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## **Book Reviews**

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### **DESCARTES AND THE HYPERBLIC QUEST: LENS MAKING MACHINES AND THEIR SIGNIFICANCE IN THE SEVENTEENTH CENTURY**

By D. Graham Burnett  
Philadelphia: American Philosophical  
Society; 2005. 152 pages.

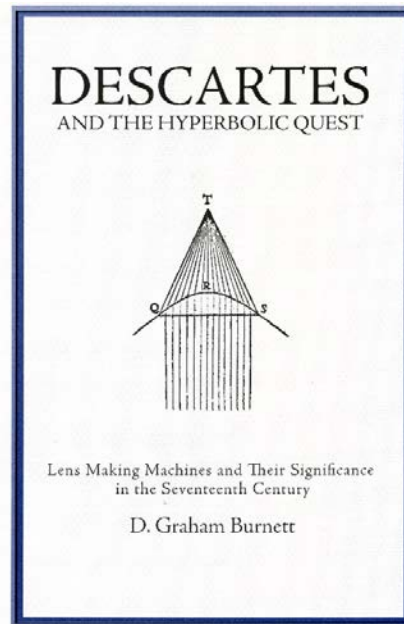
In the seventeenth century, the best lenses were being made in Italy. Although optical knowledge was improving at that time, as for example through the publications of Kepler, there was little change in lens making procedures and the improvements that did occur were more through the work of lens making artisans than through that of natural philosophers (scientists) and mathematicians.

Quality of lenses was affected by the quality of the glass and of the abrasives used in shaping and polishing the glass, as well as the skill and techniques of the lens maker. One of the best lens makers of the seventeenth century was Giuseppe Campani, who guarded his methods as trade secrets and taught them to no one except his daughter.

The market for high quality lenses was driven largely by the need for good lenses to make telescopes. Some natural philosophers also tried their hand at lens making. For example, Christiaan Huygens made good enough lenses to make a telescope with sufficient imagery to allow him in 1659 to publish a theory that rings around Saturn gave it its oblong appearance.

It was known by the early seventeenth century that the quality of lenses was limited by aberrations. By the early 1620s the mathematician Isaac Beeckman was pioneering efforts to make aspheric lenses. By the late 1620s Rene Descartes was working with a mechanical craftsman and instrument maker named Ferrier to try to design an aspheric lens making machine that was automated so that there was little work required of the lens making craftsman. His attempts to design such a machine were detailed in his 1637 book *La Dioptrique*.

Descartes' involvement in the quest to build an automated machine for hyperbolic lens grinding seems to have ended in 1640 when Florimund De Beaune, a young technically adept mathematician with whom he had been working, was injured by a piece of glass. The publication of Descartes' book *La Dioptrique* in 1637 and the high regard



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for machines in seventeenth century science seems to have spurred several natural philosophers and astronomers to try to construct mechanical systems for the production of lenses for telescopes. The author discussed the efforts of the following in the seventeenth century after Descartes: Anton de Rheita, Emmanuel Maignan, Robert Hooke, Christopher Wren, Christiaan Huygens, and Constantijn Huygens. Some of those systems were only theoretical and never constructed. None of them produced lenses equal in quality to the handcrafted lenses ground by the master Italian lens makers. By the last quarter of the seventeenth century, attention was shifting to Newtonian reflecting telescopes.

In 1671, Cherubin D'Orleans, a Capuchin friar, published *La Dioptrique Oculaire*, a treatise on lens making. He envisioned a middle ground between complete automation of lens grinding and the "vulgar artisan." He suggested a new artisan, with both theoretical grounding and practical ability, who would make use of mechanical devices designed in such a way that the artisan could guide their proper operation.

In addition to expounding on the history of attempts to automate lens making in the seventeenth century, the author also presented some philosophical musings on the relation of scientists and artisans in that time period and on Descartes' writings. The author is a history professor at Princeton University.

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