

# History of Physics Newsletter

VOLUME I, NUMBER 3

MARCH 1983

## DIVISION NEWS

\*Members of the Division of History of\*  
\*Physics should take note of the\*  
\*election information contained in this\*  
\*issue of the newsletter. Ballots must\*  
\*be postmarked by April 1, 1983. Non-\*  
\*members will not receive this ballot.\*

### BIOGRAPHICAL INFORMATION ON NOMINEES

Nominated for Vice-chairperson of the APS Division of History of Physics are:

**Arthur I. Miller:** Born 2/6/40, New York City. Ph.D. (theoretical physics), 1965 M.I.T. Currently Dr. Miller is University Professor of Philosophy and History and Affiliate of the Physics Department, University of Lowell, and an Associate of the Physics Department, Harvard University. He is author of Albert Einstein's Special Theory of Relativity: Emergence (1905) and Early Interpretation (1905-1911) and the forthcoming On the Nature of Scientific Discovery. He has also edited the forthcoming volume on relativity and field theory for the Harvard Source Book series. He has held the following fellowships and grants: Guggenheim, American Philosophical Society, NEH, NSF, the Centre national de la recherche scientifique and the Fritz Thyssen Stiftung. In the fall of 1977 he was visiting professor at the Ecole Pratique des Hautes Etudes, Paris. Prof. Miller views the history of science as a key part of the history of ideas. He also advocates an important educational role for history of physics in the making of scientists as well as non-scientists.

**Albert Wattenberg:** Born 1917, New York City. Ph.D., Univ. of Chicago, 1947; Group Leader, Manhattan Project, Univ. of Chicago, 1942-46; Director of Physics Division, Argonne National Laboratory, 1949-50; Senior Research Physicist, MIT,

1951-58; Research Professor of Physics, Univ. of Ill., 1959-present. NSF Fellow, University of Rome, Italy, 1962-63; Visiting Professor, Stanford Linear Accelerator Center, 1973, 1980-81; APS Fellow, 1964; Executive Committee of DPF, 1970-77; Council of APS, 1974-78. Contributions to books: Handbuch der Physik, vol. 30; Collected Works of Enrico Fermi, vol. II; All in Our Time (ed. Jane Wilson). Awards: Bronze Medal of American Nuclear Society; "Nuclear Pioneer" Award, Society of Nuclear Medicine. Dr. Wattenberger's research interests include: UV spectroscopy, neutron physics, nuclear reactors, photo-nuclear and photo-meson production, parity violation and CP violation, production of charmonium states and charmed particles.

Candidates for the Executive Committee are:

**William A. Blanpied:** My principal history of science interests are focused in two areas: the history of particle physics and the history of science policy. The first of these interests is an outgrowth of my former university research activity. Because particle physics was the first major field of "big science" requiring the use of centralized facilities, large groups of investigators and a high degree of specialization, the history of its emergence as a separate field provides useful insights into both the conceptual and institutional nature of contemporary physics. Given the mathematical character of particle physics, I believe that its history can only be written by people who are, or at least once were, practicing physicists. The second of my interests has developed as a result of my more recent policy-oriented work at NSF. Federal support for basic research, while now taken for granted by most American scientists, was

a startling innovation when it was first proposed almost forty years ago. Most of the histories that have been written about the emergence of a self-conscious science policy during the decade following WWII have been written from the perspective of the scientific community rather than the Federal bureaucracy. I believe that the latter perspective needs to be explored.

**Allan Franklin:** Professor of Physics, Univ. of Chicago. I began my career as an experimental particle physicist at Cornell doing work on photoproduction. At Princeton I worked on K meson decays

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**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; about 100 pages); \$5 additional 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 the first issue are still available from the editor. HPN will publish news of the Division, including announcements of sessions of papers at APS meetings; notices of positions which might be filled by historians of the physical sciences, and of grants and fellowships for which they might apply; notes and queries on various topics; information about meetings, journals, societies, and projects related to history of physics; and summaries of publications and works in progress. We do not publish substantive research articles or book reviews. The Editor welcomes letters, suggestions, summaries & news items. Editor: **Stephen G. Brush**, Dept. of History and Institute for Physical Science & Technology, University of Maryland, College Park, MD 20742; (302/454-2724). Associate Editors: **Kathryn Olesko**, Dept. of History, Georgetown University, Washington, DC 20057; and **George Snow**, Department of Physics & Astronomy, University of Maryland, College Park, MD 20742.

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using spark chamber techniques and continued these studies and bubble chamber experiments at Colorado. Eight years ago my research changed to history and philosophy of physics. My earliest work was on medieval science, including a monograph The Principle of Inertia in the Middle Ages. More recently I have been concerned with the role that experiment plays in science, particularly in the choice between competing theories or hypotheses, a problem rather neglected by most historians and philosophers of science. I have attempted to show the important role that experiment plays in such decisions by both historical and case studies and by considering methodological aspects of that role. The historical case studies include parity non-conservation ("The Discovery and Nondiscovery of Parity Nonconservation," Stud. Hist. Phil. Science, 1979) & Millikan's oil drop experiment ("Millikan's Published and Unpublished Data on Oil Drops," Hist. Stud. Phys. Sci., 1981 & "Did Millikan Observe Fractional Charges in Oil Drops?," Am. J. Phys., 1982). My recently completed study on the history of CP violation will be published in Hist. Stud. Phys. Sci. in May 1983. My methodological work includes a justification of the 1957 parity experiments as crucial experiments (Am. J. Phys., 1982) and "What Makes a 'Good' Experiment?" (Brit. J. Phil. Sci., 1981).

**Edward J. Lofgren:** Born Chicago, 1914. Ph.D., Berkeley, 1946. Manhattan Project, 1941-45. Assistant Prof., Univ. of Minn., 1946-48; high altitude cosmic ray research. Co-discoverer of the heavy component of cosmic rays. Assistant to full prof., Berkeley, 1948-present. Development, operation, and management of accelerators. This has included early work on high intensity cyclotrons and high intensity ion injectors. He was put in charge of the Bevatron in 1954 and managed its development, operation and experimental programming during the formative years of multi-BeV accelerator physics. He organized the Accelerator and Fusion Research Division of the Lawrence Berkeley Laboratory and was its Head until 1979. He spent a sabbatical year at CERN in 1959. He was a member of several of the NSF-AEC ad hoc review panels on high-energy ac-

celerators and was one of the original members of HEPAP. He also served on various review panels for Brookhaven, Argonne, and MIT. He has provided accelerator exhibits for the National Museum of American History. He is also the organizer of a special session at the January 1982 APS meeting: Fiftieth Anniversary of the Lawrence Berkeley Laboratory and the W. K. Kellogg Radiation Laboratory.

**Gloria Lubkin:** Senior editor of Phys. Today, in charge of Search & Discovery and State & Society sections. A.M., nuclear physics, Boston Univ., 1957. After working as a mathematician for Fairchild Aviation and for Letterkenny Ordnance Depot, as a nuclear physicist for TRG, Inc., and as an instructor in physics at Sarah Lawrence College, she joined Phys. Today as associate editor in 1964. She was made senior editor in 1970. During the academic year 1974-75 she was a Nieman Fellow at Harvard University and she then served on the Nieman Advisory Committee, 1978-82. As a consultant to the AIP Center for the History of Physics, she was involved in oral history interviews with Richard Feynman, Robert Serber, Victor Weisskopf, John Wheeler, and John Van Vleck (1966-67).

She has also served on the following committees: APS Forum on Physics and Society (1977-78); nominating committee for the Leo Szilard Award for Physics in the Public Interest and the APS Forum Award for Promoting Public Understanding of the Relation of Physics to Society (member, 1978; chairperson, 1979-80); APS Committee on Women in Physics (founding member, 1971-72); AIP Committee on Physics and National Domestic Goals (1973); AIP Committee on Public Information and Education (1976-78), AIP-US Steel Foundation Prize for Science Writing (judge, 1975 & 1977); AIP Subcommittee on Books (1983). She is an APS Fellow, a member of the National Association of Science Writers and a member of the American Association for the Advancement of Science.

