

# BOOK REVIEWS

Gretchen Luepke, Book Review Editor

**VICTOR MORITZ GOLDSCHMIDT (1888-1947) - A COMMEMORATIVE VOLUME ON THE CENTENARY OF HIS BIRTH.** A.A. Levinson (ed.), 1988, *Applied Geochemistry, Journal of the International Association of Geochemistry and Cosmochemistry*, v. 3, No. 4, p. 359-421, 2 portraits, softcover. \$20.

This issue of *Applied Geochemistry* has been dedicated to Victor Goldschmidt on the occasion of the centennial year of his birth. Goldschmidt is recognized as the father of geochemistry. Publication of the commemorative volume followed a major geochemical conference to recognize Goldschmidt's pioneering contributions.

Following an editorial and five memorials and tributes, three of which were published at the time of his death, this volume includes a pictorial dedication consisting of a collection of 34 photographs, a bibliography of Goldschmidt's published papers, and a brief report on the V.M. Goldschmidt Conference.

Goldschmidt's publication record, which spans the period from 1906 through 1946, is almost entirely in German or Norwegian. My own experience with Goldschmidt's papers relates to his classical studies on the contact metamorphism of the "Kristiana Gebiet" (vicinity of Kristiana in southern Norway) published in 1909 and 1911. This study was his doctoral thesis from which I took inspiration for my own Ph.D. dissertation which was likewise concerned with contact metamorphism of a similar pluton. Since his study was published in German, my own mother tongue, I found myself close to Goldschmidt whom I had briefly met in England in the mid-nineteen forties. When my own career shifted from applied chemistry to petrology, geochemistry as a subject was unknown in the academic world and considered part of petrology or mineralogy. Although Goldschmidt is the recognized father of geochemistry I know few geochemists who have read any of Goldschmidt's writings, except his post-humous works *Geochemistry*, edited by Alex Muir and published seven years after his death. In my view Goldschmidt established geochemistry as a specialized subject of geology in 1954, after his death, when his famous post-humous tome became a standard work.

V.M. Goldschmidt established a basis for classifying metamorphic minerals according to general physico-chemical laws, proposed the concept of "stability limits" of minerals, and developed the idea of mineral facies that became the central idea in mineralogy-petrology. His monumental works on the laws of geochemical distribution of the elements (*Geochemische Verteilungsgesetze der Elemente*) established the principal laws of geochemistry, especially the abundance of the elements in the Earth's crust, in meteorites, and in the stellar atmosphere.

Goldschmidt was the son of the distinguished physical chemist Heinrich J. Goldschmidt who served as Professor in Heidelberg and later moved to Oslo, Norway, where V.M. studied under Brøgger. At the age of 26 V.M. became a full professor and director of the Mineralogical Institute of the University of Oslo. At the age of 51, in 1929, he joined the University of Göttingen in Germany as Professor and Director of the Mineralogical Institute. Although the years between 1929 and 1933 were the happiest in Goldschmidt's life -- he published his classical papers on the geochemistry of the rarer elements -- his tenure at Göttingen was brief. The Nazis had obtained power in Germany and, as a Jew, this distinguished scientist -- like all Jews -- was reclassified in official language as a "subhuman" being (Untermensch) or "apeman"

(Affenmensch) in colloquialism. He returned to Norway, but his house and possessions were lost in Germany without compensation. In addition to his scientific work on his return at the Norwegian Raw Materials Laboratory he helped relatives escape from Germany. By 1940, however, after the invasion of Norway, the Germans caught up with him again, and in October 1942 he was earmarked for extermination in the gas chambers of Poland, probably Auschwitz. It seems an irony that one of the world's most eminent scientists was cast out in contempt, and considered as vermin to be destroyed by gassing under humanly unimaginable degrading conditions. How a civilized society, like that of Germany, could revert so thoroughly to barbarity is beyond comprehension. Among the 1 1/2 million Jewish children that were murdered there might have been another Goldschmidt, or Einstein, or Freud. But Goldschmidt was lucky; after his incarceration at the Grini Concentration Camp he was put on board a freighter to be shipped to the gas chambers of Poland, when a detachment of men in German Gestapo or SS uniforms appeared and marched him away. Brian Mason in this issue explains that these men were impostors from the Norwegian underground. Another possibility may be that the Minister of Internal Policies, a Nazi Collaborator of the German-installed head of Norway Quisling, was a former Goldschmidt student and had compassion for his professor. In this issue I found especially touching the account of Paul Rosband of Goldschmidt's conversation in the concentration camp with two fellow Jews, likewise headed for the gas chambers, Moses Katz and Rosenblum. Goldschmidt suggested that they should remember the names of their tormentors, so that any survivors might exact retribution. Katz answered "Revenge is not for us; that must be left for the Almighty". Goldschmidt responded what prayers would be permissible, whereupon Katz replied "you may pray that the hearts of your enemies may be enlightened". Rosenblum replied "we must break the evil circle of retribution, or there can never be an end to evil". Both men became part of the six million murdered Jews. With the help of the Norwegian underground Goldschmidt escaped to Sweden and finally to England. There he survived the war, after which he returned to Norway, but the strain suffered under the Nazis shortened his life. In one of Goldschmidt's last letters to Paul Rosband he wrote "the wisdom of the Moses Katz principles is undeniable".

Based on Goldschmidt's experimental data three scientists won Nobel Prizes in theoretical physics. In more normal times he himself may have received this distinction.

The photographic tribute in this issue is fascinating: photographs of Goldschmidt with Albert Einstein in the field studying Paleozoic strata on islands in Norwegian fjords; seminars at the Mineralogical-Geological Museum in Oslo; field trips in Germany and Norway; Goldschmidt and his dog at a dog show; and as an epilogue the beautiful urn of olivine rock containing his ashes. As Goldschmidt once remarked to Paul Rosband when they stood reverently in front of the urns of his parents, likewise made of olivine rock: "Ja, ja, the whole family in magnesium orthosilicate".

This volume touched me. We should be grateful to A.A. Levinson for this compilation.

Gerald M. Friedman, Department of Geology, Brooklyn College, Brooklyn, NY 11210, and Northeastern Science Foundation, Inc., affiliated with Brooklyn College of the City University of New York, Rensselaer Center of Applied Geology, Box 746, Troy NY 12181-0746

**U.S. COAST SURVEY vs. NAVAL HYDROGRAPHIC OFFICE: a 19th-Century rivalry in science and politics.** *Thomas G. Manning.* 1988. *University of Alabama Press.* 202 p. Hardcover. \$21.95.

