

History of Physics Newsletter

Volume V, Number 4

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FORUM NEWS

APS INVITED SESSIONS

The Forum on the History of Physics will sponsor sessions of invited papers at two APS meetings in 1994:

Pittsburgh, PA, "Solid State Physics to Silicon Valley."

The session is scheduled to take place during the meeting of 21-25 March 1994; it is being organized by Lillian Hoddeson and Sylvan Schweber. The chairperson is Lillian Hoddeson and the speakers include: Michael Riordan, Henry Aaronreich, Stewart Leslie, and Fred Seitz.

Crystal City, VA, The topic will be Science Advising to the Government. The meeting is scheduled for 18-22 April 1994; the session is being organized by Sylvan Schweber.

NOMINATION FOR OFFICERS

The Nominations Committee would appreciate receiving the names of Forum members who are willing to serve on various committees of the Forum or of the American Physical Society. The Forum needs to elect a Vice-chair who in succeeding years will become Chair-elect and then Chair. We need to elect a Secretary-Treasurer who will serve for three years. We also need to elect two members of the Executive Committee who will serve for three years. A Forum Councillor who serves on the APS Council for four years needs to be elected this coming spring. The By-laws require that we have at least two nominees for each position. Please send suggestions as soon as possible to the Chairperson of the Forum Nominating Committee, Prof. David C. Cassidy, Natural Science Program, Hofstra University, Hauser Hall 100, Hempstead, NY 11550.

ELECTION RESULTS

Elizabeth Garber was elected as Chair-elect to succeed Sylvan Schweber as Chair in May 1994. She is Associate Professor of History at State University of New York at Stony Brook. She received her Ph.D. in the History of Science from Case Institute of Technology in 1966. Her research has resulted in books and articles on Maxwell, thermodynamics, and nineteenth century mathematical physics.

John S. Rigden was elected Vice-chair and in May 1994 he becomes Chair-elect. He is on leave from the AIP where he is Director of Physics Programs. He is currently consultant to the National

Academy of Science on the National Science Education Standards Project. He received his Ph.D. from John Hopkins University in 1960. His professional activities included being Editor of the American Journal of Physics. His books and research are on the history of 20th century and contemporary physics.

William A. Blanpied was elected to serve a three year term on the Executive Committee. He received his Ph.D. in experimental nuclear physics from Princeton. He is Senior International Analyst in International Programs at the NSF. His research and writings include post World War II science policy.

Caroline L. Herzenberg was elected to serve a three year term on Executive Committee. She received her Ph.D. in experimental physics at the University of Chicago. She is a physicist at the Argonne National Laboratory. Her experimental research has been in low energy nuclear physics. Her history of science research and publications primarily relate to women scientists. She has been chair of the APS Committee on the Status of Women in Physics.

FORUM COMMITTEES

For 1993-1994, the appointed committees of the Forum are:

Program Committee:

S.S. Schweber (chair), Lillian Hoddeson, Gerald Holton, Michael Nauenberg, and Norton Wise.

Nominating Committee:

David Cassidy (chair), Lawrence Badash, Gerald Holton, and Peggy Kidwell.

Fellowship Committee:

Elizabeth Garber (chair), Lawrence Badash, Laurie Brown, Martin Klein, and Jay Orear.

Publications Committee/Editorial Board:

Albert Wattenberg (chair), Stephen Brush, Elizabeth Garber, Gloria Lubkin, and Spencer Weart.

Membership Committee:

Lillian Hoddeson (chair), Paul Forman, and Michael Nauenberg.

AWARD to HEINRICH MEDICUS

At the 1992 meeting, the Executive Committee of the Forum for the History of Physics, passed a resolution that special recognition should be given to Heinrich Medicus for his successful efforts in arranging many invited sessions on the history of physics. At the April 1993 Business Meeting of the Forum in Washington, Stewart Gillmor, Secretary-Treasurer of the Forum, presented Heinrich Medicus with a Certificate of Appreciation for his years of service to the Division (Forum) of History of Physics.

The History of Physics Newsletter (HPN) is published by the Forum on the History of Physics of the American Physical Society. It is distributed free to all members of the Forum. Others who wish to receive it should make a donation to the Forum of the History of Physics of \$10 per volume (\$5 additional for airmail.) Each volume consists of 5 issues, Editor: Albert Wattenberg, Department of Physics, University of Illinois, Urbana, IL 61801-3080. Associate Editors: Stephen G. Brush, Department of History and Institute for Physical Science and Technology, University of Maryland, College Park, MD 20742, and Elizabeth Garber, History Department, SUNY at Stony Brook, Stony Brook, NY 11794.

EXECUTIVE COMMITTEE

The Executive Committee met in Washington, DC on April 21st, 1993 with Gerald Holton presiding. Reports were given by the organizers of invited sessions and sponsored conferences. Elizabeth Garber proposed that we try to include in the Forum Newsletter highlights or an epitome of some of the invited sessions. Under the section **REPORTS** in this issue there is a report on the invited session at the Washington meeting.

Chairperson Holton pointed out that the Division/Forum had not made sufficient use of the opportunity to nominate Fellows of the APS. If you know of eminent physicist historians who have not been made Fellows of the APS, please write to the Chairperson of the Fellowship Committee, Prof. Elizabeth Garber, History Dept., SUNY at Stony Brook, Stony Brook, NY 11794 with the name of your nominee. Recommendations should include citation material such as outstanding research and publications.

Secretary-Treasurer Gillmor gave an interim financial report because the fiscal year ends on June 30th. Under the new Constitution and by-laws the APS allotment for Forum expenses will be approximately half of what it was formerly. A Forum receives \$2.50 per member yearly from the APS because there is no dues paid to the APS by members of Forums.

The Editor of the Newsletter has asked that he be replaced. A summary of the returns from the questionnaire on the newsletter was presented. There was most enthusiasm for the Summaries section. All sections received rather favorable reactions except for the section on Grants & Fellowships. It is planned to shorten that section and perhaps to include it only once a year.

APS & AIP NEWS

Relocation of the APS and AIP to the American Center for Physics in College Park, Maryland was reported to be close to the planned schedule for this fall. Approximately half of the APS New York and Woodbury staff whose positions are moving will relocate.

AIP Center for History of Physics and the Niels Bohr Library are relocating in late October this year. The Library should be open again for all services by early December if not sooner. In the meantime most inquiries by telephone and mail will be handled as usual with only brief interruptions. The new address is: Center for History of Physics, One Physics Ellipse, College Park, MD 20740 (301)209-3165 (Center office) (301)209-3175 (Niels Bohr Library) e-mail sweart@aip.org or jwb@aip.org.

The American Center for Physics building can be reached from downtown Washington, DC in about half an hour by car. By the end of the year a Metro station on the new Green Line will open at College Park within walking distance; meanwhile AIP staff can provide transportation assistance for those without a car. The Center is some two miles from the University of Maryland campus, home of the National Archives II building.

Werthamer resigns as executive secretary
- The APS and Richard Werthamer have announced Werthamer's resignation as executive secretary of the society, citing differences over APS management policies and practices. The resignations became effective July 16th. Pending the appointment of a new executive secretary Harry Lustig has been designated acting executive secretary, and he continues as APS treasurer.

Status of the APS Centennial Celebration
- At the April 1993 Council meeting, President-Elect Burton Richter reported that the Task Force on the APS Centennial Celebration considered several proposals; the most significant one is that the Society hold one large meeting in 1999 and that all subunit meetings be suspended that year. It is proposed that the single meeting, lasting one week or more, be divided into physics and common elements sessions, with the days in the middle devoted to sessions of common interest. With an anticipated attendance of 8000, the meeting could be held in New York or Washington, DC. The APS Meetings Department is being asked to explore other options that may be less costly. The Task Force will generate a report with specific recommendations and circulate it for reactions. The members and Executive Committees of the subunits should let their APS Councillors know their ideas on these proposals. (The Councillor for the Forum for the History of Physics is A. Wattenberg, 1110 West Green Street, Urbana, IL 61801.)

