SCIENCE

Published by the **American Association for the Advancement of Science (AAAS),** *Science* serves its readers as a forum for the presentation and discussion of important issues related to the advancement of science, including the presentation of minority or conflicting points of view, rather than by publishing only material on which a consensus has been reached. Accordingly, all articles published in *Science*—including editorials, news and comment, and book reviews—are signed and reflect the individual views of the authors and not official points of view adopted by the AAAS or the institutions with which the authors are affiliated.

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objectives are to further the work of scientists, to facilitate cooperation among them, to foster scientific freedom and responsibility, to improve the effectiveness of science in the promotion of human welfare, to advance education in science, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.

Membership/Circulation
Director: Michael Spinella
Deputy Director: Marlene Zendell
Member Services: Rebecca Dickerson, *Manager*; Mary Curry, *Supervisor*; Pat Butler, Helen Williams, Laurie Baker, *Representatives*
Marketing: Dee Valencia, *Manager*; Jane Pennington, *Europe Manager*; Hilary Baar, *Associate*; Angela Mumeka, *Coordinator*
Research: Renuka Chander, *Manager*
Business and Finance: Jacquelyn Roberts, *Manager*; Robert Smariga, *Assistant Manager*
Administrative Assistant: Nina Araujo de Kobes
***Science* Member Services**
Marion, Ohio: 800-347-6969;
Washington, DC: 202-326-6417
Other AAAS Programs: 202-326-6400

Advertising and Finance
Associate Publisher: Beth Rosner
Advertising Sales Manager: Susan A. Meredith
Recruitment Advertising Manager: Janis Crowley
Advertising Business Manager: Deborah Rivera-Wienhold
Finance: Randy Yi, *Senior Analyst;* Shawn Williams, *Analyst*
Marketing: John Meyers, *Manager;* Allison Pritchard, *Associate*
Traffic Manager: Tina Turano
Recruitment: Terri Seiter, *Assistant Manager*; Debbie Cummings, Celeste Wakefield, Rachael Wilson, *Sales*
Reprints Manager: Corrine Harris
Permissions Manager: Arlene Ennis
Sales Associate: Carol Maddox

PRODUCT ADVERTISING SALES: East Coast/E. Canada: Richard Teeling, 201-904-9774, FAX 201-904-9701 • **Southeast:** Mark Anderson, 305-856-8567, FAX 305-856-1056 • **Midwest:** Elizabeth Mosko, 312-665-1150, FAX 312-665-2129 • **West Coast/W. Canada:** Neil Boylan, 415-673-9265, FAX 415-673-9267 • **UK, Scandinavia, France, Italy, Belgium, Netherlands:** Andrew Davies, (44) 457-838-519, FAX (44) 457-838-898 • **Germany/Switzerland/Austria:** Tracey Peers, (44) 270-760-108, FAX (44) 270-759-597 • **Japan:** Mashy Yoshikawa, (3) 3235-5961, FAX (3) 3235-5852
RECRUITMENT ADVERTISING SALES: US: 202-326-6555, FAX 202-682-0816 • **Europe:** Gordon Clark, (44) 0223-302067, FAX (44) 0223-302068 • **Australia/New Zealand:** Keith Sandell, (61) 02-922-2977, FAX (61) 02-922-1100
Send materials to *Science* Advertising, 1333 H Street, NW, Washington, DC 20005.

Information for Contributors appears on pages 37–39 of the 7 January 1994 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005.
Internet addresses: science_editors@aaas.org (for general editorial queries); science_letters@aaas.org (for letters to the editor); science_reviews@aaas.org (for returning manuscript reviews); membership@aaas.org (for member services); science_classifieds@aaas.org (for submitting classified advertisements)

LETTERS

Smithsonian Science Exhibit

I read with great interest Eliot Marshall's article "Changing of the castle guard" (News & Comment, 5 Aug., p. 728). But, for personal reasons, I was most interested in Faye Flam's sidebar dealing with the exhibit at the Museum of American History for which I was chief curator, "Science in American Life." The piece requires correction and clarification.

The choice of informants for the article fosters an impression that the exhibit depicts science in overwhelmingly negative terms—an impression that clashes with the actual presentation. In addition to the examples noted, the article might well have mentioned the exhibit's address to the scientific research underlying pure food and drug laws, to penicillin, to the discovery of nylon, to the application of particle accelerators to the quest for a cure for cancer, and to a resounding success in gene therapy. It is true that the exhibit also deals with subjects such as the Bomb, the ozone hole, and pesticides. How could an exhibit on science in American life—an exhibit in a museum devoted to the understanding of American history—ignore matters of such importance? What the exhibit is about in its broadest terms is an extraordinarily complex and evolving interrelationship between science and society. Had our presentation of this relationship slighted these complexities, the exhibit, and the National Museum of American History, would have been derelict in their obligations to the public.

By incorporating a quotation about the exhibit not being "what the Smithsonian wanted," the article implies that truth was somehow compromised. In fact, the final narrative was the product of an open and vigorous debate. The article trivializes this debate by lending credence to a simplistic polarity between an old Du Pont advertising slogan about better living through chemistry and a desire to depict science as "pollution and death." This is ludicrous. After a thoroughgoing consideration of the diverse perspectives of many others, including the members of the advisory committee, the exhibit's script reflected my best judgment as to an objective and balanced presentation.

