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A History of Science in Society: From Philosophy to Utility. By Andrew Ede and Lesley Cormack. (Peterborough: Broadview, 2004. 458 p., fig., ill., bibl., index. ISBN 1-55111-332-5 \$42.95)

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On the History of Science in Society: From Ivory Tower to Utility

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***A History of Science in Society: From Philosophy to Utility.* By Andrew Ede and Lesley Cormack.** (Peterborough: Broadview, 2004. 458 p., fig., ill., bibl., index. ISBN 1-55111-332-5 \$42.95)

The blurb for this book promises “a concise overview that introduces complex ideas in a non-technical fashion ... [b]eginning with a small group of philosophers in Greece and ending with nanotechnology,” and the authors deliver. The prose is indeed clear and succinct, and the chapters are arrayed chronologically, with each chapter covering an array of disciplines. Since I take seriously the assignment of a reviewer to be critical I would like to make it quite clear at the outset that I enjoyed reading the book and I learned a lot in the process.

But why do we need a book of this kind? Has the genre not been pronounced dead? The historian James A. Secord gives us an answer to those questions:

After years of expert demolition by specialists, the established stories in the field—from the origins of science in ancient Greece to the Darwinian and Einsteinian “revolutions” are in ruins. Most researchers have grave doubts about the viability of a “Scientific Revolution” in the seventeenth century, although the concept remains central to the public presentation and image of the discipline. As a result, a construct founded on the primacy of method, genius and heroic discovery continues (albeit awkwardly) to organize a body of specialist literature devoted to criticizing the coherence of such concepts. Designing another kind of account is proving a difficult challenge.¹

As if to spite such dismissals, *A History of Science in Society* not only asserts that a Scientific Revolution did indeed take place but also unabashedly repeats the stories that Secord proclaimed “in ruins.” It focuses especially on “giants of science” (p. 143) and pretty much attends

1. Quoted in Nick Jardine, “Whigs and Stories: Herbert Butterfield and the Historiography of Science,” *History of Science* 41 (2003): 125-140, page 133.

to the five hundred individuals given the most coverage in the *Dictionary of Scientific Biography*.²

What might the purpose be of pursuing a history of science from Plato to NATO (or maybe by now it should be from Zeno to Nano)? The authors themselves do address the question in their conclusion:

For people living in the twenty-first century, science is an incredibly powerful tool for political, economic, and social change. (p. 404)

Scientific research represents a complex interplay of social demands, technical constraints, and personal interests and abilities. It is not driven solely by ideas, but neither can it be produced to order. While science has provided some profound insights into the structure of nature, it has also presented us with some difficult questions about how to use that knowledge. Ironically, knowing more has made our choices more difficult rather than less. Understanding history of science offers another venue for approaching these difficult questions, since it can show us the power and the danger of past choices and explain how we arrived at the world we live in. (p. 419-420)

Each chapter does provide a context as a general backdrop to the science of each individual covered, and occasionally the narrative ties up an individual's work with that backdrop. For example, we are told that in early Egypt, astronomy mattered for very practical aspects of statecraft, and we are also told that the infrastructure for public debating in Greek City states framed philosophy (Geoffrey Lloyd's argument), but subsequently the narrative describes a string of Greek cosmologists and philosophers without tie-in to either of those themes. The chapters on the "Scientific Revolution" and the "Enlightenment" succeed best in providing an account of philosophy and research in context, and it is no surprise that these are the areas of Andrew Ede's and Lesley Cormack's expertise.

But in general the book fails to convey to this reviewer a sense of the complexity of research: the vagaries of instrumentation, the difficulties of replication, the many failures, and the fits and starts. Instead, the reader is provided with thumbnail sketches of a long string of success stories; the primacy of method, genius, and heroic discovery is indeed the organizing principle. And furthermore, each sketch is given with perfect hindsight. The resulting subliminal message seems to be that finding scientific truth is basically straightforward.