ANNOUNCEMENTS

Dibner Institute Appointments

The Dibner Institute for the History of Science and Technology and the Burndy Library were established as a consortium of MIT, Boston University, Brandeis University, and Harvard University with

MIT as the host university. The first group of Dibner Institute Resident and Visiting Fellows for 1993-94 includes the following of special interest to physics: *Ronald Anderson*, his project is "Electromagnetic Potentials: Their Physics, History, and Ontological Status"; *Tian Yu Cao*, his project is "A Contextual Study of the changes in the Conceptualization of Fundamental Physics in the USA: The rise of the Effective Field Theory Approach"; *Gennady Gorelik*, his project is "Andrei Sakharov and the H-Bomb"; *Susan Hensel*, will pursue a study entitled "An Historical Account of Heaviside's Operational Calculus in Engineering"; *Abha Sur*, her project is "A Social History of Spectroscopy in India."

Declassification

Scientific reports from World War II have remained classified, or in some cases after being declassified, their status was changed back to classified. On April 26, President Clinton issued a directive ordering the Information Security Oversight Office to establish a task force aimed at drafting a revision of the Government's classification/declassification system. Some concern exists in Historical Societies that the task force contains members who are biased towards classification. There is also a problem in finding technically qualified declassification personnel and in getting funds appropriated for the process. Technical societies like the APS should explore this matter further. If there are physics historians who have looked into the effects and history of the classification of scientific documents, please contact the editor of this Newsletter.

Rittenhouse: A Journal of the American Scientific Instrument Enterprise

Rittenhouse is edited by Deborah Jean Warner, Curator, History of Physical Sciences of the National Museum of American History. The Journal aims to increase and diffuse knowledge about scientific instruments made and/or sold in the United States. The areas covered include mathematical, optical, and philosophical instruments. The editor is interested in good articles on the history of instruments, instrument makers, and other aspects of the American scientific instrument enterprise. As well as articles, book reviews and bibliographies should be sent to the editor. Her address is National Museum of American History, Smithsonian Institution, Washington, DC 20560. Information about subscriptions can be obtained by writing to *RITTENHOUSE*, Raymond V. Giordano, The Antiquarian Scientist, P.O. Box 367, Dracut, MA 01826.

MEETINGS

BSHS Science and British Culture in the 1830's this meeting of the British Society for the History of Science will be held July 6-8, 1994 at Trinity College Cambridge. For more information write Dr. Geoffrey

Cantor, Department of Philosophy, University of Leeds, Leeds, LS2 9JT, United Kingdom.

Le Comite Lavoisier de l'Academie des Sciences plans to mark the bicentenary of the execution of Lavoisier with a meeting in Paris on 3-6 May 1994. Further information can be obtained from Michele Goupil, Academie des Sciences, 28 Rue Conti, 75006 Paris, France.

The title of the **Geological Society of America Penrose Conference** is "From the Inside and the Outside: Interdisciplinary Perspectives on the History of the Earth Sciences." The aim of the conference is to bring together historians of science and scientists interested in the history of the earth sciences, with a focus on the differences in their approaches to scholarship and teaching in this field. Further information can be obtained from Naomi Oreskes at the Earth Sciences Department, Dartmouth College, Hanover, NH 03755.

The **History of Science Society** will have sessions at its annual meeting from Thursday evening November 11th, till noon Sunday November 14th, 1993. The meetings will take place in Santa Fe, New Mexico in the Santa Fe Hilton in the Sweeny Convention Center. Sessions of interest to physicists occur during the entire program. The program can be obtained by writing to the Executive Secretary, History of Science Society, DH-05, University of Seattle, WA 98195-0001; telephone (206)543-9366; e-mail (via Internet) krbenson@u.washington.edu.

An informal **Workshop on the History of the DOE Laboratories** will precede the Annual Meeting of the History of Science Society on 11 November 1993. The DOE and former AEC official historians in Washington appear to have only been interested in the history of organizations rather than scientific history. Therefore, each National Laboratory has had to develop its own history program. There has been no common approach either to writing their histories or to preserving their historical records at the various National Laboratories of the DOE. For further details about the workshop, contact Robert W. Seidel, Center for National Security Studies, Los Alamos National Laboratory, MS A112, Los Alamos, NM 87545; telephone (505)667-8919.

The annual meeting of **ICOHTEC** will be in Bath sometime in July/August 1994. Further details can be obtained from Prof. R.A. Buchanan, Center for the History of Technology, University of Bath, Claverton Down, Bath, Avon, BA2 7AY, England.

Joint Conference on Interdisciplinary and Instrumental Transfer Technologies will be held at the California Institute of Technology, fall 1994. It will be a joint collaboration between the Division of Humanities, California Institute of Technology and the Beckman Institute for the History of Chemistry. For more information write: Prof. Diana Barkan, Caltech, Baxter 138, Pasadena, CA 91125.

REPORTS

Symposium on Applied Research, World War II and Post-War Physics

APS Invited Session

Washington, DC, April 12, 1993

"Organizing War Research and Its Implications for Postwar American Science," *Larry Owens*.

"The Postwar Legacy of Wartime Instrumentation Development on Physics Research at Brookhaven," *William A. Higginbottom*.

"The Impact of CP1 on Postwar Science at the University of Chicago,"

Robert G. Sachs.

"The Los Alamos Experiences and its Impact on Postwar Nuclear Physics at Cornell," *Silvan S. Schweber*.

The speakers and audience in this session were both physicists and historians. World War II is already understood as a watershed in physics as a discipline, profession and in its funding. The poverty and dismal career opportunities of physics in the 1930s was clear from all speakers. The myriad changes of WWII were detailed in their various directions. Larry Owens indicated that the success of the Office of Scientific Research and Development (OSRD) in WWII was not a forgone conclusion. Scientific leaders like Vannevar Bush were wary of government involvement in science. They were committed to individualism and private entrepreneurship that they assumed would be compromised with government funding. In Washington, there was opposition especially from the Bureau of the Budget. BOB worried that Bush's direct pipeline to Roosevelt undermined the democratic processes of the budget, which they did. The military felt that OSRD undermined its own chains of command and other agencies also felt threatened. The key to OSRD's success was Bush and his use of the Contract to define the relationship between government, universities, corporations and individuals. This was to control government. The contract was a familiar device to define responsibilities and the limitations of a relationship, it mobilized resources quickly, decentralized operations and allowed the government to tap into private expertise without threatening the latter's independence. All of Bush's actions after the war were dedicated to curbing the influence of government which he saw as undermining science.

Willie Higginbottom sketched changes to physicists by the advent of government funding. In addition to their poverty, physicists did not cooperate with electrical engineers, only chemists in the 1930s. The impact of the forced interaction of both physicists and electrical engineers changed both disciplines. Electronics changed the instrumentation of physics markedly. Physics changed how electrical engineers were educated, at least at Cornell. He detailed the technical changes in radiation and ionization detectors and time of flight instrumentation, all key to physics after WWII. Lillian Hoddeson asked how did engineers change the way physicists actually did research and questioned the universality of the changes on electrical engineering as the relations between those disciplines differed elsewhere.

Cornell was also the focus of Sam Schweber's talk. The impact of the Los Alamos experience for Cornell faculty was shaped partly by the nature of that institution, liberal, with an independence from religious groups from its very inception, together with a strong commitment to pure research coupled with applied science, usefulness to the state and its citizenry. In the 1930s Cornell faculty interpreted the Depression as a threat to democracy. Led by Bethe the Cornell physicists saw the work at Los Alamos as an attempt to save democracy through singleminded devotion of a group of intense, intelligent people focusing narrowly on important problems. These values were all brought back to Cornell and despite rifts within the faculty were embodied in the Laboratory for Nuclear Studies. The sense of community engendered at Los Alamos reappeared, the commitment to the liberal defense of democracy untouched.

As narrated by Robert Sachs the impact on Chicago of the first operative nuclear pile was similar to the Los Alamos experience on Cornell. Interdisciplinary research institutes were founded. Some did not last, but the Institute for the Study of Metals (James Franck Institute) and that for Nuclear Studies (The Fermi Institute) flourished, partly because of the faculty and their interdisciplinary focus and Fermi's broad interests.

At the Washington APS meeting during the Unity of Physics Day, Victor Weisskopf spoke on the "Development of Physics since the Inception of *The Physical Review*."

