

terial provides the basis for the discipline's history. Both must be preserved. Jeremy Sabloff puts it right in his essay: "Historical analyses of the arguments are important; they provide a context for the arguments and indicate what arguments have had positive, negative or neutral effects in the past." The "contexts for the arguments" in historical analyses are typically multiple and fluid; they are best rendered apart from an a priori bias about what constituted that context.

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Scandinavian Contributions

Science in Sweden. The Royal Swedish Academy of Sciences, 1739–1989. TÖRE FRÄNGSMYR, Ed. Science History Publications (Watson), Canton, MA, 1989. viii, 291 pp., illus. \$45.

Two persons stand out in the chronicles of the Royal Swedish Academy of Sciences, the naturalist Carl Linnaeus and the chemist Jöns Jacob Berzelius. As the first president Linnaeus dominated the Academy during its great early period in the middle of the 18th century. Berzelius became permanent secretary in 1818 and reorganized the then slumbering organization into a new great period in which he played the central role. These two men had a pervasive and lasting influence on the development of Swedish science and were its foremost contributors internationally. I believe this much can be said without offending anyone in the long line of illustrious Swedish natural scientists.

First place no doubt goes to Linnaeus. Reading this collection marking the 250th anniversary of the Academy I am struck by the central role that natural history has played in the Swedish scientific tradition, first in the form of classification and description by Linnaeus and his numerous pupils, later through studies of geology, geophysics, oceanography, and ecology. This latter tradition in Sweden and other Scandinavian countries reached a high point in the late 19th and early 20th century and is just beginning to attract the attention of historians of science. It has been broadly described in Gunnar Eriksson's 1978 book *Kartlegarna* (the title refers to makers of maps and inventories) and is portrayed in several papers in this volume.

In his paper on the Swedish Museum of Natural History Gunnar Broberg emphasizes the continuity from Linnaeus. As he notes, "the eighteenth-century focus on taxonomy and the world inventory became, if anything stronger in the following century"

(p. 150). The first natural history exhibition opened to the general public in 1794 and the activity expanded through the 19th century, culminating in the opening of the great new palace of the Swedish Museum of Natural History in 1916. By then research had taken prominence over public exhibitions.

The leading role played by the Academy, and not least the staff of the Museum, in the conservationist movement is described in Bosse Sundin's paper, "Environmental protection and national parks." Modern Swedish ecological science has played a pioneering international role in drawing attention to environmental problems, for instance acid rain. The basis for the Academy's activity in this field was laid by the protection-of-nature law passed in 1909. A new breakthrough came in the 1960s with the establishment of a number of agencies for the protection of the environment (p. 221).

Another important strand in the broad concern with the natural world is taken up by Tore Frängsmyr in his account of Swedish polar exploration. The theory of the ice age (or ages) was a central theme in 19th-century Swedish geology. At first the idea that Scandinavia should have been covered by an immense ice shield appeared too fantastic to be true, but by the second half of the century there was sufficient evidence to make it a well-established theory. Obtaining material to test and develop this theory was one motive for Swedes to travel into the Arctic. But there were also other motives, as when A. E. Nordenskiöld made the first northeastern passage to the Orient on the ship *Vega*. This Swedish tradition of polar exploration was later continued by Norwegians like Fridtjof Nansen, Roald Amundsen, and H. U. Sverdrup.

As indicated above, Scandinavian scientists made a considerable international contribution to the study of the natural world in the last part of the 19th and the early part of the 20th century. And Stockholm was the main center for this research. Besides the Museum of Natural History there was also the new University of Stockholm (Stockholms Högskola). Here worked, for instance, the oceanographer Otto Pettersson and the physical chemist Svante Arrhenius, and for some years the geologist W. C. Brögger (Norwegian), the ecologist Eugenius Warming (Danish), and the meteorologist Vilhelm Bjerknes (Norwegian).

Practical economic interests were important for the Academy from its start. The investigations of Linnaeus and his pupils, for instance, had an agricultural aspect. The first Swedish professor of economics, Anders Berch, attached highest priority to knowledge relevant to manufacturing. Linnaeus, by contrast, insisted on knowledge

useful to agriculture. And it was the latter that in fact occupied most of the early publications of the Academy. When Linnaeus succeeded in funding a second chair in "practical" economics in 1759 it was occupied by one of his own pupils. As the utilitarian spirit faded in the late 18th century, Berch's chair was taken over by jurists and the chairs in practical economics increasingly became positions in pure botany. But this does not mean that the practical link of natural history disappeared. It was rather a reflection of specialization, as witnessed by the establishment of a Royal Academy of Agriculture in 1812. The links between natural history and practical economy were to some extent reasserted in the late 19th century as science was applied to new endeavors, such as plant and animal breeding, geological surveying, and fisheries research.

