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Megaton Man

Steven Shapin

- *Memoirs: A 20th-Century Journey in Science and Politics* by Edward Teller and Judith Shoolery

The risk of being blinded was thought to be very real, so the witnesses to the first atomic explosion at Alamogordo, New Mexico in July 1945 were given strict instructions to turn their backs on the initial blast. The physicist Edward Teller refused to obey orders. He put on an extra pair of dark glasses under welder's goggles, smeared his face with ointment, and looked straight at the aim point, not wanting to miss a second of the atomic age. In the decades that followed, Teller never looked back. He never saw a new type of nuclear weapon that he didn't like, never liked any argument against building them bigger, smaller, more numerous, or more easily deliverable, never regretted anything about his career as the greatest of nuclear weaponeers except for the obstacles put in his way by those lacking in patriotic fervour or common sense.

At wartime Los Alamos, Teller's demands for the immediate production of a vastly more powerful thermonuclear weapon became so petulant that he effectively downed tools on the fission bomb whose construction was, in any case, a technical prerequisite. You need an A-bomb to ignite an H-bomb, and the lab's Director Robert Oppenheimer reasonably enough felt that the race to forestall the Nazis required no distractions from the main lines of development. Destructive friction between fusion and fission was reduced by giving Teller what was essentially a roaming brief, and it was in these connections that one of his Los Alamos colleagues later called Teller 'a disaster to any organisation'.

After Hiroshima, when Oppenheimer suggested that the best thing to do with Los Alamos was to 'give it back to the Indians', and when the

overwhelming majority of the atomic scientists rushed to return to the universities, Teller tried to stem the tide. He was exasperated by his fellow physicists' infatuation with useless particle physics – a 'honeymoon with mesons', Teller called it – and feared the consequences for the anti-Communist cause unless there was a massive and immediate rededication to weapons work. He himself would agree to stay on, provided that the Manhattan Project labs continued or even accelerated the wartime pace of bomb-building. Norris Bradbury, Oppenheimer's successor as Director of Los Alamos, asked Teller to remain, offering him the long-coveted leadership of the lab's Theoretical Division. But Teller had conditions that Bradbury was unable to satisfy: Los Alamos should make a great effort to deliver the hydrogen bomb as well as new fission weapons, and should commit to at least a dozen nuclear tests a year, a number not attained by the US until 1951.

Through the late 1940s, Teller agitated relentlessly for the development of the H-bomb. Once he had concluded that Los Alamos was dragging its feet, he carefully cultivated contacts with sympathetic generals, Congressmen and other Washington insiders, whipping up enthusiasm for the establishment of a rival nuclear weapons lab at Livermore, California, and ultimately becoming its second Director in 1958. Together with the mathematician Stanislaw Ulam, Teller solved the problem of how to design a thermonuclear weapon, a task whose daunting computational and engineering complexity caused several leading atomic scientists to say that such a thing might be impossible, and whose potentially unlimited destructive force induced others to hope it would indeed prove impossible. With an explosive power a hundred to a thousand times greater than the Hiroshima device, the H-bomb, its opponents argued, could only have as its purpose the mass slaughter of civilian populations, and in 1949 the Atomic Energy Commission's (AEC) scientific General Advisory Committee (GAC) reported that such a weapon 'might become a weapon of genocide' and that it was 'an evil thing considered in any light'. The moralising tone of the GAC's judgment, Teller said, 'shocked' him and only strengthened his resolve to press on. Oppenheimer was the chairman of the GAC and the deadly fallout from Teller's anger took five years to reach him.

When the Cold War began in earnest, Teller worked to ensure that nuclear weapons were constructed to satisfy Air Force bomber and missile requirements, and was influential in interesting the Navy in the possibility of developing devices small enough to fit onto a submarine-launched missile, so putting in place America's Cold War 'triad' of nuclear deterrence. The US began negotiating a test-ban agreement with the Soviets in 1958, and Teller swung into action, mobilising Livermore's resources to show how the Russians could evade any conceivable monitoring technology and declaring that they would certainly do so if they could. (He knew the Communists and their Russian backers from Béla Kun's brief Government in post-World War One Hungary when he was a boy, and he hated them viscerally.) When Khrushchev withdrew from the agreement late in 1961, Teller was ready to go, and the Soviet series of 31 big tests in eight weeks convinced him that the Americans were losing their lead in the nuclear arms race. Persuaded that peaceniks, fools and fifth-columnists were undermining Free World resolve by stirring up 'public hysteria' about the dangers of radioactive fallout, he spoke out forcefully in defence of atmospheric testing, so much so that President Kennedy was under the impression that Teller thought a little extra radiation was good for you.