Noting that *Physical Review* was the most important journal in physics, on the desk, not in the bookcase, Victor Weisskopf reminded his audience that the preeminent place of the journal was not always so. It was not until 1940 that *Physical Review* replaced European journals as the most important in the world and that this position was consolidated after WWII with the changes in perception of physics and physicists both amongst physicists and the public. Most of the new work in physics was published in *The Physical Review*, experimental, computational and theoretical. After 1960 the European laboratories began to challenge American hegemony while at the same time the social structure of the science had changed. Leaders in the field had to organize politically, for funding, and institutionally, with the advent of big-team science and the fragmentation of physics into many branches. Fragmentation brought an hierarchical arrangement of subfields from the most esoteric at the top, to the more useful at the bottom.

The Centennial of *The Physical Review* was celebrated with a session on its history, coupled with an exhibition in Washington, DC, April 13, 1993.

"*The Physical Review—then and now*," *Abraham Pais*.

"Comments," *Henry Barschall*.

"Samuel Goudschmidt at *The Physical Review*," *Jonathan Logan*.

"The Jolly Green Giant (*The Physical Review*, 1950-1990)," *David Lazarus*.

"Comments on *Physical Review Letters*," *Robert K. Adair*.

"**The Physical Review** in a changing World, 1947-1992," *W. W. Havens*.

"Comments on the Future of **The Physical Review**," *Benjamin Bederson*.

The topics of some of the speakers overlapped, such as the journal's rise from obscurity just before WWII and its phenomenal growth after it. At its inception the journal was edited out of, and financed by, Cornell and included book reviews, obituaries and advertisements. Under the editorship of Tate the journal became a bi-monthly (1929). He also initiated **Reviews of Modern Physics** and **Journal of Applied Physics**.

Abraham Pais sketched the growth in size and importance of **The Physical Review** since he first read it as a graduate student in Holland in 1938. At that time it was possible to get through all of it, unlike the deluge of literature which now makes knowing even what is going on across physics impossible. These points were also noted by Barschall in his comments. Pais sketched the early history of the journal, and then continued with his own experience with it and his surprise at not seeing any mention of nuclear fission in the first numbers to reach Holland after WWII. Jonothan Logan's talk on Sam Goudschmidt and his editorship (1953-1974) focussed on Goudschmidt's varied career, his broad interests in physics from the beginning of his career, his style-as a puzzle solver-in both physics and Egyptology and his launching of **Physical Review Letters**. The last was established because Goudschmidt wanted to save some common ground for all in physics, to counter balance the dispersion already happening in the discipline.

Robert Adair reminded his audience that while Goudschmidt started **Physical Review Letters** George Trigg established it. Indeed he was its heart and soul, he set the style both literally and figuratively for the journal. Bill Havens concurred and added that that fast publication was possible through the use of hangers on typewriters with greek and mathematical symbols. This technology was replaced by computers in the 1970s. **Physical Review Letters** was envisioned as a forum for quick publication and as a small journal that could be read cover to cover.

Then Havens recounted the constant battle for survival at **The Physical Review** despite its growth in size and importance after WWII, even though the journal had edge over European publications after the war. The journal was bailed out by the Office of Naval Research in 1948 and again by NSF in 1951. The growth and fragmentation of physics was so rapid that the journal split into two in 1963 and into four in 1969. He also explained the IRS rules that lead to page charges and their repeal. In the past decade the journal has changed yet again. It has become an international journal and despite its size the average time between receipt and acceptance is still two to four months. While APS journals are cheap they are expensive to produce and soon they will be too expensive for individuals as well as libraries. There are already signs of alternative forms of electronic publi-

cations formats, but without referees. This latter point was the starting place for Ben Bederson's remarks. Journals look as though they are becoming obsolete. Within the near future all publications will be available on-line. The only questions are in what form and with what access control. This development will dwarf that of the preprint revolution. Refereed articles may become a thing of the past. The question of quantity versus quality of information has yet to be settled.

BOOK PUBLISHERS

Academic Press

J. M. Nyce and Paul Kahn **Memex to Hypertext: Vannevar Bush and the Mind's Machine** For more information write: Academic Press, Order Processing Department, 465 South Lincoln Drive, Troy, MO 63379.

Basil Blackwell

A. Rupert Hall **Isaac Newton: Adventurer in Thought**. Hall surveys the field of Newton scholarship and the changes made in our understanding of Newton through the exploration of the vast collection of manuscript material he left. He fits Newton's physics and mathematics into Newton's Christian beliefs. Hall also explains why Newton cannot simply be seen as a Platonist, mystic or magus. He offers the alternative that Newton tried to explore every aspect of God's creation.

David Knight Humphry Davy: Science and Power. Davy was one of the first modern, professional scientists. Although primarily known as a chemist Davy's research in electrochemistry straddled the boundaries between chemistry and physics. This was one of the most exciting fields of research in the physical sciences of his day. He taught Michael Faraday chemistry and lectured at the Royal Institution to large audiences. In his lifetime he was also recognized for his poetry and was friends with Lord Byron, Samuel Taylor Coleridge and William Wordsworth. For more information write: Basil Blackwell, c/o AIDC, 64 Depot Road, Colchester, VT 05446.

Basic Books

Jeremy Bernstein **Cranks, Quarks and the Cosmos: Essays from The New Yorker**. For more information write: Basic Books, 10 East 53rd Street, New York, NY 10022.

University of California Press

J. Samuel Walker **Containing the Atom: Nuclear Regulation in a Changing Environment, 1963-1971** For more information write: University of California Press, 2120 Berkeley Way, Berkeley, CA 94720.

Cambridge University Press

Mario Biagioli Galileo Courtier: The Practice of Science in the Culture of Absolutism. From 1610 onwards Galileo was mathematician to the Grand Duke of Tuscany. Patronage of the Medici entitled Galileo to pursue cosmological questions that interested him and conferred intellectual and social legitimacy to them. The new cosmology and methods threatened belief systems and undermined social and epistemological hierarchies within the universities. Therefore, Galileo's move to the Court and his use of its patronage system were crucial to the new science.

Maurice Crosland Science under Control: The French Academy of Sciences, 1795-1914 This is a history of the Academy of Sciences during the nineteenth century when it became the representative of the sciences throughout France. Taking neither extreme position, seeing the Academy as embodying all that was best in French science, nor seeing it as made up of superannuated scientists past their productive years, Crosland has tried to see how it functioned within French scientific life during a century in which the modern scientific professions came into being.

G. E. Fogg A History of Antarctic Science: Studies in Polar Research.

Loren Graham Science in Russia and the Soviet Union: A Short History. This concise volume traces the development of what became in the 1980s the world's largest science establishment. Graham traces the Czarist period, the impact of the Revolution, the strengths of the various sciences within the system, the relationship of the sciences to Russian society and the impact of the fall of Communism.

Eduard A. Tropp, Viktor Ya. Frenkel and Artur D. Chernin Alexander A. Friedmann: The Man who made the Universe Expand. Biography of the Russian scientist—who predicted, using a mathematical model, the expansion and evolution of the universe—against the backdrop of early Soviet science.

Alan E. Shapiro Fits, Passions and Paroxysms: Physics, Method and Chemistry and Newton's Theories of Colored Bodies and Fits of Easy Reflection. Based on Newton's unpublished manuscripts. Shapiro, who is editor of Newton's optical papers, traces the development and reception of Newton's theories of the color of thin films. He describes the lively debate over Newton's

ideas at the end of the eighteenth century shedding new light on the development of both chemistry and physics. For more information write: Cambridge University Press, 32 East 57th Street, New York, NY 10022.

University of Chicago Press

Jean Dietz Moss Novelties in the Heavens: Rhetoric and Science in the Copernican Controversy.

Andrew Pickering ed. Science as Practice and Culture. For more information write: University of Chicago Press, 5801 South Ellis Avenue, Chicago, IL 60637.

Columbia University Press

Stuart W. Leslie The Cold War and American Science: The Military-Industrial-Academic Complex at MIT and Stanford. The impact of the Cold War on the funding and the direction of research in the United States. For better or worse the politics of national security drove the funding of research and development at the major universities through the 1980s. For more information write: Columbia University Press, 40 West 20th Street, New York, NY 10022.

