

BOOKS

**Scientific Pathbreaker,
Feminine Trailblazer****A Feeling for the Organism***By Evelyn Fox Keller**San Francisco: W. H. Freeman.**1983. 235 pp. \$17.95.*

Reviewed by William Havender

During high school in the early decades of this century, a young woman, in taking stock of her inclination for "doing the kinds of things"—like studying for a career—"that girls were not supposed to do," pondered how she could handle her "difference." Says that woman now,

I found that handling it in a way that other people would not appreciate, because it was not the standard conduct, might cause me great pain, but I would take the consequences. I would take the consequences for the sake of an activity that I knew would give me great pleasure. And I would do that regardless of the pain—not flaunting it, but as a decision that it was the only way I could keep my sanity, to follow that kind of regime. And I followed it straight through high school, and through college, through the graduate period, and subsequently. It was constant. Whatever the consequences, I had to go in that direction.

These resonant words might well have been spoken by one of the heroines of Ayn Rand's individualist novels. In fact, however, they were spoken by Barbara McClintock, one of the world's great geneticists. Her life—an uncommonly determined, purposeful, and accomplished life—is chronicled in Evelyn Fox Keller's book, *A Feeling for the Organism*, written and published before McClintock won the 1983 Nobel Prize in medicine for discoveries in the field of genetics that underlie much current research in genetic engineering and disease control. The science of genetics must seem rather esoteric to people who are not schooled in it, so the significance of McClintock's work may not be clear. She made her major contributions to cytogenetics in the years before World War II, when scientists were still working out the relation between the phenomena that were observable by means of genetic crosses and the behavior of the microscopically observable cellular

bodies called chromosomes. Suffice it to say that McClintock's brilliant contributions at this time were seminal in establishing the chromosomal theory of inheritance. These include the first demonstration that genetic recombination is correlated to a physical exchange between chromosomes ("crossing over"), the discovery of ring chromosomes, the identification of the nucleolar organizer, and the elucidation of the cytology of the important experimental organism *Neurospora*.

She won a worldwide reputation but still found it difficult to obtain a university position, a circumstance not entirely unrelated to the fact that she was the

**Barbara McClintock**

first woman to seek to pursue a full-time career in genetic research. Still, she eventually secured a position at the Cold Spring Harbor Laboratory on Long Island's North Shore, where she remains to this day. And there she carried out the research that she regards as the most important of her career, namely her discovery in the late 1940s and early '50s of movable controlling elements that govern the turning on and off of genes in the corn plant. The significance of this pathbreaking discovery was largely overlooked at the time in the lemming-like rush of the profession to embrace the new glamor discipline of molecular biology, a rush given irresistible impetus by the working out of the structure of DNA in 1953 by James Watson and Francis Crick.

Only in the early '60s did one part of McClintock's newer work—her finding that the functioning of the genes that code for proteins can be switched on and off by genetic factors outside of the coding sequences—receive external vali-

dation in the Nobel prize-winning work of Jacques Monod and Francois Jacob with bacteria. And only in the '70s was another portion of McClintock's later work—her finding that these controlling elements can move around from place to place on the chromosomes—confirmed by the discovery of "insertion elements" in bacteria and of related phenomena in yeast and higher cells. These phenomena are currently under intense investigation for the promise they hold in understanding the coordinated growth and differentiation of tissues in living organisms and, in particular, in understanding that defect in coordinated growth known as cancer.

For those interested in learning painlessly about the history of genetic research in this century (which equals 20th-century physics in intellectual brilliance), this book is superb. For feminists, the book is to be recommended, too, as the well-told tale of yet another woman who pioneered in a man's world. And for individualists and supporters of free enterprise, the book provides a valuable illustration of the importance of a social order with many "niches" and diverse sources of funding, so that mavericks can survive even when the herds of the profession are moving elsewhere. For this reason, the ever-increasing centralization of research support in the biological sciences (currently, virtually all money for fundamental biological research comes from the federal government), with its inevitable tendency only to support work that is *conventionally* understandable, is much to be regretted. Only in a world where the sources of support are multiple, independent, and various can the true entrepreneurs of the intellect, like Barbara McClintock, flourish.

William Havender is a biologist and a freelance writer.

Clearing Deadwood**Present History***By Theodore Draper**New York: Random House. 1983. 426 pp. \$19.95.*

Reviewed by Laurence Beilenson

Nuclear war, the Western alliance, Vietnam, Henry Kissinger's diplomacy, and the Arab-Israeli wars—these are Theodore Draper's subjects in *Pres-*

ARTS & LETTERS

ent History, a collection of articles written during the last 10 years by this writer and scholar of things political and historical. His aim, he says, is "to analyze present-day events historically [and] with convincing documentation and reasoned judgment."

Draper does not suffer fools, or even mistakes of the brightest, gladly. His acid pen is at its best in burning away the deadwood that erring commentators have heaped around his subjects. His own solutions, however, are flawed by his disregard or ignorance of essential facts and his failure to use historical patterns as a guide for present policy.

The virtue and the defect become equally evident in the articles on the related problems of nuclear war and the Western alliance. George F. Kennan's advocacy of parallel declarations by the United States and the Soviet Union promising to refrain from first use of nuclear weapons, Draper spears with a single sentence: "The awful truth is that [such declarations] have no reliability at all." And if, as (*Fate of the Earth*) Jonathan Schell proposes, "we have to 'reinvent the world' to control nuclear weapons, the chance of saving the human race must be somewhere near the vanishing point." To negotiations and treaties between the United States and the Soviet Union—praised as the best hope for nuclear peace by the Catholic bishops, the media, and the peace fronts—Draper also gives short shrift. Altogether, he blows a refreshingly cool breeze through the mass of hot air beclouding the subject.

What a letdown, then, when Draper urges "minimal deterrence," as suggested by Lord Solly Zuckerman. If, as Draper asserts, deterrence is our only means of averting the calamity of nuclear war, why not deter to the *maximum* extent possible? Where survival is at stake, monetary cost should become unimportant. And as the author apparently does not know, nuclear weapons are the cheapest segment of our military establishment. We spend only one-eighth of our defense budget to deter nuclear war; seven-eighths goes to prepare to fight conventional wars in faraway places.

Having properly ridiculed the notion that treaties are reliable, Draper proposes to halt the arms race by prohibiting research and development through a test-ban treaty. The Soviets could easily pursue secret research and development and then deploy the weapons either without tests or with tests on the eve of deployment. The awful fact, as Draper

would say, is that we would have "to reinvent the world" to stop the advance in science and technology.

We shouldn't want to; it is precisely science and technology, with to-be-expected leaps, that offer the best chance of escaping from dependence on deterrence. Deterrence counts on the absence of accidents and the presence of rational conduct in a world where human error and irrational conduct have occurred regularly. To see that beneficence is not a reliable means of preventing nuclear war, it is not necessary to point to Leninist ideology and its exaltation of violence; the blood-stained pages of history bear witness enough. Real hope lies not in beneficence but in human-

kind's history of tremendous material betterment.

The geometric progress in science and technology makes probable the discovery of an effective active defense against nuclear weapons if the necessary resources and effort are devoted to the task. Impossible? Again, history teaches that conventional wisdom has derided as impossible many great inventions, including the airplane on the eve of its first flight in 1903. For the nation that put a man on the moon, active defense against nuclear weapons is feasible. Meanwhile, civil defense (whose only mention by Draper is: "a vast and wasteful program of 'civil defense'") would save millions of American lives if nuclear war should

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