This is a tightly written, one might even say sparse, book. The significance to geodesy of swinging a pendulum receives the same amount of space as description of the Coast Survey building, but both are clear. Manning gives an account of a classic turf battle in Washington, D.C. and one that kept flaring up for decades. Consider the official limits of jurisdiction of FBI and CIA today, and you have the territories of Coast Survey and U.S. Navy outlined. On the issues of whether military or civilian organizations can conduct Federal scientific investigations better, or whether the military should do anything more than defence, consider first, the organization of "star wars" and second, Antarctica where the Navy officially hires out to NSF. These concerns have not been resolved, and there is a timelessness to Manning's Washington story.

There is an accompanying cast of interesting characters. If one is an oceanographer, Bartlett and Sigsbee are household words. For those who are more philosophically inclined, pity the poor Superintendent whose employee was a geodesist/prima donna Peirce. Trying to justify gravity measurements in a Congressional hearing in the 1880s must have been harder than justifying the human genome project today; it is amazing that "Uncle Joe" Cannon was on the side of the angels. Further, one cannot help but wonder what provoked President Cleveland to assault the Coast Survey. Did Hilgard really drink as much as was claimed?

The Allison Commission is known to those interested in history of geology for the part played by John Wesley Powell. His was a sideshow role compared to the main event. Nowadays, both Congress and governmental science are far more complex, but the same kinds of villains and heroes, each with a hidden agenda, are at work. The hearings sound not unlike Iran-Contra; right and wrong depend on what intellectual baggage one is carrying, not ultimate good for the country.

What is perhaps the most interesting single point is that savings in government money by shaking up the Coast Survey, firing blind draftsmen/pensioners, denying vouchers, and similar activities which bring joy to the soul of an accountant, about equalled the salary of the Treasury Department clerks who scrutinized the books. Lowering of morale and crippling of scientific productivity are never considered in Federal economy drives. As always, when things go bad, the innocent are punished. There is some slight comfort to those who have had research labs crashing down around them as the price of oil dropped, that science has not been a bed of roses in the past either.

The Navy receives a bit less treatment than the civilians. There were errors and nastiness on both sides, but in the end one has a bit more sympathy for the Coast Survey employee. It seems to me that one is on safe ground in recommending this book to any government scientist and to anyone interested in science as run by the government, be it military or civilian.

Ellis, L. Yochelson, Research Associate, Dept. Paleobiology, National Museum of Natural History, Washington, D.C. 20560 USA.

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**THE STATE GEOLOGICAL SURVEYS--A HISTORY.** *Arthur A. Socolow, ed.* 1988. *Association of American State Geologists.* 499 p. Hardcover. \$20.00. (Order from Geological Survey of Alabama, P.O. Box 0, Tuscaloosa, AL 35486; check payable to: AASG).

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Art Socolow has done our profession a great favor by publishing the first complete and comprehensive account of all 50 state surveys since George P. Merrill (1920). On opening the book, I was

somewhat startled to find that, although it was "a project of the Association of American State Geologists," the copyright was in the name of the "American Association of State Geologists." Let us hope that this was just a typo and that the copyright was really issued in the correct name.

In beginning a review of this kind, the reviewer looks first at the title, the author, and then the preface, where he expects to find the reasons for writing, the author's support, and his procedure and sources of information. Although the editor has some interesting comments, his preface might better have been twice as long, thus filling the printed page and giving us more information on how he obtained and developed his data.

There follows some account of each of the 50 current state geological surveys. The account of each survey is headed by 1) the title, address, and phone number; 2) the "historical sequence of organizational name;" and 3) the "names and titles of organizational directors and dates served." To this reviewer, this is a most valuable permanent record of basic information needed. However, the accounts which follow do not constitute uniform coverage. Lengths of articles vary from one page for New Hampshire to 22 pages for Louisiana, more or less without regard for the "importance" of the survey. We are sometimes left in the dark on authorship; 18 accounts show no author. References are missing on 31 surveys. I miss some idea of staffing and budget in the accounts, which would help to keep the information in perspective.

Many of the write-ups are excellent; Kansas is a good example. This and others give us a flavor of the contributions of the State surveys. We respect the many eminent geologists who have left their mark on the development of geology in our country.

Understandably, I looked most closely at the California entry. I am still curious about the author or compiler. What was the author's source of data? It would have been interesting to note in the text that Dr. Joseph I. Zion, although not a State Geologist, was appointed Assistant Director of the California Department of Conservation effective August 1, 1988. The State Geologist reports directly to Zion, who was a distinguished geologist with the U.S. Geological Survey at Menlo Park. To my knowledge, California has the only State Geologist, among State surveys, who reports to a professional geologist.

In addition to the author, I miss many references in the California article. A minimum citation should have included Jenkins (1975; 1976) and Oakeshott (1985). Incidentally, the whole Socolow volume might well have listed the latter reference and others on the state surveys.

Socolow's "History" is not a work that one reads through but rather looks for the articles where he has the greatest interest. Having been associated with State surveys for over 25 active years with the California staff, I was pleased to find accounts of the work of at least one of the State geologists on each survey whom I have known personally.

Editor Art Socolow has put into the literature, under one cover, a most valuable, personalized update of the place of our State geological surveys in our society.

Gordon B. Oakeshott, Former Deputy Chief & Chief of the California Division of Mines and Geology, 3040 Totterdell Street, Oakland, CA 94611.

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**HISTOIRE DE LA GÉOLOGIE. Tome 1: Des Anciens à la première moitié du XVIIIe siècle.** François Ellenberger, 1988. *Technique et Documentation - Lavoisier, Paris.* viii + 352 p., 14 figures, paperback. FF 165.

For two decades the distinguished French geologist François Ellenberger has devoted himself with remarkable energy to the history of geology. During this time he has been publishing a good many articles of increasingly rich historical interest. Now he has finished the first volume of a two-part general examination of the development of geology, from antiquity to modern times. The merits of this first volume are considerable, and it seems probable that the completed work will become a standard historical resource for years to come.

