

already familiar with each case.

Concepts such as ‘credibility’, ‘influence’ and ‘deliberative democracy’ are the focus of the book’s closing chapters. Although they are important concepts, these chapters would have been more valuable if they had been discussed with the same analytical breadth and empirical depth of the book’s first six chapters. But the same critique can be made of much of the literature on science and society: strong on diagnosis, less strong on prescription. It shows that scholars of science, policy and politics are just like the experts they study — they have more work to do in practising what they have learned about knowledge and action in the changing context of science policy.

Overall, this is an excellent book, worth reading by anyone interested in science, politics and the environment. But it is likely to be of particular value to environmental scientists who want to understand how and why the role of science in society is changing. ■

Roger Pielke Jr is at the Center for Science and Technology Policy Research, University of Colorado, Boulder, Colorado 80309-0488, USA.

Marketing Marie

Obsessive Genius: The Inner World of Marie Curie

by Barbara Goldsmith

Weidenfeld & Nicolson/W. W. Norton: 2004.
320 pp. £14.99/\$23.95

Susan Lindee

The life of Marie Curie was better than fiction. She was brilliant, driven and difficult; a scientist of the first rank; a mother; a young widow; a scorned woman in love with a married man; and a shrewd marketer of both herself and her discoveries. She won two Nobel prizes — for her work on radioactivity and the discovery of radium and polonium. She died aged 67 as a result of her cavalier approach to laboratory exposure to radioactive materials. Her appearance was also striking, both as a pale, beautiful young woman and as a stern, intense matriarch.

It is perhaps unsurprising that her life story has been told and retold in hundreds of biographies since her death in 1934. Beginning with her daughter Eve’s affecting 1937 study, biographers have sought to illuminate her tragedies, intellectual style, determination and achievements, in studies aimed at scientists, children and the general public, published in English, French and many other languages. The flood shows no signs of abating: since 1995 there have been 36 English-language biographies entitled, roughly, *Marie Curie*. These include Susan Quinn’s *Marie Curie: A Life* (Simon & Schuster, 1995), a fast-paced and well documented portrait of the Curies and their world, and *Marie Curie: A*



THE ART ARCHIVE/CUIVIER PICTURES

More than a woman: Marie Curie believed she had overcome the physical constraints of the body.

Biography by historian of science Marilyn Bailey Ogilvie (Greenwood, 2004).

It would be reasonable to wonder why anyone would want to write another biography of Marie Curie. Her personal papers, still somewhat radioactive, have been accessible to researchers for more than a decade, and the details of her life have been well known in outline for 60 years. What more could there possibly be to say?

Yet I must acknowledge that Barbara Goldsmith has managed to say some interesting things, and they are not the result of intense data-mining. Rather, she contributes a slow, methodical curiosity about matters that other authors have brushed past.

Goldsmith turns her attention to Curie’s shifting ways of writing about her husband Pierre in the diary written after he was killed in a traffic accident, and to the mixed messages in Pierre and Marie’s discussions of the commercial applications of their work. She addresses Marie’s decision to involve her 17-year-old daughter Irene in the dangerous and gruesome war work of X-raying stricken soldiers, and she ponders Eve’s estrangement from her mother. The Curies’ interest in spiritualism, their attendance at séances and

their involvement with the Society for Psychological Research are explored in the context of Marie’s reactions to Pierre’s death. The public scandal over her affair with the physicist Paul Langevin is considered primarily in terms of its depressive effect on Marie, rather than in sociological terms, which could illuminate gender relations in early twentieth-century France. Goldsmith then considers the Curies’ incautious handling of radium, which she attributes to their love of their own discovery. A final chapter outlines the family’s enduring legacy and continuing scientific achievement. In all these discussions, Goldsmith makes good on her promise to excavate an “inner world”.

As Goldsmith acknowledges, Marie Curie invented her own life story in the ‘autobiographical notes’ that accompanied her 1929 study of Pierre after his death. That life story, which has shaped virtually every biography of her since, emphasized the irrelevance of the physical body to scientific work. She described her paltry diet, her cold garret room and her poverty, using such details to highlight the legitimacy of her apprenticeship to science. Curie said she was strong enough to overcome the constraints of the

Science in culture

The Pied Piper of Düsseldorf

The artist Joseph Beuys tried to lead his followers into a promised land of transformative imagination.

Martin Kemp

Shaman or charlatan? Genius or joker? The German artist Joseph Beuys polarizes opinions. Sculptor, assembler of things, installation maker, performance artist, teacher and polemicist, Beuys became a kind of Pied Piper for generations of young artists in the final three decades of the twentieth century. Dressed in a sleeveless flak jacket and white shirt, with a wide-brimmed felt hat shading dark-rimmed eyes sunken in gaunt features, he exercised a mesmeric spell. He aspired to lead his followers into a promised land of new human potential and transformative imagination. Modest he was not.

