History of Physics Newsletter

VOLUME I, NUMBER 2 FEBRUARY 1983

DIVISION NEWS

1983 Sessions

The Division is sponsoring sessions of invited papers at three APS general meetings in 1983: New York (24-27 January), Baltimore (18-21 April), and San Francisco (20-23 November). Programs for the New York and Baltimore sessions are listed below. The annual business meeting of the Division will also be held at the Baltimore meeting.

HISTORY OF PHYSICS DIVISION MEETINGS

Recent Physics

A session on the history of post-war physics as fostered by the AIP Center for History of Physics will be held at the APS Spring Meeting in Baltimore, Thursday morning, 21 April 1983. Check the APS Bulletin for exact time and place.

"Atoms for Research: The Emergence of the Brookhaven National Laboratory" - Allan Needell, National Air & Space Museum.

"The Flowering of Solid State Physics in the Aftermath of World War II" - Lillian Hoddeson, Illinois.

"How People became afraid of Nuclear Reactors" - Spencer Weart, AIP Center for History of Physics.

After all three presentations, the panel will discuss more generally the themes, methods, and sources in historical research on recent physics at the Center and elsewhere. Roger Stuewer (Minnesota) will chair the session and lead the discussion.

Business Meeting

The annual Business Meeting of the Division will be held immediately after the session in Baltimore, 21 April, 1983. Check APS Bulletin for time and place.

Experimental Physics

A symposium on the History of Experimental Physics, jointly sponsored by the Division and by the American Association of Physics Teachers, was held at the APS/AAPT Annual Joint Meeting, New York City, 25 January 1983:

"The Roles of Experiment in Newton's New Science of Color" - Alan Shapiro, Minnesota.

"Cavendish, Coulomb, and the Measurement of Electricity" - Samuel Devons, Columbia.

"Maxwell as an Experimental Physicist" - C. W. F. Everitt, Stanford.

"Einstein's Experiment" - Peter Galison, Harvard.

Also at the New York meeting, in a symposium arranged by the Society of Physics Students, on January 24, 1983, there was an invited lecture: "A History of Nuclear Fear" - Spencer Weart, AIP Center for History of Physics.

Theoretical Physics

A symposium on "Mechanics, Relativity, and the Rise of Theoretical Physics" was presented at the APS Spring Meeting, Washington, 27 April 1982. Since part of the program was omitted from HPN no. 1 (because of an editing error) we give the entire program here:

"The History of Physics Division in the American Physical Society" - Martin J. Klein, Yale.

"Mechanics and the Center of German Physics, 1790-1840" - Kathryn Olesko, Georgetown.

"Mathematicians vs. Physicists - Mechanics in the early 19th Century" - Elizabeth Garber, SUNY-Stony Brook.

"The Climax of the Relativity Rumpus in Germany" - Paul Forman, Smithsonian.

"Paul Ehrenfest and Theoretical Physics in the United States" - Martin J. Klein.

"Percy W. Bridgman and the Special Theory of Relativity" - Arthur I. Miller, Lowell University and Harvard University.

The History of Physics Newsletter (HPN) is published by the Division of History of Physics of the American Physical Society. It is distributed free to all members of the Division. Others may subscribe at $10 per volume (5 issues, total of about 100 pages); there is an additional cost of $5 for foreign subscribers if they want copies sent by air mail. We expect to publish 2 or 3 issues each year. A few free sample copies of issue no. 1 are still available on request to the Editor.

HPN will publish news of the Division, including announcements of sessions of papers at AP meetings; notices of positions which might be filled by historians of physics, and of grants and fellowships for which they may apply; notes and queries on various topics; information about meetings, journals, societies and projects related to history of physics; and summaries of publications and work in progress. We do not publish substantive research articles or book reviews. The Editor welcomes letters, suggestions, summaries and news items.

Editor: Stephen G. Brush, Department of History and Institute for Physical Science & Technology, University of Maryland, College Park, MD 20742 (301/454-2724). Associate Editors: Kathryn Olesko, Department of History, Georgetown University, Washington, DC 20057, and George A. Snow, Department of Physics & Astronomy, University of Maryland, College Park, MD 20742.

Executive Committee

By a mail ballot the Executive Committee of the Division voted to approve a request from Gerald Holton, on behalf of the History of Science Society, to purchase mailing labels for the membership of the Division, in order to assist the endowment campaign of the Society. Members who wish to express an opinion on the use of the mailing list for such purposes are welcome to contact any member of the Executive Committee.

Membership

As of 1 January 1983, there were 1471 members of the Division; several more have joined since then, and in addition there are 31 non-member subscribers to HPN.

Nominating Committee

Martin J. Klein, Chairperson of the Division, has appointed the following to serve as the Nominating Committee: Laurie M. Brown, Northwestern (chairperson); Max Dresden, SUNY-Stony Brook; Paul Forman, Smithsonian; K. C. Wali, Syracuse. Nominations and the election ballot will be included in the next issue of HPN.

ANNOUNCEMENTS

Summer Seminars

The National Endowment for the Humanities will sponsor 84 eight-week seminars for college teachers during the summer of 1983. Teachers selected to attend will receive a stipend of $2,700 to cover travel expenses to and from the seminar location, books and other research expenses, and living expenses. The purpose of the program is to provide opportunities for faculty at undergraduate and two-year colleges to work with scholars in their fields at institutions with library collections suitable for advanced research. The 1983 Summer Seminars for College Teachers brochure, which lists seminar topics, directors, dates, and locations will be available locally from department chairpersons or from the Division of Fellowships and Seminars, MS 101, NEH, 806 15th St., NW, Washington, DC 20506. Deadline for submitting applications to directors is April 1, 1983.

The following seminars may be of particular interest to readers of HPN. Application forms and further information may be requested from the directors.

"Reappraisals of the Scientific Revolution" - Robert S. Westman, Department of History, University of California, Los Angeles, CA 90024. June 20 - August 12, 1983.

Summary: In the past 20 years, many remarkable developments have occurred in the historiography of the scientific revolution. This seminar will examine selected areas where recent scholarship has restructured or challenged our understanding of major scientific thinkers and the process of scientific change. Among the topics to be considered are: Newton's alchemical investigations; the creation of the Newtonian world view; the

discovery and reception of Copernicus' heliocentric theory; the trial of Galileo; Renaissance magic and science; Puritanism, capitalism, and the scientific revolution. As a central objective, the seminar will study how historians of this period have created different images of science by what they have chosen to include or exclude from their accounts. Applications are invited from teachers of history and of the physical sciences, as well as philosophy, sociology, and theology.

"History of Modern Physical Science" -Stephen G. Brush, Institute for Physical Science & Technology, University of Maryland, College Park, MD 20742. June 27 - August 19, 1983.

Summary: This seminar will survey the major discoveries and theories of 19th-and 20th-century physics, astronomy, and geophysics. The emphasis will be on transformations in ideas about the structure and evolution of the physical universe on the atomic, terrestrial, and astronomical levels. Readings and discussions will explore the process by which scientific ideas have been developed and established or refuted, as well as their philosophical significance and possible relations to a broader scientific or cultural context. The topics will include: cosmology and cosmogony, quantum theory and the assault on realism, entropy and indeterminism, relativity, and current historical, philosophical, and sociological controversies about the nature of scientific revolutions. Teachers of various disciplines in the humanities and social sciences are encouraged to apply. A background in physical science is not required.

"Political Images: Science and Ideology during the Cold War, 1945-1960" - D. Paul Thomas and Gene I. Rochlin, Department of Political Science, University of California, Berkeley, CA 94720.

Summary: This seminar will examine the relationships between the growth and institutionalization of American science and the ideology and practice of the Cold War in the period 1945-1960. The direction and nature of scientific expansion in this period cannot be viewed as developing separately from the political and cultural climate, which came to assign it new social roles, both practical and mythic. Nor can the Cold War be considered simply as independently developing background, to be treated in isolation from the increasingly institutionalized and politicized scientific and technological developments. Participants will examine these reciprocal relationships comparatively, in broad terms that deal with social and cultural representation as well as analytic and historical studies. Topics for discussion will include: Hiroshima and the birth of the Cold War; Oppenheimer and the physicists; cultural representations in film and fiction; HUAC, Hollywood, and the Blacklist; and growth of the military-industrial-scientific-university complex. The seminar is intended for teachers from a broad spectrum of backgrounds and humanistic disciplines.

Book Prize

The Pfizer Award of the History of Science Society ($1500 and a medal) is given each year for a recent book by an American or Canadian author. For further information contact Arthur Donovan, Center for the Study of Science in Society, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061.

Maxwell Papers

An edition of James Clerk Maxwell's letters and manuscripts on kinetic theory and Saturn's rings has been prepared by S. G. Brush, C. W. F. Everitt and E W. Garber. The first volume will be published in 1983 by the MIT Press.

Peter Harman is preparing an edition of The Scientific Letters and Papers of James Clerk Maxwell, to be published by the Cambridge University Press. He would be very grateful for information about the location of Maxwell manuscripts, for instance from scholars who have encountered Maxwell letters in their own work on 19th-century science. Any information, which will be gratefully received and acknowledged, should be sent to: Dr. P. M. Harman, Deparment of History, University of Lancaster, Lancaster LA1 4YG, England.

Smithsonian Exhibit

A new major gallery on solar and stellar astronomy will open at the National Air and Space Museum of the Smithsonian Institution in June 1983. Titled "Stars," it will give a popular exposition of both ground- and space-based astronomy. A historical progression of instruments flown on V2 rockets and Aerobees, in the OSO series and on the Skylab Apollo Telescope Mount, will highlight how the Sun has been studied from space during the past 30 years. Major astronomical satellites will be exhibited including "Uhuru," the International Ultraviolet Explorer, and "Copernicus."

The exhibit will also use video and graphic technique to illustrate some of the major ideas that have emerged in the "new astronomy" of the past two decades. The curator of the exhibition is Dr. David H. DeVorkin of the Museum's Department of Space Science and Exploration.

BOOK SERIES

(Editor's note: items in this section announce plans for forthcoming publications and series which may be of interest to prospective authors as well as to readers. Summaries of books already published may be found in the section at the end of HPN.)

British Society for History of Science

The British Society for the History of Science started publishing a series of monographs in 1979. Recent titles include:

Rationality and Ritual: The Windscale Inquiry and Nuclear Decisions in Britain, by Brian Wynne (1982)

The Royal Society and its Fellows 1660-1700: The Morphology of an early scientific institution, by Michael Hunter (1982).

The series is edited by Roger Smith, Department of History, University of Lancaster, Lancaster LA1 4YG, England.

Philosophy & History of Science

The "Pittsburgh Series in the Philosophy and History of Science," edited by Adolf Gruenbaum, Larry Laudan, and Nicholas Rescher, is now being published by the University of California Press. Inquiries may be sent to one of the editors at the Center for Philosophy of Science, University of Pittsburgh.