Attention to such connections in Swedish science may also help bring out more clearly the difference between the broad utilitarian perspective of the 18th and 19th centuries and the narrow modern rationality of aims and means. The book that Frängsmyr and his coauthors have produced not only contains a set of readable sketches presenting central aspects of Swedish natural science during the last 250 years, it suggests interesting perspectives to the general reader and worthwhile research problems to the historical scholar.

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Association Life

Renewing a Scientific Society. The American Association for the Advancement of Science from World War II to 1970. DAEL WOLFE. American Association for the Advancement of Science, Washington, DC, 1989. x, 337 pp. Paper, \$24.95; to AAAS members, \$19.95.

In the *New York Herald Tribune* of 29 December 1952 the American Association for the Advancement of Science was reported to be reorganizing in the face of "intellectual bankruptcy." The report resulted from a joint interview with Edward U. Condon (a physicist), who was about to succeed to the presidency, and Warren Weaver (a mathematician), who had just become president-elect. The conclusions of this distinguished pair were that the annual meetings were "outmoded," that AAAS programs had grown "thinner," and that it was time to "revitalize the association." AAAS was obviously at a low point in its history.

Dael Wolfe was fully aware of such difficulties when he considered becoming AAAS's full-time executive officer. As executive secretary of the American Psychological Association from 1946 to 1950 Wolfe had, in 1946, moved the APA office into a newly owned AAAS headquarters building. He was thereby able conveniently to participate in AAAS activities; and in 1947 he served as secretary-treasurer of an Inter-Society Committee for a National Science Foundation in which AAAS played an important role. In spite of the obvious problems, Wolfe was equally aware of the considerable potential of this national organization with its important history of activity on behalf of U.S. science dating back to 1848. Therefore he accepted the challenge and joined the staff in 1954, when he was 48 years old.

In *Renewing a Scientific Society* Wolfe explains in a historical accounting how he and the many subsequent members of AAAS councils "renewed" the association and made it the key contributor to the nation it had become by the time he retired in 1970. Wolfe began this accounting in earnest in about 1984, after a 14-year interlude of teaching at the University of Washington. When he finally decided to undertake the task, he was mailed photocopies of 8000 pages of records from AAAS headquarters. Those pages were the source material that permitted him to complete in five years what can be assumed to be a highly accurate history.

This history is also surprisingly readable. Wolfe has made it so in two ways. First, he has developed vignettes from the archives that covered AAAS's role in "science's golden quarter century from 1945 to 1970." Second, he has subdivided AAAS's history according to themes and treats each mostly chronologically in chapters headed "1945: A setting for growth"; "Government relations"; "Annual meeting"; "*Science* and *The Scientific Monthly*"; "A new home for the association"; "The advancement of science"; "Changes in governance"; "Science education"; "Public understanding of science"; "International activities"; "Science in society"; and "1970: Looking back and looking forward."

Through these means Wolfe has made interesting reading of key activities in the life of AAAS. I say "life," because Wolfe treats the AAAS as a living instrument that responded to its environment, leadership, and staff. At times it responded with great volatility, as in the case of the staffing problems that arose just before Wolfe was hired; at other times it responded with great equanimity that produced successes, as in the case of *Science* under the superb editorship of Philip H. Abelson from 1962 to 1984.

Most scientists have observed AAAS only through its public programs, such as government-relations committees, the annual meetings, and *Science*. They are often unaware of AAAS's private life involving people with human assets and failings. In his book Wolfe reveals private stories as well as the public ones. In doing so, he explains the inner workings of a society that was probably typical of many other societies of the time.

In order to illustrate the real-life drama contained in Wolfe's stories as seen from the inside, I have selected for comment an episode that has special meaning to me, one that gives the background and outcome of the Condon-Weaver interview. I knew Condon firsthand as a physicist and an administrator. He was a brilliant physicist who directed the National Bureau of Standards, from 1945 to 1951 and who unfortunately gained national notoriety in 1948 as "the weakest link in our atomic security chain," according to the witch-hunting U.S. House of Representatives Committee on Un-American Activities. I also knew him to be a prolific writer, who had developed his writing skills as a part-time newspaper reporter during his college days.

Condon hired me in 1949, when I was 29 years old, to establish a high-energy electron and x-ray research group at NBS, and it was he who, 17 years later while I was still at NBS and when he was a member of the governing board of the American Institute of Physics, gave a speech seconding my nomination for the post of executive director of AIP, which I held from 1966 to 1987. So it was natural for me to read with special interest Wolfe's description of the "unfortunate" and "rancorous" exchange of letters in 1953 between Howard A. Meyerhoff, Wolfe's predecessor, and Condon as AAAS president, having to do with the editing of *Science* and other matters. "Between January 1 and February 10, 1953, there were six letters from Condon to Meyerhoff and 14 from Meyerhoff to Condon." In response to one long letter from Condon, Meyerhoff wrote, according to Wolfe, "When anybody says to me 'You will under no circumstances . . .,' my instantaneous rejoinder is 'Go to Hell.'" Needless to say, Meyerhoff's services as AAAS's administrative secretary "were terminated." Knowing Condon and reading Wolfe's account, I can easily visualize the frenzy and the determination of the two letter writers and sympathize with both.