He was determined to rewrite both history and the future. He was fascinated by Leonardo da Vinci, like so many others who have sought to transform our creativity, individually and collectively, by reuniting science and art. In the mid-1970s Beuys created his own set of drawn pages to emulate Leonardo's rediscovered codices in the National Library in Madrid. Leonardo is seen as marking a turning point in the history of Western thought. His creations were still imbued with the spiritual wholeness of medieval thought but showed clear signs of the positivist and materialist character that was to dominate subsequent science and technology and fragment our modern consciousness.

Beuys distrusted, or even hated, the analytical 'coldness' of modern science and the materialist mechanisms of our technological society. Such feelings are a recurrent theme in artists' commentaries. Benjamin Robert Haydon, an English painter of the early nineteenth century, declared that Isaac Newton had "destroyed the poetry of the rainbow, by reducing it to its prismatic colours". It is easy to dismiss such views as ignorant and puerile, but Beuys was familiar with science, having had a passion for natural history as a youth and flirting with medicine before training as an artist.

His imagery draws heavily on science and technology, particularly in the diagrammatic organization of philosophical, scientific, economic, political



and social concepts on the blackboards that featured in so many of his performances. His vitrines (works in glass cases), such as *Double Objects*, speak the vocabulary of display in science museums, and regularly exploit substances and objects that involve what might be called a 'humanized technology'. Within the glass case the paired objects, reverentially arrayed, play on recurrent themes in his work. There are typical echoes of the mythologized story of his rescue as a crashed fighter pilot on the Crimean front in 1944. His broken and freezing body was, legend has it, coated in fat, wrapped in felt and revived by Tartars who discovered his wrecked plane.

The battered batteries, blocks of peat, coal, butter and soap speak of energizing, vivifying, warming and cleansing. The telephone, made primitively from double tins, and the Siberian Symphony gramophone records evoke poignant sounds from past times. The enamelled bowls, glass bottles and paired X-ray images together convey medical associations. In Beuys' personal language of symbols, the X-rays and the brown crosses painted on the telephone represent

beneficial qualities, and the doubling of the objects signifies human conjoining and completeness.

What Beuys was striving to assert on the broadest front of social communication was the centrality and unifying power of the warmth and wholeness of the human spirit in all the diverse fields of our activity. Almost 20 years after his death, his agenda can be seen to belong to the long history of utopian visions that are more seductive than realizable. What does remain, and continues to exercise its power, is an uncanny evocation of his personal presence, his tale of near-death and his charismatic life.

His surviving creations, many of which can be seen at Tate Modern in London until 2 May, transform ordinary items and mundane substances into composite entities. They speak of human values that science must address and embody if it is to be integrated and comprehended in our twenty-first century society.

Martin Kemp is professor of the history of art at the University of Oxford, Oxford OX1 1PT, UK, and co-director of Wallace Kemp Artakt.

♦ www.tate.org.uk/modern/exhibitions/beuys

body, its need for food and warmth. By implication, she could also overcome those constraints that made her own, female body an almost insurmountable barrier to intellectual achievement. Her descriptions of a self-sacrificing life of the mind had an enduring popular appeal, and biographers writing for the children's market have emphasized Curie's indifference to 'feminine' things of the body (food, clothing, beauty) and her engagement with 'masculine' things of the mind (science, truth, evidence and power).

Goldsmith, an experienced biographer, notes that she was herself seduced as a young

girl by the Curie legend. Like myself, and so many others, she was drawn to the image of the brilliant, tragic, woman scientist, particularly as played by Greer Garson in the 1943 film *Madame Curie*. In one memorable scene, the newly introduced Marie and Pierre begin to discuss their scientific work, but just as the first few technical words are exchanged, the scene suddenly leaps forward in time to the close of their discussion and the last few technical words. The intellectual life that bound Marie and Pierre together apparently had no particular bearing on the love story. Goldsmith's biography is similarly unconcerned

with Curie's scientific contributions. Quinn's 1995 account presents Curie's scientific world in much more detail, but a full-length scientific biography of Curie has yet to appear.

Goldsmith has the sense to refrain from grandiose and dramatic claims, and her tone throughout is quizzical, calm and perceptive. The book provides not new information but a thoughtful perspective on the life of one of the most important scientists of the twentieth century. The author is careful in her extrapolations from available records, and does not assume that she knows anyone's inner feelings unless they have been expressed

in writing. With its clear and accessible style, the book could be shared with young readers, who might be less susceptible than earlier generations to narratives of romantic self-sacrifice, and more intrigued by the psychological portrait of a complicated and accomplished woman scientist. ■

Susan Lindee is in the Department of History and Sociology of Science, University of Pennsylvania, Philadelphia, Pennsylvania 19104-6304, USA.

