advisory board, and the 15 members of the study group represent diverse disciplines.

The report reaffirms the place of the natural sciences in the liberal arts curriculum and contains the study group's recommendations of goals for liberal education in the sciences as well as the multidisciplinary curriculum and the teaching strategies necessary to achieve them. Cross-disciplinary teaching that involves faculty from the humanities, social sciences, and the practical and fine arts is encouraged. The study group also recommends teaching science as it is practiced. This means incorporating the philosophy, values, and methods of science into instruction in the natural sciences.

■ **AUDREY CHAMPAGNE, Directorate of Education and Human Resources**

AAAS Briefs

Reports on the final two workshops in the AAAS Project on Scientific Fraud and Misconduct are now available free from the AAAS Directorate for Science and Policy Programs, 1333 H St., N.W., Washington, D.C. 20005, 202/326-6600.

Grants of up to $300 are available to help foreign graduate students attend the AAAS Annual Meeting in New Orleans from 15–20 February. Applications must be received by 10 January. For information on application procedures, contact Laura Mann, AAAS Directorate for International Programs, 1333 H St., N.W., Washington, D.C. 20005, 202/326-6664.

Conflict of Interest in Science

Increasing ties between academic and government research and industry have come about largely because of mounting concern over the loss of American preeminence in the high-technology international marketplace. The impetus for cooperative research has come not only from scientists and their institutions, but also from the executive branch and from Congress.

Although such policies have broad support, the resulting changes in scientific funding and associational patterns have some vehement critics and scores of concerned observers. Many of the problems raised by the increasing complexity of scientific relationships can be grouped under the umbrella heading "conflict of interest." And it is becoming clear that it will be harder to agree on policies to manage conflict of interest than has been the case with scientific fraud. Fraud is committed infrequently and is uniformly condemned by scientists, policy-makers, and the public. But conflicts of interest potentially affect most members of the research community. By encouraging cooperation, the government has, ironically, also been encouraging scientists and their institutions to form relationships that can lead to personal or institutional conflicts, can bias research, and can lead to loss of the public's confidence in research conducted with public funds.

Some critics, for example, fear that the large financial stake that industry now has in American universities is irretrievably compromising the laudable goal of open research that has been a hallmark of academic science. Some also argue that American academic and government science is no longer conducted in a spirit of wide-ranging intellectual curiosity. Instead, they say, large industry investment can force laboratories to become job shops, solving practical commercial problems rather than pursuing the basic research for which American universities have been noted.

There is also concern that America is losing the cadre of disinterested scientists who can advise on a wide range of technical dilemmas and decisions facing American policy-makers and the electorate. Advisory committees to the federal government have a hard time finding knowledgeable technical advisers who are not also employed by relevant industries, or who do not receive income through consulting arrangements.

Conflict of interest has come under scrutiny by a number of agencies, public and private, among them the National Institutes of Health. When Katherine Bick, its deputy director of extramural research, visited AAAS on 7 November to talk about her agency's draft guidelines on conflict of interest, the discussion turned out to be a short course on just how ubiquitous—and tough—these issues are.

Pointed comment was provided by George C. Levy, director of a Syracuse University data processing lab and founder of New Methods Research, Inc. The company was set up to explore the commercial potential of software developed at the lab and pays it royalties. "Undoubtedly, I have split loyalties. That really is a problem," he said. "But the alternative is to let the Japanese buy the United States."

The discussion took place at the fall meeting of the AAAS Professional Society Ethics Group, composed of over 40 professional societies. Coordinated by Mark S. Frankel, who is the acting assistant director of the Directorate for Science & Policy Programs, the group provides a forum for the interdisciplinary exchange of ideas relating to professional ethics issues in science and technology.

AAAS also organized a symposium on conflict of interest at the 1989 AAAS Annual Meeting. The symposium was exceptionally well attended, evidence of scientists' intense interest in this topic. We are coordinating a workshop on "University-Industry Ties: Headaches and Blessings" for the 1990 Annual Meeting in New Orleans. Last June, I organized a roundtable on conflict of interest, attended by individuals from government, industry, professional societies, academia, and citizens groups.

The directorate plans to maintain a leadership role by providing opportunities for people from the affected sectors of society to meet, share points of view, and attempt to arrive at a consensus on strategies for managing the increasing conflicts of interest in the scientific community.

■ **DEBORAH RUNKLE, Office of Scientific Freedom & Responsibility**