

Louis Agassiz and the racist writings of Samuel Morton, Josiah Nott and George Gliddon, the latter ultimately underpinned by Darwin's work. Pre-Adamism thus fed into the rhetoric of antebellum America and became as important politically as it was theologically. In opposition to the claims of many modern anti-evolutionists, Livingstone makes it clear that many apologists for slavery (and racial inequality) sought support not in the writings of Darwin but in Scripture, some going as far as to claim that Eve's sin was one of miscegenation with a black pre-Adamite.

The amazing scope of *Adam's Ancestors* contributes to its appeal, and it can be highly recommended both for its sweeping synthesis and for the nature of the questions it raises in the mind of the reader. Knowing already about, for example, Agassiz, Thomas Chalmers, Hugh Miller, George Pye Smith, Robert Chambers and St George Jackson Mivart, I was pleasantly surprised to encounter these theologically diverse individuals here, often in unexpected contexts. Historians of other eras are likely to have similar encounters.

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JESSICA RISKIN (ed.), *Genesis Redux: Essays in the History and Philosophy of Artificial Life*. Chicago and London: University of Chicago Press, 2007. Pp. xvii + 389. ISBN 978-0-226-72081-4. £16.00, \$25.00 (paperback).

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You might think, as I did, that research on artificial life is a relatively recent endeavour – a feature of the age of science fiction, contemporary with research on artificial intelligence. But *Genesis Redux* reveals otherwise. Growing out of a workshop at Stanford, the seventeen essays collected by Jessica Riskin draw on examples from ancient, early modern and modern science to show that people have been trying to create and re-create life for a very long time.

Several of the essays are about automata, or self-moving robotic machines designed as animals or humans. Anthony Grafton, for example, describes automata in fifteenth-century Italy, and in particular a devil automaton designed by the engineer Giovanni Fontana. Elizabeth King writes about a figure of a Franciscan monk built in the sixteenth century and designed to pray perpetually. Scott Maisano discusses a legendary seventeenth-century automaton designed by Descartes, along the way highlighting references to bodily machines in *Hamlet* and *The Winter's Tale*. Adelheid Voskuhl investigates the context of two eighteenth-century female automata designed to play keyboard musical instruments. Norton Wise situates automata of the nineteenth century – often female, black, magicians or acrobats – in their socioeconomic contexts.

One of the richest essays is Elliot Sober's account of debates about sex ratios in the eighteenth century. Was the existence of stable sex ratios at birth evidence for an intelligent, divine designer? Sober's excellent discussion is itself almost worth the price of the book. However, it is also one of the least relevant to the overall theme; studying sex ratios is not studying artificial life, unless by 'artificial' one means not only created by humans but also created by God. Sober makes a spirited case for the view that the sex ratio debate of the eighteenth century 'provides an interesting case study of the problem of whether we should regard living things as artifacts or as the result of mindless natural processes' (p. 132). It is nevertheless hard to shake the feeling that whether living organisms are artfully created or naturally developed is not, strictly speaking, a question bearing on artificial life.

If some of the essays stray from the main topic, is there nevertheless a unitary point of view here? Riskin thinks so. The cover of the volume is a close-up of the hands of God and Adam in Michelangelo's Sistine Chapel ceiling; their fingers point at each other, and are close, but they do not quite touch. For Riskin, the gap between their fingers is a symbol of what she sees as a gap in the conception of life as composed of merely mechanical, material elements. She calls this the 'Sistine Gap', and claims that the essays in the volume share the anti-reductionist view that there

is, in fact, exactly such a gap in material accounts of life. Collectively they offer, she writes, ‘an unexpected and far-reaching result: they find that attempts at artificial life have rarely been driven by an impulse to reduce life and mind to machinery’ (p. 1). But that is not my impression. The engineers, scientists and philosophers featured in most of these essays seem to have been materialists and mechanists. The thrust of Sylvia Berryman’s essay, for example, is that ‘a few ancient Greek thinkers did look to their technology in order to understand how the functions of organisms might be realized’ (p. 43). Grafton argues that Fontana ‘showed how to use mechanical devices, instead of the magician’s circle and incense, to create the same psychologically effective illusions’ (p. 55). And Timothy Lenoir suggests that the time is nearing when ‘the biological and the digital [will be] no longer ontologically distinct but [will] inhere in one another’ (p. 216). The chapters by Maisano, Sober and Evelyn Fox Keller have similarly materialist overtones.

Nevertheless, Riskin has a point. To determine if would-be designers of life assumed a role for something beyond the merely mechanical, one would have to know what is meant by merely mechanical. If what is meant is a billiard-ball collection of parts with linear relations, then she is right. She persuasively suggests that the non-mechanical elements that have been supposed to fill in the Gap have undergone shifts: in the ancient and early modern period, the Gap was filled by Soul; after the seventeenth century, it was filled by Consciousness; in the twentieth century, it was filled by Information. Another purported non-mechanical element of artificial life in the twentieth century was the notion of ‘emergence’, discussed here in the essay by Bernadette Bensaude-Vincent.

Despite its subtitle, *Genesis Redux* is overwhelmingly historical rather than philosophical. Yet the essays are written from a stimulatingly wide variety of disciplinary perspectives: intellectual history, cultural history, anthropology, women’s studies, literature, philosophy and, of course, history of science. Elizabeth King is a sculptor. These eclectic essays will entertain and educate. Many of them are also quite short. I wished that Sylvia Berryman’s wonderful nine-page contribution on the mechanistic understanding of life in the ancient world was longer. But concision is often a virtue, and this volume can be recommended to anyone interested in the history of artificial-life research, and the history of the life sciences more broadly.

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BERNADETTE BENSAUDE-VINCENT and WILLIAM R. NEWMAN (eds.), **The Artificial and the Natural: An Evolving Polarity**. Cambridge, MA: MIT Press, 2007. Pp. viii + 331. ISBN 978-0-262-02620-8. £25.95 (hardback).

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This admirable book deals with a topic of fundamental importance in Western thought. The editors are justified in describing this volume as ‘the first collective effort’ (p. 3) by historians of science, art and philosophy to focus specifically on the distinction between the artificial and the natural from antiquity to the present day. In a dazzling display of scholarly virtuosity, the contributors grapple with the ambiguities, cultural values and moral issues that inevitably accompany the concepts of art and nature. The essays show that practical and philosophical considerations over mimicking, perfecting and outdoing nature’s productive powers may be found throughout history and continue to have ontological, epistemological and moral consequences. In addition to the contributions discussed below, we have chapters on ‘The three pleasures of mimesis according to Aristotle’s *Poetics*’ (Francis Wolff), ‘Art and nature in ancient mechanics’ (Mark J. Schiefsky), ‘Forms of art in Jesuit Aristotelianism (with a coda on Descartes)’ (Dennis Des Chene), ‘The artificial and the natural: Arcimboldo and the origins of still life’ (Thomas DaCosta Kaufmann), ‘Leibniz’s theatre of nature and art and the idea of a universal picture atlas’