portant gap in the literature. The book will be indispensable to most Earth and planetary scientists and graduate students. It will also demonstrate the exciting contributions their discipline offers their colleagues in modern physics.

BOOKS: ENVIRONMENT

Pregnancy in a Polluted World

George M. Woodwell

A diabolical scheme for injecting terror into American culture and causing 3000 deaths on American soil is enough to set off war in Afghanistan, threats of expanded wars, and bellicosity around the globe. Yet few Americans blanch at their nation's annual toll of 40,000 highway deaths or the thousands mentally crippled by exposure to lead or mercury distributed knowingly by industries. Although the emergence of terrorism as a major political force dominates attention in the United States at the moment, and incipient wars have the potential for deflecting public attention indefinitely, there remains a series of demanding environmental problems that are incrementally and inexorably degrading the human circumstance. They are serious enough to rival war in their potential for generating uncertainty as to the human future. The toxic effects of industrial effluents, one of these issues, are discussed with rare expertise by ecologist and poet Sandra Steingraber in her new book, *Having Faith*.

The topic is arcane and has been obscured, often deliberately, by defenders of our current approach to handling such effluents. The concepts, for instance, that dose makes the toxin and that thresholds for effects are universal, are convenient but clearly misleading and often quite wrong. Similarly mistaken is the popular and attractive assumption that dilution into a large environment is possible and is effective in protecting the public from the effects of noxious products. That approach to waste disposal is advanced in ignorance (or defiance) of the many routes that toxins may follow through the environment and of natural mechanisms that concentrate a wide variety of toxins in ways and places that affect life, often with devastating consequences.

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Having Faith
An Ecologist's Journey to Motherhood
by Sandra Steingraber

Perseus, Cambridge, MA, 2001. 351 pp. $26, C$39.50. ISBN 0-7382-0467-6.

The issues have become only more arcane and obscure, at least to the person in the street, with the recognition of pheromones that control aspects of plant and animal behavior at extremely low concentrations (perhaps on the order of one part in a trillion) and of the no less subtle effects of a wide variety of substances on the endocrine system. These latter effects extend to influences on human embryology and development, the realm that Steingraber probes in detail. The book is a highly personal examination of the author's pregnancy and the birth and nurturing of her daughter Faith. In addressing the effects of toxic substances, she continues to explore the topic at the center of her earlier book *Living Downstream: An Ecologist Looks at Cancer* (Perseus, Cambridge, MA, 1998).

Steingraber, a brilliantly skilled artisan of image and language, has a lucid command of much larger realms of science, scholarship, and human nature than most of us manage. She moves with apparent ease from details of personal experience and attitude through an equally detailed review of pituitary function and embryology. Her observations of the world about her amplify and leaven the intimacy of the connections between that crudely managed world and the meticulously controlled warmth and comfort of the human womb.

The beauty and grace of Steingraber's presentation almost overwhelm the seriousness of her message. Greed—supported by persistent mendacity on the part of industrial interests that are frequently, if not usually, defended by governments—has produced a chemical corruption of the globe that affects human conception, embryogenesis, fetal development, birth, and life thereafter. For DDT, radioactivity, mercury, lead, the polychlorinated biphenyls, and various by-products of the plastics industry, research has amply elaborated sources, movement through the environment, and physiological mechanisms of damage in humans. Steingraber observes that while sensitivity to the extent of the general contamination of Earth with noxious wastes leads many of us to scorn tap water in favor of bottled water, we expose ourselves in our showers to large quantities of tap water and thus potentially absorb more of its noxious burden than we would drink. The safety offered by bottled water is an illusion, and she argues correctly that there is no alternative to keeping water supplies and the world clean.

Steingraber's insights into the assumptions and attitudes that delay or prevent governmental actions and the ultimate effectiveness of belated regulations are refreshingly clear. The assumption that thresholds (levels, along gradients of exposure, below which effects are nonexistent or at least negligible) exist is misleading. Also deceptive is its corollary, the belief that "assimilative capacities" allow organisms to accommodate to some level of exposure of any toxin. Both concepts are permissive human inventions that are convenient but contribute to the contamination of the environment. Inevitably, biophysical cycles both rarefy and concentrate whatever exogenous toxins we introduce. Humans do not and cannot live isolated from the world around us. The mammalian placenta is not a barrier to toxins, and human milk is universally contaminated—although Steingraber judges that its clear advantages to the newborn outweigh the hazards its use entails.

She also points out that political action has been, and remains, effective. Restrictions on the use of DDT led, over time, to important reductions in DDT residues in the environment and reduced concentrations in human milk. Similarly, the removal of tetraethyl lead from gasoline reduced the levels of lead in the blood of urban children. Such successful outcomes support calls for action against other pollutants. Although the neurological effects of mercury have been long known, power plants still spew mercury over the American landscape, and around the world gold mining using mercury is still pursued. There is no escape. Any substance that exists as vapor can be dispersed about the globe and precipitated differentially depending on environmental conditions. The sparsely populated, cold, higher latitudes accumulate a disproportionate burden of such pollutants simply because vapors are condensed in cooler regions. So the Inuit, far removed from the benefits of industry, suffer some of its most egregious consequences.

The events of the past few months mask, at least temporarily, such fundamental concerns about the human future, and they are being used by some to deflect necessary regulatory reforms. *Having Faith*, however, strikes a brilliantly aimed blow in the name of common sense and hope for a future based on political implementation of well-defined biophysical realities of human ecology. Steingraber challenges our democratic capitalistic system to rise to new heights of effectiveness in regulatory control of environmental chemistry as an essential act of self-preservation in a seriously afflicted world.

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