Ellenberger begins with the ancient Greeks and concludes this volume with a meticulous consideration of Steno. In a sense the aim is comprehensive coverage, and the organization is fundamentally chronological: the four main chapters are on antiquity, the middle ages, the Renaissance, and the 17th century. In each chapter there is, quite appropriately, substantial discussion of the general cultural conditions through which the main geological authors of the past, and their texts, must be understood. Yet in a book of moderate length it is no surprise if the goal of comprehensiveness is not fully compatible with the need to probe certain key developments in some depth. Ellenberger has chosen, wisely I think, to deal at length with selected topics and authors, at the expense of thorough coverage. In fact, I count nearly 45% of the pages of text devoted to just six individual figures (Leonardo, Palissy, Goropius, Agricola, Gassendi, and Steno); with the result in view this seems to me justified, but the cost of such emphasis is clearly the necessity of comparatively brief treatment of certain points elsewhere.

To any who might quarrel with what he has chosen to emphasize, Ellenberger can reasonably answer that he has situated his book within the secondary historical literature, to which his work is complementary. Indeed, although I think this volume can be read with much profit by anyone interested in geology's past, the ideal reader to whom it is addressed is one who has some familiarity (or is interested in becoming familiar) with the main body of scholarship -- in English, French, German, and Italian carrying on the historical dialogue over geology's early development. The annotated bibliography includes a list of some two dozen basic works which the reader is urged "absolutely" to get hold of. While the rest of the bibliography is somewhat abbreviated, there are many additional references in the text. Rather than try to present a fully self-contained history, Ellenberger offers an analysis that brings the reader into the ongoing, collective effort to attain a more accurate, demythologized comprehension of where geology came from.

Serious study of the history of geology obviously requires knowledge of its scholarship, and Ellenberger provides guidance into it. But the indispensable method exemplified in this book, and upon which Ellenberger repeatedly insists, is direct and sympathetic examination of original sources. With much erudition and labor, Ellenberger has read and re-read numerous ancient, medieval, Renaissance and early modern texts. Some are partially reproduced here. Perhaps the greatest merit of this volume is the example Ellenberger sets in interpreting specific passages -- from Ovid or Polybius or Strabo, from the *Encyclopedia of the Brothers of Purity*

or Ristoro d'Arezzo or Buridan, from Palissy or Steno -- with careful and un-condescending attention to their intellectual context and to the decisive importance of determining the sense (or noting the ambiguity) of key terms and phrases.

Ellenberger takes special pleasure in bringing forward texts that are neglected or unknown. Interesting cases presented here include those of Goropius (Jan Van Gorp, a 16th-century Fleming) and Gassendi. Ellenberger also enjoys tracking down the origins of errors and misconceptions that have had long lives in geology's historical lore -- an instance here is the perpetuation, in the 18th and 19th centuries, of the belief that Palissy endorsed the derivation of fossils from incursions of ancient seas. The detailed thoroughness with which Ellenberger documents the historical trail of such errors may, in a few cases, seem out of proportion to the broad scale of the book; but still these are exemplary of the focus on documentary evidence -- the historian's empirical base of argument -- that is characteristic of Ellenberger's study.

Although moderately revisionist in tone, and insistent on the need to reexamine accepted notions in light of primary sources, the main theses of *Histoire de la Géologie* will probably prove shocking only to readers who are oblivious to the scholarship of the last generation. (Ellenberger observes that this still leaves a sizable group in need of a jolt.) Quite reasonably, ancient writers are seen as developing many geological themes and problems that constituted a foundation for continuing debate in Western science, even though antiquity created no real geology. Medieval science is presented as extraordinarily fertile ground for geological thinking, whereas the Renaissance comes across as somewhat disappointing from a geological viewpoint. Steno emerges, from an extensive review of his work, as the closest thing geology has to a single founding figure. Through the major cultural changes of two millennia, the genesis of geological notions is traced with an accent on intellectual continuity. Ellenberger is inclined to account for most major geological innovations primarily by scientists' exercise of a rigorously empirical, inductive spirit.

This is an exemplary study, and it should be read by all who want to know more about the development of geology. Let me mention finally that this book is infused with an unfeigned love of geological science. Although it is critical history, it is also the outcome of a sort of genealogical investigation of the author's scientific ancestry. One senses François Ellenberger's pride and delight in making his geological antecedents speak more clearly to him, and to us. This is not the least of the attractions of this volume.

Kenneth L. Taylor, Department of the History of Science, University of Oklahoma, Norman, OK 73019, U.S.A.

**PAST, PRESENT AND FUTURE TRENDS IN GEOPHYSICAL RESEARCH.** Wilfried Schroder, ed. 1988. *Interdisciplinary Commission on History of the International Association of Geomagnetism and Aeronomy, Bremen-Roennebeck.* 342 p. Softcover. 22 DM. (Order from IAGA, Geophysical Station, Hechelstrasse 8, 282 Bremen-Roennebeck, West Germany).

The book fails to live up to its ambitious title. It is in fact a compilation of papers related to fluid-earth and space geophysics presented at the IAGA meeting in Vancouver. The best papers are well worth reading. S.G. Brush and S.K. Banerjee discuss the development of theories related to the origin of the earth's magnetic field, starting with Edmund Halley and working to the present. M. Gadsden discusses Kepler's attempts to study the effect of light refraction on astronomical observations, showing how the scientist had to deal with conflicting lines of reasoning about the thickness of the atmosphere. S. Dèbaret examines how 17th-century data on the eclipses of the Galilean satellites and the diameter of the sun are now used for purposes which were not envisioned at the time of the

experiments. He points out that since today's observations are the historic observations of tomorrow, documentation of methods, standardized units of measurement, and estimation of certainty are quite important.

Unfortunately the rest of the book has problems. The editor has done the non-English writers a disservice by not copy-editing. Misused tenses and French or Italian spellings slow down the reading but do not obscure the intent. Of more importance, there seems to have been little attempt at reviewing content and presentation. As an extreme example, one author is unaware that explosive volcanic eruptions can produce dry fogs by placing material in the upper atmosphere, and he considers only meteors. The paper on the effects of climate on history and the historiography of climate make little use of modern anthropology. Most of the remaining articles are either too telegraphic or too rambling. Two papers on the statistics of small historical data sets are somewhat out of place with the rest of the volume.

This is not a book for general enlightenment on either the history of science or the use of historical data in science. It is difficult to read. Still, several articles will be useful to those active in particular fields.

