

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: Richard S. Nicholson

Editor: Daniel E. Koshland, Jr

Deputy Editor: Ellis Rubinstein

Managing Editor: Monica M. Bradford

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

EDITORIAL STAFF

Senior Editors: Eleanor Butz, Martha Coleman, Barbara Jasny, Katrina L. Kellner, Phillip D. Szuroni, David F. Voss
Associate Editors: R. Brooks Hanson, Pamela J. Hines, Kelly LaMarco, Linda J. Miller, L. Bryan Ray

Letters: Christine Gilbert, *editor*; Steven S. Lapham

Book Reviews: Katherine Livingston, *editor*; Teresa Fryberger

Contributing Editor: Lawrence I. Grossman

Chief Production Editor: Ellen E. Murphy

Editing Department: Lois Schmitt, *head*; Julianne Hunt, Patricia L. Moe

Copy Desk: Joi S. Granger, Margaret E. Gray, MaryBeth Shartle, Beverly Shields

Production Director: James Landry

Production Manager: Kathleen C. Fishback

Art Director: Yolanda M. Rook

Assistant Art Director: Julie Cherry

Graphics and Production: Holly Bishop, Catherine S. Siskos

Systems Analyst: William Carter

NEWS STAFF

Managing News Editor: Colin Norman

Correspondent-at-Large: Barbara J. Culliton

Deputy News Editors: John M. Benditt, Jean Marx
News and Comment/Research News: Ann Gibbons, David P. Hamilton, Constance Holden, Richard A. Kerr, Eliot Marshall, Joseph Palca, Robert Pool, Leslie Roberts, M. Mitchell Waldrop

European Correspondent: Jeremy Cherfas

West Coast Correspondent: Marcia Barinaga

Contributing Correspondents: Barry A. Cipra, Robert Crease, Karen Wright

BUSINESS STAFF

Marketing Director: Beth Rosner

Circulation Director: Michael Spinella

Fulfillment Manager: Marlene Zendell

Business Staff Manager: Deborah Rivera-Wienhold

Classified Advertising Supervisor: Amie Charlene King

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

Employment Sales Manager: Edward C. Keller

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); Hoffman Estates, IL 60195: Jack Ryan, 525 W. Higgins Rd. (708-885-8675); San Jose, CA 95112: Bob Brindley, 310 S. 16th St. (408-998-4690); Dorset, VT 05251: Fred W. Dieffenbach, Kent Hill Rd. (802-867-5581); Damascus, MD 20872: Rick Sommer, 11318 Kings Valley Dr. (301-972-9270); U.K., Europe: Nick Jones, +44(0647)52918; Telex 42513; FAX (0647) 52053.

Information for contributors appears on pages 35–37 of the 4 January 1991 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, New York, NY 10036. Telephone 212-730-1050 or WU Telex 968082 SCHERAGO, or FAX 212-382-3725. **Subscription/Member Benefits Questions:** 202-326-6417. **Science:** 202-326-6500. **Other AAAS Programs:** 202-326-6400.

Teaching and Research

Recent stories in the media suggest that teaching and research are antithetical, that research plays too prominent a part in academic promotions, and that teaching is badly underemphasized. There is an element of truth in these statements, but they also ignore deeper and more important relationships.

Research experience is a crucial component of hiring and promotion at a research university because it is the emphasis on research that distinguishes such a university from a liberal arts college. Most research professors are conscientious, care about their students, and offer them the excitement of contact with those creating the history of science as well as describing it. Although mass education precludes Thoreau's ideal of one student and one professor sitting on a log together, the research pioneer with a classroom of students or undergraduates doing research in his or her laboratory comes as close to that ideal as is possible in a big university. Some professors, however, neglect teaching for research, and that poses a problem.

Most research universities reward exceptional teaching, but the greatest recognition is normally given for accomplishments in research. Part of the reason is the difficulty of evaluating teaching. A highly demanding, tough-grading professor is usually appreciated by top students who want to be challenged, but disliked by those whose records are less impressive. The more lenient professor gets overall ratings that are usually high, but there is a sense of disillusionment on the part of the best students, exactly those for whom the system should present the greatest challenges. Thus, a university trying to promote professors primarily on the basis of teaching qualities would have to confront these ambiguities. Research ability is more easily evaluated because of more quantitative measures such as grant support, invitations to seminars and symposia, prizes, and so forth. Liberal arts colleges can usually do a good job of rating and rewarding teaching ability because of their smaller size and greater emphasis on teaching, but even they find encouragement of research interests helps teaching quality.

As modern science moves faster, two centrifugal forces are exerted on professors: one is the time needed to keep up with the profession; the other is the time needed to teach. Attendance at meetings increases expertise, but decreases participation in the community of scholars at one's own institution. The training of new scientists requires outstanding teaching at the research university as well as the liberal arts college. Although scientists are usually "made" in the elementary schools, and the recent emphasis on the importance of that factor by the National Science Foundation, the American Chemical Society, and AAAS (see *News & Comment*, 7 December 1990, p. 1327) is absolutely correct, scientists can be "lost" by poor teaching at the college and graduate school levels. The solution is not to separate teaching and research, but to recognize that the combination is difficult but vital. The title of professor should be given only to those who profess, and it is perhaps time for universities to reserve it for those willing to be an earnest part of the community of scholars. Professors reluctant to teach can be called "distinguished research investigators," or something else, but if they are not interested in teaching, it may be that we should recognize that they are not professors. High school science teachers are frequently criticized for emphasizing method at the expense of content, but university professors, who are strong on content, probably need to pay more attention to method. Appropriate staff support is also needed to demonstrate that the university honors with substance those who contribute to its mission.

Distinguished professors should be lured, rewarded, and retained by offers of good salaries, laboratory space, recognition, and administrative support, but not by the bonus of "no teaching." Most universities are doing their best to require high teaching standards, and most professors are acutely sensitive to bad ratings from students. Thus the dichotomy between teaching and research is not as great as some would assert.

The pace of modern science makes it increasingly difficult to be a great researcher and a great teacher. Yet many are described in just those terms. Those who say we can separate teaching and research simply do not understand the system, but those who say the problem will disappear with benign neglect are not fulfilling their responsibilities. Department chairmen and university administrators would probably have an easier time dealing with Thoreau than with the modern fast-moving research professor, but the future of science says they have no other choice.—DANIEL E. KOSHLAND, JR.