Dover Publications

Sir Lawrence Bragg The Development of X-Ray Analysis.

Jacob Klein Greek Mathematical Thought and the Origin of Algebra. This study focuses on the revival and assimilation of Greek mathematics, through the appropriation of Arabic science, during the Middle Ages.

Alexander Koyré The Astronomical Revolution: Copernicus-Kepler-Borelli. For more information write: Dover Publications Inc., 11 East 2nd Street, Mineola, NY 11501.
Doubleday

William Poundstone The Prisoner's Dilemma. John von Neumann and the influence of Game Theory on American nuclear arms policy. For more information write: Doubleday, 666 Fifth Avenue, New York, NY 10103.

Editions Frontieres

Michel Bitbol and Olivier Darrigol eds. Erwin Schrödinger: Philosophy and the Birth of Quantum Mechanics. This is the proceedings of a conference on Schrödinger, Paris, June 1992. Most of the contributions

are in English. There are two biographical essays and seven on Schrödinger's later influence, both philosophical and physical. The bulk of the papers are on his philosophy, the role of physics within it and his physics. In the latter are papers on his statistical physics by Olivier Darrigol, his correspondence with Einstein by F. Balibar and his "dialog" with the Göttingen-Copenhagen physicists by Mara Beller. Included are two essays on his wave equation by S. D'Agostino, and K. von Meyenn and one on his attitude towards relativistic quantum mechanics by Helge Kragh. For more information write: Editions Frontieres, B. P. 33, 91192 Gif-sur-Yvette Cedex, France.

Harvard University Press

Sheila Jasanoff **The Fifth Branch: Science Advisors as Policy Makers.** For more information write: Harvard University Press, 79 Garden Street, Cambridge, MA 02138.

Houghton Mifflin

Leon Lederman with *Dick Teresi* **The God Particle: If the Universe Is the Answer, What is the Question?** The search for the Higgs boson. For more information write: Houghton Mifflin, 2 Park Street, Boston MA, 02108.

Johns Hopkins University Press

Nicholas Copernicus **Complete Works.**

Pawel Czartoryski ed. *Nicholas Copernicus* **On the Revolutions**, trans. *Edward Rosen*.

Pawel Czartoryski ed. *Nicholas Copernicus* **Minor Works**, trans. and commentary *Edward Rosen* and *Erna Hilfstein*.

Lewis Pyenson **Civilizing Mission: Exact Sciences and French Overseas Expansion, 1830-1940** How practitioners of the physical sciences performed in the isolation of colonial posts and how they related to the geopolitical realities of their times. For more information write: Johns Hopkins University Press, 701 West 40th Street, Suite 275, Baltimore, MD 21211.

Kluwer Academic Publications

Johann Götschl ed. **Erwin Schrödinger's World View: The Dynamics of Knowledge and Reality.** Contents include a biography of Schrödinger, his equation and his position in the Einstein-Bohr debate.

R. W. Home and *Sally Gregory Kohlstedt* eds. **International Science and National Scientific Identity: Australia between Britain and America.**

William R. Woodward and *Robert S. Cohen* eds. **World Views and Scientific Discipline Formation.** Of interest are articles on eighteenth-century astronomy, Isaac Newton, Boltzmann and Planck and Walther Nernst and quantum theory. For more information write: Kluwer Academic Publications, P. O. Box 358, Accordia Station, Higham MA, 02108-0558.

University of Nebraska Press

Michele Stenehjen Gerber **On the Home Front: The Cold War Legacy of the Hanford Nuclear Site**

M. Eugene Rudd **Science on the Great Plains: The History of Physics and Astronomy at the University of Nebraska.** For more information write: University of Nebraska Press, Lincoln, Nebraska.

Open Court

Liba Chaia Taub **Ptolemy's Universe: The Natural, Philosophical and Ethical Foundations of Ptolemy's Astronomy** For more information write: Open Court, 315 Fifth Street, Peru, IL 61354.

Oxford University Press

John Fauvel, *Robin Wilson* and *Raymond Flood* **Möbius and his Band: Mathematics and Astronomy in Nineteenth-Century Germany.** John Fauvel explores Möbius's life and Gert Schubring examines the German mathematics community in which Möbius worked while Allan Chapman and Jeremy Gray examine the changes in astronomy and the contributions Möbius made to geometrical mechanics. Ian Stewart recounts the mathematical legacy Möbius left for the twentieth century.

Domenico B. Meli **Equivalence and Priority: Newton Versus Leibniz.** Using Leibniz's manuscripts, Meli examines the reactions of Leibniz to Newton's *Principi* and relates this to issues of priority claims, the reception of rival theories by mathematicians, and the mathematization of nature in the seventeenth century.

Philip Stehle **Order, Chaos, Order: The Transition from Classical to Quantum Physics.**

J. E. D. Williams **From Sails to Satellites: The Origins and Development of Navigational Science** For more information write: Oxford University Press, 200 Madison Avenue, New York, NY 10016.

Princeton University Press

Herman H. Goldstine **The Computer from Pascal to von Neumann.**

Martin J. Klein, A. J. Kox, Jürgen Renn and Robert Schulman

The Collected Papers of Albert Einstein vol. 3 **The Swiss Years: Writings, 1909-1911** In 1909 Einstein departed from the Swiss Patent Office, called to the University of Zurich. The series ends with Einstein's report to the first Solvay Congress devoted to radiation and quantum theory. For more information write: Princeton University Press, 3175 Princeton Pike, Lawrenceville, NJ 08648.

Rutgers University Press

Ann Hibner Koblitz **A Convergence of Lives; Sofia Kovalevskaja, Scientist, Writer, Revolutionary.** For more information write: Rutgers University Press, 109 Church Street, New Brunswick, NJ 08901.

Salem Press

Hans G. Graetzer and Larry M. Browning eds. **The Atomic Bomb: An Annotated Bibliography.** For more information write: Salem Press, P. O. Box 1097, Englewood Cliffs NJ, 07632.

Science Museum (London)

Mary Holbrooke with additions and revisions by *R. G. W. Anderson* and *D. J. Bryden* **Science Preserved: A Directory of Scientific Instruments in Collections in the United Kingdom and Eire.** For more information write: HMSO Publications Centre, P. O. Box 276, London SW8 5DT, United Kingdom.

Simon and Schuster

William Broad **Teller's War: The Star Wars Deception.** For more information write: Simon and Schuster, Prentice Hall Building, Sylvan Avenue, Englewood Cliffs NJ, 07632.

Springer-Verlag

L. Boi, D. Flament and J. M. Salankis eds. **A Century of Geometry, 1830-1930** Of interest are articles on geometrical concepts in quantum theory, physics and differential ge-

ometry and the connections between physics and geometry in particular in mechanics. There are also articles on abstract and physical space and physical geometry and special relativity.

B. Bolotovskii and V. Frenkel **I. E. Tamm: Selected papers** For more information write: Springer-Verlag, 175 Fifth Avenue, New York, NY 10010, or, P. O. Box 2485, Secaucus, NJ 07096-2491.

Stanford University Press

Peter Galison and Bruce Hevly eds. **Big Science: The Growth of Large-Scale Research.** There are articles by physicists and historians on the growth of large-scale research projects and institutions in the United States, Europe, Japan and Korea. These institutions include government laboratories and universities, whose research was supported for reasons of national security as well as economics and scientific interest. The essays lay out many of the historical problems and issues of studying the physical sciences in the latter half of the twentieth century. For more information write: Stanford University Press, Stanford, CA 94305.

St. Martins Press

Linda Hunt **Secret Agenda: The United States Government, Nazi Scientists and Project Paperclip, 1945-1990** For more information write: St. Martins Press, Scholarly and Reference Division, 175 Fifth Avenue, New York NY, 10010.

Yale University Press

Larry Schaaf **Out of the Shadows: Herschel, Talbot and the Invention of Photography** For more information write: Yale University Press, 92, Yale Station, New Haven CT, 06520.

