BOOKS & ARTS

Theft or innovation?

A history of intellectual-property rights reveals how the pirating of ideas and goods has transformed science publishing, drug development and software, explains **Michael Gollin**.

Piracy: The Intellectual Property Wars from Gutenberg to Gates
by Adrian Johns
University of Chicago Press: 2010.
640 pp. $35, £24

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The cinchona plant was targeted for illicit export as it contains the antimalarial compound quinine.

By allowing scientists, inventors and artists to assert property rights over their creative work, the intellectual-property system rewards the investment of time and money required to bring ideas to market. Piracy, or unauthorized copying, of creative works is usually seen as a simple violation of commercial rights, with pirates as thieves.

Historian Adrian Johns argues instead that piracy is a cultural force that has driven the development of intellectual-property law, politics and practices. As copying technologies have advanced, from the invention of printing in the sixteenth century to the present, acts of piracy have shaped endeavours from scientific publishing to pharmaceuticals and software.

Pirates duplicate an innovative idea, publication or thing, ignoring the objections of contemporaries who assert a dominant right. Arguments against piracy have changed little over the centuries: pirated books, machines, medicines and software are criticized as being dangerous or inferior to authentic ones; pirates destroy the social fabric of creativity by denying innovators their due compensation; pirates stand outside moral and legal norms. Industry giants attack companies who make cheap copies of drugs and software as pirates, and conservation organizations berate those who collect indigenous genetic material, particularly from the tropics, as biopirates.

But piracy has always had its supporters. Printers in revolutionary America saw their copying of British works as resisting an oppressive government, and some pirates today see themselves as patriots fighting foreign domination. Pirates champion the rights of private individuals against governments or monopolistic corporations — by making available unauthorized copies of movies, for example. Pirates claim to promote the flow of information in a free society, and to serve the poorer sectors of society with lower-priced drugs, hardware and software.

Johns suggests, counter-intuitively, that piracy can promote the development of technology. The resulting competition forces legitimate innovators to manoeuvre for advantage — by moving quickly, using technical countermeasures or banding together and promoting reputation as an indicator of quality, such as through trademarks. In the nineteenth century, US policy encouraged the free use of foreign technology to promote immigration and invention by talented craftspeople, scientists and engineers.

Today's debates about publishing genetic sequences in databases and the drive for open-access scientific journals have a history that is as old as printing. London's physicians joined together to publish the first national pharmacopoeia in 1618 as a way to avoid pirated drug formulations. Ironically, that book made it easier for others to copy the formulations in it, and the book itself was pirated. The evolution of peer-reviewed journals helped to distinguish authentic authors and inventors from the outsiders who copied their scientific works and instruments. But publication also aided copying, and the possibility of piracy became a rationale for introducing copyright and the patenting of scientific work to protect its commercial potential.

The exclusive rights granted by intellectual-property laws are always being reshaped by public opinion, and accused pirates have lobbied against these laws for centuries. The strongest form of their argument — that all property rights should be eliminated in publications, ideas and objects — has not prevailed, except briefly during the French Revolution. Less radical ideas have been adopted into law, including the copyright defence of fair use and the compulsory licensing of patent rights on important inventions such as drugs. Governments have backed copyright-royalty tribunals to ensure distribution of music revenues to the copyright holders, and have instituted alternatives to privately funded innovation, such as state funding of research.

Piracy has led commerce to adopt countermeasures. Private, self-policing business associations were established as early as the seventeenth century, when booksellers formed their own registry of publications. In revolutionary America, printers such as Benjamin Franklin banded together, and today, international trade associations fight piracy for the recording, movie, pharmaceutical and agricultural industries.

Private associations can derive from piratical groups. Johns traces historical overlaps between pirate radio operators in the 1920s, ham radio operators of the 1960s, the 'phone phreakers' of the 1970s — who exchanged techniques for making free, long-distance phone calls — and the Homebrew computer club in the San Francisco Bay area of California, in which the sharing of ideas helped to incubate the personal computer. The open-source and open-access communities promote information sharing using sophisticated

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practices that avoid the label of piracy and its legal consequences, which has helped them to become accepted in parts of the commercial and technological establishment.

