matography) is a good example of the intersection of science, technology, and art. It adds a new example to the already known "artistic" practices of several prestigious calico printers and colorists from earlier in the century and reinforces Goethe's *Zur Farbenlehre* (1810) as a model of the integration of scientific, artistic, and technological factors in a unified account of the theory of colors. As John Gage has also shown in his *Colour and Culture* (Thames & Hudson, 1993), the new palette of synthetic colors provided new artistic possibilities to painters and artists.

Nevertheless, Runge's profile as an artist-chemist seems to be more an exception than a rule among the main actors in the long-term technological change from natural to artificial dyestuffs that took place throughout the nineteenth century. The history of the chemistry of synthetic dyestuffs probably owes more to Justus von Liebig's tradition and to the German style of organizing a science-based industry complex in the final decades of the nineteenth century than to the Romantic approach followed by Goethe and Runge.

Nonetheless, *Synthetic Worlds* offers a very interesting reflection on the concept of "artificiality." It explores the power of the chemical industry to transform nature—to make new compounds and to imitate natural substances in the lab and on a large scale. In that sense, the new colors became commodities, industrial objects that Leslie submits to critical analyses as elements of the industrial capitalism of the nineteenth century and even as features with uses in the Nazi period, as the chapter on I.G. Farben clearly shows. In Leslie's view, the new families of aniline colors—synthetic alizarin and indigo—are more than simple chemical reactions that were tested in quality control laboratories and also more than substances produced on a large scale in factories. They tell us a great deal about artistic taste, business, nature, politics, and the environment. "The Poetics of Carbon," "Class Struggle in Color," and "Nazi Rainbows" are some of the intriguing chapter titles, signaling Leslie's broad cultural approach to synthetic colors. As stated on page 11, the book "tracks the confluence of technologies of industrial production, philosophies of science, politics and aesthetics from the onset of industrial capitalism." This is what makes *Synthetic Worlds* particularly fascinating—though at the same time it points to the book's lack of a defined analytical focus.

Inspired by the work of Theodor Adorno and Walter Benjamin, Leslie takes a critical approach to the development of the chemical industry and its capacity to transform nature in depth. She also uses Marx, Engels, and Lenin as contemporary witnesses of the technological change from natural to artificial colors. The book helps us to integrate science and technology better in the works of some of the most relevant Marxist thinkers, a topic that surely warrants further exploration.

This is a daring and original book that will raise many interesting questions for historians of science and technology. Despite its heterodoxy, as a whole it challenges an overly optimistic image of science, technology, and progress that is still a subtle component of our research agendas.

AGUSTÍ NIETO-GALAN

**David Philip Miller.** *Discovering Water: James Watt, Henry Cavendish, and the Nineteenth-Century "Water Controversy."* (Science, Technology, and Culture, 1700–1945.) 330 pp., illus., bibl., index. Burlington, Vt.: Ashgate, 2004. $ 114.95 (cloth).

The 1839 meeting of the British Association for the Advancement of Science was the starting point of a priority dispute about a scientific "discovery" involving many eminent British philosophers and scientists. At the time, the "discovery" at stake was already part of the history of science. It concerned a major shift in the Chemical Revolution: a series of combustion experiments with hydrogen, performed between 1781 and 1784, and the subsequent theoretical conclusion that water was not an element but a chemical compound consisting of hydrogen and oxygen.

In the vein of Robert Merton, David Philip Miller uses this controversy as a vehicle to study more general epistemological and sociological questions about the nature of science and of the scientific community. But Miller seeks thoroughly to historicize Merton. He studies controversies not to carve out a universal normative structure of science but to trace the contingent ways in which the historical actors "attributed" the label "discovery" or "discoverer" to certain events or persons. What counted as a scientific discovery in early Victorian science and culture? What was the image of science and of its relation to industry and society in that time and culture? What kinds of broader social interests informed the BAAS members' images of science and scientific discovery? These are the major questions that Miller discusses effectively at the beginning of his study. A controversy is thus used, in a

historicized way, as an epistemological and sociological laboratory.

