

Nuclear is for Life

**A Cultural
Revolution**

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For
George, Edward, Minnie,
Joss, Alice, Alfie
and
others of their generation
who inherit what we leave

About the author

Wade Allison is a Fellow of Keble College and an Emeritus Professor of Physics at the University of Oxford. There he studied and taught for 40 years, covering subjects such as electromagnetic radiation, particle and nuclear physics, and medical physics. His first book was an advanced student book: *Fundamental Physics for Probing and Imaging* (2006). Concerned that many otherwise educated people have significant misconceptions about radiation and nuclear energy he wrote his second book for a wider audience: *Radiation and Reason, the Impact of Science on a Culture of Fear* (2009). It attracted considerable attention around the world, especially following the accident at Fukushima Daiichi in 2011, after which it was published in Japanese and Chinese. Since then he has been to Japan several times to lecture and to visit teachers, community leaders, doctors and evacuees in the region affected by the accident. Incidentally, he has never had any connection with the nuclear industry.

Some reviews of *Radiation and Reason*

“Sensational.” **Simon Jenkins, The Guardian**

“I very much agree with the conclusions of this book, and am very pleased to see them presented in a style that makes them accessible to the general reader.” **Sir Eric Ash, FRS**

“If Professor Allison’s well-documented arguments are right – and if people can be persuaded to examine them! – his book gives us a little more hope of confronting the problems posed by both dwindling fossil fuel reserves and the release of their waste products into the atmosphere.” **Michael Frayn, playwright and author**

“This is an important and useful book. Wade Allison’s message is simple - we’ve got it wrong about nuclear power. We’ve over-reacted to the level of risk posed by low level radiation exposure, and because of that we make nuclear power ridiculously expensive. The arguments are very powerful.” **Brian Clegg, Popular Science website**

“Why I’m becoming a pro-nuke nut..... The other scholar challenging my nuclear views is Wade Allison....we must consider all alternatives available to us — including nuclear energy, which just a few months ago I fervently opposed.” **John Horgan, Scientific American**

“Even if you disagree with where Allison takes his arguments, a large part of the book is a good accessible review of the science of radiation and its biological effects. This in itself makes it a potentially valuable read for activists interested in nuclear and environmental issues.” **Peace News**

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Preface

This book expands on the message of *Radiation and Reason* (2009) following the Fukushima accident (2011). It is a broader study of the historical, cultural and scientific interactions of radiation with life; it asks why society takes such a cautious view of nuclear technology; it looks at the effects of nuclear accidents and other radiation exposures; it looks at the efficacy of safety, as provided by nature and as imposed by regulation; it explains how biological evolution prepared life to survive exposures to low and moderate levels of radiation; it asks if nuclear energy would be expensive, if normal levels of information, education, safety and design were applied.

These questions are not difficult, though far too few people are asking them. I suggest that the answers are important for everyone on the planet in view of atmospheric pollution and its effect on the climate. I shall be encouraging my grandchildren to read and look with fresh eyes at the amazing natural world that is our home. May they and their contemporaries understand better the beauty of what they see, and so look after it better than my generation has done.

Chapter 1 gives a short outline. The points it makes are supported by the evidence and discussion given in the body of the book. Chapters 2 and 3 discuss public confidence, trust in nuclear energy and the events at Fukushima. Chapter 4 tells how the use of energy has changed as life has evolved. Chapter 5 is about the science of radiation and how it affects life; including an explanation of the conventional LNT (Linear No-Threshold) model and why it is mistaken. More evidence of the effect of radiation on life from accidents and experiments is provided in Chapter 6. Chapters 7 and 8 cover the extraordinary natural protection of life afforded by the physical and biological sciences, each in their separate way. The task of outlining an evidence-based safety regime that takes proper account of nature is discussed in chapter 9, which then goes on to ideas of how this might be explained to the public who have been misinformed for so long. Chapter 10 is a historical account of the view that radiation is dangerous and why authorities still support this view in spite of the overwhelming evidence that it is mistaken. This historical account of the people involved, and why they behaved as they did, makes an interesting story that is more about human nature and less about science. Chapter 11 is a discussion of the relationship between trust in science, religious culture and natural philosophy. Chapter 12 summarises a number of conclusions.

The subject matter is far reaching and readers may wish to move from chapter to chapter, skipping sections that seem too obvious or demanding; to help in this some harder passages are shown enclosed in boxes. Some notes and references are given in square brackets and listed at the end of each chapter, but I do not imagine that readers will need to look at all of these. At the end of the book is a short list of recommended books, articles, videos and websites, referenced by labels [SR1] to [SR10]. There are also a glossary, lists of tables and illustrations and an index. Those illustrations that are quantitative are described as diagrams or graphs; others may be merely descriptive or sketches.

A study such as this is not possible without the help of many people. I have made many friends, some of whom I have never met but whose contributions have been essential and whose opinions I have come to respect. Mohan Doss, Rod Adams, Jerry Cuttler and other members of SARI, the international ad hoc group. Their knowledge and determination give great hope that one day radiation and nuclear energy will be accepted. James Hollow who read through drafts of *Radiation and Reason*, gave me unstinting assistance in Tokyo for this book too, also with help from Paul Eden. I also thank others who introduced me to useful contacts and information in Japan including David Wagner, Tateiwa san, Takamura san, Dr Oikawa, Dr Hashidume, Professor Tom Gill and Shoji Masahiko. I thank John Brenner, Ikeda sensei and Takayama san for their support, and also other members of SRI (Society for Radiation Information) in Japan for making me welcome on my recent visits. Those who have worked painstakingly through my writing and wielded a red pen with justice have my profound thanks: John Priestland, T.R., Clive Elsworth, Richard Crane, Richard Walker and, of course, my wife Kate who has also encouraged me and kept me going over the months and years. Thanks too to all members of my family who have seen less of me recently than they should. Thank you to Royston Robertson for drawing the cartoons, to Richard Crane and Michelle Young for building the website and to my son Tom for designing the cover, also to York Publishing Services who have been most helpful and held my hand during the publishing stage, as they did for *Radiation and Reason*. Inevitably and regrettably, when all is done, there are many omissions and no doubt some mistakes too, that should be laid at my door.

Wade Allison
Oxford
October 2015