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Shaping Science with Rhetoric: The Cases of Dobzhansky, Schrödinger, and Wilson

Michael Dietrich
Dartmouth College

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merely convenient—is sometimes problematic. Giacomo Pietramellara, for example, is included among the fifteenth-century teachers, though his teaching spans the period from 1496 to 1536, and Eustachio Manfredi in the seventeenth century, though in fact he taught from 1699 to 1739—the inconsistency in this case is made more evident because Manfredi is mentioned in the introduction to the chapter following the one where his profile is included.

The volume contains 132 biographies; these treat astronomers like Gian Domenico Cassini, Geminiano Montanari, Lorenzo Respighi, and Guido Horn D'Arturo as well as figures who are virtually unknown. For each astronomer the name and its variant forms are given, though not all of the variants are included in the index, as would have been useful. The biographical profiles are followed by a list of the astronomers' original works, often manuscripts, and by secondary bibliography. When available, iconographic sources are mentioned. The concluding apparatus—annual lists of the teachers of astronomy, a bibliography, and several indexes—is useful and well presented.

The sources used include the *Rotuli*—the main source for the lecturers' census—as well as the main reference works and biographies of scientists. Much of the information comes from archival documents including those stored at the Historical Archive of the Department of Astronomy of Bologna University.

Each chapter is preceded by a brief introduction—which does not, however, claim to be exhaustive—summarizing developments in astronomy in Bologna during the period. Bönoli and Piliarvu's book will prove a useful tool for those who would like to deepen their research on single themes or characters, since the astronomers' files are exhaustive and do not refer exclusively to their period of teaching at Bologna University.

The second volume under review presents the proceedings of a conference held in Bologna in 1997 to celebrate the seven hundredth anniversary of Bartholomew of Parma's *Tractatus Sphaerae*, the third part of which is published here for the first time (the first two parts were published by Enrico Narducci in 1884, and the accompanying CD presents the complete text).

There is little certain information on the life of this astrologer, and most of what we know is inferred from his works. "The evidence that Bartholomew taught in the Faculty of Arts is scanty," writes Charles Burnett (p. 70). Another question is how much is original in Bartholomew's work and how much is derived from other

authors, especially Michael Scot or common earlier sources. Burnett approaches the matter by analyzing the astrological texts of a manuscript that belonged to Nicholas of Kues, two of which are attributed to Bartholomew, and by comparing them with some of Michael Scot's works. The similarities seem to refer back to a corpus of astrological texts that were elaborations of literal translations from the Arabic made in the twelfth century, but "who was responsible for these elaborations is not yet clear" (p. 68). Silke Ackerman deals with a set of new constellations contained in Bartholomew's *Breviloquium*; these differ from the set of forty-eight Ptolemaic constellations and demonstrate the strong dependence of Bartholomew's work on Michael Scot's *Liber de signis*. The environment in which Bartholomew's works and teaching developed is reconstructed by Federici Vescovini, who analyzes the curriculum at the Bologna Faculty of Arts and Medicine and emphasizes the strong link between medicine and astrology.

Finally, John D. North, in his notable essay on the allegorical theme of the astrology of the Crucifixion, shows how the spread of astronomical knowledge—also due to university education—enabled Dante and Chaucer to use new forms of astronomical and astrological allegory with some hope that their readers could appreciate them. Altogether this is a very stimulating book, though not all the contributions reach the standard of those I have mentioned; the figure of Bartholomew is revealed in all its "severe intellectual limitations" (North, p. 22), but without disregarding the importance of the cultural role he played.

MARIO DI BONO

Leah Ceccarelli. *Shaping Science with Rhetoric: The Cases of Dobzhansky, Schrödinger, and Wilson.* xi + 204 pp., illus., bibl., index. Chicago: University of Chicago Press, 2001. \$20 (paper).

Shaping Science with Rhetoric offers a rhetorical and historical analysis of texts intended to inspire interdisciplinarity in science yet, curiously, fails to inspire a strong interdisciplinary connection itself. The subjects of Leah Ceccarelli's analysis are three books: Theodosius Dobzhansky's *Genetics and the Origin of Species* (1937), Erwin Schrödinger's *What Is Life?* (1944), and E. O. Wilson's *Consilience* (1998). Each of these books sought to bridge the gap between different communities of scientists or between scientists and humanists. Ceccarelli devotes two chapters to each book, the first pro-

viding analysis of its historical context and significance and the second offering a rhetorical analysis of its construction and interdisciplinary function. The rhetorical strategies of these texts are then compared, with the failure of *Consilience* to inspire interdisciplinary collaboration contrasted to the success of Dobzhansky's and Schrödinger's texts.

