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## **The Man Who Shook the World**

*On Wednesday, BBC-2 launches a seven-part drama series based on the career of J Robert Oppenheimer. It tells a story that no scriptwriter would dare invent – a story of the dawn of the nuclear age. And it offers an encounter with some of the key issues of our time. Walter C Patterson reports*

If you were to ask the average person to name the scientist who best epitomises twentieth-century science, chances are you would be told Albert Einstein. But a far better choice would be J Robert Oppenheimer. In many respects Einstein's career was not untypical of that of a nineteenth-century scientist. Oppenheimer's career, however, could only have happened in the twentieth century. And a remarkable career it was – no television script-writer would have dared to invent it. It was steeped in every kind of drama, from the intensely personal to the spectacularly global. At its centre was the charismatic, enigmatic figure of Oppenheimer himself: brilliant scientist, inspiring teacher, commanding administrator, engendering fierce loyalties and equally fierce hostilities.

Oppenheimer's story is a natural for television; and in their new BBC2 series Peter Goodchild's team acquit themselves admirably. Viewers will watch *Oppenheimer* simply as a gripping tale grippingly retold. It is, however, more than that: it gives the lay public a striking opportunity to encounter close at hand some of the key issues now affecting the relationship between science and society.

The popular image of science is one of clinical orderliness, with the human factor ruthlessly suppressed into the background. As *Oppenheimer* makes vividly clear, nothing could be further from the truth. Science is turbulent and messy and full of loose ends. Scientists are people, just like accountants, plumbers, politicians and television critics. Scientists have love lives and aches and pains and bills to pay; they have pride and ambition and insecurity and erratic personal judgment, just like everyone else. Robert Oppenheimer was the epitome of the twentieth-century scientist not because he was different but because he was more so: he typified at an extraordinary level of intensity, most of the characteristics – good and bad – which makes scientists human.

Episode 1 sets the stage, introducing Oppenheimer as man and as scientist, and showing how the two are inseparable facets of a single whole. In 1938 Robert Oppenheimer is a 35-year-old theoretical physicist, a lecturer at the University of California, an American Jew from a wealthy family. He is in the grip of an unhappy love affair with Jean Tatlock, a neurotic and a member of the Communist Party. Oppy – the nickname by which all his many friends know him – is not a member of the party, but he gives money to it and agrees vaguely with its apparently humanitarian aims. He shares the general concern about the advances of Fascism and Nazism in Europe; but his involvement in politics appears essentially incidental, like that of most people, passive and on the level of personal friendship rather than ideology. Typical though such mildly radical associations then were – and in a different context, with different labels, still are – they will come back to haunt Oppenheimer for the rest of his life.

He and his physicist colleagues learn of the discovery of nuclear fission, and recognise at once the potential outcome of a chain reaction in uranium. As the war clouds gather he asks to join a

'uranium project' being organised under Government auspices. His decision is not merely a rational choice, but an emotional one, a blend of apprehension about the war, a desire to be in with his colleagues on an exciting undertaking, and a sense that this may be his chance to 'do something big'. He is now embroiled with Kitty Harrison, bringing about her third divorce and becoming her fourth husband.

By this time the government has begun to realise the military potential of scientific development, a theme which has since become inescapable throughout the world. The United States Army sets up the Manhattan Project, and begins recruiting scientists. General Leslie Groves, in charge of the project, quizzes the leading physicists about the contributions they can make to the programme; Oppenheimer impresses him, and ere long is appointed director of the new bomb design laboratory which is to be set up in Oppenheimer's beloved New Mexico desert, near the town of Los Alamos.

Discussions between Groves and Oppenheimer, scripted by Peter Prince with incisive clarity, illustrate conflicts which have permeated the world of science from the 1940s onwards. The traditional openness of scientific discussion, peer review, and communal evolution of understanding collides with the perceived need for secrecy about weapons technology. This conflict has since been generalised to cover secrecy about any form of potentially advantageous scientific development, be it industrial, chemistry, solid state electronics, or genetic engineering; it has become a central dilemma of twentieth century science, and is as far from resolution now as it was at Los Alamos.

