

**Frontiers of Illusion: Science, Technology, and the Politics of Progress**



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Mechanics, Dijksterhuis said, should be taught in a mathematical way; for him mechanics was the mathematization of the basic physical concepts. And he characterized the Scientific Revolution as the mechanization of the world picture, in which, again, mathematization played the central role. His position in the debate about the “two cultures” can be seen in the same light: he argued that, fundamentally, the scientific method is as applicable to the arts as to the natural sciences; in both, generalization and mathematization should be the governing notions.

This book is the result of extensive research: van Berkel consulted numerous archives, personal as well as institutional. His style is professional throughout, and the beginning and the end of the book are especially well written. For the benefit of both van Berkel’s subject and his potential readers, it is to be hoped that a version of this biography will eventually be published in English.

IDA H. STAMHUIS

**Daniel Sarewitz.** *Frontiers of Illusion: Science, Technology, and the Politics of Progress.* xiv + 235 pp., index. Philadelphia: Temple University Press, 1996. \$54.95 (cloth); \$19.95 (paper).

The end of the Cold War in the early 1990s has generated calls to reexamine American science and technology policy. Daniel Sarewitz thinks the time is right for a paradigm shift in the ways science and society relate to each other. In this accessible book he seeks to debunk several post-World War II policy “myths” that he believes originated with Vannevar Bush’s influential 1945 report, *Science, the Endless Frontier*. In their place, Sarewitz, a geologist who worked as a congressional science policy analyst before he became the director of the Institute for Environmental Education at the Geological Society of America, promotes “sustainable development” as the new guiding philosophy.

The postwar science policy has been “good for American science” but not, Sarewitz contends, “good for America,” as the physicist Leon Lederman claims (p. 4). Quoting from the Bush report and more recent statements of prominent scientists, Sarewitz constructs five myths that have shaped postwar science and technology policy—the myths of infinite benefit (more science and technology mean greater social progress), of unfettered research (science is most productive without societal interference), of accountability (science can police itself), of authoritativeness (experts know best), and of the

endless frontier (science embodies the human desire to gain an ever better understanding of nature). These myths amount to a linear model of science enhancing technology, economic development, and national well-being. They are responsible for (and sustained by) the enormous growth of the American research and development system. Sarewitz questions the validity of the linear model by pointing to the widespread dissatisfaction among the American public with the health-care system, weakening economic competitiveness, and mounting environmental problems, despite the great increase in biomedical and other scientific and technological investments. The growing disparities among different regions of the world also indicate the need to reorient the science and technology policy of the industrial countries to address Third World problems more effectively.

To make science and technology more responsive to societal needs, Sarewitz advocates incremental changes. Most are admittedly unoriginal: a greater effort to diversify the racial and gender makeup of the R&D community; collaboration between natural and social scientists to integrate human concerns and scientific research; more extensive public involvement in science and technology policy; attempts to better understand and work more cooperatively with the nations to our south. One interesting specific proposal calls for the establishment of government-supported “independent” policy institutes—on global change, energy, health, and communication, for example. Such institutes would help link science and society. Yet it is not clear how these “honest brokers” could avoid capture by special interest groups or the fate of the former Office of Technology Assessment, which was killed by Congress in 1995.

One may or may not agree with Sarewitz’s rather negative assessments of the contributions of science and technology to social progress, which involve value judgments that are often difficult to quantify. Further, his focus on scientists’ rhetoric tends to obscure the role of broad social and political forces, such as the Cold War arms race, in shaping science and technology policy. Above all, the book’s lack of historical depth is disappointing. Sarewitz says very little, for example, about the various attempts to reform the U.S. R&D system between World War II and the end of the Cold War, especially during the late 1960s and early 1970s, when the National Science Foundation launched the Research Applied to National Needs (RANN) program to address explicitly some of the issues raised here.

Nevertheless, Sarewitz’s book, which is

clearly written and cogently argued, will be useful to specialists as a thought-provoking, if not historically textured, treatise on postwar science policy and to students as an introduction to some of the major issues in the recent debate on the topic.

