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Oliphant, the Father of Atomic Energy

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Abstract: Sir Marcus Oliphant, perceived by several generations of Australians as the kindly public face of Australian physics, may be regarded as the individual who introduced the concept of an atomic bomb to the World. Oliphant did not discover fission, nor did he work on the fission process, but he was responsible for bringing together the people and the information required for the development of both the atomic bomb and civil atomic energy. Yet he was a man noted later for speaking out publicly against nuclear weapons, so how can these two statements be reconciled?

Keywords: Sir Marcus Oliphant, atomic energy, atomic bomb, Australia

INTRODUCTION

Oliphant had been living in Britain at the outbreak of the war and he had no hesitation about becoming involved with the work of war. It was his radar work during the war, his position as Professor of Physics at Birmingham University, and his Cavendish network of colleagues that gave him access to those in positions of authority that would bring about Britain's commitment to develop the atomic bomb. It was also during the war that Oliphant insured that Australia had knowledge of the developments of the British bomb project. After the war, Oliphant returned to Australia and became an advocate of the civil uses of atomic energy. He especially espoused the development of an atomic power station and a desalination plant in the Port Pirie region of his native South Australia. He later became involved with the Industrial Atomic Energy Committee and it was through his impatience and the actions that resulted from this that lead to the establishment of the Australian Atomic Energy Commission. While he was never a Commissioner and was never employed by the Commission, his influence in the development of Atomic Energy in Australia is such that he can be considered as father of atomic energy.

THE MAUD COMMITTEE

In 1927, Oliphant arrived at the Cavendish Laboratory in Cambridge as an 1851 Exhibition Scholar[1]. Oliphant was to spend the next ten years at the Cavendish working with Ernest Rutherford and associating with the other gifted young men such as James Chadwick and John Cockcroft, both of whom would both play major parts in the development of atomic science. This association would result in what can best be described as a brotherhood of Cavendish men and would include all Cavendish alumni.

In October 1937, Oliphant took up a position as Professor of Physics at Birmingham University. As an experienced researcher, Oliphant wanted to follow research directions started at the Cavendish. He was determined to have his own accelerator so he could continue his research into nuclear physics. The cyclotron, a new type of accelerator developed by Ernest Lawrence at Berkeley in California, could deliver much more energy to the accelerated protons than either the Cockcroft-Walton or Van der Graaff designs of linear accelerators. In fact, Oliphant wanted a bigger version of Lawrence's machine [2]. This interest in the cyclotron would bring Oliphant into contact with Lawrence, with whom he would form a working relationship in the years to come.

At the outbreak of the Second World War, Oliphant and many of his team at Birmingham were working for the Admiralty on radar. This work was a highly secret operation and those scientists resident in Britain who were foreign nationals or those regarded as being enemy aliens were left to do their own research. Two of these scientists who had made their way to Birmingham University were Otto Frisch and Rudolph Peierls. In early March 1940, Oliphant received a short note from Frisch and Peierls, entitled 'On the Construction of a

"Super-bomb" based on a Nuclear Chain Reaction in Uranium'. The notion of using the fission reaction to power a bomb had already been discussed in scientific circles but it was thought that such a device would require several tons of the rare uranium isotope, uranium-235. The Frisch-Peierls note described that a fission explosion could be achieved using only a few kilograms of pure metallic uranium made up of the uranium-235 isotope. The note continued to discuss the possible method of obtaining this isotope in sufficient quantities (thermal diffusion of uranium hexafluoride gas), the construction of the bomb and possible radiation effects of fission products after its explosion [3]. The note is significant in that it was short; it was written in a non-technical style so that a non-physicist could readily understand most of its content but it contained enough technical information to allow physicists to make their own calculations in verification.

The memorandum had arrived on Tizard's desk by the 19^{th} March with a covering note from Oliphant. The covering note suggested that a Committee be established comprising G.P. Thomson, Patrick Blackett, Oliphant and Tizard [4]. Tizard in turn sent a copy to Thomson who wanted to discuss the contents with Oliphant and Cockcroft [5]. On the 10^{th} April, Thomson, Oliphant, Cockcroft and another ex-Cavendish physicist, Philip Moon, met under instructions from Tizard, at the Royal Society headquarters with the purpose of determining if such a 'super-bomb' could be constructed [6].

By June this small committee of essentially ex-Cavendish physicists had grown to include the Nobel Laureate Norman Haworth and another ex-Cavendish man, C. Ellis. The Committee had become known as the MAUD Committee. Both Frisch and Peierls were excluded from the Committee but were included in the Technical Sub-committee [7]. Oliphant would himself be excluded from the MAUD Committee in 1941 when it would undergo a reorganisation. Oliphant was then relegated to the Technical Sub-committee [8]. However, Oliphant, unlike other members of this Sub-committee, would not be working directly on research into the bomb.