The transnational character of science, the refusal of nature to recognise political borders, also becomes a source of friction between Groves and Oppenheimer; Groves is even unhappy about the arrival of the British scientists, to say nothing of their middle-European colleagues. Doesn't America have the best scientists in the world? Can these foreigners be trusted to be loyal to the United States? Scientific nationalism, much less patriotism, is on the face of it another contradiction in terms which has nevertheless since the 1940s become the norm.

The Manhattan Project also sees the coming of age of 'big science' – science as a large-scale team effort, with all the consequent problems of fragmentation, co-ordination, and especially finance. The running battle between Oppenheimer and Edward Teller as to how much effort to devote to Teller's obsession, the 'Super' thermonuclear fusion bomb, underlines the fundamental point at which the classical image of science as dispassionately objective investigation evaporates; how do you choose what to study?

The very choice of your line of investigation is quintessentially 'political', in other words a question of values – both at the personal and at the collective level. If you choose a given line of investigation you forgo others; the resources are simply not available to study everything simultaneously. Such issues have since come to dominate the public dimension of science policy all over the world.

At Los Alamos the thrill of the scientific chase is conveyed with electric authenticity. The brainstorming session in which Seth Neddermeyer comes up with the idea he gropingly describes as 'implosion' is only one of many vignettes which bring to life the way that scientists – scientific people – actually create science. When Oppenheimer, for reasons of urgency, takes the implosion project from Neddermeyer and reassigns it to Kistiakowsky the emotional undertones are poignant. The tension leading up to the Trinity test, on July 16, 1945, is almost unbearable, and the awesome release, as the world's first nuclear dawn breaks over the desert, is mirrored in the wild hilarity of the cavorting bomb-makers. But Oppenheimer lowers his smoked glasses and stares into the churning sky, and you hear one of his most memorable quotations, a line from the ancient Sanskrit

Bhagavad-Gita: 'I am become death, the destroyer of worlds...!' Joining Oppenheimer, his lieutenant, Ken Bainbridge, in charge of the test, puts it more succinctly and even more memorably; 'Now we are all sons of bitches.'

The consequences – the obliteration of Hiroshima and Nagasaki – are revealed to the Los Alamos team through flickering images on grainy film screened in one of the blockhouses; this understatement makes their impact all the more traumatic. From this time on Oppenheimer becomes progressively more of an embarrassment to the official US establishment. In his role as chairman of the top-level General Advisory Committee, he argues strongly against development of the Super and bitterly antagonises many influential people.

Meanwhile the amalgam of secrecy and nationalism into 'atomic secrets' elicits its obverse, 'atom spies'. Many United States officials are convinced that the first Soviet nuclear explosion, in 1949, is a direct result of the betrayal of American 'atomic secrets'. The universality of science has left Oppenheimer and his colleagues in no doubt that sooner or later the Soviets will produce a bomb; the only real 'atomic secret' is that it can be done. Nevertheless, the boiling paranoia of the Cold War and the advent of McCarthyism at last give Oppenheimer's enemies the opening they have been seeking. Through the 1940s and onwards J Edgar Hoover's FBI has been watching Oppenheimer, tapping his phone, bugging his homes and offices. With the connivance of Lewis Strauss, chairman of the United States Atomic Energy Commission, Oppenheimer is, in effect, accused of being a Soviet spy. In a 'hearing' that is more like a kangaroo court – and once again typical of 'show trials' elsewhere in the twentieth century – Oppenheimer is condemned as a security risk and discharged from any further government service. The man whose evidence most damages him is his old colleague Edward Teller.

For Oppenheimer it is the end. Looking back, he considers his career futile, his life a farce. His creation of the atom bomb has eventually destroyed him. In that, too, he may prove to be the epitome, not merely of the twentieth-century scientist, but of twentieth-century humanity.

*Walter C Patterson is international editor of the Bulletin of the Atomic Scientists. In December 1945, when the Bulletin was first published, one of its founding sponsors was J Robert Oppenheimer.*

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