book (with the late Robert R. Bush) on models for learning theory, and a flow of later papers.

Mosteller's medical activities have become richer and stronger with the years. They began with papers in the 1950's on the measurement of pain, expanded in the late 1960's to a grand treatment (with others) of the safety of surgical anesthetics, and more recently have turned to cost-benefit analyses for surgery and attempts to quantify ideas of the quality of life. This medical research has exhibited and sharpened Fred's role as a master data analyst. There, as elsewhere, he frames a model that the rest of us can admire appreciatively (because it is so clear) but can seldom hope to match.

Teaching has always been a passion for Fred Mosteller, as his many former students will testify. That passion has found concrete expression in his superb textbooks and manuals of practical advice for teachers, in his television "Continental Classroom" course, and in his concern for teaching at secondary school levels. He led a joint committee of the American Statistical Association and the National Council of Teachers of Mathematics that published two wholly new kinds of statistical books. One, *Statistics by Example*, put together a sequence of examples that could be used at all levels of instruction to teach real statistics via analyses of football scores, calibration of auto speedometers, user ratings of typewriters, and Thomas Paine's early ideas about old age pensions. The other, *Statistics: A Guide to the Unknown*, now in its second edition, contains nontechnical essays describing the importance of statistics applied in testing vaccines, counting whale populations, deciding on police manpower, predicting election results, and many other important activities. For both these books, Mosteller was organizer, major editor, and participating author.

A related activity has been Mosteller's collaboration in the National Assessment of Education Progress. This systematic study of achievement levels in the secondary schools has faced numerous issues of statistical design, analysis, and exposition.

Mosteller has for years devoted much thought to societal problems, and to the roles of science in society; that thoughtfulness has expressed itself in print more and more frequently. His book, edited with Daniel P. Moynihan, *On Equality of Educational Opportunity*, begins with the editors' superb, constructive opening chapter on the fundamental methodological problems of the famous report by James Coleman and others. A later book, *Statistics and Public Policy*, edited with William Fairley, includes masterful chapters by Mosteller (himself or with coauthors) on assessment of social innovations, the infamous Collins case in California, and order of magnitude estimation. Evaluation of public policy is, I confidently guess, a process in which Fred Mosteller and the AAAS find natural synergy.

Perforce, I omit any but this paraleptic mention of other problems and areas to which Fred Mosteller has brought his vigor and special talents: the Kinsey report (and its relevance to other surveys), the evaluation of weather modification experiments (with wise suggestions for their future improvement), a magisterial statement (*2*) about nonsampling errors in statistics, his text—with John W. Tukey—on data analysis and regression, and so on.

It will be plain by now that Fred Mosteller is a scientific collaborator par excellence. His style often is to raise seductively interesting questions with colleagues, students, friends, or a chance visitor—obviously overlapping categories, to see intellectual sparks catch fire, and to feed them as they grow to new illumination. He is a warm, demanding, interactive friend and colleague, and he will be a warm, demanding, interactive President of the AAAS. In that process he will demand more of himself than of others, and he will meet those demands for our common benefit.

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1978 Report of the Executive Officer

William D. Carey

1978 was a strong year for the AAAS, where strength signifies growing membership, more joint activity with affiliated societies, continued financial soundness, increased circulation of *Science*, higher visibility earned through timely reports and meetings on federal R & D policy, and new program initiatives in areas of scientific freedom, human rights, public understanding of science, and international cooperation. It was also a year that featured its full share of external challenges to the shaping and the priorities of science and technology in the larger sense, ranging from growing governmental friction with university research to constraints imposed by domestic inflation, and, on the internationnal front, the confrontation with authoritarian states over scientific freedom followed by the spectacular entry of the People's Republic of China into the common market of scientific inquiry and cooperation. And finally, 1978 brought its measure of sadness as we lost five past presidents—James B. Conant, Chauncey Leake, Kirtley Mather, Margaret Mead, and Warren Weaver—as well as our colleague on the Council, Leo Schubert.

A period of strength in the affairs of the Association is a time for considering a sensible and affordable agenda. The Council will receive the end report of the Committee on Future Directions with its substantial menu of opportunities and priorities which can serve to define and clarify our options, as well as settle questions about the style of operations of the AAAS. On that score, one hopes there is consensus that AAAS as an organization should be conservative in its growth of staff and budget but progressive in anticipation and responding to new tests and opportunities. We can achieve that

balance by traveling light and optimizing our roles as a "convenor" organization with an expanding network of cooperating organizations, bodies, and groups. As to the future agenda itself, one also hopes that there is consensus that the five objectives of AAAS as stated in our Constitution should be the binding force legitimizing whatever new initiatives we may take on. What still will call for close judgments is the question of scaling, of judging how far—and for what expected results—we commit resources.