Norman H. Sleep, Department of Geophysics, Stanford, University, Stanford, CA 94305

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**HAYDEN AND HIS MEN.** *Frank Chambers, compiler, 1988. Frances Paul Geoscience literature, 50 Church Street, Hoosick Falls, New York 12090. Softcover, 108 plates. \$27.50, shipping and handling, \$2.00.*

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This book is a photographic tribute to Ferdinand V. Hayden and his men as they examine the geology and geography of the western United States. It consists of 108 photographs taken by William Henry Jackson (1843-1942) to whom this book is dedicated with the inscription "without whose photographs, there would be no book". These photographs were taken as part of the tasks of the United States Geological and Geographical Survey of the Territories in 1870-1878 which Hayden headed. They illustrate how with their transit these early geologists/geographers measured and triangulated points to produce maps and how photography was possible in the mountain wilderness with cameras of the 1870's.

Chambers selected these photographs with the help of the Photographic Library of the U.S. Geological Survey. These photographs are part of thousands of pictures which Jackson took on these field trips. Chambers notes that "for sheer beauty, his efforts in the Rocky Mountains are unparalleled. Few pictures taken today, even with the modern equipment available, can match the fantastic panoramic views he produced". Remarkable photographs of the geysers and springs in Yellowstone National Park, the Great Falls of the Yellowstone River, the Tetons, and others of Utah, Idaho, Wyoming, and Colorado are reproduced untouched as Jackson printed them 114 to 119 years ago. The pictures show geologists, packers, hunters, cooks, and horses, and all the necessary equipment for an expedition and survey in the unknown mountainous terrain in the western United States.

Gerald M. Friedman, Department of Geology, Brooklyn College, Brooklyn, NY 11210, and Northeastern Science Foundation, Inc., affiliated with Brooklyn College of the City University of New York, Rensselaer Center of Applied Geology, Box 746, Troy NY 12181-0746

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**THE TRADITION OF SCIENCE: Landmarks of Western Science in the Collections of the Library of Congress.** *Leonard C. Bruno. 1987. Library of Congress, Washington, D.C. 351 p. Hardcover, \$30. (For sale from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 Stock #030-000-00183-4).*

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"This book can best be described as an elaborate bibliographical essay." So begins the preface to this not-quite-random walk through the classic scientific works found in the U.S. Library of Congress. Although this is not a scientific history, the author has tried to treat each work in a broad historical context--a formidable task. The book is intended for anyone interested in science. For the general readership, this reviewer believes the author accomplished his goal.

After the introduction, the book is divided into eight chapters--on astronomy, botany, zoology, medicine, chemistry, geology, mathematics, and physics--and an epilogue that is an overall discussion of the history of science.

As might well be expected, the list of writers represented reads like a veritable "Who's Who" in science. The author includes very brief biographical sketches of the scientists who wrote the books he discusses. Because only the classic scientific works are listed in the bibliography, it is impossible to know where he obtained the many interesting anecdotes that are sprinkled liberally throughout the text. To have included such sources would have made the book too long, but their absence effectively precludes this book's being used as a quotable source.

The bibliography, not surprisingly, is very detailed, including the complete Library of Congress call number. The bibliography was produced by Ruth R. Freitag, whom the author acknowledges in the preface. The book contains 208 illustrations, 14 in color, reproduced from some of the listed books; the quality of this reproduction is one of the best features of this book. Also, the index is sufficiently detailed for browsing and cross-referencing.

The author for the most part identifies anyone whose name is mentioned, with one curious exception. On p. 7 is a wonderful quote by one George Sarton: "Science is not distinct from religion or art in being more or less human than they are, but simply because it is the fruit of different needs or tendencies. Religions exist because men are hungry for goodness, for justice, for mercy; the arts exist because men are hungry for beauty; the sciences exist because men are hungry for truth." Because the author clearly wishes to arouse the reader's interest in the history of science, Sarton deserves to be identified as a major science historian.

The absence of references other than the primary scientific works makes the book seem a bit elementary, but this would be an excellent book to get people interested in science, the history of science, and the Library of Congress. It would therefore make a good gift to a budding scientist at the high school or university level. Also, it should be available in all high school libraries. For practicing scientists it would make very enjoyable light reading.

Gretchen Luepke, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025

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**CONISTON COPPER: A HISTORY.** *Eric G. Holland. 1987. Cicerone Press, Milnthorpe, Cumbria, England. 312 p. Hardcover. £14.95 (available from the publishers; include £2.00 for postage and packing).*

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Walking the hills of Coniston on a sunny day in autumn in the Lake District in England is a delight. I was first introduced to



this delight as a young scientist on a guided geological tour. The day was perfect: to find trilobites in the Coniston Limestone and graptolites in the Torver slates, to walk down the actual Ash-Gill beck, to find beautiful specimens of copper ore, all in one day was magic. It was all the more magic because the "Old Man of Coniston" and his neighbouring hills shone with that typical lakeland glow of subtle brown, purple and green colours constantly changing in the cloud-modulated sunlight.

The memory of that day was instantly recalled upon seeing the cover of a book-"Coniston Copper: a History." I just had to read it.

"Coniston Copper" is written by an enthusiast and professional, Eric G. Holland, who has amassed a vast amount of material about the origin, development and personalities involved in the rise and fall of copper mining in this remote region. The author has traced the beginnings of mining hereabouts back to the year 1561. He has done this both academically and physically (to the extent of finding and digging open some of the oldest and most inaccessible of these mines). He gives us a vivid account of the trials and tribulations, the hopes and disappointments of the 16th century entrepreneurs; the working conditions, the influx of foreign skilled labour and the influence of these upon the small village community so isolated from the rest of the world.

Indeed, so isolated was Coniston in those pre-road days that all the ore mined had to be taken twenty miles by pack-horse to the nearest smelters at Keswick. This meant travelling over some of the most terrifying terrain that England can produce. As the author says, "On a stormy day in winter with the wind roaring fit to throw a man to the ground and the towering mass of Brimfell Pike lost in whirling confusion of mist, cloud and snow, there can be few places more remote or menacing than Boulder Valley at Coniston."

In the early chapters the book describes how both the mine owners and workers struggled in their own way through the Elizabethan period. As production costs rose and copper prices fluctuated, both found the effort to survive increasingly hard. With the onset of the Civil War in 1648, the mines could no longer operate and one by one began to close. By the end of the war, all the mines were completely abandoned and totally derelict.