Science for the Public

The Commonwealth Fund is starting a series of books by scientists for the lay reading public, to explain the discoveries and work now underway on the frontiers of science. The series is edited by Lewis Thomas. Scientists interested in applying for grants to write a book for this program should send a brief summary of their proposal, plus a curriculum vitae and a bibliography, or send for the brochure explaining the series; write to The Commonwealth Fund Book Program, Memorial Sloan-Kettering Cancer Center, 1275 York Avenue (Room 604, Schwartz Hall), New York, NY 10021.

Bibliographies

A series of bibliographies in the History of Science and Technology is being published by Garland (New York) under the general editorship of Robert P. Multhauf and Ellen Baker Wells at the Smithsonian Institution (Washington, DC). A summary of the first one, by David DeVorkin on The History of Modern Astronomy and Astrophysics, appeared in HPN, no. 1, p. 18. The following are scheduled for publication in 1983 or 1984:

The History of Science and Technology in the United States by Marc Rothenberg, Joseph Henry Papers, Smithsonian

The History of the Earth Sciences by Roy Sydney Porter, Wellcome Institute, London

The History of Mathematics by Joseph Dauben, Herbert H. Lehman College of CUNY

The History of Chemical Technology by Robert P. Multhauf, Smithsonian

Volumes under contract include

The Scientific Revolution by Theodore M. Brown and Kathleen H. Parrow, Department of History, University of Rochester

Modern Physics by Stephen G. Brush, IPST, University of Maryland, College Park, and Lanfranco Belloni, Institute of Physical Science, University of Milan

Meteorology and Geophysics by Stephen G. Brush and Helmut Landsberg, IPST, University of Maryland, College Park

Classical Physics, by R. W. Home, Department of History and Philosophy of Science, University of Melbourne

There is a 15% discount for standing orders for the entire set. For details about ordering contact Garland Publishing, Inc., 136 Madison Avenue, New York, NY 10016 (212/686-7492).

Earth Sciences Reprints

Physicists may be interested in certain volumes of this series, which has now reached 75 volumes. Published by Hutchinson & Ross (Stroudsburg, PA) and edited by Rhodes Fairbridge (Columbia), each volume is intended to provide a synthesis of some specific topic of contemporary interest. It usually takes the form of facsimile reprints, or extended extracts, of the key papers in the

history of that subject, together with discussions and a "state-of-the-art" introduction by the volume editor. Efforts are made to unearth (& sometimes translate) some of the more inaccessible foreign papers. The usefulness of each volume rests on its role in bringing scattered data and ideas together in one spot, focussed to be sure, but relatively unbiased, thanks to the use of the original authors' own words, and not rephrased in textbook writers' jargon with its attendant prejudices.

Volumes of potential interest include, for example, Geochronology: Radiometric Dating of Rocks and Minerals (C. T. Harper); Philosophy of Geohistory (C. C. Albritton); Tektites (V. E. & M. A. Barnes); Physical Hydrogeology (F. A. Freeze & W. Back); Fabric of Ductile Strain (M. Stauffer); Meteorite Craters (G. J. H. McCall); Geology of the Planet Mars (V. Gornitz).

The series is marketed through S & E Division, Van Nostrand Reinhold Co., 135 W. 50 St., New York, NY 10020 (or Wokingham, England). For further information contact Dr. R. W. Fairbridge, 420 Riverside Dr., 2B, New York, NY 10025.

Wisconsin

The University of Wisconsin Press announces a new series of books, Wisconsin Publications in the History of Science and Medicine, under the general editorship of William Coleman, David Lindberg, and Ronald Numbers. The series will be broad in coverage, both chronologically and topically, and will include the history of technology and the social relations of science. Although the editors are particularly interested in receiving book-length manuscripts by single authors, they will also consider edited collections that are devoted to a well-defined topic and editions and translations that include substantial interpretative or historiographic materials. Authors are invited to discuss current or future projects with any of the editors, c/o Department of the History of Science, South Hall, University of Wisconsin, Madison, WI 53706 (608/262-1406).

Computing Classics

A Reprint Series for the History of Computing is being developed by the Charles Babbage Institute, that will make available a substantial collection of early and difficult to obtain literature relating to the history of computing in a series of volumes to be published during the next five years. The series will include both reprints of major works and collections of selected papers. Scheduled for early publication are the classic textbook on programming, The Preparation of Programs for an Electronic Digital Computer by M. V. Wilkes, D. J. Wheeler and S. Gill, first published in 1951, and Babbage's Calculating Engines, the collection of Charles Babbage's works assembled by his son Major H. P. Babbage and first published in 1889.

For further information about the series, or to suggest specific works to be reprinted, write to Martin Campbell-Kelly at the Computer Science Department, University of Warwick, Coventry CV4 7AL, England.

Modern Physics

A description of the planned series of works on the history of physics between 1800 and 1950, to be published by Tomash, appeared in HPN, no. 1, p. 5. The following additional information has been received about one of the first books in this series:

Project Y: The Los Alamos Story. The history of Project Y, the Los Alamos Laboratory, from its founding in 1943 to its completion in December, 1946, is now available to the public in book form with the text essentially identical to the internal laboratory reports as written in the 1940's by members of the staff. The book is to be published in March 1983 in commemoration of the Laboratory's 40th anniversary. Volume I, written by David Hawkins with a new introduction by the author, chronicles the period up to the cessation of hostilities (August, 1945); Volume II, by Edith C. Truslow and Ralph Carlisle Smith, tells the story of the following period, ending at December, 1946 when the Manhattan District Project relinquished control of the Los Alamos Laboratory to the Atomic Energy Commission.

For further information on the series contact Adele Clark, Tomash Publishers, P. O. Box 49613, Los Angeles, CA 90049 (213/395-1055).

CONFERENCES & COLLOQUIA

Joint Atlantic Seminar

The 10th Annual Meeting of the Joint Atlantic Seminar in the History of the Physical Sciences will be held jointly at the Smithsonian Institution and Georgetown University in Washington, D. C., on April 8 & 9, 1983. Graduate students or recent Ph. D.s who wish to present a paper should send a title and brief abstract to Kathryn Olesko, Department of History, Georgetown University, Washington, DC 20057, no later than February 15, 1983. Registration forms, hotel information, and a preliminary program will be mailed about March 1. Anyone interested in receiving such information who is not yet on the JAS mailing list should contact Dr. Olesko as soon as possible.

History of Physics in Education

A meeting on "Using History of Physics in innovatory physics education" is being planned for September 1983 by the Centro Studi per la Didattica della Facolta di Scienze of the University of Pavia. It is anticipated that there will be about 90 participants for a 4-day meeting to be take place in the late medieval colleges of Pavia. Food and accomodation will be provided at a price of about $40 per day, and the conference fee (including Proceedings) will be $80. There will be a special dinner and visit to Pavia. For further information contact Prof. Fabio Bevilacqua at the Centro, Universita degli Studi di Pavia, Via A. Bassi 6, 27100 Pavia, Italy.

History of Science Society

The annual meeting of the History of Science Society will be held at the Burndy Library, Norwalk, Conn., 27-30 October 1983. For further information see the History of Science Society Newsletter or contact the Secretary of the Society, Dr. Audrey Davis, National Museum of Natural History, room 5000, Smithsonian Institution, Washington, DC 20560 (202/357-2274).

Paradigms

A symposium on "Paradigm Found: Thomas Kuhn's Structure of Scientific Revolutions 20 years later" is planned for the meeting of the Southwest and Rocky Mountain Division and the Pacific Division of the American Association for the Advancement of Science at Logan, Utah, in June 1983. For further information contact Prof. George Gale, Department of Philosophy, University of Missouri, Kansas City.

Documentation

An international symposium on problems of documentation for the history of sciences is being planned by the Commission on Documentation of the Division of History of Science/IUHPS and the History of Medicine and Science Unit of the University of Edinburgh. It will be held at Newbattle Abbey College, near Edinburgh, 16-20 September 1983. For further information contact Nathan Reingold, Henry Papers, Smithsonian Institution, Washington, DC 20560, or E. G. Forbes, History of Medicine and Science Unit, University of Edinburgh, High School Yards, Edinburgh EH1 ILZ, Scotland, UK.

Ethnoastronomy

An International Conference on "Ethnoastronomy: Indigenous Astronomical and Cosmological Traditions of the World" will be held at the Smithsonian Institution, Washington, DC, 5-9 September 1983. It will emphasize a blend of the sciences and the humanities, bringing together pioneering investigators of ethnoastronomical data and representatives of established scholarship in the history of astronomy. Organized by Von Del Chamberlain and John B. Carlson, the conference will be hosted by the Smithsonian's National Air & Space Museum, the University of Maryland's Center for Archaeoastronomy, and the American Astronomical Society's Historical Astronomy Division. A special feature of the conference will be the availability of a Zeiss Model VI planetarium for use by participants as a research instruments. For further information contact J. B. Carlson, Center for Archaeoastronomy, University of Maryland, College Park, MD 20742.

Galileo

"New Star Messages and the Crisis of Traditional Knowledge," an internatinal conference of Galileian studies, will be held in Pisa, Padua and Florence, 19-26 March 1983. The conference celebrates the 350 anniversary of the publication of Galileo's Dialogo sopra i due massimi sistemi del mondo (1632) and of the subsequent trial of Galileo. For further information write to Comitato Organizzatore del Convegno Internazionale di Studi Galileiani, c/o Istituto e Museo di Storia della Scienza, Piazza dei Giudici, 1, Firenze 50122, Italy.

Chemistry

On Friday, 11 March 1983, the American Chemical Society and the University of Pennsylvania will celebrate the inauguration of the Center for History of Chemistry. The celebrations will begin with the opening of a major exhibition devoted to Joseph Priestley, and on Saturday, 12 March, there will be a pilgrimage to Priestley's home and grave in Northumberland, PA. (Priestley was born 13 March 1733.) The program on 11 March includes a lecture by Sir George Porter, "Joseph Priestley and Photosynthesis Today."

Women

A conference on "The Role of Women in Science, Technology, and Medicine in the 19th and 20th Centuries" will be held in Veszprem, Hungary, 14-18 August 1983. For more information contact Eva Vamos, National Museum of Science and Technology, H-1117 Budapest, XI Kaposvar u. 13-15, Hungary.

For information about possible travel support for American participants, contact Dr. Margaret Rossiter, History and Philosophy of Science Program, National Science Foundation, Washington, DC 20550.

The meeting will be timed so that participants may also participate in another conference in Budapest on "Science and Technology in Central Europe, 1914-1938."

Boston Colloquium

The program of the Boston Colloquium for the Philosophy of Science, spring 1983, includes the following:

"Cosmology as Science and as Religion" - Stephen Toulmin, Chicago, 16 February, 8 pm, School of Theology 19, Boston University

"Reception of the Theory of Relativity" -symposium with papers by Michel Biezunski, University of Paris; Judith R. Goodstein, Caltech; Thomas F. Glick, Boston University; Stanley Goldberg, Hampshire College; 25 March, 3 pm, George Sherman Union, room 314, 775 Commonwealth Avenue, Boston.