## CONFERENCES

### Joint Atlantic Seminar

The 1983 Joint Atlantic Seminar in the History of the Physical Sciences will be

jointly sponsored by the Smithsonian Institution and Georgetown University on April 8 & 9, 1983. Keynote speakers on the evening of April 8 will address the topic of "The History of the Physical Sciences outside the Academy;" these speakers will include David Allison, Joan Bromberg, David DeVorkin, & Stanley Goldberg. Robert Multhauf will moderate the session, which will be followed by a brief reception. Predoctoral candidates and recent Ph. D.s will deliver papers on their research at the Intercultural Center of Georgetown University on Saturday, April 9. Individuals wishing to receive registration material should write to: Dr. Kathryn Olesko, 1983 JAS, Department of History, Georgetown Univ., Washington, DC 20057; call: 202/625-4910.

## EXHIBITS

### Max Born & James Franck

The Institute for Cultural Relations of the Federal Republic of Germany has issued an exhibit honoring Max Born and James Franck entitled, "Max Born and James Franck: Physicists in their Time and Age." The exhibit, consisting of 50 flexible plastic panels, displays historical photographs, reproductions of journal pages and copies of letters. The explanatory text is in English. The exhibit can be hung on a wall or on free standing partitions which can be supplied with the exhibit. The exhibit is available free of charge under the condition that transportation from the previous place of exhibition be provided by the host institution. For additional information, contact: Cultural Department, Embassy of the Federal Republic of Germany, 4645 Reservoir Rd., Washington, DC 20007; (202/298-4000).

### Time Museum

The Time Museum (Rockford, Illinois) was established to illustrate the development of timekeeping devices. Covering the evolution of time measurement from Stonehenge to the Atomic Clock, this collection spans a period of 4,000 years. In addition to many different kinds of clocks and watches, the 2500 pieces displayed include sundials, astrolabes, nocturnals, incense burning clocks, sand-glasses, and navigational instruments.

The museum also has a collection of automated clocks. The museum is located at the junction of I-90 and Bus. 20, about a 1 hr. drive from Chicago O'Hare Airport. Hours: T-F, 10-8; S-S, 10-6. Contact: The Time Museum, 7801 E. State St., Rockford, IL 61125 (815/398-6000).

## REPORTS

### 1920-29 Citation Index

A workshop on historical applications of the Physics Citation Index 1920-29 was held at the Institute for Scientific Information, Philadelphia, 10-11 December 1982. The PCI lists all articles since 1800 cited in any paper contained in 16 selected journals of the 1920s. The data base allows one to perform various types of analyses such as co-citation clusters. It also includes secondary authors and notes acknowledgments of assistance and funding. Participants in the workshop were given printouts of the PCI in advance and were offered the opportunity to request special analyses before the meeting.

**Henry Small** (ISI) described the procedure for preparing the PCI and presented some overall statistical results. The most frequently cited journal was Zeitschrift für Physik and the most frequently cited article was Compton's 1923 Phys. Rev. paper, followed closely by Einstein's 1917 Phys. Z. paper.

**Elizabeth Garber** (SUNY-Stony Brook), **Dan Sullivan** (Carleton College) and **Stephen Brush** (Maryland, College Park) reported the results of some earlier studies on the history of recent physics using the Science Citation Index.

**Belver Griffith** (Drexel) reported work he had done with **Howard D. White** on "Author Co-citation, Document Obsolescence and Journal Inter-citation." They found that articles published around 1905 did not "age" but continued to be cited through the 1920s. About 1924 the physics literature began to "gulp itself:" earlier articles were digested and were no longer cited.

**Spencer Weart** (AIP) discussed the use of PCI by the International Project in the History of Solid State Physics. Citation analysis showed the formation of this new field. One unexpected result was that subfields were drawn together by and

clustered around the experimental techniques associated with X-rays, rather than the theoretical methods associated with quantum theory.

**Karl Hufbauer** (California, Irvine) presented "Trends in Theoretical Astrophysics in the PCI." **John Heilbron** (California, Berkeley) exploited the information given on authors' addresses and acknowledgments in the PCI to investigate travel and funding patterns in the physics community. **Yves Gingras** (Montreal) showed how patterns of development in Canadian physics could be revealed in citation data.

At the Saturday morning session, **Joseph Sneed** (Colorado School of Mines) compared the intellectual structure of a scientific field to the structure of its literature. **Paul Forman** (Smithsonian) reported his preliminary results on "Searching for the Crisis of the Old Quantum Theory in the Citation Index." Of articles published in 1922-25, the most frequently cited were by Landé and Bohr; there were no authors of the most frequently cited papers who were not working in either quantum theory or atomic physics. **Mara Beller** (Maryland, College Park) showed that the struggle between wave mechanics and matrix mechanics resulted in a quantitative victory of the former, as measured by the number of citations to Schrödinger's papers as compared to those of Born, Heisenberg and Jordan. **Katherine Sopka** (Fort Lewis College) identified some outstanding theoretical papers by Americans which were recognized and some that were not. She pointed out that the high citation rate of Phys. Rev. contradicts the usual view that American work was ignored at this time. Finally, **Stanley Goldberg** (Hampshire College) discussed ways in which the citation index data base could be made available for use by researchers with their own computers. For further information about the PCI, contact Henry Small, Institute for Scientific Information, 3501 Market St., Philadelphia, PA 19104. Both the conference and the compilation of the index were supported by NSF grants.

### Value of Older Scientific Works

by Ellen Wells

"The Value of Older Scientific Works: A

Dialogue among Historians, Scientists and Bibliographers," a Smithsonian Institution bibliographic seminar, was held on 23 September 1982 in the Dibner Library of the National Museum of American History. Under discussion was the value today's scientists give to early publications, manuscripts and laboratory notes in relation to their current work. Are the physical sciences constantly progressing from accumulations of facts and observations to new concepts and truths, and as this 'progress' goes on, is older knowledge abandoned as false or unnecessary? Do older scientific works offer no more than antiquarian or aesthetic interest to contemporary scientists? On the other hand, if there is information of substantive value for current research in such sources, is there then a responsibility for those who maintain archives & libraries to preserve those records and publications and make them known and accessible to users? Who can judge what must be kept?

Speakers noted particular genres of printed materials, including early or superceded encyclopedias, textbooks in the sciences, and advertising in bound journals, which are often weeded or pruned in libraries. A major issue, not resolved but warmly discussed, was the retention or selective retention of working drafts and notes of scientists. Institutions and universities are often reluctant to keep drafts due to lack of trained staff and the sheer bulk of scientific or engineering papers. The impossibility of saving everything was sorrowfully recognized by both speakers & audience.

David DeVorkin, Associate Curator, History of Astronomy, National Air & Space Museum; Uta Merzbach, Curator, Division of Mathematics, National Museum of American History; Clifford Nelson, Staff Geologist, Office of Scientific Publications, USGS; Sharon Gibbs, Archivist, Scientific, Economic and National Resources Branch, NARS; and Jack Goodwin, Manager, Collection Management Division, SIL, participated in the panel discussion before an audience of nearly 40 scientists, curators, historians & librarians from the Washington, DC area.

### Crookes Meeting

The British Society for the History of Science sponsored a one day meeting on "William Crookes, Science and Pseudoscience in Victorian Britain," at the Science Museum, London, 8 January 1983. The following papers were presented:

W. H. Brock, "William Crookes--Eminent Victorian?"

F. James, "Crookes' Early Spectro-chemical Work"

S. Sinclair, "Crookes and the Atom: From Inorganic Evolution to Radioactive Transmutation"

M. R. Barrington, "Crookes & Psychical Research"

F. Greenaway, "Crookes & the Elements: Periodic Tables, Rare Earths and Inert Gases"

J. Darius, "William Crookes: the Chemist as Photographer"

### Italy

Fabio Bevilacqua (Pavia) writes: "This year the Physics Committee of the Italian National Research Council and the Italian Ministry of Education began to sponsor two new areas of research in physics departments: the history of physics and physics education. This is a major institutional change in the field in Italy. We have already had national meetings and we hope for more in the future. Links with your Division of History of Physics are very welcome. The president of the first group (history) is Prof. Guido Tagliaferri (Istituto di Fisica--Via Celoria, 16, Milano); of the second (teaching) is Prof. Gianni Bonera (Istituto di Fisica--Via Bassi, 6, Pavia). I am the secretary of the first group and am working with Bonera in Pavia in an effort to establish cooperation between the two."