The MAUD Committee produced its report on 30 June 1941, recommending that a bomb was feasible and that atomic energy could also be a useful source of electrical power [9]. A minority report produced by Blackett suggested that the full-scale plant to produce the bomb be set up outside Britain, possibly in the US or Canada. This minority report was taken up by the Ministry of Aircraft Production [10]. The MAUD Committee ceased to exist in December 1941 but its work had been taken over by the Tube Alloys Project that had been established in October that year to develop the British atomic bomb.

While those around him were involved in the uranium and fission work, Oliphant continued with his work on radar, specifically on magnetrons. Collaboration had been established between Britain and the US in the development of more sophisticated magnetrons. In August 1941, Oliphant went to the US essentially to continue work on this partnership. However, before he left Britain he was approached by Thomson who asked him to investigate why the US had not responded to the contents of the MAUD Committee Report which had previously been sent to the US [11]. At this time Britain wanted to establish a joint uranium project that included exchanges of information [12]. When Oliphant was finally able to free himself from radar work to follow the mission entrusted to him by Thomson, Oliphant was shocked to discover that the MAUD Committee's report had languished unread in the safe of Lyman Briggs, the head of the National Bureau of Standards in Washington and Chairman of the Uranium Committee [13].

Oliphant now attempted to enthuse Briggs, but failed. He then attempted to interest Vannevar Bush and James Conant (Bush was President of the Carnegie Institution and Chair of the National Defence Research Committee and Conant was a member of the Uranium Committee) in the findings of the MAUD Committee, with a similar result to that experienced with Briggs. Oliphant was not easily deterred. He now went to Berkeley to visit Ernest Lawrence with whom he had been corresponding for a number of years. The result of this visit was

the production by Oliphant of a summary of the MAUD Committee report [14] and the inspiration to produce enriched uranium through electromagnetic separation using Lawrence's cyclotron as a mass spectrometer [15]. Lawrence took Oliphant's summary and met with Conant and Arthur Compton. This meeting ultimately led to a restructuring of the US Uranium Committee and ultimately to the establishment of the Manhattan Project [15].

FOREVER AN AUSTRALIAN

While in Washington, in August 1941, Marcus Oliphant was invited to a dinner party hosted by Dr Darwin, the grandson of Charles Darwin, and his wife at which the Australian Minister to the US, Richard Casey, was also a guest. It was in this capacity that Oliphant was introduced to him. Oliphant initially discussed radar work with Casey but later mentioned a new scientific project that was currently being undertaken in Britain [16]. It was obvious from Casey's replies that he knew nothing of the MAUD Committee or the uranium project, so Casey asked for a note on this matter.

The next morning, 26^{th} August, Oliphant sent Casey a four-page letter, effectively summarising the findings of the MAUD Committee which at this time was secret. Oliphant, in his covering note, suggested that Australia should 'do some work on the energy machine, so that if and when she wishes to exploit it she will have something with which to bargain' [17]. The other significant aspect of this note was the stress for the peaceful uses of the 'Uranium Energy Machine', but he did mention the requirements for a bomb and the possible radioactive after effects of such an explosion [17]. Oliphant even suggested that this form of energy could use Australian uranium:

'It is possible to make a machine in which the production of energy is less violent than in the bomb and which could be used for the commercial production of power. Such a machine could be realized at the present time ... by mixing uranium oxide with "heavy water", or deuterium oxide, or possibly also with carbon or beryllium ... Such a machine should be capable of producing 100,000 horsepower for very many years without any fuel whatsoever. It would be of the greatest possible importance to Australia, with her isolated coal-fields. I am confident that the scientific and engineering problems will be overcome and that Australian uranium, will prove as valuable to the country as oil-wells have to America' [17].

Casey made at least two copies of this note. The original was sent to Prime Minister Robert Menzies, (1894–1978), and what is remarkable is that very little was done with the information it contained. Political turmoil hit Australia within weeks of the despatch of the note, when the general election brought not only a change in Prime Minister but also a change in the governing party and consequently the memo was virtually forgotten. The new Prime Minister was John Curtin. Curtin took office a few months before the Japanese entered the war and hence had other more pressing matters to consider.