"Hypotheses and Mr. Newton" - John Worrall, London School of Economics and Political Science, 5 April, 8 pm, George Sherman Union, room 314.

For further information contact Robert S. Cohen or Debra Nails, Department of Physics, Boston University, Boston, MA 02215.

Israel Colloquium

The program of the Israel Colloquium for the History, Philosophy and Sociology of Science for spring 1983 includes the following:

"The Spread of the Copenhagen Interpretation of Quantum Physics" - John Heilbron, University of California at Berkeley, and "American Philosophy of Physics" - Robert S. Cohen, Boston University, 8 March, 6:30 pm, Gilman Building, Hall 449, Tel-Aviv University

"The Nature of Persuasive Evidence in 20th Century Experimental Physics," a series of 6 lectures by Peter Galison, Harvard; 8-13 May, in Tel Aviv (details to be announced)

"Social and Intellectual Roots of the Physics Discipline in America" - Robert Kargon, Johns Hopkins, and "Social and Intellectual Roots of Chemistry in America" - Arnold Thackray, Pennsylvania; 7 June, 6:30 pm, Gilman Building, Hall 449, Tel Aviv University.

"Mechanical Philosophers and Godly Men" - Simon Schaffer, Imperial College of Science, London; 23 June, 6:30 pm, at the Van Leer Jerusalem Foundation, Einstein Square

For further information contact Edna Margalit, Israel Colloquium coordinator, P.O.B. 4070, Jerusalem, Israel.

EDITORIAL

The British astrophysicist A. J. Meadows, in an opinion piece in Physics Bulletin, August 1982, suggests that "the period marking the decline of the historial approach to teaching in physics has also marked the rise of the professional historian of science." He argues that professional historians of science oppose both the "great man" approach favored by physics teachers who use historical anecdotes, and the explanation of modern theories by reference to their origins in the past. The first ignores the context in which new ideas arose, while the second perpetrates the "whig" error of seeing the past through the eyes of the present.

According to Meadows, "those physicists who still wish to delve into the background of their subject frequently find the material they are offered indigestible. Indeed, there are now virtually two views of physics - that of physicists, and that of historians of physics - which by no means bear a one to one relationship with each other."

Meadows argues that "certain aspects of physics may still be best taught from a historical standpoint" yet physics teachers now receive "little help from professional historians of science, for they have different aims. Perhaps we should take our own initiative, and give the history of physics an official status within our professional organisations."

The formation of the Division of History of Physics in the American Physical Society might appear to be just the sort of thing that Meadows wants his British colleagues to do, but it would certainly be a mistake to conclude that we intend to promote "physicists' history of physics" in opposition to "historians' history of physics." On the contrary, some of the physicists who have been most active in developing the historical approach to physics teaching in the U.S. have at the same time participated fully in (and been accepted by) the professional discipline of the history of science. Perhaps the split is more evident in England because the history of science profession there grew up without as much input from scientists, although one can hardly ignore the contributions of people like J. D. Bernal and Joseph Needham in this regard.

One purpose of this Division (and of HPN) is to show that physicists can indeed learn something useful from historians of science -and conversely. We welcome the views of our readers on this matter.

GRANTS AND FELLOWSHIPS

Historians

The American Historical Association publishes an annual directory of Grants and Fellowships of Interest to Historians in October. The cost of the 1982-83 edition is $4 for AHA members and $5 for others. Send prepaid order to AHA Publications Dept., 400 A St. SE, Washington, DC 20003.

Space Telescope

The Space Telescope History Project (STHP) invites qualified historians of science and technology to apply for Daniel and Florence Guggenheim fellowships at the post-doctoral level, tenable at the National Air & Space Museum of the Smithsonian Institution. Areas of special interest to the Project include the history of astronomy and astrophysics, of space science and technology, and of American science and technology in the 20th century. Inquiries should be addressed to Paul Hanle, NASM, Smithsonian Institution, Washington, DC 20560 or Robert Kargon, History of Science, Johns Hopkins University, Baltimore, MD 21218.

JOBS

South Alabama

Associate or Full Professor to chair a 13-member department. Preferred research interests: history of science and technology, medicine, or law in a social and cultural context. Application deadline 1 March 1983. Send letter of application, vita, and names and addresses of at least 3 references to Prof. Larry Holmes, Chair, Search Committee, Dept. of History, HumB 344, University of South Alabama, Mobile, AL 36688. (205/460-6210)

LETTERS TO THE EDITOR

Einstein Papers

To the Editor of HPN:

The note in the History of Physics Newsletter of August 1982, page 12, entitled "Einstein Papers" requires some corrections.

The "dispute" did not occur between Princeton University Press and me, but between the Press and the Trustees of the Einstein Estate, one of whom is me. The project was not "stalled for nearly five years." It was never stalled. The Press continued it throughout the "dispute" in complete violation of contractual arrangements with the Estate.

Press and Estate disagreed about the editorial machinery for the project. The Press wanted to appoint an editor-in-chief while the Estate did not want to vest the authority over Einstein's gigantic, and probably unique, scientific and literary heritage in a single person. The Estate suggested that the advice of the Search-Committee for the editorship should be followed and a board of three co-equal editors be appointed. The Estate further proposed that one of the three editors be the very same scientist whom the Press wanted to, and meanwhile did, appoint Editor-in-Chief. The work of many outstanding personalities was not edited by an editor-in-chief. The papers of Bertrand Russell, for example, are being edited at this time by a board of five co-equal editors.

Otto Nathan, Executor, Estate of Albert Einstein.

OBITUARIES

Bonelli

Prof.ssa Dott.ssa Maria Luisa Righini Bonelli (1917-1981) was Director of the world-famous Istituto e Museo di Storia della Scienza in Florence, Italy, and founder/editor of Physis and other history of science journals. In 1966 she "came to international notice as the heroine of the great flood of Florence. Single-handedly she rescued most of the important treasures of her museum." — Silvio Bedini, Annals of Science, 1982, 39: 327-28.

Cannon

Susan Faye (nee Walter Faw) Cannon, historian of science, born 1925, died 6 November 1981. Her book Science in Culture: The Early Victorian Period, received the Pfizer Award of the History of Science Society in 1979; it includes chapters on "The Invention of Physics" and related topics. See the article "The Ordeal of Walter/Susan Cannon," by Aaron Latham and Andrea Grenadier, Psychology Today, October 1982, vol. 16, no. 10, pp. 64-72 .

Shankland

Robert S. Shankland, professor of physics at Case Western Reserve University for more than 40 years, died 5 March 1982 (he was born in Willoughby, Ohio, in 1908). His interviews with Albert Einstein, published in the American Journal of Physics, became an important source for the history of relativity theory. For further details see Leslie L. Foldy, Physics Today, August 1982, vol. 35, no. 6, p. 66.

PERSONALIA

Grant

Edward Grant, Professor of History of Science at Indiana University, was elected Vice-President of the History of Science Society for a two-year term expiring on 31 December 1984. He will then assume of the office of President for a two year term. Gerald Holton is President during 1983 and 1984. Grant is known for his research on ancient, medieval and early modern science. His most recent book is Much Ado About Nothing: Theories of Space and Vacuum from the Middle Ages to the Scientific Revolution (1981).

Wilson

Robert W. Wilson, professor of physics at Cornell and member of the Executive Committee of the Division of History of Physics, was elected Vice President of the American Physical Society for 1983. An account of his career, especially his leadership in the design and construction of the 400-GeV proton synchrotron at Fermilab, may be found in the recently-published book by Philip J. Hilts, Scientific Temperaments (Simon & Schuster).

PHYSTORY

"The current quest for particles that would support a Grand Unified Theory is inspired as much by history as it is by theory. In the 19th century James Clerk Maxwell combined the laws of magnetism and electricity, showing that the two were one and paving the way for radio, television and similar wonders of modern life. Although physicists cannot predict the uses of a Grand Unified Theory, many hope for similar breakthroughs." — W. J. Broad, New York Times, 18 Jan. 1983, p. C1-2.

QUERIES

Eddington quote

The query in HPN no. 1 has been answered by Professor Clayton A. Gearhart, Jr., Department of Physics, Saint John's University, College of Saint Benedict, Collegeville, Minnesota. (Also by Prof. A. P. French, MIT) Here is the complete paragraph (the part quoted is usually some version of the last sentence):

"But are we sure of our observational facts? Scientific men are rather fond of saying pontifically that one ought to be quite sure of one's observational facts before embarking on theory. Fortunately those who give this advice do not practise what they preach. Observation and theory get on best when they are mixed together, both helping one another in the pursuit of truth. It is a good rule not to put overmuch confidence in a theory until it has been confirmed by observation. I hope I shall not shock the experimental physicists too much if I add that it is also a good rule not to put overmuch confidence in the observational results that are put forward until they have been confirmed by theory." (Italics in original)

The source is Eddington's Pathways in Science (Macmillan, New York, and Cambridge University Press, 1935), page 211.

REPORTS

Einstein papers

"Publication of the papers of Albert Einstein was given a boost recently by a $120,749 grant from the National Science Foundation. The joint project of the Princeton University Press and the Hebrew University of Jerusalem was delayed for several years by a legal dispute between the press and the Einstein estate. With the case now settled, the first volume is expected in 1983.

"Publication of all 43,000 documents in the archive will take several decades, and N.S.F. is considering an additional proposal for long-term support of the project." — Chronicle of Higher Education, 15 December 1982, p. 33.

For additional background see John Walsh, "Einstein papers coming on," Science, 12 November 1982, vol. 218, p. 664, and the Letter to the Editor in this issue of HPN.

Lasers

Four professional societies - APS, the Laser Institute of America, the Optical Society of America, and the Quantum Electronics and Applications Society - have joined with the AIP's Center for History of Physics and the Institute of Electrical and Electronics Engineers' Center for the History of Electrical Engineering, to intiate a project on the history of lasers.

The project's central activities will be the taking of oral histories, and the locating of papers, photographs, tapes, and equipment of historical significance.

The Project welcomes news of scholarly studies, completed or in progress, on the history, sociology, or philosophy of laser science and engineering and the laser and electro-optical industry. The Project also solicits information on oral histories already conducted and on archival or personal collections of papers and equipment.

Send all information to: Joan Lisa Bromberg, Director, Laser History Project, 25 Stoddard Street, Woburn, MA 01801 (617/938-8289).

Modern Physics meeting

The "History of Modern Physics" and "National Traditions in Science" were the twin themes of the joint meeting of the British Society for the History of Science and the Societe Francaise d'Histoire des Sciences held at New Hall, Cambridge, England, on 5-7 July 1982. Sir Rudolf Peierls delivered the opening address on "Recollections of the Early Days of Quantum Mechanics." Nearly all of the presented papers concerned the history of the physical sciences during the 19th and 20th centuries. The topics of these papers included the science of electricity in the 19th century, the interface between mathematics and physics, the interrelationship of politics and physics, and the interaction of theory and experiment in the discovery of the weak neutron current in 1973. A significant number of papers concerned post-1920 atomic and nuclear physics, especially the theory of the neutron, the discovery of the antiproton, solid-state physics and the electron theory of metals.

