

## American Association for the Advancement of Science

*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.

**Publisher:** Alvin W. Trivelpiece

**Editor:** Daniel E. Koshland, Jr.

**Deputy Editors:** Philip H. Abelson (*Engineering and Applied Sciences*); John I. Brauman (*Physical Sciences*)

## EDITORIAL STAFF

**Managing Editor:** Patricia A. Morgan

**Assistant Managing Editor:** Nancy J. Hartnagel

**Senior Editors:** Eleanor Butz, Ruth Kulstad

**Associate Editors:** Martha Collins, Barbara Jasny, Katrina L. Kelner, Edith Meyers, Phillip D. Szuroni, Kim D. Vandegriff, David F. Voss

**Letters Editor:** Christine Gilbert

**Book Reviews:** Katherine Livingston, *editor*; Deborah F. Washburn

**This Week in Science:** Ruth Levy Guyer

**Contributing Editor:** Lawrence I. Grossman

**Chief Production Editor:** Ellen E. Murphy

**Editing Department:** Lois Schmitt, *head*; Michele A. Cleary, Mary McDaniel, Barbara E. Patterson

**Copy Desk:** Beverly Shields, Anna Victoreen

**Production Manager:** Karen Schools

**Assistant Production Manager:** James Landry

**Graphics and Production:** Holly Bishop, James J. Olivari, Eleanor Warner

**Covers Editor:** Grayce Finger

**Manuscript Systems Analyst:** William Carter

## NEWS STAFF

**News Editor:** Barbara J. Culliton

**News and Comment:** Colin Norman, *deputy editor*; William Booth, Mark H. Crawford, Constance Holden, Eliot Marshall, Marjorie Sun, John Walsh

**Research News:** Roger Lewin, *deputy editor*; Deborah M. Barnes, Richard A. Kerr, Jean L. Marx, Leslie Roberts, M. Mitchell Waldrop

**European Correspondent:** David Dickson

## BUSINESS STAFF

**Associate Publisher:** William M. Miller, III

**Business Staff Manager:** Deborah Rivera-Wienhold

**Classified Advertising Supervisor:** Karen Morgenstern

**Membership Recruitment:** Gwendolyn Huddle

**Member and Subscription Records:** Ann Ragland

**Guide to Biotechnology Products and Instruments:** Shauna S. Roberts

## ADVERTISING REPRESENTATIVES

**Director:** Earl J. Scherago

**Traffic Manager:** Donna Rivera

**Traffic Manager (Recruitment):** Gwen Canter

**Advertising Sales Manager:** Richard L. Charles

**Marketing Manager:** Herbert L. Burklund

**Sales:** New York, NY 10036: J. Kevin Henebry, 1515 Broadway (212-730-1050); Scotch Plains, NJ 07076: C. Richard Callis, 12 Unami Lane (201-889-4873); Chicago, IL 60611: Jack Ryan, Room 2107, 919 N. Michigan Ave. (312-337-4973); San Jose, CA 95112: Bob Brindley, 310 S. 16 St. (408-998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer, 24808 Shrubbery Hill Ct. (301-972-9270); U.K., Europe: Nick Jones, +44(0)64752918; Telex 42513; FAX (0392) 31645.

**Information for contributors** appears on page XI of the 25 September 1987 issue. Editorial correspondence, including requests for permission to reprint and reprint orders, should be sent to 1333 H Street, NW, Washington, DC 20005. Telephone: 202-326-6500.

Advertising correspondence should be sent to Tenth Floor, 1515 Broadway, NY 10036. Telephone 212-730-1050 or WU Telex 968082 SCHERAGO.

## Brittle Books and Journals

One of the stimuli for scholarly publication is the belief by scientists and other authors that their work will add enduring values to the human heritage. But, as librarians have known for decades, most books and journals are perishable. Efforts to minimize degradation and its consequences will require the cooperation of scientists and engineers with librarians, archivists, and others.

The extent of the problem is typified by an inventory of the 13.5 million volumes at the Library of Congress. Of these, 3 million are too brittle to handle, and each year about 70,000 more volumes are added to this group. Science and technology represent 25 percent of the class collections of the Library of Congress.

The major source of the degradation is a defect in the manufacture of most paper. To prevent running of the printing ink on the paper, a sizing or filler is used that has an acid reaction. The sizing is a combination of alum and resin that results in a pH of about 4.8. Paper contains adsorbed water to the extent of 4 to 6 percent of the weight of the cellulose. The hydrogen ions catalyze hydrolysis of the cellulose, destroying its strength and suppleness. When the pH is 7 or slightly above, paper can remain strong and supple for many hundreds of years. Satisfactory paper need not be acid. A sizing containing magnesium or calcium carbonate maintains the pH at a safe level. Cost of such paper is about the same as the acid type. Problems of future degradation would be lessened if editors and publishers insisted on the use of acid-free paper.

It seems likely that practical processes will be capable of halting degradation of existing acidic books. One process, which has been tested in a pilot plant, involves neutralization of the acid and incorporation of an alkaline reserve into the pages of the books and journals. In a full-scale plant, now under construction, 7500 to 9000 volumes will be loaded into a tank capable of sustaining a high vacuum. When the vacuum is established, most of the water in the books (on the order of 50 gallons or more) will be pumped out, reducing the content in the books to 1 percent or less. A volatile compound, diethyl zinc, will then be introduced. It will diffuse into the volumes, neutralize any acid present, and react with moisture to form zinc oxide, which is mildly alkaline. Subsequently, excess diethyl zinc will be removed, and the books rehydrated. The total process will be complete in 3 to 5 days, with a cost per volume estimated at about \$3. The process leaves no odor or toxic substances and does not affect the ink or the binding. However, the process must be conducted carefully; diethyl zinc bursts into flame when exposed to air.

The big problem for libraries is what to do about the books that have become brittle. The pages of the volumes can be photographed, resulting in master copies of microfilm or microfiche. However, costs per volume range up to \$100. For the collection at the Library of Congress, the expenditures needed to save 3 million volumes have been estimated at \$258 million. The Library of Congress has our greatest collection, but other institutions have many items not catalogued there. To avoid unnecessary costs and duplication, it will be desirable to have a nationwide accessible bibliographic data file. In addition, in science and technology, some books and journals are far more valuable than others. Priorities need to be established. A useful model is that used at the National Library of Medicine, where committees of physicians, scientists, and librarians have selected the most important literature for inclusion in the library's bibliographic system. In consequence, the biomedical literature is well provided for. The National Agricultural Library will probably serve the needs of agriculture. However, much of the remainder of science and technology is not specifically covered. The Library of Congress will need cooperation in its selection of scientific and technical literature. Another focal point for preservation activities is a newly created Commission on Preservation and Access formed under the sponsorship of the Council on Library Resources located in Washington, DC.

Ultimately, much of the scientific literature will be available in machine-readable and searchable form. But that is some time away, and most scientists will wish to retain the convenience of hard copies of journals.—PHILIP H. ABELSON