At the same time, Teller's enthusiasm for all things nuclear spilled over into a series of fantastic plans for the 'peaceful' use of these devices. In secret 1957 meetings at Livermore, he suggested that if you rocketed a nuclear weapon at the Moon all sorts of interesting scientific observations might be secured. His more down-to-earth proposals to use a series of 'clean' nuclear explosions to carve out an unwanted harbour on the north-west coast of Alaska, and another to dig a second Panama Canal, were better received in Government circles. In any case, such proposed civilian uses offered potent justifications for continued testing, and it was through testing alone that progress could be achieved and the bomb-builders' theories empirically checked: 'It connected our work with reality.' These 'Project Plowshare' schemes were ultimately aborted, due, in Teller's opinion, to 'hyperbole in the popular press about the risks of exposure to radiation' and 'political timidity' in not standing up to unscientific panic-peddling, but not before the AEC 'experimentally'

contaminated the Arctic environment with a cocktail of radioactive isotopes to see how they might disperse after the planned peaceful detonations. Teller thought that in this, as in other nuclear matters, Kennedy showed insufficient zeal, and when the President asked him about the Panama plan, Teller was sharp with his Commander-in-Chief, telling him to his face that 'It will take less time to complete the canal than for you to make up your mind to build it.'

Scarcely a year elapsed from the first test launch of an ICBM to the start of Teller's agitation for a missile defence programme, and in 1963 he testified in Congress against even a limited nuclear test ban because testing was considered so vital to developing an active anti-missile system. The Anti-Ballistic Missile Treaty of 1972 was a devastating blow to Teller, but forces had already been set in motion which, with his energetic assistance, would eventually lead to its abrogation by George W. Bush. In 1966, Teller met Ronald Reagan, then running for the governorship of California, and, once elected, Reagan accepted his invitation to tour the Livermore lab, where Teller and his colleagues told him about plans to build a vast anti-missile defence system. Teller was impressed with Reagan's subtle intelligence in grasping the essence of Livermore's capabilities – 'He clearly comprehended the technology' – and when Reagan became President 14 years later Teller enjoyed an entrée to the Oval Office that made him effectively the most powerful scientist in the world.

Teller had a protégé appointed as Presidential science adviser and was himself the sole scientist in a group of wealthy Republican industrialists formed to press for anti-missile defences. When the group assembled at the White House in September 1981, he held out a grand vision of 'assured survival' in a nuclear war and began the process of aggressively selling the virtues of a nuclear bomb-pumped X-ray laser then in the very early research stages at Livermore. On the evening of 23 March 1983, Reagan startled the world by announcing the Star Wars programme and Teller was in the White House audience, having been specially summoned there by the President. The old physicist was over the moon. He had, after all, spontaneously drafted an insert for Reagan's State of the Union

address the preceding January, in which he wanted the President to announce a crash programme to build an anti-missile system. What Reagan was unwilling to say then, he was saying now. So Teller can only be pedantically correct when he writes in these *Memoirs*: 'I do not know how President Reagan arrived at [this] decision.' Teller's salesmanship swung into the highest gear. He no longer had any official position at Livermore – just an office next to the Director's, the ability to influence who would be Director, and the largely unquestioned right to represent Livermore's thinking to the Pentagon and the White House. Now he promised that the X-ray laser system had been proved possible in principle, that it was shortly to go into its engineering phase, and that it would surely be operational within a few years.

