

Soraya de Chadarevian and Nick Hopwood, eds., *Models: The Third Dimension of Science* (Palo Alto, CA: Stanford University Press, 2004), xvi + 464 pp., illus., \$65.00, \$24.95 (paper).

This anthology literally brings a new dimension to our understanding of scientific representation, practice, and pedagogy. With an introduction, thirteen historical essays, and two commentaries, *Models* ranges widely from Enlightenment architectural models to contemporary computer graphics.

Most readers of *JHB* will undoubtedly be drawn to the more biological chapters of this volume. Renato Mazzolini's exploration of the Florentine anatomical models (meticulously created in wax and later wood) expertly contextualizes the work of the Florentine Museum and its director, Felice Fontana. Mazzolini describes Fontana's shifting emphasis from wax models meant to be viewed to wooden models intended to be dissected and reassembled. For Fontana, tactile experience unified his practice of modeling artificial anatomies with practices of real anatomical dissection. The production of anatomical models is revisited in Nick Hopwood's analysis of the Ziegler's nineteenth-century embryological models and in Thomas Schnalke's exploration of moulages, wax models of disease produced until the mid-twentieth century. Embodying the theories of notable biologists, such as Wilhelm His and Ernst Haeckel, the Ziegler models were fashioned as essential tools for teaching and as a form of research publication. Hopwood captures the dynamic relationships between subject, viewer, modeler, and scientist as he charts the rise and fall of these wax creations. The production of "realistic" wax models from the interaction of subject, viewer, modeler, and scientist is also superbly rendered in Schnalke's discussion of moulages. In contrast to the Ziegler's silent embryos, moulages represented patients with their own perspective on their disease and its representation. The individuality and realism of these productions forms an important feature of Schnalke's analysis as he describes different relationships to these models; in effect, moulages served as boundary objects, although he does not use that term.

Moulage collections were displayed as exhibits of medical expertise, institutional pride, and individual expression. The display of nature through models is a theme taken up directly in James Secord's essay on the dinosaur displays at the Crystal Palace exhibition and in Lynn Nyhart's essay on natural history museum exhibits. Taken together these contributions beautifully illustrate attitudes toward authenticity in depictions of nature as these exhibits actually begin to incorporate

sometimes very large bits of nature itself. Secord and Nyhart also reveal the commercial and ideological dimensions surrounding the display of nature as well as the tensions between authentic representation and financial solvency notable at the Crystal Palace and elsewhere.

The role of models in research, especially as guides to thought and to seeing the unseen, is well explicated in Soraya de Chadarevian's contribution on modeling in molecular biology, Simon Schaffer's analysis of models of electric fish and ship hulls, and Mary Morgan and Marcel Boumans's fascinating treatment of hydraulic models of economic systems. In all three of these cases, models were constructed as simulations of natural phenomena and as such became accepted as the objects of research themselves. The models of protein structure described by de Chadarevian also reveal the struggle to find forms of representation that rendered large and complex structures visible and understandable. The tension between realism and communication is masterfully presented in this essay and in contributions by Christoph Meinel on the first chemical models and Eric Froncoeur and Jerome Segal on the rise of computer graphics. These essays, as well as Malcolm Baker's and Christopher Evan's, highlight the significance of what role models are given and the relative importance of aesthetic features. While Baker and Evans document the tension between viewing models as aesthetic and scientific objects, de Chadarevian and others demonstrate the role of aesthetic considerations within scientific practices of modeling in the twentieth century.

While the heart of this anthology consists of engaging historical studies, it concludes with two commentaries. The first, by James Griesemer, considers models and modeling from the perspective of the philosophy of science. Focusing on problems of epistemology and representation, Griesemer convincingly argues for the relevance of three-dimensional models and the act of modeling itself for our understanding of historically situated knowledge production. The second commentary, by Ludmilla Jordanova, engages the preceding essays from the perspective of art history. Jordanova urges the further consideration of scientific modeling as visual culture in a way that explores the practices of producing objects as well as the wide array of cultural influences that shape their production and interpretation.

Models is a rich and engaging exploration of three-dimensional representations in science. The demonstrated tensions between the real and the imagined, the authentic and the artificial, the modeler and the modeled, as well as the scientist and her audience are masterfully

analyzed. This edited volume will certainly have a great influence on the future of research on scientific representation.

Michael R. Dietrich

Michael Ruse, *The Evolution–Creation Struggle* (Cambridge, MA: Harvard University Press, 2005), 327 pp., \$25.95.

I find myself in the embarrassing situation of reviewing Michael Ruse's book having just started one of my own on the same subject for the same publisher. Admittedly, the target audiences are different – his is aimed at the general reader while mine will be a text for introductory history of science courses. But allowing for the differences in style that will entail, the comparison may be of interest to *JHB* readers. Michael and I disagree on some factors in the history of evolutionism, but since I have expressed my comments recently in the *JHB* [38, no. 1 (2005): 19–32], I shall not repeat them here. I do, however, want to point out some differences between the ways in which we try to understand the response of religious thinkers to evolutionism and in the tactics to be used in addressing the nonspecialist readership in this area.

Let me begin by making it clear that this book is a *tour de force* of popular historical writing. Ruse has a knack for focussing on key individuals and texts (he quotes several hymns) to help identify positions. You have to take your hat off to an author who begins his chapter on pre-Darwinian evolutionism with Diderot's description of a lesbian nun's orgasm – and then shows you why it's relevant. But this technique does involve jumping from one example to the next with little time to describe what went on in between. Even Darwin gets very little exposure, presumably because he didn't write much on religion. More seriously, Ruse misses the continuity of the liberal Christians' efforts to forge a synthesis with evolutionism – Teilhard de Chardin appears as a bolt from the blue in the 1950s as though no one had been defending that position for the previous half-century. Admittedly, the existing literature on the topic often ignores the fact that even in America there were high-profile religious leaders desperate to stem the tide of Fundamentalism.

Ruse himself is deeply involved in the defense of evolution against the Creationist attack. He analyzes the debate in terms of a polarization, but not the simple division between secular evolutionism and Creationism. He argues that both evolutionism and Creationism are a response to the crisis of faith initiated by the Enlightenment. He sees a