



Both French Resistance firebrands in the war-torn 1940s, molecular geneticist Jacques Monod (left) and writer Albert Camus later became friends.

MOLECULAR GENETICS

A revolutionary meeting of minds

Jan Witkowski relishes the interwoven stories of Nobel laureates Jacques Monod and Albert Camus.

In *Brave Genius*, the biologist Sean Carroll tells the stories of two remarkable men whose lives intersected in the aftermath of the Second World War, sparking a rare communion of spirit. Jacques Monod was a founder of molecular genetics who, with biologists André Lwoff and François Jacob, received the 1965 Nobel Prize in Physiology or Medicine. Novelist and philosopher Albert Camus was another Nobel laureate, receiving the 1957 literature prize for work “which with clear-sighted earnestness illuminates the problems of the human conscience in our times”. Just over two years later, Camus died in a car crash.

Both men were fearless in their fight against the German invaders; both were geniuses in their own spheres; and the two were united in their world views. Monod’s scientific outlook informed Camus’s work, and Camus’s philosophy greatly influenced Monod, so much so that Carroll calls Monod “Camus in a lab coat”.

Carroll’s story takes off in Paris in 1940, the year the city fell to the Germans. Monod

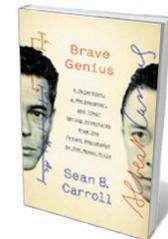
was part-way through his thesis at the Sorbonne, studying the growth of bacteria. That year he discovered ‘adaptation’, the lag that occurs when bacteria that are growing in a medium with two sugars exhaust the first and switch to the second. The observation led to his life’s work exploring the regulation of gene expression in bacteria. Around the same time, Camus arrived in Paris from Algeria. Already an experienced reporter and editor, he found a job at the newspaper *Paris-Soir*, but he had grander ambitions: to write about the absurd. In this philosophy, the Universe has no goal or meaning. Far from being a credo of despair, it urges people to recognize the absurd and live life to the full.

As Carroll shows, each man heeded French general Charles de Gaulle’s call that “all free Frenchmen, wherever they be, should continue the fight as best they may”. Monod distributed *Résistance*, a clandestine newspaper, and later joined a group that sabotaged German supply lines. He played a leading part in the rebellion of

August 1944, when the Resistance fought German troops in the streets of Paris. Camus joined a Resistance cell and wrote editorials for its newspaper, *Combat*. Carroll brings out how each man managed to pursue his vocation under the most dangerous of circumstances. Monod moved to a now legendary attic laboratory at the Pasteur Institute with Lwoff. Meanwhile, Camus continued to write, publishing *L’Étranger* (*The Outsider*) in 1942 and establishing his place among the French intelligentsia with his then friends Jean-Paul Sartre and Simone de Beauvoir.

It was a shared revulsion at Soviet biologist Trofim Lysenko’s genetics theory that brought Monod and Camus together. In August 1948, the Paris Communist paper *Les Lettres Françaises* extolled Lysenko’s work as “A Great Scientific Event”. Three weeks later, Monod wrote a counterblast

in *Combat*, declaring Lysenko’s work non-scientific. By this time, Camus had come to believe that any totalitarian regime, including those of communist states, was inherently corrupt — a view confirmed by conversations with the Hungarian-born writer Arthur Koestler, whose anti-totalitarian novel *Darkness at Noon* had infuriated communists. Camus was working on *L’Homme* ▶



Brave Genius: A Scientist, a Philosopher, and Their Daring Adventures from the French Resistance to the Nobel Prize
SEAN B. CARROLL
Crown: 2013.

► *Révolté (The Rebel)*, his long essay on the nature of revolution. He was introduced to Monod and, as Carroll puts it, they “hit it off right away”. Monod helped Camus with a chapter on how communism had perverted science in the Soviet Union, exemplified by Lysenko. (The cruel Soviet suppression of Hungary’s 1956 uprising put the seal on their mutual rejection of communism.)

Camus’s influence on Monod is clear in *Le Hasard et La Nécessité (Chance and Necessity; Seuil, 1970)*, the international best-seller in which Monod drew on the new science of molecular biology. Biology, for instance, had demonstrated that *Homo sapiens* arose through a series of chance events and that there is no grand design to the Universe. In a reference to Camus’s world view, Monod wrote that man “lives on the boundary of an alien world; a world that is deaf to his music, and as indifferent to his hopes as it is to his suffering or his crimes”. In the late 1950s, Monod carried out experiments with François Jacob and biochemist Arthur Pardee that hinted at the existence of an unstable intermediate between DNA and ribosomes. Further work by Monod and Jacob led to the operon model of how gene expression is regulated, described in a classic paper in 1961. The same year Jacob, with biologists Sydney Brenner and Matt Meselson, provided the experimental confirmation by demonstrating the existence of messenger RNA. The Nobel prize for Monod, Jacob and Lwoff followed.

The journalist Jean Daniel observed of the comradeship between Monod and Camus that there was “a complicity so intense ... that only a shared kindness of heart allowed them not to find unwelcome those who interfered in their privacy”. I am not sure that Carroll has conveyed that intensity — perhaps no one can. But although *Brave Genius* is a long and complex book, Carroll does a masterful job of keeping the many elements together and the story moving. I learned much about France at the time of the Second World War, and was prompted to reread Camus’s great novel *La Peste (The Plague)*.

In 1959, C. P. Snow wrote of the “two cultures” — that gulf between science and the humanities. *Brave Genius* provides an opportunity for those on both sides of the divide to sample a potent mix of genetics, philosophy and literature, forged in the twentieth-century tumult of war and cold war. ■

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Winston Churchill on a voyage across the Atlantic in October 1941.

ATOMIC SCIENCE

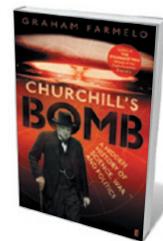
Winston and the warheads

Richard Rhodes explores a history of Britain’s little-known role in the race to develop an atomic bomb.

Britain and the United States, which cooperated so effectively as military allies during the Second World War, collaborated only intermittently — and from the British point of view inadequately — in the development of the first atomic bombs. The US side of the story has been told more than once; the British side, not recently explored, is now tackled by Graham Farmelo in *Churchill’s Bomb*.

The author, a physicist, ranges across Winston Churchill’s long career — from 1901, when Churchill wrote to H. G. Wells to congratulate him on *Anticipations*, a work of predictive non-fiction, to his final turn as prime minister in the early 1950s, when he pushed for a British hydrogen bomb. Farmelo is especially good on the Second World War years, revealing much about the Anglo-American relationship that has been guarded or unclear.

British work on the bomb preceded that by the United States. Britain was at war for more than two years before the United States came in, and was inevitably more urgently concerned with German uranium research. Moreover, Britain’s generous policy of taking in refugee Jewish scientists who were



Churchill’s Bomb: A Hidden History of Science, War and Politics
GRAHAM FARMELO
Faber & Faber: 2013.

fleeing the Nazis supplied a cadre of highly motivated physicists to investigate the explosive properties of uranium at a time when most British physicists were working on radar. In fact, it was the refugee scientists who first alerted the British government to German uranium research, just as their US counterparts famously enlisted Albert Einstein to alert President Franklin Roosevelt.

On both sides of the Atlantic, however, gatekeeper scientific advisers delayed progress. In the US case, the culprit was a government scientist named Lyman Briggs. Briggs, the director of the National Bureau of Standards, so overemphasized secrecy that the meeting minutes he received from the MAUD committee — the group of British officials tasked with researching the feasibility of building an atomic bomb — languished

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