Teller's old adversary Hans Bethe called Star Wars a 'dangerous fantasy', but, of the two great physicists, Teller was much the better rhetorician and salesman. Billions were committed to Star Wars on the basis of these assurances, all of which proved wrong. When Roy Woodruff, one of Livermore's associate directors, accused Teller of knowingly misrepresenting the technical facts of the matter, Teller and his allies had him hounded out of Livermore. Woodruff eventually fetched up at the rival Los Alamos weapons lab, where he was made very welcome, assuming a position whose title ('program director for non-proliferation and arms control') represented some of the cultural differences between the two labs. (This story is meticulously told in William Broad's *Teller's War: The Top-Secret Story Behind the Star Wars Deception*, 1992.) When the X-ray laser was ditched, Teller scarcely missed a beat, drumming up enthusiasm for the space-based anti-missile system known as 'Brilliant Pebbles' – the successor to 'Smart Rocks'. In 1989, the Defence Secretary (now Vice-President) Dick Cheney redirected the torrent of dollars towards that technology. Bush the Elder, like Reagan, was applauded for his 'excellent grasp of the importance of strategic defence'. He toured Livermore in 1990, announcing his commitment to the Pebbles, pointedly referring to Teller as 'my friend of long standing', and calling for $659 million for that programme alone by 1992. To Teller's distress, Bill Clinton reined in, but by no means halted, the flow of Star Wars money. However, Teller – now in his mid-nineties

and retired from the political arena – can glow with contentment at Bush the Younger's renewed commitment to a scaled-down, but vastly expensive and still unproven missile defence programme.

On his own testimony, Teller is a complicated man and so much misunderstood. Branded a 'war criminal' by the Berkeley anti-Vietnam War activists in 1970, he was 'shocked' – a word he uses a lot to highlight his delicate sensibilities – that his own pacific nature and his contributions to world peace have not been more universally acknowledged. Accused not only of 'thinking the unthinkable' but of covertly supporting the idea of actually fighting a limited nuclear war, Teller's critics quoted him as saying that 'our nuclear forces can stop massed Communist manpower' and 'I am convinced that our victory would be assured in any limited war.' Teller curiously acknowledges that 'the comments in question' – evidently advocating the tactical use of nuclear weapons – '*may* be mine', but, if they are, he reassuringly notes that 'they refer to the European theatre, not to Vietnam.' When his opponents pointed out the radically destabilising effects of an anti-missile system – giving the side possessing such a system the potential for an effective first strike – Teller glossed over the issue by drawing attention to America's evident 'moral superiority', which would in itself make the Soviets appreciate that any first use of nuclear weapons by the US was unthinkable. So he was 'shocked and hurt' when, at a White House reception in 1987, Gorbachev refused to shake his hand or even recognise him as the Father of the H-bomb.

Eisenhower's Farewell Address in January 1961 famously warned the nation against the growing influence of the 'military-industrial complex'. Teller, who met Eisenhower socially after his Presidency was finished, has an idea whom the President had specially in mind: Tom Lanphier of the Convair Corporation, whose heavy-handed lobbying about the alleged 'missile gap' annoyed Eisenhower. Less well-remembered in the Farewell Address was Eisenhower's caution about 'the equal and opposite danger that public policy could itself become the captive of a scientific technological elite'. Herbert York, Livermore's first Director and nominally Teller's boss in the early 1950s, visited Eisenhower in the California desert at about the same

time and, as York told me recently, asked the former President whom he was thinking of in that connection. Eisenhower did not hesitate, naming two of the people who later made up the person of Dr Strangelove: 'Teller and Wernher von Braun.' Eisenhower, York says, 'regarded both of them as super-salesmen who would say anything, invent any threat, to sell their idea of the moment'. So, although Teller will presumably be 'shocked' to learn it, his military-technological huckstering appalled the old general, and, once again, Teller suffered from misunderstanding.

Teller has consistently disputed the view that scientists bear the slightest 'social responsibility' for the uses of their work: scientists are 'not responsible for the laws of nature'; it is just their job 'to find out how these laws operate'. The responsibility, for example, for deciding 'whether a hydrogen bomb should be constructed, whether it should be used, or how it should be used . . . rests with the American people and with their chosen representatives'. In the autumn of 1942 Oppenheimer reportedly suggested to him that, while physicists must now do their masters' bidding, 'the time is coming when we will have to do things differently and resist the military.' Teller's memory for these things remains razor sharp after 60 years, since here and elsewhere precise words and phrases are attributed to individuals who did not acknowledge them when they were alive and cannot dispute them now. (Revenge, for Teller, is a meal best eaten when its victims are cold.) But he recalls that he was 'shocked' by what he took as Oppenheimer's suggestion of 'civil disobedience in a democracy'. In Teller's scheme of things, however, following orders was not inconsistent with seeking to write the orders which he then felt obliged to follow – and that is just what alarmed Eisenhower and so many other contemporary observers, who also seem to have misunderstood Teller's disciplined apoliticism.