As rhetorical analysis of scientific writing, *Shaping Science with Rhetoric* makes an interesting and valuable contribution. Close reading and comparative analysis allow Ceccarelli to find what she calls "conceptual chiasmus": linguistic constructions that lead readers from one discipline to think from another perspective. This conceptual boundary crossing is reinforced by her analysis of polysemy: linguistic constructions that support multiple readings or meanings. When these tools are applied to the three texts in question, Ceccarelli demonstrates how choices of metaphors and other forms of presentation foster or fail to foster connections between divergent perspectives. Her presentation and analysis of different readings of the Schrödinger text is particularly persuasive.

As historical analysis, Ceccarelli's contextualization of these texts is disappointing. The book offers a schema for integrating historical and rhetorical analysis. As such, it has great promise and is worth pursuing. However, because Ceccarelli rests a great deal of her rhetorical analysis on problematic historical analysis, her rhetorical analysis and her case for the value of integrating rhetoric and history are undercut. Take, for example, her analysis of Dobzhansky's *Genetics and the Origin of Species*. Ceccarelli presents this text as the catalyst of the evolutionary synthesis. Dobzhansky's book was certainly influential, but when Ceccarelli considers its rhetorical influence she restricts her analysis to book reviews. We know that Dobzhansky's book had a profound influence on Ernst Mayr's *Systematics and the Origin of Species*, yet this book, which was modeled on Dobzhansky's, and Mayr's many other texts discussing *Genetics and the Origin of Species* are not considered as evidence of Dobzhansky's rhetorical appeal. Moreover, by representing the many historical interpretations of the synthesis in opposition to each other, Ceccarelli selectively represents the historiography of this period as one of polarizing antagonism. The possibility of a complex, multilayered understanding of the synthesis is denied, and the context for the synthesis is reduced to a brooding conflict between naturalists and mechanists. Given this "antagonist" view of the synthesis, it is surprising that Ceccarelli does not

make more of the perceived political tension underlying the sociobiology debate and the subsequent reception of Wilson's *Consilience*, where such a view may be more appropriate.

Shaping Science with Rhetoric offers an interesting perspective on the articulation of interdisciplinarity in science. Its value rests in its rhetorical analysis and the promise of future integrations of historical and rhetorical analysis.

MICHAEL R. DIETRICH

Alfred W. Crosby. *Throwing Fire: Projectile Technology through History*. xii + 206 pp., illus., index. New York: Cambridge University Press, 2002. (Cloth.)

This charming book entertains and vexes. It displays all the originality and wit that have made Alfred Crosby's earlier works so influential and popular, especially his *Ecological Imperialism* (Cambridge, 1986) and *The Measure of Reality* (Cambridge, 1997). Unlike those works, however, *Throwing Fire* lacks focus. It is, rather, an extended essay, almost a stream of consciousness, ruminating on the connection between throwing and fire. The connection is not adequate to his purpose.

Crosby begins by defining humans as "two-legged throwers who start fires" (p. 4). He devotes some space to explaining the origins and significance of human bipedalism but focuses most of his attention on the human penchant for effecting "change at a distance via projectile and fire" (p. i). The story unfolds in four stages—or "accelerations," as he calls them. During the first acceleration, from the Pliocene age to the Middle Ages, humans threw with organic muscle power, sometimes aided by machines, sometimes by gravity. He suggests, among other points, that throwing contributed to brain development, that fire was used by prehistoric peoples to shape the environment, and that human hunting contributed to the extinction of many large animal species in the late Pleistocene age. This first acceleration climaxes in the Middle Ages with siege engines and Greek fire, the only premodern technologies to combine fire and throwing.

The next acceleration traces the introduction of gunpowder from its Chinese origins, through Western adoption, to the gunpowder empires of the Middle East and Japan's centuries-long experiment in "giving up the gun," climaxing with the Paris gun of World War I. Most of this material is familiar, save for Crosby's suspicion that "there is more to our addiction to explosives than reason." He believes that "we love them for themselves, for their spectacle, the joy and terror