Casey sent the two copies of Oliphant's note, on 17^{th} September, to David Rivett, as 'Secret by Safe Hand'. Rivett was then the Executive Officer of the CSIR [17] and the covering letter gives the impression that Rivett and Casey were on familiar terms, Casey stated:

'... I gather he (Oliphant) came from Adelaide in the first place and has been working in England for the last fifteen years. He seems to be regarded as a man of some note. Darwin speaks of him with great respect. He has been working on radio-physics for the British Admiralty lately and is in this country in this connection. ... Oliphant began to speak more generally of new applications of scientific knowledge to war purposes and in due course asked me if I was aware of the work that is being done in England in connection with Uranium. ... I said that I was unaware of this – and pressed him for further information – whereupon he told me about it. I asked him if he would let me have a short memorandum on the subject, which he did the next day. ... I have since discussed it with Munro – and he tells me that you will undoubtedly have been relevantly informed by Sir John Madsen' [18].

Rivett responded to Casey on 8^{th} November, stating ' ... I am rather hoping that Madsen will

come back with something in his head and in his bag about all this, and, in the meantime, I am treating the file as very strictly confidential' [18]. Sir John Madsen (1879–1969) was Professor of Electrical Engineering at the University of Sydney and was involved with the Australian Radar project and the CSIR (Council for Scientific and Industrial Research). Australia was also at war with Germany at this time. Rivett and the rest of CSIR were too much involved with the Australian radar project to be concerned with some new research project that at the time was still of a theoretical nature and under a military classification. According to Tim Sherratt, Rivett did not just ignore the note, he 'began to seek more information through his scientific contacts, and tried to arrange for increased Australian involvement in the work. He was, however, unsuccessful' [19].

In December 1941 Japan attacked the US Naval Base at Pearl Harbour in Hawaii, bringing the US into the Second World War. Within months the Japanese military moved south to occupy most of South-East Asia. Once Singapore fell to the Japanese in February 1942, Oliphant saw Australia as being under threat, and immediately offered his talents to the service of his country, especially in the area of radar research. On the 14^{th} Feb 1942, Stanley Bruce (1883–1967), the Australian High Commissioner in London, sent a memo to the Prime Minister, John Curtin, stating that Professor Oliphant was offering his services to Australia and 'In addition to RDF his knowledge covers other branches of Scientific Warfare' [20]. RDF stood for radio direction finding, later called radio location, and is now known as radar. The other branches of Scientific Warfare referred to his knowledge of atomic energy. Rivett was swift to reply and on 18^{th} February sent a note to the Prime Minister's department stating, 'Am strongly recommending Minister accept offer' of Oliphant coming to Australia. The following day, Rivett sent another note to the Prime Minister's Department stating 'Madsen and White welcome proposal' and on 20th February Rivett sent a further memo to the acting Australian High Commissioner in London, Mr McDougall, asking Oliphant to bring materials for magnetron research with him [20]. Frederick White (1905–1994) was then Chief of the Division of Radiophysics in CSIR.

On the 24^{th} February, McDougall responded to Rivett that the British Admiralty, saying 'Tizard wholly concurs desirable Oliphant go to Australia' [20]. What Oliphant had hoped to achieve is unknown but he was now to be reunited with his family whom he had sent to the safety of Australia two years before. Events moved swiftly with Oliphant finishing up at Birmingham and leaving the United Kingdom 19^{th} March. Australia House wrote to CSIR on 31st March informing them of Oliphant's departure [21]. The journey was not as swift as Oliphant had expected since Oliphant is next heard from in Capetown on 23^{rd} April requesting to return to Britain, 'owing to transport delay and possibility of no return from intended destination'. The request was refused by the Australian High Commission in London. What now followed was what could best be described as a comedy of errors. Rivett had decided that Oliphant was not required because the local group had made considerable head way on the radar project. Rivett then informed the Australian High Commission to allow Oliphant to return to the UK. However, the telegram recalling Oliphant 'missed' him.

During his entire journey, Oliphant had not been in contact with his family who by this time were quite naturally concerned about his welfare. His wife Rosa sent a letter to Rivett that arrived on 11^{th} May stating that she was worried that she hadn't heard from Oliphant for two months. On 13^{th} May Rivett replied suggesting that Oliphant was on his way back to UK since Rivett believed that Oliphant had received his message in Bombay. Letters were now passed between the CSIR and the Navy in an attempt to discover where Oliphant actually was [21]. The search for Oliphant ended on 26^{th} May when Oliphant, who was in the Physics Department at University of Western Australia in Perth, sent a telegram to Rivett 'please instruct authorities here urgent priority air passage for me plane leaves six am Perth time tomorrow'. Oliphant arrived in Melbourne on 29^{th} May. That night Oliphant went to Syd-

ney with Madsen and White, where he started work at the National Standards Laboratory on 30^{th} May [21].

Rivett and the CSIR may not have wanted Oliphant for the radar work and Oliphant certainly did not want to remain in Australia but he was part of the radar team and the CSIR was going to make use of his expertise. This arrangement was to be short lived with Oliphant and his family leaving Australia within months of his arrival. Before Oliphant left Australia, he made a short visit to Wellington in New Zealand to address a meeting of New Zealand scientists who were working on radar.

