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Review of "A. Mayor, Gods and Robots: Myths, Machines and Ancient Dreams of Technology"

Georgia L. Irby
William & Mary, glirby@wm.edu

A. Mayor, *Gods and Robots: Myths, Machines and Ancient Dreams of Technology*. Princeton, 2018. 304 pp, Hb. ISBN 9780691183510; $29.95 USD.

In 1942, the great science fiction writer Isaac Asimov conceived of three laws of Robotics mandating that: "A robot may not injure a human being or, through inaction, allow a human being to come to harm. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law." A later addition, the fourth, or zeroth law, outweighed the others: "A robot may not harm humanity, or, by inaction, allow humanity to come to harm" ("Runaround," 1942, later republished in *I, Robot* [1950]; Mayor, p. 177). Such anxieties resonated with ancient thinkers, and Mayor interrogates these and similar tensions in *Gods and Robots: Myths, Machines and Ancient Dreams of Technology*. One of her stated goals is to "suggest that on deeper levels the ancient myths about artificial life can provide a context from the exponential developments in artificial life and Artificial Intelligence (AI)—and the looming practical and moral implications" (p. 214). In this she succeeds as she straddles the myth, philosophy, science, and technology of the ancient and modern worlds.

In this accessibly written and richly illustrated book (72 black and white illustrations plus 14 color plates), Mayor has collected textual and visual evidence for biotechnology in the ancient Mediterranean world, woven together with telling comparanda from other pre-modern societies (ancient Chinese, ancient Indian, Islamic, and medieval European). In addition to ancient evidence, Mayor considers "modern" science fiction as it may have been informed by the ancient tales as well as initiatives in modern robotics. Throughout, Mayor asks timely questions about the nature and ethical implications of AI and automata: Are androids merely anthropomorphized? Or are they sentient and capable of learning and emotion? For example, Hephaestus' android servants can anticipate the god's needs and desires, and they are ascribed with mind, wits, voice, vigor, and knowledge. Aristotle notoriously described slaves as "living tools," but even Aristotle speculated on the elimination of slavery should tools become animate and capable of foreseeing the needs of their users (*Politics* 1.3–4; Mayor, p. 152). Are such initiatives in technology acts of *hubris* (as evident in the moral of Icarus or the apocryphal tale of Alexander the Great's bathysphere that encroached "beyond the world" and was nearly crushed by giant fish: Mayor, p. 82). Mayor fits her interpretations within lively retellings of the ancient stories from which these *thaumata* (marvels) that are "made, not born" arise. And much of this evidence is validated by the science and technology of Mediterranean antiquity.

Mayor also acknowledges, as other have observed, that Prometheus' gift of technology to humanity to counteract human frailty, in part lessening the gap between mortals and immortals. *Contra* Silvia Berryman (*The Mechanical Hypothesis in Ancient Greek Natural Philosophy* [Cambridge, 2009], pp. 27–28), Mayor furthermore debunks the erroneous assumption that the ancients lacked the imagination to envisage "what devices can actually achieve without practical experience" (p. 95). It is also, as Mayor emphasizes, important not to underestimate the skill and ingenuity of the ancient craftsmen (p. 86).

The book falls into nine chapters, eight of which deal with the *thaumata* or biotechnological initiatives recounted in Greek myth, especially Hephaestus' Talos, Medea's acts of rejuvenation, Daedalus living statues (and efforts to attain human-powered flight), Pygmalion's "sex-bot" ivory girl, and Pandora. A ninth chapter treats the historical and technical accounts of engineering marvels and automata, many of which (like their mythic counterparts) were commissioned by despots as weapons of mass destruction or cruel punishments (e.g., Phalaris' bronze bull that roasted men enclosed within it: Mayor, p. 181). Mayor includes a brief précis of the devices constructed or imagined by Philon and Hieron, and she recounts an intriguing Buddhist tale that suggests exchange of technology between the Far East and the Greek-speaking *Yavanas* in *Romavisaya* (referring vaguely to the "kingdom of Rome" in the west), including knowledge of "spirit movement machines" (Mayor, p. 205).