Today's intellectual-property system is built on decisions made in the past. In revealing how piracy affected those decisions, Johns's history provides a valuable addition to the literature. However, the book does not deal with the future implications of piracy. Lacking a practical understanding of current intellectual-property law and practice, Johns is unable to draw lessons or make predictions or recommendations.

Piracy is an aspect of intellectual-property dynamics that scientists, lawyers, policymakers, business people and consumers should understand. When pirates gain the upper hand, innovators suffer and quality declines. But when exclusivity becomes too strong, society loses the benefits of access. A constant effort is required to balance the interests of innovators and copiers, and to nurture a healthy creative environment. ■

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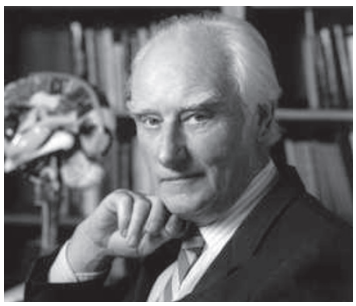
Symmetry and hubris

Francis Crick: Hunter of Life's Secrets
by Robert Olby
Cold Spring Harbor Laboratory Press: 2009.
450 pp. $45, £30

Francis Crick was not your run-of-the-mill scientist, as Robert Olby makes clear in his superb biography. A tall man given to verbal diarrhoea and infectious laughter, Crick did his Nobel-prizewinning work before he finished his PhD. His thesis, on the X-ray analysis of protein structure, provided him with skills to appreciate the molecular arrangement of DNA, but his work with James Watson was done in his spare time. Crick included an offprint of their 25 April 1953 *Nature* paper, the most fundamental in twentieth-century life sciences, in the back of his thesis as proof that he was a published researcher.

The Cambridge thesis was his second attempt at a doctorate. His first, in physics at University College London, was interrupted by the outbreak of the Second World War, during which he worked on mine research for the Admiralty. After the war, Crick convinced the Medical Research Council (MRC) to give him a studentship to apply physics to biology. He went to Cambridge, first to the Strangeways Research Laboratory, and then to what is now known as the MRC Laboratory of Molecular Biology (LMB).



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Francis Crick: no ordinary scientist.

Discovering the structure of DNA saved his career. Lawrence Bragg, director of the Cavendish Laboratories where the LMB was then housed, had grown tired of Crick's boisterous behaviour. After the DNA paper, Bragg held a different view and Crick stayed at the LMB until 1976. His contributions to the development of molecular biology and genetics, and to our understanding of the genetic code and of transfer RNA, ribosomes and messenger RNA, are without parallel. His formulation of the central dogma — that information flows in one direction, from DNA to RNA to proteins — also dates from this period, along with the gradual realization that the structures and functions of molecules in cells are more complicated than he had earlier assumed.

Olby brilliantly follows Crick through these creative years. By highlighting the scientist's interactions with a growing group of others devoted to developing the field, he captures the excitement, false dawns and triumphs that followed the Watson–Crick model of DNA. Olby is fair to all of the early participants in DNA work: Linus Pauling, Maurice Wilkins and, above all, Rosalind Franklin and her collaborators at King's College London. Watson and Crick used Franklin's data, and benefited from a breakdown in relations between Franklin and Wilkins that interrupted Wilkins's work on the molecule. The full story emerged only after the Nobel prize was awarded in 1962 to Watson, Crick and Wilkins; by then, Franklin had died, tragically young, of ovarian cancer. In 1952, both Franklin and Pauling were close to coming up with the structure themselves.

Issues of priority generate passion, but Olby's account can be recommended for its dispassionate analysis and mastery of archival sources. Crick's long-time collaboration with Sydney Brenner, another scientific giant, is given its due. So, too, are Crick's later decades spent at the Salk Institute in La Jolla, California, where he became a neuroscientist. Crick led a privileged existence there, able to invite scientists whose work he admired to spend months with him.

Brash young physicist turned molecular biologist; successful molecular biologist turned neuroscientist: there is symmetry to Crick's discipline changes, but hubris as well. For Crick

Stamps celebrate Royal Society scientists

To mark the Royal Society's 350th anniversary, the UK Royal Mail has issued a set of postage stamps featuring ten prominent fellows, each representing a 35-year period. Five are shown below (left to right): Alfred Russel Wallace, Joseph Lister, Ernest Rutherford, Dorothy Hodgkin and Nicholas Shackleton.

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