### Astronomy

At the 161st meeting of the American Astronomical Society in Boston, 9-12 Jan. 1983, the Historical Astronomy Division sponsored three sessions: Native American Astronomy, Ancient and Medieval Astronomy and Astrophysics. Historical papers were also presented at a session on space science. The following papers of interest to historians of physics were included in the program:

- J. G. Baker, "Optics in the Early 40s at Harvard College Observatory"  
 P. A. Kidwell, "Cecilia Payne-Gaposchkin and Stellar Atmospheres"  
 B. L. Welther, "Beta Lyrae: A Misfit on the Massachusetts Diagram"  
 D. H. DeVorkin, "The Origins of Space Astronomy"

#### History of Science in Liberal Arts

The Committee on Education of the History of Science Society sponsored a symposium on "History of Science in the New Liberal Arts Curricula" at the HSS annual meeting in Los Angeles, December 1981. The symposium was organized and chaired by Stephen G. Brush (Maryland), chairperson of the Committee. The two major speakers were Stanley Goldberg (Hampshire College) and Daniel M. Siegel (Wisconsin), with comments by David A. Hollinger (Michigan) and Gerald Holton (Harvard). Summaries have been published in Science, Technology and Society, the curriculum newsletter of the Lehigh University STS Program, no. 30 (June 1982). The same issue contains a syllabus for a course "Introduction to the History and Philosophy of Science" by Jeffrey L. Sturchio, a course on "The Scientist as Writer" by Robert P. Reno, and an "Introductory Bibliographic Guide" to History of Science by Christine M. Roysdon. For further information, contact Stephen H. Cutcliffe, Editor, STS Newsletter, 327 Maginnes Hall #9, Lehigh University, Bethlehem, PA 18015.

#### France

According to a report recently issued by the French Ministry of Research and Industry, the history of science and technology is one of the academic fields in which French scholarship is far behind that in the US and UK. See Chronicle of Higher Education, 20 Oct. 1982, p. 20.

#### Texas Archives

The Humanities Research Center of the University of Texas at Austin has the following collections of interest to historians of physics:

**Paul Janet Collection.** This consists of hundreds of papers acquired by the French physicist Paul Janet (1863-1937) on electricity, optics, thermostatics, thermodynamics, and thermochemistry. Included are publications of several major

French physicists.

**Schuster Science Collection.** This consists of 7000 pamphlets and reprints covering 19th and early 20th c. research in astronomy, mathematics, chemistry, physics, botany, zoology, meteorology, and geology, collected by Sir Arthur Schuster, a mathematical physicist.

**John A. Wheeler Library.** The theoretical physicist Wheeler (b. 1911) came to UTA from Princeton in 1976. His achievements have been principally in the fields of nuclear physics, elementary particle physics, relativity theory, cosmology and astrophysics. Included in the several hundred books from his library is a set of 28 bound volumes of reprints (including some typescripts and letters) of seminal works by Wheeler and others from the 1920s to 1950.

**The Archives of American Mathematics.** The HRC is the depository for the archives of the Mathematical Association of America. The archives currently contain the papers of the topologist R. L. Moore and the number theorist H. S. Vandiver.

**Albert Einstein Papers.** About 130 letters from Einstein, 3 MSs of published papers, and one MS of some 300 pp. of unpublished mathematical material.

**Maurice Ewing Papers.** To date, 144 cu. ft. of material has been received of the archives of the geophysicist Maurice Ewing (1906-1974).

**O. W. Richardson Papers.** The Center has the personal papers as well as the publications and library of the English physicist O. W. Richardson (1879-1959) who received the Nobel Prize for work in thermionics. Included are 2700 books on the history of the concept of the atom, 14,000 pamphlets and offprints, 25,000 MS items (representing 3500 writers including almost all Nobel Laureates in physics before 1950), photographs and clippings.

**Alfred Schild Collection.** The papers of the physicist Schild (1921-1977) representing Schild's research, teaching & administration in physics and his interest in the arts and politics. He studied under Leopold Infeld at Toronto and was founder and director (1962-72) of the Center for Relativity Theory at UTA. The collection is especially strong in documenting the formation and activities of the "Texas group" of relativists.

**JOURNALS AND SOCIETIES**

As requested by the Executive Committee (HPN, no. 1, p. 4), we present a list of history of science societies and journals publishing articles in the history of physics.

American Association of Physics Teachers. Publishes **American Journal of Physics & The Physics Teacher**.

**American Journal of Physics**

Devoted to the instructional and cultural aspects of physics. Edited by John S. Rigden for the American Association of Physics Teachers. Membership in AAPT costs \$29 which includes a subscription to this or another journal; subscription for nonmembers is \$60. Published monthly; each issue may include 1 or 2 articles on history of physics. For nonmember subscriptions contact: Subscription Fulfillment Department, AAPT, Graduate Physics Building, SUNY-Stony Brook, NY 11794.

**Annals of Science**

An international review of the history of science and technology from the 13th c. Edited by G. L'E. Turner; published by Taylor and Francis Ltd., London; bi-monthly issues of about 100 pages each. Subscriptions \$220 (air freight to USA, Canada, and Mexico); USA subscribers should send order and cheque (made out to Taylor & Francis, Ltd.) to Account 04810879 Bankers Trust Co., PO Box 9137 Church St. Station, NY, NY 10049.

**Archaeoastronomy**

Edited by John Carlson. \$10 for individuals, \$15 for institutions. Published by the Center for Archaeoastronomy, Univ. of Maryland, College Park, MD 20742.

**Archives internationales d'histoire des sciences**

Edited by John North. As of June 1982, the publisher is the Istituto della Enciclopedia Italiana, I-00186 Roma--Piazza Paganica, 4, Casella postale no. 717, Italy. Subscription rate: DM 72 for two issues of about 225 pages each.

**Archive for History of Exact Sciences**

Edited by C. Truesdell. Published irregularly by Springer-Verlag. DM 320

plus postage and handling for a volume of about 400 pages.

**Berichte zur Wissenschaftsgeschichte**

Organ der Gesellschaft für Wissenschaftsgeschichte, e.V. Edited by Fritz Krafft, Fachbereich Mathematik, Johannes Gutenberg-Universität, Saarstrasse 21, D-6500 Mainz, BRD. About 300 pages per year. Subscription: DM 58. Published by Akademische Verlagsgesellschaft Athenaion Postfach 1107, D-6200 Weisbaden, BRD.

**The British Journal for the History of Science**

Edited by David Knight. Published three times a year in parts of about 100 pages each. \$28 per year for US subscribers. Application for membership and for orders for publications should be sent to: The Administrators, The British Society for the History of Science, Halfpenny Furze, Mill Lane, Chalfont St. Giles, Bucks. HP8 4NR, England, UK.

The British Society for the History of Science also publishes a Newsletter three times a year, an annual list of theses recently completed or in preparation in British universities, and a series of monographs.

**Centaurus**

International magazine of the history of mathematics, science and technology. Edited by Morgan Pihl, Professor of Physics, Univ. of Copenhagen, Denmark. Quarterly, total of about 325 pages per volume. Subscription: \$90.55. Address for editorial correspondence: Centaurus History of Science Department, University of Aarhus, Ny Munkegade, DK-8000 Aarhus C Denmark. Published by Munksgaard International Publishers, Copenhagen, Denmark.

**Earth Sciences History**

Journal of the History of the Earth Sciences Society. Edited by Gerald M. Friedman, Dept. of Geology, Rensselaer Polytechnic Institute, Troy, NY 12181. Two issues per year, about 60 pp. each. Membership in the society is \$15; library subscription is \$20. For subscription and membership, contact Ellis L. Yochelson, Secretary, HESS, Room E-501, Museum of Natural History, Washington, DC 20560.

**Historia Mathematica**

A publication of the Commission on the History of Mathematics of the Division of the History of Science of the International Union of the History and Philosophy of Science. Edited by Joseph W. Dauben, Dept. of History, Herbert H. Lehman College, CUNY, Bedford Park Blvd. West, Bronx NY 10468. Send manuscripts to the Managing Editor, Esther R. Phillips (same address). Quarterly; total of about 500 pages per year. Subscriptions: \$45. Write to publisher for personal rate. Published by Academic Press, 111 Fifth Ave., NY, NY 10003.