Working with a broad range of primary and secondary sources, Miller provides a dense historical description of the British "water controversy" and its context from the 1830s through the 1850s, supplemented by a brief discussion of the earlier priority dispute in the more immediate aftermath of the Chemical Revolution. The rich historical material he presents offers a clear picture of competing views about the nature of sciences in early Victorian Britain, which may be classified roughly along two lines: a utilitarian view that argued for closer linkages between the sciences and industry, and a more contemplative one that argued for disinterested research and "ultimate utility" only; the former rendered Watt, the latter Cavendish, iconic figures. Much of Miller's material, however, is not concerned with the water controversy directly but with the protagonists' lives and their various practices constituting the more or less immediate context of the controversy. So, why would we want to scrutinize an extremely complex controversy, one that is transparent only if we also possess substantial historical knowledge about the Chemical Revolution, when we can achieve the same goal in an easier way?

Following a specific controversy may provide insight into the working life of the protagonists' concepts of science and their concrete ways or "strategies" of "attributing" discoveries. It may allow us to grasp the protagonists' actual practice of selecting and highlighting certain aspects of the event at stake as significant criteria for its identification as a "discovery." In the specific case of the water controversy, however, such an approach entails a methodological problem. The point is that the protagonists' criteria for their judgment about the "discovery" of the composition of water and the related questions of priority hinged not merely on their more general concept (or "ideology") of scientific discovery but also on their specific historical knowledge about the Chemical Revolution. Their views about the nature of scientific discovery intersected with their methods of performing the history of science, and this fact certainly does not facilitate Miller's analysis. Reading Miller's illuminating quotations of the different participants in the water controversy, it becomes clear that their judgments depended crucially on whether they had carefully studied the historical documents; some of them even sought out documents in archives. The differentiations between the experimental and the theoretical dimension of the "discovery" that many of these protagonists made, as well as their nuanced accounts of the specific contributions of Watt, Cavendish, Lavoisier, and several other chemists, are sometimes astonishing indeed. Unfortunately, most of these nuances are obliterated in Miller's analysis. He also seems to propose that something like universal or "basic argumentative strategies" exist in priority disputes (drawing on A. G. Gross), which further casts his entire enterprise into question.

*Discovering Water* offers many new insights into early Victorian science and the concept of science at the time, as well as stimulating ideas on scientific controversies, but as a historical analysis of the specific controversy it treats it is not always persuasive.

URSULA KLEIN

**Kim Pelis.** *Charles Nicolle, Pasteur's Imperial Missionary: Typhus and Tunisia.* (Rochester Studies in Medical History.) xx + 384 pp., figs., apps., bibls., index. Rochester, N.Y.: University of Rochester Press, 2006. $90 (cloth).

Kim Pelis's thoughtful, thorough study of the French microbiologist Charles Nicolle (1866–1936) suggests the benefits of analyzing the connections between the scientific and political aspects of colonial medicine. Nicolle assumed the directorship of the Tunis Pasteur Institute in 1906. He guided its transformation from a sleepy laboratory, established in 1893 (Tunisia became a French protectorate in 1881), into one of the most active and illustrious of the sixty-five institutes that existed worldwide by World War II. The renown of the Tunis institute can be traced back in no small part to Nicolle's demonstration of the louse transmission of typhus. That discovery, made in 1909, would secure for Nicolle the 1928 Nobel Prize in Medicine and Physiology. Even before he received this honor, however, recognition of Nicolle's work made the Tunis institute an important attraction for prominent scientists and writers. He marshaled his burgeoning reputation to forge an international medical research network, especially between France and the Americas (the United States, Mexico, Argentina), where typhus remained a serious and puzzling problem. And he pursued the implications of his louse discovery, challenging the accepted medical doctrine of specific diseases through the development of ideas such as "inapparent infection," the individuality of microbes, and the fortuitous evolution of disease entities. Although much of Nicolle's conceptual and administrative work entailed a criticism of