RECENT ARTICLES

American Journal of Physics

1992, vol. 60

"Independent-particle Models of the Nucleus in 1930," *Karen E. Johnson*, 164-172.

Annals of Science

1991, vol. 48

"Oceanography of the Pacific: George F. McEwen, H. U. Sverdap and the Origins of Physical Oceanography on the West Coast of North America," *Eric L. Mills*, 241-266.

1992, vol. 49

"The Scholar and the Craftsman: Robert Boyle," *Malcolm Ostler*, 255-276.

"Michael Faraday, Henry Wilde and the Dynamo," *D. S. L. Cardwell*, 479-487.

Archive for History of Exact Sciences

1992, vol.44

"Kirchhoff's Theory of Rods," *Ellis Harold Dill*, 1-23.

"Newton's Solution to the One-Body Problem," *Bruce Pourcain*, 125-146.

British Journal for the History of Science

1993, vol. 26

"The NIMBY Syndrome: Its Significance in the History of the Nuclear Debate in Britain," *Ian Welsch*, 15-32.

Bulletin of Atomic Scientists

1992, vol. 48 no. 7

"Declassified Files Reopen the "Nazi Bomb" Debate," *Stanley Goldberg* and *Thomas Powers*, 32-40.

Deutsches Museum, Wissenschaftliches Jahrbuch

1990

"Philip von Jolly und des Geheimis der Bleikugel," *Gisela Oither-Turkar*, 72-81.

Dix-huitieme Siécle

1990, vol. 22

"L'observations du passages de Venus sur le soleil: Le voyage de Pingré dans l'Océan Indienne," *Jean-Michel Racault*, 107-120.

Earth Science History

1991, vol. 10

"The First International Polar Year, 1882 - 1883 and International Geophysical Cooperation," *Wilfried Schröder*, 223-226

1992, vol. 11

"Norman L. Brown, 1887-1956, MIT Class of 1912, first Predoctoral Fellow of the Geophysical Laboratory," *H. S. Yoder Jr.*, 45-55.

History of Education Quarterly

1991, vol. 31

"Transforming the University: Administrations, Physicists and Industrial and Federal Patronage at Stanford, 1935-1949," *Rebecca S. Lowen*, 365-388.

Historia Scientiarum

1991, no. 1

"The Growth of Fourier's Theory of Heat Conduction and his Experimental Study," *Haruyo*

Yoshida and *Seiji Takata*, 1-26.

"The Role of the Three-body Problem in William Rowan Hamilton's Construction of the Characteristic Function for Mechanics," *Michigo Nakane*, 27-38.

"On Einstein's Statistical-Mechanical Approach to Early Quantum Theory, 1904-1916," *Luis Navarro*, 39-58.

Historical Records of Australian Science

1991, vol. 8

"Nuclear Magnetic Resonance in Australia, 1952-1986," *K. Marsden* and *Ian D. Rae*, 119-150.

"Spectroscopic Research in CSIRO Division of Chemical Physics," *J. B. Willis*, 151-182.

Historical Studies in the Physical and Biological Sciences

1992, Vol. 23

"The Americanization of Molecular Physics," *Alexi Assmus*, 1-34.

"Science and Secret Weapons Development in Revolutionary France, 1797-1804: A Documentary History," *Charles Coulston Gillispie*, 35-152.

"The Making of a Science-based Technological University: Karl Compton, James Killian and the Reform of MIT, 1930-1957," *Christophe Lecuyer*, 153-180.

History of Science

1991, vol. 29

"How the *Principia* got its Name; Or, taking Natural Philosophy Seriously," *Andrew Cunningham*, 377-392.

1992, Vol. 30

"Do we Understand how experimental Knowledge is acquired?" *Frederic L. Holmes*, 119-136.

Isis

1991, vol. 83

"Inventing a Climate of Opinion: Vannevar Bush and the Decision to Build the Bomb," *Stanley Goldberg*, 429-452.

Journal for the History of Astronomy

1992, vol. 23

"The English Quadrant in Europe: Instruments and the Growth of Consensus in Practical Astronomy," *J. A. Bennett*, 1-14.

"James Gregory and the Reflecting Telescope," *A. D. C. Simpson*, 77-92.

"The Hollow World of Edmund Halley," *N. Kollerstrom*, 185-192.

Journal for the History of Biology

1992, vol. 25

"The Rockefeller Foundation and Spectroscopy Research," *Doris T. Zallen*, 67-85.

Minerva

1991, vol. 29

"Airpower and Governmental Support for Scientific Research: The Approach to the Second World War," *Norris Hetherington*, 420-439.

Notes and Records of the Royal Society

1992, vol. 46

"George Biddell Airy (1801-1892)," *Allan Chapman*, 103-110.

Nuncius

1991, Vol. 6

"New Documents on Galileo," *Mario Biagioli*, 157-169.

New York Review of Books

1992, August 13

"The Farm Hall Transcript: The German Scientists and the Bomb," *Jeremy Bernstein*, 47-53.

Osiris

1992, Vol. 7

This annual issue is edited by Arnold Thackray and is on "Science After '40," 1940 that is. There are articles on how historians have viewed this era by *James A. Capshaw* and *Karen A. Rader*. *Roger L. Geiger* writes on one of the big issues in this era, the relationship between science, the universities and defense, and *Loren Graham* on science in the Soviet Union in the 1980s. These overviews of the general trends in science since 1940 are followed by a series of case studies. Of interest are the articles by *Paul Forman* on the development of the maser and on cold fusion by *Bruce Lewenstein*. The issues of how the federal government competed for limited talent in certain critical fields is examined by *Margaret Rossiter* and *Ronald E. Doel* looks at evaluations of Soviet lunar science during the Cold War. Finally, *Joan Warnow-Blewett* examines the problems of documenting twentieth-century science with a list of the archives with major holdings in this field.

Physis

1991 Vol. 28

"The Origins of the Provençal School of Astronomy," *F. J. Baumgartner*, 291-304.

Quipu

1990, Vol. 7

"Richard Feynman in Brazil, Personal Recollections," *J. Leite Lopes*, 383-397.

Proceedings of the Royal Irish Academy

1990, Vol. 90 (C)

"James MacCullagh (1809-1847)," *B. K. P. Scryfe*, 67-106.

Public History

1992, Vol. 14

"Radiation Safety, the AEC and Nuclear Weapons Testing," *Barton C. Hacker*, 31-53.

Reviews of Modern Physics

1991, Vol. 63

"Deep Inelastic Scattering: The Early Years," *Richard E. Taylor*, 573-595.

Science et Technologie en Perspective

1990-91, Vol. 18

"La radioactivité: Histoire d'une découverte," *Loïc Barbo*, 1-131.

Science in Context

1991, Vol. 4

"The Peculiarities of Americans, or, Are there National Styles in the Sciences?" *Nathan Reingold*, 347-366.

1992, Vol. 5

"Competition Among Scientific Disciplines in Cold Nuclear Fusion Research," *James W. McAllister*, 17-50.

1993, Vol. 6

The March 1993 number of the journal is devoted to Albert Einstein. Articles include one by *Diana Barkan* on Nernst and Einstein.

Scientia Canadensis

"The Liquefaction of Helium and the Promotion of National Science," *Andrew Ede*, 51-65.

Soviet Physics Uspekhi

1990, Vol. 34

"How the Concept of Acceleration took shape in the Mechanics of Galileo," *V. A. Fabrikant*, 201.

GRANTS & FELLOWSHIPS

AIP Center for History of Physics

The Center for History of Physics has a program of grants-in-aid for research in the history of modern physics and allied sciences (such as astronomy, geophysics, and optics) and their social interactions. Grants can be up to \$2000 each. They can be used only to reimburse direct expenses connected to the work. Preference will be given to those who need part of the funds for travel and subsistence to use the resources of the Center's Niels Bohr Library in College Park, Maryland (easily accessible from Washington, DC), or to microfilm papers or to tape-record oral history interviews with a copy deposited in the Library. Applicants should either be working toward a graduate degree in the history of science (in which case they should include a letter of reference from their thesis advisor), or show a record of publication in the

field. To apply, send a vitae plus a letter of no more than two pages describing your research project and a brief budget showing the expenses for which support is requested. Send to Spencer Weart, Center for History of Physics, One Physics Ellipse, College Park, MD 20740. Deadlines for receipt of applications are June 30 and December 31 of each year.

