

# 11

## *The pilot*—Geoffrey Dhenin



Geoffrey Dhenin (left) and crew before their flight to gather samples after the 1953 Totem 1 test

Source: Imperial War Museum.

The Royal Air Force (RAF) decided Britain's first operational atomic weapons, dubbed 'Blue Danube', were too small. The 1953 Totem tests in Australia had only shown an explosive yield of 8–10 kilotons, and military chiefs wanted more:

A working party on the operational use of atomic weapons decided the Blue Danube was not powerful enough to destroy primary targets in the USSR, such as airfields or ports, with a single bomb. Therefore the working party stated 'the possession of a bomb in the 5 or 10-megaton range offers this possibility and would go a long way towards overcoming the need for improved terminal accuracy. Hydrogen bomb to give a yield of 5–10 megatons would weigh from 9,000–12,000 pounds and could be carried by the V-class bombers'.<sup>1</sup>

Military leaders thus proposed that Britain's main nuclear strike force should be larger Valiant bomber aircraft, which could reach distant targets. But before the development of a Valiant force to deliver the hydrogen bomb, aircrew used other planes during the Australian nuclear testing program between 1952 and 1957.

The first British atomic tests conducted on the Australian mainland were codenamed Totem 1 and Totem 2 in October 1953. The RAF, the Royal Australian Air Force (RAAF) and the US Air Force all deployed aircraft to Emu Field, in the desert of South Australia, to monitor the tests and collect samples of radioactivity from the mushroom cloud.

As the McClelland Royal Commission later reported, the RAAF deployed Lincoln aircraft because the Canberra planes requested by the British scientific team were not available:

In the United Kingdom it was also decided that a Canberra aircraft should fly through the atomic cloud as soon as possible after the explosion to assess the aircraft's behaviour under such conditions and to gain information on types and levels of contamination.

Australia was approached about providing such an aircraft but, with its Canberra production line not yet fully operational, the limited number of aircraft available to the RAAF and Australian commitments in

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1 Andrew Brookes: *Valiant units of the Cold War*, Osprey combat aircraft, No. 95 (Osprey, Oxford, 2012).

South-East Asia, it was decided the request could not be met. The need to collect the information was given a very high priority and the British authorities decided to provide their own Canberra aircraft.<sup>2</sup>

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The first time a Canberra bomber flew through a mushroom cloud to gather radiation samples was in October 1953, during Operation Totem. Commanded by RAF pilot Geoffrey Dhenin, the plane flew at 30,000 feet above the Australian desert north of Woomera for the Totem 1 test—the source of the black mist that reportedly blinded Yami Lester (Chapter 1).

After testing the level of radioactivity with sensors mounted on the wing, Dhenin made an initial pass through the mushroom cloud, followed by two more: one through the base and one through the top. On return to base, the aircraft was tested and found to be contaminated with radioactivity. Despite shielding on the aircraft, Dhenin and the two other crew members received high doses of gamma radiation.<sup>3</sup>

Britain's chief nuclear scientist William Penney told Dhenin that the aircrew had been exposed to radiation doses above the permitted level. Although they were scheduled to perform the same task for the Totem 2 test within a fortnight, the crew were withdrawn, with Penney telling Dhenin:

Go home, boy. You have done enough. I cannot authorise such a thing a second time.<sup>4</sup>

Penney later brusquely dismissed the danger to the pilots, telling the 1984 Royal Commission:

The fact that the crew of an RAF Canberra received significant doses of radiation as a result of their early passage through the cloud was reported to me. I did not regard it as very serious as it was a once in a lifetime dose.<sup>5</sup>

2 Government of Australia: *The Report of the Royal Commission into British Nuclear Tests in Australia* (Australian Government Publishing Service, Canberra, 1985), para. 6.5.39, p. 203.

3 The Royal Commission estimated their doses at 18, 19 and 21 R on their dosimeters (*Royal Commission*, op. cit., pp. 207–208).

4 'Air Marshal Sir Geoffrey Dhenin', obituary, *Daily Telegraph*, 11 May 2011.

5 William Penney: Statement to Royal Commission into the British Nuclear Tests, 1984. National Archives of Australia, NAA A6449, p. 2.

