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HISTORIC BARRIERS TO ANGLO-AMERICAN NUCLEAR COOPERATION

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Despite being the closest of allies, with shared values and language, attempts by the United Kingdom and the United States to reach accords on nuclear matters generated distrust and resentment but no durable arrangements until the Mutual Defense Agreement of 1958. There were times when the perceived national interests of the two countries were unsynchronized or at odds; periods when political leaders did not see eye to eye or made secret agreements that remained just that; and when espionage, propaganda, and public opinion caused additional tensions.

STATUS IMBALANCE

The Magna Carta of the nuclear age is the two-part Frisch-Peierls memorandum. It was produced by two European émigrés, Otto Frisch and Rudolf Peierls, at Birmingham University in the spring of 1940. Unlike Einstein's famous letter to President Franklin D. Roosevelt, with its vague warning that a powerful new bomb might be constructed from uranium, the Frisch-Peierls memorandum set out detailed technical arguments leading to the conclusion that "a moderate amount of U-235 [highly enriched uranium] would indeed constitute an extremely efficient explosive." Like Einstein, Frisch and Peierls were worried that the Germans might already be working toward an atomic bomb against which there would be no defense. By suggesting "a counter-threat with a similar bomb," they first enunciated the concept of mutual deterrence and recommended "start[ing] production as soon as possible, even if

it is not intended to use the bomb as a means of attack."[1] Professor Mark Oliphant from Birmingham convinced the UK authorities that "the whole thing must be taken rather seriously,"[2] and a small group of senior scientists came together as the Maud Committee.

In July 1941 James Chadwick (the physics laureate who had overseen a year of intense research at leading English universities) drafted the Maud report, concisely detailing the necessary steps required to construct a uranium bomb.[3] The report avoided any discussion of the atomic bomb as a deterrent and, perhaps because of the dire military situation, viewed it simply as a new weapon of "decisive possibilities."[4] By September 1941, scientific advisers, Prime Minister Winston Churchill and the chiefs of staff had all accepted the Maud recommendation that work should continue with the highest priority and "on the increasing scale necessary to obtain the weapon in the shortest possible time." Britain was thus the first state to take the decision to acquire an atom bomb.

The Maud report also called for continued collaboration with the United States. Although several U.S. centers had begun research into uranium and the novel element, plutonium, they lacked the urgency and coherence of the British project that was propelled by the immediate Nazi threat. The first reaction from Washington was ambivalent—Vannevar Bush and James Conant (Roosevelt's chief science advisers) thought "the time is ripe for a full examination of whether the whole business should be continued at all."[5] After a further period of digestion came the first big opportunity for Anglo-American cooperation. But feeling that they were ahead in the science and letting imperialism blind them to the economic realities, the British showed no enthusiasm for President Roosevelt's proposal of a joint project. Oliphant, who toured the United States raising awareness of the Maud report, was one of the few who understood the extent of the U.S. prewar atomic program. A year later it had expanded into the Manhattan Project, driven by the unrelenting General Leslie Groves.

By contrast, Tube Alloys, the British atomic weapon project, failed to make any worthwhile progress, and Sir John Anderson, the minister in charge, warned Churchill that the construction necessary for the production of fissile material was out of the question in wartime Britain. Britain was, as Churchill said, "a struggling country beset by deadly foes." One year after the Maud report had optimistically predicted a bomb might be ready by the end of 1943, there was not the

steel or the skilled men available to build even a pilot isotope separation plant. Anderson's concern that the pioneering research work done in England was "a dwindling asset"[6] was borne out by the subsequent reluctance on the U.S.'s part to countenance British scientists joining their project. The standoff was not resolved until the Quebec Agreement of August 1943 allowed a pooling of effort: the agreement also stipulated that no information about the project would be communicated to third parties; nor would the weapon be used against an enemy without each other's consent.