With that background, two main arenas for enlarged effort by the AAAS now confront us. One is in international scientific affairs, while the other involves the public understanding of science. As to the first, the potential for AAAS participation in bilateral and multilateral scientific affairs is very nearly open-ended. On the one hand, the few ventures that we have made at very little cost to work with the developing countries have awakened a widespread interest in closer ties with AAAS as a nongovernmental organization with multidisciplinary resources which the developing countries prize, and this holds true for the countries of the Western Hemisphere as well as Africa, the Middle East, and the Far East, notably China. At the same time, opportunities are growing for closer relations between the AAAS and like organizations in the advanced countries of Europe and the Far East. Add to this the pressing importance of transnational problems of science, such as the impacts of climate change on the environment and human settlements, and the dimensions of international science bring us back quickly to the questions of scaling resources.

Turning next to the arena of public understanding of science, we are looking mainly at a domestic rather than an international challenge. If there is one feature of the AAAS that distinguishes it from the more specialized scientific organizations, it is its populist orientation. For years, the Constitution of AAAS has mandated a duty to "increase public understanding and appreciation of the importance and promise of the methods of science in human progress." While that obligation has not been taken lightly, the fact of the matter is that the problem has far outdistanced the level of effort that we have put into it. Advancing technologies, risk assessment related to basic scientific research, issues of the function of R & D in driving the arms race, and well-publicized controversy over scientific evidence and scientific responsibility have opened a sizable gap in public understanding. A wholly defensive posture in this situation is not appealing, nor does it fulfill our constitutional objective in an age where the media shape public opinion and uncertainty to so great an extent. It is for these reasons that AAAS is weighing the benefits and risks of a major strategic venture in the shape of a new and authoritative magazine of science for an educated general audience, one that will be distinctly different from *Science* without encroaching on other magazines of science that are already in the field. AAAS has the editorial and publishing experience to do this job well, but the size of the economic investment would lead to budget deficits for several years. If the AAAS opts to accept the challenge, as well as the risks, solid support from the Council will be needed to see us through the difficult stages.

Highlights of the Year

The 1978 Annual Meeting, held in Washington, D.C., was a general success with attendance substantially above 5000 and a wide-ranging program consisting of 180 half-day sessions. The 1979 meeting dates in very early January began an experiment aimed at overcoming objections to meetings held in February or March. Whether this strategy results in better attendance is not likely to be known until we count the house after the San Francisco meeting in January 1980.

To overcome a mixed record of book and reports publication, AAAS set out a year ago to get its publishing activities in better shape. During 1978, some 18 out of 20 scheduled volumes from the 1977 annual meeting symposia were published, along with a dozen other books on publications ranging from *Combating the #1 Killer* by Jean L. Marx and Gina Bari Kolata to *Health Care: Regulation, Economics, Ethics, and Practice*, edited by Philip H. Abelson. Our plans for 1979 call for increasing our publications output, including several occasional papers on issues of the relationship between science, technology, and public policy.

The Committee on Scientific Freedom and Responsibility, chaired by Bentley Glass, expanded its Clearinghouse on Persecuted Foreign Scientists to include 34 affiliated societies. During the past year, the clearinghouse directly assisted individual foreign scientists in the Soviet Union and Argentina, and carried out a special role as the organizing group for scientists who both wished to attend the 1978 International Cancer Congress in Buenos Aires and express human rights

Summary budget for 1979.

Major category of revenue	1979 revenue budget	Office/Center	AAAS funds	Direct grant and contract funds	Total expense
Revenue (in thousands)			*Expense (in thousands)*		
Dues of annual members	$ 3,990	Executive Office	$ 527	$ 63	$ 590
Institutional subscriptions	1,490	Contingency reserve	100		100
Advertising in *Science*	3,575	Office of Administration	1,276		1,276
Grant and contract funds	1,269	Office of Comptroller	299		299
Subscriptions to *Science Books & Films*	80	Membership and Public Information Office	379	50	429
Annual meeting registration and exposition	175	Development Office	65		65
Investment income	500	Editorial Center (*Science*)	6,251	5	6,256
Product sales	450	New magazine (Phase II, Test)	142		142
Contributions and other items	200	Meetings and Publications Center	690		690
		Programs Center	555	1,046	1,601
		Contingency for potential income taxes	160		160
Total revenue	$11,729	Total expense	10,444	1,164	11,608
		Unexpended operating balance	121		121
		Total	$10,565	$1,164	$11,729

concerns to the authorities. The Committee also developed policies and procedures for responding to individual claims from U.S. scientists regarding alleged infringements of scientific freedom or responsibility, and continued to review and comment on due process mechanisms for "whistle blowers."

