Both books are important additions to a cosmologist's library. Durrer's book is a distillation of years of development of CMB theory into a single coherent and unified story. It links theory and observations and teaches how to connect the two to learn about the universe. Giovannini's book, in contrast, is anchored in the inflationary model of the universe and illustrates the important link between the theory of inflation and the theory of CMB fluctuations. More importantly, the formalism in Giovannini's book, although perhaps less elegant, yields equations that are closer to those used in standard numerical codes. The two books are complementary, and graduate advisers should have both of them ready to hand out to their graduate students as the need arises. I will definitely keep both books on my shelf.

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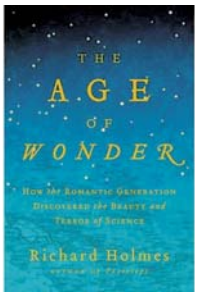
The Age of Wonder

How the Romantic Generation Discovered the Beauty and Terror of Science

Richard Holmes
Pantheon, New York, 2009. $40.00 (576 pp.). ISBN 978-0-375-42222-5

From the time before the divide we now accept between the arts and sciences, before the word "scientist" existed, comes the inspiration for *The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science*. Richard Holmes has written a vivid evocation of the lives of some of the greatest 18th-century natural philosophers. He first achieved fame for his gripping, intimate biography of the radical poet Percy Bysshe Shelley and his loves. In his latest work, he again draws heavily on personal diaries, this time to bring to life through telling detail the passions and dreams of such luminaries as William and Caroline Herschel, Humphry Davy, and Michael Faraday. (Notably absent from the book is British polymath Thomas Young.) He also details their friendships with romantic poets including Shelley, Lord Byron, and John Keats. Both natural philosophers and poets believed, as Holmes says in the book, that "Truth is a species of Revelation." They also believed, as Richard Feynman would later agree, that science must remain a continual dialog between skeptical inquiry and a sense of inexplicable mystery.

The narrative starts with naturalist Joseph Banks, who later became the Royal Society's most influential president. In 1769 Banks traveled with explorer James Cook to Tahiti, the island labeled a "sexual utopia" by a French botanist. There, naked girls offered themselves to Cook's crew in welcome—and later, for the ship's nails, since the natives had no metals. Led by Banks, the crew collected plants, recorded the transit of Venus, tested John Harrison's chronometer, and evaluated the effectiveness of lemon juice against scurvy. However, they failed to prevent the spread of venereal disease. Crew members spent their days surfing with the girls, playing the nose flute, roasting wild dogs, and wrestling naked. The communal Tahitians helped themselves to the sailors' gear—a theft that might be contrasted with the subsequent European colonization of those islands. Banks's candid report of the exploration shocked London—he presented the city with Omai, a Tahitian he brought back.



I had no idea that balloonists had crossed the English Channel before the French revolution, or that Keats (as a medical student) and Percy and Mary Shelley held debates with Percy's doctor about the doctrine of vitalism (the belief in a mysterious "spark of life"). The recent invention of the battery suggested that electricity might supply that spark. Indeed, the three attended demonstrations at which high voltages were applied to corpses—the inspiration for Mary's novel *Frankenstein*, the birth of science fiction.

But the most affecting writing deals with William Herschel and his devoted sister Caroline. William discovered Uranus and IR radiation, cataloged nebulae, and produced the first decent map of the Milky Way that featured our Sun. The immensity of the universe, its evolving nature, and man's insignificant place in it were radical notions first presented by him. After reading William's work, Erasmus Darwin—physician, poet, and Charles's grandfather—suggested that the universe might one day collapse into a "dark center." Pierre Simon Laplace, responding to William's nebulae hypothesis, told Napoleon he had "no need of the God hypothesis" to explain planetary formation. Meanwhile, Charles Lyell's new geology was establishing a far more ancient Earth than was then believed and providing a basis for Charles Darwin's later ideas on evolution.

William worked as local organist to pay for his telescopes and eventually became the king's astronomer at Slough, where he built his famous "forty-footer," a telescope in whose tube was held a champagne party hosted by Lord Byron. Later, William would call out coordinates to his "computer" Caroline, who sat under the vast wooden supporting framework performing laborious astronomical calculations. Caroline, who sacrificed a career as a concert singer, polished the telescope mirrors—the largest yet produced—and withstood the freezing Bristol night air to view and discover comets. She was eventually elected one of the first female members of the Royal Astronomical Society and salaried by the king. In heartbreaking detail, her diaries record her devotion to science and to her brother, and the frustrations of being a woman in science in 1790. She keenly expressed her distress when William married a wealthy neighbor.

But the bulk of *The Age of Wonder* concerns Davy, the chemist who discovered many alkaline earth metals, chlorine, iodine, and chemical affinity, and who invented the miner's safety lamp. Davy also published Samuel Taylor Coleridge's poetry and his own. A highly imaginative, ungainly, tactless, fiercely enthusiastic country lad, Davy was capable of petty jealousy, as in his relationship with the young Faraday. Holmes's text follows Davy from the Pneumatic Institute in Bristol, where he discovered the uses of nitrous oxide, or laughing gas, to his appointment in 1801 at the Royal Institution, established in 1799 by Count Rumford. Davy's public lecture series established a great tradition, which Faraday (and recently Holmes himself) continued. In 1812 Davy appointed Faraday as his assistant when the youth presented him a 300-page summary of Davy's lectures. In 1833, at the third meeting of the British Association for the Advancement of Science held in Cambridge, the aging Coleridge met and took a liking to the young Faraday, impressed by his "fine open face, with its mop of curling hair and gazing wide-apart eyes, his modest manner, with its peculiar directness and intensity."

For Holmes to bring those people back to life is a great achievement. Along with Richard Rhodes's *The Making of the Atomic Bomb* (Simon & Schuster, 1995) and Bruce Hunt's *The Maxwellians* (Cornell University Press, 1991), this is the finest history of science book I've come across.

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