As they collected samples while flying through the mushroom clouds at Maralinga, the skin and engines of the RAAF Lincolns were contaminated with radioactivity. Thirty years later, Royal Commissioner James McClelland was critical of the lack of safety precautions from the British scientific team:

Evidence confirms the appalling lack of foresight on the part of the British authorities, who did not perceive the need for special precautionary measures for air and ground crew during and after the Lincoln cloud sampling of Totem 1.<sup>6</sup>

In its final judgement, the Royal Commission found that the RAF aircrew received the highest recorded doses, greater than those recorded by RAAF Lincoln crews. The Royal Commission found that ground crew as well as pilots were affected:

No special arrangements were made to ensure the radiation safety of aircrew in Lincolns prior to Totem 1. The RAAF was told at the time of Operation Hurricane that there would be no hazard to aircrew or ground staff from that operation ... There was no attempt made to bring the RAAF aircrew within the framework of the regulations set down for the ground operations in the Emu area. As a result, no arrangements were made to provide any form of health control and, in consequence, no personal monitoring devices were provided.<sup>7</sup>

As preparations for Operation Grapple were underway in England in 1956, Penney and the RAF chiefs recognised that there was a need for significant changes in procedure. The hydrogen bomb tests, with greater explosive power, needed to allow the aircraft more time to get out of the impact range and avoid damage. After dropping a hydrogen bomb, a more powerful blast and heat would come from the weapon, with 10,000 times the explosive yield of the Totem atomic devices.

To practice the flying skills required to release a hydrogen bomb and escape before being hit by the massive blast wave, new Valiant aircraft were deployed with the RAF 49 Squadron, based at Wittering in England. Air Commodore Arthur Steele set up a detailed training program for the four teams of aircrew selected for Operation Grapple. By April 1956, the Valiant training program was supported by two new all-volunteer crews, led by Squadron leader Ted Flavell and Flight Lieutenant Bob Bates.

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6 *Royal Commission*, op. cit., para. 6.5.124, p. 221.

7 *Royal Commission*, op. cit., para. 6.5.32, p. 202.

In September that year, Wing Commander Kenneth Hubbard took command of the 49 Squadron, with only months to prepare before the first test on Christmas Island. He has described the next two years as ‘the most exciting and challenging task of my life’.<sup>8</sup>

By November, new Valiant bombers were delivered from the manufacturers Vickers, painted all-white to reflect the heat in the nuclear detonation. But there were numerous problems. On one trial run, an attempt to drop a dummy bomb weighing 10,000 pounds failed: the bomb did not release from the bomb rack during a trial run, but then—after the bomb bay doors had closed—fell out of the rack as the aircraft was returning to base. To compound the error, the dummy bomb fell to the ground when the bomb bay doors were opened on the airstrip!

The Valiant aircraft were flown to Christmas Island in early March 1957, where Air Commodore Steele continued the training program and a series of trials to familiarise the aircrew with the target on Malden Island.

The first Grapple test over Malden Island, codename ‘Short Granite’, was held on 15 May 1957. The Valiant bomber XT818 was piloted by Wing Commander Hubbard. The first bomb exploded with the yield of just 300 kilotons, to the disappointment of scientific staff who were expecting a megaton yield.

The work of pilots was hazardous, even beyond the dangers of dropping a hydrogen bomb. Following the Grapple 1 test, a Canberra aircraft crashed over Canada as it was urgently flying back to the United Kingdom with samples collected from the mushroom cloud. The day after the test, the Canberra was landing to refuel at Goose Bay, Newfoundland, but Pilot Officer J.S. Loomes and Flying Officer T.R. Montgomery were killed as the plane crashed in poor weather.

For the first test, the actual hydrogen bomb had been flown from England to Christmas Island on a Valiant aircraft, transiting through Canadian and US airspace with stopovers at Goose Bay, Newfoundland; Namao, Alberta; Offutt Air Force Base, Nebraska; Travis Air Force Base, California; and Hickam Air Force Base, Hawai‘i.

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<sup>8</sup> Kenneth Hubbard and Michael Simmons: *Operation Grapple* (Ian Allen, London, 1985), republished more than 20 years later as *Dropping Britain’s First H-Bomb—the story of Operation Grapple, 1957–8* (Pen and Sword, Barnsley, 2008).

