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for example, she makes much of medical men's claims, in the fifteenth century, to have performed the operation in person—what she calls “the innovative male presence”—although, as she herself notes, such claims in other contexts often merely preface a passage copied from another writer. Despite such reservations, this is an unusual, lively and readable volume.

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JAMES R. MOORE (ed), *History, humanity and evolution: essays for John C. Greene*, Cambridge University Press, 1989, pp. xii, 429, illus., £35.00, \$59.50 (0–521–33511–6).

John C. Greene is a grand old man of the history of science. His career crucially interlocks with the subject's fortunes in America since the 1940s, both as a discipline in its own right and as a significant constituent of *après-Lovejoy* intellectual history. This volume sets Greene's work as an historian of evolutionary thought against the current state of the art in studies of natural theology, evolutionary theory and scientific naturalism as cultural and polemical constructs. It does this through the framing devices of an “Introductory conversation” between Greene and the editor and an “Afterword” in which Greene comments on the preceding essays put together in his honour.

James R. Moore's interview with Greene is a notable feature of the book and suggests comparisons with an earlier *estschrift* of a great historian of science. In “The making of an honorary Taoist”, the first essay in the 1973 collection, *Changing perspectives in the history of science—Essays in honour of Joseph Needham* (ed. Mikuláš Teich and Robert Young), Needham, writing under the pseudonym of “Henry Holorensaw”, gave his own account of how “a biochemist turned into a historian and sinologist” and came to regard himself as an “honorary Taoist”. Greene, in conversation with Moore, tells of how a liberal Congregationalist from Vermillion, South Dakota passed through the Harvard of the 1940s—the *Pareto Circle* and Society of Fellows in the era of Craine Brinton and A. N. Whitehead—and came to produce the classic account of the dissolution of the static view of nature that was to be published as *The death of Adam: evolution and its impact on western thought* (1959).

Another parallel between the two volumes is that both are seen by their editors as important staging posts along the road from the subject's “coming of age. . . as a discipline” (Teich and Young) in the late 1950s and early sixties. Where Teich and Young emphasized the increasingly interdisciplinary character of the history of science since that time, Moore sees the thirty-year interval since the centennial commemorations of *The origin of species* as a period during which the “interests and interpretations” of the principal commentators on evolution have changed fundamentally. In spite of, but also because of the “Darwin industry”, Moore observes, “Today's historians are more likely to fault than to flatter biologists' triumphal polarization of their disciplinary past. Darwin, for them, is not the revolutionary figure he once appeared to be, evolutionary ideas are not simply the rational outcome of a self-correcting science.” Greene's particular contribution to this change has been to show the primary importance of the religious, philosophical and political constituents of evolutionary thought in all its biological, geological and astronomical complexities. His emphasis on the ways in which, as Moore puts it, “the human significance of evolution” was and continues to be “paramount” has inspired the generation of historians represented in *History, humanity and evolution*.

Historiographically, Greene's influence can be located in three related areas. In the first place, his writings have provided a bridge between Lovejoy's “unit ideas” and the more recent project of a social history of ideas. Second, most notably in the 1971 essay “The Kuhnian paradigm and the Darwinian revolution in natural history”, Greene convincingly argued that Kuhn's model of scientific change, “sealed off” from the extra-scientific influences of religion, ideology and culture, was peculiarly inappropriate for explaining the success of natural selection in Victorian Britain. Although Greene has always stressed that ideas do have a history of their own, his adage in the title essay of the 1981 collection *Science, ideology and world view* that “The lines between science, ideology, and world view are seldom tightly drawn” has

become the rallying cry of “externalist” historians of science and its cultural role. The frequency with which his pronouncement is cited in the present volume bears witness to that.

Greene’s third area of influence is manifest in the subject-matter of contributors to his *festchrift*. This is the gradual supersession, between the late-eighteenth and the late-nineteenth centuries, of a static natural theology by an evolutionary and dynamic scientific naturalism. The essays assembled by Moore are valuable pointers to the current state of the art here. The emphasis now is increasingly away from a monolithic natural theology or scientific naturalism, with both the generalizations and the chronologies of the historiography of the last two decades being called into question. Thus Roy Porter finds Erasmus Darwin’s biomedical theories more central to his subject’s thought-world as a physician of the shires than his social and ideological affinities with the industrialists with whom he shared membership of the Birmingham Lunar Society. Adrian Desmond and Simon Schaffer meanwhile give the triumphalist scientific naturalism of Huxley and Tyndall in the 1860s and seventies a radical (and Caledonian) pre-history in the 1830s and forties: Scoto-Lamarckians in the London anatomy schools, in the case of Desmond; the marriage between utilitarian political economy and the nebular hypothesis out of which the Glasgow Professor of Astronomy John Pringle Nichol sought to procreate a “science of progress”, in that of Schaffer. Evelleen Richards’ “Huxley and woman’s place in science” illustrates the limits of both the radical liberalism and the support for the meritocratic emancipation of women by the best known public exponent of scientific naturalism in its Darwinian heyday, while Bernard Lightman shows how their polemical battle with socialists for plebeian hearts and minds led the lapsed-protestant virtue of the “new” agnostic popularizers of the late-Victorian period towards, of all things, an evolutionary theodicy. “God was explicitly left in. Evolution became at once a naturalistic, a theistic and a teleological process.”

