
Radiation and Modern Life: Fulfilling Marie Curie's Dream

A.E. Waltar, ed.

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Several aspects of this book are initially off-putting, including the author's style of writing. However, having read the book, set it aside, and let its message "soak in," I am comfortable saying that I learned several things from the book and do not regret having read it. I shall keep it in my library as a resource for those rare occasions when I am called on to know something more about radiation than just a little bit of nuclear medicine physics.

The book has a scope far broader than the medical applications of ionizing radiation and thus serves to position the work of nuclear medicine within a larger context. Our specialty benefits from an accurate public perception, which this book seeks to promote, of the benefits and risks of ionizing radiation. The information in this book should be especially valuable to journalists and policymakers who need to understand our specialty in the larger context of the benefits afforded to modern society by the responsible, peaceful use of radiation.

The author has a background in the nuclear power industry (Westinghouse Hanford Co. and Pacific Northwest National Laboratory) and academia (head, Department of Nuclear Engineering, Texas A&M University) and has served as president of the American Nuclear Society.

According to the acknowledgments, this book was originally to have been written by Glenn T. Seaborg, who died before actually starting to write it. The author took up the mantle and enlisted Marie Curie's granddaughter, Hélène Langevin-Joliot, to write the introduction. She offers a brief history of the discovery and early investigation and exploitation of radiation and concludes that "the answer [to public apprehension regarding nuclear power and atomic waste, concerns bred by the deployment of atomic weapons and by the Chernobyl accident] is not to fear. Rather, it is to understand. . . . Let us use Marie Curie's discoveries for the greatest benefit to humanity." This book sets out to improve public understanding of those benefits.

The chapters entitled "Thriving in Radiation" and "Harnessing Radiation" give a layperson's introductions to radiation biology and to nuclear physics and engineering that are accessible and useful. The chapter on agriculture describes pest control, food sterilization, and the acceleration of the development of new cultivars by irradiation. The

brief chapter on medicine inexplicably includes a description of MRI but otherwise covers diagnostic and therapeutic uses of ionizing radiation at the same level of sophistication as the rest of the topics. The chapter on electricity discusses the growing demand for electrical power and the relative merits of nuclear and other means of power generation in meeting that demand. I particularly enjoyed the chapter on modern industry, which describes several ways that radiation makes modern manufacturing methods practical and efficient. The chapter on transportation is largely just a further description of industrial and manufacturing uses of radiation. The applications of radiation described in the chapter on space exploration consist mainly of thermal and electrical power generation and spacecraft propulsion. The chapter entitled "Terrorism, Crime and Public Safety" discusses smoke detectors, DNA fingerprinting, and detection of explosives and provides a capsule summary of the effects were terrorists to explode a dirty bomb and how these risks compare with others encountered in life. The chapter on arts and sciences discusses radionuclide-dating methods, production of special gems, and nondestructive analysis of works of art. The chapter on environmental protection mentions tracer methods in ecology and briefly discusses environmental contamination from past weapons production and power generation activities and accidents, how radioactive waste may be stored more safely for the long term, and the relative future environmental impact of nuclear power and its alternatives. The book concludes with an overview of radiation in chapters entitled "Modern Economy," "A Day with the Atom," and "A Glimpse into the Future." Throughout this whirlwind tour, the author's message is that radiation offers considerable hope for meeting the demands of a growing population for safety, sustenance, health, and power and that the risks of using radiation to meet these demands are manageable and pale beside the benefits that it offers.

I found the author's discussion of food irradiation perhaps the most informative and a good counterargument to the antiirradiation stance taken by my local health food store. I was fascinated by the discussions of cultivar production, heating and powering of spacecraft, and sandpaper manufacturing.

While reading the book, I compiled 2 handwritten pages noting quibbles with it, many of which are just particularly painful turns of phrase and a few of which amount to concern that particular discussions are one-sided or seem to me to be strongly biased in favor of radiation. That said, the author does acknowledge that there are other points of view on controversial topics and he does not ignore negative topics such as radioactive contamination incidents. The book seems to have a slant toward an audience in the United States, both from the examples chosen and from the use of traditional units of measure in many places.

My only real disagreement with the author is over the implication of half-life. In 2 places in the book, the author invokes $A = \lambda N$ (activity equals the decay constant times the number of unstable nuclei) without stating the formula, to argue that materials with long half-lives pose less risk than those with short half-lives because the decay constants of the

former are smaller and hence the exposure rates are lower. That may be true per unit mass of the material. However, we in nuclear medicine tend to measure sources with the A rather than the N, as perhaps do those concerned over long-term storage of radioactive wastes, and thus might conclude that, per unit activity, a shorter half-life is preferable.

This book is valuable for its broadly encompassing overview of the presence, uses, risks, and benefits of radiation in modern life. The level of presentation is nontechnical and should be accessible to a wide audience. Other readers may enjoy the author's personal, chatty, and anecdotal style more than I did.

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