Given the failure of Grapple 1, the Atomic Weapons Research Establishment (AWRE) scientists had manufactured a larger device for the second Grapple test, using new techniques to trigger the detonation—a prototype of the warhead planned for the Blue Streak missile. A problem arose when the device, codenamed ‘Orange Herald’, was too large to fit into the bomb bay of a Valiant to be flown to the Pacific. Instead the device was disassembled and flown to Christmas Island in three separate loads on Hastings aircraft in May 1957.

As scientists and RAF crew tried to reassemble the components of the bomb, they found that two copper hemispheres used to surround the explosive sphere would not completely screw together. With the two bits of metal jammed tightly together, an RAF Warrant Officer told chief scientist Bill Cook: ‘In my experience of this sort of engineering problem, sir, there’s only one thing left to do—clout it!’ Using a 7-pound copper-headed sledgehammer, he proceeded to thump the spheres to loosen the thread and allow them to be screwed into place!<sup>9</sup>

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With the completion of the three initial Grapple tests on Malden Island, RAF Canberra aircraft were again redeployed to South Australia for the resumption of atmospheric testing at Maralinga during Operation Antler. Following the three Antler atomic tests in September and early October 1957, five Canberra aircraft again flew back across the Pacific, to be used for the Grapple X and Y hydrogen bomb tests at Christmas Island.

En route, these planes landed at Nadi Airport in Fiji for maintenance and refuelling. British military authorities tried to hide the fact that the RAF aircraft were contaminated with radioactivity. A confidential memo from RAF Air Commodore W. P. Sutcliffe—the Commander of the Antler program in Australia—ordered crews of the RAF bombers not to tell local authorities in Fiji that their engines were radioactive. The memo noted that although the planes had been cleaned on the outside, their engines were still coated with radioactive material on the inside:

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9 The full incident is described by Wilfred Oulton: *Christmas Island Cracker—an account of the planning and execution of the British thermonuclear bomb tests 1957* (Thomas Harmsworth, London, 1987), pp. 337–339.

Aircraft of the No. 76 Squadron flying to Christmas Island and stopping at Nandi and Canton may be radioactive internally ... There appears to be no regulations in force governing the transit of radioactive aircraft through international civil airports such as Nandi and Canton. The fact that an engine may be 'hot' should be concealed from the Nandi authorities unless they ask.<sup>10</sup>

The internal contamination of the aircraft posed a particular problem for ground crew from 76 Squadron, who were placed at greater risk as they serviced the engines. As occurred in Australia, the ground crew on Christmas Island were involved in the washing down the planes to remove surface radioactivity, but often operated with very basic equipment and no gear to monitor exposure rates. Bryan Young was one of the ground crew:

We were cleaning off barrier paint above me and water came off the back of the wing. I was only wearing cotton whites so, of course it went straight through, and bearing in mind that it was contaminated water coming off, I wasn't a very happy person underneath. But we were all too busy at the time to do much about it. In the middle of decontamination, you can't just stop and say 'Oh God, I've got to go and shower all this lot off!' Work has to carry on.<sup>11</sup>

The number of aircrew and ground staff grew rapidly for the Grapple Y test in April and subsequent tests throughout 1958 (1,426 RAF personnel were deployed on Christmas Island throughout the year, the largest number at any time for Operation Grapple). With scientists preparing for the largest test of the whole operation, a new range of procedures were developed to cope with the larger blast.

On 28 April, the day of the test, Squadron Leader Robert 'Bob' Bates piloted the Valiant bomber XD825 carrying the hydrogen bomb (Bates later died of leukaemia). Five Canberra aircraft of 76 Squadron were also deployed: three planes circled the proposed drop zone while two others were sent downwind to track the mushroom cloud and collect

10 'Transient Canberras of No.76 Squadron—Nandi and Canton', Memorandum from Air Commodore W.P. Sutcliffe (Services Commander, Task Force 'Antler'), 13 October 1957, ATF/S.5014/Air, marked 'Confidential—UK eyes only'. See Rob Edwards: 'Plane deceit', *New Scientist*, 8 May 1999.

11 Interview on *Nationwide* program, BBC1 TV, 12 January 1983, cited in Denys Blakeway and Sue Lloyd Roberts: *Fields of thunder—testing Britain's bomb* (George Allen and Unwin, London, 1985), p. 169. Before leaving Christmas Island, Young reported skin problems and blinding headaches, with ongoing health issues after he returned home.

samples. Hundreds of troops were ordered onto landing craft offshore, standing room only, to prepare for evacuation out to sea to see if the Valiant aircraft crashed on take-off.