Among the conference papers were:

"The Geiger-Mueller Counter of 1928" - T. J. Trenn, Munich

"Lady or Tiger? - The Meitner-Hupfeld effect and Heisenberg's neutron theory" - Laurie M. Brown and Donald F. Moyer, Northwestern

"Science and Politics: Kapitza's departure from Rutherford's laboratory" - Lawrence Badash, University of California, Santa Barbara

"The Making of the Antiproton" - John Heilbron, University of California, Berkeley

"Mathematics and Mathematical Physics in France and Britain, 1800-1840" - I. Grattan-Guinness, Middlesex Polytechnic at Enfield

Summaries of these papers may be found in this issue of HPN.

History of Geophysics

by David P. Stern

The Committee on History of Geophysics (CHG), operating within the American Geophysical Union (AGU), continued its activities (see HPN, no. 1, p. 11). A special all-union session, commemorating the 25th anniversary of the International Geophysical Year (IGY), was held on December 10 as part of AGU's Fall Meeting in San Francisco. James Van Allen (U. of Iowa) spoke on the "Genesis of the IGY," describing how the idea of a "3rd international polar year" began at a dinner party in his home on 4/5/1950. George H. Ludwig (NOAA, Boulder) described the construction of the first Explorer satellites and their initial discoveries, in which he himself had participated. John R. Winckler (U. of Minnesota) talked about the "Fringes of Space," about IGY observations of auroral X-rays and solar flare protons by balloon-borne instruments. Charles R. Bentley (U. of Wisconsin) spoke on the IGY oversnow traverses of Antarctica and on the first soundings of that continent's ice cover, which turned out to be far thicker (up to 14,000 ft.) than expected. Finally, Charles D. Keeling (Scripps Inst. of Oceanography) described the beginning of accurate measurements of atmospheric CO_2 around the time of the IGY, and the founding of the Mauna Loa observatory. All these talks revolved around first-hand experiences and were recorded.

Other sessions also commemorated the IGY. In the Solar-Planetary Relationships section, John A. Simpson (U. of Chicago) described IGY research on cosmic rays and solar flare particles, R. Grant Athay (NCAR, Boulder) described the impact of the IGY on solar physics, S.-I. Akasofu (U. of Alaska) spoke on "Auroral, Geomagnetic Storm Studies and the IGY" and E. K. Smith (JPL) talked about IGY ionospheric studies. Sessions were also devoted to IGY geodesy research and to the lessons from IGY in the area of international cooperation.

Members of CHG met at noon on December 10 and planned further sessions for the AGU Spring meeting in Baltimore, on the week of Memorial Day. A newsletter has been started and the initial issue (November 1982) is available; persons wishing to submit material to the next issue should send it to Prof. George L. Siscoe, Department of Atmospheric Sciences, UCLA, Los Angeles, CA 90024. Persons who would like to join CHG should notify its secretary, Dr. James Heirtzler, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, and are encouraged to list if their letters details of their particular interests.

Physics Education articles

The British journal Physics Education has begun a series of historical case studies. An example is the article by Brian Davies about G. S. Ohm, "A web of naked fancies," in the January 1980 issue. Other articles are by J. Harris (Nov. 1979), D. P. Newton (March 1980), B. Davies (July 1980), J. L. Hawes (Sept. 1980), G. N. Cantor (March 1981), J. L. Hawes (May 1981) and B. Gee (March and May 1983). A group of physics teachers has drawn up a set of guidelines for preparing historical case studies. For further information contact the Editor of Physics Education, A. Ashby, Institute of Physics Publishing Division, Redcliffe Way, Bristol, England. (A copy of the guidelines may also be obtained from the Editor of HPN.)

Geophysics

The German Geophysical Society has established a Committee on the History of Geophysics. The aims and plans of the committee are three different directions: (a) history of science in the "classical sense," (b) contemporary history of science, i. e. the preservation of the record of recent and ongoing research in geophysics/geosciences; (c) the preservation and use of historical data, e. g. records of ancient auroras, earthquakes, storms, floods, etc. Another project is to collect and publish bibliographies and scientific correspondence of German geophysicists. The Committee has decided to start a newsletter (Mitteilungen), which contains news of historical studies on geosciences, new publications, and reports. For further information contact the secretary: Dr. Wilfried Schroeder, Hechelstrasse 8, D-2820 Bremen-Roennebeck, Federal Republic of Germany.

Solid State

An international project in the History of Solid State Physics has been organized involving groups in Britain, Germany, and the U.S. in cooperation with scientists and historians in other countries. The American branch of the project is led jointly by Lillian Hoddeson Baym of the University of Illinois, the chief project historian, and Spencer Weart, director of the AIP Center for History of Physics. The British branch is being led by Ernest Braun at the University of Aston; and the German branch is headed by Juergen Teichmann at the Deutsches Museum in Munich. Oral interviews are being conducted with pioneers in the field, including both academic and industrial people. At the same time, correspondence and other unpublished papers of leading people are being preserved at appropriate repositories, in order to save the documentation that historians will also need. While the whole period from the late 19th century to the present is of interest, special attention is given to the period from the 1920s into the 1950s, ranging from study of the condition of the field at the advent of quantum mechanics, to investigation of the first burgeoning of industrial applications.

Using interviews and documents as well as printed papers, historians are writing an extensive scholarly history, to be published by Oxford University Press. Also, reports will be published to guide outside historians and other writers to sources they may find useful, encouraging wider interest in the history of solid state physics and its role in society.

For further information about the project, contact Lillian Hoddeson Baym, Department of Physics, University of Illinois, Urbana, IL 61801. One may receive the project's newsletter by writing to Spencer Weart, Center for History of Physics, American Institute of Physics, 335 East 45 Street, New York, NY 10017.

SUMMARIES

Authors of books and articles on the history of physics are invited to send summaries for publication in this section. Maximum lengths: 75 words for articles, 150 words for books. In addition, for articles please give author's mailing address and indicate whether reprints are available; for books published outside the U.S., indicate the U.S. distributor (if any) or complete mailing address of publishers, and give the price in U.S. dollars including cost of mailing (if applicable). We can also publish summaries of papers presented at meetings if the author is willing to distribute reprints; otherwise, if copies are not available but the author is willing to correspond with others about the research, a summary may be submitted for the "Work in Progress" section. We regret that space limitations made it impossible to publish in this issue all the summaries that have been received; we hope to take care of the backlog in the next issue.

Unifying Trends

KYPRIANIDIS, T.; SARDELIS, D. Unifying Trends in Physics. (Presented at the First International Meeting of Epistemology, Athens, September 1982.)

We briefly expose the main physical theories from Aristotle's to Supergravity concentrating on those concepts in them that reflect essentially our historic cognitive relation with reality. Such concepts are the ones referring to the modes and forms of existence of matter, i.e. those referring to the unity seen in historic evolution, makes manifest a unifying trend in physics that contributes to a non-cummulatice, evolutionary process of grasping reality marked by qualitative, conceptual transformations and discontinuities.

For preprint write to T. Kyprianidis, Physics Department, University of Crete, Iraklion, Greece.

Subversive Atomism

TIELSCH, E. W. The Secret Influence of the Ancient Atomistic Ideas and the Reaction of Modern Scientist under Ideological Pressure. History of European Ideas, 1981, 2: 339-348.

Ancient atomistic ideas (Democritus, Epicurus, Lucretius) about an empirical-critical theory of knowledge and action (choice), the plurality of the worlds and their natural development and decline, about individual human rights of happiness and democratic social contract, in and after the middle-ages were strictly persecuted by state-universities and Christian church. Therefore the "normal" later modern scientist, from Newton, Boyle, Locke or Darwin until today, developed certain standard-patterns of cautious concealment of his true "heathen" sources which history must take account of.

For reprints, write to: Prof. D. Dr. E. W. Tielsch, D-1000, Berlin, 37 Box 433, Germany.

Galileo Experiment

DRAKE, STILLMAN. Analysis of Galileo's Experimental Data. Annals of Science 1982, 39: 389-397.

In 1609 Galileo designed a set of experimental measurements in hope of finding rules governing oblique trajectories after undeflected roll from planes at fixed angles. Planes were set at arc sin 1/3, 1/6, and 1/2; rolls were chosen for selected speeds of projection, and drops were rationally chosen from relations in the steepest test. Measurements were made to one-half mm. No rule was discovered and Galileo published only on oblique trajectories reducible to equivalent horizontal projections. Manuscript notes reveal this experimental attack on a physical problem.

For reprint write to S. Drake, 219 Glen Road, Toronto, Ont. Canada M4W 2X2.

Archimedes

SATO, TOHRU. Archimedes' Lost Works on the Centers of Gravity of Solids, Plane Figures and Magnitudes. Historia Scientiarum, 1981, 20: 1-41.

In his Propositions 6 and 7 of On the Equilibrium of Planes Book I, Archimedes demonstrated the law of the lever using the concept of center of gravity. However, a definition of center of gravity is not found in his extant works. Consequently, it can be assumed that there existed a work by Archimedes including a definition of center of gravity. In this paper, an attempt is made to reconstruct the lost works of Archimedes concerning mechanics by examining in what meaning inferential particles are used in Archimedes' extant works. Archimedes' view of mechanics is also examined.

For reprint write to Assoc. Prof. Tohru Sato, Dept. of General Education, Tokyo Medical & Dental Univ., 2-8-30 Kohnodai, Ichikawa-shi, Chiba-ken. 272 JAPAN.

Polish Renaissance

WRÓBLEWSKI, ANDRZEJ. Renaissance in Science. Presented at the conference "The Polish Renaissance in its European Context", Indiana University, Bloomington, Indiana, May 25-28, 1982. To be published in the conference proceedings.

A short account is given of the development of science in renaissance Poland. Evidence is presented that Polish renaissance in Science seems to be virtually unknown and/or ignored in western oriented history of science.

Copies free: write to Professor H.J. Lubatti, Visual Techniques Laboratory, Department of Physics, University of Washington, Seattle, WA 98195.

Galileo Demonstration

FEHÉR, MARTHA. Galileo and the Demonstrative Ideal of Science. Studies in History and Philosophy of Science, 1982, 13(2): 87-110.

The paper deals with the question whether Galileo rejected the Artistotelian ideal of demonstrative science. The author argues that, in his Dialogue, Galileo tried to conform to the requirements of demonstrativeness. He lacked however a metaphysical or dynamical principle by which he could explain the central position of the sun in the solar system (as supposed by the Copernican, heliocentric astronomy). Such a principle would have been necessary in order to construct a genuine demonstrative syllogism. Thus, although Galileo accepted the Aristotelian ideal of demonstrative science he had to modify somewhat the way of attaining it.

For reprint write to Martha Fehér, Department of Philosophy, Technical University Budapest, Muegyetem rkp.3., H-1111, Hungary.

