

Book Reviews

Philanthropists and Promoters

Dollars for Research. Science and Its Patrons in Nineteenth-Century America. HOWARD S. MILLER. University of Washington Press, Seattle, 1970. xiv, 258 pp. + plates. \$9.50.

This study provides a thoughtful but episodic view of private support of American science in the 19th century. Government support has previously received significant attention from historians, but private support has not. Miller here demonstrates control of two relatively new fields of historiography: the history of American science and the history of American philanthropy. He combines them to reveal the emergence at the end of the century of a pattern of scientific support wholly different from that prevailing at the beginning.

His first episodes record new levels of support for astronomy mobilized in the 1830's and 1840's. First is recounted Albert Hopkins's success in establishing an observatory at Williams College, next the ability of Ormsby MacKnight Mitchel to sell shares to interested amateurs to purchase a good telescope in Cincinnati, and then the general subscription launched by Harvard College to buy a still larger telescope. The tensions between the lay public providing such support and the professional astronomers directing the observatories came to a head at the Dudley Observatory in Albany in the 1850's. The scientific leaders in Washington and Cambridge who supported the designated director, Benjamin A. Gould, had finally to retreat, thus demonstrating the difficulty of basing a scientific institution upon popular, voluntary support.

Later, when the great optical telescopes were built, the pattern was reversed; the astronomers, not the donors, called the tune. Here, Miller effectively displays the foibles of the eccentric James Lick and the robber baron Charles Yerkes. He brings to attention that ideal patron, Catherine Wolfe Bruce, who did not need promoter-scientists such as George Ellery Hale to set her in motion but who offered help for the best professional objectives.

The questions of basic science versus technology and of basic science aims versus promotional aims are introduced at several points. Miller compares Asa Gray with Louis Agassiz, concluding that Gray was the more profound scholar and that Agassiz mobilized support with greater finesse. Less generally familiar is the curious drift in emphasis which Miller describes in the early development of the Lawrence and Sheffield scientific schools. Although the donors in each case wanted to endow institutions to train men for needed technological roles, the faculties from the beginning turned the schools from practice toward basic science.

In the feud between Edward D. Cope and Othniel C. Marsh over the discovery of fossils, Miller confronts another case in which the values of science vied with promotional values, but for each of these men support was initially provided by family wealth. This rivalry offers the historian an opportunity to compare government with private support, for, in the end, Marsh gained the greater victory partly because of his access to government support through the Geological Survey—although Cope had had earlier government support from the Hayden Survey. Miller reports some of the facts, but he does not weigh the differences between government and private support.

Early private support accorded science was largely a matter of buying instruments, but much more sophisticated and directed support was provided later in the century. The visiting English physicist and lecturer John Tyndall awakened concern for endowment funds at a critical period. Still more significant were the endowments of research institutions provided by John D. Rockefeller and Andrew Carnegie. Rockefeller saw research as close to the center of his purpose in endowing the University of Chicago. The Carnegie Institution was a new type of research institution which would not compete with the universities but complement them; more important, it became the prototype of the 20th-century American research foundation.

The greatest weaknesses of this book are at its periphery. The author exaggerates the deficiencies of American science prior to the era with which he deals. For example, the science of John Winthrop and David Rittenhouse was in no measure, as Miller asserts, inspired by piety, and Rittenhouse's instruments were in no degree makeshift. Colonial science was certainly not limited to natural history nor had a cabinet of natural curiosities ever been the index of the scientist. It could not possibly have been difficult in any but the weakest early-19th-century colleges to distinguish natural philosophy from natural theology. Further, Miller's own account provides much better grounds for explaining the limitations of American scientific achievement than the negative influence of Baconian philosophy to which he ascribes them. Despite the assertions of 19th-century publicists and scientists, modern scholars should recognize that Baconianism was merely an epithet for "empirical," and America, as well as Europe, had witnessed a long conflict between the rational and the empirical in the pursuit of science.

At its center, this book fulfills well its objective of catching the spirit and plotting the impact of private philanthropy upon science. At the end of the century, this support was responsible for research centers and foundations about to flower into leadership. Miller tells his story engagingly and in human terms. He does not exhaust the subject but provides a good introduction for a wide range of readers and a good stimulus for researchers.

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Market Projections

Human Resources and Higher Education. Staff Report of the Commission on Human Resources and Advanced Education. JOHN K. FOLGER, HELEN S. ASTIN, and ALAN E. BAYER. Russell Sage Foundation, New York, 1970. xxxii, 480 pp., illus. \$17.50.

The progenitors of this book are the organized elite of U.S. higher education: the American Council of Learned Societies, the American Council on Education, the National Academy of Sciences-National Research Council, and the Social Science Research Council. The Carnegie Corporation and the Russell Sage Foundation split the bill. The councils appointed a prestigious

private commission chaired by Dael Wolfe, whose distinguished role in the first Commission on Human Resources and as author of its report, *America's Resources of Specialized Talent* (Harper, 1954), assured continuity and authority. (The other members of this commission were Robert D. Calkins, Allan M. Cartter, Henry Chauncey, Kenneth S. Pitzer, Gordon N. Ray, Merriam H. Trytten, John W. Riley, Jr., Richard Schlatter, Elbridge Sibley, Gordon B. Turner, and Frederick T. Wall.) The book is well born.