The reader may imagine me climb to the pulpit, sanctimoniously wag a finger, and charge the authors with the sin of Whiggism. So let us remember just why Whiggism is supposed to be so bad. The Whig inter-

2. Charles C. Gillespie, ed., *Dictionary of Scientific Biography*, 18 v. (New York: Scribner's Sons, 1970-1990).

pretation selects its materials so as to condemn or exclude all that doesn't belong to a triumphal progress converging on present beliefs and institutions.³ The coiner of the phrase, Herbert Butterfield, didn't question progress as such but merely the linear view of history that fails to realize "how crooked and perverse the ways of progress are, with what wilfulness and waste it twists and turns, and takes everything but the straight track to its goal, and how often it seems to go astray, and to be deflected by any conjuncture, to return to us—if it does return—by a back-door".⁴ Butterfield found Whigs to have a tendency to regard progress as the work of "friends of progress" triumphing over obstacles placed in its way by its "enemies."

Let us judge Ede and Cormack by this yardstick. The narrative does converge on the present in just the way denounced by Butterfield. A refrain from the Greeks through the Middle Ages increasingly marginalizes the supernatural and theology (p. 33, 43, 65, 76, 88, 89). In Early Modern Europe the convergence narrative is combined with the identification of precursors to experimentation, such as Paracelsus: "Although much of his work had mystical aspects, he also promoted the concept of understanding matter, based on elemental composition, one of the foundational ideas of later work in chemistry" (p. 121). Institutional history also converges: "Sixteenth-century natural philosophers, providing status and spectacle for European princely courts, are the linear ancestors of the Manhattan project and Big Science funded by the government and military" (p. 404).

There are many other instances of oversimplification—not just in the sense of providing an artificial convergence. Consider the following: "Although this method [parallax] worked for close stars, it did not work for objects farther away since the light of distant objects had no measurable angle of intersection" (p. 350). Hindsight here precludes understanding. How does one know that parallax is a viable option at all, if it doesn't work for most stars? One can only know this by recourse to other techniques. The abbreviated account thus misrepresents the issue by making parallax on its own seem unproblematic and trustworthy.

There are several other examples of abbreviated accounts that in effect dismiss the complexity of the historical process of "chance, conflict, compromise, and unintended consequences."⁵ Among examples found at a glance in the book:

3. Jardine, 130.

4. Jardine, 131.

5. Jardine, 134.

Philosophically, the concept of the participation of the observer in the thing observed, the end of objectivity, had far-reaching implications, helping to produce the cultural relativism that transformed the social sciences in the twentieth century. (p. 308)

[The] link between the behaviour of cells at the microscopic level and the evidence of evolution at a macroscopic one was still unclear until Mendel's work was rediscovered in 1900. (p. 314)

[The] stability of geology was called into question when Alfred Lothar Wegener (1880-1930) introduced his ideas about the continental drift in 1912. (p. 346)

In many ways, uncovering the structure of DNA was like being given the owner's manual to an expensive car and finding that it was written in code. (p. 394)

And why is all this simplification bad? For Butterfield, the Whig interpretation, by presenting the past as convergent on the present, ratifies our prejudices and encourages historians to venture beyond the limits of history by delivering moral judgements, the historian should be "neither judge nor jury, but expert witness".⁶ And Ede and Cormack do judge: The authors list "positive and negative effects on natural philosophy" (p. 93); cold fusion is "wishful thinking" (p. 102); "scientific charlatans flog their wares with impunity" (p. 405); "dozens of crazy ideas ... turn out to be complete hogwash and deserve to be struck down." (p. 408); and "[u]nfortunately" the court ruling in the Scopes trial hindered proponents of evolution (p. 310).

But there is another, perhaps more important, reason why such simplification should be rated X, viz. that it seriously misrepresents the most important issues of science today. Again, Ede and Cormack themselves address them in their conclusion: "The problem of biased research has become so urgent" that certain journal editors have had to issue warnings. "An increasing number of scientific journals now require a disclosure of financial interest, such as funding sources or corporate remuneration, from scientists submitting papers" (p. 409). Further, they wrote:

The conundrum of science in society is that the producers of science may not be the best people to judge what the impacts of their products will be; however, because of the highly technical nature of the work, those who lack training may not understand the work well enough to make informed choices. Errors, flawed work, and other problems are inevitable, and the examples of DDT, thalidomide, and eugenics should stand as a warning. (p. 419)

The problem with the book is that instead of being structured to address these central issues historically, it tells a convergent success story. A caveat is required here. For example, when describing the discovery of

6. Jardine, 128.

deoxyribonucleic acid (DNA), the issue of right conduct is brought up (p. 334-338). In other words, there is not a complete disconnect between the issues brought up in the conclusion and the main body of the book. But the Whiggish structure amounts to a convergent success story failing to problematize bias and the politics of science.⁷

If the aim of this book is to help undergraduates become informed participants in the democracy and politics of science in the twenty-first century, then surely it needs to convey the crooked and perverse ways of progress. But spreading oneself thinly is antithetical to that aim. So is the Zeno to nano genre dead? Should one, despite the above, underscore the need of textbooks covering the Antiquity to the present day, as the book-review editor to this journal suggested to me?