The Quebec Agreement set the terms for collaboration on the Manhattan Project through a Combined Policy Committee (CPC), but its sway did not survive the end of the war. As wartime allies, the two nations envisioned their duopoly continuing into the future (after cornering the world uranium supply), but peace brought fresh domestic and international complexities that eclipsed bilateral considerations. A joint declaration from the leaders of the United States, the United Kingdom, and Canada in November 1945 recognized that no national monopoly of atomic power could exist and that atomic weapons more powerful than those used against Japan were possible; it also called for a UN commission on atomic energy to guarantee collective security. In the meantime, there would be continued scientific exchanges between the three countries.[7]

Bernard Baruch, a veteran financier summoned by President Harry S. Truman for diplomatic duty, proposed at the UN his version of the State Department's Acheson-Lilienthal plan, suggesting that all "dangerous" activities like uranium mining and the separation of fissile materials should be controlled by an international atomic development agency; then, after the atomic development agency was successfully established, the United States would scrap the world's only existing nuclear arsenal. While the British would have supported such a plan, the Soviets, for a variety reasons, resisted it.[8] The spectrum of opinion in the United States ranged from those who believed that the country alone possessed the secret of making atom bombs and should preserve its military advantage at all costs to those who realized there were no scientific secrets, just technical and industrial barriers, and who believed ultimate security would be best served by an effective system of international control.

Aside from the question of international control, Truman was faced with the need for domestic legislation to transfer authority over the

U.S. nuclear program from the secret, U.S. Army–run Manhattan Project to a civilian-led Atomic Energy Commission (AEC) that would report to Congress.[9] The legislation to achieve this transformation was introduced by Senator Brien McMahon (D-Conn.), and it originally offered the prospect of some international exchange of scientific information. By the time Truman signed it into law as the Atomic Energy Act (AEA) in August 1946, the communication of "restricted data" (which included civilian as well as military information) was punishable by death. In the absence of any international agreements, the AEA shaped the U.S. foreign atomic policy.

The British initiated contingency plans for plutonium production as early as September 1945; in January 1947, when there was no international consensus in sight at the UN and the strictures of the AEA supplanted all the wartime agreements from the U.S. point of view, the UK government secretly launched an independent nuclear weapons program. Despite the wartime depredations and the calamitous economic collapse following the sudden termination of Lend-Lease, Britannia was still the world's top cop, and many in Whitehall believed Britain's authority depended on an imperial navy and troops garrisoned across the globe. Not only were the operational costs of this bloated military unsupportable, the opportunity costs in terms of men and materials ensured continuing austerity at home. With the principal economic ministers excluded from the secret January meeting, Foreign Secretary Ernest Bevin carried the day by asserting, "We could not afford to acquiesce in an American monopoly of this new development," and "We've got to have the bloody Union Jack on top of it."[10]

The same month in Congress, the Joint Committee on Atomic Energy (JCAE) began contentious confirmation hearings on Truman's nominations to the civilian AEC. For the first time in the United States there was to be some democratic scrutiny of atomic policy, and the AEC was mandated by the 1946 Atomic Energy Act to keep the JCAE informed. Two awkward skeletons from previous agreements with the British needed to be disclosed: first, the Quebec Agreement required the United States to obtain British "consent" before using the atomic bomb; second, the British were receiving half the uranium shipped from the Congo while the burgeoning U.S. program was critically short of raw material.[11] These concessions sat uneasily with the new Truman doctrine of getting tough with the Soviet Union, especially with those who regarded the atomic bomb as the ultimate guarantee of security.

George Kennan, the diplomat who helped harden Truman's attitude toward the USSR, in August 1947 pronounced the UN atomic negotiations worthless, and the U.S. administration turned back to the CPC as a forum in which to negotiate with Britain and Canada. After months of intense negotiations, a modus vivendi was concluded that erased the wartime Quebec Agreement, boosted the U.S. supply of uranium, and allowed the British to receive technical information on the grounds it would advance "common defense and security."[12] The Pentagon was not convinced that the United Kingdom was a secure site to build atomic plants, and when the CPC was informed (by Donald Maclean from the British embassy) that the United Kingdom was going to build atomic weapons, the extent of technical cooperation, especially regarding plutonium production, and atomic intelligence sharing became controversial.

