ANNOUNCEMENTS

PERSONALIA

At the annual meeting of the Geological Society of America in Reno, Nevada, in November 2000, the Historical Division presented its annual History of Geology Award to Hugh S. Torrens. Hugh has been a long-term member of the editorial board of *Earth Sciences History.*

Kristine C. Harper, Ph.D. candidate in the Program for History of Science, Department of History, Oregon State University, has been awarded the prestigious fellowship from the American Meteorological Society for the academic year 2000–2001. Her thesis research examines the development of numerical weather prediction models by Navy scientists from the 1950s through the 1980s. Her senior professor is Mary Jo Nye, Horning Professor of the Humanities.

RESOURCES

The International Union of History and Philosophy of Science (Division of History of Science) is interested in the preservation of archives relating to twentieth-century and twenty-first-century scientific activities. The IUHPS's Commission on Bibliography and Documentation (chaired by Professor R. W. Home, Melbourne University, Australia) is undertaking a worldwide program to encourage scientists to preserve contemporary scientific archives.

At the meeting of the International Commission on the History of Geological Sciences (INHIGEO) in Freiberg, Germany in September 1999, INHIGEO nominated Professor K. S. Murty of India to coordinate an arm of this project aimed at geoarchives and the papers of geologists, geological organizations, and geological institutions.

For more information, contact Professor Murty at 101 Sneh Chaya Apts., 28 Hindustan Colony, Amaravati Road, Nagpur 440 010, India. Telephone: 91 712 557 984; fax: 91 712 549 521; e-mail: ankush99_99@yahoo.com.

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H-Environment is a web-site "gateway to information concerning past human interactions with nature. Part of H-NET, the Humanities & Social Sciences OnLine initiative, H-Enviroment is supported by organizations of professional historians such as the American Society for Environmental History and the European Society for Environmental History." You will find it at http://www2.h-net.msu.edu/~environ/.

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The Center for History of Physics (American Institute of Physics) has awarded several Grants to Archives that will ultimately make available important collections in the history of the geosciences. Grants have been made in 2000 to: the National Cataloguing Unit for the Archives of Contemporary Scientists (United Kingdom) for the papers of S. Keith Runcorn; the National Center for Atmospheric Research (USA) for the papers of Philip D. Thompson; the University of Minnesota for the papers of Alfred O. C. Nier, Phyllis Freier, and Edward Ney; and Woods Hole Oceanographic Institution for the papers of Columbus O'D. Iselin, John B. Hersey, John M. Hunt, Nicholas P. Fofonoff, Raymond B. Montgomery, Charels D. Hollister, and William S. von Arx. (Grants were also made

for collections of physicists.) Awards in 1999 included one to the University of Alaska, Fairbanks for the Sydney Chapman papers. For current program guidelines visit www.aip.org/history/grntgde.htm.

* * *

The Center for the History of Physics (AIP) announces receipt of an oral history of Joseph Smagorinsky conducted by John Young and of two interviews Nancy Gauss carried out with Ed Lorenz and Philip Thompson. The Center also has accessioned 40 linear feet of historical records of the International Union of Geodesy and Geophysics for the period from 1919 to the mid-1990s. The center has received two manuscript autobiographies as part of its History of Geophysics survey: William W. Kellogg and Jack Oliver (244 p.). Lastly, several finding aids have been received relating to geoscience: Philip H. Abelson papers (Carnegie Institution of Washington); Raymond B. Montgomery papers (Woods Hole); and Robert Sinclair Dietz papers (Scripps Institution of Oceanography).

* * *

The Russian Academy of Sciences has made available for researchers the archives of Aleksandr Iosifovich Shalnikov (1905–1986). Although he was a physicist, included in his collection are letters of the volcanologist L. G. Kvasha, the geologist and crystallographer A. N. Zavaritsky, and the papers of his wife's sister, the geophysicist Lidia Gaigor'evna Kvasha (1901–1977). Contact: Elena Curapova, Russian Academy of Sciences, Moscow Branch, Archive, Ul. Novocheremushkinskaia, 34, Moscow 117218, Russia.

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The University of California, Santa Barbara: the unprocessed papers of William Whithill Rand (1902–1988). The collection of this geologist, engineer, and petroleum prospector includes includes correspondence, meeting minutes, log books, project files relating to deep-sea drilling, maps, and the business records of his company. 1920s to 1960s. Contact: David Tambo, University of California, Santa Barbara, Library, Department of Special Collections, Santa Barbara, CA 93106, USA.

FELLOWSHIP ANNOUNCEMENTS

The American Meteorological Society (AMS) is pleased to invite applications for a 2001/2002 AMS graduate fellowship in the history of science, to be awarded to a student wishing to complete a dissertation on the history of the atmospheric, or related oceanic or hydrologic sciences. The award carries a $15,000 stipend and will support one year of dissertation research. Fellowships cannot be deferred and must be used for the year awarded, but can be used to support research at a location away from the student's institution provided the plan is approved by the student's thesis advisor.

The goal of the graduate fellowship is to generate a dissertation topic in the history of the atmospheric, or related oceanic or hydrologic sciences, and to foster close working relations between historians and scientists. An effort will be made to place the student into a mentoring relationship with an AMS member at an appropriate institution.

Candidates wishing to apply must be a graduate student in good standing who proposes to complete a dissertation as described above. Any questions regarding

the fellowship opportunity may be directed to Donna Fernandez, 617-227-2426 ext. 246, *dfernand@ametsoc.org*. Deadline for application: 16 March 2001.

The American Institute of Physics, Center for History of Physics has a program of grants-in-aid for research in the history of modern physics and allied sciences, including geophysics, and their social interactions. Grants can be up to $2,500. They can be used only to reimburse direct expenses connected with the work. Preference will be given to those who need funds for travel and subsistence to use the resources of the Center's Niels Bohr Library, near Washington, DC, or to microfilm or tape-record oral history and interviews with a copy deposited in the Library. Applicants should name the persons they would interview or papers they would microfilm, or the collections at the Library they need to see. You can consult the online catalog at www.aip.org/history. Inquiries about the Library's holdings are invited. For application information, contact Spencer Weart, Center for History of Physics, American Institute of Physics, One Physics Ellipse, College Park, MD 20740; phone: 301-209-3174; fax: 301-209-0882; e-mail: sweart@aip.org.

PRIZES

The American Society for Environmental History awards prizes each year for the Best Book, Best Dissertation, and Best Article in environmental history. The deadline for nominations for the prizes for 2002 will be some time late in 2001, usually in November and December. Specifics may be found later this year at the ASEH web site, noted above, http://www2.h-net.msu.edu/~environ/.

* * *

The History of Geology Division of the Geological Society of America seeks nominations for the History of Geology Award. This award is given to an individual for contributions of fundamental importance to the understanding of the history of the geological sciences. Achievements deserving of the award include publication of papers or books that contributre new and profound insights into the history of geology (based on original researchor a synthesis of existing knowledge); discovery of and making available rare source materials; comptrehensive bibliographic surveys; editing a thematically integrated collection of articles; orgainizing meetings and symposia in the history of geology; research into original sources; orginal interpretations of data; translations of key materials; and exceptional service to the Division.

The award, established in 1981, consists of an engrossed certificate and a Pewter Revere bowl. The deadline for receipt of nomination by the selection committee chair is April 1 each year. Please send nominations to William R. Brice, University of Pittsburgh –Johnstown, Depart of Geology and Planetary Science, 250 Krebs Hall, Johnstown, PA 15904, USA; or e-mail to wbrice@pitt.edu.

