The Guardian

Paul Dirac: The man who conjured laws of nature from pure thought

A fellow quantum physicist has said his discoveries were like 'exquisitely carved statues falling out of the sky, one after another'. In The Strangest Man, Graham Farmelo gets under the skin of one of the most baffling geniuses the world has seen *The Strangest Man has won the 2009 Costa Biography Award*

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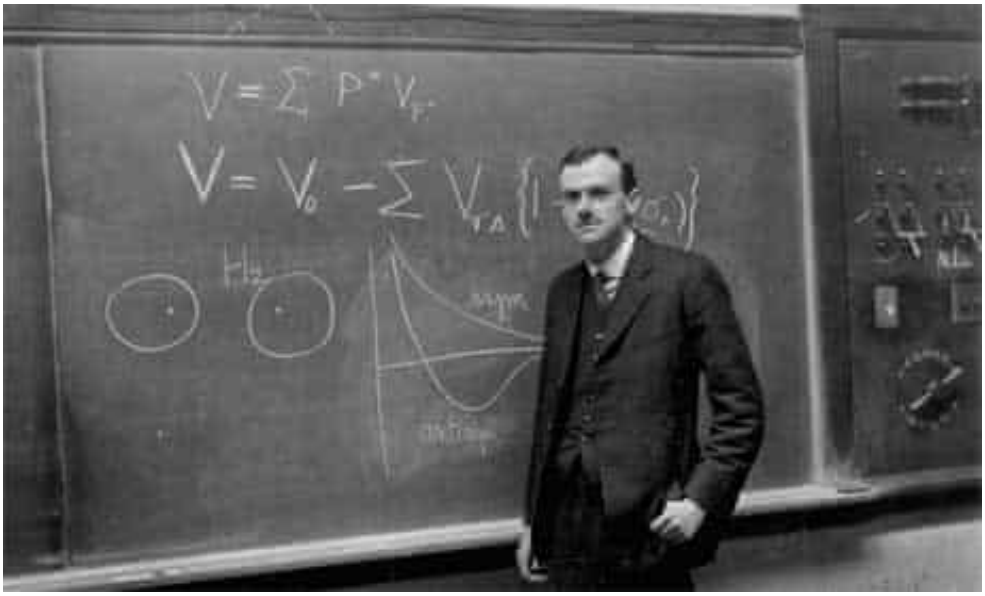


Asked to explain his discoveries in quantum mechanics, Dirac responded that they 'cannot be explained in words at all'. Photograph: AIP Emilio Segrè Visual Archives

Here's a puzzle. Bristol boy - slightly older contemporary of Bristol's other boy Cary Grant - has an unhappy childhood, but doesn't mention it for 50 years; learns to speak French, German and Russian, but becomes famous for his long silences; embarks on the wrong career; gets interested in mathematics and ends up at Cambridge, where he becomes famous for his even longer silences; hears about Einstein and gets into advanced physics; and then goes to Copenhagen to meet Niels Bohr, who grumbles to Ernest Rutherford, "This Dirac, he seems to know a lot of physics, but he never says anything."

Somehow this silent, solemn, young beanpole earns the enthusiastic friendship and admiration of vibrant and merrymaking geniuses such as Bohr himself, Robert

Oppenheimer, Werner Heisenberg, George Gamow, Peter Kapitza and so on, without, apparently, initiating reciprocal entertainment or conversation. His discoveries are in quantum mechanics, a subject that remains opaque even after 80 years of continuous exposition.

These discoveries involve no experiment, no apparatus and no observation that ever spontaneously troubled a layman. When quizzed about his achievements and their significance, he declines to explain, saying that quantum theories are built up "from physical concepts which cannot be explained in words at all".

His responses to the most ordinary pleasures have a semi-detached air. He relaxes by climbing trees in a three-piece suit. Dirac once asked Heisenberg why he danced and got the unsurprising answer that it was a pleasure to dance with nice girls. Farmelo reports: "After about five minutes of silence, he said: 'Heisenberg, how do you know beforehand that the girls are nice?'"

Dirac sounds like an unlikely candidate for a biography, let alone a "hidden life". And yet this book races along. In the foreground, a lonely boy who becomes a lonely man driven by the concept of mathematical beauty (not an obsession you tend to volunteer in the pub). In the middle distance, there is university snobbery and economic privation, a difficult father, a smothering mother and a suicidal brother, along with the rise of the Nazi party in Europe, the repressions of Stalinist Russia, the second world war, the devastation of a continent, the atomic bomb, the McCarthy era, and the cold war.

Embracing both foreground and background is the intellectual ferment of physical theory that begins with puzzles about the electron, and comes to a climax with the debate about the nature of matter and the commencement of space and time.