After many false starts and much effort the mines eventually re-awoke in the late 1600s, but only on a small scale. The 18th Century began to see a considerable increase in the leasing activity for copper mining at Coniston. Actual productivity seems to have remained low, however. All this is minutely documented by the author, who supplies us with fascinating glimpses of the lives of the people involved, both the hardship and companionship existing within this intensely integrated community.

At this point in the historical narrative--always enlivened by anecdotes of political scheming, devious rivalry and subtle encroachments--the author breaks off to provide us with a comprehensive review of the techniques of copper mining employed at the time, together with accounts of the costing methods and what he calls the principles of employment. The latter were the various means by which the workers were paid. Sometimes a sliding scale known as "tutwork" was used; this depended upon the quality of the ore produced. At other times a bargain was struck between management and the leader of a working gang as to what quantity the gang would produce. This was known as "tribute," a very risky method of payment often resulting in the workers receiving no pay or even being in debt to the company at the end of, for example, a three-month contract. In such cases the company was usually kind enough to allow the debt to be carried over into the next bargaining contract!

Of course, the workers were not the only ones taking a risk. Just as today, explorations, trials, developments and new processing experiments all create a risk to capital. When these risks became a little too great for comfort, requests to reduce royalty payments to the aristocratic landowners were often made. But as likely as not they received this sort of reply--from Lady le Fleming's comments to

her solicitor to be conveyed to the mine owners: "...they undertook the adventure at their own risk and ought to abide by the consequences. If they think they can find a lost vein, or by driving a new level find a new one, they will do one or the other for their own advantage." No sympathy for the entrepreneur there!

As in any form of mining the work was dangerous. The early methods of shot blasting, for example, ensured that serious injury and perhaps death occurred from time to time. Even when the consequences of actions like tamping explosive powder with an iron bar were well-known and expressly forbidden by the management, accidents from this cause continued to happen because some miners would still brave the action in order to save time. Such explosions were still occurring at the end of the 19th Century, and the author has recorded the details of these: the cause of the accident, the efforts to save the victim, the effects on family and dependents, the slow recognition of the need for compensation (for not all accidents were the result of foolhardiness).

The latter part of the book takes us in great detail--almost on a day-to-day basis--through all the problems facing the various entrepreneurs who tried their hand at running the ever-more-extensive and difficult complex of interconnected tunnels forming the Coniston mines. Some of these adventurers failed through lack of mining skill or management competence; others made a small return on their investment. No one made a fortune. Yet there was, and is, something about these mines that constantly entices risk-takers and challenges the knowledgeable.

The mines officially closed in the 1950s, although sporadic efforts to re-work them have continued into the 1980s. Currently they are designated as listed buildings by the United Kingdom Department of the Environment, which means that, being part of the nation's industrial archeological heritage, they cannot be substantially altered now.

This book is a tour de force in its own specialized field, the result of dedicated work by one man whose practical knowledge about these mines has grown over the past 40 years and is here so well expressed. The narrative is supported by numerous line drawing, sketches, photographs and tables, which help the imagination as the complicated saga unfolds. It contains a glossary of terms and is well indexed.

In my opinion, this book deserves to be on the bookshelf of anyone interested in the history of Man's struggle to exploit the mineral wealth of the earth. But, if any reader ever visits this fascinating and rewarding area at Coniston, then the companion book "Coniston Copper Mines--Field Guide" by the same author and publisher (1981, papercover, £2.95) is a must, if only for one's health and safety.

Philip Holroyd, 11 Carriage Drive, Frodsham, Cheshire WA6 6DU U.K.

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**HAYDEN AND HIS MEN.** *Frank Chambers, compiler. 1988. Francis Paul Geoscience Literature, 50 Church Street, Hocsick Falls, NY 12090. No pagination, 108 plates. Softcover. \$27.50. (To order, send check plus \$2.00 shipping to publisher).*

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The subtitle to this book has an old-fashioned ring: "Being a selection of 108 photographs by William Henry Jackson of the United States Geological and Geographical Survey of the Territories for the years 1870-1878." It is, however, appropriate for this publication because it reflects the era in which the original 8- by 10-in. photographs were taken. The compiler chose to publish them unretouched to give the book as much flavor as possible. In this, he succeeds admirably.

A short preface and introduction give the reader all the information necessary to understand and enjoy these pictures. The writing is tight; no words are wasted. As Chambers points out, thousands of photographs were taken by William Henry Jackson during the Hayden

surveys, but none of them appeared in any of the voluminous accounts published (cost appears to have been the obvious reason). Nonetheless, many of Jackson's pictures were used by Hayden to influence members of the House and Senate who initially opposed the idea of establishing Yellowstone as a national park. Pictures used in this lobbying campaign were from the Grand Canyon of the Yellowstone (plate 34), Upper and Lower Falls of the Yellowstone River (plates 36, 37, 38), and many from Geyser Basin (e.g., plates 50-54). The rest, as they say, is history.

The reproduction of the photographs is very good, although the originals are not surprisingly of varying quality. The best are those panoramic shots in which there were no moving objects to cause blurs.

However, where the blurring of rushing water conveys a feeling of real movement, as in the Grand Canyon of the Yellowstone (plate 34) and at Tower Falls on Tower Creek (plate 55), the quality is enhanced. Any people in the photographs are nearly always identified.

Anyone who enjoys classic photography will enjoy this book. It would also be a good companion in the Yellowstone/Teton country, to compare views of then and now.

Gretchen Luepke, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025

## 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 are requested to send them to the Editor.

Ambraseys, N.N. and Adams, R.D., 1989, Long-term seismicity of northern Armenia confirmed by the historical record: *Earth in Space*, v. 1, No. 7, p. 8-10.

Amstutz, G. C., 1988, Johannes Menge, Begründer der australischen Mineralogie, in Johannes Menge, *Wanderer durch die Welt*, Steinau, FDR, West Germany, p. 3-12.

Amstutz, G. C., 1988, Hans Schneiderhöhn - ein Versuch einer Standortbestimmung seines erzenetischen Lebenswerkes: *Erzmetall*, v. 41, No. 7/8, p. 375-378.

Babicz, 1989, States and Earth Sciences in Modern Times/ Wechselbeziehungen zwischen Staat und Geowissenschaften: International Congress of History of Science, 1-9 August - Science and Political Order/Wissenschaft und Staat, Hamburg-Munich, Second Circular, p. 29.

