

The Moonstruck Tuscan

Seeing Galileo as the late Renaissance radical that he was

ANTHONY GRAFTON

GALILEO: WATCHER OF THE SKIES BY DAVID WOOTTON NEW HAVEN: YALE UNIVERSITY PRESS. 354 PAGES. \$35.
GALILEO BY J. L. HEILBRON NEW YORK: OXFORD UNIVERSITY PRESS. 528 PAGES. \$35.

In the late Renaissance, many northern Europeans came to Italy in search of a world of natural wonders. The Swiss Hebraist Caspar Waser reported in 1593 to a friend in Basel that he had visited everything from Jewish printing houses in Venice to Roman sites outside Naples. But he dwelled on the natural philosophers whose thrilling museums he had seen: Ulisse Aldrovandi in Bologna and Giambattista della Porta and Francesco Imperato in Naples. Waser gaped at their magnificent collections, the shelves stocked with shells, fossils, monstrous fish, and Siamese-twin animals, the ceilings hung with everything from starfish to crocodiles. He went home believing that the natural philosopher's job was to identify, and then to use, the hidden powers of stones, plants, and animals.

One Italian student of nature whom Waser apparently did not meet was Galileo Galilei, the son of a Florentine musician, who had begun teaching mathematics in Padua, Venice's university town, in 1592. This seems a shame. For Galileo already had strong, unorthodox views about the museums where Waser spent his time. In an essay on the epic poets Ariosto and Tasso, Galileo compared reading the latter's work, which he loathed, to visiting a collection of things "unusual for their antiquity or rarity, but in fact trivial things, a petrified crab, a dried chameleon, a fly and spider in amber, some of those dolls said to come from Egyptian tombs, and, as for pictures, something sketched by Baccio Bardinelli or Parmigianino." The cabinets of wonder where Waser listened to tales of the super- and preternatural were, for Galileo, sterile attics, metaphors for boredom and pedantry.

In 1610, Galileo himself revealed marvels—but they were marvels of a radically different kind. In a short, sharp Latin pamphlet equipped with uniquely precise illustrations, the *Starry Messenger*, he told his contemporaries what he had seen through the telescope. The moon was not the perfect sphere imagined by Aristotle and his followers but a rough-surfaced body like Earth, with mountains and valleys. The Milky Way was not a splotch on the outermost sphere but a mass of individual stars. Jupiter was not a perfect, lonely planet like the others. Rather, it resembled Earth: It had four satellites that revolved around it. For millennia, Western thinkers had assumed that Earth was the domain of change and decay, where the four elements combined and recombined in different forms. The heavens, by contrast, were the realm of eternity. Perfect, spherical planets were carried on unchanging circular paths around Earth by perfect, transparent crystal spheres.

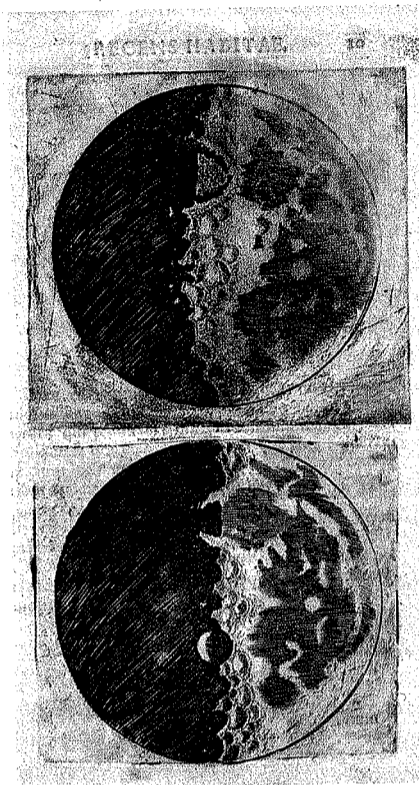
Previous natural philosophers had appealed to their readers and visitors by evoking cosmic harmonies and arguing that earthly things had hidden, marvelous powers. But Galileo did exactly the opposite. He

leveled the universe, showing that the planets and stars were no different from Earth, and fascinating everyone from the Medicean Grand Duke of Tuscany, to whom he dedicated both the book and the new satellites of Jupiter (he called them the Medicean stars), to his fellow astronomer Johannes Kepler, who published a detailed reply.

Galileo, as everyone knows, did much more than discover celestial novelties. He cobbled together impressive devices, from the "geometric and military compass" to the telescope. Most important, he became a convinced and radical Copernican and devised what he saw as powerful arguments to prove that Earth revolved around the sun, whatever the Bible or Aristotle might say. As gifted at prose as at everything else, Galileo wrote up his results—except for the discovery of the Medicean stars—not in Latin, the language of universities and scholarship, but in biting, brilliant Italian, and used a dialogue form to argue with and satirize authorities who were committed to a geocentric cosmos. In 1616, he was warned by Cardinal Bellarmine not to teach the Copernican system. After Galileo's *Dialogue Concerning the Two Chief World Systems* appeared in 1632, he was arrested by the Inquisition, threatened with torture, and officially silenced. Yet he still managed to write his book on a new, mathematical science of motion—one that applied to the heavens as well as to Earth—and have it published in Holland, outside Catholic censorship. By the end of his life (he died in 1642) he had destroyed the ancient, hierarchical physical universe that had survived for almost two millennia and laid foundations for the new structure that Isaac Newton would complete, nearly a century later.