CIES: the Council for International Exchange of Scholars

CIES administers the Fulbright Scholar Program for research and university lecturing abroad in cooperation with the United States Information Agency. For 1994-95 the awards include about 1,000 grants in research and university lecturing for periods ranging from two months to a full academic year. There are openings in over 135 countries and in many regions. Fulbright awards are granted in virtually all disciplines, and scholars in all academic ranks are eligible to apply. Applications are accepted from retired faculty and independent scholars. In 1993 the application deadline was August 1st. Correspondence should be addressed to the Council for International Exchange of Scholars, 3007 Tilden Street, N.W., Washington, DC 20008-3009; telephone (202)686-7877.

Dibner Institute Fellows Program 1994-1995

The Dibner Institute for the History of Science and Technology was established in Massachusetts in 1990 as a consortium including the Massachusetts Institute of Technology as host institution, Boston University, Brandeis University and Harvard University. With the Burndy Library, the Dibner Institute is a center where invited Fellows from the United States and abroad can collaborate in an atmosphere of collegiality and find the resources and the appropriate setting to carry on their own work.

The Dibner Institute supports research in all areas of the history of science and technology. Candidates for fellowships should have advanced degrees in appropriate fields and offer evidence of significant scholarly accomplishment and professional experience. Dibner Fellows are expected to reside in the Boston area during the term of their grants, to participate in the Dibner Institute community and to present their current work at appropriate occasions during their fellowship appointment.

Applicants may request support for periods from one to three academic terms over the course of the year. The Institute provides office space, support facilities, full privileges at the libraries of consortium universities as well as the Burndy Library, access to programs, events and many resources at consortium-member institutions and to the entire spectrum of activities that will take place at the Dibner Institute. The Dibner expects to have ten to fifteen Fellows each term. Funds are available for travel, housing accommodations and living expenses. The deadline for receipt of applications for 1994-1995 is January 1, 1994. Fellowship recipients will be announced in March, 1994. Please send requests for further information and for application forms directly to: Helen Dippold,

Program Coordinator, Dibner Institute for the History of Science and Technology, Dibner Building, MIT E56-100, 38 Memorial Drive, Cambridge, MA 02139. Telephone (617)253-8721. Fax (617)253-9858. e-mail: dippold@mit.edu.

Friedrich Solmsen Fellowships

The Institute for Research in the Humanities of the **University of Wisconsin** invites application for several post-doctoral Friedrich Solmsen Fellowships, tenable at the Institute during the academic year 1994-1995 in literary and historical studies with a European focus, antiquity through the 17th century. Up to three fellowships are anticipated at a stipend of approximately \$26,000. Applicants must be in possession of the doctorate at the time of the application. The application deadline is 15 January 1994. For more information contact Loretta Freiling, Institute for Research in the Humanities, Washburn Observatory, 1401 Observatory Drive, University of Wisconsin, Madison, WI 53706; telephone (608)262-3855.

John Clarke Slater Fellowship

The American Philosophical Society Invites applications for a doctoral dissertation fellowship in the history of the physical sciences in the twentieth century. The Slater Fellowship carries a stipend of \$12,000. It is open to candidates for doctorates in the U.S. and to those in universities abroad who propose to spend the fellowship year in association with an American university or research institution. The deadline is December 1st for the following academic year. Write to American Philosophical Society, Slater Fellowship, 104 South 5th Street, Philadelphia, PA 19106-3387.

National Endowment for the Humanities is on BITNET

In May, public information officer Joy Evans announced that NEH is now on BITNET. They can receive and process requests from individuals and institutions for publication and application information more efficiently. They hope that the BITNET system will decrease the turnaround time on requests for information on HEH grants. However, NEH will not accept grant proposals sent through BITNET. Contact Joy Evans or her colleague, Suzanne Volpe, at NEHOPA@GWUVM with your requests and for a copy of the July 1993 issue of *Overview of Endowment Programs*.

The BITNET address for the Fellowships & Seminars Division is NEHFELL@GWUVM. The programs of that Division include: Fellowships for University Teachers, Fellowships for College Teachers & Independent Scholars, Summer Stipends, Faculty Graduate Programs for HBCU, Younger Scholars Awards, Study Grants for College and University Teachers, Summer Seminars for College Teachers.

SUMMARIES

Authors of books and articles on the history of physics are invited to send summaries for publication in this section. Maximum length: 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 the publisher. Publication will be expedited if each summary is typed, on a separate sheet, in the format of the summaries below.

Summaries should be sent to Elizabeth Garber, History Dept., SUNY at Stony Brook, Stony Brook, NY 11794.

SUMMARIES

NATURAL NUMBERS

Phillip Mirowski *Looking for those Natural Numbers: Dimensionless Constants and the Idea of Natural Measurement*, *Science in Context*, 1992, 5: 165-188

This paper surveys the history of measurement standards, physical dimensions and dimensionless constants as one instance of the quest to purge all anthropomorphic taint first in the metric system, then in the dimensions provided by the atom, then in physical constants intelligible to extraterrestrials, only then to end back at overt anthropomorphism in the late twentieth century. This suggests that the "naturalness" of natural numbers has always been conceptualized in locally contingent cultural terms.

HISTORY OF PHYSICS

David Park *The How and the Why*, 488, Princeton University Press, 1990.

An *ab initio* history of the ways in which people have thought about the physical world and tried to explain it so that it made sense in the larger context of ideas. The title refers to the common wisdom that science tells how but never why. But for most of history *Why* has been regarded as the important question, and removing it from the domain of science seems arbitrary and pointless. Even today, as we follow trains of thought further and further from direct experience, it is hard to believe that all they are telling us is *How*. Although the book is loosely organized around this question, its main purpose is to tell how people actually thought: what they considered important, what truths they assumed, and how they argued. *The How and the Why* won the Phi Beta Kappa Award for the year's best book on science for the wider public.

MEDIEVAL ARABIC SCIENCE

S. I. Salem and A. Kumar eds. *Science in the Medieval World*, xxvi + 118. University of Texas Press, 1991.

During the Middle Ages Muslim Spain was a thriving center for learning, where students gathered to consult Arabic manuscripts of earlier scientific works and study with famous teachers. One such teacher was Sa'id al-Andalusi (Sa'id of Andalusia) who in 1068 wrote *Kitab Tabaqat al-'Umam* (The Book of the Categories of Nations) which recorded the contributions to science of all known nations. This is one of the few surviving medieval, Spanish muslim texts and is here translated and edited.

Science as used by Sa'id, and in general in the period, is a broad term covering all aspects of human knowledge. Sa'id discusses the specific contributions of nine nations and peoples—India, Persia, Chaldea, Greece, Rome, Egypt, the Arab Orient, al-Andalus, and the Jews to knowledge.

THE SCIENTIFIC REVOLUTION

Daniel Garber *Descartes' Metaphysical Physics*, 448, University of Chicago Press, 1992.

This book concerns the foundations of the physics presented by René Descartes in the early seventeenth century. Descartes was important in breaking the hold of Aristotelianism and presenting an alternative view of the physical world, mechanism, that came to dominate in the era immediately preceding Newton. The book shows the way in which this new mechanistic and anti-Aristotelian physics grows out of Descartes' metaphysics. Topics discussed include Cartesian method, the geometric conception of body as extension alone, the refutation of atomism, forms and qualities, the rejection of the vacuum, the notions of motion and relativity of motion, Descartes' laws of motion and impact, the role of God in Descartes' physics and the status of the notion of force.

HUYGENS' TREASURE

Joella Yoder *Christian Huygens' Great Treasure*, *Tractrix*, 1991, 3: 1-13.

In order to make the *Oeuvre completes de Christian Huygens* more useful to historians the author is preparing a catalogue of the manuscripts that is cross-referenced with the *Oeuvres*, facilitating a return to the manuscripts themselves. Examples drawn here from his work on motion show what a re-examination of the manuscripts can yield. Included is a history of the manuscript collection and of the editors' influences upon it.