Barrett, Paul H., Freeman, R.B. and Gautrey, Peter, eds., *The Works of Charles Darwin*. London: Pickering and Chatto, Ltd. 29 volumes. v. 1-10 £470. v. 11-20 £420. v. 21-29 £350. Hardcover.

Berg, Thomas M., 1988, John James Stevenson: *Pennsylvania Geology*, v. 19, No. 5, p. 22-25.

Berkeley, E. and Berkeley, D.S., 1988, George William Featherstonhaugh: The first U.S. Government Geologist. University of Alabama Press, Box 870380, Tuscaloosa, AL 35487-0380, 352 p. \$39.95 plus \$1.50 postage and handling.

Blust, Sandra D., 1988, Arthur Winslow: *Pennsylvania Geology*, v. 19, No. 5, p. 29-30.

Bond, G.C. and Kominz, M.A., 1988, Evolution of thought on passive continental margins from the origin of geosynclinal theory (~ 1860) to the present: *Geol. Soc. America Bull.*, v. 100, p. 1909-1933.

Branagan, D.F., 1988, The history of geologic mapping in Australia, in Borchardt, D.H., ed., *Some sources for the history of Australian science*. Historical Bibliography Monograph No. 12. History Project Incorporated.

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Buttner and Kohler, 1989, History of Earth Sciences: International Congress of History of Science, 1-9 August - Science and Political Order/Wissenschaft und Staat, Hamburg-Munich, Second Circular, p. 29.

Carey, S.W., 1988, Theories of the earth and universe - a history of dogma in the earth sciences. Stamford University Press, Calif., 413 p. \$45.00.

Carlé, Walter, 1988, Carlé's Biography of Ferdinand von Hochstetter, translated by Fleming, C.A., Kermodé, L.P., Northcote-Bade, J. and Spörli, K.B. *Geol. Soc. of NZ*, 75A Argyle St., Herne Bay, Auckland, 2, New Zealand: Geological Society of

New Zealand Miscellaneous Publication No. 40, 24p. NZ\$3 plus \$1.50 parking and postage.

Clark, Robert D., 1988, The Odyssey of Thomas Condon: Irish Immigrant/Frontier Missionary/Oregon Geologist. Portland, Oregon: Oregon Historical Society Press, 592 p. \$29.95 (cloth).

Corsi, Pietro, 1988, The age of Lamarck. Evolutionary theories in France, 1790-1830. Univ. of California Press. 360 p.

Darragh, Thomas, 1987, The Geological Survey of Victoria under Alfred Selwyn, 1952-1868: *Historical Records of Australian Science*, v. 7, p. 1-25.

Decker, E.R., Heasler, H.P., Buelow, K.L., Baker, K.H. and Hallin, J.S., 1988, Significance of past and recent heat-flow and radioactivity studies in the Southern Rocky Mountains region: *Geol. Soc. America Bull.*, v. 100, p. 1851-1885.

Delano, Helen L., 1988, J. Peter Lesley: *Pennsylvania Geology*, v. 19, No. 5, p. 16-18.

Dodge, Clifford H., 1988, Charles Albert Ashburner: *Pennsylvania Geology*, v. 19, No. 5, p. 5-8.

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Doskey, John, 1988, The European Journals of William Maclure. *Memoirs of the American Philosophical Society*, v. 171, 815 p. \$40.00 (Cloth).

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- Fritz, Mary, 1989, How one theory changed the world: *Explorer*, v. 10, No. 4, p. 28-29, 31-32.
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- Laughrey, Christopher D., 1988, Persifor Frazer, Jr.: *Pennsylvania Geology*, v. 19, No. 5, p. 13-15.
- Lee, W.H.K., Meyers, H. and Shimazaki, K., 1988, Historical seismographs and earthquakes of the world. 513 p. \$45.00.
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- Malin, S.R.C., 1988, Sydney Chapman - a pioneer in study of earth's magnetic field: *Earth in Space*, v. 1, No. 3, p. 4-7.
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## OFFICER REPORTS

### REPORT OF THE SECRETARY -- 1988

In its seventh year the Society continued to grow in membership, and EARTH SCIENCES HISTORY continued to be a valuable forum for information concerning the development of the geosciences.

The Society's evolution in 1988 was largely gradualistic, but the increase in dues represented a small but saltational step. It is gratifying to report that 94% of the members voting agreed to raise annual dues from US \$15 to US \$20. The catalyst for the Council's suggestion to elevate dues was the 1988 rise in U. S. Postal Service fees, but publication costs and the desire to expand services also dictated a new fee structure. We thank you for your recognition of the fact that membership in H.E.S.S., with its two issues per year of EARTH SCIENCES HISTORY, is a genuine bargain, particularly in these days of exceptionally high costs for professional journals.

Officers elected in 1988 were President-Elect Robert H. DOTT, Jr. (University of Wisconsin-Madison) and Councilor François ELLENBERGER (Universite de Paris-Sud). Dr. Dott will serve as President in 1990 and Dr. Ellenberger will be on the Council in 1989 and 1990.

Along with the good news about the Society's growth, positive response to the dues increase, and strong leadership, I must report the sad news that one of our founders, Claude C. ALBRITTON, Jr., died in November 1988. It is fitting that EARTH SCIENCES HISTORY will issue an Albritton Commemorative Volume which will include papers on "The Idea of Time," as presented at the INHIGEO Symposium during the 28th International Geological Congress (Washington, D. C., July 1989). Dr. Albritton, as most of you know, wrote *THE ABYSS OF TIME* (1980) and was greatly interested in the multifaceted nature of time. Also lost to the Society in 1988 was Hollis D. HEDBERG, known mostly for his work in stratigraphy and petroleum exploration, but also a dedicated historian of geology.

Please do your part for the Society by inviting new members to join and by sending me any changes in address or items of potential value for the Miscellanea Column in ESH. Membership brochures are available from me if you would like to distribute them to a colleague, particularly a librarian friend. Ellis Yochelson and Bob Dott are hopeful that in 1989 and 1990 we will be able to expand our base of institutional subscribers, so your efforts in that direction will be greatly appreciated.

Respectfully submitted,  
Kennard B. Bork

### REPORT OF THE TREASURER FOR 1988

The revenues of the History of Earth Sciences Society continue to be just sufficient to produce Earth Sciences History and to provide part of the officers' postage expenses. The recently-approved dues increase will brighten the picture somewhat, but the Society is still only barely solvent.

The continued health of the journal will be aided if Society members will encourage friends and colleagues to join HESS, and if they will recommend that their institutional libraries subscribe to Earth Sciences History.

