

CESARE S. MAFFIOLI, *La via delle acque (1500-1700). Appropriazione delle arti e trasformazione delle matematiche*. Florence : Leo S. Olschki, 2010. Pages XXII + 391. Index. ISBN 978-88-222-6008-6. Price : € 43.

This book is the continuation of *Out of Galileo. The Science of Waters 1628-1718*, the important work that Cesare Maffioli published in 1994. In this earlier

study Maffioli traced the development of the science of moving water from Benedetto Castelli, Galileo's most gifted student and follower, to the contribution of the eighteenth-century Paduan professor, Giovanni Poleni, the last representative of a Galilean approach in this field. Maffioli's account filled a serious gap in our understanding of modern science. He showed how practical needs kept hydraulics at the forefront of Italian attention. There was, of course, the eternal problem of the Venetian lagoon but there were also other problems, primarily flooding in the territory of Bologna, where efforts early in the century to relieve flooding in Ferrara had imposed a disaster on Bologna.

In *La via delle acque*, Maffioli examines the genesis of the science of hydraulics in Italy prior to Galileo, and subsequent developments at the hands of Domenico Guglielmini (1655-1710). The various ways Girolamo Cardano, Leonardo da Vinci, and Francesco Patrizi tackled the problem are discussed in scholarly detail, but it is once again Benedetto Castelli who holds the centre of the stage. Maffioli provides an insight into the difficulties involved during the entire period but many readers will particularly relish his lively discussion of the way engineers struggled to understand the new science that Castelli had made available in a book entitled, *On the Measure of Running Waters*, in 1628. A dramatic moment was the flood along the Bisenzio that occurred in 1630 when Castelli had already moved to Rome. Descending from the Apennines to the north of Florence, the Bisenzio emerges from the mountains at Prato and enters the plane that flanks the north bank of the Arno. The distance from Prato to the Arno is 10 kms as the crow flies but rivers seldom flow in a straight line, and instead of 10 kms to make the journey it takes in fact 15. The challenge is how to conduct the river across the flatlands to its destination. Most of the time the virtual absence of incline causes no trouble. During the summer the river shrinks to the tiniest trickle, and in most winters it remains modest enough. In the early 17<sup>th</sup> century, the area along the river was one of the most fertile and was densely populated. It was here that the patricians of Florence built their villas, among them the family of Mario Guiducci, a close friend of Galileo, who had let the master put his name on a *Discourse on Comets*. As though to ensure the attention of those whose attention mattered, the winter of 1630-1631 witnessed the outbreak of the plague in Florence. The Florentine patricians were at home, not in the city with the plague but on the plane when the Bisenzio swept over its banks. The Grand Duke sent his engineer who submitted a proposal to relocate the lower half of the river by constructing a new bed that would run in a straight line directly to the Arno. This was hotly contested by Guiducci and his friends who argued that instead of cutting a new bed it would be wiser to clean out the old one, restoring the flood channel to a uniform width of about 16 meters and cutting down the brush growing in it that obstructed the flow of the water. Galileo supported his friend Guiducci and urged that the new channel should not be cut. That his arguments were not conclusive tell us much about the science of flowing water at the time and, by implication, about science and technology in the first half of the seventeenth century. Maffioli explains this in a way that is as clear as it is compelling, and he

reminds us that talk about useful knowledge is not identical with the fact of useful knowledge. Historians of science who tend to think that the problems of engineering are simpler than those of pure science may wish to reconsider.

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