17th & 18th Centuries

HEILBRON, J. L. Elements of Early Modern Physics. Berkeley: University of California Press, 1982. $25 hardcover, $8.95 paperback.

The book is made up of the two introductory chapters of Heilbron's earlier book, Electricity in the 17th and 18th Centuries (1979), and a summary of the remaining chapters. The first chapter presents the general principles to which physical theory at different times conformed or that otherwise mediated its development: peripatetic philosophy, corpuscularism, Newton's attractions, Newtonian forces and fluids, the impulse toward quantification. The second chapter describes the institutional frameworks in which physics was cultivated in the 17th and 18th centuries. The third chapter presents the case for electricity.

Vibrations

CANNON, JOHN T.; SIGALIA DOSTROVSKY. The Evolution of Dynamics: Vibration Theory from 1687 to 1742. (Studies in the History of Mathematics and Physical Sciences, Volume 6.) ix + 184 pp. New York, Heidelberg, Berlin: Springer-Verlag, 1981. $38.

This book is a detailed study of sixteen (essentially all) works on dynamics in more than a single degree of freedom that were written after the publication of Newton's Principia in 1687 and before Euler's discovery, in the 1740's, that dynamical equations could be obtained on the basis of Newton's Second Law. Interesting problems were solved: Newton analyzed pressure waves; Taylor derived Mersenne's Law for the vibrating string; Daniel Bernoulli and Euler analyzed the oscillations of a hanging chain, of a beam, and of floating bodies. On the other hand, without the guidance of a general theory, fallacious notions sometimes emerged.

Light Pressure

WORRALL, JOHN. The Pressure of Light: The Strange Case of the Vacillating "Crucial Experiment". Studies in the History and Philosophy of Science, 1982, 13(2): 133-171.

A sketch is given of the history of the attempts made since the eighteenth century to decide experimentally whether or not light exerts a pressure. The history of the appraisals made of the import of the experimental verdict for the rival corpuscular and wave theories of light is also sketched. Both histories contain dramatic about-faces. This makes the episode particularly interesting from the methodological point of view; and an attempt is made to draw some methodological conclusions.

For reprints write to the Dept. of Philosophy, Logic & Scientific Method, London School of Economics, Aldwych, London WC2A 2AE.

Light

HAKFOORT, C. Nicolas Beguelin and his Search for a Crucial Experiment on the Nature of Light (1772). Annals of Science, 1982, 39: 297-310.

In the second half of the 18th century a lively debate was going on in Germany about the nature of light. One important contribution to this discussion, namely a paper by Nicholas Beguelin, is studied in this article. In his essay, Beguelin compared the Newtonian emission theory of light and the wave theory of Leonhard Euler. Whereas others opted for one of the two theories by invoking arguments or authorities, Beguelin made a systematic search for experiments which he hoped would settle the dispute. Two of these experiments were most original. The first, which Beguelin himself performed, concerned light rays grazing a glass surface. For several reasons it did not have the impact it deserved. The second one was a thought experiment which was meant to illustrate a major tenet of the wave theory, that is, the analogy between light and sound. An analysis is given of these two experiments, and it is shown that neither of them brought the debate to an end.

Author's address: C. Hakfoort, Instituut voor Geschiedenis der Natuurwetenschappen, Rijksuniversiteit Utrecht, Janskerkhof 30, 3512 BN Utrecht, The Netherlands.

Bowditch's Black Hole

MONTGOMERY, JAMES W. Nathaniel Bowditch's Classical "Black Hole" Calculation of 1808. Journal for the History of Astronomy, 1982, 13: 54-55.

Henry

REINGOLD, NATHAN; ARTHUR P. MOLELLA; MARC ROTHENBERG; KATHLEEN WALDENFELS; JOAN F. STEINER (eds.) The Papers of Joseph Henry. Volume 4: January 1838-December 1840: The Princeton Years. xxxiv + 475 pp. Washington, D.C.: Smithsonian Institution Press, 1981. $30.

This volume documents the years immediately following Henry's first tour of Europe. Gratified by his acceptance by the European scientific community, Henry returned to the United States with renewed concern for the institutional and intellectual development of American science, especially the need to protect the scientific community from charlatanism. This period was also noteworthy for the laboratory research conducted by Henry. During these years he increased his understanding of electromagnetic induction, concentrating on the phenomena of induction of higher order currents, shielding (where he differed considerably with Faraday's conclusions), and induction over long distances. The published fruits of these experiments were Parts III and IV of his series "Contributions to Electricity and Magnetism."

Mathematics

ISRAEL, GIORGIO. "Rigor" and "Axiomatics" in Modern Mathematics. Fundamenta Scientiae, 1981, 2(2): 205-219.

This paper deals with some aspects of the history of mathematics of eighteenth century and of its relationships with mathematical physics. Its aim is to confute the thesis of the existence of a close link between the "rigor" movement and the "axiomatic" movement. It demonstrates that the origins of the "rigor" movement go back to the conceptions of Fourier, which are founded on: (a) the close link between mathematical analysis and the study of nature, (b) the constitution into autonomous discipline of techniques for handling mathematical equations.

For reprint write to Prof. G. Israel, Instituto Matematico "G. Castelnuovo", Città Universitaria, P.le A. Moro, 2, 00185 Roma Italy.

French Math. Physics

GRATTAN-GUINNESS, I. Mathematics and Mathematical Physics in France and Britain, 1800-1840. Presented at the joint meeting of the British Society for the History of Science and the Société Française d'Histoire des Sciences, Cambridge, England, July 1982.

In this paper I shall survey broadly the French achievement in mathematics and mathematical physics as of 1830. While French work dominated the field from 1780 to 1830, after 1830, and especially after 1840, the subject became more international with significant figures emerging in the British Isles and the German states. British contributions during this period were occasional, although some were noted by the French. But from the late 1820's the importance of this work greatly increased. Selected examples of this panorama of work up to the 1840's will be presented.

Author's address: I. Grattan-Guiness, Middlesex Polytechnic at Enfield, Enfield, Middlesex EW3 4SF, England.

Cambridge Tripos

WILSON, DAVID B. Experimentalists among the mathematicians: Physics in the Cambridge Natural Sciences Tripos, 1851-1900. Historical Studies in the Physical Sciences, 1982, 12: 325-371.

Throughout the 19th century, Cambridge graduated a steady supply of first-rate mathematical physicists. At the end of the century, it supported a strong research program in experimental physics directed by J. J. Thomson. This paper concerns the Cambridge educational basis for these two traditions. It concentrates on the new natural sciences tripos (NST) as it became part of an educational system dominated by the older mathematical tripos (MT). The MT was the preferred tripos for physicists until about 1890, when ad hoc measures effected by Thomson established the NST as a primary examination for physicists.

For reprints write to David B. Wilson, Dept. of History, Iowa State University, Ames, IA 50011.

Rankine's Entropy

HUTCHISON, KEITH. Rankine, Atomic Vortices, and the Entropy Function. Archives Internationales d'Histoire des Sciences, 1981, 31: 72-124.

This paper is a detailed study of the origin of the entropy function. This function was explicitly introduced into thermodynamics in 1854 by the Scottish engineer W. J. M. Rankine, though under the name 'thermodynamic function'. What led Rankine to discovering the function was a peculiar kinetic theory of matter, according to which heat was represented by the kinetic energy of sub-atomic vortices. The paper examines Rankine's calculations, and his later attempts to reach his earlier conclusions by quasi-phenomenological reasoning where explicit reference to the atomic model was avoided.

For photocopy write to Dr. K. R. Hutchison, H.P.S. Department, University of Melbourne, Parkville, 3052, Australia.

Clausius & Boltzmann

MARIC, Z; M. POŽIC; D. DAVIDOVIC. Randomness and Determinism in the Kinetic Equations of Clausius and Boltzmann.

The works of Clausius and Boltzmann which deal with the derivation of the kinetic equation are analysed with the aim of identifying the dynamical elements incorporated into different forms of the kinetic equation. We have identified three important stages in Boltzmann's works, each characterized by a specific level of dynamics describing binary collisions. We trace this line of thought as a transition from the Clausius model of collisions, which is neither deterministic nor time reversal invariant, to a complete dynamical model of collisions being, of course, time reversal invariant.

For preprint write to Z. Maric, Institute of Physics, 11001 Beograd, Studentski trg 12/V, P. O. Box 57, Yugoslavia.

Aurora

SCHRÖDER, WILFRIED. Some Aspects of the History of Auroral Research. EOS, Transactions of the American Geophysical Union, 1981, 60: 1035-1036.

For reprint write to W. Schröder, Hechelstrasse 8, D-2820 Bremen-Roennebeck, Germany.

Fritz on Aurora

SCHRÖDER, WILFRIED. Hermann Fritz, a Pioneer of Aurora Research. Vierteljahrsschrift der Naturforschenden Gesellschaft in Zürich, 1981, 126: 199-204.

The endeavours of Hermann Fritz (1830-1893) relating to aurora and solar-terrestrial physics are presented here so as to give an idea of his contributions to this subject made during the years 1860-1893.

For reprints write to W. Schröder, Hechelstrasse 8, D-2820 Bremen-Roennebeck, Germany.

Boltzmann on Thermodynamics

BIERHALTER, GÜNTER. Boltzmanns mechanische Grundlegung des zweiten Hauptsatzes der Wärmelehre aus dem Jahre 1866. Archive for History of Exact Sciences, 1981, 24(3): 195-205.

Die Arbeit behandelt den 1866 durch Ludwig Boltzmann betriebenen Versuch einer mechanischen Deduktion des zweiten Hauptsatzes der Thermodynamik. Der Aufsatz setzt dabei als Schwerpunkte: die Grundlagen des Boltzmannschen Beweises, die in der Annahme einer periodischen Molekularbewegung und einer Definition des Wärmeinkrementes dQ auf molekularem Niveau bestehen. Weiterhin wird die Herleitung der Regel von Dulong und Petit besprochen, wie sie Boltzmann 1866 aus seinen mechanischen Formeln für Temperatur und Wärme gewinnt. Weitere Gegenstände der Untersuchung sind die Beurteilung der mechanischen Grundlagen des Boltzmannschen Beweises durch R. Clausius und C. Szily, welche diesen auf das Hamiltonsche Prinzip der variierenden Wirkung reduzieren. Ferner wird dargestellt, daß eine Erklärung für die Existenz irreversibler Vorgänge durch ein rein mechanisches Theorem unmöglich ist.

Sonderdrucke sind noch in sehr beschränktem Umfang erhältlich bei G. Bierhalter, Rudolf-Pöhler-Allee 8, D-7530 Pforzheim, Federal Republic of Germany.

Irreversibility

ERDI, PETER. Világképek metszéspontjában--Irreverzibilitás és ciklikusság [In the intersection of world concepts--Irreversibility and periodicity]. Világosság, 1982, 23: 329-336 (in Hungarian).