The Society owes thanks to the following members who generously added contributions to their dues payments:

#### 1988 Contributors to HESS

Duncan Carr Agnew, Michele Aldrich, Al Armstrong, Roger L. Batten, Joanne Bourgeois, Arthur L. Bowsher, James E. Brooks, A. Brouwer, G. C. Cadee, Margaret D. Champlin, Gilbert Corwin, Robert H. Dott, Jr., Ellen T. Drake, Grenville Draper, Bruce Francis Elchison, John S. Ferguson, Jr., Henry Frankel, Barry A. Frey, Gerald M. Friedman, David H. Geiser, Robert N. Ginsburg, W. Dean Grafton, Mott Greene, David Hight, Jennifer Hines, Alan Horowitz, B. F. Howell, Jr., Isao Imai, William M. Jordan, Arthur F. Krueger, Rachel Laudan, Alan E. Leviton, Joel J. Lloyd, Kathleen Mark, Ursula B. Marvin, Alan P. Mason, Dove Menkes, Robert C. Milici, Anne Millbrooke, Barbara L. Narendra, S. E. Newcomb, H. Obodda, Thomas R. Osberg, Alexander M. Ospovat, Leroy E. Page, George Rapp, Jr., Gerald P. Salisbury, Marie Siegrist, Brian J. Skinner, David Spalding, Myron T. Sturgeon, Tsutomu Tanimoto, J. Cotter Tharin, Walter H. Wheeler, Owen L. White, Leonard G. Wilson, Hatten S. Yoder, Jr.

Respectfully submitted,  
Kenneth L. Taylor

*Selective Guide to the Collections*, Institute Archives and Special Collections, Massachusetts Institute of Technology Libraries (108 pages, 1988), is a catalogue of archival and manuscript collections that document the founding and growth of the Institute and its five schools (Architecture and Planning, Engineering, Humanities, Management, and Science); the Institute's educational and research activities (particularly in science and engineering); and non-MIT individuals and organizations whose activities complement MIT's holdings. Emphasizing the history of contemporary science and technology and their impact on society, the collections illustrate the growing influence of government and industrial resources on research, as well as the role of academic experts in the formation of science policy. Copies may be ordered for \$7.50 from the Institute Archives and Special Collections, Room 14N-118, Massachusetts Institute of Technology, Cambridge, MA 02139. Checks should be made payable to the Massachusetts Institute of Technology.



## ANNOUNCEMENTS

### NOTED GEOLOGIST CLAUDE C. ALBRITTON DIES

Claude C. Albritton, Jr., Hamilton Professor Emeritus of Geology at Southern Methodist University in Dallas, died Nov. 1 after a short illness. He was 75.

On the day Albritton died, his colleague, Dr. James Brooks of SMU's Institute for the Study of Earth and Man accepted for him the prestigious Geological Society of America's Archaeological Geology Award at the Society's Centennial meeting in Denver. Albritton was the second person to receive it.

An endowed chair bearing Albritton's name, made possible through a \$1 million gift from former student Roy M. Huffington and his wife Phyllis, of Houston, was added in recent years to the Department of Geological Sciences at SMU.

Albritton's research is noted for bridging the gaps between the disciplines of archaeology and geology. His studies into the geology of archaeological sites took him to Mexico, Egypt and Ethiopia, but much of his work concerned sites in Oklahoma and his native Texas. He was co-author with SMU professor Fred Wendorf in 1955 of *The Midland Discovery*, an account of Pleistocene human remains found on the High Plains of Texas. An earlier work, co-authored with J.D. Boon, detailed meteor impacts and their effects on earth. It foreshadowed an upcoming work of his own, entitled *Catastrophic Episodes in Earth History*, to be published in London this spring.

### Symposium on the History of The Petroleum Industry planned in 1989

The American Association of Petroleum Geologists (AAPG) will sponsor a Symposium on the History of the Petroleum Industry September 17-20, 1989 in Titusville - Oil City, Pennsylvania with the cooperation of the Drake Well Museum and Oil Creek State Park. This Symposium should be a unique event, for the setting is in a beautiful area along Oil Creek in northwest Pennsylvania. There, the Drake Well (1859), only a mile or so from Titusville, initiated the first oil belt in the United States.

International in scope, this first symposium will be directed to oil and gas exploration. Invited speakers from around the world will present papers on early exploration efforts in various basins and countries such as Brazil, the Middle East, the Arctic, Venezuela, Africa, Mexico, the United States and elsewhere. Jeffery C. Greenawalt, Chief Geologist of Kerr-McGee Corp., Pittsburgh, is the Technical Program chairman.

Special field trips will be conducted, one of them is a train ride down Oil Creek to include the sites of Pioneer and Petroleum Centre. Participants can reconstruct the heyday of the ghost towns when they were in full bloom. Pithole will be one of them. The equipment and casings of old gas and oil fields hidden in the woods will be seen plus some of the famous early wells of the first decade of the oil industry. Upper Devonian, Lower Mississippian and Lower Pennsylvania strata will be observed during the field trips.

The keynote speaker will be Parke A. Dickey, who wrote the report, "Oil Geology of the Titusville Quadrangle, Pennsylvania", as published by the Pennsylvania State Topographic and Geologic Survey in 1941.

Schröder, Wilfried (ed.), PAST, PRESENT and FUTURE TRENDS IN GEOPHYSICAL RESEARCH, Selected papers from the symposia of the Interdivisional Commission on History of IAGA during the IUGG Assembly, held in Vancouver, 1987

Bremen. 1988. 343 p, fig. and tables, 22,--DM

**Contents:** Kopecky/Kuklin, Maunder-Minimum - Ribes et. al. Solar envelope during the Maunder-Minimum - Debarbat: Sur l'usage de certaines données hist. pour l'étude de l'environnement terrestre - Legrand/Simon: Use of historical reports in geomagnetism - Hersè: Bright nights S.-G. Brush/S.K.Banerjee: Geomagnetic secular variation and theories of earth's interior - Gadsden: Kepler's atmospheric physics - Wiederkehr: G Neumayer and the foundation of the geophysical-nautical observatory in Melbourne 1857 - Valensise/Colacino: Impact of climate and environment on history - Gregori/Santoleri et. al.: Analysis of point-like historical data series - Colacino/ Gregori et. al.: Climate as a historiographical problem - Fiorentino/Gregori et. al.: Multi-variate analysis of historical data series - Heikila: Review of magnetic reconnection and viscous interaction

Selected papers for a symposium held at the IUGG Assembly in Vancouver (1987); may be ordered (in DM) from Schröder at the following address:

Prof. Dr. Wilfried Schröder  
Geophysical Station  
Hechelstrasse 8  
D-2820 Bremen-Roenebeck  
WEST GERMANY (FRG)

The Drake Well Museum, chosen for this annual event, is very fitting for the subject of the History of the Petroleum Industry; a concept conceived and planned by General Chairman Samuel T. Pees, an exploration geologist of international experience, now located in Meadville, Pennsylvania.

