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(*b.*Edinburgh, Scotland, 1 December 1671; *d.*Oxford, England, 31 August 1721)

*physics, mathematics.*

Keill's early education was at Edinburgh, where he also attended the university, studying under David Gregory, the first to teach pupils on the basis of the newly published Newtonian philosophy. He graduated **M.A.** before going to Oxford with Gregory, who had been made Savilian professor of astronomy there. Keill was incorporated M.A. at Balliol in 1694 and in 1699 became deputy to Thomas Millington, Sedleian professor of natural philosophy. After a short absence from Oxford he became Savilian professor of astronomy there in 1712, and a year later a public act made him doctor of physic. He remained as Savilian professor until his death.

Keill was one of the very important disciples gathered around Newton who transmitted his principles of philosophy to the scientific and intellectual community, thereby influencing the directions and emphases of Newtonianism. As one of the few around Newton with High Church patronage, Keill apparently tried to counter the [Low Church](#) influences of such spokesmen as [Richard Bentley](#) and [William Whiston](#). While agreeing with them that the discoveries and doctrine of universal attraction of Newtonianism should play a crucial role in fighting "atheistic" Cartesianism and mechanical thinking, he rejected the notion that this should be accomplished exclusively or primarily by means of natural theology. Rather, natural theology should be subordinated to the Scripture, while natural philosophy should acknowledge the important role played not only by Providence but also by outright miracles. These arguments are made in Keill's first work, *An Examination of Dr Burnet's Theory of the Earth. Together with Some Remarks on Mr. Whiston's New Theory*. . . (1698). This was probably written before he had met Newton, and was an attack on the cosmogonical treatises about the world's creation then being widely debated by many members of the [Royal Society](#). Although supposedly written specifically against the unscientific methods of the theories of [Thomas Burnet](#) and [William Whiston](#), in substance it amounted to a very hostile attack—in the name of orthodoxy—on the delusions of "world-making" which were caused, Keill claimed, by Cartesian natural philosophy. As an antidote Keill prescribed the more modest and exact Newtonian philosophy, based solidly on mathematical reasoning, even though Newton himself was known at the time to have sympathies with the cosmogonical theories. Besides those of Burnet and Whiston, Keill attacked the ideas of [Richard Bentley](#), who had tried to use Newtonian principles as the foundation for his physicotheology in his famous Boyle lectures in 1692.

In effect, Keill's work offered itself to Newton as an alternative Newtonian theology, different from that of the [Low Church](#) disciples. Newton's public acceptance of Keill's basic criticism against "world-making" was incorporated in 1706 in what was to be the famous 31st Query of the *Opticks*.

Keill's role as propagator of Newtonian philosophy was carried out primarily through his major work, *Introductio ad veram physicam*. . . (1701), based on the series of experimental lectures on Newtonian natural philosophy he had been giving at Oxford since 1694. The first such lectures ever given their attempt to derive Newton's laws experimentally did much to influence later publications. Although Keill makes the decidedly anti-Newtonian principle of the infinite divisibility of matter in nature a fundamental axiom, the *Introduction* again unfavorably contrasts Cartesian mechanism, with its dangers of atheism, and Newtonianism. Descartes's insufficient use of geometry, his attempt to define the essences of things rather than being content merely to describe their major properties, and his desire to explain the complex before he can adequately deal with the simple distinguish his fictions from the true principles of Newton. An appendix to the *Introductio* gives a proof for the law of centrifugal "force," whose magnitude had been announced in 1673 by [Christiaan Huygens](#). Several years after the *Introduction*, Keill published an article on the laws of attraction, dealing mainly with short-range forces between small particles, in which he elaborated on Newtonian hypotheses that Newton himself had been unable to pursue.

Some of Keill's writings also brought hostile attacks against Newtonianism from the Continent. For example, his charge that Leibniz had plagiarized from Newton's invention of the calculus gave rise to a major dispute between English and Continental natural philosophers, in which Keill served as Newton's "avowed Champion." Keill's article on the laws of attraction also brought criticisms from the Continent against the employment in Newtonianism of such dubious philosophical concepts as attraction.

In 1700 Keill was elected fellow of the [Royal Society](#). Support from Henry Aldrich, dean of Christ Church College, Oxford, helped Keill's preferment, particularly in becoming deputy to Millington in 1699, just after the attack on Burnet, Whiston, and Bentley. In 1709 [Robert Harley](#) helped Keill become treasurer for the refugees from the Palatinate, in which connection he traveled to [New England](#). From 1712 to 1716, with Harley's help, he was a decipherer to Queen Anne.