It is a very good question, and a very timely one. Whether we like it or not, the pressure is on all academic institutions to account for their activities and preferably in terms of cost-benefit analysis. In other words, it is not enough to argue the benefit of a smattering of knowledge through the millennia; one has to argue that time is better spent thus than pursuing economics, chemistry, literature, or algebra. The question is how to convince a Dean of Humanities to allocate precious and scarce budgetary resources? And so it might be worth considering in turn the value of history in general, of history of science, and of Zeno to nano.

There are of course some who proffer the *l'art pour l'art* argument or suggest that history improves your powers of argument, but classicists have argued this for decades, and look where that got them! No—articulation is called for. John Tosh has pointed out that history can simply be a storehouse of moral example and practical lessons, which is the way in which politicians, such as Winston Churchill, have used it. It is an argument that ought to play well with a Dean, but, more ambitiously, Tosh suggests that history supplies an excellent heuristic tool by juxtaposing the past and the present. As an extension of that suggestion, he suggests that historians are specialists in “lateral thinking.” Their search for context in a sense enables them to see things in a new light,

7. On a less important level, I have to mention that the authors have clearly not digested the nineteenth and twentieth century physics. Here the narrative degenerates to a string of facts—and frequently to factual errors. Amadeo Avogadro becomes the man who solved the mystery of the nature of electricity (p. 272); Joseph John Thomson becomes Lord Kelvin (p. 281); the section on atomic theory before the First World War is entitled “Atomic Energy” (p. 290-295); Erwin Schrödinger argues that electrons could be described as standing waves (p. 306); and two hydrogen atoms fuse to become a helium atom (p. 331-332). And as usual, small countries get short shrift. The Swiss Karl Wilhelm von Nägeli becomes a German (p. 313), the Austro-Hungarian Leo Szilard a Czechoslovakian (p. 325), and the Danish Niels Bohr’s first name becomes anglicized (p. 325, 328).

both the past and the present. Furthermore, the understanding of diachronicity, of historical process, enables lateral thinking at a higher level. Tosh provides a simple example: without historical knowledge one might assume that present-day social identities are timeless—the weapon of myth-busting history is wielded here most potently. Finally, Tosh summarizes all this with the excellent pitch that historical understanding leads to self-awareness.⁸

It seems feasible to argue similarly for the history of science: it can provide an excellent heuristic tool through juxtaposition; the search for context can leverage fresh thinking; and this might well lead to self-awareness, especially of scientists themselves. However, Whiggishness is obviously an obstacle here: viewing the past in terms of the present precisely precludes the felicitous juxtaposition leading to understanding.

So why cover Zeno to nano at all, a genre at odds with the most powerful and beneficial uses of history? I think the answer has to lie with the most powerful role of history—one that Tosh ignores—presumably because it borders on the irrational and manipulative. History not only busts identities, it more importantly creates or supports them. National histories create national identities, disciplinary histories create disciplinary identities, corporate histories create corporate identities, and so on.

I will go out on a polemical limb: the point of Zeno to nano is to prop up a certain attitude to reason, metaphysics and faith. Ede and Cormack are not in the business of preparing students to understand the complexities of science. They are in the business of promoting a secular anti-metaphysical attitude. Whiggish history serves this purpose admirably. The tale of progress outlines the direction in which society will naturally go: further towards rationality and empiricism. The tale of progress configures believers and metaphysicists as obscurantists who are losing out. The long-term tale from Zeno to nano is powerful because it supplies history with a civilizational logic of winners and losers. Rational human beings may at times feel like isolated individuals fighting the forces of darkness in their little corner of the world, but Ede and Cormack show them to be in tune with the best of humanity through the ages. The message is motivational (as is that of this review) and it will play well with some Deans.

8. John Tosh, *The Pursuit of History: Aims, Methods, and New Directions in the Study of Modern History* (London: Longman, 2002, 3rd ed.), ch. 2 “The Uses of History,” 26-53.