ceives it, is an artificial, thin abstraction that overlooks the interconnectedness of a scientific-technological-material culture.

Another way to see Fuller's mistake is to recognize that both Planck and Mach were wrong. They agreed that the fundamental issue for the politics of science concerned how the unified guild interests of scientists relate to other social aspirations. But the sciences are neither unified nor separable from the wider society in responding to contemporary issues. Fuller's critique of the "political impotence" of recent science studies is tellingly silent about energy use and global warming, genetic intervention, the cultural meaning of evolution, the resurgence of infectious disease, the social transformations wrought by information technologies, or the dangers of nuclear and biological weaponry. Not surprisingly, he identifies "science studies" with the sociologists who accept Mach's and Planck's terms, rather than with the cultural historians, anthropologists, and feminist scholars who take us beyond them. Readers interested in the philosophy and politics of science will gain much from the detailed interpretations and arguments in this provocative book, even though Fuller is led astray in his own conclusions by a fundamental misconception of how to think about the intertwining of science and society.

BOOKS: MEDICINE

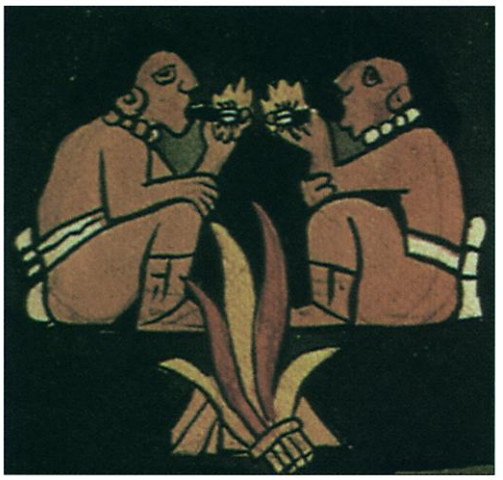
Cancer Research by Way of Metaphor

John Cairns

As a recognized authority on leukemia, Mel Greaves is comfortable in many disciplines, including molecular biology, immunology, pathology, therapeutics, and epidemiology. So he is well placed to review the whole field of cancer research. Additionally, he has a naturally fluent way of writing that carries the reader along with its uninhibited haste. Unfortunately, these skills cannot overcome the undisciplined presentation of thoughts in his book *Cancer*.

Greaves introduces readers to all the major topics in contemporary cancer research. They are told what is known about the causes and distinguishing features of the major forms of human cancer and of the experimental counterparts in other animals. If readers are left a little confused, that is partly the fault of the field, which at present is rather fragmented and incoherent. But it is also the fault of Greave's organization of his book. If there is a logic to the order of the chapters, I do not see it. The main sections are entitled (i) "Cancer: ancient legacies and modern myths"; (ii) "Evolving cancer"; (iii) "Paradox of progress: indecent exposures"; and (iv) "Finessing the clone." The book's general thesis is the widely held belief that cancers arise as the result of mutation and selection—in other words, through conventional Darwinian evolution operating at the level of somatic cells, rather than the germ line. But even knowing that, any scientist would be hard pressed to guess what the four sections are about. Scientists are trained to be direct and plainspoken; when we come up against unnecessarily flowery language and a profusion of metaphors, our first thought is that we are being conned. I can well believe, however, that nonscientists find things easier to understand when a certain amount of space-filling rumination is placed between major concepts, as a kind of referees' time out during which everyone can get another beer. So perhaps Greaves has judged his intended audience correctly.

Cancer
The Evolutionary Legacy
by Mel Greaves
Oxford University Press, Oxford, 2000. 288 pp. $27.50, £19.99. ISBN 0-19-262835-6.



Early smokers. This detail from Diego Rivera's *Las Mansiones de Xibalba* (1931) reflects temple reliefs from the Yucatan peninsula that show Mayans blowing smoke from a tube of rolled up palm leaves, reeds, or bamboo.

Nonetheless, I have to say that I found it hard to keep reading. Although I was told many things I did not know, most of them could not then be coupled with any of the references at the end of each section, nor could they be revisited later via the index. But what I found hardest to tolerate was the endless stream of metaphor. For example, the author's photograph of a leukemia cell with three copies of chromosome 8, the one color illustration in the book, is labeled "molecular mug shot of cancer cell," which is the sensational language of the popular press. And surely Greaves was being carelessly anthropomorphic when he says that expanding clones may find that "Machiavellian ploys may be advantageous"; this is the kind of lateral thinking that would have been excised by a knowledgeable copy editor.

Often the metaphors either obscure the meaning or actually introduce confusion. Even the title, *Cancer: The Evolutionary Legacy*, does not really convey what the author thinks. Cancer is hardly a "legacy" from the past, but simply the result of an unavoidable level of somatic mutation combined with the opportunity for natural selection of fitter, potentially cancerous variants. The only sense in which I can see cancer as a legacy is that natural selection decreed that lower rates of mutations were not cost-effective as long as life expectancy was only 40 years.

Like many clinicians and molecular biologists, Greaves tends to underplay the contribution of epidemiology. I had expected to find an account of Kinlen's brilliant demonstration that childhood leukemia is often the result of some kind of infection because it becomes much more common when children in isolated communities mingle with city children—as happened, for example, when London's children were evacuated to country towns during the war. Greaves never refers to Kinlen. And all he says, mysteriously on the penultimate page, about the link between infection and childhood leukemia is that he himself has a "vested interest in this idea" and craves the indulgence of his readers for mentioning it.

Reviewers are expected to show their conscientiousness by pointing out a few errors in the text. Here are some. Does any epidemiologist believe that the age-standardized incidence of cancer was 10-fold lower at the end of the 19th century? Would anyone these days say that *Mycobacterium tuberculosis* and streptococci were viruses? Since when was Bob Weinberg at Harvard, and when did the word "bacteria" count as a singular noun? I know that this is nit-picking, but I think these errors arose because Greaves's admirable ebullience is not coupled with much of an inclination to check what he has written (or to get others to check it). In the acknowledgments, he thanks someone for "deciphering [his] midnight scrawls." Perhaps that explains a lot.

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