Oliphant initially wanted to leave Australia with his family on 19^{th} August but was forced to remain until October. On 27^{th} August Oliphant had presented to the CSIR a paper entitled 'Report on Uranium as a Source of Energy' [22]. This was Oliphant's attempt to encourage the CSIR to ensure that control of uranium ore deposits was vested in the Commonwealth government [23]. Oliphant himself claims that he did not suggest that the government should control the uranium deposits, but that 'if there was uranium in the country that it would be wise not to let it go overseas unless they decided that they didn't want to use it themselves' [24]. Regardless of whether Oliphant used the term 'control' or not, he still attempted to alert the scientific community of the need for uranium and indirectly of the potential uses of atomic energy.

The CSIR Minutes of Executive Meeting 23^{rd} October 1942, under item 2 Uranium, Sir David Rivett referred to secret correspondence in connection to uranium [25], which could only be related to the British request for uranium to be used in the Tube Alloys project. At this meeting Marcus Oliphant was also appointed as an advisor to the Radiophysics Division of CSIR [25]. This was the division of CSIR that would ultimately be responsible for research into atomic energy.

Oliphant was finally given permission to leave Australia from Melbourne on 27^{th} October [26]. On 31st October 1942, Rivett sent a cable to the Australian High Commission in London, informing them of Oliphant's return [27]. Rivett may well have thought his problems with Oliphant were over but on 28^{th} November Oliphant cabled Rivett with a request for money and a fast passage from Durban. Oliphant and his family did not get their fast passage and were there until the 14^{th} January. He arrived in the UK on 1st March 1943 [26].

THE MANHATTAN PROJECT

When Oliphant returned to Birmingham in early 1943, his work on radar was virtually complete. The work on Tube Alloys was continuing but Oliphant was not a member of this project. Yet he did manage to glean that progress was very slow. The processes devised for the enrichment of uranium were not producing a large enough yield quickly enough. Now Oliphant suggested an alternate proposal, that of electromagnetic separation using a cyclotron [28]. He sent his proposal to Edward Appleton, who was secretary of the Department of Scientific and Industrial Research under which Tube Alloys operated. Appleton sent his note onto the leaders of the Tube Alloys project with the subsequent request that Oliphant join the project [29].

Britain had earlier been decided to move some of the Tube Alloys work to the safety of Canada. Scientists in the US were working on their own uranium project. Negotiations between Britain, Canada and the US resulted in the Quebec Agreement, which was signed on 19^{th} August 1943 [30], and it should be noted that Oliphant accompanied the British delegation for these discussions, returning to Birmingham in September [31]. Australia was kept informed of the developments concerning the lead up to the Quebec agreement by Oliphant, who had briefed Stanley Bruce in London on 16^{th} August. Oliphant again stressed that Australia should secure its uranium deposits [32]. As Oliphant was well aware of the secrecy of his mission to the US, one wonders what was Oliphant's motivation in attempting to keep the Australian Government informed of these events.

With the agreement signed, all the Tube Alloys personnel were transferred to continue work in Canada or seconded to the US project, now called the Manhattan Project. In November 1943 Oliphant was posted to Berkeley to work with Ernest Lawrence on the electromagnetic separation of uranium isotopes. Oliphant, during his posting to Berkeley, returned to Britain for visits during February and March 1944 and again from November 1944 to early March 1945. He left Berkeley and the Manhattan Project in March 1945 [33].

While Oliphant was working at Berkeley, he attempted to get other Australians working on the project. In part, he must have realised that the knowledge gained by these physicists could be utilised in post war Australia. Oliphant went so far as to nominate whom he wanted to join him and January 1944, Oliphant sent his request to David Rivett stating; 'Would you release Burhop for the duration to take part in urgent semi-theoretical work on tube alloys problems ... On account of his past experience Burhop could advance materially the use of the new weapon' [34]. Burhop kept his superior informed of his work at Berkeley, writing to Rivett in June; ' ... My own feeling is that this project is very important for the future of Australia and the present time is a golden opportunity to get knowledge of the techniques that, it seems, will prove vital for the future of the country. In my opinion there are in Australia several people who have had the right type of training that would make them suitable to pick up the various techniques involved and would enable them to make a significant contribution to the work' [35].

As is now well known the collaboration between the three nations did produce an atomic bomb. In fact it produced three; one was made from enriched uranium and two were made from plutonium. The first bomb exploded was a plutonium bomb. As a result the Second World War ended on 15th August 1945. With the end of the war both in Europe and in the Pacific, many of the scientists working in Canada and the US wanted to return to their homes and families.

