

Appendix: A Forgotten Controversy

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Introductory Note to the Appendix

More than a century ago three eminent Galileo scholars, Raffaello Caverni, Antonio Favaro, and Emil Wohlwill, discussed the emergence of Galileo's science of motion and the documentary evidence pertaining to it. Among the works of these scholars, only Favaro's *Edizione Nazionale* of Galileo's works is still widely used, while the contents of their other writings only play a minor if any role in the current English-speaking literature. The disappearance from historical memory of many of the substantial contributions by these authors is closely associated with a narrowing of the perspective under which Galileo's science and its context have been discussed in more recent scholarship.

This Appendix comprises three short contributions by Caverni, Favaro, and Wohlwill respectively, each prefaced by an essay that discusses their work in the context of the period. Although these contributions by three turn-of-the-century masters of Galileo scholarship certainly do not represent the pinnacle of their respective intellectual achievements, the writings here presented for the first time in English translation have the advantage of being closely related to each other, forming part of a controversy about the origin of Galileo's discoveries of the law of fall and of the parabolic shape of the projectile trajectory, as well as about the authenticity of certain unpublished texts by Galileo.

From the perspective of currently accepted views on Galileo's discoveries, the exchange, partially represented by the three contributions reproduced here, may appear to be rather odd: In the first volume of his monumental *History of the Experimental Method in Italy*, Caverni claims that Galileo had stolen the discovery of the parabolic shape of the trajectory from a disciple. In the fifth volume, an excerpt of which is translated here, Caverni published a hitherto unknown writing of Galileo on the hanging chain, crediting him with the dubious "discovery" that the hanging chain allegedly has, just as the projectile trajectory, a parabolic shape. Wohlwill, in his paper reproduced here, disputes Caverni's claim that Galileo committed intellectual theft and argues that Galileo in fact discovered the parabolic shape of the trajectory early in his career, after having first found the law of fall. In his later biography of Galileo, Wohlwill eventually develops the unorthodox and henceforth neglected view that Galileo possibly discovered first the parabolic shape of the trajectory and only then inferred from this discovery the law of fall. Reacting to the publication of Caverni's last work, Favaro, in a short paper also included in this Appendix, refutes the authenticity of the supposedly Galilean text published by Caverni but abstains from commenting on its content. In summary, it

seems that the texts of Caverni, Favaro, and Wohlwill were rightly neglected in the past hundred years, since they merely deal with marginal subjects in Galileo's work such as the hanging chain, unorthodox opinions about his achievements, such as the claim that Galileo stole the discovery of the parabolic trajectory or made it even earlier than that of the law of fall, and even with forgeries of historical sources, justly forgotten after they had been revealed as such.

Revisiting this controversy from a broader perspective, however, it appears in a different light. Seen against the background of the intellectual context of Galileo's work as it becomes evident from his unpublished manuscripts, from the writings of his contemporaries, and from the practical challenges of the time, the three texts by Caverni, Favaro, and Wohlwill contribute to a new account of the establishment of the law of fall and of the parabolic shape of the projectile trajectory. According to this account, Galileo's achievements emerge not as isolated discoveries but as part of the development of the shared knowledge of the time. (For an extensive discussion, see Renn, Damerow, and Rieger, "Hunting the White Elephant," in this volume.) It furthermore turns out that, from this perspective, Favaro, Wohlwill, and even Caverni are each correct in their specific claims, in spite of their diverging views.

First of all, a close investigation of Galileo's unpublished manuscripts, including an examination of the inks used by Galileo in some of them, has made it possible to add further evidence to Favaro's assertion that the supposedly Galilean text published by Caverni must be a fake. In fact, the text published by Caverni mentions certain manuscripts by Galileo which can actually be identified among his papers (Ms. Gal. 72, folios 41/42 and 113). According to the supposedly Galilean text by Caverni, these manuscripts document the way in which Galileo produced, by means of a hanging chain, curves of projectile trajectories for the practical purposes of artillery, a description which turns out to be a plausible interpretation of these manuscripts. But the text also claims that these curves had been generated with the help of charcoal powder. A closer inspection of the drawings in these manuscripts, as well as their analysis by means of a PIXE (*Particle Induced X-ray Emission*) analysis, performed at the Istituto Nazionale di Fisica Nucleare in Florence, has, however, shown that these curves must have been produced by letting ink seep through a perforated sheet rather than sweeping it with charcoal powder from a feather duster, as claimed by Caverni. Thus Favaro's arguments in favor of forgery could be confirmed.

Second, a reconstruction of Galileo's investigative pathway in the context of his cooperation and exchange with contemporaries such as Paolo Sarpi has vindicated also Wohlwill's unorthodox suggestion, made in his biography of Galileo, that the search for the shape of the projectile trajectory, a question of practical interest at the time, was indeed at the root of his later science of motion, in contrast to the now generally held view.

Finally, it has turned out that even Caverni was right after all, despite having fabricated a Galilean text. On closer inspection, Caverni's text represents not only

a shrewdly produced forgery but an ingenious reconstruction of Galileo's preoccupation with a challenging object of study neglected by most historians of Galileo's science, the curve of a hanging chain. In this odd way, Caverni points to the fact that the hanging chain was a subject crucial to Galileo's thinking on projectile motion. A careful analysis of the extant manuscript material makes it evident that Caverni was justified in claiming that Galileo, towards the end of his life, planned to complete the *Discorsi* with a proof of the alleged parabolic shape of the hanging chain, although, for all we know, this plan was never actually realized by Galileo himself.

The texts of this appendix have been edited by Giuseppe Castagnetti and rendered into English by a team of translators: Giuseppe Castagnetti, Lindy Divarci, Susan Kutcher, Leigh Rogers, and Fiorenza Zanoni-Renn.

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