It contains a wealth of data pertaining to higher education in the United States. The data alone, 177 tables, many from private and federal agencies and hard to come by, are worth the price of the book, although virtually all of them are restricted to simple head counts. Much of the statistical analysis rests on an elaborate set of projections of enrollment and degrees. These projections are derived by methods akin to the population projections of demographers, but they are less dependable because the variables entering into them are subject to even more rapid change than those that determine population growth.

The book also comprehends a wide array of studies pertaining to the levels of ability of students, factors influencing college attendance, college career choices, scientific productivity not predicted by grades, underdeveloped talent among low socioeconomic groups, and the dual careers of women. One of the conclusions that emerges is that there is no discernible lack of innate ability for the high level of skills with which this book is concerned. The task of higher education is to develop this plentiful ability. To do this is costly in terms of public and private expenditures and in terms of the value of the students' own time. Public and private funds and the students' time are scarce resources. Without them, this stock of innate ability cannot be developed. But this book is silent on the critical issue of determining the optimum allocation of scarce resources to higher education and among its many parts.

The book reveals with unusual clarity the long-standing ambiguity of its progenitors with respect to economic analysis. They want "some" economics, but they do not want it from economists. They consult a bit, but shy away from the analytical parts. Toward the end there is an expression of awareness that "economists have shown an increasing interest in the question of the value of

investment in . . . training and education" (p. 369), but these economic studies are deemed unrealistic.

The vocabulary of economics abounds in the book. The two most favored words are "supply" and "demand," reflecting the endeavor of the commission to approach the problem from the point of view of society, "represented by such terms as *manpower, supply and demand, shortage, surplus, utilization of supply, or adjustment of supply and demand*" (p. xvi), and throughout the book appear such terms as "the market" for college graduates, "market operations," human resource "investment," "cost-benefits," "economic returns," and "input-output model." As used in this book, these words are merely empty boxes, however. There is a large literature in economics (the second edition of Mark Blaug's *Economics of Education: A Selected Annotated Bibliography* [Pergamon, 1970] includes over 1300 items, of which some 500 have been added since the first edition appeared in 1966) from which many of them could have been filled.

Discussions of "supply" and "demand" that rest on the projections of

enrollment and degrees are not sufficient for determining the market for the services of these highly skilled people. The actual market for graduates with bachelor's, master's, Ph.D., and professional degrees is very different from the market that this study projected for 1970. Are the estimates for 1975 and 1980 to be taken as more reliable? The answer must be in the negative. As an economic analysis of these markets, the book is a failure.

When I started this review I felt that I might best serve the readers of *Science* by presenting the core of the findings that have been established in economics pertaining to the costs of and returns to higher education and the behavior of the markets for the services of highly educated people. But it turns out to be too big a task to be borne by a review, and such a presentation would not resolve the issue that a reading of the commission's study raises. How much longer will these leaders in higher education avoid economics?

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Toward an International Outlook

Main Trends of Research in the Social and Human Sciences. Part 1, Social Sciences. Unesco, Paris, 1970 (U.S. distributor, Unipub, New York). xlviii, 820 pp., illus. \$30.

The contributors to this first volume of Unesco's international study of research trends are a group of distinguished scholars: Piaget (Switzerland), P. Lazarsfeld (United States), W. J. M. MacKenzie (Great Britain), J. Bourgeois-Pichat (France), R. Jakobson (United States), R. Boudon (France), P. de Bie (Belgium), S. Rokkan (Norway), and E. Trist (United States). To each of these authors were made available guidance from a panel of consultants (26 members representing 18 countries); commissioned papers on particular topics from a large pool of specialists; and considerable help from the Unesco Secretariat. Participating in the planning and execution of the study were also all the National Commissions of Unesco and 12 nongovernmental organizations. In addition to inputs from a wide range of intellectual perspectives, advice and criticism were sought from experts on both sides of the Iron

Curtain and in the Third World. What we have exemplified here, therefore, is a truly multilateral endeavor.

The first section of the book consists of overviews of sociology, political science, psychology, economics, demography, and linguistics. (Anthropology will appear in a second volume because the manuscript was submitted too late for this one.) In no sense are these intended as systematic surveys based on a detailed investigation of ongoing research. Rather, they provide an outline of central trends in each discipline with respect to the goals and strategies of research and theory, an identification of problems likely to engage the discipline in the future, a charting of existing and needed relationships to other disciplines, and at least a preliminary assessment of the nature of the discipline's involvement in problem-oriented activity. Although the authors relied upon technical advice and papers from many colleagues, the resulting portraits are necessarily those painted by a single individual, reflecting in each case a somewhat different blend of objective reporting and personal