AUSTRALIA WANTS ATOMIC ENERGY

Shortly after Oliphant returned to Britain in 1945, he became involved in another new project, that of setting up a British atomic energy research establishment. Cockcroft had been the Director of the Canadian Experimental Atomic Energy Plant during the war and had also returned to Britain at the conclusion of the war [36]. By April 1945, Cockcroft and Oliphant toured a number of sites that were being considered as possible locations for this new establishment. The site most favoured and hence recommended was a disused airfield at Harwell near Oxford. By July, the British Atomic Energy Research Establishment had a director, Sir Edward Appleton, and the support of the newly elected Labour Prime Minister, Clement Attlee. Harwell was to be the location of an experimental reactor which had been designed by the Graphite Group that had been formed in 1944 in Montreal [37].

Australia wanted access to atomic energy information, which it had been denied during the war. As soon as the war was over Australia again made overtures to Britain for this information. Ben Chifley, Australia's Prime Minister, sent a cable to Stanley Bruce in London on 6^{th} September 1945 stating:

'Repeated attempts made throughout war have failed to obtain for Australia information on research ... on utilization of atomic energy. This development is of very considerable importance both in regard to its wartime application and its peacetime possibility as a source of power ... my Government would appreciate an opportunity of contributing to the research and ... If the United Kingdom Government is willing to release information to us ... request you endeavour to ascertain if Professor H.S.W. Massey or Professor O.M.L. Oliphant would be permitted to come to Australia to communicate this information' [38].

Chifley had thought that by supplying Britain with uranium ore during the war, Britain would in return provide Australia with information on atomic energy, but this information was not forthcoming. Chifley received

a reply, on the 26^{th} September, from Evatt, who was in London and had been in contact with Oliphant. Again Oliphant informed the Australian government that the British government was in the process of establishing atomic research facilities that would research both military and peaceful uses of atomic energy. Oliphant had recommended that since Britain would have the necessary facilities, Australia should seek to send scientists to be trained in Britain.

The process for establishing the United Nations Atomic Energy Commission commenced on 3rd October 1945 when President Truman announced to Congress that he was about to initiate talks with the UK and Canada 'on the international control of atomic energy' [39]. The notion of 'control of atomic energy' was a euphemism for maintaining the status quo and not sharing atomic secrets with anyone. These discussions with the UK and Canada were only relevant because Canada had a reliable source of uranium ore and the US had none, and the UK had been involved in atomic energy from the beginning and was badgering the US to share the knowledge and technology that the US had developed during the war years based on the information that Britain had first shared with the US.

On the 26^{th} March 1946 Ben Chifley received a cable informing him of Oliphant's expected visit to Australia [40]. Records from the National Archives of Australia indicate that Oliphant had agreed in March to be part of Australia's delegation to the United Nations Atomic Energy Commission [41]. I suspect that it was during this visit that Oliphant and Chifley met and not at the Commonwealth Prime Ministers' Conference that was held in Britain in May 1946, as has been stated in the Oliphant biography written by Cockburn and Ellyard.

On the 4^{th} February 1947, Chifley sent a note which had been drafted by Coombs, to Atlee that stated:

'Professor Oliphant has made it clear that he could not take up a position here until his present obligations in the United Kingdom are complete. And it is understood that this may take another two or three years. Furthermore, he is anxious that if he should accept appointment this should be done with the goodwill of his fellow scientists in the United Kingdom and the United Kingdom Government to whom he feels a considerable debt of gratitude. Furthermore, he points out that the work he would do here should be regarded as part of the general British Commonwealth contribution to the development of knowledge in the field of atomic physics and that he should have continued opportunity for consultation and collaboration with fellow scientists working in the United Kingdom' [42].

Oliphant had wanted to continue playing a part in applied research into atomic energy and was not prepared to forego that type of involvement on his return to Australia.

Atlee responded to Chifley's request on 4^{th} March and stated:

' . . . In so far as his work was concerned with fundamental physical research of a non-secret character, we should hope that he might have the fullest opportunity for consultation and collaboration with fellow scientists working in the United Kingdom . . . There are as you know, aspects of atomic energy which much of our knowledge in this country is derived from the work we did during the war in conjunction with the Americans and the Canadians. Professor Oliphant who played such an important part in that work, will know that the war-time partnership has placed hither to certain limits on our freedom to co-operate on atomic energy with other countries, even within the Empire. You will remember that I explained the position at our meeting here last May' [42].

This reinforced the conditions that the U.S. had placed on both the United Kingdom and Canada concerning the sharing of knowledge and information on atomic energy and related technologies.

