

its role in the moral order rests on a minimal conception of the possibility of God. The volume concludes with Watkins's argument that certain features of the natural and moral orders are possible only on the basis of the divine order. The claim is revisionary in redirecting Kantian anthropocentrism back toward divinity, which, given Watkins's aims for the volume, makes perfect sense.

The advantage of the volume's approach is that it is wonderfully ambitious. If early modern philosophy really does turn out to have order as its overarching theme, it will presumably provide us with rich, more historically adequate insight into the period. However, the volume does not quite reach its goal. First, more had to be done to justify the assumed need for a unifying narrative. It may well be that the period involved various philosophies that overlapped piecemeal in various ways, without any single unifying thread. Second, even if we accept the need for a unifying narrative, the volume would have benefited from an extended, programmatic attempt to argue that it is *order* that plays that role. The introduction includes a few general remarks about how order was at issue (p. xviii), but the justification is missing. Presumably, the evidence in favor of order is intended to come out of the individual essays that make up the collection. What they show, however, is that order is *an* issue for certain early modern philosophers, but not that it is *the* issue that provides a united, single account. The picture that comes out of these essays is ultimately not that of order as a new grand narrative, but of order as a partial narrative that usefully highlights various features of various philosophies and various connections between them. That is no bad thing.

Barnaby R. Hutchins

Jane Maienschein. *Embryos under the Microscope: The Diverging Meanings of Life.* x + 336 pp., illus., tables, index. Cambridge, Mass./London: Harvard University Press, 2014. \$28.95 (cloth).

Embryos under the Microscope has an activist aim: its author, Jane Maienschein, wants to improve debates on what should and should not be done with embryos. She argues that participants in current U.S. policy debates on matters like abortion, cloning, and stem cell research all too often ignore biological knowledge. Antiabortionists, for example, defend their opinion by claiming that fetuses can feel pain, although biologists are convinced that they cannot. And the personhood movement advocates (legal) personhood for all fertilized eggs, a position Maienschein considers untenable because biology teaches that most of these eggs will never develop into fully formed individual organisms. Maienschein sees such arguments as "inconsistent with the scientific facts," something that in her eyes "should not be acceptable in modern society" (p. 14). She urges us all to look through the microscope, directly or indirectly (for example, by reading her book), and learn what biology says about embryos. Biology's lessons are, according to Maienschein, best learned in their historical context. Hence, the book tells the history of embryo research.

Maienschein starts with an ancient chicken and its egg. Almost twenty-four hundred years ago, Aristotle opened eggs to study the development of the chicks inside. He saw an undetermined mass change into a small chicken and concluded that embryos develop gradually—a view known as epigenesis. Epigenesis contrasts with preformationism, the idea that the embryo is fully formed right from the start (although its form might not yet be visible to us). From antiquity until the early modern period epigenesis was the dominant view (and it returned later). Maienschein skips most of these centuries: she moves straight from Aristotle to the Scientific Revolution, when researchers like William Harvey started looking at embryos through the newly invented microscope—thus transforming Aristotle's "hypothetical" embryo into an "observed" one.

The hypothetical and the observed embryo, Maienschein explains, are the first two of seven stages of embryo research—a periodization she considers self-evident. The third stage is the experimental embryo,

which arose around 1900 in the laboratories of, among others, Wilhelm Roux, Hans Driesch, Edmund Beecher Wilson, and Thomas Hunt Morgan. With the rise of genetics came the inherited embryo, wherein development was seen as guided by DNA. In the late 1960s it was followed by the computed embryo, characterized by computational models showing how the embryo evolved. Up until then, almost all empirical research had been done on animal embryos. Frogs were particularly popular because their fertilized eggs are so easily acquired and observed. The same applies to sea urchins, often used in early twentieth-century laboratories. Human embryos, however, remained largely inaccessible to researchers until 1978, when Robert Edwards and Patrick Steptoe managed to fertilize a human egg *in vitro*. For the first time, a living human embryo could be put under the microscope: the visible human embryo emerged. However, even with *in vitro* fertilization, only the earliest stages of human development can be studied microscopically: once the embryo is about five days old and reaches the so-called blastocyst stage, it has to be either implanted or frozen (for implantation at a later date); otherwise it dies. The last period Maienschein distinguishes is the engineered/constructed embryo—an entity that Jacques Loeb already attempted to create around 1900 but that remained theoretical until the second half of the twentieth century, when Beatrice Mintz created mouse embryos out of cells from different mice in the 1960s, Nicole Le Douarin managed to combine duck cells with first quail and later chick cells in the 1970s and 1980s, and Ian Wilmut and his team cloned a sheep in the 1990s.

Our journey through these seven chronological but overlapping stages is beautifully illustrated—we see sketches drawn by researchers, figures from landmark articles, and photographs of both embryos and embryologists in action. The book is easy to navigate: it has a clear structure, with eight main chapters, and an extensive, helpful index. Less extensive are the references, especially those to secondary literature. Remarks like “According to some historians, Mendel was a revolutionary who did not cause a revolution” (p. 113) and “The social understanding of embryos . . . has been widely discussed elsewhere” (p. 18) lack annotation. This probably will not bother general readers, seemingly Maienschein’s main audience, but it may disturb historians of science.

Another thing that may not please every historian of science is Maienschein’s tendency to judge past science according to present-day norms. She writes, for example, that Loeb’s perspective “was well ahead of most of his contemporaries” (p. 177); that “we know today that although this [Roux’s theory] is a clever theory, it is not the way chromosomes actually work” (p. 71); and that, before the microscope, “data come from belief rather than empirically grounded knowledge” (p. 2). Such remarks fit with her activist aim to teach people what twenty-first-century biology thinks about embryos. This aim the book certainly fulfills, although I doubt that it will indeed lead proponents of personhood for embryos and antiabortionists to change their minds—I suspect that their views stem from more than just a lack of knowledge.

Hieke Huistra

Lino Conti (Editor). *Natura e scienza nella rivoluzione francescana*. 316 pp., illus.
Perugia: Edizioni Centro Stampa, 2013. €20 (paper).

On 18 and 19 October 2012, a group of scholars gathered in the Sala dei Notari in Perugia to explore “Scienza, natura, pratiche terapeutiche nella rivoluzione francescana,” the “Franciscan revolution” that took place in the thirteenth century. This relevant information is mentioned nowhere in this volume. Yet one of the major strengths of *Natura e scienza nella rivoluzione francescana* is the ways in which the papers engage with each other. The volume’s introduction welcomes us, the audience, to the Sala dei Notari, and the discussions that took place there must have been fascinating. For example, the papers propose a variety of definitions for the “Franciscan revolution” but do not, in the end, agree even on whether it was a purely thirteenth-century event with long-lasting consequences or is in fact ongoing