**Historia Scientiarum**

**International Journal of the History of Science Society of Japan**  
[Formerly Japanese Studies in the History of Science]

Edited by Shuntaro Ito, Univ. of Tokyo. Overseas distributor: Japan Publications Trading Co., Ltd., PO Box 5030 Tokyo International, Tokyo, Japan.

**Historical Studies in the Physical Sciences**

Edited by John L. Heilbron. Published twice a year in parts of about 200 pp. each. \$17.50 for individuals, \$22 for institutions; \$2 extra for foreign. Write to Journals Manager, Univ. of Calif. Press, Berkeley, CA 94720.

**History of Science**

Edited by R. S. Porter. 4 issues per year with 75 pages each. \$55 for institutions, \$33.50 for individuals. Published by Science History Publications, Halfpenny Furze, Mill Lane, Chalfont St. Giles, Bucks HP8 4NR, England.

**History of Science in America: News and Views**

Edited by Clark A. Elliot, University Archives, Pusey Library, Harvard Univ., Cambridge, MA. 02138. \$5 per year.

**Indian Journal of History of Science**

Edited by F. C. Auluck, Indiana National Science Academy, 1 Park St., Calcutta, India 700016.

**Isis**

Official Journal of the History of Science Society. Edited by Arnold

Thackray. Four issues per year (total of about 750 pages) plus the annual Critical Bibliography. \$27 for individuals (\$32 foreign), \$14.50 for students, \$45 for institutions (\$50 foreign). Individual subscription includes membership in the Society and subscription to the quarterly Newsletter. Write to Isis Subscriptions, Univ. of Penn., 215 S. 34th St./D6, Philadelphia, PA 19104.

**Janus**

Revue Internationale de l'Histoire des Sciences, de la Médecine, de la Pharmacie et de la Technique. Edited by H. A. Bosman-Jelgersma, et. al. Address: Redaction de Janus, 185, Joh. Verhulststraat, Amsterdam, Netherlands. About 350 pages per volume. Subscription: 54 Dutch florins. Order from Foundation "Janus," Amsterdam, Netherlands, Postal giro 3700273.

**Journal for the History of Astronomy**

Edited by M. A. Hoskin. 4 issues, one of which is an Archaeoastronomy supplement about 75 pages each. \$60 for institutions and \$37.50 for individuals. Published by Science History Pubs., Ltd., Halfpenny Furze, Mill Lane, Chalfont St., Giles, Bucks HP8 4NR, England.

**Journal of the History of Ideas**

Edited by Philip P. Wiener, Temple Univ., Humanities Bldg., Rm. 750, Philadelphia, PA 19122. About 700 pages per year. Subscription: \$25 (institutions), \$15 (individuals); add \$3 for mailing abroad.

**Minerva**

A review of science, policy and learning. Edited by Edward Shils for the International Council on the Future of the University, NYC. Quarterly issues of about 200 pages each. Subscription: \$45. Correspondence and subscriptions should be sent to Minerva, 59 St. Martin's Lane, London WC2N 4JS, England, UK.

**Notes and Records of the Royal Society of London**

Edited by R. V. Jones and William Paton. Published by the Royal Society, 6 Carlton House Terrace, London SW1Y 5AG, England.

**NTM**

Schriftenreihe für Geschichte der Natur-



wissenschaften, Technik und Medizin. Edited by Rolf Sonnemann, et. al. Submit manuscripts to Doz. Dr. Irene Strube, DDR-7010 Leipzig, Talstrasse 32, DDR. Published twice a year; issues of about 100 pages each. Publisher: Deutscher Verlag der Wissenschaften, Niederwallstr. 39, Berlin, DDR.

#### Physics Bulletin

Edited by C. I. Pederson, Techno House, Redcliffe Way, Bristol BS1 6NS England. Published by The Physics Trust for the Institute of Physics, London. Monthly issues of about 40 pages each. Air freight to North America, \$135. Order from American Institute of Physics, Department N/M, 335 E. 45th St. NY.

#### The Physics Teacher

Edited by Clifford E. Swartz, Dept. of Physics, State University of New York, Stony Brook, NY 11794. Published by the American Association of Physics Teachers; an AAPT regular member can receive TPT for the membership fee of \$29, or both TPT and the American Journal of Physics for \$44 (see above). Nonmember subscriptions \$30 in USA, \$36 elsewhere. Subscription orders to AAPT, Graduate Physics Bldg., SUNY-Stony Brook, NY 11794. Nine issues per year, about 600 pages.

#### Physis

Revista Internazionale de Storia della Scienze. Edited by Vincenzo Capelletti and Francesco Ogliari. Address: Domus Galilaeana, Via S. Maria 26, 56100 Pisa, Italy. Three times a year; about 400 pages total. Published by Leo S. Olschki Editore, Viuzzo del Pozzetto (Viale Europa), Cas. post. 66, 50100 Firenze, Italy.

#### Revue d'histoire des sciences et de leurs applications

Edited by Suzanne Delorme & René Taton, Centre international de synthèse, Section d'histoire des sciences, 12 rue Colbert, 75002 Paris, France. Published quarterly, total of about 360 pages per year. Subscriptions: 160 F in France, 190 F foreign. Published by Presses Universitaires de France, 12 rue Jean-de-Beauvais 75005 Paris, France.

#### Science, Technology and Human Values

Edited by Marcel LaFollette, MIT. Quarterly, \$48 per year (reduced for members of some societies). Published by John Wiley & Sons, 605 Third Ave., New York, NY 10158.

#### Soviet Physics Uspekhi

Translation of Uspekhi Fizicheskikh Nauk (Advances in the Physical Sciences) published by the USSR Academy of Sciences. Edited by George M. Volkoff. Monthly; total of about 1000 pages. Subscription: \$145. Order from Subscription Fulfillment Division, AIP, 335 E. 45th St., NY, NY 10017.

#### Studies in History and Philosophy of Science

Edited by G. Buchdahl and Mary Hesse. 4 issues, total of about 350 pages. \$70 for institutions. Individuals whose institutions subscribe are eligible for special rate of \$15. Published by Pergamon Press, Oxford.

#### Technology and Culture

The international quarterly of the Society for the History of Technology. Edited by Robert C. Post, National Museum of American History, Smithsonian Institution, Washington, DC 20560. Quarterly, about 700 pages per year. Subscriptions: \$35 for institutions, \$25 for individuals (includes membership in SHOT). Published by University of Chicago Press, Journals Division, PO Box 37005, Chicago, IL 60637

#### Vistas in Astronomy

Edited by Peter Beer, Langham Villa, High Street, Newport, Essex, UK. Quarterly, each issue about 100 pages. Subscription: \$105; \$40 for individuals whose library subscribes at full rate. Published by Pergamon Press, Inc., Maxwell House, Fairview Park, Elmsford, NY 10523.

#### Voprosy Istorii

#### Estestvoznaniia i Tekhniki

Edited by S. R. Mikulinsky, Staropanski 1/5, Moscow K-12, USSR.

[Editor's note: We plan to include information about other journals and societies in future issues of HPN. Suggestions are welcome.]

## 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 publisher, 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 preprints; 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. Publication will be expedited if each summary is typed, on a separate sheet, in the format of the examples below.

## Weight

O'BRIEN, D. Theories of Weight in the Ancient World: Four Essays on Democritus, Plato and Aristotle. Volume I: Democritus, Weight and Size: An exercise in the Reconstruction of Early Greek Philosophy. xxi + 419 pp. Leiden: Brill, 1981. \$26.85 (pb).

In the theory of Democritus, "the atoms have weight in proportion to, and dependent upon their size . . . One body is lighter than another, if it contains a larger amount of void" -- J. Longrigg, Isis, 1982, 73: 594-5.

## Al-Biruni

SAID, HAKIM MOHAMMED: ANSAR ZAHID KHAN. Al-Biruni: His Times, Life and Works. xi + 244 pp. Karachi, Pakistan: Hamdard Academy, 1981. \$15.

Biography of the 11th-century Muslim scientist-scholar, including summaries of his writings on astronomy, trigonometry, light, sound, gravity, density, mechanics, weights & measures, and geodesy.

## Galileo

NIEDERER, UELI. Galileo Galilei und der Entwicklung der Physik. Vierteljahrschrift der Naturforschenden Gesellschaft in Zürich, 1982, 127(3): 205-229.

