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(*b*. Aspenden, Hertfordshire, England, 5 April 1617; *d*. Knightsbridge [now in London], England, 6 January 1689), *astronomy*.

Ward was the second son of John Ward, attorney, and Martha Dalton Ward. He entered Cambridge in 1632, graduated B.A. in 1637, received the M.A. in 1640, and was elected a fellow of his college. He subsequently became mathematical lecturer (1643) before the ascendancy of the Puritans induced him to leave the university. Only in 1649 did he master his scruples sufficiently to subscribe to the Solemn League and Covenant and return to academic life, this time at Oxford, as a replacement for the ousted Savilian professor of astronomy, John Greaves. Although the Puritan "visitors" succeeded, by such means, in securing the allegiance of the universities, there was a strident group of pamphleteers who insisted that reform should go much deeper, to the very heart of the curriculum-the Aristotelian corpus. In 1654 (the year he received the D.D.), Ward published with John Wilkins *Vindiciae academiarum* in defense of the extent to which the universities had responded to the new learning.

In 1660, on the second occasion of being disappointed in his bid for administrative advancement, Ward abandoned his academic career. In two years he accumulated several church livings and rose to bishop, in which post he proved a zealous administrator of church law and property.

Ward is remembered in the history of astronomy for his formulation of an alternative to Kepler's law of areas. Kepler's law of elliptical motion began to find general acceptance with the publication of Boulliau's *Astronomia philolaica* in 1645. In place of the area law, however,, Boulliau postulated a complicated motion described by reference to a cone. Ward, in 1653, showed that Boulliau's scheme amounted to assuming uniform angular motion with respect to the empty focus of the ellipse. An idea with a distinguished pedigree (essentially Ptolemy's bisection of the eccentricity), it presented a very attractive alternative to the intractable Kepler equation. During the following generation, it and various modifications of it were widely used in planetary computations.

BIBLIOGRAPHY

I. Original Works. Ward's more important writings are *In Ismaelis Bullialdi astronomiae philolaicae fundamenta inquisitio brevis* (Oxford, 1653); *Vindiciae academiarum* (Oxford, 1654), written with John Wilkins; *Astronomia geometrica; ubi methodus proponitur quaprimariorum planetarum astronomia sive elliptica sive circularis possit geometrice absolvi* (Oxford, 1656); and *In Thomae Hobbii philosophiam exercitatio epistolica* (Oxford, 1656). He also published a few lesser scientific works and many theological writings.

II. Secondary Literature. See Phyllis Allen, "Scientific Studies in the English Universities of the Seventeenth Century," in *Journal of the History of Ideas*, **10** (1949), 219–253; J. L. Russell, "Kepler's Laws of Planetary Motion: 1609-1666," in *British Journal for the History of Science*, **2** , no. **5** (1964), 1–24; and Curtis A. Wilson, "From Kepler's Laws, So-Called, to Universal Gravitation: Empirical Factors," in *Archive for History of Exact Sciences*, **6** , no, 2 (Apr. 1970), 89–170.

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