Past awardees are: George W. White, 1982; Claude C. Albritton, Jr., 1983; Mary C. Rabbitt, 1984; Cecil J. Schneer, 1985; Ursula B. Marvin, 1986; Martin J. S. Rudwick, 1987; Stephen Jay Gould, 1988; Albert V. Carozzi, 1989; Gordon Y. Craig, 1990; William Anthony Swithin Sarjeant, 1991; Michele L. Aldrich, 1992; Martin Guntau, 1993; François Ellenberger, 1994; Robert H. Dott, Jr., 1995; Gordon L. Herries Davies, 1996; Kennard B. Bork, 1997; Hatten S. Yoder, Jr., 1998; David R. Oldroyd, 1999; and Hugh S. Torrens, 2000.

CONFERENCES AND CALLS FOR PAPERS

March 28–April 1, 2001, Making Environmental History Relevant in the 21st Century, a Joint Meeting of the American Society for Environmental History and the Forest History Society, Durham, North Carolina, USA

The theme of the conference is described on the conference web site as follows: As we enter a new century, the field of environmental history has a responsibility to bring historical analysis to bear on environmental/social issues facing the world at the dawn of the new millennium. Papers and panels might focus on examples of how environmental history informs public policy, resource management, pollution control, local and international development, social conflict, the understanding of environmental problems, etc. http://www.lib.duke.edu/forest/jtconf2001.html.

May 2001, International Conference—H_2O: Origins and History of Hydrology, Dijon, France

Official languages for the conference are French and English. Contact: www.cilea.it/history/DHS/Oh2.htm; or Dr. J. P. Carbonnel at Université P. et M. Curie, Laboratoire de Géologie Appliquée, Case 123, 4 Place Jussieu, F-75252 Paris, cedex 05, France; e-mail: oh2@biogeodis.jussieu.fr

June 20–24, Maury III: Third Biennial Conference on the History of Oceanography, Monterey Bay Aquarium Research Institute, Monterey, California, USA

The working theme for the conference is "The Machine in Neptune's Garden: Historical Perspectives on Technology and the Marine Environment." The deadline for paper proposals is past. Previous Maury conferences have examined the role of patronage in the history of oceanography, the history of oceanography as an interdisciplinary science, and the history of international cooperation in oceanography. For additional information, contact Gary Weir or David van Keuren (contact info in their articles in this issue of **Earth Sciences History),** or Keith R. Benson, College Studies, Box 354330, University of Washington, Seattle, WA 98195; telephone: 206-543-6358; e-mail: krbenson@u.washington.edu.

June 20–23, 2001, History of the Oil Industry—Symposium and Field Trips, Titusville, Pennsylvania, USA

A call for poster-papers has been issued by the Drake Well Foundation, the Drake Well Museum, History of and other organizations for a symposium and field trips in Oil City, PA, USA. They are seeking papers on subjects concerning any aspect of the development of the oil industry worldwide. For authors who wish to contribute their paper, a proceedings volume will be published in *Oil Industry History,* a new journal (see below) established by the Drake Well Foundation. Abstracts should be about 250 words. E-mail submissions are encouraged. Deadline is April 20, 2001. Registration before June 15 is $175, and afterwards $200. (This includes a banquet and some meals). Contact: Dr. William Brice, Geology and Planetary Science, Universtiy of Pittsburgh at Johnstown, Johnstown PA 15904, wbrice@pitt.edu. For abstract submission and information see http://www.pitt.edu/~upjgeol/.

July 8–14, 2001, International Perspectives on the History of Meteorology: Science and Cultural Diversity, XXIst International Congress of History of Science, Mexico City.

Papers are requested on international aspects of the history of meteorology, broadly construed to include scientific, environmental, social, political and cultural

issues. How did meteorology emerge as an international science? What tensions have existed between national weather services, national research styles, and international or global agendas? What are the social and/or cultural implications of trans-national research, education, and forecasting?

Participants may also wish to attend the inauguration of the new Commission on the History of Meteorology and participate in its governance. If circumstances warrant, the Commission will pursue publication options for the conference papers.

Deadline for early registration: 15 December 2000; Deadline for abstracts: 30 April 2001; Conference web page: http://www.smhct.org/default.htm. Please send your name, affiliation, paper title and brief abstract to: Prof. James R. Fleming, President, Commission on History of Meteorology, STS Program, 5881 Mayflower Hill, Colby College, Waterville, ME 04901, USA. E-mail: jrflemin@colby.edu.

August 2001. History of Geomagnetics, Solar-Terrestrial Physics, and Space Physics, Hanoi, Vietnam.

For more information, contact Wilfried Schr*der, Hechelstrasse 8, D-28777, Bremen, Germany.

September 5–8, 2001, The First conference of the European Society for Environmental History, St. Andrews, Scotland

This conference will be hosted by the Centre for Environmental History and Policy (Universities of St. Andrews and Sterling) and the Institute for Environmental History (St. Andrews University). The on-line membership directory includes a detailed statement of research interests of each member. Interested individuals can learn more about this relatively young academic society at its web site, http://www.eseh.org/.

November 5–8, 2001. Geological Society of America, History of Geology Division, Boston, Massachusettes, USA

Paper proposals are requested for a special session on Geobiography. History of science finds enlightenment from biographies of scientists to undertand how science operates over time. The session requests papers on past geologists as case studies for analyzing the merits and limitations of biography as a way to write history of geology. What are the effects of social, political, economic, educational, and family context on what geologists study and how they go about their science? Is there any meaning to the cliché "ahead of their times"? Does gender or ethnic background determine aspects of a geologist's career and research? Scientists hesitate to generalize from a sample of one; can we generalize from biography to history? Speakers will be asked to limn the life and career of a geoscientist (or a group of them for collective biography) and then tell the audience what they learned about how biography enhances our understanding of geological knowledge generally. Abstract forms will be available from GSA in April 2001 and are due in late July. See GSA website for details, www.geosociety.org or call 303-447-2020. Organizers: Michele Aldrich, 24 Elm St., Hatfield, MA 01038, e-mail: 73061.2420@compuserve.com, phone: 413-247-5828; and Alan E. Leviton, California Academy of Sciences, San Francisco, CA 94118–4599, e-mail: aleviton @calacademy.org, phone: 415-752-1554. Early discussion of ideas for contributed papers is encouraged.

NEW JOURNAL

The Drake Well Foundation has established a new journal, *Oil Industry History,* edited by Gerald M. Friedman. The first issue was published in 2000, with a

subscription charge of US$35, plus US$5 for postage for subscribers outside the US. For 2001, two issues will be published. Individual subscriptions are $45 in the US and $50 in other countries; institutional subscriptions are $65 inside, $75 outside. Payment may be made in checks or money orders in US dollars only; no credit cards please. Checks made out from company or university accounts are considered institutional subscriptions. Please send subscriptions to Drake Well Foundation, P.O. Box 233, Titusville, PA 16354. Visit the journal web site at www.oilhistory.com.

NEW INTEREST GROUP FOR HISTORY OF SCIENCES RELATED TO "EARTH AND ENVIRONMENT"

The History of Science Society, at its annual meeting in November 2000 in Vancouver, Canada, approved the establishment of a new Interest Group for Earth and Environment. According to the group's petition, Earth and Environment is "a coordinating and cooperative body for the purpose of promoting research and education in the history of environmental sciences and in the environmental history of science, encouraging an interest in the subject in all its aspects, and fostering historiographical and methodological excellence among scientists, historians, and similar groups who might contribute to an understanding of the historical development of environmental sciences." One of the main functions of Earth and Environment will be to sponsor sessions at History of Science Society meetings. More information will be available during 2001.