After a short review of the life of Galileo (1564-1642) two of his principal scientific works are discussed. The Sidereal Messenger (1610) is important not only because it contains the first historic results of observations of the sky with a telescope, but also because it clearly shows the objective and openminded attitude of Galileo as a scientist. In the Discourses (1638) Galileo created the theory of motion as a pure kinematics. His scientific method which proceeds through the steps of hypothesis, deduction and confirmation unites the three elements to the physics we know and of which he was a founder.

Author's address: U. Niederer, Institut für Theoretische Physik, Schönberggasse 9, CH-8001 Zürich, Switzerland.

## Speed of Light

WROBLEWSKI, ANDRZEJ. De Mora Luminia. Presented at the Colloquium in the Department of Physics, University of Washington, Seattle on June 1, 1982 and also in the Department of Physics, University of California, Davis, on June 9, 1982, pp. 44.

The paper deals with the discovery by Olaus Roemer that the velocity of light is finite. The background, chronology, and reception of Roemer's work are described. Evidence is presented that very many present textbooks offer a distorted and/or falsified account of the great discovery.

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

## Newton's prisms

MILLS, A. A. Newton's prisms and his experiments on the spectrum. Notes & Records of the Royal Society of London, 1981, 36: 13-36.

Author's address: Department of Astronomy and History of Science, The University, Leicester.

This issue of Notes & Records includes a color photo of a rainbow over Woolsthorpe Manor, Newton's birthplace, taken by R. L. Bishop, and an extract from Newton's Opticks describing his work on the rainbow.

## Newton

BECHLER, ZEV. Contemporary Newtonian Research. 246 pp. Boston: Riedel, 1982. \$39.50.

Contents: Z. Bechler: Introduction: Some Issues of Newtonian Historiography. I. Bernard Cohen: The Principia, Universal Gravitation, and the 'Newtonian Style', in Relation to the Newtonian Revolution in Science: Notes on the Occasion of the 250th Anniversary of Newton's Death. D. T. Whiteside: Newton the Mathematician. Richard S. Westfall: Newton's Theological Manuscripts. J. E. McGuire: Space, Infinity, and Indivisibility: Newton on the Creation of Matter. R. W. Home: Newton on Electricity and the Aether. G. A. J. Rogers: The System of Locke and Newton.

## Newtonian Orbits

WEINSTOCK, ROBERT. Dismantling a Centuries-Old Myth: Newton's Principia and Inverse-square orbits. American Journal of Physics, 1982, 50: 610-17.

Examination of Newton's Principia reveals a fallacy in its purported proof of the otherwise well established fact that an inverse-square central force acting on a particle requires that the particle move in a conic-section orbit. The great difficulty of reading through the Principia material antecedent to the fallacy is offered as a major reason for the centuries-long delay in its detection and general acknowledgment. It was Johann Bernoulli, evidently, who in 1710 first proved that the inverse-square force implies a conic-section orbit.

For reprint (with additional comment) write to R. Weinstock, Dept. of Physics, Oberlin College, Oberlin, OH 44074.

## Electricity

NASTASI, PIETRO. I primi studi sull' elettricità a Napoli in Sicilia. Physis, 1982, 24: 237-64.

In this paper the state of sciences in Palermo and Naples has been examined with special attention to studies in electricity which were receiving widespread interest after the Leiden experiment (1745).

The picture which emerges is that Naples was a very active centre (number of books published, rapid circulation of ideas etc.) while Sicily was somehow delayed; in both centres a fairly rapid decay of interest is noted. Some of the motivations of the interest of the Sicilian Jesuit scientists with respect to the lack of interest by laic scientists is examined in detail.

Author's address: P. Nastasi, Istituto di Geodesia, Università de Palermo, Italy.

## 17th &amp; 18th Centuries

SHEA, WILLIAM R., ed. Nature Mathematized. Historical and Philosophical Case Studies in Classical Modern Natural Philosophy. 336 pp. Boston: Reidel, 1982. \$56.50.

Papers presented at the Third International Conference on the History and Philosophy of Science, Montreal, August 1980. Contents: Introduction: William R. Shea: Do Historians and Philosophers of Science Share the Same Heritage? Part I: Maurice Clavelin: Conceptual and Technical Aspects of the Galilean Geometrization of Motion: Some Historical Considerations. Ashot Grigorian: Measure, Proportion and Mathematical Structure of Galileo's Mechanics. Part II: J. E. McGuire: Space, Geometrical Objects and Infinity: Newton and Descartes on Extension. J. D. North: Finite and Otherwise. Aristotle and Some Seventeenth Century Views. Part III: Paul Weingartner: The Ideal of the Mathematization of All Sciences and 'More Geometrico' in Descartes and Leibniz. François Duchesneau: The 'More Geometrico' Pattern in Hypotheses from Descartes to Leibniz. Thomas M. Lennon: The Leibnizean Picture of Descartes. Part IV: P. M. Heimann: Force and Inertia: Euler and Kant's Metaphysical Foundations of Natural Science. Kathleen Okruhlik: Kant on the foundations of Science. Vladimir Kirsanov: Non-mechanistic Ideas in Physics and Philosophy: From Newton to Kant. Part V: V. P. Kartsev: V. V. Petrov's Hypothetical Experiment and Electrical Experiments of the 18th Century. Karel Berka: The Ideal of Mathematization in B. Bolanzo. V. Vizgin: "Die schönste Leistung der allgemeinen Relativitätstheorie": The Genesis of the Tensor-geometrical Conception of Gravitation.

## Theological Ether

CANTOR, G. N. The Theological Significance of Ethers. Pp. 135-55 in G. N. Cantor, M. J. Hodge (eds) Conceptions of Ether. New York: Cambridge Univ. Press, 1981.

Shows that ether theories were utilised not only in science but also had a wide currency in theological discourse. Drawing on examples from Newton to Lodge this essay explores several such roles; thus for some writers ethers indicated providential design while for others they mediated between the physical and the spiritual or were the active agents by which God controls the physical universe. Frequently, too, controversies over the existence of ethers turned more on their theological implications than on their utility in science.

## Substance

HARMAN, P. M. Metaphysics and Natural Philosophy. The Problem of Substance in Classical Physics. Brighton, Eng.: Harvester Press; Totowa, NJ; Barnes & Noble, 1982. 168 pp. \$26.50

This book emphasizes the conceptual diversity of the systems of physical theory comprising classical physics, and highlights the role of metaphysical arguments in the justification of the ontological assumptions of these physical theories. By focusing on some of the major concepts in the historical development of classical physics, concepts of force, inertia, energy and matter, this book seeks to provide an analysis of the problem of substance and the associated concepts of force, energy, and the activity and passivity of matter in the physical theories of the 18th and 19th centuries. By an analysis of the work of Newton, Leibniz, Kant, Faraday, Helmholtz, Maxwell and others this book emphasizes the role of metaphysical argument in establishing the intelligibility and conceptual rationale of physical theories. The book analyses the attempts of 18th-century natural philosophers to clarify the conceptual structure of physical theory, and the reference to ontological foundations and metaphysical argument by 19th-century physicists in formulating energy and field theories and in justifying their appeal to mechanical principles.

## Specific Heat

SCOTT, E. L. Richard Kirwan, J. H. de Magellan, and the Early History of Specific Heat. Annals of Science, 1981, 38: 141-53.

In the spring of 1780 there appeared a short work by J. H. de Magellan, published in London but written in French, which contained the first table of specific heats (and the first use of this term) to appear in print. Magellan attributed the table to Richard Kirwan, but in none of his published works does Kirwan refer to it, so that the circumstances of its compilation are obscure. Kirwan's correspondence, however, provides evidence both of his association with Magellan and of his long concern with theories of heat. In a series of letters concerned principally with his forthcoming publication, written to James Watt at the beginning of 1780, Magellan attacked Joseph Black for his failure to publish his own work on heat.

Author's address: Stamford High School, Stamford, Lincolnshire PE9 2LJ, England.

## Social Temperature

VAN ROSSUM, WOUTER. Before Standardization: Temperature as a Social Construction. Presented at the Annual Meeting of the Society for the Social Studies of Science, Philadelphia, 29 October 1982.

Author's address: Dept. of Social Welfare, University of Groningen, The Netherlands.

## Caloric Theory

SEBASTIANI, FABIO. La Teoria Microscopico-caloricistica dei gas di Laplace, Ampère, Poisson e Prevost. Physis, 1982, 24: 197-236.