Oliphant by this time had the ear of the Australian Prime Minister and over the next decade would continue to have this type of familiarity with Chifley's successor, Robert Menzies. During the period 1946 to 1950, there would be much negotiation between Oliphant and the Australian officials who were attempting to bring him out. In August 1950 Oliphant

finally arrived in Australia [43]. He took up the position of Director of the Research School of Physical Sciences at the Australian National University.

INDUSTRIAL ATOMIC ENERGY COMMITTEE

Australia had, more from good fortune than by design, become involved in the international politics of atomic energy and its control by its membership of the first Security Council of the United Nations and as such a member of the United Nations Atomic Energy Commission. This was a position that Australia wanted to maintain. It was a new technology and at the time there was no reason to suppose that Australia could not join the elite technologically advanced atomic club. After all, many of her sons had been involved in the development of the atomic bomb and were now working on the development of atomic energy.

John Dedman, as the Minister responsible for the CSIRO, wrote on 27^{th} June 1949 to the Minister of Defence (one notes with some amusement that the Minister of Defence was also John Dedman), stating that 'The executive of CSIRO has recently advised me that it is difficult for it to formulate future policy on many different aspects of atomic energy with which the Commonwealth Government may be concerned without collaboration of your Department of Defence and of the Department of Supply and Development' [44]. He suggested that a group of officers from the CSIRO, the Department of Defence and the Department of Supply should meet 'with the view to advising the three Ministers concerned as to the interdepartmental machinery which should be set up to advise Cabinet on policy matters' [45] concerning atomic energy. By 26^{th} July a group representing the CSIRO, the Department of Defence and the Department of Supply and Development met at CSIRO Head Office in Melbourne [45].

This meeting recommended the formation of an Atomic Energy Policy Committee. Initially this committee was to have representatives from the Departments of Defence and of Supply and Development, a representative of CSIRO and three technical experts, under the chairmanship of Marcus Oliphant [46]. Oliphant had 'agreed with the view that Defence and other aspects of Atomic Energy could not be separated' [46]. However, in a note sent to the Secretary of Defence by the Acting Secretary, it became obvious that the Minister of Defence 'did not wish Defence to be associated at this stage with CSIRO on the committee, although he did say that Defence could be added later.' The rationale for this Ministerial decision was evident later in this note, 'He (Dedman) mentioned that the government was desirous of setting up an atomic pile in South Australia for the generation of electrical energy as a counterpart in that State to the Snowy River Scheme' [46].

This committee was later renamed as the Industrial Atomic Energy Policy Committee and was established on 19^{th} August 1949 by Chifley. It was to advise the government on the possible industrial applications of atomic energy and to suggest a program for its development. It was answerable to the Minister responsible for the CSIRO [47]. Oliphant was to be the Chairman and the other members of the committee were representatives of the Departments of Supply and Development, Treasury and the CSIRO and 'three technical men, familiar with the physical, chemical and minerals problems that will require consideration'[48].

Oliphant initially was involved with the works of the committee by correspondence but was to take a more active role on his return to Australia in 1950 [23]. Menzies, who by this time was Prime Minister, endorsed Oliphant as chairman but also included his own nominees, one of whom was Professor Philip Baxter. Oliphant was an active chairman and made independent submissions to Menzies concerning the development of atomic energy in Australia. When Oliphant discovered in February 1951 that Menzies did not see Mr Clement Attlee, the then Prime Minister of the United Kingdom, to discuss 'cooperation in the field of atomic energy' [49], Oliphant went so far as drafting a note to Attlee stating that 'Detailed exploration of uranium ores at Radium Hill in South Australia has proved that at least 600 tons of

uranium is recoverable as oxide' [49] and that since a joint program of development would be useful to Australia, 'authority be given for technical discussions' between Oliphant and Cockcroft, who could then make recommendations in the development of atomic energy in Australia [49].

This draft letter, based on a report that Oliphant had prepared on behalf of the Industrial Atomic Energy Policy Committee, which recommended the adoption of an atomic energy program in Australia, was sent to Menzies, by Oliphant, with the instructions that Menzies ought to send it to Attlee. Menzies obediently cabled this letter, unaltered, to Attlee who responded that there were issues of security due to the constraints of the tripartite agreement and that not all information available to Britain could be freely passed on to Australia [49].

Specifically Attlee's reply stated 'We have to regard our commitments under the tripartite agreement between the United States, Canada and ourselves. Complete separation of power and military programs for the use of atomic energy is not possible and a worthwhile program for industrial power could not be carried out without the use of classified information. ... In these circumstances we should in the first place need to have from you assurance that any Australian project in the industrial field would be dealt with as 'classified' to the extent that this is necessary under the rules agreed with the United States and Canada.' The response concludes with 'This need not, however, hold up essential preliminary work such as ore mining operations' [48, 49]. Quite clearly Britain was unwilling to share information but it still wanted its uranium ore.