BOOK REVIEWS

Gretchen Luepke, Book Review Editor

EXPLORING THE HIGHEST SIERRA. *James G. Moore. 2000. Stanford University Press. 448 p. Hardcover, $45.00; Softcover, $17.95.*

James G. Moore brings together his many years of experience in this book: "In all, I spent more than 6 cumulative years in the field, two and one-half years of it camping out and sleeping on the ground" (Preface, p. xiii). Moore, a senior research scientist emeritus of the U.S. Geological Survey, is one scientist who no doubt has been to the top of all the peaks, turned back often from his objectives by deep snow banks, drenched by late summer rains, and reminded of his own vulnerability while ducking into low spots or behind rock outcrops as lightning bounced off nearby ridges. It is a pleasure to read his well penned prose, which informs the reader clearly and objectively.

If you are interested in exploration, read this book. If you are curious about the geologic history of the highest Sierra, read this book. If you want to read a scientist's attempt to make complex earth processes understandable to nonscientists, read this book. The book is well written, well edited, and well illustrated. It should grace the coffee tables and bookshelves of everyone who is curious about not only the exploration of the west, but also the history of the Earth.

The first 197 pages (Chapters 1–3) deal with exploration and mapping. The author, in fact, could have stopped there, but he went on for the next 150 pages (Chapters 4–6) to write about geologic time and the rocks that are found in the highest Sierra. The next chapters are about mineral deposits (Chapter 7), volcanic rocks (chapter 8), glaciers and glaciation (Chapter 9), landslides (Chapter 10), and geologic structures (Chapter 11). The author ties the sections together in the Afterword and reviews many of the contributions made by early explorers. He also discusses the future of the region. The geologic road and trail guides (pages 357–392) are the dessert portion of this literary meal. I look forward to driving the roads and walking in the author's footsteps. An excellent glossary and finally a section on references cited complete the book.

I particularly liked the sections on map making and the old maps that are published in the book. I suspect that it was necessary to enhance some of the maps, pixel by pixel, after they had been scanned into computers. The clarity of these maps is surprising. I also was intrigued by the search for the highest of the high Sierra peaks and the perseverance of several climbers, including Clarence King, the first director of the U.S. Geological Survey.

My biggest disappointment in the book was the almost complete absence of personal experiences that the author must have had in the highest Sierra. I would like to look over his shoulder as he made significant geologic discoveries. I would like to read how his interpretations of the geologic history changed after the acceptance of the plate-tectonic paradigm. I want to know what he thought about when he reached the top of Mt. Whitney the first time. And, he must have had some memorable experiences with animals and birds—and with people he met on the ridges and trails of that fantastic region. The reader should know that James Moore is also an oceanographer who has made significant discoveries about sea-floor and island volcanic rocks and about underwater landslides. Did he learn

anything at sea that was used in the interpretations of the highest Sierras? Or, did he learn anything in the highest Sierras that was used to understand the sea floor?

A small criticism about the book itself is in the layout. The pages could contain many more words if the margins were narrowed. Alternatively, sidebars with more history and personal experiences may have been used to fill some of the emptiness of some pages.

All in all, however, the book takes the reader on a remarkable journey. It is well worth the purchase price and the time it takes to read it.

Tracy Vallier, Research Geologist Emeritus, U. S. Geological Survey, 611 Verdun Court, Hollister, California 95023

EMIL WIECHERT: PHYSIKER-GEOPHYSIKER-WISSENSCHAFTSORGANISATOR. *Wilfried Schröder. 2000. Science Edition, IDC History and History Commission DDG. 216 p. Softcover, US$20.00.*

Even for the earth sciences, where polymaths are prominent, Emil Wiechert was unusually successful as an interdisciplinary entrepreneur. Wiechert grew up in Königsberg (Kaliningrad), then part of East Prussia, where his widowed mother had resettled from Tilsit. Wiechert's secondary-school teachers encouraged his talent in mathematics and physics. He attended the local university, which then had an unusually large complement of accomplished professors and lecturers in the exact sciences. He completed a doctorate at age 28 (his dissertation treated elasticity); one year later, in 1890, he obtained the venia legendi, allowing him to lecture as Privatdocent. His interest quickly turned to cathode rays and electron theory, and he hoped that his publications would result in a Königsberg professorship. When that path forward was blocked, in 1897 he went to Göttingen, where he habilitated at the invitation of physicist Woldemar Voigt (under whom he had studied at Königsberg). The invitation stemmed from a plan by Voigt and mathematician Felix Klein to install Wiechert in geophysics, an area that Wiechert had explored at Königsberg and one that Klein wanted to develop as part of a larger strategy for Göttingen to dominate the mathematical elaboration of all nature's laws. Wiechert's appointment in geophysics came in 1898, and along with it a new institute on the Hainberg above the town.

Over the next thirty years, Wiechert established his institute as the world's preëminent center of seismology. He and his students pioneered both instrumentation and theory on a number of geophysical topics. Wiechert also kept his hand in electron theory, proposing a version of special relativity that incorporated the electromagnetic ether. Geophysics easily lent itself to geopolitics. Wiechert supported globe-encircling projects of an international flavor, but he devoted special effort to observing the earth at remote locations in German colonies and spheres of influence. In a striking instance of cultural imperialism, where the impractical research enterprise of seismology contributed to legitimizing Germany's territorial aggrandizement, Wiechert's students and assistants staffed the geophysical observatory at Apia, in Western Samoa. [Lewis Pyenson, *Cultural Imperialism and Exact Sciences: German Expansion Overseas, 1900–1930* (New York, 1985), pp. 33–138.]

In this volume Wilfried Schröder reprints articles of his about Wiechert which have appeared over the past two decades, to which have been added other documents and photographs, a number of them presented without identification or comment. The reprinting is infelicitous. Most of the articles appeared in readily

accessible journals, although there is no attribution for the first one. Wiechert deserves better.

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THE ETERNAL DARKNESS: A PERSONAL HISTORY OF DEEP-SEA EXPLORATION. *Robert D. Ballard, with Will Hively. 2000. Princeton University Press. 388 p. Hardcover, $29.95.*

EXPLORATIONS: A LIFE OF UNDERWATER ADVENTURE. *Robert D. Ballard, with Malcolm McConnell. 1998. Hyperion, New York. 407 p. Softcover, $14.95.*

In the past five years, Robert D. Ballard, one of the world's most famous underwater explorers, has written two books that may seem, at first glance, to be the same one. The most recent is *The Eternal Darkness.* In 1995, the hardback edition of Ballard's *Explorations* first appeared in print; in 1998, the paperback edition's release coincided approximately with the release of the movie "Titanic." The books' co-authors are curiously not given equal treatment: Malcolm McConnell is identified on the back cover of *Explorations* as an editor with *Reader's Digest* and author in his own right, but Will Hively (contributing editor for *Discover* magazine and former senior editor with *Discover* and *American Scientist*) is not identified on the book jacket of *The Eternal Darkness.* This omission should be corrected if this book is later released in softcover.

I heard Dr. Ballard speak at the Tech Museum of Innovation in San Jose, California in 1998. His enthusiastic speaking style is well reflected in his books. The question is whether two separate books, which cover much of the same territory, are needed. All of the major chapters in the history of marine exploration after World War II are covered in both books, including Project FAMOUS (French-American Mid-Ocean Undersea Study of the Mid-Atlantic Ridge); the *Alvin* submersible; the ANGUS (Acoustic Navigated Geological Undersea Surveyor) camera sled; the bathyscapes *Archimede* (which badly malfunctioned on the Mid-Atlantic Ridge) and *Trieste II* (which almost didn't make it back from the Cayman Trough in the Caribbean). The cast of characters is a veritable "Who's Who in Marine Science" and includes Kenneth (K. O.) Emery, Maurice Ewing, Elazar (Al) Uchupi, Tjeerd (Jerry) van Andel, Jack Corliss, Jean-Louis Michel, and Xavier Le Pichon.