NEWTONIAN TECHNOLOGY

Larry Stewart *The Rise of Public Science: Rhetoric, Technology and Natural Philosophy in Newtonian Britain, 1660-1750*, 487 pp., Cambridge University Press, 1992.

The spread of public interest in Newton's science throughout the early eighteenth century was intimately tied to the rise of mechanical projects. While the early Royal Society had unsuccessfully promoted technical achievement, by the early eighteenth century, the image of physics fashioned by Newton's disciples brought mechanical projects into the world of public lecturing on science. Numerous courses of lectures given in coffee-houses by Newton's apostles, among them J. T. Desaguliers and John Harris, were dedicated to improving devices such as early steam engines and to ventures in water supply and mining. This concept of improvement was based on the notion that natural philosophers alone could provide the physical principles that would enable investors to distinguish between those schemes likely to succeed and the innumerable frauds with which the century was otherwise inundated. The notion of practical science presented by the Newtonian lecturers thus helped pave the way for early British industrialization.

CENTURY MEN OF SCIENCE

Sydney Ross *Nineteenth-Century Attitudes: Men of Science*, xi + 235pp., Kluwer Academic Publishers, 1991.

The essays collected in this volume are studies of nineteenth-century discoveries in physics and chemistry, including *inter alia*, Volta's contact potential, Faraday's electromagnetic induction, Herschel's discovery and use of "photographer's hypo," and Faraday's new terminology of electrochemistry: *electrolyte, ion, anode, cathode* etc., as argued out between himself and his scholarly advisers, William Whewell of Trinity College, Cambridge, and Whitlock Nicholl his London physician. The book covers the formative period of science as a profession in England, and the resistance of the scientific community to professionalization. The latter is well exemplified by the slow acceptance in a class-ridden society of the epicene term *scientist* in place of the dignified appellation *man of science*. This essay is an updated version of Ross's famous article, "*Scientist: The Story of a Word*," which originally appeared in 1964.

ROBERT MAYER

Kenneth Caneva *Robert Mayer and the Conservation of Energy*, xxiii + 439 pps., notes, biblio., index, Princeton University Press, 1993.

The book aims to make Mayer's thinking historically intelligible in terms of his context and the specific problems that concerned him. It attempts a plausible reconstruction of the progress of his thinking, and as such a case study in the dynamics of scientific concept formation. Its context embraces physiology, medicine, physics, chemistry, religion and spiritualism. The book examines the status of forces and causes in physics and contains a re-evaluation of the status of the vital force and a reassessment of the transformation of the life sciences around 1840. In examining the historiographical issue of the widely alleged but unfounded connection between Mayer and *Naturphilosophie*, it offers a new look at the nature and role of *Naturphilosophie* in German science. It also throws light on the work of several other real or alleged co-discoverers of the conservation of energy, such as Liebig, Helmholtz, Mohr and Hirn.

THE KÖNIGSBERG SEMINAR

Kathryn M. Olesko *Physics as a Calling: Discipline and Practice in the Königsberg*

Seminar for Physics, 496, Cornell University Press, 1991.

This book is about physics teaching and learning. It is the story of the founding, evolution and demise of the physics seminar at Königsberg (Kalingrad) East Prussia, between 1834 and 1876 while Franz Neumann was director. Neumann's seminar pioneered the integration of exact experimental and mathematical traditions in physics. The book focuses on: how and why Neumann created his physics curriculum, the problems he had in teaching quantitative techniques in physics, and how his students translated learning into practice. The more famous graduates of the seminar—such as Gustav Kirchhoff, Oskar Emil Meyer and Woldemar Voigt—are treated alongside the seminar's rank-and-file clientele—future secondary school teachers of physics. Of interest to present day physicists are the book's discussion of the formation of the modern curriculum in physics with mechanics at its foundation, and of the importance of error analysis, especially the method of least squares, in teaching students values, including moral ones, in doing physics.

GERMAN MAXWELLIANS

Olivier Darrigol *The Electrodynamical Revolution in Germany as Documented by Early German Expositions of "Maxwell's Theory"*, Archive for History of Exact Sciences, 1993, 45: 189-280.

After Hertz's experiment on electromagnetic waves and before Lorentz's electron theory became popular the new German Maxwellians radically questioned continental conceptions of electricity. They either opted for an agnostic view of electricity, or else completely adopted Maxwell's own picture. The historical significance of this short, revolutionary period is argued.

SCIENCE IN AMERICA

M. Eugene Rudd *Science on the Great Plains: The History of Physics and Astronomy at the University of Nebraska-Lincoln*, xii + 168 pps., University of Nebraska Studies, New Series No. 71, 1992.

While physics and astronomy had been taught since the University opened in 1871 the physics department grew rapidly after 1887 when DeWitt Bristol Brace, with a PhD under Kirchhoff and Helmholtz, joined the faculty. His research on ether drift led to worldwide recognition. Brace was a charter member and Vice President

of the American Physical Society when he died suddenly in 1905 at the age of forty-six. Although the department went through a long period of decline in research its teaching staff continued to turn out high quality students including John Tate, Henry Margenau and Joel Stebbins. The book traces the decline, the new beginning in research after World War II and the rapid expansion of the department in the 1960s. An appendix quotes letters from Rutherford, Webster, Nichols, Crew and Magie at the time of Brace's death.

EDISON

Paul B. Israel *How Edison Incorporated 'Prior Knowledge' and 'Theory' into the Work of his Menlo Park Laboratory: The Case of Electric Lighting* paper presented at the British-North American Joint Meeting of the Canadian Society for the History and Philosophy of Science, Toronto, Canada, July 26-28, 1992.

The author examines Edison's program of invention and development in electric lighting through a detailed analysis of laboratory records. He argues that Edison succeeded by blending traditional shop invention with research that drew on scientific knowledge. Edison was familiar with much scientific work on electricity, particularly by such as Faraday and Ohm, who established the basic laws, but his practical experience with electricity was important on both allowing him to apply this knowledge and to develop his own working theories and laws applicable to electric lighting. During his research Edison also drew on basic knowledge contained in dictionaries and handbooks in determining such issues as the most promising materials for lamp filaments, where his research both confirmed existing knowledge and also contributed new knowledge as he experimented with materials under novel conditions.

CHANGING IMPORTANCE OF MACHINE SHOPS

Paul B. Israel *From Machine Shop to Industrial Laboratory: Telegraphy and the Changing Context of American Invention, 1830-1920*, 251 pps., Johns Hopkins University Press, 1992.

The author argues that the machine shop was the central institution of nineteenth-century invention. Focusing on telegraphy, he demonstrates how the electromechanical character of telegraph technology generated its own shop tradition centered in the industry's operating rooms and manufacturing shops. He then exam-

ines those forces that ended the shop tradition. Of particular importance was growing corporate control of the industry by the 1870s, which initially spurred invention, encouraged electrical engineering and led Thomas Edison to establish his Menlo Park laboratory where machine shop merged with an electrical and chemical laboratory. However, company officials seeking greater operating efficiencies also supported engineering and management practices that increasingly divorced invention from the workplace and fostered the decline of the shop tradition. Industrial research laboratories and electrical engineering—drawing on models from academic science—emerged more fully in the new electric lighting and telephone industries.

SIMON NEWCOMB

Albert E. Moyer *A Scientist's Voice in American Culture: Simon Newcomb and the Rhetoric of Scientific Method*, 301, University of California Press, 1992.

In the United States during the nineteenth century mathematical astronomer Simon Newcomb held sway as the nation's most celebrated scientist. He was also the most vocal scientist of his day. Typically he relied on the rhetoric of scientific method to garner popular support for the lagging American scientific enterprise and to proselytize the public on issues in areas as diverse as political economy, religion, philosophy, education and psychical research. The ways in which he marshaled the language of scientific method linked him to the American pragmatic movement and to an even broader, British rhetorical tradition. Thus, Newcomb's life, as delineated in this first book on the eminent astronomer, not only constitutes a story worth telling for its own sake but also reveals the extent to which Newcomb—and in turn the pragmatists—fit into a larger context in the history of modern science.

NOBEL PRIZES

Ellisabeth Crawford *Nationalism and Internationalism in Science, 1880-1939: Four Studies of the Nobel Population*, 160, Cambridge University Press, 1992.