Oliphant was shown a copy of this response and in return responded, on 28^{th} May 1951, with a willingness to accept the notion of secrecy of any information made available from Britain. He concluded: 'Assuming that the Government agrees to 'classification' of work on atomic energy, I assume that the project must be transferred to a Ministry which has the necessary machinery for dealing with classified information' [49]. Even before Oliphant had a chance to write a reply to Attlee's response other members of the Industrial Atomic Energy Policy Committee were being brought secretly into the discussion.

The first shot was fired by Harold Breen, on 23^{rd} April 1951 when he sent a copy of Menzies' letter to Attlee, with Attlee's response, to the Secretary to the Department of Defence, with a cover note stating that 'No member of the Committee was aware of the first cable' [50]. The Secretary of Defence responded saying that the Defence Department had no official representation on the Committee. By 4^{th} May, Breen had met with two other members of the Committee, Martin and White, who were in general agreement as to what should be done. They produced a report that was critical of Oliphant's views on atomic energy, suggested that the Committee would need to be reconstituted. The cover note to this report was written by Breen and sent to Menzies on 7^{th} June 1951. Breen refers to the issue as the 'Oliphant-Uranium matter'. The final paragraph of the cover note states: 'I am particularly anxious to know if any Australian scientific help may be needed by the United Kingdom in Australia in the near future because of a certain event which is being planned and which may occur in Australia. You are aware of this possible project. White and Martin do not know' [50]. This is a reference to the forthcoming British atomic tests which were to be held in Australia commencing in 1952.

Oliphant's reply of the 28^{th} May drew a 'slap on the wrist' by the Secretary of the Prime Minister's Department, suggesting that Oliphant should meet with the Industrial Atomic Energy Policy Committee and present a report. Oliphant did what he had been asked [48]. The Committee met and recommended that it be disbanded and replaced by a new committee 'constituted under one of the Departments of the Defence group' [51]. The machinations of the Secretaries of the Departments of the Defence Group resulted in The Industrial Atomic Energy Policy Committee being reconstituted under the Department of Supply. Howard Beale sent a letter on 4^{th} April 1952 inviting the respective Departments to nominate their representatives. Oliphant, however, did not hear about the changes to the new committee until

almost three weeks later when he received a letter from Menzies asking him to act as a consultant to the committee. Oliphant objected vociferously [51]. The committee remained in existence until November 1952 when it was reduced in size and changed in composition to allow for the easy transition for the new Commissioners who would run the new organisation once the Atomic Energy Act 1953 was enacted [52].

OLIPHANT AND NATIONAL SECURITY

It has already been noted that Oliphant had a somewhat relaxed approach to security. His reputation was further damaged by two different 'spy scandals'. The first was the revelation, in March 1946, that Alan Nunn May had acted as a spy for the Soviet Union. Nunn May had been an undergraduate in Oliphant's Physics Department in Birmingham. What added to the scandal was that Oliphant knew Nunn May's family who lived near the Oliphants in Birmingham [53]. The second scandal was the famous Klaus Fuchs affair. Fuchs was arrested in Harwell in early 1950, as a Soviet agent. Fuchs had worked at Birmingham with Rudolph Peierls and Otto Frisch and later on the Manhattan Project [53]. Both spies were Birmingham men and Oliphant was their Professor, so now Oliphant was tarnished by guilt through association.

The Australian Security and Intelligence Organisation, ASIO, had the responsibility of vetting all Public Service appointees. It also established files on individuals who may have posed a security risk; the outspoken Oliphant had such a file established. The file contains allegations of a trivial nature which indicate that Oliphant held strong views and was willing to express them. In 1953 there were two assessments made of Oliphant; one dated 17^{th} August stated, 'we have an unconfirmed report that he expressed horror at the dropping of the bomb on Hiroshima, a civilian target, and accused the American Government of a breach of faith in that regard; his contention being that they had promised that if the bomb was produced, it would be used only on a military target ...I would also quote the opinion of Professor J.P. Baxter of the Atomic Energy Commission, who said "I have known Mark for years, and cannot conceive of him harbouring a disloyal thought"'[54]. The opinions expressed by Oliphant were shared by many loyal Australians. Another quote from the vetting process for the Australian Atomic Energy Commission stated 'extensive enquiries failed to reveal any evidence of Professor Oliphant's interest in, or membership of, any organisation of security interest' [54].

