

PATRICK BLACKETT IN INDIA: MILITARY CONSULTANT  
AND SCIENTIFIC INTERVENOR, 1947–72. PART TWO

by

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SUMMARY

Patrick Blackett's role as a military consultant to India was described in Part One of this article. But Blackett was and is best known in India as an intervenor in scientific affairs and as an adviser to the research system. Here, Part Two shows how he came to understand the political economy of science, specifically the political limits of the influence of the scientific community and the way that very scarce economic resources were (or were not) mobilized within it.

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Few foreigners have played a role in independent India such as the role Patrick Blackett played between 1947 and 1972. As a military consultant<sup>1</sup> he initiated a debate about the effective role of scientific research in military development and promoted the conditions and careers of scientists attached to defence research, particularly up to about 1964. This was a period of dramatic change in India, with an emphasis on comparatively low-cost military development (particularly when compared with later periods). The same period also marked the steady decline in India's foreign exchange reserves, and Blackett understood how this decline would influence strategic programmes, determine the level of imports and establish the volume of subsidies sought by the Indian Government. An argument for 'self-reliance' became more and more necessary, although paradoxically was increasingly difficult to put into practice, as each year went by. He argued for (and against) new weapons, learned how these developments or purchases were financed, and helped in some instances to make appointments and close deals. He reinforced an attitude of 'self-reliance' in circulation in the 1940s, articulated by Indian scientists long before any real prospect of independence for India, and which traded on the momentum of Gandhi's idea of a self-reliant industry, made-at-home goods, and independent-minded politics. While Gandhi would not have imagined this idea applied to military development, Nehru and his political allies/advisers learned that it would be a policy of necessity, because there could be few alternatives. At the same time Blackett's independent views on nuclear weapons and the 'arms race' was a stimulant to

discussions with Nehru, Homi Bhabha and other scientists. He was a regular guest of the Chiefs of Staff, discussing both disarmament and armaments. In this sense there was an official acceptance of his presence and advice. During this period India learned how to optimize the potential of great-power rivalry to obtain favourable terms for commercial and military contracts and agreements.

#### BLACKETT AND THE COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH

What has gone wrong, I think, in some government research stations is that the principle of scientific freedom has sometimes been misapplied to mission-oriented R and D, where it is largely inapplicable...

(Patrick Blackett 1971)

It is not as a military consultant, but as an intervenor in scientific affairs and adviser to the research system that Blackett was and is best known in India. He came to understand the political economy of science, specifically the political limits of the influence of the scientific community and the way in which very scarce economic resources were (or were not) mobilized within it. Although Blackett and Bhatnagar (and Nehru) discussed the development of the vast government research organization, the Council of Scientific and Industrial Research (CSIR), his involvement appears intermittent before 1955–56. After the visit in the winter of 1955–56, Blackett is curiously absent from India for seven years (according to his own records). The 1956 Gnat fighter deal seems to end the first phase of this involvement, which began in 1947. Until his sudden death in January 1955, Bhatnagar was in regular communication with Blackett, and they sometimes toured CSIR laboratories together. This is the period during which Bhabha, Bhatnagar and Nehru formed the powerful triangle of the Atomic Energy Commission, but we have little evidence of Blackett's activities, if any, on their behalf. Blackett's deeper involvement with the CSIR seems to occur after 1963–64, during which period his work as military consultant decreases. He appears to have liked Bhatnagar and approved of the general direction of the CSIR's evolution as the State's applied research system, even if he saw research that was not being applied, or could not be. In the eight years that he knew him (1947–55), he helped Bhatnagar. Bhatnagar valued Blackett's influence with Nehru and supplied Blackett with the list of patents he needed for a study of defence production. Bhatnagar worked hard to find good appointments for his laboratories and was looking outside India for candidates. There is no clue in the papers whether Blackett advised for or against the appointment of non-Indians, but he certainly assisted Bhatnagar, Kothari and Bhabha to identify candidates abroad, often acting as a channel for Indian applicants. Therefore in 1951 Blackett interviewed a Canadian metallurgist working in London, who wanted to 'get a job in India and settle there permanently'. Bhatnagar said the new National Metallurgical Laboratory was 'in the charge of a brilliant young Frenchman', and he welcomed the arrival of this Canadian, W.K.A. Congreve, from London, with Blackett's favourable opinion based on a metallurgist colleague's expert recommendation.<sup>2</sup> A.V. Hill played a similar role at this time, looking