Keill's uncle was John Cockburn, a controversial Scottish clergyman with Jacobin sympathies. His brother, James, with help from, John, tried to apply Newtonian principles to medicine; at his death James left a large sum of money to John. John's marriage in 1717 to Mary Clements, many years his junior and of lesser social standing, was the cause of some scandal. Besides her, Keill was survived by a son, who became a linen draper in London.

## BIBLIOGRAPHY

I. Original Works. *Introductio ad veram physicam, accedunt christiani Hugenii theoremata de vi centrifuga et motu circulari demonstrata*. . . (Oxford, 1701) was translated as *An Introduction to Natural Philosophy, or Philosophical Lectures Read in the University of Oxford*. . . (London, 1720); when Newtonianism began to make inroads in France, it was translated into French. *An Examination of Dr Burnet's Theory of the Earth. Together With Some Remarks on Mr Whiston's New Theory of the Earth* (Oxford, 1698) includes, in the 1734 ed., Maupertuis's *Dissertation on the Celestial Bodies*. Keill answered Burnet's and Whiston's defenses in *An Examination of the Reflections on the Theory of the Earth. Together With Some Remarks on Mr Whiston's New Theory* (Oxford, 1699). *Introductio ad veram astronomiam, seu selectiones astronomicae*. . . (Oxford, 1718) was translated as *An Introduction to the True Astronomy; or, Astronomical Lectures*. . . (London, 1721) and also appeared in French. "On the laws of Attraction and Other Principles of Physics" is in *Philosophical transactions of the Royal Society*, no. 315 (1708), p. 97. "Response aux auteurs des remarques, sur le différence entre M. de Leibnitz et M. Newton," in *Journal littéraire raure de la Haye*, 2 (1714), 445–453, is one of several articles by Keill on the calculus controversy. He edited the *Commercium epistolicum D. Johannis Collins, et aliorum, de analysi promotum*. . . (London, 1712), which contains the original documents bearing on the Newton-Keibniz controversy. Samuel Halkett and John Laing, *Dictionary of Anonymous and Pseudonymous English Literature*, II (Edinburgh, 1926), 202, cite a contemporary MS note in attributing authorship of Martin Strong [pseud.], *An Essay on the Usefulness of Mathematical Learning. In a Letter From a Gentleman in the City to His Friend at Oxford* (London, 1701), to [John Arbuthnot](#) and Keill. "Theoremata quaedam infinitam materiae divisibilitatem spectantia, quae ejusdem raritatem et tenuem compositionem demonstrans, quorum ope plurimae in physica tolluntur difficultates" is in *Philosophical Transactions of the Royal Society*, no. 339 (1714), p. 82. There are letters from Keill in *Correspondence of [Sir Isaac Newton](#) and professor Cotes*, J. Edleston, ed. (London, 1850). Two boxes of Keill MSS, including some letters, drafts of lectures, notebooks, and an inventory of his library are in the Lucasian Papers at [Cambridge University Library](#).

II. Secondary Literature. There has been very little attention given to Keill by historians of science, and mention of him generally is found only in connection with the controversy over the calculus. Among Newton's biographers, Sir [David Brewster](#), *Memoirs of the Life, Writings, and Discoveries of [Sir Isaac Newton](#)*, I (Edinburgh, 1855), pp. 335, 341–342, II, pp. 43–44, 53–69; and Frank Manuel, *Portrait of Isaac Newton* (Cambridge, Mass., 1968), pp. 271–278, 321–323, 329, 335–338, 351, 399, 456, discuss Keill. There is a section on Keill's approach to natural philosophy in E. W. Strong, "Newtonian Explications of Natural Philosophy," in *Journal of the History of Ideas*, 18 (1957), 49–83. [Ernst Cassirer](#), *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit*, II (Berlin, 1907), pp. 404–406, has a brief discussion of Keill. Pierre Brunet, *L' introduction des théories de Newton en France au XVIII<sup>e</sup> siècle. Avant 1738* (Paris, 1931), p. 79 f., briefly deals with Keill. See Arnold Thackray, "'Matter in Nut-Shell': Newton's Opticks and Eighteenth Century Chemistry," in *Ambix*, 15 (1968), 29–53, for Keill's ideas on the infinite divisibility of matter and *Atoms and Powers. An Essay on Newtonian Matter-Theory and the Development of Chemistry* (Cambridge, Mass., 1970). A chapter on Keill in David Kubrin, "Providence and the Mechanical Philosophy: The Creation and Dissolution of the World in Newtonian Thought," unpub. diss. ([Cornell University](#), 1968), discusses Keill's attack on Burnet and Whiston. See also Robert Schofield, *Mechanism and Materialism. British Natural Philosophy in an Age of Reason* (Princeton, 1969), pp. 15n, 25–30, 42, 42n, 43–44, 55, 80.

David Kubrin