

A FRAGILE POWER: SCIENTISTS AND THE STATE

By Chandra Mukerji

1989, 253 pp., \$24.95, Princeton University Press

Reviewed by Andrew G. Dickson

What does the state expect for its research dollars? What intellectual and political compromises does a scientist make by seeking government grants or contracts? Do such questions haunt you as you write your final reports, your new proposals? Perhaps they

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should. In her recent book, Chandra Mukerji, professor of Sociology at the University of California, San Diego, studies oceanographers as paradigms of soft-money scientists at large (those who seek government funds to further their research, not solely those whose salary depends on such funds) and concludes that most scientists delude themselves as to the extent of their individual scientific autonomy—that scientists have sold their “voice” for a mess of pottage.

Her discussion focuses detailed attention on two seemingly different programs: research funded by the U. S. Department of Energy ostensibly to examine the suitability of the oceans as a site for the disposal of nuclear waste and expeditions funded by the National Science Foundation to study submarine hydrothermal vents. She uses these as case studies to examine the relationship between scientist and state and dismisses as oversimplified the utilitarian concept that

BIOLOGICAL OCEANOGRAPHY: AN EARLY HISTORY, 1870 TO 1960

[CONTINUED FROM PAGE 61]

ods for measuring nutrients, submarine light and phytoplankton pigments, recognized the importance of thermally-induced stratification, and identified the role of grazers in controlling phytoplankton blooms. Eventually, Gordon Riley at Yale and the Woods Hole Oceanographic Institution used Plymouth Laboratory information on nutrients, light and grazing to develop (with H. Stommel and D. Bumpus) mathematical models of physical and chemical controls on phytoplankton and zooplankton growth over Georges Bank. Mills contends that at that point (approximately 1960) most major paradigms, sampling schemes and analytical techniques in use in biological oceanography today were in place. One wonders whether development of fluorometric assays for chlorophyll pigments by Yentsch and others should have been included among the fundamental developments, but otherwise Mills seems to have given a thorough and accurate recounting. What is striking, and perhaps cause for reassessment, is that so much of what we do today derives with clear lineage from a few investigators with whom most of us share a common and, it must be said, a somewhat narrow geographical and cultural heritage.

Mills charts for us the exchanges of information during these ninety years of research, the character of the investigators and their laboratories, the development of ideas

and analytical and sampling technologies, the national financial support and international sampling programs, and the blooming and senescence of the Kiel and Plymouth groups. The author's prose is clear and precise and figures and data are supplied in a useful manner. A map would have been helpful to understand northern European coastlines and non-oceanographers might wish for a glossary. Nevertheless, learning this history, being introduced to predecessors whose names may be familiar only from bindings of taxonomic guides or as parenthetic appellations to scientific names, discovering the sources of our understanding, is an enjoyable voyage.

It is also a voyage that provokes. We find ample precedent for grand programs implemented to measure ocean processes that eventually deteriorate to uncertainty about sampling efficiency, for radical changes in understanding as a result of analytical improvements, for progress as a function of ship availability, and for the evocation of oceanic microenvironments to render non-conforming conditions or processes more plausible. This history provides no explicit lessons or remedies, but reminds us that we in 1990 are not so unprecedented as we suppose nor so heretical as our reviewers contend. It also reminds us that since the start of oceanographic research we have been dependent on the expertise and energy of oceanographic

technicians and that oceanography in general has been very successful when it has been able to attract talent from other disciplines. One wonders, as we cut technician salaries to reduce grant budgets and anticipate numerous retirements among senior oceanographers over the next five to ten years, whether our present system of attracting undergraduates from traditional science disciplines into employment or graduate training in oceanography will provide sufficient diversity of talent and whether enough skilled science undergraduates will be available from any discipline.

In 1989, when this history of European and American research on plankton blooms in the North Atlantic was published, European and American oceanographers were involved in a major research effort on plankton blooms in the North Atlantic. That the topic has developed global import does not perforce indicate that our understanding has expanded proportionally. Dr. Mills provides us a valuable reference against which to check our intellectual, logistical and analytical progress. He also does us a considerable service, in a pleasant manner, by supplying us with oceanographic history that most of us failed to get as part of our education, by reintroducing us to our intellectual forebears, and by reminding us of the excellence and limitations of our heritage. □

scientists are funded purely to “make the natural realm more accessible to human understanding and manipulation.” Her book draws substantially on interviews with a variety of scientists at various universities and research institutions in the United States; indeed transcripts of such interviews and of some tapes from Alvin dives make up 5-10% of the book. As the names of both scientists and institutions have been either changed or omitted, entertainment abounds—identify the speaker(s) from their words, the institutions from the context.