In this paper it is emphasized how in the context of the caloric theory of heat some methodological presuppositions to the atomic theory of matter have been developed. With this purpose the caloric theories of gases of Laplace, Ampère, Poisson, Prevost are reviewed. After a short introduction, previous microscopical theories of gases of Newton, Hermann, Euler, D. Bernoulli are also recalled, with a very brief history of caloric theory; finally, an account of Herapath's theory is reported to complete the picture of the microscopical theories of gases at the beginning of the eighteenth century.

Author's address: Istituto de Fisica "Guglielmo Marconi", Università di Roma, Italy.

## Helmholtz on Thermodynamics

BIERHALTER, GÜNTER. Zu Herrmann von Helmholtz's mechanischer Grundlegung der Wärmelehre aus dem Jahre 1884. Archive for History of Exact Sciences, 1981, 25(1): 71-84.

In dem Aufsatz wird hauptsächlich die von Herrmann von Helmholtz gegebene mechanische Begründung des zweiten Hauptsatzes der Thermodynamik diskutiert. Zu diesem Zweck ist dargestellt, wie v. Helmholtz über die Lagrangeschen Bewegungsgleichungen zu einem Beweis dieses Satzes gelangt: Er führt zwei grundsätzlich verschiedene Arten generalisierter Koordinaten ein, die auch in unterschiedlicher Weise in die Lagrangeschen Gleichungen eingehen. Die so beschriebenen (monozyklischen) Systeme zeigen Analogien zum Verhalten warmer Körper. Ferner wird das von v. Helmholtz gegebene Modell der "isomorphen Koppelung" kritisch besprochen, das ein mechanisches Pendant zum Temperaturgleichgewicht warmer Körper liefert. Den Abschluss des Aufsatzes bildet ein Vergleich der v. Helmholtz'schen Resultate mit den von Boltzmann (1866) und Clausius (1871) erzielten Ergebnissen einer mechanischen Herleitung des zweiten Hauptsatzes.

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

## Lloyd

SPEARMAN, T. D. Humphrey Lloyd, 1800-1881. Hermathena, A Dublin University Review, 1981, nos. 130 & 131: 37-52.

Lloyd was known for his experimental confirmation of conical refraction, predicted by W. R. Hamilton's optical theory.

## Maxwell on Molecules

EL'YASHEVICH, M. A.; T. S. PROT'KO. Maxwell's contribution to the development of molecular physics and statistical methods. Soviet Physics Uspekhi, 1981, 24: 876-903. Translated from Uspekhí Fizicheskikh Nauk, 1981, 135: 381-423.

A reprint of the translation may be ordered at \$1.50 per page from American Institute of Physics, Current Physics Reprints, 335 East 45 St., New York, NY 10017. The authors are at the V. I. Lenin Belorussian State University and the Institute of Philosophy, Belorussian Academy of Science.

## Motion & Heat

CLARK, PETER. Matter, Motion and Irreversibility. British Journal for the Philosophy of Science, 1982, 33: 165-186.

Review of S. G. Brush, The Kind of Motion We Call Heat (1976): discusses irreversibility; the theory of matter and objections to atomism; Brownian motion and stochastic processes.

## Boltzmann's Mechanics

MILLER, ARTHUR I. On the Origins, Methods and Logic of Ludwig Boltzmann's Mechanics. Presented at the International Conference on Ludwig Boltzmann, Vienna, 5-8 September 1981; to be published in its Proceedings.

An analysis of the interplay between Boltzmann's physics and philosophy.

Author's address: A. I. Miller, Jefferson Physical Laboratory, Harvard University, Cambridge, MA 02138.

## Rowland

MOORE, A. D. Henry A. Rowland. Scientific American, 1982, 246(2): 150-161.

This 19th-century American physicist has been undervalued by history. Among his accomplishments was the building of the first engine for ruling the diffraction gratings on which modern spectroscopy depends.

## Maxwell's E & M

LEVIN, M. L.; M. A. MILLER. Maxwell's "Treatise on Electricity and Magnetism." Soviet Physics Uspekhi, 1981, 24: 904-13.

Translated from Uspekhí Fizicheskikh Nauk, 1981, 134: 425-40.

Reprint available for \$1.50 per page from American Institute of Physics, Current Physics Reprints, 335 East 45th Street, New York, NY 10017.

## Einstein

PAIS, ABRAHAM. 'Subtle is the Lord . . . ' The Science and the Life of Albert Einstein. xvi + 552 pp. New York: Oxford University Press, 1982. \$25.

"Here is a coherent account of almost everything of scientific significance that Einstein did, along with a great deal of needed historical background information and an eminent physicist's perspective on the significance of Einstein's achievements." -- J. Stachel, Science, 1982, 218: 989-90.

## Einstein

DUKAS, HELEN; BANESH HOFFMANN (eds.) Albert Einstein, The Human Side. New Glimpses from His Archives. Princeton, NJ: Princeton University Press, 1982. \$12.50 cloth, \$3.95 paperback. (Reprint)

## Einstein's Clock

SCHUCKING, E. L. Disinterment of an Error by Einstein. New York Times, 11 May 1982, pg. A18.

Einstein's statement, in his 1905 paper on relativity, that a clock at the equator goes more slowly than one at the poles, was accepted by J. Bernstein though corrected by Einstein himself.

## Einstein's Nobel

PAIS, ABRAHAM. How Einstein got the Nobel Prize. American Scientist, 1982, 70: 358-65.

Why did the Nobel Committee for Physics wait so long before giving Einstein the Prize, and why did they not award it for relativity?

Author's address: A. Pais, Rockefeller University, New York, NY 10021.

## Einstein

DUFFY, M. C. Commemorating Einstein. Annals of Science, 1982, 39: 593-603.

Essay review of C. M. Kinnon, A. N. Kholodkin and J. G. Richardson, eds., The Impact of Modern Scientific Ideas on Society: In Commemoration of Einstein (Dordrecht/Boston: Reidel, 1981).

Author's address: Dept. of Mechanical Engineering, Sunderland Polytechnic, Chester Road, Sunderland, SR1 3SD, England.

## Bohr

HONNER, JOHN R. The transcendental philosophy of Niels Bohr. Studies in History and Philosophy of Science, 1982, 13: 1-29.

Bohr's interpretation of quantum theory can be shown, from his published and unpublished writings, to rest on his insight into the necessary conditions for objective description of processes at the boundaries of human experience. His prescription of the principles of correspondence and complementarity follows from this more general argument. Bohr has consistently reasoned in this way throughout his writings, and his fundamental approach can legitimately be described as transcendental philosophy: it is concerned with an articulation of the necessary conditions for the possibility of experimental knowledge. The quantum theory thus represents a particular instance of the boundedness of human experience.

No reprints available. Author's address: J. R. Honner, Campion College, 99 Studley Park Rd., KEW Victoria, 3101, Australia.

## Gravity

GILLIES, GEORGE T. The Newtonian Gravitational Constant: An Index of Measurements. 83 pp. Sèvres, France: Bureau International des Poids et Mesures, 1982.

The Newtonian Gravitational Constant, "G," has probably been measured more often but, interestingly, with less precision than any other physical constant of fundamental importance. In an effort that has spanned more than a century to connect gravitation to the other forces of nature, over 200 experiments on G have been completed and reported; but many of them have not been reported in what would now be considered to be the open literature. This paper is an attempt to carry MacKenzie's and Poynting's bibliographies forward from the 1800's to the present; and thereby include as many as possible of the experimental results on G that have been obtained since 1900.

Copies free on request; write to G. G. Gillies, Bureau International des Poids et Mesures, Pavillon de Breteuil, F-92310 Sèvres, France.

## ✓ Physics Articles

BAZEMAN, CHARLES. The Emergence of the Modern Physics Article: A Stylistic History of the Physical Review, 1893-Present. Presented at the Annual Meeting of the Society for the Social Studies of Science, Philadelphia, 29 October 1982.

Author's address: Dept. of English, Baruch College, New York, NY 10010.

## American Science

MOYER, ALBERT E.; ROBERT W. SEIDEL; C. STEWART GILLMOR; ANTHONY F. C. WALLACE. Science Establishing Itself. Science, 1982, 216: 850-854.

