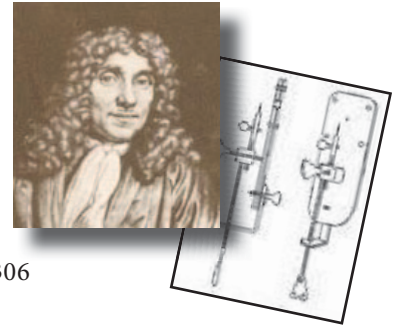


Pioneers in Optics: Henry Baker and Giovanni Borelli

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Henry Baker (1698-1774)

Born in London on May 8, 1698, Henry Baker was a significant contributor to the popularization of microscopy and the dissemination of scientific knowledge. During his younger years, he served as an apprentice to a bookseller and later made his fortune by devising and practicing a system to teach hearing- and speech-impaired children.

Baker's achievements were

noticed by the writer Daniel Defoe and inspired his novel *The History of the Life and Adventures of Duncan Campbell*, the title character of which is a deaf conjurer. Defoe's youngest daughter, Sophia, was also intrigued by Baker, and the couple married in 1729.

Having attained wealth early in his life, Baker was left with ample time to pursue his many interests. Perhaps influenced by his father-in-law, Baker was often involved in the arts and was a writer and translator of poetry. He was also connected with Defoe in the launching of the publication *The Universal Spectator and Weekly Journal* and was a founder of the Society of the Arts, established in 1754.

Simultaneously a fellow of the Society of Antiquaries and the Royal Society, Baker was a naturalist whose microscopical observations of aquatic animals and fossils were of interest to a wide audience. In 1744 his study of crystal morphology garnered Baker the Copley Gold Medal for his microscopical work and inspired other scientists to engage in systematic microscopic studies of crystalline formations. Many of the materials he examined were observed through a compound microscope made by the English optics expert John Cuff (1708-1772), which he designed at Baker's behest.

Baker published two books on microscopy, *The Microscope Made Easy* (1742) and *Employment for the Microscope* (1753), that were extremely popular throughout the eighteenth century. In fact, *The Microscope Made Easy* had run through

five editions by 1769, and both were translated into French and Dutch. Continually enthralled with the wonders of the universe revealed through a microscope, Baker spent many years of his life dedicated to instilling the same reverence in others. In *The Microscope Made Easy*, he writes:

The works of nature are the only source of true knowledge, and the study of them the most noble employment of the mind of man. . . . Microscopes furnish us as it were with a new sense, unfolding the amazing operations of nature, and presenting us with wonders unthought of by former ages.

Dying in London on his seventy-sixth birthday, Baker's vision was perpetuated by those whom he first inspired to look through a microscope, as well as their successors. The Royal Society continues to sponsor a Bakerian lecture each year in his honor, the foundation of which was initially established by a bequest of money made by Baker in his will.