Both books are lavishly illustrated with largely the same photographs and drawings, many of which are made by Ballard. Other contributors include National Geographic Society photographers Emory Kristof, George Mobley, Mark D. Thiessen, and Joseph H. Bailey. The color photographs are grouped into three sections in *Explorations*; this places them nearer to corresponding chapters and is a clearly better alternative to grouping them all together in the book's center. Interestingly enough, most of the photos in *Explorations* are in color, while many of these same photos are less clearly reproduced in black and white in *Eternal Darkness.*

The Eternal Darkness will probably be of more use to science historians; while it is subtitled as a "personal history," Ballard also attempts to cover the entire history of deep-sea exploration, describing the research of other scientists as well

as his own. The book's final pages (from p. 315) contain a further reading list (grouped by year) and an index. Some errors occur; geologist Rachel Haymon's last name is misspelled in the text (p. 207) and index but correctly spelled in the "further reading" list. But such errors are almost inevitable when so many names are involved.

On the other hand, *Explorations,* is an unabashedly popular book. Its 5-part/10-chapter-plus epilogue contains plenty of dialogue but no index, and for this reason it may be a bit cumbersome for a science historian to consult. All the chapters, however, do give historic background. It is also clearly Ballard's autobiography, with his worries about getting tenure and many details of his family life (including one we really didn't need to know). Ballard's telling of the death of his oldest son Todd in a car accident is particularly poignant. His terrifying descriptions of his own brushes with death vividly show that the early days of deep-sea exploration were not for the faint-of-heart.

The two books, while covering much of the same territory, are therefore clearly aimed at different audiences. There are those who regard Ballard, a controversial figure in scientific circles, as being more interested in publicity than in science. But the fact remains that he was directly involved in most of the major deep-sea exploration endeavors long before any television cameras followed him.

The books, particularly *Explorations,* are of course the life (and opinions) of only one person, but this one person was not only involved in marine geology when it was first coming into its own, but also in the telling of this story to the general public (which ultimately funds this exploration). Therefore anyone who contemplates writing a comprehensive history of the development of the marine sciences in the twentieth century should be familiar with both books. But most readers will want to choose between them. So if you want a strong introduction to the history of deep-sea exploration, *The Eternal Darkness* is the better choice. If you love autobiographical accounts, *Explorations* gets the nod. The reader wins either way.

Gretchen Luepke Bynum, U. S. Geological Survey (retired), 650 Alamo Court #6, Mountain View, California 94043; gluepke@aol.com

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INTO THE DINOSAURS' GRAVEYARD. CANADIAN DIGS AND DISCOVERIES. *David Spalding. 1999. Doubleday Canada Ltd., Toronto. 305 p. Hardcover, $24.95 ($34.95 Can).*

In *Into the Dinosaur's Graveyard* David Spalding considers the evolution of dinosaur paleontology in Canada. The author presents a history of the role of Canadians and others in this endeavor and also considers the impact of Canadian dinosaur paleontology on the country's economy and culture. The author is certainly qualified to speak to these topics given his direct involvement in Canadian paleontology over the past 30 years, especially in Alberta. The writing is aimed at an informed general audience, but the historical information should be of interest to many professionals as well.

The book can be divided informally into sections that present, in turn, the history of dinosaur discovery, collecting and research in Canada, a survey of the various types of Canadian dinosaurs, a discussion of the contribution of Canadians and Canadian institutions to various topical issues and debates, such as those regarding dinosaur physiology and extinction, a "travellers in time" fantasy, the recent role of Canadians in dinosaur research and collecting outside of North America, especially through the Canada-China Dinosaur Project organized by the

Ex Terra Foundation, and a consideration of the impact of dinosaurs on Canadian culture.

The first, longest, and most strictly historical section presents a more or less chronological account of the many personalities and events that have contributed to the discovery of Canadian dinosaurs and the development of paleontology in this country. There is a consideration of the role and development of institutions, from the early work by the Geological Survey of Canada to the building of the Royal Tyrrell Museum of Palaeontology at Drumheller, Alberta, with its 43 (by 1998) mounted dinosaur skeletons, and the development of paleontology programs with international reputations.

In the "travellers in time" section, the reader is taken back in time to the Cretaceous and tours the area in and around present-day Dinosaur Provincial Park in Alberta. I found this historical fantasy out of place in a book of this kind, and somewhat contrived as essentially all of the important dinosaurs known from that area of Alberta are conveniently seen on the reader's short trip. This section is clearly reminiscent of a portion of C. H. Sternberg's classic "Hunting Dinosaurs." Perhaps, through the inclusion of this section, Spalding is paying homage to this earlier writer on Alberta's dinosaurs.

The last section looks at the interaction between dinosaur paleontology and both First Nations and Christian beliefs, and the influence of Canadian dinosaurs on the arts and literature. Spalding also discusses public funding for dinosaur research and the economic impact of dinosaurs through cultural tourism. The coverage here is broad and necessarily superficial, and it is my hope that Spalding's interesting thoughts on these topics will provide the impetus for more in-depth analyses.

The text includes a number of short sidebars that consider topics that range from the use of plaster and burlap in the collection of fossils to the University of Toronto's failure to hire a young Thomas Henry Huxley in the 1850s despite testimonials from Charles Darwin and Richard Owen. While I found this particular piece of history especially intriguing because of the role that Huxley might have played in the development of Canadian paleontology, the contemplation of alternative histories is always problematic. Huxley's successful rival had a role in the establishment of the Royal Ontario Museum, which has had its own important role in the development of paleontology in Canada.

There is a nationalistic undercurrent throughout the book. The author bemoans the lack of recognition, both inside and outside of Canada, of the country's dinosaurs and the contributions of Canadians to paleontology. He notes the early neglect, or lack of appreciation, by Canadians of their dinosaur fossils, as illustrated by the fact that the first extensive systematic collecting in the dinosaur country of Alberta was by Barnum Brown of the American Museum of Natural History in New York. Although important points are made, I feel that the case is somewhat overstated.

Similar issues are addressed on a national level as the author describes the "loss" of Alberta fossils to central Canadian paleontological institutions during the first half of the twentieth century. Although it is true that even by the late 1930s one had to visit museums in eastern North America to see Alberta dinosaurs, without this eastern involvement many fossils would have been lost to erosion, and, in part, this situation simply reflects the east-to-west pattern in the development of public and scientific institutions in Canada. Nonetheless, as the author points out, the development of provincial institutions and local community initiatives that combine science and economic benefits are playing an increasingly important role in Canadian paleontology.

The book is mostly history with little critical analysis, and there were instances where I found myself wishing for more of the latter. There is a brief consideration

of the approach taken to the legislative protection of paleontological resources by several Canadian provinces in which vertebrate fossils are considered the property of the crown and legal collection often requires a permit, regardless of the ownership of the land. The negative reaction by some to such government control is noted, but I would have liked to see an analysis of the positive and negative impacts of this approach, as compared to those practiced elsewhere, particularly in the United States. Certainly the story of the *Tyrannosaurus rex* Sue would have been very different if this animal had died and been preserved in the Alberta or Saskatchewan portions of this fossil species' known range.