Who would deny that science in its social context is fraught with complex, subtle, and highly debatable issues? Certainly, members of the American scientific community do not. Nor did the scientists, sociologists, historians, and educators on our exhibit's advisory committee. Yet, one would never get a glimmer of this from the article. The committee—which, contrary to the article, was *jointly* appointed by the Smithsonian and the American Chemical Society—represented a wide range of opinions. Had the views of Glenn Seaborg been cited (just to name one member who went unmentioned), the article would have been more balanced.

Arthur Molella
Chief Curator, "Science in American Life," National Museum of American History, Washington, DC 20560, USA

I was surprised to read in Flam's account of the Smithsonian's new exhibit on Science in American Life about "a 5-year battle between an advisory committee appointed by the ACS [American Chemical Society] and curators at the Smithsonian's Museum of American History." As a member of the advisory committee since its inception, I attended all of the meetings except one, and like other members was asked by the Smithsonian's staff to review exhibit content and to provide ideas and information as the project evolved.

I was appointed to the committee by the Smithsonian, not the ACS. The committee represented a variety of interests and professional expertise, and there were frequent differences among its members about the relative importance of specific developments in the history of science in the context of American society. Perhaps some members felt that they were in a "battle" with the curators, but my experience was that our job was to assist and advise these scholars. As a historian of science I feel that the exhibit builds on a solid foundation of historical scholarship and provides a well-balanced and honest view of science in American life. It neither attacks nor celebrates science and scientists, but provides museum visitors with an exciting and informative account of science as a human and social enterprise reflecting the society in which it is nurtured and having important social, economic, and political consequences. Isn't that what "scientific literacy" should be about?

Charles Weiner
Program in Science, Technology, and Society, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

The controversy over the Science in American Life exhibit at the Smithsonian Institution, funded by the American Chemical Society, reflects conflicting approaches to understanding and explaining the history of science. Until very recently, scientists virtually owned the history of science. The History of Science Society was founded by practitioner-historians (that is, working scientists who also wrote the history of science). Practitioner-historians shared the values of their scientific colleagues. In their hands, the history of science glorified the activities of great scientists (mostly male) and the inevitable progress of scientific knowledge, as well as technological control over the natural world. However, as more and more Ph.D.-trained historians of science entered the field, conflict became inevitable. Historians of science and practitioner-historians frequently have very different approaches to the subject. Take one critical example. As part of graduate education, historians of science are trained to recognize and appreciate a variety of historiographical perspectives. Historiographical diversity includes a range of methods, theoretical concerns, and interpretative frameworks. There is no single canonical interpretation of the past. The subject is too vast; the cast of characters too great.

The task of the historian is not to discover ultimate truth, but rather to construct a carefully researched, coherent, and convincing explanation of selected aspects of human behavior. In short, historians write (and organize museum exhibits) from a clearly defined historiographical perspective. They explain and interpret the development of science as a social, political, economic, and intellectual process in a carefully defined context. They do not feel compelled to justify the ways of scientists to the rest of humanity.

Neither scientists nor their professional organizations can be allowed to practice censorship over the activities of historians of science. If the American Chemical Society wanted a "better living through chemistry" celebratory exhibit, they should have hired a hall. However, practitioner-historians and their patrons should put aside claims of special privilege and enter the market place of ideas, where explanations and interpretations openly compete for approval and support.

John Lankford
Office of the Provost, and
Department of History,
Kansas State University,
Manhattan, KS 66506–0113, USA

■

Beta-Carotene and the Prevention of Cancer

In her 22 April News & Comment article (p. 500), Rachel Nowak comments on the Finnish study (*1*) on the effects of supplements of beta-carotene on the incidence of lung cancer among heavy smokers in Finland. Beta-carotene appeared to markedly increase the incidence of the cancer, and she notes that "the Finnish study has triggered calls for a moratorium on health claims about antioxidant vitamins." Moreover, a similar conclusion has been widely published in the general press, one that has probably confused many readers who had been told by scientists for several years that beta-carotene is among the best candidates for the prevention of cancer.

However, the dosage schedule of the supplementation of beta-carotene and the additive used in the Finnish study (*1*) might have been far from optimal. First, Finnish volunteers received a daily supplement for several years, which resulted in an increase in the concentration of beta-carotene in their serum, from a median value of 0.18 milligram per liter to 3.0 milligrams per liter (*1*). It is well known that beta-carotene is converted to vitamin A (retinol) in the body. Even very high doses of beta-carotene supplementation do not result in a significant increase in the concentration of retinoids in the serum under normal conditions. Moreover, it has been suggested, on the basis of experimental and clinical studies, that retinol is an anticarcinogen (*2*). This suggestion has led to the study of vitamin A in lung cancer chemoprevention (*2*). But there is also some evidence that dietary vitamin A can increase the risk of cancer at some sites (*3*). Thus the supplementation of beta-carotene could result in a significant increase in the concentration of retinoids in the serum of heavy smokers, because smoking can result in a disturbance of the metabolism of beta-carotene and retinoids. Furthermore, it is known that, at high concentrations, retinoids can promote, rather than prevent, the development of lung cancer in experimental animals (*4*). Thus, a question arises concerning the concentration of vitamin A in the serum of the studied people before and after supplementation.

Second, some exogenous antioxidants could convert into pro-oxidants, and to avoid such conversion, it is necessary to stabilize them. Beta-carotene stabilized in different mixtures of nontoxic antioxidants (*5*) has been found to decrease the frequency of cancer in hamsters and rats. In addition, the stabilized form of beta-carotene