

Biographical Encyclopedia of Astronomers

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Ward, Seth

Born Aspenden, Hertfordshire, England, April 1617

Died London, England, 6 January 1689

Seth Ward was a mathematician, astronomer, clergyman, and controversialist. Baptized on 5 April 1617, he was the second son of John Ward, an attorney, and Martha (née Dalton) Ward, mother of six. After taking degrees at Cambridge (BA: 1637; MA: 1640), Ward was appointed Savilian Chair in Astronomy at Oxford (1649–1661), having been nominated by his ousted predecessor, John Greaves. Previous Savilian professors—John Bainbridge and Greaves—taught Ptolemy; Ward was the first to lecture on the Copernican Systems. A founding fellow of the Royal Society, Ward produced several short works in mathematics before becoming Bishop of Exeter (1662) and Salisbury (1667). When Ward finally left Oxford and academic life (1662), the Savilian Chair was taken by Christopher Wren

Ward's career in science was marked by controversy. The first dispute, now known as the Webster-Ward debate, focused on the role of the New Science in the university curriculum. In his *Vindiciae academiæ* (Oxford, 1654), Ward opposed claims of John Webster and positions taken by Thomas Hobbes, arguing that the mathematical sciences were faring well in England and that university reform was unnecessary. Ward later attacked Hobbes's materialist philosophy in his *Thomæ Hobbii philosophiam exercitatio epistolica* (Oxford, 1656).

But Ward's defining contribution to astronomy, the so-called "simple elliptical hypothesis," emerged from the Boulliau-Ward debate. This dispute focused on Kepler's laws, or more precisely, alternatives to Johannes Kepler's first two planetary rules, now known as the ellipse and area laws. Significantly, deep cosmological concerns formed the core of the debate, issues first framed by Ismaël Boulliau in his influential *Astronomia philolaïca* (Paris, 1645). Here, Boulliau made startling claims against Kepler's now-famous cosmological contributions. Calling Kepler "ingenious" and "sagacious," as well as a "mediocre geometer," Boulliau rejected Kepler's celestial physics as "mere figments" and dismissed his demonstrations as "a-geometric." In place of Kepler's *anima motrix* and "magnetic fibers," Boulliau argued it was more natural to assume that the planets were self-moving. In place of Kepler's cumbersome geometry (involving trial and error approximation), Boulliau proposed a "direct solution" based on mean motion.

Here, Ward opposed Boulliau's assumptions, methods, and conclusions. Prompted by Sir Paul Neile, Ward published two treatises attacking Boulliau's geometrical procedures. In his *Inquisitio brevis* (1653), Ward claimed to have produced a more accurate elliptical theory, the "simple elliptical hypothesis," which had in fact been known earlier to Kepler, Albert Curtz, and Boulliau himself. Focusing strictly on mathematical methods, Ward never questioned the empirical accuracy of Boulliau's theory but insisted (incorrectly) that his results were more accurate. Three years later, Ward published his *Astronomia geometrica* (1656), which provided

a more polished account but continued to ignore empirical factors. Finally, in the following year, Boulliau responded with his *Astronomia philolaica fundamenta clarius explicata* (Paris, 1657). After acknowledging his error (noted in his *Astronomia philolaica*), Boulliau demonstrated that Ward had mistakenly identified the conical hypothesis with his alternative "simple elliptical" model, that is, an ellipse where the empty (non-solar) focus served as an equant point. To demonstrate the difference, Boulliau cleverly argued that if Ward's hypothesis were applied empirically to the planet Mars, it would result in a maximum error of over 7' in heliocentric longitude, not the 2.5' calculated from the conical hypothesis. While his "modified elliptical hypothesis" (1657) seemed to win the day—it surpassed the accuracy of Kepler's "area law" for Mars—Boulliau's cosmological principles failed to excite focused attention.

But the technical debate continued. Over the next three decades, the great debate on the "problem of the planets" was largely reduced to quibbles about "saving the appearances." But there was wide agreement about planetary orbits. By the 1660s, the elliptical path was commonplace. Thanks to Boulliau's "English Lieutenants" (Jamy Shakerley, John Newton, Vincent Wing, Nicolaus Kauffman (Mercator), and Thomas Streete), the modified elliptical hypothesis had been continually refined. Yet, in retrospect, this technical success was also marked by failure. Debates of the 1660s and 1670s failed to illuminate the critical relationship between computational simplicity and cosmological explanation. If this lapse marks a "retrograde step," it was not an isolated *faux pas*. In any case, by the 1670s, the "problem of the planets" had become an English affair, and by tradition, that decade marks the uneasy divide between "post-Keplerian" and "pre-Newtonian" astronomy. In the end, by the time of Isaac Newton's *Principia* (1686), Ward had left behind a large legacy of sermons but nothing new in science. Most of Ward's papers are lost—reportedly his cook used them for kindling and as doilies for cooling potpies.

Robert Alan Hatch

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