There are few errors of fact or content that I am aware of and typographic mistakes are minimal. As a researcher on fossil mammals I couldn't help but notice that the Tertiary rocks of the Cypress Hills Formation in southwestern Saskatchewan were omitted on the geological map of Canada inside the front cover. But in a book about dinosaurs, this sort of error can be considered minor.

I greatly enjoyed reading this book; it is an entertaining way to increase one's knowledge of the history of dinosaur paleontology in Canada, and especially in Alberta. As Phil Currie of the Royal Tyrrell Museum of Palaeontology notes in his foreword to the book, no one is more qualified to take on this task than David Spalding. I recommend it highly to those interested in this subject.

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WILDLIFE OF GONDWANA. DINOSAURS AND OTHER VERTEBRATES FROM THE ANCIENT SUPERCONTINENT. *Patricia Vickers-Rich and Thomas Hewitt Rich. 2000. Second edition, revised and expanded. Indiana University Press, Bloomington. 304 p. Hardcover, $59.95.*

Australian paleontologists have been unusually well served by excellently presented works, lavishly illustrated in color and monochrome, on the fossils of that continent—to a point at which we, living as we do in other countries much less well served, should be quite envious! All these books have been in large format; in each, the photography and color reproduction have been superb, the artistic work of high quality and the text (though, of course, with the minor flaws from which such work can never be free) essentially authoritative and reliable. Earliest among these works was *Kadimakara. Extinct Vertebrates of Australia* (P. Vickers-Rich and G. F. van Tets, eds., 1985; 21.5 × 30.5 cm). This was illustrated, not with photographs, but with historic text-figures and excellent paintings by Frank Knight. The first to feature photographs extensively was *The Greening of Gondwana* (1986; 23 × 33 cm), Mary E. White's account of the evolution of Australasian vegetation from the first appearance of land plants to the Cretaceous, with a briefer treatment of Cainozoic events and plants. Next came a compilative work by several scientists on *Vertebrate Palaeontology in Australasia* (P. Vickers-Rich, et al., eds., 1991; 17.5 × 26 × 6 cm) and, in the same year, the account by Michael Archer, et al., of what was surely one of the greatest of all paleontological discoveries, *Riversleigh* (1991; 21 × 28 cm). After that, there was the excellent first edition of the work here reviewed (1993; 22.5 × 33 cm), with a coverage extending beyond Australia to the other southern continents. Next came Mary E. White's second work on the evolution of Australia's vegetation, *After the Greening*. The *Browning of Australia* (1994; 20.5 × 29 cm), treating with the climatic deterioration which commenced as a consequence of plate-tectonic movements, the Late Cretaceous. And now we have the second edition of *Wildlife of Gond-*

wana, brought up to date and comparable in format (22.5 × 32.5 cm). Yes, well served indeed!

Though the history of geology has not been a principal theme of these volumes, the history of vertebrate paleontology, at least, has been very well treated. The first chapters of *Kadimakara* were accounts by Patricia Vickers-Rich of "Priests, Geologists and Knighted Explorers. A short history of the discovery of vertebrate fossils in Australia" (pp. 17–38) and by Richard H. Tedford of "The Stirton Years: A search for Tertiary mammals in Australia" (pp. 39–58), both articles being illustrated by historical photographs. Revised versions of both papers began the collection on *Vertebrate Palaeontology in Australasia*—P. Vickers-Rich and Neil W. Archbold, "Squatters, priests, and professors: a brief history of vertebrate palaeontology in Terra Australis" (pp. 1–43) and R. H. Tedford, "Vertebrate Palaeontology in Australia: the American contribution" (pp. 45–83). The second section of the first edition of *Wildlife of Gondwana,* "The Search for Beginnings" (pp. 47–60), was again an historical review of work done in Australia; it did not extend to the other regions of Gondwana. That section is repeated, without any changes of text or illustration, in this second edition.

There are thus two good reason to buy this book. First of all, it is not only a scientific treat but also treat for the eye—a "coffee-table" book, to be deliberately left around so that its excellent illustrations—the photographs by Francesco Coffa and Steven Morton, the reconstructions by Peter Trusler—can be properly admired. Second, because it contains the best available account of how the study of vertebrate fossils began and developed in Australia.

However, though the book's title might cause one to expect that the history of vertebrate paleontology in the other parts of ancient Gondwanaland—or at least, in Australasia in general—would be reviewed, that is not the case. Nothing is said even about the discoveries in New Zealand or on the island of New Guinea (now divided into West Irian, Indonesia, and Papua-New Guinea). Moreover, this new edition gave opportunity for an expanded treatment of developments in Australia itself in the latter part of the 20th century—and, in particular, a more extended account of the truly spectacular discoveries around Riversleigh in Queensland. Consequently, though I am happy to have this second edition, and though I shall certainly recommend it and display it to visitors, I am left with a slight sense of disappointment at opportunities not taken.

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GIDEON MANTELL AND THE DISCOVERY OF DINOSAURS. *Dennis R. Dean. 1999. Cambridge University Press, Cambridge, U.K., and New York. 290 p. Hardcover, $69.95.*

Gideon Algernon Mantell is so major a figure in the history of geology that a new biographical treatment is overdue. Though excerpts from his journal, edited by E. C. Curwen, have been published (1940), the only available biography is by Sidney Spokes (1927)—if indeed one can call the latter work "available," when copies are so rare. The appearance of this new account of Mantell must thus be welcomed, especially when so much of it is based upon primary sources not hitherto available to scientific historians.

There is indeed much here that is both useful and interesting. The main theme—Mantell's work on dinosaurs—is treated very thoroughly. His developing attitudes to then-current concepts of rock formation and the evolution and extinction of

organisms are fully exposed, from "stridently catastrophist" (p. 91) through the progressive changes of thinking brought about by Lyell's ideas (pp. 104–105), to an eventual rejection of James Parkinson's equation of biblical days of Creation to geological epochs (p. 204). Indeed Dean, though evidently very much admiring Mantell, sets forth quite clearly his wrong-headedness in some areas; for example, his belief that *Cetiosaurus* was a marine creature (p. 227) and his ready acceptance of erroneous concepts concerning the origin of Siberian mammoths (pp. 225–226).

The story of Mantell's relations with (Sir) Richard Owen is told very fully, from friendship (always rather condescending, on Owen's part), through phases of ever-more-distant mutual courtesy, to an eventual, outright hostility consequent upon Owen's arrogance, tactlessness, and jealousy (pp. 213, 235, 244–245). Of course, Mantell was just one of many Victorian scientists trapped between the Scylla of Owen and the Charybdis of Sir Roderick Muschison, but all who suffered in that fashion merit our posthumous sympathy.

Mantell's relationships with his family also gain intermittent treatment. In that regard, however, one's sympathies must be with the family members who, because of their husband's or father's extreme egotism and self-focus, suffered so much. Few wives could relish being moved out of their place of residence into a rented cottage, so that their house could be turned into a museum by their husband (p. 135); none would like it when illness was resented by their husband "as it kept him from enjoying his distinguished visitors more fully" (p. 143). It is scarcely surprising that, "after twenty-three years of often stormy marriage and several extended separations" (p. 174), Mary Ann left Gideon forever on 4th March 1849. Their elder daughter, Ellen Maria, soon left also, as did their son Walter, emigrating to New Zealand against the wishes of his father. One wonders whether the long illness and eventual decease of his invalid younger, and favorite, daughter Hanna Matilda, almost exactly a year after her mother's departure, might have been a consequence of her parents' marital battlings. The unhappy story of Walter Mantell's attempts to placate, even please, his difficult father is told in part in later chapters: however, Walter gains insufficient credit in the story (pp. 197–199) of the discovery of eggs of the moa (for a fuller treatment, see Buick, 1931).