Another chapter Wolfe makes alive with real people that is directly relevant to my experience at AIP is the one detailing changes in the governance of AAAS. Societies such as AAAS and AIP have as members

of their governing bodies brilliant scientists who have strong opinions on how the political, scientific, and administrative issues facing the society should be addressed. And the problem for the leadership and staff is how to channel the brilliance into productive results. Often trial and error are required. For example, during Wolfe's early years as executive officer, AAAS changed the council's executive committee into a board of directors. And further, in Wolfe's words:

In six years the statutory relationships had shifted 180 degrees, from having the board of directors be advisory to the council to having the council be advisory to the board of directors. That change, however, was more one of wording than of fact, for it did not alter what the two bodies were doing. The council continued to elect officers and members of the board, made decisions about sections and affiliates, and performed its other traditional duties. The board continued to be responsible for funds, meetings, publications and other operations.

Semantic or not, this change in governance resulted in a desirable degree of insulation of AAAS operations from what must by 1970 have become an often free-wheeling and uncontrollable council, numbering 500 members. By clearly identifying a smaller group of 13 members as a board of directors, AAAS was able to focus the fiduciary responsibility for its operations. Also, by providing for a continually changing board membership by means of staggered four-year terms, the AAAS was able, I am certain, to minimize negative influences of some board members and their affiliated societies or groups. Such a board would also tend to be supportive of rather than adversarial to the efforts of the executive officer and his staff in accomplishing the chartered mission and goals of AAAS. I believe the AAAS experiences are relevant to and should be considered by many other societies that have large governing councils and smaller executive committees.

AAAS had come a long way in 1970 from the Condon-Weaver days just after World War II. All officers of scientific societies owe Wolfe thanks for recording the events that took place in the intervening time in such understandable and useful detail. There are still some unanswered questions, however: for example, what were the staff sizes and budgets of AAAS at different times in its development, and why has AAAS continued to avoid in-house handling of advertising and composition for *Science* and its other publications? But enough have been answered to my satisfaction that I recommend the book to all society officers who want to know what things have been tried by a society such as AAAS and what makes society council members behave the way they sometimes do. I also recommend the book

to other specialists, such as historians of science, and even to the generalists looking for a readable book about scientific societies.

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Books Received

Biotechnology. Vol. 7B, Gene Technology. G. K. Jacobson and S. O. Jolly, Eds. VCH, New York, 1989. xvi, 587 pp., illus. \$298.

Bites and Stings. The World of Venomous Animals. John Nichol. Facts on File, New York, 1989. 208 pp., illus. \$19.95.

Combinatorial Mathematics. Gary S. Bloom, Ronald L. Graham, and Joseph Malkevitch, Eds. New York Academy of Sciences, New York, 1989. x, 436 pp., illus. \$109. Annals of the New York Academy of Sciences, vol. 555. From a conference, New York, June 1985.

Computation for the Analysis of Designed Experiments. Richard M. Heiberger. Wiley, New York, 1989. xviii, 683 pp., illus., + diskette in pocket. \$59.95. Wiley Series in Probability and Mathematical Statistics.

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The Fifth Essence. The Search for Dark Matter in the Universe. Lawrence M. Krauss. Basic Books, New York, 1989. xviii, 342 pp., illus. \$21.95.

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Food Price Policy in Asia. A Comparative Study. Terry Sicular, Ed. Cornell University Press, Ithaca, NY, 1989. xii, 307 pp., illus. \$49.95; paper, \$16.95.

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An Introduction to Noncommutative Noetherian Rings. K. R. Goodearl and R. B. Warfield, Jr. Cambridge University Press, New York, 1989. xviii, 303 pp. \$49.50; paper, \$19.95. London Mathematical Society Student Texts, vol. 16.

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Millimetre and Submillimetre Wavelength Lasers. A Handbook of cw Measurements. Nigel G. Douglas. Springer-Verlag, New York, 1989. x, 278 pp., illus. \$64.50. Springer Series in Optical Sciences, vol. 61.

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The Roots of Prosocial Development in Children. Nancy Eisenberg and Paul H. Mussen. Cambridge University Press, New York, 1989. viii, 195 pp. \$32.50; paper, \$9.95. Cambridge Studies in Social and Emotional Development.

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