Rivalry and revenge

Costantinopoli 1786: la congiura e la beffa (Constantinople 1786: The Conspiracy and the Hoax)

by Paolo Mazzarello

Bollati Boringhieri: 2004. 327 pp. €24.

In Italian.

<http://www.bollatiboringhieri.it/>

Nicola Nosengo

The second half of the eighteenth century was a time of spectacular advances in the life sciences. Fundamental problems such as the generation of life were addressed for the first time using modern experimental tools. But these issues were the source of great controversy, and also great rivalries among biologists — or philosophers, as they still preferred to call themselves.

At a time when many scientists were still convinced that life can be generated spontaneously from decomposition, the Italian Lazzaro Spallanzani was the first to demonstrate the necessity of sperm for reproduction. He was the first to perform artificial insemination — a challenging experiment at the time, especially as he was a Catholic priest.

Spallanzani was a strong opponent of Carolus Linnaeus, who in 1735 had published the first complete classification of living species, mostly based on external traits. Spallanzani, however, was convinced that naturalists should study every aspect of living forms, including their behaviour and environment, rather than simply force them into groups according to what they look like.

Such a man could easily make enemies. In Pavia, where he taught natural history at the university and was responsible for the museum, Spallanzani was surrounded by envy, particularly from Giovanni Antonio Scopoli, a chemist and botanist, and devoted follower of Linnaeus. The rivalry between Spallanzani and Scopoli resulted in a conspiracy worthy of a Shakespearean tragedy. The tale is told in this book by Paolo Mazzarello, a professor of the history of medicine at the very same university in Pavia.

In 1785, Spallanzani set sail for Constantinople, taking advantage of Venice's new diplomatic links with the Ottoman capital. He had taken a year off from teaching in Pavia, but this was no pleasure cruise — it



Lazzaro Spallanzani poured scorn on rivals whose experiments failed to meet his own high standards.

was a genuine scientific mission. Spallanzani left Pavia equipped with scientific instruments, such as barometers, thermometers, lenses and a microscope. He spent most of his time taking measurements and collecting samples, studying everything from living species to climate and geology.

In Spallanzani's absence, his rivals conspired against him. Under the instructions of Scopoli, Serafino Volta, Spallanzani's assistant in the museum, visited his family home in Emilia, asking to see his private museum. He then accused Spallanzani of stealing objects from the Pavia museum and putting them in his own collection. The news spread throughout Europe and reached Spallanzani, by now in Vienna on his way home.

On his arrival in Pavia, Spallanzani was able to prove his innocence and restore his reputation. His rivals were severely reprimanded by the authorities in Milan.

But this was not enough for Spallanzani, who took a supplementary revenge when Scopoli, in 1785, announced his discovery of a new species of worm: a human parasite unlike any other previously known. The parasite ostensibly came from a woman from northern Italy, and its scientific description brought Scopoli fame. He even dedicated it to the botanist Joseph Banks, then president of the Royal Society in London. But in 1787 the worm turned out to be a hoax, constructed by a farmer for a joke from the oesophagus and windpipe of a chicken. Spallanzani ensured that Scopoli's humiliation was widely

known. Using a pen name, he wrote a pamphlet, full of scorn and cruel irony, condemning Scopoli's ability as a scientist.

Scopoli, he wrote, wanted to study nature inside "dead museums", only hoping to be lucky enough to discover and classify new animals and put them on the shelves. But nature, in Spallanzani's view, had to be studied in action, observing animals' behaviour, comparing them in terms of the structures and functions of their organs. Had Scopoli paid more attention to the internal structure of the worm, had he stopped to wonder how it could actually live, he would probably have realized his mistake and avoided his humiliation, argued Spallanzani in his pamphlet.

Mazzarello tells the whole story with detailed descriptions of landscapes and the people Spallanzani met during his journey, based on his diaries. He describes Spallanzani's "lust for knowledge", his being as "fascinated and seduced by Nature as his contemporary Giacomo Casanova was by women".

But what is really compelling is that through this plot we can observe the development of experimental methods in biology. It is mostly over methods that Spallanzani and his rivals clashed. The worst that Spallanzani could throw at his rival when he took his revenge was to call him a poor experimenter. Personal authority was no longer enough in science unless it was supported by reliable and replicable methods. ■

Nicola Nosengo is on the editorial staff of the Italian science magazine Galileo, based in Rome.