Dean's citation of secondary sources is curiously incomplete and grudging. Several papers quoted through "Abbreviations" are so obscurely referenced that any reader will find them difficult to track down. For example, "Pentland letters, ed. Sarjeant and Delair (1980)" is cited on p. xviii, but not fully referenced until a footnote on p. 61, with the unjust interpolation that the letters are "often misdated"; in fact, only one letter has been shown to have been misdated, and that in consequence of a misleading postmark. Other citations are marred by further snipings. Hugh Torrens's masterly and authoritative paper on Mary Anning (1993) is dismissed as a "recent updating" of W. D. Lang's earlier writings (p. 58), while the excellent paper by Torrens and John Cooper on George F. Richardson (1985) is only cited "despite some flaws" (p. 156). Such carpings, when unsupported by textual evidence, can only be considered unjust and unwise.

A number of relevant references entirely escape mention. The important paper by David Norman (1993), on the splendid slab of *Iguanodon* bones that has been called Mantell's "mantelpiece," is ignored. John Cooper's very relevant paper (1993) on the relationship of George Bax Holmes to Mantell and Richard Owen suffers a like fate. Yet Dean cannot claim ignorance of these works, since they were published in the same journal issue as one of his own papers!

Dean launches an early tirade against the "slipshod scholarship" of previous writers on Mantell (p. 4) yet his own text is by no means free of flaws. He states (p. 2) that the English Weald is now a valley, whereas it has a variable topography, much of it upland. He states also (p. 46) that, in 1822, dinosaurs had yet to be

discovered; not so, for their bones had been found and illustrated in England as early as 1677. Joseph Pentland was an Irish, not an English, naturalist (p. 80). The giant amphibian *Labyrinthodon* was extinct long before the Triassic (*contra* p. 229) and pterosaurs did not glide (p. 1), but flew as freely as birds. The London society is the Linnean, not the Linnaean (*contra* pp. 29–30) and a baronetcy, unlike a knighthood, is heritable (*contra* p. xiv). Dean's claim that reptilian (= dinosaurian) extinction was abrupt (p. 107) is contradicted by the Late Cretaceous fossil record of their progressive fading. His earlier statement (p. 2) that the extinction of dinosaurs was sudden, and accompanied by an equally sudden vanishing of "mosasaurs, plesiosaurs, pterosaurs, ammonites, belemnites and other less familiar creatures" (p. 2) is likewise contradicted by the evidence from the fossil record, which shows a staggered extinction, not a simultaneous one; the belemnites, in fact, appear to have survived into the Palaeocene.

Minor errors are also to be found. Some are evidently uncorrected misprints—"Tallyrand" (p. 118), "oblitering" (p. 164), "pondrous" (p. 189), "Syndenham" (p. 260) and "Serjeant" (p. 288)—but others are surely errors—"*Paleotherium*" (pp. 54, 55) and "Ornithicnites" (pp. 197, 199, 200) are examples, as is "chelonite" (p. 184)—not a mineral, but a chelonian. Dean's unsystematic use of "iguanodon", "*Iguanodon*", "iguanodontian" and "iguanodont" is slipshod; these are not equivalents in meaning. Tautologies such as "provocatively contentious" (p. 146), oddities such as "somewhat realized" (p. 146), and an innovative vocabulary—"outrightly" (p. 167), "snidely" (p. 204)—add to the reader's difficulties. There are sentences that defy comprehension. Whatever was the "famous horn" which was "certainly that, but only tentatively iguanodontian" (p. 227)—the spikelike thumb of *Iguanodon,* which Mantell had misinterpreted, or the horn of some other creature? What do we make of this sentence (p. 225)?

> His human fossils no longer included some Mississippi River footprints discredited by David Dale Owen, a section on geysers added New Zealand to Iceland, and small changes to Lecture 1 made its geology more Lyellian than formerly.

Dean states flatly that the Dinosauria, "Owen's famous new suborder of reptiles," was "a mistake from the beginning" since it "amalgamated two distinct classes of saurians having substantially different features" (p. 190). Yet the parallels between the Saurischia and Ornithischia are strong, their differences from other reptiles—in behaviour as well as in osteology—profound. Nowadays, indeed, many scientists are again utilizing the name Dinosauria and even including into it the Aves!

On other matters, supplementary information would have been helpful. Three persons—Joseph, Henry, and Samuel—sharing the unusual surname Stutchbury are mentioned, but their relationships (if any) are not made clear. Dean gives only a brief and slim treatment (pp. 216–217, 227) of Mantell's work on the problematical microfossils then called "xanthidia": yet these microfossils (now known to be dinoflagellate cysts) are fundamental to biostratigraphy and Mantell's conclusions concerning their morphology, unjustly neglected for over a century, have proved remarkably accurate. The genus *Spiniferites* that Mantell named and illustrated is indeed one of the most numerous and important dinoflagellate cyst genera, ranging from the Cretaceous to the present.

Gideon Mantell will always remain an enigma. Beyond question, he made great scientific discoveries. As this account shows, his changing scientific attitudes reflected the attitudes of other, more innovative scientists and quite often his deductions, founded upon insufficient fossil evidence, have proved incorrect (for example, his estimations of the morphology and size of his particular discovery, *Iguanodon,* and of the behaviour of *Cetiosaurus*). Yet, at the time they were made, those deductions were reasonable. In other instances—for example, his demon-

stration (not quoted here) that the supposed fossil *Xanthidium* could not be zygospores of desmids, since they were composed, not of silica, but of an organic compound and occurred in marine, not freshwater strata—his percipience was remarkable. His popular writings gained a wide audience for geology and palaeontology, vying with those of Hugh Miller in clarity, ready comprehensibility, and outreach to a wider readership than our sciences had hitherto attained.

Yet Gideon Mantell was an uncomfortable creature, always conscious of his relatively humble origins in a tightly stratified English society and driven by the ambition that, through science, he might overcome the disadvantages of birth. He was capable of strong friendships, yet insensitive to the needs of his own family—a family destroyed by his ambition. He was harassed by illnesses—some probably of psychological causation—and by the carriage accident that twisted his spine. He was fortunate in some scientific relationships (as with Benjamin Silliman, Sr.) and unfortunate in others (that with Edward Charlesworth surely exacerbated his difficulties with Richard Owen). His attainments were considerable, but so was their cost to him and to those about him.

Dean's account of Mantell has its demerits and, in my view, does not portray this talented, tortured creature adequately; yet because it makes available so much new information about him, it is destined to remain of long-term importance.

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VOLCANOES AND HISTORY. *Nicoletta Morello, ed. 1998. Proceedings of the 20th INHIGEO Symposium, Napoli-Eolie-Catania (Italy, 1995). Brigati Glauco, via Isoccorte 15, Genova-Pontedecimo, Italy. 755 p. Softcover, 115,000 Italian lira.*

A meeting in 1995 in Naples and Catania of the International Commission on the History of Geological Sciences brought together about 60 geologists, mainly volcanologists, from Europe, Japan, and America. Nearly all of the papers presented during the week-long conference have been assembled in a huge 755-page volume. Most of the papers are printed in full, many with excellent illustrations.