The AAPG looks upon this Symposium as a special occasion in that it is so clearly focused on our roots and heritage and will help document the beginnings of oil exploration and point to its future. The Symposium is planned as an annual event, passing on to other societies in the industry.

for information contact:

Telephone: AAPG, Tulsa, OK (918) 584-2555

Mail: AAPG Meetings Coordinator  
Barbara G. Caves  
P.O. Box 979  
Tulsa, OK 74101

or Samuel T. Pees, General Chairman  
Masonic Building 224  
Meadville, PA 16335  
Tel.: (814) 336-1229

NEWSLETTER 21 OF THE INTERNATIONAL COMMISSION ON THE HISTORY OF GEOLOGICAL SCIENCES (INHIGEO), PUBLISHED IN MOSCOW, U.S.S.R., IN 1988 REACHED MY DESK ON APRIL 6, 1989. IT INCLUDES REPORTS FROM AUSTRALIA, AUSTRIA, BRAZIL, CHINA, CZECHOSLOVAKIA, FDR GERMANY, FRANCE, HUNGARY, POLAND, SWEDEN, UNITED KINGDOM, U.S.A., U.S.S.R., AND VENEZUELA AS WELL AS BOOK REVIEWS, MISCELLANEOUS ITEMS, CONFERENCE REPORTS, AND MEMORIALS.

Gerald M. Friedman  
Editor

## BRAZIL

### I Coloquio Brasileiro de Historia do Conhecimento Geológico -- 05/07/88

Included were:

Conferencia inaugural: "Present and Future of the History of Sciences" - Prof.Dr. Martin Guntau/Univ. de Rostock RDA.

"History of Geological Society of London-its links to Latin America" - Prof.Dr. John Thackray/Geological Museum,London.

"The relation of past and present of the Earth as epistemological problem in geology" - Prof.Dr. Martin Guntau/Univ. de Rostock - RDA.

Mesa Redonda

"Fontes para a Historia das Ciencias Geologicas"

Coordenadora: Profa.Dr. Heloisa Beloto IEB/USP.

#### Participantes:

Dr. Hugh S. Torrens (University of Keele/Inglaterra): "The importance of geological specimens and collections as sources for the History of Geology".

Prof.Dr. Juan J. Saldana G. (Pres. da Soc. Latino Americana de Hist. das Ciencias e da Tecnologia): "El Programa de Base de Datos de Fuentes Documentales para la Historia de las Ciencias y la Tecnologia".

Dr. Carlos Oiti Berbert (Diretor da DGM/DNPM): "O Sistema de Informacao em Geociências - SIGA".

Repres. Instituto Geologico: "O Arquivo Historico do Instituto Geologico".

Repres. Centro de Logica, Epistemologia e Historia da ciencia/UNICAMP: "O Arquivo e Biblioteca de Historia das Ciencias no Brasil".

Painel

"Memoria das Ciencias Geologicas na America Latina".

#### Participantes:

- Prof.Dr. Josué Camargo Mendes (IG/USP);
- Prof.Dr. Milton Vargas (Soc.Bras. Hist. da Ciência)
- Dr. Franco A. Urbani P. (Univ. Central de Venezuela)

## Niels Steensen (Steno) canonized in Rome

After Nicolaus Steno (1638-1636) at an age of 28 years met geology in the field, he gradually changed his scientific sphere of interest from the medico-biological to the geological.

His great merit was that he started doing real field geology in Toscana and in a simple language could report what he had seen in nature with his own eyes. This had never been attempted earlier in history by any scientist.

During his work Steno gradually became convinced that the fossils he found in the rocks were remains of once-living animals and not formed by vis plastica as a result of the merry games of nature. On this subject he remarked: Since fossils are not formed in the rocks today, and since it is probable that the material in which they are embedded today at some time was soft and watery, what is wrong in assuming that these bodies are the remains of animals that once lived in these waters? He went so far as to determine several of them to genus (*Ostrea*, *Pecten*). In this way Steno became the founder of that branch of geology built on palaeontology.

Steno clearly realized that the present day occurrence of beds of old sea deposits with marine snails and mussels on dry land, meant that immense geological forces must have been active, and that mountains must be the result of the interaction of a number of these forces. In other words he was fully aware of the significance of dynamic geology.

It is within the field of crystallography, however, that Steno has reached his greatest fame; also in this field he was aided by his extremely good powers of observation. He observed crystal growth with great precision, and described what he saw with equal accuracy. Even details, such as minute fluid inclusions were not missed by his sharp eyes. It is fully justified that the first crystallographic law on the constancy of the edge angle carries his name "Steno's Law".

Speech delivered by Prof. A. Noe-Nygaard at the canonization of Niels Steensen in Rome. October 23, 1988 (translated by Finn Surlyk from Danish).

## History of Oceanography at the 18th International Congress on the History of Science. West Germany 1989

A one-day symposium titled *Historical research on oceanography 1800-1950* will be held in Hamburg between 1-4 August 1989 (exact day still uncertain) during the Eighteenth International Congress on the History of Science (ICHS-XVIII). Speakers from the United Kingdom, West Germany, Monaco, the U.S.A. and Canada will consider topics such as the interest of the German Reichsmarine in oceanography between the wars, the early organization of oceanography in Britain, the history of expeditions, and recent historiography of oceanography. Time has been scheduled for discussion at the end of morning and afternoon sessions.

A meeting of the Commission of Oceanography, Division of History of Science, International Union of the History and Philosophy of Science, open to all, will be held at the end of the afternoon session.

For information and registration forms for the ICHS-XVIII contact CPO HANSER SERVICE, Postfach 1221, D-2000 HAMBURG- Barsbüttel, Federal Republic of Germany

Eric Mills, Dalhousie University