Modern science has inherited the antinomy of irreversibility and periodicity from ancient philosophy and religion. Both notions played a significant role in the rise and fall of the Newtonian clockwork world view. The effect of the discovery of steam-engine on the disorganization of the cyclic mechanistic word concept has to be emphasized. Though the theory of irreversibility, namely thermodynamics, developed rather meanderingly, the two laws of thermodynamics had an indescribable effect on the physics and metaphysics of the second half of the 19th century. Therefore, the encounter between the mechanical and thermodynamic world concepts was unavoidable. Nowadays the old story starts again; such conflicting ideas as rhythmic biological activities and irreversible biological evolution are intended to be reconciled by some thermodynamic theory. However, no general thermodynamic theory able to take into consideration the minute details of the biological structures exists.

Author's address: Peter Érdi, 1st Department of Anatomy, Semmelweis University Medical School, Tüzoltó utca 58, 1450 Budapest P.B.95, Hungary.

Siemens & PTR

CAHAN, DAVID. Werner Siemens and the origin of the Physikalisch-Technische Reichsanstalt, 1872-1887. Historical Studies in the Physical Sciences, 1982, 12(2): 253-283.

The origin of one of Imperial Germany's premier scientific institutions, the Physikalisch-Technische Reichsanstalt (PTR), is narrated and analyzed. First, the PTR's pre-history (1872-82) as a proposed mechanical institute intended to advance German precision technology is discussed. Second, the transformation in 1882 of the proposed mechanical institute into a full-fledged pure scientific and technological research and testing organization is related. It is argued that the PTR's establishment in 1887 was largely due to the conceptions, resources and energy of Werner Siemens and that Siemens' principal motive in establishing the PTR was to make a contribution to pure science, both for its own sake and for the glory of his beloved fatherland.

For reprint write to Prof. David Cahan, Dept. of History, The University of Nebraska-Lincoln, 610 Oldfather Hall, Lincoln, NE 68588-0327.

Electron Mass

CUSHING, JAMES T. Electromagnetic Mass, Relativity, and the Kaufmann Experiments. American Journal of Physics, 1981, 49(12): 1133-1149.

This paper presents the theoretical background for and the detailed analysis of Kaufmann's 1901-1905 experiments to determine the e/m ratio for fast electrons. Far from providing the first experimental confirmation of Einstein's special theory of relativity, these data were initially interpreted as confirming Abraham's classical model of a rigid spherical electron and as providing evidence against special relativity. Only in 1906-1907, upon Planck's subsequent reanalysis of Kaufmann's 1905 data, did these experiments become evidence marginally in favor of relativity over classical models of the electron.

For reprints write to Prof. J. T. Cushing, Dept. of Physics, University of Notre Dame, Notre Dame, IN 46556.

Special Relativity

MILLER, ARTHUR I. Albert Einstein's Special Theory of Relativity: Emergence (1905) and Early Interpretation (1905-1911). xxviii + 466 pp. Reading, MA: Addison-Wesley, 1981. $39.50 hardcover, $27.50 paperback.

An in-depth analysis of Einstein's invention of the special theory of relativity and its interpretation during 1905-1911. Included are discussions of the state of theoretical and experimental physics during 1890-1905, Einstein's philosophical presuppositions, Einstein's view of physical theory, and comparison of special relativity with the theories of Max Abraham, H. A. Lorentz and Henri Poincaré.

Electrodynamics

NOVY, LUBOS, and IURI I. SOLOV'EV, eds. Revolutionary Changes in Science and Technology at the Turn of the 19th and 20th Centuries. 477 pp. Prague: Institute of Czechoslovak and General History of the Czechoslovak Academy of Sciences, 1981.

Reviewed by P. R. Josephson in Annals of Science, 1982, 39: 511-512. Includes: V. P. Kartsev and V. M. Rodionov, "Maxwell's Electrodynamics and the Emergence of New Technical Disciplines"; Joseph Illy, "Lenin, the electromagnetic world view and the theory of relativity".

Drude

FUJISAKI, C. P. Drude's Theory of Dispersion of Light and Atomic Model (1900-1913). Historia Scientiarum, 1982, 22: 19-67.

This paper examines both Drude's formulation of 1904 about the relation between the components of a molecule and their proper spectra, and its acceptance. The purpose is to indicate that Drude's theory, which was derived from his dispersion theory, occupied a central position in both the formation of Bohr's theory about the relation between hydrogen atomic and molecular structures and their spectra, and in valency electrons theories given by physicists and chemists at that time. This paper also indicates the historical origin of valency electrons and Bohr's thought process leading to the frequency condition.

For reprint write to C. Fujisaki, Division of Chemistry, General Education Department, Niigata University, Ikarashi 2-8050, Niigata City, Japan.

Bohr's Works

[BOHR, NIELS] HOYER, ULRICH, ed. Niels Bohr Collected Works. Volume 2. xvi + 646 pp. Amsterdam: North-Holland/New York: American Elsevier, 1981. $127.75.

Contents: Absorption of charged particles; constitution of atoms and molecules; consolidation of the quantum theory of the atom; selected correspondence.

Atomic Explanations

MACKINNON, EDWARD M. Scientific Explanation and Atomic Physics. x + 450 pp. Chicago: University of Chicago Press, 1982. $27.50.

This is a history of atomic physics with a focus on the scientific explanations that were introduced, developed, and modified in the course of this development. The first three chapters treat atomism in classical physics. The bulk of the book is given over to a detailed and quite selective analysis of the work of those who developed and shaped the interpretation of quantum mechanics. Here the emphasis is on getting behind the text-book accounts and showing how the decisive breakthroughs actually happened. The book concludes with a detailed historical analysis of the Bohr-Einstein debates. The disagreements, it is argued, rest on differing ideas on scientific explanation. The development of each man's view is presented both historically and systematically.

Kapitza

BADASH, LAWRENCE. Science and Politics: Kapitza's departure from Rutherford's Laboratory. Presented at the joint meeting of the British Society for the History of Science and the Société Française d'Histoire des Sciences, Cambridge, England, July 1982.

The lecture describes Peter Kapitza's career in Great Britain, the numerous alleged reasons for his detention in Russia in 1934, the reaction of the international scientific community, efforts made to secure his release, Kapitza's treatment in Moscow, and the shipment to Russia of the contents of his Cambridge laboratory when it became clear that the Kremlin would be unyielding. The episode is an example of the poor contact between science and government at a time when they had little experience with, or understanding of, each other. In some respects, Kapitza's troubles may be compared with those of Andrei Sakharov; in the latter case protests by scientists abroad seem to have provided Sakharov with at least some measure of protection against persecution by his government.

Author's address: L. Badash, Dept. of History, University of California, Santa Barbara, CA 93106.

Geiger-Mueller Counter

TRENN, T. J. The Geiger-Müller Counter of 1928. Presented at the joint meeting of the British Society for the History of Science and the Société Française d'Histoire des Sciences, Cambridge, England, July 1982.

Ancillary to the emergence of nuclear physics in the 1930's, this important instrument soon became one of the most famous of all time. Yet little is known of its origin, how it differs from the Geiger counter of 1913, or what role Walter Müller played in the invention of the G-M counter of 1928. The presentation will include relevant earlier work from the turn of the century and a discussion of Muller's research in the context of the mid-1920's along with some biographical evidence about the principals.

Author's address: T. J. Trenn, 25 Thaler Ave. 2, Kitchener, Ontario N2A 1R3, Canada.

Deuterium

BRICKWEDDE, FERDINAND G. Harold Urey and the discovery of deuterium. Physics Today, Sept. 1982, 35(9): 34-39.

Presented at the inaugural session of the Division of History of Physics, 22 April 1981. The author collaborated with Urey on the work leading to the discovery in 1931.

Chemistry, nuclear physics, spectroscopy and thermodynamics came together to predict and detect heavy hydrogen before the neutron was known.

Author's Address: F. G. Brickwedde, Department of Physics, Pennsylvania State University, University Park, PA 16802.

Slater

MORSE, PHILIP M. John Clarke Slater, December 22, 1900-July 25, 1976. Memoirs of the National Academy of Sciences, 1982, 53: 297-321.

Slater contributed significantly to the start of the quantum theory revolution in physics in the 20's. In the 30's he established a graduate school of physics at MIT that enabled students from this country to become contributing physicists without having to go abroad--helping to bring the United States to scientific maturity by the 40's. In the course of this Slater wrote texts that are still used, and he personally supervised the thesis research of many who have made a major mark on physics. In the 40's he contributed to defense research by investigating and elucidating the dynamics of the magnetron, important for radar. From the 30's to the end of his life, he made major contributions to our understanding of the nature of molecules and of solids. A short sketch of his life and a list of his publications.

A very limited supply of reprints are available: write to Professor Philip M. Morse, Room 6-108, Mass, Inst. of Tech., Cambridge, MA 02139.

Pauling's Quantum

ABE, YUKO. Pauling's Revolutionary Role in the Development of Quantum Chemistry. Historia Scientiarum, 1981, 20: 107-124.

Pauling's quantum chemistry was formed between 1926-33. He first attempted to change Lewis' static electron model into a dynamic electron model of old quantum theory in 1926. Two published papers in 1926 differed qualitatively from the ultimate form of his valence bond theory. Pauling's revolutionary jump from the first stage of a rough chemical system to his quantum chemistry was enabled through his study in Europe during 1926-27. Pauling himself accounted for his theory as the extension of Lewis' classical one. Easy acceptance of Pauling's theory among chemists lies in the above fact.

For reprint write to Y. Abe, 203 Mutsumi-cho 2-chome, Minami-ku, Yokohama, 232 Japan.

Good Experiments

FRANKLIN, A. What Makes a 'Good' Experiment. British Journal for the Philosophy of Science, 1981, 32: 367-374.

A categorization of 'good' experiments by their relation to existing theories or their call for new theories is given. The classes include crucial, strongly corroborative, and anomalous experiments as well as those which exhibit new phenomena. The classes are illustrated by examples from the history of physics.

For reprint write to Prof. A. D. Franklin, Dept. of Physics, Campus Box 390, University of Colorado, Boulder, CO 80309.

Kellogg Lab

FOWLER, WILLIAM. Phifty Years of Phun & Physics in the W. K. Kellogg Radiation Laboratory at Caltech. Presented at the Symposium of the Division of History of Physics, San Francisco, 25 January 1982.

The hero of the Kellogg story is Charles Christian Lauritsen (1892-1968), who was lured to Caltech by the siren call of Robert Andrews Millikan in 1926. Charlie, Ralph Bennett, Benedict Cassen and Richard Crane developed a high-potential X-ray tube that could operate at the one million volts provided by the AC transformers in the old High Voltage Laboratory at Caltech. Springing from the successes in the High Voltage Lab, the Will Keith Kellogg Radiation Lab was built in 1931 for the use of Charlie's high-potential tubes in cancer therapy and for study of the physics of high-energy X-rays. . . At the end of World War II, Charlie and his son Tommy Lauritsen and I resolved to concentrate on those nuclear reactions thought to occur in stars.