The Nobel population is more than one thousand scientists from twenty-five countries who were candidates and/or nominators for the Nobel prizes in physics and chemistry from 1901 to 1939. They are

used here for prosopographic studies concerning nationalism and internationalism in science at the turn of the century. The book takes issue with the commonly held notion that universalism and internationalism are inherent features of science. On the contrary, it can be shown that scientific activities during the second half of the nineteenth century were part of nation-building both in Europe and North America. Internationalism in science, both theoretical and practical emerged more slowly when economic relations and transportation and communication facilities began to cross national boundaries.

QUANTUM THEORY

Diana Barkan *Walther Nernst and Quantum Theory* in William Woodward and Robert S. Cohen eds., *World Views and Scientific Discipline Formation*, 462, Kluwer Academic Publications, 1991.

In 1911 Walther Nernst, eminent physical chemist at the University of Berlin, convened the first International Solvay Congress in Physics, the first scientific meeting devoted to a survey and analysis of the quantum theory of matter and radiation postulated by Max Planck in 1900. This article discusses Nernst's research interests in physical chemistry, his experimental work, and his involvement in the emerging quantum discourse between the publication of Albert Einstein's paper on the quantum theory of solids in 1907 and the congress of 1911.

CLASSICAL PHYSICS AND QUANTUM THEORY

Olivier Darrigol *From c-numbers to q-numbers: The classical analogy in the history of quantum theory*, 388 pp., University of California Press, 1992.

This historical study of formal analogies between classical and quantum theory analyzes three central examples: Planck's radiation theory, Bohr's correspondence principle, and Dirac's quantum mechanics. The focus on analogies sheds light on the mathematical and symbolic aspects of

the construction of quantum theory. It also reveals various guiding interests and convictions of the principal actors which oriented the analogies. For example, Planck's transposition of Boltzmann's methods was shaped by his belief in a universal principle of elementary chaos; Bohr's correspondence principle depended on a quest for consistency in the definition of basic quantum-theoretical concepts, and Dirac's transposition of classical methods and structures rested on his own conception of the relations between algebra, geometry and physics.

OXFORD BETWEEN THE WARS

Jack Morrell *Research at the Clarendon Laboratory Oxford, 1919-1939*, Historical Studies in the Physical Sciences, 1992, 22: 263-307.

When Frederick Lindemann assumed the chair of experimental philosophy at Oxford in 1919 he found that the Clarendon Laboratory, for which he was responsible, was moribund. Twenty years later it had acquired an international reputation in three fields of research namely, atmospheric physics, high resolution spectroscopy and above all in low-temperature physics. This transformation depended crucially on the arrival in Oxford in 1933 of several physicists, mainly cryogenicists from Breslau and Göttingen. They implanted German laboratory practice in an ancient university renowned for its devotion to *litterae humaniores*. Reprints available from the author: J. B. Morrell, Department of European Studies, University of Bradford, Bradford, BD7 1DP, West Yorkshire, England.

THE GERMAN ATOMIC BOMB PROJECT

Mark Walker *German National Socialism and the Quest for Nuclear Power, 1939-1949*, 296, Cambridge University Press, 1989.

This book uses first and foremost primary material to examine the German efforts to harness the economic and military applications of nuclear fission during the second world war, perhaps one of the most debated and controversial topics in the history of recent science. This study does not end in 1945, rather it continues into the immediate postwar period in order to analyze the origins of postwar myths and apologetics surrounding this subject.

GERMAN URANIUM PROJECT

Mark Walker *Legends surrounding the German Atomic Bomb*, in Mark Walker and Teresa Meade eds., *Science, Medicine and Cultural Imperialism*, St. Martins Press, 1991, 178-204.

This article contains a brief survey of the German "Uranium Project" during the second world war and an analysis of the postwar controversy surrounding the "myth of the German atomic bomb" and its two parts: the "apologetic thesis" that German scientists deliberately slowed down or diverted their research in order to deny atomic bombs to Hitler, and, the "polemic thesis" that only scientific incompetence stopped German scientists from providing nuclear weapons to the National Socialists.

THE MANHATTAN PROJECT

Stanley Goldberg *Still so Secret after all these Years: Tales from the Manhattan Project*, Paper delivered at the XVIIth Pacific Science Congress, Honolulu, May 1991.

The amount of Manhattan Project material still security classified is very small but it is concentrated in a few topics. This classified material is unlikely to change the main historical thread of the Manhattan Project, yet it is likely to reveal a significantly broader range of activities than has thus far been chronicled. The reasons for the continued suppression of most of this material can no longer be justified on the grounds of national security. Fifty years after the events it is time to liberate the Manhattan Project from the declassification industry.

WORLD WAR II ASTRONOMY

Peggy A. Kidwell *Harvard Astronomers and World War II: Disruption and Opportunity*, in Clark Elliott and Margaret Rossiter eds., *Science at Harvard University: Historical Perspectives*, Lehigh University Press, 285-302

World War II transformed the Harvard College Observatory. Some staff, like Theodore Sterne entered the armed forces. Others, like Bart J. Bok, James G.

Baker and Walter Orr Roberts worked as civilians on military-sponsored programs. Still others, like Cecilia Payne-Gaposchkin, attempted to continue astronomical research. All experienced both disruptions and opportunities for new responsibilities. The changes of the war years would have enduring influence on both power relations and astronomy at the observatory.

THE COLD WAR

Jessica Wang *Science, Security and the Cold War: The Case of E. U. Condon*, *Isis*, 1992, 83: 238-269.

In March 1948 the House Un-American Committee (HUAC) accused Edward U. Condon, the well-known theoretical physicist and director of the National Bureau of Standards, of being "one of the weakest links in our atomic security." HUAC's attack was embedded in postwar partisan politics, but it also reflected a more fundamental conflict between an ideology espoused by many scientists, of intellectual freedom and international cooperation in science, and the postwar preoccupation with national security and protection of supposed atomic secrets.

RELATIVISTIC THERMODYNAMICS

Chuang Liu *Einstein and Relativistic Thermodynamics in 1952: an Historical and Critical Study of a strange Episode in the History of Modern Physics*, *British Journal for the History of Science*, 1992, 25: 185-206.

This paper is a detailed study of a set of Einstein-von Laue correspondence between 1952 and 1955 about Einstein's objection, and proposal of an alternative, to the original formulation of relativistic thermodynamics (RTD) established by Planck, Einstein and von Laue between 1907 and 1910. There was no indication that Einstein's ideas concerning the subject were known to any of the participants of the heated debate on RTD in the 1960s and 1970s, even though they anticipated just about every major position in that debate. Einstein's

elliptical derivation of the alternative is reconstructed and the correspondence is put into the wider context of the RTD debate.

NEUTRINO ASTRONOMY

Arthur Roberts *The Birth of High-Energy Neutrino Astronomy: A Personal History of the DUMAND Project*, *Reviews of Modern Physics*, 1992, 64: 259-312.

This is a detailed history of the long period of gestation (1974-1993) of the field of high-energy neutrino astronomy. The first high-energy neutrino telescope DUMAND is about to be installed in the Pacific ocean, and already several others are in construction or partially installed. High-energy neutrino astronomy is the only branch of astronomy in which the entire universe (with the exception of stellar interiors) is transparent and visible.

TRANSNATIONAL SCIENCE

Elisabeth Crawford, Terry Shinn and Sverker Sörlin eds. *Denationalizing Science: The Contexts of International Scientific Practice*, *Sociology of the Sciences Yearbook*, 1992. Kluwer Academic Publishers, 1993.

Present trends indicate that in the years to come transnational science, whether basic or applied, and involving persons, equipment and funding will grow considerably. The main purpose of this volume is to try to understand the reasons for the denationalization of science, its historical contexts and its social forms. The Introduction to the volume sets out the socio-political, intellectual and economic contexts for the nationalization and denationalization of the sciences. The articles examine the specific conditions that have given rise to the cognitive and technical standardization of scientific knowledge products, pressure towards cost sharing of large installations like CERN, the voluntary and involuntary migration of scientists and the global market for research and development products that has emerged at the end of the century.

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