The majority of the 47 papers fall into one or more of four main categories: biographical accounts, compilations of historic records, studies of individual volcanoes or districts, and the development of scientific concepts. Those in the last group, of course, are the most interesting. For example, David Oldroyd gives us a fascinating 46-page account of the dispute between Sir Archibald Geikie and John Wesley Judd over the nature of the rocks of the Scottish Hebrides, and

Robert Dott reviews the development of ideas on the role of volcanism in ancient orogenic belts. Bernhard Fritscher has written an intriguing analysis of the exchange of views between James Hutton and Adam Smith and the reciprocal influence on their respective classics of geology and economics. The importance of early studies of Italian volcanoes is brought out in several papers, including one on the work of Charles Lyell by Leonard Wilson, another on the contributions of the staff of the Carnegie Geophysical Laboratory by Hatten Yoder, and a report by Patrick Wyse Jackson on early work by Irish geologists. Similarly, Italy is foremost among the volcanoes for which historic records have been compiled, but we are given information on the Azores, Japan, Iceland, and central Europe as well. Biographical notes offer new information on Judd (by Ambrose-Hamilton), Abraham Werner (Martin Guntau), Gerhard vom Rath (Wolfhart Langer), Giovanni Alfonso Borelli (Nicoletta Morello), Teodoro Monticelli (Antonio Nazzaro), Geikie and Ferdinand von Richthofen (David Oldroyd), Leopold von Fichtel (Gabor Papp), Lazzaro Spallanzani (Ezio Vaccari), and Lyell (Leonard Wilson).

The text seems to have been prepared from electronic files, with no editing beyond that of the authors. As a result, some of the papers are marred by countless errors. It is not clear what the editor was doing for the four years it took to get the book out. Unfortunately, there is no index, and even the table of contents contains errors. Nevertheless, the book is a valuable source of information and should be of interest to all geologists concerned with the history of igneous geology.

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A BEDSIDE *NATURE*: GENIUS AND ECCENTRICITY IN SCIENCE 1869–1953. *Walter Gratzer, ed. 1998. W. H. Freeman, New York. 266 p. Hardcover, $27.95; softcover, $18.95.*

A Bedside Nature is a celebratory history of *Nature,* formed from a chronological collection of annotated excerpts intended to entertain rather than to instruct with science. The first excerpt is an allegory by "F.R.S." on the value of scientific knowledge, originally the lead article in the second issue of *Nature,* 11 November 1869. The last excerpt contains the obviously understated claim on the structure of DNA by Watson and Crick, originally published in 1953.

Watson and Crick (1953) is one of the most famous scientific communications of the twentieth century, but the editor, Walter Gratzer, does not aim to present a collection of "Great Papers from *Nature.*" Rather, he aims to provide "a panorama of science, seen against the backdrop of nineteenth– and twentieth–century history." The panorama is spread over fifteen chapters, with greater detail given in the opening years: the first four and the last four chapters each total sixty pages, but the first sixty pages leisurely sample the first eleven years, and the last sixty pages speed through the last thirty years.

Each chapter opens with an illustrated title page that contains a telegraphic summary of the chapter highlights and a paragraph on contemporary political and social events. Each excerpt is preceded by the editor's comment which provides context that may be literary, biographical, or organizational. These comments add interest and value to the excerpts which follow. Each pair of facing pages has at least one illustration.

Readers of this review will want to know what *A Bedside Nature* says about geology. It does not say much. There is a four–page introduction by Stephen Jay

Gould, who identifies the only two geological excerpts in the collection: George Darwin on radioactivity as a reason to erase Lord Kelvin's limits on the age of the earth, and French prisoners of war on the bedrock geology of their prison (the rock originated by syntectonic granitization).

From its earliest issues, *Nature* has given significant space to geology, broadly construed. The very first issue of *Nature,* 4 November 1869, which *A Bedside Nature* does not sample, illustrates this attention to geology. T. H. Huxley wrote the lead article which begins with Huxley's Whitmanesque translation of a romantic extravagance by Goethe in praise of Nature. (*Nature* frequently mentioned Nature in the early decades, always with a capital N.) Huxley also wrote an article on Triassic dinosaurs in that first issue, and the list of society meetings shows him scheduled for two talks within the week, including one on dinosaurs and birds.

In this first issue, Archibald Geikie reported on a meeting of German naturalists at Innsbruck, where he was surprised by the German respect for and acceptance of Darwin's ideas on the origin of species. Geikie ended this report by observing a Franciscan monk among the attendees, Geikie wondering what the monk was doing there. It would take more than three decades for the news to reach readers of *Nature* that Gregor Mendel, abbot of the Augustinian monastery in Brünn, had that year published the second of his two papers on heredity in plants that led to the science of genetics. (Innsbruck and Brünn were then both in Austria.)

J. Norman Lockyer reported on the total eclipse of the sun viewed in India during the previous year, with his interpretation of the solar corona as "nothing else than an effect due to the passage of sunlight through our own atmosphere." This first issue also noted deep-sea (greater than 2,400 fathoms) dredging, and earthquakes on the Continent. The only 'Letter to the Editor' in this first issue of *Nature* concerned the effects of beach erosion and longshore transport along the Nile delta on the entrance to the Suez Canal.

If geology was so well represented in *Nature,* is there any prospect for a collection of 'Great Geology Papers from *Nature*'? Here follows an objective investigation into this question. The approach is to examine the frequency of reference to papers in *Nature* by authors writing about the whole of geology. To evaluate the 1869–1953 period of *A Bedside Nature,* it would be desirable that the authors have written after 1953, and that references to publications written prior to 1869 be deleted. The text book by Arthur Holmes, *Principles of Physical Geology,* 2nd edition (1965) is without equal for this purpose. The book has 31 chapters, each with its own set of references, and the publishing career of its author spanned the later half of the period, 1869–1953.

I compared Holmes's *Physical Geology* (1965) with a work by an historian of geology, *Thinking About the Earth,* by David Oldroyd (1996). *Thinking* is a "broad–brush" examination of geology from an historian's perspective, with 31 pages of references.

The references in Holmes (1965) and in Oldroyd (1996) are the raw material for this analysis. Each of these references is assumed to be 'significant' by virtue of appearing in one or the other book, but each is not necessarily 'great'. I deleted from Oldroyd any work published prior to 1869, including pre-1869 work translated after that date. Holmes (1965) did not require such deletions, but it did repeat some references in separate chapters. I did not systematically weed out such duplications.

There remained 543 references from Holmes (1965) and 549 references from Oldroyd (1996). These references were divided into 'periodicals' and 'books', 'periodicals' being a publication that appeared on a regular schedule, each issue usually with more than one article on more than one topic, and 'books' being all

else. By my count, Holmes used 325 periodical references (60% of his total), and Oldroyd used 232 periodical references (42% of his total).

I then counted the number of references to *Nature* among the referenced periodicals, and did a similar count for references to *Science,* the closest competitor to *Nature.* The results are quite interesting.

Among the periodical references, there were 26 to *Nature* and *Science* in Holmes and 19 to *Nature* and *Science* in Oldroyd. This is 8.0% of all periodical references in Holmes and 8.2% of all periodical references in Oldroyd. As a percentage of the *Nature* + *Science* total, *Nature* accounted for 69% in Holmes and 63% in Oldroyd.

At least on this level, there are similarities in the statistics of the geologist and the historian of geology: in total references (543 vs 549), in percent (*Nature* + *Science*) of periodicals (8.0% vs 8.2%), and in percent *Nature* of (*Nature* + *Science*) (67% vs 63%). There is a noticeable difference in periodicals as a percent of total references (60% vs 42%).