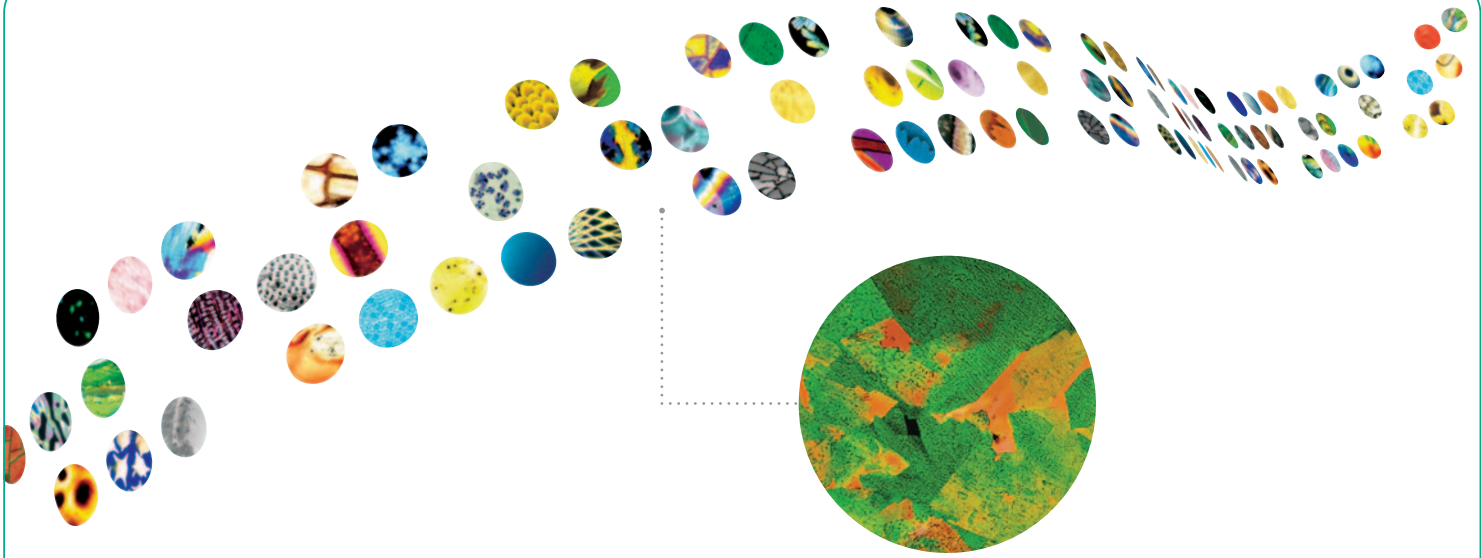


Giovanni Borelli (1608-1679)

Born as Giovanni Francesco Antonio Alfonso in Naples, Italy on January 28, 1608, the son of a Spanish infantryman was to become a great mathematician and physicist, later changing his surname to Borelli. An adept microscopist, Borelli was dedicated to preserving and advancing the Galilean tradition of studying nature and

is most renowned for his studies in physiology.

Borelli was a professor of mathematics at Messina beginning in 1649, but took another teaching position in Pisa in 1656. Eleven years later he returned to Messina, but was compelled to retire in 1674 to Rome, where he lived under the protection of Christina, Queen of Sweden. Throughout his lifetime Borelli carefully studied a variety of topics, but he is particularly noted for his microscopic investigations of red blood cells and his accurate observation of the regularity of stomatal movements in plants.



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Intrigued by astronomy, Borelli wrote numerous works on the topic, including a paper in 1666 that deliberated the effect of at-traction on the satellites of Jupiter. Additionally, in a letter published in 1665 under the pseudonym Pier Maria Mutoli, Borelli was the first to suggest that comets travel in a parabolic path.

Borelli's most famous work, however, was *On the Movement of Animals*, but he did not live to see it in print. The paper, which was published posthumously in two parts between 1680 and 1681, often garners Borelli the title "Father of Biomechanics." His physiological study was based on solid mechanical principles and the work included muscle analysis and a mathematical illustration of movements, such as running and jumping. In the paper, Borelli also attempted to clarify the reason for muscle fatigue, explain organ secretion, and hypothesize on the concept of pain.

Extremely inventive, Borelli is also often remembered by scuba diving enthusiasts for his drawings of a closed circuit "rebreather." His illustrations depict a giant bag utilizing chemical components, which he suggested should allow the air to be breathed again by a submerged diver. Although the device was apparently never made, his design was the first to visualize a diver as a free-swimming "frogman."

Borelli died in Rome on December 31, 1679, but his impressive body of original work helped inspire a great number of future scientists, microscopists, and inventors. The highest honor bestowed by the American Society of Biomechanics is the Giovanni Borelli Award, which is given annually to an investigator who has conducted exemplary research in biomechanics. [MT](#)

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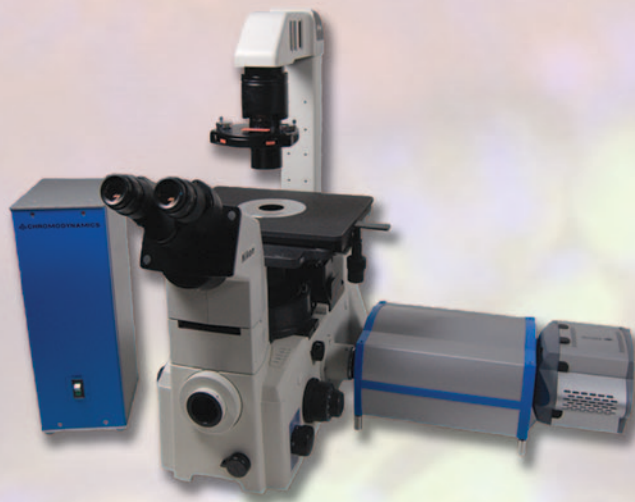
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