The increasingly interdisciplinary input into the history of science is particularly well represented by Ludmilla Jordanova’s comparative study of Lamarck and the Mary Shelley of *Frankenstein* as mythologizers of creation and production; in Martin Rudwick’s “Encounters with Adam” we see the extent to which, as a visual genre, the dioramic views of the deep past which continue to draw museum crowds, have their origins in (pre-Darwinian) visual representations produced by William Buckland and his associates in the 1820s and thirties. Some current Darwiniana can be found in the contributions of Paul Weindling, Peter Bowler and John Durant, but the two essays which best complement John Greene’s interests are those of James Secord and the editor himself. Secord’s “Behind the veil” looks at the disparate sources on which Robert Chambers drew for *Vestiges of Creation* and the ways in which the book represented a colonization and domestication of evolutionary theory for the emergent liberal readership of the 1840s. James R. Moore attempts to bring out the real story of Charles Darwin’s loss of faith from the mythology created by Darwin himself in the *Autobiography*, plausibly relocating it before the publication of *The origin of species*. The sense of religious relativism gleaned from the Fuegian episode of the *Beagle* voyage was decisively turned into an ethical rejection of Christian eschatology by the death of Anne, his ten-year-old daughter, in 1851.

No collection in this field would be complete without a piece by Robert M. Young, whose contribution immediately precedes the “Afterword” in which Greene ends his call for a methodologically pluralistic history of science by acknowledging with pride and delight that most of the contributors gathered together to honour him follow in the “science as politics” footsteps of Young. His own position as articulated here and in the interview with Moore goes somewhat less far in the “Science *is* social relations” direction but the moral drive of his historical critique of the adherents of evolution continues to inspire the tradecraft of younger more epistemologically and politically radical colleagues. The atomistic reductionism of evolutionary biologists when writing as citizens or ideologues tragically fails to do justice to the complexity and fecundity of the evolutionary process. There are serious moral, ecological and political problems inherent in the naturalistic rejection of ideology in favour of attempting to produce an adequate personal and public system of values from science and to apply its methods to the study and organisation of human society. “The Baconian Dream, whether in its

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original form, its Enlightenment dress, or its Marxian transformation, shatters on the hard rock of human nature, a nature known in part to politicians and novelists but highly refractory to the tools of science.”

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A. C. CROMBIE, *Science, optics and music in medieval and early modern thought*, London and Ronceverte, Hambledon Press, 1990, pp. xxii, 474, illus., £37.50 (0-907628-79-6).

This is a collected volume of essays written over the last forty years by Alistair Crombie, whose major achievement lies in establishing the history of science as a legitimate and viable discipline on British soil. It is Crombie's conviction that scientific thought, first created by the Greeks, is the “essential diagnostic characteristic” of Western civilization and that therefore the history of science is an important and integral part of Western intellectual history (Preface, chs 1, 18). Positing a continuous tradition of scientific thought as the object of this history of science, Crombie identifies it first in the twelfth and thirteenth centuries, when Greek philosophy was recovered and assimilated into Western thought through logic and calculation, and when figures such as Robert Grosseteste and Roger Bacon established the elements of scientific experimentation and quantification (chs 2–7). Crombie further finds in the renaissance idea of the “virtuoso” the intellectual commitment to rational analysis and material mastery of nature essential for modern scientific thought (ch. 8). Galileo Galilei, René Descartes and Marin Mersenne all made their contributions to establishing the identity of modern science by developing a mathematical programme and a mechanistic philosophy (chs 11, 12, 15, 16). By skilful internal analyses of available theories and philosophical presuppositions, Crombie examines how men in the past succeeded (or failed) in reaching the right questions and answers. In particular he argues that the mechanistic and mathematical conception of nature enabled physiological breakthroughs such as Johannes Kepler's discovery of the dioptric mechanism of the eye and the discovery of auditory mechanisms by Thomas Willis and Joseph Du Verney (chs 9, 10, 13, 14).

In this volume not only may we read Crombie's own scholarly contributions to individual fields of the history of optics, music or physiology, but the collection as a whole also enables us to appreciate and trace the process by which the history of science came to be established as an academic discipline (the Appendix includes Crombie's account of the teaching of the history of science at Oxford).

Now that this discipline has been established, perhaps there is less need for us to make the claim for an independent identity for the history of science by stressing its differences from other disciplines. We are now in a position to reap a richer harvest by crossing conventional disciplinary boundaries to learn more from other approaches (such as economical, sociological, political and popular history) in order to understand the ‘*people thinking*’ (p. 463)—if indeed, as Crombie himself states, the history of thought is about the “totality of human experience in all its variety on this spinning globe” (p. 441).

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