A more detailed look at the *Nature* references shows distinctions between Holmes (1965) and Oldroyd (1996) that may reflect professional orientations or other factors. Holmes refers 18 times to *Nature,* but three references duplicate references in earlier chapters so only fifteen separate papers are involved. Of these fifteen, fourteen were published in the four years, 1961–1964, immediately preceding Holmes (1965), including three by J. Tuzo Wilson. The remaining one *Nature* paper appeared in 1957. Holmes shows restraint in quoting himself, and, for example, omits reference to his 1945 article in *Nature* on granite, which was fairly widely noticed at the time. The index to Holmes (1965) has no entry for Holmes and nine lines of type for Doris Reynolds, his wife.

Oldroyd (1996) includes references to 12 papers in *Nature,* ranging in date from 1883 to 1988, only one of which also appears among the references in Holmes (1965). That one paper was Dietz (1961) on sea-floor spreading.

Holmes refers to 15 papers in *Nature* and Oldroyd to 12. As a percentage of total periodicals, these numbers are 4.6% and 5.2%, respectively. These statistics suggest that about 5%, or one in twenty, of significant geology papers published in 'periodicals' originate in *Nature.*

The data on references in Holmes (1965) and Oldroyd (1996) show that large collections of significant geology references have only a small percentage of papers from *Nature,* and they suggest that the judgements of authors selecting the significant references are apt not to coincide. To answer the question we started with, the prospect of developing an objective list of 'Great Geology Papers from *Nature*' is slight.

The book under review is an important record of a principal scientific journal, it is entertaining reading, and it is good value for the price. I recommend it to a general readership interested in the history of science.

There are always qualifications to any recommendation, and here are mine. The book is not an aesthetically pleasing product. It is a hardcover book, covered with tan paper devoid of anything but an ISBN and flecks of dark brown that indicate environmental awareness. These flecks are anachronistic, given that the editor wishes to "preserve a sense of period," by reproducing the excerpts "in untouched facsimile." The facsimile process seems to have muddied the printed type, which was small to start with. The color of the paper resembles the aging pages of early issues of *Nature.* Most illustrations are in monotone sepia. Some of them pertain to the adjacent texts, but most are unidentified space fillers.

The editor introduces the first excerpt in the book as being "probably by Huxley." The synopsis of Chapter 1 on its title page begins with "*Nature* proclaims its creed in its first leading article, penned by T. H. Huxley." S. J. Gould in the Foreword says "we begin with T. H. Huxley."

I doubt that Huxley wrote this piece. This excerpt attributed to Huxley is the lead article of the second issue of *Nature,* signed by "F.R.S.". As shown above, Huxley did write the lead for the first issue, and it is signed "T. H. Huxley." Huxley was neither bashful nor boastful, and as he lived by his wits, he had reason to make himself known, although in keeping with the custom of the day, he did write anonymous reviews. Further, "F.R.S." authored an excerpt on p. 123 of *A Bedside Nature* dated 1905, ten years after Huxley died. In addition, the style of the excerpt attributed to Huxley does not fit the style in Huxley's published essays. The excerpt in question uses the editorial 'we', and Huxley commonly used 'I'. It is allegorical and allusive in ways that are unclear to the common reader, a fault Huxley rarely committed.

I nominate Norman Lockyer, the first editor of *Nature,* as the author of its second lead article. He had just been made "F.R.S." a few months before, he had a reputation for fine writing in the Victorian style, which the excerpt in question is, he remained editor of *Nature* until well after 1905, and the article contains statements consistent with Lockyer as its author.

I tried reading *A Bedside Nature* in bed, and it did not work. The book's covers measure about 21.5 cm by 28.5 cm, and although it is not a thick book, it weighs enough that the resulting moment put a torque on my wrists that could not be comfortably resisted. At a table with an erect chair, it is an enjoyable read.

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NATURWISSENSCHAFTEN UND RELIGION (VERSUCH EINER VERHÄLTNISBESTIMMUNG, DARGESTELLT AM BEISPIEL VON MAX PLANCK UND WERNER HEISENBERG). *Wilfried Schröder. 1999. Science Edition, Potsdam/Bremen, Germany. 60 p. Softcover, US$10.*

This book recalls early nineteenth-century and prior attempts to bridge the gap between natural science, particularly geology, and religion. Two German twentieth-century scientists were selected for their input: Max Planck (1858–1947) and Werner Heisenberg (1907–1976).

Planck's publication "Religion and Natural Science" is well known. In this and other publications he is particularly concerned about the interface of these two diverse fields. He points out that attempts have been made to synthesize these two subjects into an anthropogenic science. Science and religion need one another as supplement and complement to make people think. Planck points out that the most serious thinkers of the past, including scientists, were deeply religious.

In his 1930 address "Positivism and the Real World," Planck held that for God all human beings are primitive, even the most perfect, even geniuses like Goethe and Mozart. In 1937 Max Planck gave lectures in many cities titled "Religion and Science," even in Berlin, Germany, headquarters at the time of the Nazi "Thousand-Year Empire." He noted that religion is the binding of man to God. It is based on the awe of the divine power, below which human life subsists and which has man in its grasp. On the question of the existence of God, he notes that from the point of view of the methods of natural science (that is, from research and observation in natural science), this question cannot be answered. According to Planck, the answer to this question is a matter of religious faith. In 1947, that is, after the Nazi catastrophe in Europe and the holocaust, he wrote that "I have always been deeply religious but cannot believe in a Christian God."

Planck did not recognize the existence of a confrontation between natural science and religion.

Werner Heisenberg was a physicist who received a Nobel Prize in 1932. I teach Heisenberg's Uncertainty Principle to my geology students. Heisenberg published studies about natural science and religion. He claimed that natural science concerns the objective and religion is the subjective side of reality. He raised the point that it may not seem right to separate knowledge from faith. Yet heaven in the Bible has little overlap with the heaven in which planes and rockets operate.

This book, in its brief Heisenberg biography, omits critical background of Heisenberg. In fairness to the reader, these critical data should have been emphasized rather than omitted. In the years 1941–1945—years which tested ethics in Germany—Heisenberg was the powerful director of the Kaiser Wilhelm Institute for Physics and Professor at the University of Berlin, literally within walking distance of Hitler's "Bunker." So was the house in which I was born in Bendler Strasse, now known as Stauffenberg Strasse and named after the general who plotted against Hitler and faced a firing squad. He was lucky; his colleagues were hanged on meathooks! Heisenberg's lectures, often presented in a brown or black Nazi uniform, began and ended with "Heil Hitler." Words on religion by someone of such shaky caliber leave me cold. When I received an honorary doctorate in Germany, the academic ceremony was without cap and gown. The rector (president) of the university pointed out to me that academic gowns are not worn in Germany because they may hide a brown or black Nazi uniform!

The attempt to explain the relationship between natural science and religion through someone like Heisenberg is a failure. To me Heisenberg was a first-rate scientist whose name and accomplishments in science my geology students are aware of. But as a powerful personality in the Nazi regime, when many millions of innocent children, men, and women were murdered in gas chambers and ovens, or dumped alive into burning pits in the rush of the Nazis to meet their quota in murder, Heisenberg cannot explain to me religion or God.

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INTERESTING PUBLICATIONS

Gerald M. Friedman, EDITOR

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 are requested to send them to the Founding Editor Gerald M. Friedman, Department of Geology, Brooklyn College and Graduate School of the City University of New York, c/o Northeastern Science Foundation affiliated with Brooklyn College of the City University of New York, Rensselaer Center of Applied Geology, 15 Third Street, P.O. Box 746, Troy, NY 12181-0746, U.S.A.; E-mail: gmfriedman@juno.com; E-mail attachment files (IBM-only): gmfstf@ix.netcom.com

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