Internal debate was still going on more than a year later in Washington, when the shocking news that the USSR had exploded a nuclear device increased the tensions. The U.S. monopoly was over, and the United Kingdom now pressed for complete collaboration, including over nuclear weapons. But the United States had achieved its objectives from the modus vivendi, and the exposure of Klaus Fuchs as a spy in February 1950 ended any small prospect of a joint program. There was deep unease in London that U.S. aircraft (potentially to be armed with atomic bombs) had been stationed in the United Kingdom since the 1948 Berlin airlift without any explicit formula governing their deployment. Whereas the Pentagon worried about the security of atomic bombs stored in the United Kingdom, the British began to view those bombs as a potential cause for Soviet retribution against their island that had become a forward U.S. base in the unfolding Cold War. The British were in the dark about the U.S. strategic air plan, which severely limited their capacity to plan any defense measures.

The United Kingdom became the third member of the nuclear club in October 1952 with the detonation of a plutonium device; it came at a time when Britain's conventional defense costs were finally recognized as ruinous and led to renewed hope that the overall defense budget could be cut without detriment to national security.[13] The United States, which now had a formidable stockpile of fission weapons, initiated a super club a month later with a thermonuclear explosion at Eniwetok atoll, and the Soviets followed suit in August 1953. The United Kingdom was increasingly anxious about its position, squeezed

between the two superpowers. During the Korean War, there had been a casual reference to the use of atomic weapons by Truman, and after the Eisenhower administration's "New Look" review proposed that security and solvency were achievable through nuclear armaments, Secretary of State John Foster Dulles announced a policy of massive retaliation would be followed.

The United Kingdom, wary of potential U.S. adventurism and fearful about a nuclear exchange with the Soviets vaporizing British cities, felt compelled to develop its own H-bomb. It seemed to offer the only way to restrain one superpower while deterring the other. In recommending the decision in July 1954, Churchill stated that the possession of the most up-to-date nuclear weapons was essential to maintaining influence as a world power and supported the main policy goal of preventing major war.

In the summer of 1956, the U.S. Air Force decided that it would share some of its strategic targeting plans with the Royal Air Force now that the British V-bomber force was at last coming into service, armed with a few fission bombs. There was also tentative agreement to site some Thor missiles in the United Kingdom.[14] Negotiations ceased during the Suez crisis, a period that demonstrated the limitations of both Britain's friendship with the United States (which was completely unsupportive of British and French efforts to topple President Nasser and deny the Egyptians control of the canal) and its independent deterrence (Khrushchev, whose troops were busily invading Hungary, hinted that nuclear retaliation against both the United Kingdom and France over Suez was possible).

Anglo-American relations were at a postwar low, but early in 1957 discussions about strategic coordination resumed both at the chiefs-of-staff level and between Eisenhower and the new prime minister, Harold Macmillan. Macmillan shrewdly built on this rapprochement later in the year, when the U.S. defense establishment suddenly felt vulnerable with the unheralded Sputnik launches. The outcome was the Declaration of Common Purpose that promised to wipe the slate clean and to begin anew Anglo-American collaboration on nuclear policy.[15]

STATESMEN AND THEIR ADVISERS

The international problems that flow from the possession of nuclear weapons are so grave that they demand the personal attention of national leaders. For the early history of the nuclear age, it is rewarding

to examine the interactions between the Anglo-American pairings of Churchill-Roosevelt, Attlee-Truman, Churchill-Eisenhower, and Macmillan-Eisenhower to see where collaboration broke down. Although the ultimate responsibility rested at the top, the roles of trusted advisers should not be underestimated, especially in the case of Churchill whose loyalty to Lord Cherwell, the Oxford physicist turned politician, was unbounded. It was Cherwell who warned Churchill, just before the Maud report appeared, that "whoever possesses such a [uranium enrichment] plant should be able to dictate terms to the rest of the world. However much I trust my neighbour, and depend on him, I am very much averse to putting myself completely at his mercy and I would, therefore, not press the Americans to undertake this work."[16]