Christmas Island veterans have long argued that the greatest radioactive fallout during Operation Grapple was created by this test, with an estimated yield of 2.8 megatons. As detailed in Chapter 17, the explosion was closer to sea level than expected. The detonation sucked up quantities of water and debris into the mushroom cloud, irradiating them in the process—fallout that spread over the naval flotilla and the Main Camp.

Flight Lieutenant Eric Denson captained Canberra WH980 and flew through the dispersing mushroom cloud of Grapple Y, 49 minutes after the detonation. Because of a fault on one of the dosimeters, Denson was ordered to keep the plane inside the cloud for six minutes; four minutes longer than the aircraft should have been inside. Denson and his crew are estimated to each have collected 13,000 rads (the equivalent of 6,500 full body X-rays).

After making several passes through the mushroom cloud, Denson's plane returned to the airstrip, but: 'when it landed and taxied to a halt at the far end of the runway near to the contamination pits, the Canberra sent every radiation counter crazy. His logbook showed he was in the air for one hour 55 minutes'.<sup>12</sup>

After the flight, Denson was told that his dosage exceeded the legal limit, excluding him from participation in further tests. His vomiting started almost immediately, and became so severe that he was forced to delay in Fiji for a further three days before returning to England.

For 18 years, Squadron Leader Denson suffered mentally and physically with breathing difficulties, acute sinusitis, mood swings, anxieties and depression.<sup>13</sup> In 1976, at the age of 44, Denson committed suicide, leaving wife Shirley and four children.

In 2002, Labour MP Siobhan McDonagh stood before the British House of Commons to call for justice for Eric Denson's family. She highlighted the ongoing secrecy over the medical records of service personnel, which could assist veterans' families with their pension claims:

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12 Alan Rimmer: *Between Heaven and Hell* (E-book, lulu.com, 2012), p. 35.

13 For an interview with Shirley Denson, see *ibid.*

Great emphasis was placed on the imposition of strict orders of secrecy concerning any discussion of events going on in the south Pacific. Be that as it may, after Eric Denson's return in obvious ill health, no medical checks or follow-up—in fact, no duty of care of any reasonable kind—were provided that could have alerted him to the probable cause of his progressive medical problems. Significantly, no mention was made in his medical records of his activities in the south Pacific in 1958.<sup>14</sup>

For the final Grapple Z test on 11 September 1958, the Canberra sniffer aircraft was piloted by Christopher Donne. Ten minutes after detonation, Donne flew through the mushroom cloud at the highest possible level to gain samples of radioactivity for scientific staff on the ground. He later reported:

I remember seeing this yellowy-brown thing ahead of me, stretching out almost as far as I could see, and I remember turning the aircraft and getting it straight and level and just scrambling up those last few feet and then approaching the cloud and hoping that I'd got a small part of it—we called it a 'cut'—from which, of course, we could work out when it was safe to send the other aircraft on ... And then we hit it, and I can remember my navigator saying 'Bloody hell! Let's get out of here!' But, of course, we couldn't because there was no way I could turn the aircraft—the turbulence was causing me to concentrate very hard on flying it at all at that height.

I can remember sort of glancing out of the side of my eyes to look at the instruments—the needles were pressed very firmly up against the stops ... showing the very high levels of radiation, which were very much higher than we'd anticipated. I can remember the health physicist muttering in his beard something about it being very much hotter than he'd thought.<sup>15</sup>

After landing, the aircrew were decontaminated, with their heads shaved and fingernails clipped. Donne was informed that he must return to the United Kingdom and undergo blood testing. Decades later in 2013, Donne was still searching for information about the levels of radiation exposure for his crew, using Freedom of Information legislation.<sup>16</sup>

14 UK House of Commons, Hansard official report, 4 December 2002, Column 251WH.

15 Jane Resture: *About Christmas Island and bomb tests* ([www.janesoceania.com/christmas\\_about/index.htm](http://www.janesoceania.com/christmas_about/index.htm)).

16 'Permitted radiation levels for aircrew flying through the clouds formed by the nuclear explosions at Christmas Island in the late 1950s', response by Ministry of Defence (MoD) to Christopher Donne, 29 November 2013 ([www.whatdotheyknow.com/user/christopher\\_donne](http://www.whatdotheyknow.com/user/christopher_donne)).

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