

Specifically, the idea of users as rebels is outlined most forcefully in the final section of the book and particularly through the descriptions of computer hackers in eastern Europe. Highlighting the individual consumer's power to subvert the technology of large-scale corporations links nicely to the book's conclusion, which examines the recent past to plea for users to actively challenge governmental and corporate-level decisions regarding technology: 'When individual users of consumer goods transform themselves into user-citizens, they become a force to be reckoned with' (p. 326).

COREEN MCGUIRE  
*University of Leeds*

ANGELA N.H. CREAGER, *Life Atomic: A History of Radioisotopes in Science and Medicine*. Chicago: The University of Chicago Press, 2013. Pp. xvi + 489. ISBN 978-0-226-01780-8. £31.50 (hardback).

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It is no secret that Matthew Meselson and Franklin Stahl's crucial experiment on DNA semi-conservative replication – based on radioactive labeling – is connected to the Hiroshima and Nagasaki blasts of August 1945. It is, however, less known that it is possible to draw a line from modern ecology back to the same Manhattan Project that purportedly put an end to the Second World War and commenced the nuclear age. In the two decades following the end of the conflict, life scientists teamed with nuclear researchers to expand the use of radioisotopes – radioactive atoms obtained by hitting existing elements with a neutron beam in a cyclotron or a nuclear reactor – in life sciences. Angela Creager's book follows radioisotopes in their booming phase, from the 1940s, to their relative decline in 1960s. Widely used as tracers in biological research, their role is mirrored in the historical perspective: following these human-made elements, it is possible to trace in great detail the development of life sciences post-Second World War.

As Creager's reconstruction underlines, the use of artificial radioactive elements pre-dates the war. However, the shift from low-energy cyclotrons to nuclear reactors made radioisotopes cheaper and more abundant. This shift also changed the institutional apparatus connected to the new elements. In the US the military became the main source for radioisotopes, and this changed the way in which scientists worldwide could access the material. At the same time, radioisotopes became 'political' objects to be exploited in the Cold War arena. The Atomic Energy Commission (AEC), created in 1946, inherited the management of nuclear power from the military-operated Manhattan District created during the war: one of the AEC's main concerns was to develop a positive public attitude towards atomic energy, and radioisotopes became an integral part of this effort. Creager devotes several pages to this topic, showing how scientists and politicians' agendas often clashed: while the AEC pushed for the free circulation of radioisotopes (implementing a low-price policy and making the bureaucracy easier), delivering nuclear 'objects' abroad appeared dangerous in the Cold War climate. Notwithstanding the political hurdles, science greatly benefited from the new technologies based on radioactive elements. The new molecular approach to biology blossomed thanks to the use of tracers: radioactive elements incorporated within biological macromolecules (e.g. nucleic acids or proteins) so that it was possible to follow in depth metabolic processes even in complex organisms.

The great wealth of details presented in Creager's reconstruction shows that molecular biology and biochemistry overlapped in their practices and shared many traits: the use of radioisotopes has been the common backbone for the development of a physical approach to the understanding of life, producing widely used methods as well as new questions to investigate. Medicine benefited from the use of radioisotopes too, especially in diagnostics. Several paragraphs are devoted to the introduction of radioelements in medical practices, and these sections are probably the most interesting within the book: they connect fundamental research and the 'hype' surrounding the use of radioisotopes in therapy. High hopes were raised, but results were scarce. Yet the promises perfectly fitted within the political agenda – the atom as a peaceful tool – so that they gained

momentum: radioisotopes were heralded as lifesaving tools, only to be quietly forgotten a few years later. Medical research also involved one of the most controversial issues touched on in the book: the series of experiments conducted on human subjects, well beyond the ethical boundaries established in Nuremberg. These studies included administering radioactive elements to pregnant women in order to investigate iron metabolism, as well as heavy total-body irradiation of veterans, so that information about the harmful effects of atomic warfare on soldiers could be gathered. Only in the 1990s were these experiments made public and investigated by an advisory committee to US president Bill Clinton, who made a public apology in 1995. The secrecy of these experiments was not only due to military reasons; worries about possible negative publicity were also involved.

Public attitudes toward atomic energy are also a theme of the tenth chapter, devoted to ecology. The fears elicited by atomic energy – from nuclear waste to fallout – shaped the discourse and the practices of environment studies: managing the consequences of the new power source became a constant concern for the public and for governmental agencies such as the AEC. Again, the ‘tracer’ approach proves to be crucial in highlighting the complex webs of interaction within ecosystems. It became clear that various organisms could concentrate pollutants up to a thousand times with respect to the surrounding environment, so that even a small but constant release of radioactivity in the air or in water bodies could pose a threat. In this sense, radioactive contamination became the model for any other kind of pollution.

Relying on a solid base of archival sources, Creager manages to picture in full the growth of a whole technology and the several developments it allowed. The network of people, concepts and practices in the US is accurately portrayed, showing how science is not limited to the laboratory. The book, which for obvious reasons is limited to one country, is definitely a foundational piece of scholarship, hopefully opening the way for comparative and critical studies. A global history of radioisotopes, tracing the tracers around the world and mapping the relations among scientists and their research, would further enlighten issues that are only hinted at in the book, such as the international circulation of technologies and scientists, the role of scientific relations within the hot climate of the Cold War, and industrial innovation in the sensitive domain of atomic energy. With its richness and density, this book is a stimulating gateway to new historical research.

MAURO CAPOCCI

*Sapienza Università di Roma*

CATHERINE JOLIVETTE (ed.), **British Art in the Nuclear Age**. Farnham: Ashgate, 2014. Pp. xv + 275. ISBN 978-1-4724-1276-8. £70.00 (hardback). doi:10.1017/S0007087415000886

Artists can tell radically different narratives about the world. In the edited volume *British Art in the Nuclear Age* their stories create landscapes and links that are not readily exposed by scientists or mainstream media. Part of Ashgate’s Histories and Interpretations since 1700 series, the volume offers us a new angle to the often revisited history of the nuclear Cold War. In nine chapters, historians of art, curators, gallery directors and PhD candidates share insights into the nuclear world by way of art. This is a new way of looking at this particular history, and one that comes at a time when artists are yet again asking, “Who killed the world?” (*Mad Max: Fury Road*, 2015). The book is a timely reminder of the power of representation and the role of the artist in times of political anxiety and nuclear tension.

*British Art in the Nuclear Age* will be of equal interest to historians of science and art, artists and scientists. The varied, visual responses of the many British artists discussed here create an insight into the ambivalent feelings of the time. Straddling the boundaries of hope and despair, beauty and horror, their artworks negotiate the realities of places such as Hiroshima and the potential of nuclear energy. The artists in the book respond to real places and imagined threats. They work