Preparation for *Science* Centennial

In 1980, *Science* will observe its centennial year and an ad hoc group headed by Edward E. David is at work on plans for marking this milestone event. Meantime, average paid circulation in 1978 was over 153,000. Four special issues were published in 1978, dealing with health maintenance, energy, and lasers. Articles which appeared from time to time on solar energy were brought together by William D. Metz and Allen Hammond as a book, *Solar Energy in America*. The economics of publishing *Science* continue to be affected heavily by inflation in paper, postage, and other costs. As far as possible, this situation is being dealt with by efforts to increase the efficiency of operations, but much of the inflation burden must be passed through to dues, subscriptions, and advertising rates. Compared with major national weekly magazine subscription prices, ranging from $26 to $31, *Science* is a very good buy because the price includes membership and, in effect, gives readers 50 percent more pages for the share of members' dues which is allocated to *Science*. Nevertheless, the prospect of continued high inflation in the nation's economy is not good news for AAAS and its flagship publication. At the same time, the editors are striving to introduce innovative features and to broaden the reach of *Science*, and as part of this effort Dr. Abelson has embarked on site visits to some 20 industrial research laboratories.

Research and Development

The Committee on Science, Engineering, and Public Policy, chaired by Melvin Kranzberg, formed five subcommittees in 1978 which will deal with international topics, policy research and analysis, public-private relationships in research and development, the annual R & D budget analysis, science and state government, and university education in science and technology policy. AAAS had the cooperation of six affiliated societies in preparing timely reports on the President's 1979 budget for R & D and the results of congressional action. The third annual AAAS colloquium on R & D policy, held in June, drew 261 registrants representing government, industry, universities, nonprofit organizations, and foreign embassies, and was covered well by TV-news media and major newspapers and news magazines. AAAS Report III, on *R & D in the Federal Budget*, was again prepared by Willis H. Shapley and Don I. Phillips, and remains a unique publication with a growing reputation for authoritative analysis and comment. The Congressional Science and Engineering Fellows Program continued successfully in 1978 and was sponsored or cosponsored by 14 affiliated societies with the probability that three more societies will join in cosponsorship in 1979. In the Congress, Representatives Ray Thornton and James Martin took the lead in forming a House Science Forum which currently has 20 members, and the Senate is considering a similar step. In 1979, former Congressman Charles Mosher will join the AAAS staff to guide the relationships between AAAS, its affiliated societies, and congressional groups. AAAS also undertook at the request of the White House Science and Technology Office a special project in intergovernmental relations designed to increase the involvement of state and local jurisdictions in the federal research and development process. Finally, the AAAS-ABA National Conference of Lawyers and Scientists held an annual meeting symposium on "Assessment of Technological Risk," and published its proceedings of the 1977 symposium, *Weather Modification: Technology and Law*. In addition, the Conference held a successful 1978 workshop on "Cross-Education of Lawyers and Scientists," and the proceedings are to be published by the American Bar Association in *Jurimetrics Journal*.

Opportunities in Science

The Office of Opportunities in Science is an example of "traveling light" with a small staff of hard-working people who approach a range of intransigent problems by organizing conferences, negotiating with federal agencies on behalf of affected groups, and providing clearinghouse resources to other organizations working with minority, women, and handicapped scientists. In 1978, the meetings were on energy and resource development on Indian lands, barriers to handicapped students on the college level, participation of women in science, and science and technology for the handicapped. The result of the meetings is that a network is left in place to provide linkages for members of the scientific and technical community who are often only marginally connected with the science establishment. In 1978 the office also completed a study for the National Science Foundation (NSF) on the participation of women in scientific careers, and undertook for NSF an inventory of programs in mathematics and science for women. In addition, the office completed a resource directory of handicapped scientists, an analysis of barriers to science education for handicapped college students, a study of coping strategies for handicapped students, and a striking role model project in which a deaf scientist employed by Xerox Corporation visited across the United States with handicapped students, school systems, and community organizations discussing careers in science and science education. In 1979, the office will work with affiliated societies to improve career options in science, and plans a joint program with the education associations to develop models for laboratory accommodations for handicapped students.

International Activities

In the area of international scientific cooperation, the highlight of 1978 was the acceptance by the Board of Directors of an invitation by the Scientific and Technical Association to visit the People's Republic of China. The Board spent 3 weeks in China, from November 13 through December 3, and visited a host of research institutes, universities, and organizations. The visit resulted in an agreement for future cooperation between the respective associations, featuring exchanges of information and cooperation in such areas as the social sciences, scientific literature, symposia, popularization of science, and possibly science education. The Chinese will send a delegation to visit the AAAS in 1979.