Once the Anglophobic General Groves took charge of the Manhattan Project, he was able to persuade Roosevelt and his scientific advisers that any exchange of information was to be strictly limited. Curiously neither Cherwell nor Groves interfered with the remarkable wartime attempts of the Danish physicist Niels Bohr to promote a new policy of international openness regarding atomic weapons as a way to avoid a postwar arms race. Although Bohr gained a sympathetic audience from Roosevelt, Churchill reproached Cherwell for bringing Bohr to see him and was able to convince the ailing FDR to dismiss his radical proposals, opting instead for "full collaboration" in military and civilian atomic enterprises to continue after the war "until terminated by joint agreement."[17] This 1944 accord, the Hyde Park aide-mémoire, was never disclosed by Roosevelt to any member of his government and proved to be a dead letter.

Clement Attlee (a man so modest and self-effacing that Churchill quipped, "an empty taxi arrived at 10 Downing St. and out stepped Attlee") proved a quick study in nuclear affairs and developed the most detailed understanding of the implications of any political leader of his time. Within weeks of taking office he wrote to Truman identifying atomic bombs as posing such a threat to the future of mankind that they demanded "a new valuation of what are called national interests."[18] At his behest, the tripartite meeting with Canada was held in Washington in November 1945 that resulted in a declaration urging the UN to set up a commission to oversee the elimination of atomic weapons and the imposition of safeguards so that all could share the peaceful benefits of atomic energy. The declaration was meant to replace the Quebec Agreement but to keep provisions about prior consultation on the use

of weapons and the allocation of raw material. Vannevar Bush, General Groves, and Secretary of State James F. Byrnes opposed its terms, and Truman soon abrogated it. Attlee's next trip to Washington came five years later to receive Truman's reassurance that he had not authorized the use of atomic bombs in Korea; Secretary of State Dean Acheson had to restrain the president from pledging to obtain British consent before ordering any such use, and no firm text was forthcoming.[19]

When Churchill returned to office in 1951, he was not sure of the need for an independent bomb program, arguing that the United Kingdom "should have the art rather than the article."[20] Cherwell soon convinced him that the United Kingdom must continue to make its own bombs and not rely exclusively on the United States. Churchill's outlook was obscured by the mists of his wartime relationship with FDR, and he confidently expected that, when he traveled to Washington in January 1952, he would be able to shame the Truman administration into granting the United Kingdom "a reasonable share of what they have made so largely on our initiative and substantial scientific contribution."[21] Even though he achieved no tangible success, the election of Eisenhower rekindled his wartime optimism. Eisenhower was persuaded that the 1946 Atomic Energy Act imposed unreasonable restrictions on America's NATO allies and should be amended; but there were few practical benefits to the United Kingdom, in part because Lewis Strauss (the special assistant to the president on atomic affairs) took a consistently less liberal position than his boss.[22]

The short-lived Eden government collapsed in the wake of Suez, bringing Macmillan, another wartime friend of Ike's, to 10 Downing Street. Macmillan had experienced the frustration of being minister of defence in Churchill's last cabinet, when he reached the conclusion that "there is really no protection against a nuclear attack, certainly in these islands. The only protection is the deterrent of the counter attack."[23] As chancellor of the exchequer under Eden, Macmillan gloomily reflected that expenditure on the United Kingdom's still excessive armed forces had broken the back of the economy without providing any real national security.