ZUOYUE WANG

**Christopher Scholz.** *Fieldwork: A Geologist's Memoir of the Kalahari.* vi + 190 pp., figs. Princeton, N.J.: Princeton University Press, 1997. \$24.95, £19.95.

In 1974 Christopher Scholz was invited to serve as earthquake consultant on a Food and Agriculture Organization (FAO) water supply project in Botswana. A professor at Columbia University's Lamont-Doherty Earth Observatory who studies the mechanics of earthquakes and faulting, Scholz was puzzled at the invitation because Botswana was not known as an earthquake-prone region. After examining past earthquake records available at Lamont, however, he discovered that a number of earthquakes had indeed occurred in the region of the Okavango Delta, the swamp that would be a major source of water supply for future development in Botswana. The possible threat to the delta's hydrological system was the reason for the FAO's interest.

The pattern of seismic data that Scholz accumulated suggested to him that a fault might be forming along the edge of the swamp, at the western border of the Kalahari. He hypothesized that this fault was a previously unrecognized branch of the East African rift zone extending southwest from the great rift valleys where the continent is breaking apart. Scholz went to Africa because he realized that the project could not only fulfill the practical needs of the FAO but would also give him the opportunity to collect data to test his rift hypothesis.

*Fieldwork* is in a sense a sequel to Bailey Willis's *Living Africa: A Geologist's Wanderings through the Rift Valleys* (McGraw-Hill, 1930). Like Willis's book and the memoirs of other geologists, Scholz's work illustrates the motives and methods of the geologists who leave the classroom or laboratory for the field, and it conveys the sense of adventure and love of exploring that attract people to geology as a profession in the first place.

Provided with transportation, crew, and supplies by the Botswana Geological Survey, Scholz and his Lamont assistant, Ted Koczynski, traveled through northern Botswana, looking for hard-to-find outcrops of bedrock on which to set

up their seismic recorders. With considerable difficulty they succeeded, after three months' work, in determining the source of enough small earthquakes on northeasterly striking faults to confirm to Scholz's satisfaction the existence of a nascent rift valley.

In the uncontrolled conditions of the field, many seemingly unrelated factors can impinge on the geologist's work. For Scholz and his team there were the routine problems of obtaining and transporting supplies, navigating the desert where there were no accurate maps, and repairing instruments and vehicles far from civilization. Scholz describes his difficulties in dealing with the bureaucracy of the FAO as well as the pleasures of working with compatible members of the Botswana survey; of maintaining authority with his crew after an encounter with a Bushman tribe; and learning to rely on the invaluable local knowledge of his native driver. Wild animals play a major role in the memoir. In order to set up the seismometers at suitable sites, Scholz and his crew had to be aware of the habits of elephants, lions, and cape buffalo. In Chobe National Park, their chosen campsite turned out to be next to a watering hole visited every night by herds of elephants. In Chobe "the rules were set by the animals, not by us," Scholz observes (p. 114).

Although the book contains only two small (but adequate) maps of the region, no illustrations, and no index, Scholz's narrative by itself is a fascinating and useful example of how fieldwork is conducted and how it relates to both practical and theoretical goals.

PEGGY CHAMPLIN

**Thomas R. Vale; Geraldine R. Vale.** *Walking with Muir across Yosemite.* x + 166 pp., illus., bibl., index. Madison: University of Wisconsin Press, 1998. \$32.95 (cloth); \$14.95 (paper).

In this well-written book Thomas and Geraldine Vale retrace the route John Muir followed during his first summer in the Sierra Nevada, as described in *My First Summer in the Sierra* (1911; rpt., Boston: Houghton Mifflin, 1979). Part of this route later became Yosemite National Park, in large measure through Muir's advocacy. Lest we readers imagine Muir's trek as a purely wilderness journey, the Vales remind us that Muir was employed to oversee a shepherd and that the two men were accompanied by two thousand sheep, whom Muir dubbed "woolly locusts" (p. 56). After an introductory chapter on the geology, climate, vegetation, and animal life of the