Most of her focus is on the literary and artistic depictions of ancient Greco-Roman biotechnology. Mayor brings to bear careful readings of the ancient artwork to flesh out the incomplete and fragmentary literary record. She compellingly interprets the myth of Talos, a giant bronze robot programmed to protect the shores of Crete, as deriving from the current technology of the lost wax process that was employed for casting bronze statues. The "life"-sustaining *ichor* that gushed from the bolt-hole in Talos' ankle seems in parallel with the melting wax of models in furnaces. Talos' loss of *ichor*, Mayor surmises, also imitates the contemporary medical practice of blood-letting. The technology of bloodletting also figures into Medea's artificial extension (and premature extinguishing) of life where biotechnology is, at best, merely hinted at through the "magical" use of herbs (medicine and pharmacology were included among the *techne* of the ancients). Medea restored vitality to Jason's elderly father by exsanguination. Aeson's blood was then replaced with the medicated blood of a young animal. Erichtho, furthermore, re-animated Pompey's dead soldiers with incantations and magico-medical poisons (Lucan, *Pharsalia* 6.667–749; not quite the Frankenstein-type monsters envisioned by Mayor, p. 126). Such efforts, both the artificial extension of life and re-animation of the deceased, raised ethical questions in antiquity as they do now. Mayor notes that Socrates asserted that medicine should not be used to prolong a human life "beyond its proper time": Plato, *Republic* 405a–409e; Mayor, p. 58). Such anxieties were deeply ingrained in the social fabric, expressed as early as Homer, when Hera had warned Zeus against trying to re-animate his beloved son Sarpedon who had fallen on the battlefield at Troy (*Iliad* 16.439–457, omitted by Mayor). There is a real sense in the ancient tradition that chaos would ensue if the dead were brought back to life.

Mayor underscores that humanity in general and Pandora in particular are artificial constructs, "made, not born" by the agency of divine sculptors who work with clay (n.b. *Gilgamesh*¸ *Genesis*), or divine craftsmen fashioning humanity with their tools, as in pictorial accounts where Prometheus is shown like a sculptor building men up from skeleton-armatures. Noting also the rarity of facial gestures and front-facing depictions of human figures in ancient art, Mayor sees the leering images of the doll-like Pandora as indicating that artists and mythographers understood that Pandora was not a real girl

but rather a crafted artifice. Mayor compares Pandora to the mirthless, enigmatically smiling archaic Kore statues and the robotic girl with her "weird, incomprehensible smile" in Fritz Lang's 1927 *Metropolis* (p. 170) (Mayor nonetheless eschews comment on grinning medusas and the benignly smiling Asclepius.).

Unlike Medea, Hephaestus and Daedalus, the master craftsmen of ancient myth, work with "no whiff of magic" (Mayor, p. 70), but rather they were guided by imagination and sheer adroitness by means of the agency of their tools they created lifelike automata with internal mechanisms that could generate facial movement and tears (e.g., the Telchines of Crete and Cyprus and the singing statues of Delphi). The clever Daedalus and his divine avatar fashioned mechanistic creations with the historical tools of human engineers.

Mayor explores more deeply modern incarnations of ancient Greco-Roman automata in three short essays, appended to relevant chapters (chapter 1: "Talos in the modern world" [Talos missile]; chapter 4: "Human-powered flight" [da Vinci, hang-gliders, the "Icarus Cup"]; chapter 9: "Imagining Ancient Robots"). Also provided are a glossary of terms and a select bibliography. The references strike a balance between citation and annotation.

This book is aimed the non-specialist (Greek is transliterated, translations come from the Loeb Classical library, and relevant passages and evidence are omitted). While Mayor mentions the Bagdad battery and the Antikythera mechanism, she omits pre-literate computers, such as Stonehenge and Chichén Itzá, both aligned to indicate the solstices. In addition, we note that Mayor rightly asserts that "the history of the real mechanical designs and practical inventions…has been intensely and comprehensively studied" (p. 180; e.g., E.W. Marsden s magisterial *Greek and Roman Artillery* [Oxford, 1971]; J.P. Oleson, ed. *The Oxford Handbook of Engineering and Technology in the Classical World* [Oxford, 2009], both in her bibliography). Welcome, nonetheless, would be a deeper and more nuanced treatment of the inner workings of such historical and theoretical machines as they might have influenced the ancient understanding of the marvels produced by Daedalus, Hephaestus, and the mythographic imagination (but that would be a different sort of book). Finally, Mayor includes a great deal of artistic evidence from Etruria, which could be connected to the rich Etruscan engineering tradition, especially in hydraulic infrastructure and metallurgy,[1] in parallel with the robust engineering tradition of Rhodes where engineers produced the great Colossus, animated bronze statues, and possibly even the Antikythera mechanism (p. 186). Nonetheless this delightful book raises timely questions regarding age-old anxieties and draws the reader into the imaginative science fiction of Greek and Roman myth.

GEORGIA L. IRBY,
THE COLLEGE OF WILLIAM AND MARY

[1] See, for example, Claudio Giardino, Villanovan and Etruscan mining and metallurgy, in Jean MacIntosh Turfa (ed), *The Etruscan world* (London; New York: Routledge, 2013), pp. 721–737.