When, in the fall of 1957, Eisenhower was reeling from failed disarmament and test ban talks at the UN, the superiority of Soviet missile technology indicated by Sputnik, and deep fears about the vulnerability of the thermonuclear deterrent of the United States, Macmillan showed a velvet touch: "Dear Friend," he wrote, "What are we going to

do about these Russians? . . . Has not the time come when we could go further toward pooling our efforts and decide how best to use them for our common good?"[24] Fortuitously Strauss passed through London and was successfully briefed so that Macmillan was soon in Washington to hold wide-ranging talks on NATO and defense policy with Eisenhower, who announced at their conclusion that he would encourage the "close and fruitful collaboration of scientists and engineers of Great Britain, the United States, and other friendly countries."[25] What Macmillan referred to as "the great prize"—the full exchange of nuclear technology and a mutual defense agreement—was at last in reach.

ESPIONAGE, PROPAGANDA, AND PUBLIC OPINION

The three national leaders who met in Washington in November 1945 knew that an extensive network of Soviet spies had been revealed in Canada a few weeks earlier. This sensational news became public in February 1946 at a critical juncture in the passage of the McMahon bill through Congress; it fed the campaign of those in the United States who wished to preserve military security over the nuclear "secrets" and opposed any international exchange of information.[26] The subsequent imprisonment of Alan Nunn May, a British physicist who worked in the wartime Manhattan Project laboratory in Montreal, cast doubts on the political judgment and reliability of his colleagues, such as those in the Federation of American Scientists who had been advocating with some success for international control. May's plea of social responsibility was, on its face, indistinguishable from many opinions expressed in the new Bulletin of the Atomic Scientists. The title of Section 10 in the McMahon bill, "Dissemination of Information," soon became "Control of Information," reflecting more restrictive second thoughts in Washington.

The late 1940s brought heightened anxiety about communism in the United States, primarily owing to the abusive behavior of the Soviets in Europe but dramatized by revelations about U.S. spies like Elizabeth Bentley and the hearings of the House Un-American Activities Committee. The confession of Klaus Fuchs, the head of theoretical physics in the British atomic energy program at Harwell, to passing material (acquired while at Los Alamos) on the subjects of fission and thermonuclear bombs to the Soviets terminated the tentative modus vivendi.

Fuchs's treachery went a long way to explaining why the Soviets had been able to detonate an implosion bomb in 1949. Dean Acheson

recorded, "The talks with the British and Canadians returned to square one, where there was a deep freezer from which they did not emerge in my time."[27] When Bruno Pontecorvo, a talented physicist who had worked with May in Canada and Fuchs at Harwell, disappeared to the USSR in October 1950, the British government's inquiry was specifically designed to avoid further damage to nuclear negotiations with the United States.[28] U.S. outrage about the woeful state of British security increased in 1951 with the defection of Donald Maclean, the civil servant at the British embassy in Washington who was in charge of atomic energy affairs from 1944 to 1948. Even the early release of May from prison widened the rift between Washington and London: the U.S. administration thought the original sentence too mild (the Rosenbergs were about to be executed for similar crimes) and that it illustrated a fundamental British "softness" toward communism.[29]

The publicity surrounding the spy cases reinforced the notion that there was a secret that was key to developing nuclear weapons; it was a secret that should be held, as Truman suggested, in "sacred trust" by the United States. Such an idea was in contradiction to what the atomic scientists themselves had been saying publicly since the end of the war. Even after the Soviet thermonuclear detonation 1953, a large element of the U.S. public and polity clung to the hope of an enduring superiority, if no longer a monopoly, in nuclear weapons, but a growing faction of skeptics doubted their aspirations. This was especially true after the H-bomb test at Bikini in 1954, with its excessive fallout suggesting that the new apocalyptic weapons were not under perfect control. The throwaway remark of AEC chairman Strauss (who meant to be reassuring the public after the event) that the H-bomb could be created large enough to take out any city unnerved U.S. citizens and reawakened fears in the United Kingdom.