Published as "Phiphty Years of Phun and Physics in Kellogg," Engineering & Science (California Institute of Technology), March 1982, 45(4): 18-21; see also the account of the 50th anniversary celebration with several photographs in the same issue of this magazine, pp. 15-17.

Author's address: W. K. Kellogg Radiation Laboratory, California Institute of Technology, Pasidena, CA 91125.

HOLBROW, CHARLES H. Neither Horsefarm nor Hospital. Physics Today, July 1981.

Fifty years ago the W. K. Kellogg Radiation Laboratory of the California Institute of Technology was founded as a center of radiation therapy. Seven years later it abandoned medicine to pursue its development into an internationally known center of nuclear physics. The founding and subsequent changes were shaped in important ways by the successes and failures of Caltech's chief executive, Robert A. Millikan, in raising money to support the Lab. His efforts, including an attempt to take a horse farm away from the University of California, reveal why this Nobel prize winning physicist was so successful as head of Caltech, and show that it was just as difficult then to get support for pure research in a new field of physics as it is today.

For reprints, write to: Charles H. Holbrow, Department of Physics, Colgate University, Hamilton, NY, 13346.

Time

LANDSBERG, PETER T. (ed.) The Enigma of Time. xii + 241 pp. Bristol, Eng.: Adam Hilger, 1982. £ 13.95.

Anthology of articles, mostly on time in physical science, by G. N. Lewis, E. Schroedinger, P. Morrison, P. T. Landsberg, F. Hoyle, P. A. M. Dirac, A. Aharony, Y. Ne'eman, A. J. Leggett, R. Penrose, P. C. W. Davies, E. H. Gombrich and W. J. Ong.

Elementary Particles

BROWN, LAURIE M. & LILLIAN HODDESON. The Birth of Elementary-Particle Physics. Physics Today, April 1982, 35(4): 36-43.

It is argued that the field of elementary particle physics originated in the early 1930's out of the confluence of three streams: nuclear physics, cosmic ray physics, and quantum field theory. As a recurrent theme, apparent contradictions to generally accepted conservation laws and physical principles, such as economy and unification, were found to be solved by the discovery of new particles (e.g., neutrino, neutron, positron, mesotron). This article is based upon the introduction to the proceedings of a symposium on the history of elementary particles (Fermilab, 1980). It also touches upon the relation between the intellectual development and the social and other human aspects of the history of particle physics.

For reprints write to Dr. Lillian Hoddeson, Fermilab Mail Station 109, Box 500, Batavia, IL 60510.

Yukawa

YUKAWA, HIDEKI. Tabibito (The Traveler), translated by L. M. Brown and R. Yoshida, with introduction by L. M. Brown. vi + 218 pp. Singapore: World Scientific Publishing Co., 1982. $28.00 (hard cover), $12.00 (soft cover).

This is Yukawa's autobiography of his early years, written in 1957 when he was fifty-years old. It describes his family background and the education and the experiences, social and intellectual, that formed his character and motivated his career. He discusses his relationships with his colleague Tomonaga, his teacher Nishina, and with his early students and collaborators. The book ends with Yukawa's completion and publication in English of the article proposing the meson theory of nuclear forces. Included are photographs, chronology, and a reprint of the meson paper.

Nucleus to Neutron

BROWN, LAURIE M.; MOYER, DONALD F. Lady or Tiger? -- The Meitner-Hupfield effect and Heisenberg's neutron theory. Presented at the joint meeting of the British Society for the History of Science and the Société Française d'Histoire des Sciences, Cambridge, England, July 1982.

The observation by several workers in May 1930 of an anomaly in the scattering and absorption of gamma rays was an important omen of the New Physics of the 1930's. Although experiments with targets of light elements confirmed the theoretical predictions, based upon electrodynamics and the relativistic electron theory of Dirac, the results on heavy targets pointed to a nuclear effect that was a harbinger of new particles and new phenomena. We discuss the development of experimental investigations of the anomalous absorption and the constraints this appeared to place on possible theories of nuclear structure.

Authors' address: L. M. Brown and D. F. Moyer, Dept. of Physics and Astronomy, Northwestern University, Evanston, IL 60201.

Antiproton

HEILBRON, JOHN. The Making of the Antiproton. Presented at the joint meeting of the British Society for the History of Science and the Societe Francaise d'Histoire des Sciences, Cambridge, England, July 1982.

The production and detection of the antiproton in 1955 required the world's largest particle accelerator (the Bevatron), the latest magnets and electronics, and formal research management. The lecture describes the successful and competing experimental setups and the proximate historical origin of their principal inanimate ingredients. A critical parameter, the design energy of the Bevatron, will be related to postwar science policy and to defense in the Cold War, and the counters and other detectors employed will be traced back to weapons programs of World War II. The detection of the antiproton brought a Nobel prize to two of the senior investigators in a team of four plus a supporting group of about twenty. The problems of awarding prizes to a few of the many individuals who collaborate on big experiments will be mentioned with reference to legal action brought by a physicist who thought that his contributions to the discovery of the antiproton were inadequately recognized.

Author's address: J. Heilbron, Office for History of Science and Technology, 470 Stephens Hall, University of California, Berkeley, CA 94720.

High Energy Theory

CUSHING, JAMES T. Models and Methodologies in Current Theoretical High-Energy Physics. Synthese, 1982, 50: 5-101.

A case study of the development of quantum field theory and of S-matrix theory, from their inceptions to the present, is presented. The bulk of this paper consists of a description of these two major research programs in contemporary high-energy physics. The main sections are:

1. From the Old Quantum Theory to Quantum Mechanics (1900-1926)
2. Quantum Field Theory - Mostly Quantum Electrodynamics (1927-1960)
3. S-Matrix Theory (1943-1975)
4. Gauge Field Theories (1954-)
5. Ordered S-Matrix Theory (1977-)

This historical sketch is compared with the pictures of science as represented by some current methodologies in the philosophy of science.

For reprints write to Prof. J. T. Cushing, Dept. of Physics, University of Notre Dame, Notre Dame, IN 46556.

CP Asymmetry

CRONIN, JAMES W. and MARGARET STAUTBERG GREENWOOD. CP Symmetry Violation. Physics Today, July 1982, 35(7): 38-44.

"In an informal discussion the co-discoverer of CP asymmetry recalls the circumstances of the observation and discusses its implications." (Author's summary) Cronin is professor of physics at the University of Chicago.

Quantum Knowledge

HARVEY, BILL. Plausibility and the Evaluation of Knowledge: A Case-Study of Experimental Quantum Mechanics. Social Studies of Science, 1981, 11: 95-130.

This paper describes a recent series of experimental tests of quantum mechanics and examines the way in which various knowledge-claims were evaluated. In each case, it is argued that an agreed evaluation was only possible because of the shared culture of the physicsts involved. The concept of plausibility is introduced as a way of characterizing the role of the social and cultural context in the evaluation of knowledge. This concept may be useful in clarifying the relationship between relativism and empiricism.

For reprint write to Bill Harvey, Physics Department, Napier College of Commerce and Technology, Colinton Road, Edinburgh EH10 5DT, Scotland, UK.

Social Quantum

HARVEY, BILL. The Effects of Social Context on the Process of Scientific Investigation: Experimental Tests of Quantum Mechanics. Pp. 139-163 in KNORR, K.D., KROHN, R. and WHITLEY, R. (eds) The Social Process of Scientific Investigation, Sociology of the Sciences Yearbook Volume 4. 328 pp. Boston, MA: D. Reidel Publishing Company, 1981.

This paper examines a group of physicists who performed tests of Quantum Mechanics and discusses the social context in which this work took place. It is concerned not with the products of this activity but with the way in which this activity was carried out. Specifically, it examines the recruitment of personnel, physicists' decisions to leave this field, and the ways in which they presented their work to other scientists. In each case, the limitations of a Mertonian account of scientific methodology are pointed out. An alternative model is presented which stresses the role of microsociological factors in determining scientists' action.

Author's address: Bill Harvey, Physics Department, Napier College of Commerce and Technology, Colinton Roda, Edinburgh EH1i 5DT, Scotland, UK.

Particles

ROSNER, JONATHAN L. (ed.) New Particles. Selected Reprints. iv + 121 pp. Stony Brook, NY: American Association of Physics Teachers, 1981, $4 ($4.50 outside the U.S.).

The period 1974-1979 witnessed a spectacular growth in the number of "elementary" particles. The discovery of the J/ψ in November of 1974 heralded the fourth ("charmed") quark, and shortly therafter a new lepton (τ) and evidence for a fifth quark were also found. This period is traced via original journal articles, starting with the theoretical underpinnings of charm, and via a brief summary of the relevant literature up to early 1979.

Send orders to: Publications Department American Association of Physics Teachers Graduate Physics Bldg., SUNY at Stony Brook, Stony Brook, NY 11794.

Transistor

HODDESON, LILLIAN. The Discovery of the Point-Contact Transistor. Historical Studies in the Physical Sciences, 1981, 12: 41-76.

This article traces the steps leading to the discovery of the first transistor by Walter Brattain and John Bardeen in late 1947. The focus is on the scientific history as reflected in laboratory notebooks and as clarified in interviews with major participants and their contemporaries, but the development is also set into the larger contexts of the growth of solid state physics since 1926, industrial interest in semiconductors in the 1930's and 40's, technical interests of the Bell Laboratories, and institutional factors such as the creation of a unique multidisciplinary research group whose members were encouraged to explore the basic physics of semiconductors.

For reprint, write to Lillian Hoddeson, Physics Department, University of Illinois, 1110 W. Green St., Urbana, IL, 61801.

Superconductivity Citations

NADEL, EDWARD. Citation and Co-Citation Indicators of a Phased Impact of the BCS Theory in the Physics of Superconductivity. Scientometrics, 1981, 3(3): 203-221.

An intellectual account of the development of superconductive physics was compared with citation and co-citation data during two historical periods that coincided with the introduction of its central explanatory theory (BCS). The question is raised whether citation and co-citation data provide a useful supplement to the historical analysis of major events. The results give preliminary support to a hypothesis that distinguishes impact phases in the effect of a major theory in the cognitive organization of a specialty. It is also observed that citation and co-citation are separate types of information which, under some historical conditions, give differing results.

For reprint write to E. Nadel, Institute for Scientific Information, 3501 Market Street, Philadelphis, PA 19104.

Superconductivity

DOBROV, G. M.; DZIEKOVSKAYA, I. V. Methods and Results of Studying the Flow of Information in the Field of Thin-Film Superconductivity. Scientometrics, 1982, 4: 27-44.

This paper deals with a physical-statistical analysis on the information flows in the field of superconductive thin films for 1949 to 1977. The dynamics of growth of the number of publications is considered, and changes of researchers' scientific interests concerning the application of various chemical materials and structures in thin films are studied. The problems of professional mobility are also investigated.

For reprint write to G. M. Dobrov, 51-53 Vladimirskaya str., Apt. 45, 252003 Kiev, USSR.