The story is dizzying: the unlikely hero is widely declared the second greatest scientist of the 20th century, and most people have still never heard of him. He proposes anti-matter not on the basis of physical observation, but because his own mathematical logic tells him that it must exist. He shares a Nobel Prize and writes a textbook that becomes an instant and peerless classic (you can read a similar but differently accented response to the man, the discovery and the textbook in Frank Close's highly readable Antimatter, Oxford, £9.99, coincidentally published within a few weeks of The Strangest Man).

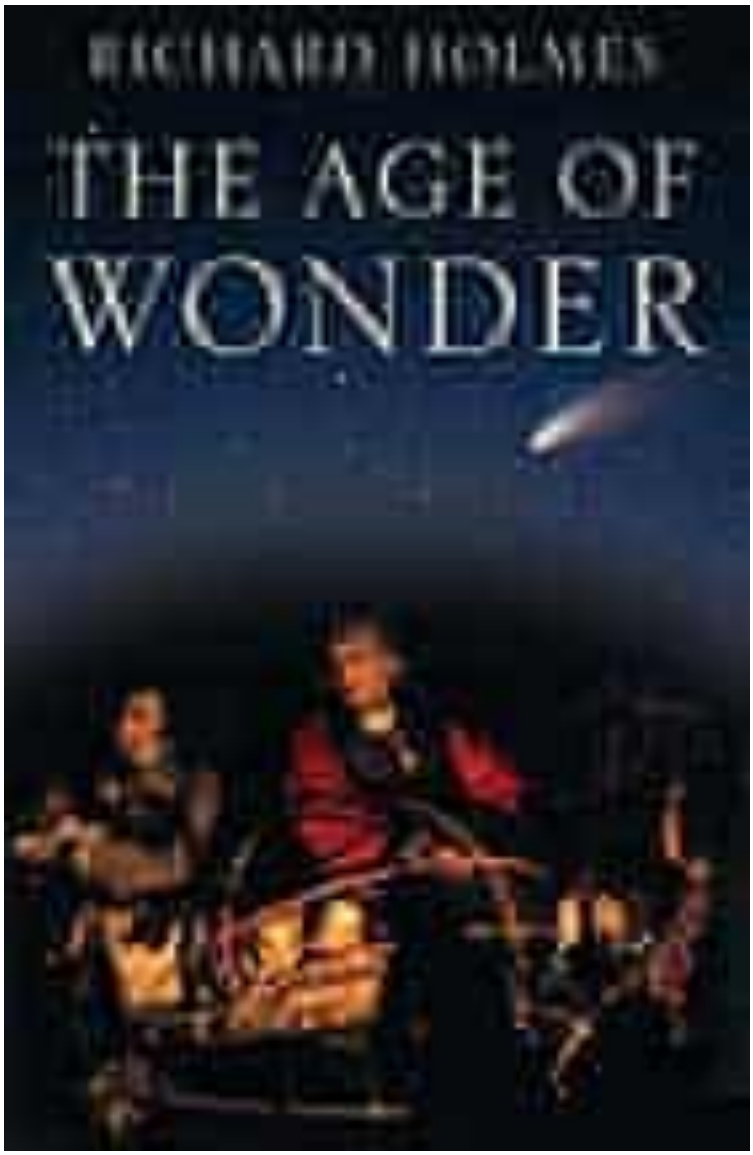
And then the mystery deepens. This apparently unfeeling, probably autistic man somehow learns to become politically opinionated, and even warmly responsive, at least to a few friends. He marries, becomes a good husband and father, takes up gardening, learns to tell jokes, develops lecturing skills that make him part of the landscape of scientific show business, and emigrates to America, all without becoming a whit less taciturn to most of his associates.

When I introduced this book club, I wondered if a biography counted as a science book. That is because life is what we make of it; but science goes its own sweet way. Farmelo makes the same point in chapter 31: "If Marie Curie and Alexander Fleming had never been born, radium and penicillin would have been discovered soon after the dates now in the

textbooks." The science would have happened anyway: the story of the people who made the science tells us more about history than science.

Dirac might, however, be an exception. He addressed mysteries, and solved them mysteriously. "His discoveries were like exquisitely carved statues falling out of the sky, one after another," says Freeman Dyson in the same chapter. "He seemed to be able to conjure laws of nature from pure thought."

Books such as these tell us as much about the why, as about the how of science. Farmelo has already had enthusiastic reviews and quite rightly, too. This is a rich book: it pinpoints the moment, the milieu, the excitement of discovery and the mystery of matter, and it provides an alternative social history of the 20th century as well. And all of this is held together by a figure simultaneously touching and mysterious, capable of leaps of the imagination on the scale of Einstein and Newton and Darwin, but also capable, when his wife exploded "What would you do if I left you?" of thinking for a while and then answering "I'd say, 'Goodbye, dear.'"



Next month's book is The Age of Wonder: How the Romantic Generation Discovered the Beauty and Terror of Science, by Richard Holmes (Harper Press)

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