

chapter, a diagram intended to show genetic affinity (genetic distance?) between 30 populations based on 69 antigens at HLA loci is poorly explained and close to uninterpretable. The scale of the distances is not defined and neither is the significance of bifurcation in the diagram. In the end, the book provides a long list of factors about human variation; however, with little theoretical underpinning, these amount to little more than travellers' tales for the curious.

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Cancer Wars: How Politics Shapes What We Know and Don't Know about Cancer

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A book entitled *Cancer Wars*, from America, might well be dominated by melodramatic anecdotes from the action-packed front line. But not so. This is an impressive book that is well documented and critically argued. Furthermore, it is about much more than cancer; it is a tale embedded in the historical and political philosophy of science. How is it that we have come to know what we think we know about cancer, and yet we have remained ignorant of much that we might otherwise know?

Robert Proctor, an historian of science, has researched his subject thoroughly. He explores the social, scientific, and political currents that have swirled around a century of cancer research—predominantly the research conducted within the United States. Throughout, he is fluent with the complex mix of biology, toxicology, physics, chemistry, molecular genetics, and epidemiology of cancer.

The book title echoes President Nixon's 1971 declaration of "war on cancer" since which time the United States has spent more than \$25 billion on cancer research. However, the results have been meager. The overall age-standardized incidence of cancer is not declining. Proctor argues that this stalemate (which others have referred to as a "Medical Vietnam") reflects various internecine "wars": the struggles between contending scientific theories about carcinogenesis; between the priorities accorded to cancer prevention, treatment, and basic biology; and between society's vested interests (capital, labor, regulator, consumer, and citizen-bystander). He criticizes the relative neglect of cancer prevention activities. Cancer cure has been the lure, always the most likely path to

a Nobel prize. A life saved is a heartwarming triumph; a cancer prevented is an invisible statistic. More importantly, society's conservative vested interests support policies that leave commercial activities unconstrained by cancer prevention while instead, the scientific establishment obligingly seeks (elusive) therapeutic breakthroughs.

Proctor examines the early theories of cancer causation. Of course, those ideas about climate, diet, humoral imbalance, stress, and celibacy now seem vague and crude. Yet it is only during this century, since Gregor Mendel and the advent of microscopy, that we have been able to imagine that cancer cells might have a "genetic" abnormality, that they might be a deviant subset of the body's cells. Subsequently, two important observations converged: first, that ionizing radiation causes cancer, as suspected from lung cancers in European (radioactive) pitchblende miners; and second, that radiation causes mutations in experimentally exposed cells. Together, these two observations suggested that carcinogenesis entails somatic mutations.

This association of cancer with genetic alteration has been the basic tenet around which much scientific and political struggle has occurred since the 1950s. With radiation-induced cancer as precedent and a new understanding of the architecture and mutability of DNA, physicochemical theories of carcinogenesis gained ground. Compared with the manifest cancer hazards of specific occupational chemicals, radiation (ionizing or solar), and cigarette smoking, viruses seemed unimportant and hormones, diet, stress, and social class seemed mechanistically elusive. Accord-

ingly, ambient environmental exposure to chemicals emerged as a plausible major cause of cancer. Although much lower in concentration than occupational exposures, environmental exposures were widespread in food, water, and air. During the 1960s and 1970s, the three archexponents of environmental cancer hazards were Wilhelm Hueper, his admirer Rachel Carson, and Samuel Epstein.

Hueper headed the Environmental Cancer Section of the US National Cancer Institute from 1948 to 1964. His attempts to document the lung cancer excess in Colorado Plateau uranium miners were suppressed by the Atomic Energy Commission; the nascent politics of the 1950s Cold War took precedence. Interestingly, his convictions about environmental cancer hazards were matched by a discounting of cigarette smoke as a major lung cancer hazard. Building on Hueper's convictions, Carson (1) argued in the early 1960s in *Silent Spring* that pervasive exposures to pesticides were an insidious health hazard. Subsequently in the mid-1970s, Epstein claimed in *The Politics of Cancer* (2) that industrial and agricultural chemical effluent and proliferating occupational exposures accounted for most human cancer. This view culminated in the high-profile, and soon discredited, estimate—emanating from the ranks of US Government science in 1978—that 20–40 percent of all cancer in American men would within several decades be due to occupational carcinogens.

Proctor's book ranges expansively over the major peaks on the skyline of American cancer research and politics. These include the history of cancer and its reputation as a "disease of civilization"; the emergence of the environmentalist view and the opposition lifestyle-centered view of cancer causation; the ideological struggles of the deregulatory Reagan era; the argument that nature itself is a source of hazard (especially Ames' thesis that human-made chemical contaminants occur at doses very much lower than natural plant-borne carcinogens); the shameless manipulation of science by powerful commercial interests ("doubt is our product," says the archvillainous tobacco industry); and the "political morphology" of the dose-response relation, with attendant debates about no-effect thresholds and linear backward extrapolation.

Moving beyond environmental controversy, Proctor examines the evolution (and episodic suppression) of knowledge about ionizing radiation and cancer; the recognition of naturally occurring domestic radon gas as a lung cancer hazard (an anti-environmentalist's "wet dream"); and the recent burgeoning of cancer molecular genetics, replete with its ethical dilemmas. He also contrasts the perennial tension between con-

servatism in science—seeking to avoid false-positive conclusions about nonexistent hazards—and the conservatism that policy makers should exhibit—seeking prudently to protect the public from possible existent hazards. Finally, he examines today's prospects for a greater emphasis on cancer prevention, given that we now seem to know quite a bit about the specific and generic causes of cancer. Straightforward public health measures, he argues, could—if the political shoals were negotiated adroitly—greatly lessen society's cancer load.

Proctor's field of vision has some limitations. Controversies over cancer do not begin and end in the United States; there are instructive dimensions to this fascinating topic in diverse cultures, environments, and polities elsewhere. Proctor does not consider how US cancer rates might actually have differed if Americans had acted differently. Perhaps he could have explored comparative data from other countries. (For example, the British have never taken environmentalism as seriously as have the Americans.) Book authors, too, have their own views: Seemingly impressed by evidence that DNA damage by exogenous exposure agents is the nub of carcinogenesis, Proctor glosses over the hormonal, metabolic, immunologic, and virologic influences on human cancers. Although he rationalizes this selectivity, the reader may well sense an imbalance.

Overall, though, this is a big and bold book, a story well told. As political philosophy, its message transcends the details of this fascinating disease, cancer. It extends beyond the now passé social scientists' debate about "real" versus "relative," about positivists versus social constructivists. Rather, it addresses directly the ideological and political entanglement of the science and policy that surround cancer and its prevention. Because the professional, commercial, and political stakes are high, there has been much unattractive self-serving behavior by scientists, business persons, and political ideologues. Did someone once say that science is value free?

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