A key focus of this book is her examination of the concept of scientific autonomy and of the way in which a feeling of autonomy is very important to scientists, although such autonomy may well be chimerical. Using these two projects as examples of “applied” and “pure” research respectively, Mukerji details the struggles for scientific autonomy and power by scientists within each project, and suggests that differences between “pure” and “applied” science are often more imagined than real and that scientists are expected to manipulate the goals of either class of project to suit their own agenda. Controversies in science and the concomitant struggles are seen as a constituting a source of power for scientists, their laboratories, and for the institution of science itself. Insiders maintain control over “information” and thereby sustain some autonomy for their work. She views the struggle for autonomy as largely between scientists and the state. Discussion of the social process within the community of scientists that go to define “good science” and the resulting loss of individual autonomy are barely touched on.

Although Mukerji argues that soft-money scientists constitute a reserve labor force of skills and manpower kept off the streets by an elite form of workfare—the topics being studied being less important to the state than that such a labor force exist—she asserts that it is the act of “doing science” that is important, both to the individual scientists and to government. The perception of scientific autonomy is seen as central to the major role that scientists play in assisting to articulate and legitimate government policies. The shifting definition of what comprises “good science” is maintained by a scientific elite which appears to be independent and to be made up of dispassionate, disinterested scientists who can, as a result, speak with authority on various subjects dear to the heart of the state. Without such autonomy, she claims,

the voice of science with its authority and dispassion could not have become the central political tool that it has been since the second World War.

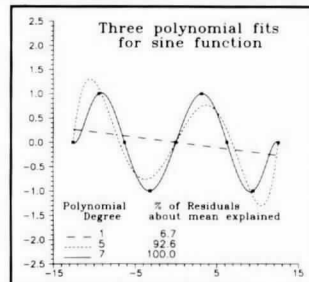
Mukerji’s preface claims *A Fragile Power* to be “a book that many scientists may find offensive”—nevertheless, read on. The professional sociologist’s view of science is necessarily alien to most scientists, at first. Our central picture of “scientific progress” seems to disappear into a looking-glass world where “facts” and “artefacts” assume almost equal importance, where the final “science” becomes unimportant, where the focus is on “science in the making” (for a fascinating exposition of this see Latour, 1987). It is the use of this alternate set of conventions and priorities that may repel the casual scientific reader. The focus on oceanography to discuss this important topic makes this thought-provoking book strangely interesting. I moved back and forth between protests of “No, it’s not like that!” and nods of agreement wherever my own prejudices were confirmed. What I found hardest to accept is her reference to “the state” as if it were some monolithic entity. This is not really so; the state is made up of its own groups of individuals each with their own agenda, conflicting as much as acting in concert. It is hard to see the interaction between science and the state as quite so deterministic; scientists have also been agents in defining the role they play.

Mukerji writes readably, with only a small amount of jargon, though the underlying assumptions of what is important in science seem strange to the working scientist. Indeed, the book seems split into two portions: one part aimed at answering the questions raised above, the other a more conventional sociological study of science with chapter headings such as “techniques and status,” “expanding the domain of science,” “directing scientific discourse.” It is curious yet thought-provoking to see one’s own life and work through her alternate eyes. Still as Alice said, “Only I do hope it’s my dream and not the Red King’s! I don’t like belonging to another person’s dream....” (Lewis Carroll, 1871).

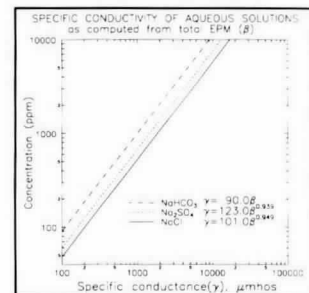
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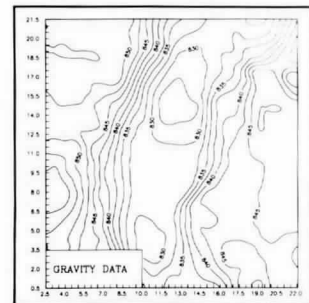
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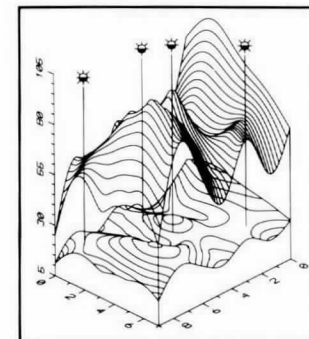
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