There was a general revitalization of peace and religious groups, and scientists once again became forceful anti-bomb spokesmen. The Russell-Einstein manifesto of 1955 influenced global public opinion more than any of the preceding international nuclear agreements or declarations. Disarmament movements in the United States and Europe reflected transnational concerns about radioactive fallout and became a significant force in setting the nuclear test ban agenda.[30]

CONCLUSIONS

The tergiversations that characterized UK-U.S. nuclear relations during World War II and its aftermath were the product of both tumultuous times and human judgments and delusions. The story illustrates how changes in U.S. politics can have unforeseen international consequences. In a world of clashing ideologies, an economically strapped United Kingdom engaged in nuclear proliferation, not only in response to a perceived threat from the USSR but because the United Kingdom distrusted the United States and wanted to preserve its status as a great power. International disagreements over nuclear policy may persist for a decade, even when they are being addressed in moderately good faith by wise statesmen who speak approximately the same language.

NOTES

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2. R. W. Clark, *Tizard* (London: Methuen, 1965). Clark discovered the nontechnical "Memorandum on the Properties of a Radioactive Superbomb" with Oliphant's covering letter in Tizard's papers—the only copy in existence. According to Arnold, Ibid., the technical part "on the construction of a 'super-bomb,' based on a nuclear chain reaction in uranium" was discovered in a cornflake box in a strong room of the UK Atomic Energy Authority in the early 1960s. No copy of the memorandum was made although Cockcroft did disclose its contents to various university groups on a visit to the United States in the fall of 1940.
3. A. P. Brown, *The Neutron and the Bomb* (Oxford: Oxford University Press, 1997), pp. 177–213.
4. M. Gowing, "The Maud Reports," appendix 2, *Britain and Atomic Energy* (London: Macmillan, 1964), pp. 394–436.
5. C. G. Darwin, letter to Lord Hankey, August 2, 1941, quoted in Brown, *The Neutron and the Bomb,* p. 217.
6. Anderson, letter to Churchill, July 30, 1942, quoted in Brown, *The Neutron and the Bomb,* p. 228.
7. Brown, *The Neutron and the Bomb,* p. 310.
8. Ibid., pp. 317–319.
9. R. G. Hewlett and O. E. Anderson, The New World, 1939/1946 (University Park: Pennsylvania State University Press, 1962), pp. 482–530.
10. P. Hennessy, Cabinets and the Bomb (Oxford: Oxford University Press, 2007), pp. 9 and 57.
11. Brown, The Neutron and the Bomb, pp. 312–313.

12. R. G. Hewlett and F. Duncan, *Atomic Shield 1947/1952* (Berkeley: University of California Press, 1990), pp. 261–314.
13. J. Baylis, *Ambiguity and Deterrence* (Oxford: Clarendon Press, 1995), pp. 126–177.
14. Ibid., pp. 234–277.
15. L. Arnold, *Britain and the H-Bomb* (Basingstoke: Palgrave, 2001), pp. 198–199.
16. Brown, *The Neutron and the Bomb,* p. 218.
17. Ibid., p. 269.
18. C. R. Attlee, letter to H. S. Truman, September 25, 1945, quoted in M. Gowing, *Independence and Deterrence* (London: Macmillan, 1974), pp. 78–81.
19. Ibid., pp. 311–314.
20. Ibid., p. 406.
21. Ibid., p. 407.
22. Arnold, *Britain and the H-Bomb,* p. 197.
23. A. Horne, *Macmillan 1894–1956* (London: Macmillan, 1988), p. 389.
24. A. Horne, *Macmillan 1957–1986* (London: Macmillan, 1989), p. 54.
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28. S. Turchetti, "Atomic Secrets and Governmental Lies," *British Journal of the History of Science* 36, no. 4 (2003): pp. 389–415.
29. British Embassy to London Foreign Office, cable, January 3, 1953, file no. KV 2/2218, National Archives, Kew.
30. L. S. Wittner, *Resisting the Bomb* (Stanford: Stanford University Press, 1997).