Reviews of N. Reingold & I. H. Reingold, eds., Science in America, A Documentary History, 1900-1939; R. H. Kargon, The Rise of Robert Millikan, Portrait of a Life in American Science; D. K. Allison, New Eye for the Navy: The Origin of Radar at the Naval Research Laboratory; Brooke Hindle, Emulation and Invention.

## Loomis

ALVAREZ, LUIS W. Alfred Lee Loomis -- last great amateur of science. Physics Today, January 1983, 36(1): 25-34. Adapted from Biographical Memoirs, National Academy of Sciences, 1980, 51.

This multimillionaire banker, who for years led a double life, spending days on Wall Street and evenings and weekends in his private physics laboratory, became one of the most influential physicists of the century.

Author's address: Physics Department, University of California, Berkeley, CA 94720.

## Battery

SCHALLENBERG, RICHARD H. Bottled Energy: Electrical Engineering and the Evolution of Chemical Energy Storage. xvi + 420 pp. Philadelphia: American Philosophical Society, 1982 (Memoirs, vol. 148).

"This posthumously published monograph examines the history of the electric storage battery and its applications from the early 19th century to around 1970. The book deals with the interaction of science, technology, and the marketplace." Review by J. E. Brittain in Science, 1983, 219: 165-66.

## Unipolar Induction

MILLER, ARTHUR I. Unipolar Induction: A Case Study of the Interaction between Science and Technology, Annals of Science, 1981, 38: 155-189.

An analysis of how the interplay among science, technology and society influenced the development of the unipolar dynamo in Germany, the United States and England.

Author's address: A. I. Miller, Jefferson Physical Laboratory, Harvard University, Cambridge, MA 02138.

## Bell Research

HODDESON, LILLIAN. The Emergence of Basic Research in the Bell Telephone System, 1875-1915. Technology and Culture, 1981, 22(3): 512-544.

This paper examines the relationships between science, technology and industry in the process of establishing scientific research in industry through a case study of the emergence of basic research in one prominent American industrial firm. It is found that in this case the research program has no sudden beginning, but was a steadily evolving interior growth responding to particular telephone problems. As such problems grew more complex, the company came to recognize the usefulness of an in-house scientific effort.

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

## Solid State

HODDESON, LILLIAN. The Flowering of Solid State Physics in the Aftermath of World War II. Presented at the symposium of the Division of History of Physics, Baltimore, April 1983.

Working groups in the U.S., Great Britain and Germany, together with collaborators in France, Japan and other countries, are presently identifying and assembling documents, and writing the first scholarly account of the emergence of modern solid state physics. This International Project on the History of Solid State Physics is exploring, in addition to the intellectual development of the discipline, relationships between the evolution of the field and institutional and social developments such as the growth of industrial research and competitive subfields of physics. Following a brief overview of the project, this talk will focus on a particular issue: the impact of World War II through motivation of particular studies, creation of new experimental and theoretical techniques as well as materials, and establishment of a firm basis for financial support of research.

Author's address: L. Hoddeson, Dept. of Physics, University of Illinois, Urbana, IL 61801.

## Superconductors

HULM, JOHN K.; EUGENE KUNZLER; BERN T. MATTHIAS. The road to superconducting materials. Physics Today, Jan. 1981, 34, no. 1: 34-43.

The discovery of type II superconductors, which retain their properties even at high fields and high current densities, required clearing away erroneous ideas and preconceptions as well as a good measure of luck.

Address: J. K. Hulm, Director of Corporate Research and R & D Planning, Westinghouse Electric Corp., Pittsburgh, Pa.

## Theory Competition

NADEL, EDWARD. Commitment and Co-Citation: An Indicator of Incommensurability in Patterns of Formal Communication. Social Studies of Science (in press).

The consequences of incommensurability for citation practice are operationalized for two case studies of theory competition in physics. It is argued that positive co-citation will be observed if theories are commensurable but a lack of co-citation among competitors will be observed if theories are incommensurable. Incommensurable theories should be cited with supporting empirical and methodological articles but not with each other. The operational indicator is applied to a case of theory competition in superconductivity and to a re-analysis of longitudinal co-citation data among theories of weak-electromagnetic unification. It is also shown that the operational definition breaks down in competition at the hypothesis level.

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

## Fusion

BROMBERG, JOAN LISA. TFTR: The Anatomy of a Programme Decision. Social Studies of Science, 1982, 12: 559-83.

The TFTR (Tokamak Fusion Test Reactor) is the largest experiment being mounted by the U.S. programme to invent a magnetic fusion reactor. The history of the TFTR decision throws light on one mechanism by which the political environment can affect experimental design; their struggle for increased funding made the Washington programme managers fight for an experiment that would be more difficult (because radioactive) but more newsworthy (because it would actually produce energy).

Author's address: J. L. Bromberg, 25 Stoddard St., Woburn, MD 01801.

## Quantum Interpretation

HARVEY, BILL. The Interpretation of Quantum Mechanics: A Case-Study in the Sociology of Science. 317 pp., Ph.D. Thesis, Edinburgh University, 1981.

This thesis is a study of the group of scientists who share an interest in the interpretation of Quantum Mechanics. This is not a typical scientific specialty; it lacks both a cohesive social structure and an agreed set of theories and practices. It is argued that social and cognitive factors interact in a complex way to bring about and maintain this fragmented state. In particular, methodological differences are identified as a major cause of disputes in this field. Particular attention is paid to a subgroup who performed experimental tests of Quantum Mechanics. It is argued that the construction and evaluation of knowledge-claims can only be satisfactorily described by reference to a specific cultural context; a normative account of this activity is examined and rejected. These conclusions support a relativist view, in which the products of scientific activity reflect social processes within and outside science. However, the rejection of empiricism does not imply that 'anything goes'; the social and cultural context can also operate as a powerful constraint. The concept of plausibility is introduced in an attempt to explain in detail the role of social processes in science.

Copies available from Edinburgh University Library for the cost of photocopying and postage.

## Politics of Science

ALBURY, DAVID; SCHWARTZ, JOSEPH. Partial Progress: The Politics of Science and Technology, viii + 215 pp. London: Pluto Press (The Works, 105a Torrione Ave., London NW5, UK), 1982. \$10.95.

This book aims to provide a new critical, radical perspective on the history, development and impact of science and technology. Drawing on many current and historical examples the authors show how scientific and technological theories and practices have been designed, developed and used to serve particular purposes and reflect the (partial) interests of managers, employers and governments.

Partial Progress demystifies the notion that the work of scientists and technologists has been inherently beneficial or morally neutral. By tracing out the history of specific research problems, including the study of the interaction of elementary particles, the application of quantum theory to gravitational fields, safety in coal mines and the rise of electrical technology, a "politics of curiosity" is articulated which situates science and technology within their social context.

It is not intended to be the last definitive word on the subject but an analysis which people may find useful in understanding and challenging the impact of science and technology on their daily lives.

## Millikan

MICHEL, JOHN L. Millikan's Identity Crisis: Educator versus Researcher. Presented at the History of Science Society meeting in Los Angeles, CA, 27-30 December 1981.

Millikan's first love and enlightenment with physics came in college as a preparatory school teacher; but in graduate school he was trained to be a researcher. His early pedagogical achievements, rather than his research, first earned him recognition. He became understandably anxious about the imbalance between personal and professional rewards by 1907. He resolved his dilemma by increasingly integrating classroom and laboratory activities in dissimilar ways. He brought experiments into his undergraduate classes, and included his graduate students in his own researches. His experiments in electron and quantum physics suggested new course and research topics that interested a growing number of graduate students. Teaching these courses stimulated and informed him and his students about the latest theories and experiments related to his own and his students investigations. He organized thusly one of the earliest American research "troops", which contributed to the success of his Nobel prize winning experiments.

Part of doctoral dissertation on "Young Millikan and the American Academic Physics Community."

For preprint write to J. L. Michel, 1025 West Daken St., Apt. 2E, Chicago, IL 60613.

MIT Archives

SLOTKIN, HELEN W. Selective Guide to the Collections in the Institute Archives and Special Collections, M. I. T. Libraries, 1981.

The Institute Archives and Special Collections department of the Massachusetts Institute of Technology Libraries has issued a Selective Repository Guide (22 pages). The Archives is the repository for the manuscript and archival records of MIT, its faculty, alumni and staff. The collections reflect the strengths of the research and educational programs of the Institute and therefore emphasize the history of contemporary science and technology, and its impact on society.