Figure 1. Discussing rock magnetic study, 1962, Tata Institute, Bombay:  
 (left to right) Vikram Sarabhai, Patrick Blackett, K.R. Ramanathan, P.W. Sahasrabudhe.  
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 The author appreciates the kind assistance of E.R. Deutsch.

internationally for good candidates for Bhatnagar, but of course Hill already had a much longer and deeper involvement in the development of the CSIR, starting in 1943.<sup>3</sup>

At the same time Blackett was inspired by a research project on solar power at the National Physical Laboratory (NPL) in Delhi, and went to considerable lengths to obtain French reports for Bhatnagar in 1951. It is curious Bhatnagar could not obtain these directly, because an agreement was signed that year between France and India on scientific cooperation, including rare earths and nuclear power.<sup>4</sup> The NPL solar-powered cooker project did not deliver on its promise, but Blackett's papers do not reveal evidence of Bhatnagar's embarrassment or Nehru's displeasure for the way in which the CSIR as a whole exaggerated its potential. Blackett's involvement in the NPL was to become much deeper in a few years. A series of problems arose within the CSIR with respect to leadership of the National Physical Laboratory (NPL) after the death of K.S. Krishnan in 1961, and Blackett was appointed by the Minister of Scientific Research and Cultural Affairs (Humayum Kabir) to conduct what the newspapers called a 'full enquiry at NPL'. Moreover, one of these news stories said that 'The Director's post ... was offered to Professor Blackett last year, but he declined it.'<sup>5</sup> There is no trace of this offer in the Blackett Papers at the Royal Society.

This publicity prompted his old friend from London, now living in Orissa, the biologist J.B.S. Haldane, to invite Blackett to visit for a discussion about the CSIR. With seven years' experience of living and working in the CSIR, Haldane drew Blackett's attention to what he must learn before he formed an opinion about the CSIR, and provided Blackett with the following advice:

I don't envy you your job. Considerable efforts will be made at the top to prevent you from finding out the truth, and when you do get through to unofficial sources you will hear some outrageous lies from people who cannot imagine an uncorrupt reason for doing anything. I advise you to get hold of the contract offered to junior scientific workers (such as myself) agreeing to go anywhere at a month's notice.<sup>6</sup>

Blackett worked fast at the NPL, and submitted a report in a month. He recommended reorganization of the whole Laboratory: moving some or most of those who worked largely in basic research to a new Centre for Advanced Physics at the University of Delhi; moving those in rain and cloud physics out to the Meteorological Department; moving potential manufacturing units in radio, glass and ceramics out to join their industries; and defining the work of remaining divisions more clearly while enhancing communication among them. Blackett found a culture of administrative rigidity in the NPL, where most people fought to define and protect the boundaries of their work. He thought this could be overcome by reorganization. In effect, he said, the NPL lacked purpose. This was not his first brush with the NPL. He had earlier criticized the fact that the CSIR pressured Sir K.S. Krishnan to leave basic research in a university, offering double his professor's salary, to ask him to try to build a research tradition applied to industrial problems. Blackett had seen this same phenomenon at Britain's National Physical Laboratory at Teddington. Both Blackett and A.V. Hill criticized the practice in India. D.S. Kothari also criticized Bhatnagar for taking scientists away from the universities, but his own Defence Science Organization did the same thing. Bhatnagar and Kothari argued that there was no other source of competent people.

