

Book Reviews



Giovanni Di Pasquale, *Le macchine nel mondo antico. Dalle civiltà mesopotamiche a Roma imperiale*. Roma: Carocci, 2019. 241 pp. 18€. ISBN: 9788843095896.

Giovanni Di Pasquale's book is a brilliant narrative of the history of technology in the ancient world. This history is reconstructed through a modern historiographical perspective that uses an integrated study of sources as the method to reach a more organic narrative of the past. In fact, sources are usually studied only in their respective disciplinary domains and in a non-dialectical way; this approach does sometimes lead to partial interpretations and, more specifically, to a distorted perception of the cultural value of machines and technical knowledge in the ancient world. The book, which includes an important iconographic apparatus of 75 images, clearly highlights how science and society have always been in close relationship with technological development in all eras, including the most ancient ones. The book also claims that the intersection between society and technology was seen as a real opportunity to increase well-being and military strength, offensive and defensive.

In the first chapter, Di Pasquale discusses the historiographical debate underlining the importance of an approach to the study of technology that takes material history into account. He shows the inconsistency of the thesis according to which, in Antiquity, machines were considered superfluous since societies were largely based on slavery. He also undermines the thesis that – when actually made – machines were deemed expressions of manual labour without any theoretical foundations. Relying on archaeological evidence, Di Pasquale criticises the idea of an ancient science as separated from practical knowledge, of a science to which no cognitive value was recognized. These artefacts tell us that machines were attributed a great utilitarian value, which constituted the foundation of social welfare since pre-Hellenistic times. Material findings such as pulleys, winches, cranks, as well as funeral reliefs and terracotta reproducing scenes featuring machines, and the complexity of mechanisms such as that of Antikythera, are interpreted in relation to more “theoretical”

works such as the mechanics and pneumatics of Heron of Alexandria and Vitruvius' *De architectura*, to cite examples of two of the best-known authors of ancient engineering culture. This innovative analysis reveals the image of a past rich in technology, and of a science that, even in its most abstract aspects, such as the geometries of the movements of the planets, made use of measuring instruments and mechanical models, such as astrolabes and armillary spheres, which relied on the gears of machines to function.

The following eight chapters of the book focus on the discoveries of civil and military engineering from the Mesopotamian period to late Roman antiquity. The first example is that of the development of agricultural techniques in the first sedentary civilizations and the subsequent slow progress induced by the mechanization of agriculture with the introduction of increasingly efficient plows and hydraulic machines for irrigation. These, together with new means of transportation and lifting systems such as cranes, winches and hoists, quickly made technology a central and essential element of civil and military life. Along with precise and clear technical descriptions, Di Pasquale also recounts the evolution of machines through its cultural and social aspects, in a pleasant reading narrative. The mythical origin of the techniques is traced through a study of the figures of Hephaestus, Prometheus and Ulysses, and Di Pasquale also tells us how the art of war became an institutionalized practice giving rise to real schools; in cities such as Rhodes, Alexandria, Pergamum, Syracuse and then Rome, engineers acquired an increasingly important social status and a cultural role. Some notable examples are engineers such as Bitone, Philo of Byzantium, Apollodorus of Damascus, Archimedes, Vitruvius, Heron of Alexandria, who also left memory of their activity and studies in very important written works. Di Pasquale underlines how the works of Heron in particular sheds light on the remarkable development achieved by civil and military engineering, as it emerged in the Mediterranean area in the first century AD, a development which became theoretically complete through the strengthening of "disciplines" such as mechanics and pneumatics. Indeed, in the Alexandrian era, pneumatics represented the most remarkable technical-scientific achievement of engineering. It had a strong experimental component, transforming engineering in an instrument through which to manipulate and control the intrinsic forces of matter, with the aim of producing mechanical and hydraulic actions.

The volume also deals extensively with the figure of Archimedes, whose works are referred to by the author as machine science. The work of the Syracusan is presented in a measured and well contextualized manner, distinguishing the mythological dimension of an exceptional inventor, as built by tradition, from themes such as burner mirrors or hydraulic machines. Although signif-

icant, Archimedes' contribution to these specific topics must be placed in a historical context in which he sought to innovate on the basis of technologies already in use for some time and of an already-existing debate.

The conclusion of the book consists in a general evaluation of the weight of technical-scientific culture in the ancient world. Di Pasquale highlights how great fields of enquiry such as mechanics, pneumatics, astronomy and the philosophy of nature, as well as primary mechanical elements such as the pulley, the connecting rod, the piston or the crank, constituted the basis from which subsequent medieval and Renaissance developments paved the path that will lead to the birth of modern science.

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