Jane Maienschein. *Embryos under the Microscope: The Diverging Meanings of Life*. Cambridge, Massachusetts, Harvard University Press, 2014. x, 336 pp., illus., \$28.95.

KEYWORDS: embryology, stem cells, in vitro fertilization, genetics

The historian and philosopher of biology Jane Maienschein “sorts through the muddle” of ideas about embryos in the present-day United States (10), and fights those powerful meanings that owe more to metaphysics and sentiment than science. She is rightly most critical of the recent movement to recognize personhood from conception, which she sees as harking back to views from millennia ago. Instead, she seeks a shared respect for science, while recognizing that this leaves room for values and thus debate. Much like Maienschein’s *Whose View of Life? Embryos, Cloning, and Stem Cells* (Harvard University Press, 2003), this book proposes to provide reliable knowledge of embryology, in part through summaries of current science, but mainly through history. Science communication does not always need history, but Maienschein offers it as a resource for reflection that can help avoid past mistakes and act as a source of productive questions to grapple with new techniques. History can also show “how and why each new understanding has emerged” (10), while past choices shed light on present dilemmas. The history Maienschein tells is European and American, generally of animal as well as specifically of human embryology; the focus for the most recent past is on human embryos in the United States with admiring side-glances at the regulatory regime in the UK.

As a structuring device, Maienschein has grouped approaches to studying embryos into seven “clusters” or overlapping periods (19). The first substantive chapter quickly reviews “the hypothetical embryo” and “the observed embryo” from Aristotle to the mid-1900s, the former only imagined, the second directly seen. The rest of the book concentrates on the period from the late nineteenth century, beginning with an account that takes “the experimental embryo” from the manipulations by Wilhelm Roux and Hans Driesch in the 1880s and 1890s to the invention of cell culture and transplantation. The next chapter is about “the inherited embryo,” with reflections on DNA, genes, and nuclear transplantation, as well as “the evolved and computed embryo” since Roy Britten and Eric Davidson’s theory of gene regulation in 1969. A section on “physical modeling and picturing development” links to a chapter on “the visible human embryo.” This considers in vitro fertilization, Lennart Nilsson’s fetal photographs, contraception, abortion, (heterosexual) parenthood, genetic engineering, eugenics, and preimplantation genetic diagnosis. Three chapters then discuss “the engineered and constructed embryo” beginning with Jacques Loeb’s announcement of sea-urchin parthenogenesis around 1900 but emphasizing recent stem-cell debates and the promises of regenerative medicine.

In this way, Maienschein covers a lot of ground while touching on various fascinating episodes. The text is accessible, though the complex illustrations from Karl Ernst von Baer (41), Wilhelm His (64), and Robert Edwards (141) would have benefited from more explanation. Some favorable reviews from biologists and journalists

suggest that Maienschein is meeting a need. Historians of biology and medicine are not the target audience, but the book raises questions for us about how best to write the short, reliable, up-to-date, socially engaged survey history of embryology we lack. Maienschein's prescription is remarkably specific—"Any careful look at embryos should start with the first, hypothetical period and categorize the history of studying embryos into seven somewhat overlapping, roughly chronological periods" (22–23)—but other divisions would work as well or better. Her scheme skates over the nineteenth century, giving the years of transformation around 1800 and the theory of evolution around 1900 short shrift. One would hardly know that for decades, Darwinism drove most research on embryos and the promotion of an embryological vision of life. (It was also the context for Ernst Haeckel's coining of the term *stem cell* in 1868.) The emphasis on the twentieth and twenty-first centuries is understandable, however.

Though promising "the story of science" (x), Maienschein has not imposed much of a narrative beyond her main theme—the problematic persistence of the hypothetical embryo—and this leaves the treatment episodic. Though no one would demand a strictly chronological presentation, it is challenging to build a sense of change, in views of embryos or as these related to larger shifts in the sciences, and thus to begin to specify and explain past choices. From paragraphs such as those about early work on human embryos and on the discovery of the germ layers (61, 63), it is hard even to reconstruct accurately who did what. Explanation is made the more difficult throughout by the separation of "the scientific understanding of embryos" from "social considerations," which Maienschein includes only when high levels of politicization put "science and society . . . in direct contact" (18, 218). This leaves the history rather thin.