Last year marked the four-hundredth anniversary of the *Starry Messenger*. Exhibitions, conferences, and books commemorated the man and his work. Two especially rich studies, by David Wootton and J. L. Heilbron, take the most traditional of forms: full biography. Both authors tell the story of Galileo's life, both investigate his work, and both analyze his complex and sometimes self-destructive character. They agree on a good many points; both attribute his downfall in part to his own lack of prudence and self-knowledge. Yet their books differ strikingly in style and emphasis.

Wootton, a deeply erudite historian by trade and a passionate revisionist by temperament, began life as an intellectual historian of Renaissance Italy. He argued in his first book, *Paolo Sarpi: Between Renaissance and Enlightenment* (1983), that Sarpi—Venetian patriot, polemical historian of the Council of Trent, Servite monk, and friend and scientific associate of Galileo—was an unbeliever, in Christian terms, who saw religion as useful only because it supported social discipline. In *Galileo: Watcher of the Skies*, Wootton etches a detailed, admiring,



Drawings of the moon from the first edition of Galileo's *Starry Messenger* (1610).

but sometimes acid portrait of Galileo. The book takes in everything from the evolution of his ideas and practices as a student of nature to his relations with his father, mother, lovers, and children—and traces suggestive connections between the theoretical and the personal. Galileo, the expert on fortification, fortified his self so strongly that only informed speculation can re-create his inner life: Wootton suggests that resistance to both his talented but failed father and his "bullying and devious" mother motivated many of his choices. Making deft use of passages from two of Galileo's most insightful readers, Donne and Milton, Wootton teaches us to see Galileo as the radical he was.

Always countersuggestible, Wootton revises any number of widely held positions. In the teeth of conventional judgment, he argues that Galileo, like his friend Sarpi, was not a Christian. Though Galileo read his way into the history of exegesis in order to argue that the Bible did not contradict Copernicanism, Wootton thinks Galileo was really a deist who believed in the Platonic *anima mundi* and who for most of his life almost never mentioned the church's saints, rituals, and miracle stories. For two generations, historians of science have held that the Christian convictions of early modern natural philosophers are what eventually led to their interest in the secrets of nature. Wootton sharply rejects this line of argument and radically revises, at one and the same time, Jonathan Israel's atheistic genealogy of modernity, which starts with Spinoza.

In *Galileo*, Heilbron, like Wootton, sees his subject as a gigantic figure: "He obliterated

the ancient distinction between the celestial and terrestrial realms, raised the earth to the heavens, made the planets so many earths, and revealed that our moon is not unique in the universe. Not since the creation had there been such a refashioning." But his inspection of the colossus yields a view quite different from Wootton's. A preeminent historian of the physical sciences, Heilbron has written massive technical studies of early modern physics and cosmology. Here he provides detailed accounts of each of Galileo's major works, stripped of the "Jabberwocky" of Renaissance geometry and recast in modern form. Serious readers must be prepared to study diagrams, do trigonometry, and follow tightly packed mathematical arguments. And that's only right. Galileo famously insisted that the book of nature "is written in the mathematical language, and the symbols are triangles, circles and other geometrical figures, without whose help it is impossible to comprehend a single word of it; without which one wanders in vain through a dark labyrinth." Where Wootton brilliantly unlocks the period meaning of Galileo's principle, Heilbron follows it in practice, economically and insightfully, setting the man's career into a much wider context.

Galileo astonishes us with his versatility and boldness. He loved to debate the qualities of epic poets, to draw and paint, to study music, as much as he loved to plumb the intricacies of bodies in motion—and he did all of these things with assurance and panache. As Heilbron shows, in everything from this interdisciplinary flair to the insistence that Italian could serve as a technical language for philosophy, Galileo was a Tuscan intellectual of the late Renaissance. Galileo emerges not as a proud religious dissident but as one of many Florentines who did not take much interest in religious questions, but loved to argue—a figure in a recognizable historical landscape, the texture and color of which Heilbron vividly conveys.

Read Wootton to meet a Galileo who was always estranged from vital aspects of his social and cultural world—and used that estrangement, as great intellectuals do, to fuel his intellectual progress. Read Heilbron to meet a Galileo who grew up in a rich and fascinating environment, one that gave him many of the tools he used to fashion a new world. If you have to choose, choose Heilbron. He writes more eloquently than the eloquent Wootton, even composing some exuberant Galilean dialogues of his own. And he gives a richer sense of the new world that Galileo built, the world that inspired wonder because it lacked wonders—and that remains, in the end, the reason why he matters. □

Anthony Grafton is Henry Putnam University Professor of History at Princeton.