The guide is available for \$2 from the Institute Archives and Special Collections, Room 14N-118, Massachusetts Institute of Technology, Cambridge MA 02139. Checks should be made payable to the Massachusetts Institute of Technology.

## American Physics

MOYER, ALBERT E. Operational Thought and Modern Physics in the United States: An Old Ideology for a New Science. Presented at the History of Science Society meeting, Los Angeles, CA, 27-30 December 1981.

Certain American physical scientists during the period from 1880 to 1930 embraced the same operational ideology. Nevertheless, they applied the ideology differently. Specifically, there were three stages of operational thought. The first or evangelical stage occurred around 1880 and is exemplified by astronomer Simon Newcomb. He reserved his operational perspective primarily for attacks on the conceptual frameworks of nonscientists who were guilty of "metaphysical" thinking. The second or self-critical stage occurred around 1905 and is illustrated by physicist William S. Franklin. Operationalism now served mainly as a means of critically appraising the conceptual presuppositions of nineteenth-century atomomechanical theories as well as of controversial turn-of-the-century formulations such as energetics. Finally, the third or interpretive stage occurred around 1930 with physicist Percy W. Bridgman. In his case, the operational attitude represented primarily a means of rationalizing or making intelligible the confusing fields of relativity and quantum theory.

U For preprint write to A. E. Moyer, Dept. of History, Virginia Polytechnic Institute, Blacksburg, VA 24061.

Lawrence Lab

SEIDEL, ROBERT W. Accelerating Science: The Post-War Transformation of the Lawrence Radiation Laboratory. Presented at the History of Science Society meeting, Los Angeles, CA, 27-30 December 1981; to be published in Historical Studies in the Physical Sciences.

The Lawrence Berkeley Laboratory seized new opportunities and challenges confronting nuclear science after World War II to become one of the first great high-energy physics laboratories. Analysis of postwar planning, reorganization and implementation of this laboratory reveals important continuities from its prewar and wartime experience as well as important new ideas and novel departures which gave the laboratory a substantial head start over rival organizations like the Brookhaven National Laboratory. Lab leaders not only transformed their own organization, but had an important influence on the shaping of postwar science policy in the Manhattan Engineer District and the Atomic Energy Commission. Their efforts to win unprecedented levels of national support for a university-operated laboratory in peacetime resulted in and ongoing AEC commitment to high-energy physics, epitomized in the negotiations over the Bevatron and the Cosmotron, which are explored here in detail.

Author's address: R. W. Seidel, Department of History, Texas Tech University, Lubbock, TX 79409.

## Geosciences

SCHRÖDER, WILFRIED. Why Research into the History of Geosciences? EOS, Transactions of the American Geophysical Union, 1981, 62: 521-522.

A review of historical research in geosciences, problems and methodology of historical research in geophysical disciplines.

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

## Geosciences

SCHRÖDER, WILFRIED. "Aspekte der Wissenschaftsgeschichte der Geowissenschaften". Sudhoffs Archive, 1982, 66: 339-49.

Research activities focusing on the history and philosophy of various sciences are rather heterogenous. Some disciplines, such as medicine, mathematics, and astronomy, have numerous noteworthy compendia and even specialized journals where papers on their respective history and philosophy can be published. The situation in geophysics, meteorology, and other subdivisions of the geosciences is less favorable. In this essay it is shown that research in the history and philosophy of these sciences requires profound knowledge of many disciplines, including the geosciences. The author intends not only to acquaint a larger circle of geophysicists with the necessity of studying historical aspects in geophysics, but also to stimulate colleagues in the history and philosophy of science to contribute to the history of geosciences through their own writings.

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## Geology

GREENE, MOTT T. Geology in the Nineteenth Century. Changing Views of a Changing World. 324 pp. Ithaca, NY: Cornell University Press, 1982. \$29.50.

"... a history of theories of mountain formation and of the origin of continents and oceans. . . . Greene treats 19th-century geology as an exciting theoretical discipline in its own right, rather than as merely the activity that set the stage for the Darwinian revolution." Review by Rachel Laudan in Science, 1983, 219: 280.

## Continental Drift

MESSERI, PETER. Institutional Bases for Early Support of Innovative Thought in Science: The Case of Drifting Continents. Presented at the Annual Meeting of the Society for the Social Studies of Science, Philadelphia, 29 October 1982.

This paper reports on research investigating the nature and extent to which position in the social structure of science influenced individual propensity towards early support of continental drift or seafloor spreading.

Author's address: Sociology Department, Columbia University, New York, NY 10027.

## Astrophysics

KRAFFT, FRITZ. Astrophysik contra Astronomie. Das Zurueckdrängen einer alter Disziplin durch die Begründung einer neuen. Berichte zur Wissenschaftsgeschichte, 1981, 4: 89-110.

"Astrophysics contra astronomy" means the displacement of astronomy and stellar astronomy as the main and solely acceptable branches of astronomy by the new astrophysics. This displacement started with the introduction of spectroscopic and photometric methods of observation founded by J. C. F. Zoellner and W. Huggins in the late 1850's. It was Zoellner, too, who gave the methodical and instrumental foundations of the new branch called consciously "Astrophysik" by him, because it gives insight into the "physical constitution" of the stars and other celestial bodies - whereas the traditional astronomy had been studying only the motions of the stars and other celestial bodies. . . .

## Planets

TATAREWICZ, JOSEPH N. "Where are the people who know what they are doing? Space technology and the renaissance of planetary astronomy, 1958-1975. Presented at the History of Science Society meeting, Philadelphia, 28-31 October 1982.

. . . studies of the moon and planets, once the preoccupation of astronomers, were eclipsed early in this century by other research programs. NASA's early attempts to survey the state of planetary astronomy in preparation for exploration seem to have been met by astronomers with indifference and even opposition. . . . Renewed interest in earth-based planetary astronomy grew among astronomers through the late 1960's, until the specialty was again accorded full status around 1970. Solid scientific results from space astronomy and planetary exploration, improved observatory technology due to space research, and the production of new facilities and personnel are possible factors. Theoretical developments linking cosmology and cosmogony and other "internal" factors figure significantly as well.

For preprint write to J. N. Tatarewicz, National Air & Space Museum #3552, Smithsonian Institution, Washington, D.C. 20560.

## Social Neutrinos

PINCH, TREVOR J. The Three-Sigma Enigma: On the Negotiation of Error in Physics. Presented at the Annual Meeting of the Society for the Social Studies of Science, Philadelphia, 29 October 1982.

This paper takes as its reference the well-known discrepancy in physics between theory and experiment which is usually termed the 'solar-neutrino problem.' This problem consists of the mismatch between the detailed predictions of nuclear-astrophysical theory of the flux of neutrinos emitted by the Sun and experimental measurements of this flux. . . . it is shown to what extent what would appear to be a narrow technical statistical issue can be seen to be a product of social negotiation.

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## Eddington

TENN, JOE S. Arthur Stanley Eddington -- A Centennial Tribute. Mercury, 1982, 11: 178-88 & cover.

This issue may be ordered for \$2 from Mercury, Astronomical Society of the Pacific, 1290 - 24th Avenue, San Francisco, CA 94122.

## Chandrasekhar

WALI, KAMESHWAR C. Chandrasekhar vs. Eddington -- An unanticipated confrontation. Presented at the Inaugural Session of the Division of History of Physics, Baltimore, MD, 22 April 1981. Physics Today, Oct. 1981, 35, no. 10: 33-40.

Subrahmanyan Chandrasekhar was a young astrophysicist in the early 1930's when he discovered the critical mass condition in connection with the theory of white dwarfs. Now acclaimed as a major discovery and known as the "Chandrasekhar Limit," his work was doubted for a long time by astronomers largely because of ridicule and disbelief expressed by Eddington at a meeting of the Royal Astronomical Society in 1935.

Chandrasekhar's clear reasoning was not overruled by sound argument but by Sir Arthur Stanley Eddington's tremendous international stature, authority and influence, on account of which physicists remained reluctant to intervene and clarify the matter. As a consequence confusion prevailed amongst the astronomers concerning stellar evolution for nearly two decades. It was also ironical that Eddington, imaginative as he was, failed to grasp the significance of the discovery. Eddington came close to being the first to discover the existence of black holes in the astronomical universe.

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