Other international science activities during 1978 included continued participation in the program of Western Hemisphere Cooperation, focused in the Interciencia Association which is a federation of AAAS with several scientific organizations in Latin America. In addition to nurturing the trilingual journal *Interciencia*, the Western Hemisphere program organized three symposia dealing with nutrition and agriculture, energy and development, and plant resources in the development of arid lands. New initiatives include Science Writers Seminars cosponsored by the Interciencia Association and the IDRC of Canada, and an Interciencia Program of Applied Research. In other areas of the world, Board Chairman Emilio Q. Daddario attended the UNESCO General Conference in Paris in November, and Earl P. Scott was the AAAS delegate to the 11th Biennial Meeting of the West African Sci-

ence Association. AAAS also sent representatives to the 1978 Solar Energy Mission to Tanzania, the U.N. Development Regional Seminar on Development in Arid and Semi-Arid Zones, the International Arid Lands Conferences on Plant Resources, the International Congress of Anthropological and Ethnological Sciences, the Post Plenary Session on Anthropology and Desertification at the Central Arid Zone Research Institute in India, and the first International Rangelands Congress. In addition, AAAS cosponsored with the Indian National Science Academy and the Indian Science Congress Association an Asian Regional Seminar on contributions of science and technology to national development, in which representatives of 18 developed and developing nations participated. AAAS was represented at the 97th Congress of the French Association for the Advancement of Science by John G. Dennis and William D. Romey, while Louis D. Wheeler represented AAAS at the 34th Annual Meeting of the Sri Lanka Association for the Advancement of Science.

AAAS in 1978 sponsored four seminars for the science attachés posted to embassies in Washington. Topics included nuclear proliferation, the U.S. National Climate Program, the World Administrative Radio Conference, and solar energy. In the area of climate variability and change, the Board of Directors in 1978 approved a new AAAS international science initiative dealing with the impacts of climate variation on all sectors of human activity as a cooperative project with national and international groups in organizing interdisciplinary workshops, conferences, and regional and sectoral case studies. Roger Revelle has taken the lead for AAAS in examining the scope of the project, which is long-range in nature. The first step will be a workshop on environmental and societal impacts of CO_2-induced climate change, under a grant from the U.S. Department of Energy, and will be held in Annapolis, 2–6 April 1979. Somewhat related was a follow-up to the AAAS Nairobi conference in 1976 on desertification problems, taking the form of a joint activity by AAAS with counterpart organizations in Britain, France, India, East Africa, and the countries joined in the Interciencia Association to reach agreement on standards or indicators for recognizing effects and causes for desertification. Handbooks and papers are available.

The foregoing account serves to reinforce the observations made earlier in this report regarding the striking growth of AAAS's involvement in international scientific concerns. It is evidence on the one hand of a growing agenda of international scientific issues, and on the other of an accelerating "bridging" of national boundaries and self-interest. At the same time, it forecasts a type of endless horizon for AAAS in the years to come.

Science Education

Closer to home, AAAS continues to deal with problems of science education, though consensus is difficult to establish regarding the vital issues in science education. Our staff has prepared for NSF a directory of 117 college programs and almost 1000 courses oriented to ethics and values in science and technology. A report is in preparation on the implications for science education of three NSF-supported studies of precollege science education, and the officers of Section Q (Education) are developing a draft position paper which seeks to identify priority issues in science education for the AAAS. The program of Short Courses for College Teachers is continuing, with a series of 136 courses prepared with guidance from an advisory group chaired by William Bevan. At the initiative of the Board of Directors, a range of options is being developed with the aim of defining an effective AAAS program in science for young people. A whole set of questions relating to the mission of AAAS in science education constitutes a central policy problem for the Association as it faces a new year and a new decade.

Conclusions

Lastly, the financial affairs of AAAS are in fair order. The operating budget for 1979 will reflect the fourth successive balance, though not without the help of repeated increases in dues and advertising revenue. Costs continue to escalate as the result of economic trends over which we have no control. Member contributions above and beyond dues have been genuinely helpful as well as encouraging. Total assets of the Association are now at $10 million, though only a fraction is free of encumbrances to meet fixed obligations. To close on a note of good news, the declining trend in membership which gave us great concern only 2 years ago has been reversed, and total membership once again is close to the previous historical peak.

At this point the AAAS appears to be in relatively strong shape and on the verge of important steps consistent with its capacities and its mission.