As the science journalist Daniel Greenberg has written, during the selling of Star Wars Teller was a scientific expert neither 'on top nor on tap'; 'he was better situated: deep inside the White House.' A member of Reagan's White House science council relates what it was like working with Teller: the council would agree that some weapons development was a bad idea, but then Teller 'would trot across and

walk into the President's office, and say, "Ron, you should hear about this," and give his own personal view of what happened, even though he was in the minority'. Nor did Teller uniformly defer to the wisdom of the American people whose sovereign will constituted the democracy he professed so to love. When the same American people who he said should decide whether or not an H-bomb ought to be built – or, when built, to be used – expressed their uneasiness about radioactive fallout from atmospheric testing, Teller lashed out at them as 'superficial, facile, unintelligent, selfish spoiled children'.[*] Aware that by the late 1950s he had assumed a considerable political presence, he privately resolved the evident contradiction between his political activism and his insistence on scientific purism by writing to a friend that 'I am no longer a physicist.' If that was so, it fooled the politicians whom he advised and browbeat, and for many of whom Teller spoke with the collective authority not just of physics but of American science as a whole.

Those who over the years found Teller to be an 'organisational disaster' – petulant, self-centred, tyrannical, deceitful and ultimately disloyal to his friends and colleagues – likewise misunderstand the man. 'My friendships are deeply important to me,' Teller writes: 'I much prefer to get along with everyone, so when someone I care about is angry with me, I am truly and deeply in despair.' Friendship and the collaborative doing of science were, for Teller, often much the same thing: 'the best of all pleasures' was 'collaborating on scientific work with friends'. That was a pleasure he enjoyed at Leipzig and Göttingen during the golden years of German physics in the 1920s and early 1930s – a 'unique and wonderful community' in which it didn't matter whether you were a Hungarian and didn't yet matter all that much whether you were a Hungarian Jew. It was a pleasure he experienced again building the atomic bomb at Los Alamos – 'the most wonderful time in our lives' – where you could calculate the shock waves of implosion by day and play Schubert with your colleagues by night. And it was a pleasure that Teller boasts he re-created at the Livermore weapons lab – a democratic sort of place marked by 'high enthusiasm and good fellowship'. Science was, for Teller, 'the only world I could live in', the only world that offered him intellectual fulfilment and emotional support.

Teller's personal tragedy in the mid-1950s was to lose almost all of his friends, and his tragedy half a century later is still not to understand why he lost them and how badly he replaced them. The defining moment came on 28 April 1954, when he provided the prosecution's crucial evidence to the AEC Board convened to pass judgment on Oppenheimer's security clearance. Although Oppenheimer had several powerful enemies among the atomic scientists, Teller alone was prepared to deliver the *Dolchstoss*. Asked whether he considered Oppenheimer a security risk, Teller replied that he had repeatedly seen Oppenheimer act 'in a way which for me was exceedingly hard to understand . . . To this extent I feel that I would like to see the vital interests of this country in hands which I understand better, and therefore trust more.' Pressed on whether or not clearance for Oppenheimer 'would endanger the common defence and security', Teller struck home: it 'would be wiser not to grant clearance'. Leaving the room, he turned to Oppenheimer, offered to shake his hand, and said: 'I'm sorry.' 'After what you've just said,' his former boss responded, 'I don't know what you mean.'

