

## JOHN DESMOND BERNAL – THE SAGE

By

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I remember excitedly buying a boxed set of 4 books, *Science in History* by John D. Bernal (Pelican, 1965), when I was an undergraduate. At the time I was an amateur Marxist and Bernal's work was an encyclopaedic analysis of science and society from a Marxist point of view. I was delighted to learn that Bernal was an Irishman who had spent a brilliant career at the leading edge of UK science, making many notable contributions.

John Desmond Bernal was born in Nenagh, Co. Tipperary in 1901. The Bernals were originally Sephardic Jews who came to Ireland in 1840 from Spain via Amsterdam and London. They converted to Catholicism and John was Jesuit-educated. John enthusiastically supported the Easter Rising and, as a boy, he organised a Society for Perpetual Adoration. He moved away from religion as an adult, becoming an atheist.

Bernal showed precocious talent right from the start. At the age of two he was taken by his American mother to see his grandmother in California and he amazed passengers on the steamship by talking in both English and French. In later life at Cambridge his fellow students nicknamed him 'Sage' because of his great knowledge.

Bernal started as a science undergraduate at Cambridge in 1919 where his studies included mineralogy and the mathematics of symmetry. He gained a research position in 1923 at the Royal Institution in London with William Henry Bragg the eminent crystallographer (one who studies crystalline structures using X-rays).

He returned to Cambridge in 1927 as the first lecturer in structural crystallography, fully convinced of the enormous potential of his chosen field to elucidate the structure of the technological and biological worlds. Bernal fulfilled his agenda through his own brilliant work and by inspiring the upcoming generation of crystallographers at the Cavendish Laboratory and at Birbeck College London where he was appointed Professor of Physics in 1937.

The young field of molecular biology was stagnant until Bernal observed that you could only do X-ray studies of proteins in the wet state. The research groups at the Cavendish Laboratory and at Birbeck College did much of the basic work in establishing the structures of the vital biological molecules - the proteins and the nucleic acids. They also studied the detailed structure of the simplest biological organisms, the viruses.



John Desmond Bernal

Many of Bernal's students went on to have brilliant careers. Prominent students of Bernal's included Rosalind Franklin, Dorothy Hodgkin, Aaron Klug and Max Perutz. Franklin worked out much of the structure of the DNA molecule but received little public credit, which goes almost entirely to James Watson and Francis Crick. Hodgkin and Perutz became Nobel Laureates. Perutz said of Bernal, 'When I was a student I wanted to solve a great problem in biochemistry. One day I set out from Vienna, my home town, to find the Great Sage of Cambridge. We really did call him Sage because he knew everything, and I became his disciple'.

Bernal had a brilliant mind and he generated endless fruitful research ideas. However, he never personally pursued any single idea to the extent required to win a Nobel Prize. One of the many topics he interested himself in was the origin of life on earth. In 1947 he suggested that clays may have concentrated organic molecules on the early Earth, enabling rapid chemical evolution and leading to the origin of life. Also, following discovery of organic substances in the Orgeuil meteorite, which fell in France in 1864, Bernal suggested that if contamination by earthly organic substances could be ruled out then the organic substances in the meteorite either resulted from living things on the meteorite's parent body or else resulted from inorganic processes in the early solar system. Either eventuality could mean that meteorites supplied the raw material for the origin of life on earth.

The Russian Revolution of 1917 inspired many Cambridge intellectuals, including Bernal, to become Communists. Bernal published several books including 'The Social Function of Science' (1939) and his magnum opus 'Science in History' (1965). In the Social Function of Science, Bernal analysed science both under socialism and under capitalism. He argued that science was outgrowing capitalism and that UK science could only achieve its full potential under socialism. He recognised that science was a powerful force in society and destined to become even more powerful. During the Second World War, Bernal was appointed Scientific Advisor to the Chief Combined Operations. He was particularly impressed by what science could achieve when backed by large focussed resources.

Bernal was a very popular figure in the USSR and in the post-war East European States. He won the Lenin Peace Prize in 1955. His dedication to Marxist philosophy made him a great admirer of the Soviet Union but his outlook in this respect was far too uncritical. In his obituary of Stalin, Bernal described him as 'a great scientist who combined a deeply scientific approach to all problems with his capacity for feeling and expressing himself in simple and direct terms'. Bernal's reaction to Trofim Lysenko, Stalin's favourite biologist, was ambivalent. Lysenko challenged the conventional theory of genetics and enforced his ideas on Soviet agriculture with disastrous economic and scientific consequences.

John D. Bernal clearly deserves the accolade of Sage for his scientific work and for his wide-ranging general knowledge. I am no expert on Marxism or the former Soviet Union but, nevertheless, it seems to me that Bernal's judgement regarding Soviet society and science fell far short of sagacity.

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