983, The Florida Bureau of Geology: Past, present, and future: State of Florida, Dept. of Natural Resources, Division of Resource Management, Bureau of Geology, Spec. Publ. No. 26.

- Houston, C.S., ed., with illustrations by H.A. Hochbaum and appendices by J.W. Thompson and W.O. Kupsch, 1984, Arctic ordeal: The journal of John Richardson, surgeon-naturalist with Franklin, 1820-1822: McGill-Queen's University Press, 383 p., \$29.95 (Canadian).
- Lurie, Edward, 1960, Louis Agassiz: A Life in Science, abridged edition: The University of Chicago Press, 5801 S. Ellis Ave., Chicago, IL 60637, xiv, \$3.95 (paper).
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CALENDAR

1986

April 25-26, The next meeting of the Joint Atlantic Seminar in the History of Biology will be at the University of Maryland, College Park. Those who wish to present a paper should send a title and abstract by March 1; graduate students are especially encouraged to submit papers. Those wishing to attend the conference should register by April 1. Contact: Lindley Darden, Committee on the History and Philosophy of Science, 1131 Skinner Hall, University of Maryland, College Park, MD 20742.

June 1-6, Third International Conference on Geoscience Information, Adelaide, Australia. For further information: Secretary, Organizing Committee 3IGGI, Australian Mineral Foundation, PB97, Glenside, South Australia 5065.

August 27-31, 12th International Sedimentological Congress (Canberra, Australia). This Congress will include a session devoted to the historical and philosophical aspects of sedimentology. Interested individuals may contact: Dr. E. Yochelson, U.S. National Museum, Washington, D.C. 20560 or Dr. Barry Cooper, c/o S.A. Dept. of Mines and Energy, P.O. Box 151, Eastwood, South Australia 5063.

September, Celebration of the 200th Anniversary of the Societaet der Bergbaukunde (Society of Mining Engineers). Contact Min. Rat. Dipl.-Ing. Maj. A. Weiss, Bundesministerium fuer Handel, Gewerke und Industrie, Stubenring 1, A-1010 Vienna, Austria.

October 23-26, History of Science Society Meetings, Pittsburgh, PA. Contact Dr. L. Daston and Dr. M. Mahoney, History of Science, Princeton University, Princeton, N.J.

September, IV International Congress on the History of Oceanography, Hamburg, West Germany.

The following topics are proposed:

1. History of international cooperation
2. Experiences in interdisciplinary research
3. Economic aspects in, and their influence on, marine sciences
4. Scientific and technical assistance in marine research

Further suggestions are welcome.

(Deutsche Gesellschaft für Meeresforschung, -ICHO-IV-, Bundesstrasse 55, D-2000 Hamburg 13, FRG).

NOTICES

CALL FOR PAPERS FOR SYMPOSIUM AND PUBLICATION IN NEW JOURNAL CARBONATES AND EVAPORITES

June 4, 5 1986
Rensselaer Center of Applied Geology
15 Third Street, P.O. Box 746
Troy, New York 12181

In 1986 the Northeastern Science Foundation, Inc. is introducing a new journal entitled **CARBONATES AND EVAPORITES**. There will be one issue published the first year, two issues in 1987, and thereafter four issues per year.

A symposium entitled **CASE HISTORIES OF CARBONATE RESERVOIRS** will be held on June 4 and 5, 1986 at the Rensselaer Center of Applied Geology in Troy, New York. Papers presented at this symposium will be published in the first issue of **CARBONATES AND EVAPORITES**. This symposium is sponsored by the Northeastern Science Foundation, Inc., a not-for-profit corporation whose home base is the Rensselaer Center of Applied Geology in Troy, New York. Titles and abstracts should be submitted to Dr. Gerald M. Friedman, Northeastern Science Foundation, Inc., P.O. Box 746, Troy, New York 12181.

For information on attending the **CASE HISTORIES OF CARBONATE RESERVOIRS** symposium and/or subscription to **CARBONATES AND EVAPORITES**, please contact the Northeastern Science Foundation, Inc., P.O. Box 746, Troy, New York 12181.

CALL FOR PAPERS 12th INTERNATIONAL SEDIMENTOLOGICAL CONGRESS

August 24-30, 1986
Canberra, Australia

The 12th International Sedimentological Congress will be held August 24-30, 1986 in Canberra, Australia. This Congress will include a session entitled Sedimentology: historical and philosophical perspective, co-sponsored by the History of Earth Sciences Society and the International Commission on the History of the Geological Sciences. The International Convenor is Gerald M. Friedman, Rensselaer Center of Applied Geology, P.O. Box 746, Troy, New York 12181 and the Australian Convenors are B. L. Cooper and C. G. Gatehouse, SA Department of Mines & Energy, P.O. Box 151, Eastwood, SA, 5063, Australia. Abstracts may be sent to Gerald M. Friedman, Rensselaer Center of Applied Geology, P.O. Box 746, Troy, New York 12181.

NORTHEASTERN GEOLOGY

Northeastern Geology
Northeastern Science Foundation
P.O. Box 746
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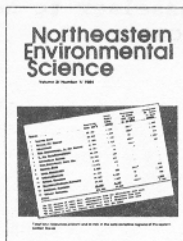
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A subscription to NORTHEASTERN ENVIRONMENTAL SCIENCE, Volume 4, 1985 includes the issue containing papers presented at the symposium on GROUNDWATER: GEOCHEMICAL AND ENVIRONMENTAL RELATIONSHIPS, held May 30-31, 1985 at the Rensselaer Center of Applied Geology in Troy, New York.

Also begun in Volume 4 is a series of articles entitled, A COMPUTER WORKSTATION FOR RESEARCH SUPPORT IN THE ENVIRONMENTAL AND ENGINEERING SCIENCES, by Dr. Peter J. R. Buttner. A series which will provide scientists and engineers new to computers an understanding of not only how computers work but also how to make them work. This series will be continued in Volume 5, 1986.

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