Soon not shaking Teller's hand became the thing to do for some of his former Los Alamos colleagues. The first time it happened, Teller reacted as if he had been punched in the stomach, ultimately breaking down and crying. As he now tells the story, the true victim of the 1954 hearings was not Oppenheimer but himself: 'If a person leaves his country, leaves his continent, leaves his relatives, the only people he knows are his professional colleagues. If more than 90 per cent of these then come around to consider him an enemy, an outcast, it is bound to have an effect.' Asked by a journalist many years later, whether his continuing ostracism hurt, Teller screamed: 'Of course that hurts! It was meant to hurt, and it did!' And what especially hurt, Teller complains, is that his colleagues so wilfully misunderstood his motives in the Oppenheimer testimony. In a convoluted story which he has been telling since just after the event, and which few historians or colleagues have ever been able to credit, he says he had intended to exonerate Oppenheimer but, just before going into the hearing room, he was shown Oppenheimer's immediately preceding bizarre testimony about the so-called Haakon Chevalier affair and his prevarications about whether and how he had

been approached during the war to spy for the Soviets. With an irony whose richness Teller still does not grasp, what so 'tremendously shocked' him was not just Oppenheimer's confusing testimony but his 'betrayal of his friend' Chevalier: 'That he had accused a close friend of espionage . . . seemed to me inexcusable.' Teller says he was left flat-footed by what he had just heard, and the testimony he delivered moments later referred, he insists, to those revelations and not to Oppenheimer's consistent postwar opposition to the development of Teller's cherished H-bomb. There is much documentary evidence to dispute this story, including notes made by an AEC liaison officer in an interview with Teller six days before his testimony, in which Teller suggested 'deepening the charges' against Oppenheimer to include his opposition to the H-bomb. And, in any case, Teller's story is clearly contradicted by his own words at the hearings, when he specified that the reasons to deny clearance arose from Oppenheimer's 'wisdom and judgment, *as demonstrated by actions since 1945*' (my italics).

Teller now needed new friends, and, therefore, a new scientific community. These he found at Livermore. For Teller, weapons work represented the kind of physics for which his enormous talents were ideally suited. On his own say-so, his genius was not of the sort that produced conceptual breakthroughs at the most fundamental level: he quotes his former colleague George Gamow calling him 'a good second fiddle'. What Teller liked, and what he was outstandingly good at, was seeing the overall shape of very complex physical problems and making a series of often totally wrong, occasionally brilliant guesses at how such problems might be solved. Guessing how a hydrogen bomb might be built was what Teller's intellectual talents were made for. And 'good fellowship' in bomb-building was what he found emotionally rewarding, the more so when he could recruit to the well-paid cause large numbers of young physicists for whom Teller was not just a senior administrative figure but a scientific god. He loved the adulation as much as the companionship. He loved being right, and he loved even more being told he was right. As he became more isolated from the academic physics community, so he used his vast persuasive powers to nurture and expand this new community around him, one that engaged his scientific talents and

approved his political goals. As he entered old age, almost all of those he called his close friends shared his right-wing Republicanism and his fear and loathing of everything connected with the Russians. If some of his old colleagues wouldn't help build his weapons, wouldn't talk to him, wouldn't shake his hand, then the new technoscientific world of constructing ever more advanced nuclear weapons might make it all just bearable.

He has not aged gracefully. Nearly blind, and gimpy-footed from an old Budapest tram accident, Teller at 94 is no Oedipus at Colonus: his sufferings have not produced in him a holy serenity; they have just made him more bitter and more concerned with paying back his enemies and detractors, almost all of whom he has now outlived. There is little of significance in this drearily written, 'as told to'-style autobiography that he hasn't said before. The book's sole literary virtue is putting it all in one place, and its major distinction from Teller's previously expressed views is the increased spitefulness with which he disputes colleagues' entitlement to share with him the credit for the successful H-bomb design, and the less restrained malice with which he carries on the vendetta against Oppenheimer's ghost. In his prime, Teller's vindictiveness was ugly and frightening; now it's ugly and a little pathetic. It is an unintended, but nonetheless considerable, achievement of this mean-spirited book so fully to expose the sadness of megaton man.

Note

* In 1998, the US Congress ordered a study to estimate the total number of cancers caused by atmospheric testing by the US, the Soviet Union and the UK between 1951 and 1962. The Institute for Energy and Environmental Research recently released its findings, assessing the likely toll at 80,000 total cancer cases in the US, of which 15,000 were fatal: see Nancy Dunne, 'Toll of Nuclear Tests May Exceed 15,000', *Financial Times*, 1 March 2002.

From the *LRB* letters page: [27 June 2002] Gennady Gorelik.

Steven Shapin teaches at Harvard and has written several books on the history of early modern science. His next will be *The Life of*

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