History will provide more useful resources if it recognizes all knowledge as social, from collecting the embryos to writing up and discussing the results. This would bring more centrally into the story such nonembryological understandings as the various interpretations by pregnant, aborting, or miscarrying women, and the fishermen, hunters, and others who supplied nonhuman material. More fully representing these competing discourses would facilitate engagement with social histories of bodies and images. It will further aid reflection on current controversy to recognize that much of the history can be written in terms of arguments among people with different views. These encompass resonant innovations reported in the press and on television as well as esoteric topics of interest only to small groups of researchers, but all demand attention to processes of communication and debate. Assessing the role of visual images, in particular, requires more precise tracing of their display. It is not quite true that already "[i]n 1953, Watson and Crick and their DNA model appeared on the front cover of magazines and newspapers" (107) or that "[o]nly in 1978," with the birth of Louise Brown, "did the very first stages of normal human development become visible in living organisms via in vitro fertilization" (138). Taking communication seriously would make the past a still more relevant resource for the present, when means of sending and receiving information attract almost as much comment as what is said.

Many will applaud Jane Maienschein's stand for policy consistent with science. While she also deserves credit for addressing a wide audience, discussion is needed

of the kinds of history that would serve reflection best. May this book encourage others to do more and different, and so contribute also to debate over the history of embryos.

Nick Hopwood

Department of History and Philosophy of Science, University of Cambridge, Free School Lane, Cambridge CB2 3RH, UK

doi:10.1093/jhmas/jrv042

Advance Access Publication: October 13, 2015

Christian W. McMillen. *Discovering Tuberculosis. A Global History, 1900 to the Present*. New Haven and London, Yale University Press, 2015. xii, 338 pp., \$40.00.

KEYWORDS: World Health Organization, BCG vaccine, HIV/AIDS, antibiotic resistance

Tuberculosis (TB), as Christian McMillen points out at the start of this volume, kills one-and-a-half to two million people every year, and yet, since the 1940s, the means to cure it have been available: antibiotics work. Why then are there still millions of people suffering and dying from this curable disease in the twenty-first century? This is the question that McMillen sets out to answer, and he does so with commanding knowledge and compassionate insight. This study is, despite the many breakthroughs in TB control, an account of failure: not one failure but many. However, as he is at pains to emphasize, this is not an exercise in blame but an attempt to analyze the structures that constrain and direct the decisions and actions of individuals and organizations. Amongst the significant structures, he includes the discourse of race, the lure of cost-effectiveness, the “trap of compliance” that led to a focus on patient behavior, the “well meaning, though lumbering, behaviour of a global bureaucracy” and a “willful blindness to readily apparent failures” (228).

McMillen’s history of TB is rightly termed “global” because it provides the history of the disease across the globe, including the Americas, Africa, and India, and because it traces the global responses to the disease. The book tells its story in three parts. In the first part, McMillen explores the arguments around race and biology most strikingly formulated in relation to American Indians and Africans as the subject. With little or no epidemiological knowledge of TB amongst these peoples, racial susceptibility and virgin soil explanations proved, he shows, very compelling. Even though the discursive predominance of such explanations had waned by mid-century, race never entirely disappeared, and McMillan shows how it remerged in new guise in recent discussions on genetics and TB.

In the second part of this book, McMillen focuses on the 1950s and 1960s. He claims that this period, when “will,” “money,” and “expertise” came together, was the most productive period in the history of TB control (61). With the advent of the BCG vaccine and antibiotics, TB could, it was thought, be rendered impotent. McMillen argues that this optimistic prediction rested on both “hope” and “hubris”