Citation Classics

GARFIELD, EUGENE. Citation Classics - Four Years of the Human Side of Science. Current Contents, Physical, Chemical & Earth Sciences, 1981, 21(22): 5-16.

Authors of the most frequently cited papers in various fields of science were asked to provide commentaries on how they came to write the paper and on its impact. These have been published weekly in Current Contents. The 1981 "Citation Classics" in physics included: E. R. Cohen & J. W. M. DuMond, "Our Knowledge of the Fundamental Constants of Physics and Chemistry in 1965" (1965) [CC, Aug. 31]; S. A. Colgate & R. H. White, "The Hydrodynamic Behavior of Supernovae Explosions" (1966) [CC, Jan. 26]; R. A. Cowley, "The Lattice Dynamics of an Anharmonic Crystal" (1963) [CC, Oct. 19]; C. Domb, "On the Theory of Cooperative Phenomena in Crystals" (1960) [CC, Nov. 2]; M. K. Gaillard, B. W. Lee & J. L. Rosner, "Search for Charm" (1975) [CC, Mar. 9]; H. Goldstein, Classical Mechanics (1950) [CC, Jan. 12]; D. P. McKenzie, J. M. Roberts & N. O. Weiss, "Convection in the Earth's Mantle: towards a Numerical Simulation" (1974) [CC, Nov. 23]; G. E. Pake, "Nuclear Resonance Absorption in Hydrated Crystals: Fine Structure of the Proton Line" (1948)[CC, Dec. 7]; D. N. Zubarev, "Double-Time Green Functions in Statistical Physics" (1960) [CC, June 8].

Author's address: E. Garfield, Institute for Scientific Information, 3501 Market Street, Philadelphia, PA 19104.

Einstein, S. B. Preuss

GOENNER, HUBERT F. S. B. Preuss: a short life. Physics Today, May 1982, 35(5): 15, 116.

Careless citations generated a new "collaborator" of Einstein.

Censorship

HAVENS, W. W., Jr. Examples of previous experiences with U. S. Controls on the Release of Scientific Information. Presented at meeting of American Physical Society, Washington, D.C., 27 April 1982.

Recent actual and proposed Government controls on the release of scientific information are premised on the belief that more controls on the release of information will result in less export of information to potential adversaries. At stake in the current controversy is the scientific community's investment in maximum possible circulation of information. In my opinion, experience should have taught us that less Government control of information results in more progress in basic research, engineering and applied science. My "lessons from experience" concern neutron cross sections measurements, controlled thermonuclear reactions data and the development of laser technologies.

Author's address: W. W. Havens, Jr., Department of Applied Physics and Nuclear Engineering, Columbia University, New York, NY 10027.

Numerology

BARROW, JOHN D. The Lore of Large Numbers: Some Historical Background to the Anthropic Principle. Quarterly Journal of the Royal Astronomical Society, 1981, 22: 388-420.

We describe how the study of numerological coincidences in physics and cosmology led first to the Large Numbers Hypothesis of Dirac and then to the suggestion of the Anthropic Principle in a variety of forms. The early history of 'coincidences' is discussed together with the work of Weyl, Eddington and Dirac.

Author's address: Astronomy Centre, School of Mathematical Physics, University of Sussex, Falmer, East Sussex, BN1 9QH, England, U.K.

Chandrasekhar

TIERNEY, JOHN. Quest for Order. S. Chandrasekhar Meditates on Black Holes, Blue Skies, and Scientific Creativity. Science '82, Sept. 1982, 3(7): 69-74.

A profile of the astrophysicist, beginning with an account of his disagreement with A. S. Eddington on relativistic degeneracy in stars.

Geophysics

SCHRÖDER, WILFRIED. Disziplingeschichte als wissenschaftliche Selbstreflexion der historischen Wissenschaftsforschung. CH-3012 Bern, Jupiterstrasse 15; Verlag Peter LANG 1982, sFr 27, --

The book deals with the history of geosciences, including case-studies in pure and applied geophysics and some relation to physical science. Concepts of philosophy of science (models of Thomas S. Kuhn, Imre Lakatos and Karl R. Popper) are discussed with regard of their application in some case-studies of the development of geophysics as an exact science.

Continental Drift

TOTTEN, STANLEY M. Frank B. Taylor, Plate Tectonics, and Continental Drift. Journal of Geological Education, 1981, 29: 212-20.

A recently discovered letter written December 4, 1931, by Frank B. Taylor to the author of a Popular Science Monthly article contains evidence that Alfred Wegener first got his ideas about continental drift from Taylor. The Taylor letter details the early development of the continental drift hypothesis and contends that Wegener was aware of Taylor's work on drift at an early date. Taylor's claim as originator of the drift hypothesis stems mainly from the presentation of a paper to the Geological Society of America in 1908. In this paper, which was published by the Society in 1910, Taylor outlined the formation of Tertiary mountain belts by the collision of crustal sheets (we would now say "plates") which had experienced horizontal creeping of hundreds, even thousands of kilometers over a plastic substrate.

For reprints write to Stanley M. Totten, Dept. of Geology, Hanover, IN 47243.

Lunar Basins

HARTMANN, WILLIAM K. Discovery of multi-ring basins: Gestalt perception in planetary science. Pp. 79-90 in P. H. Schultz, R. B. Merrill (eds.) Multi-Ring Basins. Proceedings of Lunar and Planetary Science Conference, 1981, vol. 12A.

Early selenographers resolved individual structural components of multi-ring basin systems but missed the underlying large-scale multi-ring basin patterns. The recognition of multi-ring basins as a general class of planetary features can be divided into five steps. Gilbert (1893) took a first step in recognizing radial "sculpture" around the Imbrium basin system. Several writers through the 1940's rediscovered the radial sculpture and extended this concept by describing large-scale systems of interrelated features. Baldwin (1949) made an important third step in describing concentric rings around several circular maria. Some reminiscences are given about the fourth step--discovery of the Orientale basin and other basin systems by rectified lunar photography at the University of Arizona in 1961-62. Multi-ring basins remained a lunar phenomenon until the fifth step--discovery of similar systems of features on other planets, such as Mars (1972), Mercury (1974), and possibly Callisto and Ganymede (1979). This sequence is an example of gestalt recognition whose implications for scientific research are discussed.

For reprint write to W. K. Hartmann, Planetary Science Institute, 2030 E. Speedway, Suite 201, Tucson, AZ 85719.

Selenogony

BRUSH, STEPHEN G. Nickel for your Thoughts: Urey and the Origin of the Moon, Science, 1982, 217: 891-898.

Presented at the Inaugural Symposium of the Division of History of Physics, Baltimore, 22 April 1981.

The theories of Harold C. Urey (1893-1981) on the origin of the moon are discussed in relation to earlier ideas, especially G. H. Darwin's fission hypothesis. Urey's espousal of the idea that the moon had been captured by the earth and has preserved information about the earliest history of the solar system led him to advocate a manned lunar landing. Results from the Apollo missions, in particular the deficiency of siderophile elements in the lunar crust, led him to abandon the capture selenogony and tentatively adopt the fission hypothesis.

A longer version has been published in Spacelab, Space Platforms and the Future, edited by P. M. Bainum et al. (proceedings of the American Astronautical Society's Goddard Memorial Conference, March 1982).

For reprint write to S. G. Brush, IPST, University of Maryland, College Park, MD 20742.

Geomagnetism

GLEN, WILLIAM. The First Potassium-Argon Geomagnetic Polarity Reversal Time Scale; a Premature Start by Martin G. Rutten. Centaurus, 1981, 25: 222-238.

In 1959, Martin G. Rutten, a broadly trained and practiced Dutch geologist, expediently determined the magnetic polarities of some Italian rock units that had just been dated in the pioneering, young-rock, potassium-argon laboratory of Jack Evernden and Garniss Curtis at the University of California at Berkeley. By combining their isotopic dates and his own polarity data, Rutten formulated the first (however crude) calendar of reversals of the earth's magnetic field. Although he was poignantly aware of the value of such a time scale to earth science - especially stratigraphy - he did not follow up on his initial, historic effort; likely, because he lacked training in both radiometry and paleomagnetism, prerequisites demonstrated in the greatly refined polarity-reversal scale of A. Cox, R. Doell, and B. Dalrymple in 1963.

Author's address: W. Glen, Office of History of Science & Technology, University of California, Berkeley, CA 94720.

Aerodynamics

HANLE, P. A. Bringing Aerodynamics to America. xvi + 184 pp. Cambridge, MA and London: MIT Press, 1982. $20.

The Wright brothers achieved powered flight in 1903, but in the years immediately following, the major contributions to aerodynamic theory were made by German scientists. The mathematician Felix Klein established an institute for applied mechanics at Göttingen University for the scientific investigation of technical problems. The first director of this institute was Ludwig Prandtl, one of the creators of the new field of fluid mechanics. Prandtl introduced the boundary-layer concept that was to become central to the science of flight. Later, Prandtl's student Theodore von Karman established a similar facility at the Polytechnic Institute at Aachen. His major theoretical investigations included the nature of vortices and turbulent flow.

American Science

REINGOLD, NATHAN; IDA H. REINGOLD (eds.). Science in America: A Documentary History, 1900-1939. xii + 490 pp. Chicago: University of Chicago Press, 1981. $37.50.

The documents are organized thematically within a general chronological framework. There are separate chapters on pre-World War I astrophysics and physics, the physical sciences between the World Wars, and such significant institutions as the Carnegie Institution of Washington and the Institute for Advanced Study. The book includes analytical introductions to each chapter and annotations to the documents. The editors have appended a guide to manuscript collections.

Work in Progress

Keeler

OSTERBROCK, DONALD E. James E. Keeler - Pioneer American Astrophysicist. Presented as a Special Seminar at the National Air and Space Museum, Washington, D.C., 7 April 1982.

Keeler played a central role in the development of observational astrophysics, from 1881, when he graduated from Johns Hopkins University and became Samuel P. Langley's research assistant, until 1900, when he died unexpectedly, while serving as Director of Lick Observatory. By his contemporaries he was considered the outstanding American astrophysicist of his time. His contributions were particularly strong in planetary, stellar and nebular spectroscopy, and the beginnings of the study of spiral "nebulae" with large reflecting telescopes.

For further information write to Dr. D. E. Osterbrock, Lick Observatory, UCSC, Santa Cruz, CA 95064.

Volterra

ISRAEL, GIORGIO. Vito Volterra, the mathematician as physicist. Presented at the Smithsonian Seminar, Washington, D.C., 6 May 1982.

This work describes Vito Volterra's scientific paradigm: his aim was to consolidate and to extend the field of intervention of the explanatory structures of classical determinism and of the mathematical tools related to it (i.e., the theory of differential equations). Volterra considered it was necessary to maintain the relationship between mathematics and experimentation which had been established by the French school of mathematical physics.

For further information write to Prof. G. Israel, Istituto Matematico "G. Castelnuovo", Città Universitaria, P.le A. Moro, 2, 00185 Roma, Italy.

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