Two later notes from Oliphant's file indicated that he was under some form of casual surveillance. On 11^{th} June 1956 Oliphant received gifts from Peter Kapitza. Kapitza had been a fellow Cavendish student and had returned to his native Russia just before Stalin closed the borders of the USSR thus effectively making Kapitza a captive in his homeland. It was quite natural for Oliphant and Kapitza to correspond and even exchange gifts. A later entry included that on 10^{th} January 1957 Petrov stated that Oliphant was known to him. Petrov had been a minor diplomat in the Russian Embassy in Canberra and had defected dramatically. Oliphant as Professor of Physics at the Australian National University had attended diplomatic functions and hence this comment by Petrov had little impact.

One insightful entry in Oliphant's file, dated 14^{th} July 1954, stated 'there is evidence of rivalry existing between Professors Messel and Oliphant ...a campaign is on the way to discredit Oliphant and have him removed from his post which would be taken over by Messel' [54]. If Oliphant was aware of this rivalry, he certainly did not exhibit any malice towards Messel. Meanwhile Messel was busy establishing the first university fundraising foundation in Australia, at the University of Sydney.

Finally, Oliphant was not just concerned with atomic energy. He was also an advocate of other forms of energy production. An article in the Sydney Daily Telegraph dated 19^{th} July 1951 stated that Oliphant ' ...suggested that Australia could build a solar radiation power station using huge aluminium mirrors to reflect the sun's rays and drive steam power generators ...' [55]. Oliphant was certainly a man of vi-

sion, he could see the potential of solar powered electricity generation more than 50 years before the first solar pilot steam generating plant was established by David Mills in the Hunter region, north of Sydney in 2004 [56]. Oliphant would continue with his researches and would later become Governor of his home state, South Australia. By the time of his death in July 2000, Oliphant would have regained much of his earlier reputation purely from his great integrity. He was seen as a prominent opponent of the nuclear arms race.

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Ernest Marsden's Nuclear New Zealand: from Nuclear Reactors to Nuclear Disarmament

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Abstract: Ernest Marsden was secretary of New Zealand's Department of Scientific and Industrial Research from 1926 to 1947 and the Department's scientific adviser in London from 1947 to 1954. Inspired by his early career in nuclear physics, Marsden had a post-war vision for a nuclear New Zealand, where scientists would create radioisotopes and conduct research on a local nuclear reactor, and industry would provide heavy water and uranium for use in the British nuclear energy and weapons programmes, with all these ventures powered by energy from nuclear power stations. During his retirement, however, Marsden conducted research into environmental radioactivity and the impact of radioactive bomb fallout and began to oppose the continued development and testing of nuclear weapons. It is ironic, given his early enthusiasm for all aspects of nuclear development, that through his later work and influence Marsden may have actually contributed to what we now call a 'nuclear-free' New Zealand.

Keywords: Ernest Marsden, heavy water, nuclear, New Zealand

INTRODUCTION

In the 1990s, Ross Galbreath established Ernest Marsden as having been the driving force behind the involvement of New Zealand scientists on the Manhattan and Montreal projects, the creation of a nuclear sciences team at the Department of Scientific and Industrial Research (DSIR), and the subsequent plans for a nuclear reactor in New Zealand [1]. In an article about New Zealand's involvement in the British hydrogen bomb tests of 1957–58, defence historian John Crawford identified Marsden as advising Prime Minister Sidney Holland against allowing the United Kingdom to test hydrogen bombs on New Zealand territory. Crawford also covered the joint United Kingdom-New Zealand plans for the establishment of a heavy water plant to provide raw materials for the British nuclear energy and nuclear weapons programmes, but it was outside the scope of his article to cover Marsden's initiation and encouragement of the heavy water project [2].

This article focuses on Ernest Marsden as the brains behind New Zealand's nuclear schemes in the 1940s and 1950s, adds the context of his early work in the radiation and nuclear sciences, and examines how his attitude to nuclear weapons development – which he was happy to support in the 1940s and 1950s – changed in his later years. By necessity this article includes some material already covered by Galbreath and Crawford but it also covers new ground. The principal sources for this article are the records of the DSIR, External Affairs Department, and New Zealand Atomic Energy Committee held at Archives New Zealand in Wellington, and Ernest Marsden's personal papers held at the Alexander Turnbull Library in Wellington. Biographical pieces in the history of science in some cases overlook the institutional and wider social context of science. In the case of the present study, however, which concerns both the very small country of New Zealand and a field as focussed as nuclear science, the very reverse is true. In this case, one person significantly shaped both the institutional setting and the wider social environment for his science and we learn much about the context precisely by examining his influence. Ernest Marsden's wide experience, outspokenness and apparent capriciousness towards nuclear weapons development makes him an interesting study, providing some insight into the changing attitudes to nuclear development in the nation of New Zealand as a whole.