The CSIR struck a committee to review Blackett's report, tour the labs and recommend how the Executive Council of the NPL should respond to it. In April 1963, this committee reported to the Executive Council that:

The Committee finds itself in general agreement with the spirit of the Blackett report. In what follows, the Committee would like to record its views concerning the implementation of these ideas.

Its own assessment was that:

there should be enough flexibility so that when an individual project is taken up which requires that scientists from different disciplines be brought together, then it should be possible to do this without difficulty. This aspect has been sorely neglected hitherto.

There was an exception to their approval, however, in that:

the Committee was not at all in favour of one possibility indicated by Professor Blackett, that of completely amalgamating the proposed Centre for Advanced Physics with the Delhi University.

The report suggested instead an Institute like the Saha Institute in Calcutta that was autonomous from, but very close to, the University, with University participation in its Governing Body. The members of this committee included M.G.K. Menon of the Tata Institute of Fundamental Research (TIFR) (who authored the report), R.C. Majumdar of Delhi University, A.K. Saha and B.D. Nag Chaudhuri of Calcutta's



Figure 2. Patrick Blackett peering down a 250 metre precipice while collecting rock samples near Khandala in the Deccan Traps in 1962. Reproduced with permission of the Tata Institute of Fundamental Research, Mumbai. The author appreciates the kind assistance of E.R. Deutsch.

Saha Institute of Nuclear Physics—the latter three were students of Meghnad Saha—plus J.C. Kapur, W.M. Vaidya and L.C. Verma.<sup>7</sup> This report proposed changes that did not always satisfy Blackett, and on his copy, beside the issue of the Centre for Advanced Physics, he noted ‘All this does not agree with my recommendations’. Much may be learned from a study of this era and these individuals in the NPL. Blackett was well aware of the complicated historic relations between universities and government laboratories; the loud debate was about how universities were being deprived of good researchers and therefore could not demonstrate how good research was also a form of training. On the other hand there was criticism that universities were inhospitable to good researchers and that government laboratories actually were the source of most good research in India. For a historical explanation of this tension, see the recent essay by Raina and Jain.<sup>8</sup>

The saga of the NPL reached Blackett again late in December 1964, when the Director General of the CSIR, Husain Zaheer, wrote to him:

I am afraid matters have not improved very much during the past year. The Director, whom we appointed last October, had eventually to be removed from service. The main defect was that he could not get on well with his younger colleagues. Now we are on the lookout for appointing a Director.

This was the Director brought in to implement the changes.<sup>9</sup>

Blackett had just been in China and discussed with Zaheer his opinion that the Chinese were far advanced in electronic instruments. (This was not the first time this warning had been sounded by a British physicist: newspapers throughout India carried

the statement of Blackett's friend J.D. Bernal in December 1954 that 'China has made more rapid progress in science than India'. Speaking in Madras, Bernal said this in the context of his support for the 'Five Nehru–Chou Principles' and his condemnation of the arms race. Nehru, who had, like Bernal, just returned from China, was keen to meet Bernal in Delhi to hear his views.) The 1962 military conflict with China caused a rapid and agonized reappraisal of India's development and military requirements. Homi Bhabha was appointed Chairman of an Electronics Committee in 1963, charged to plan the mobilization of Indian resources for increased research, development and production in electronics. Zaheer accepted Blackett's warning about the Chinese and electronics, and quickly outlined the steps two CSIR laboratories were taking—one in electronic engineering in Palani and the other in scientific instruments at Chandigarh—but did not admit (in his 1964 letter) that the underdevelopment of these functions was retarding India. The real issue was not simply electronic instruments for researchers, or electronic engineering for production and military systems, but also consumer electronics, as well as the supply and delivery of electricity itself. Blackett's friend Homi Bhabha had just negotiated contracts with Canada and the USA for nuclear reactors that were intended to solve this problem once and for all, but Blackett knew it would be many years until they delivered power to the grid.

Blackett was, at this stage, newly appointed Adviser to the Minister of Science in the new Labour Government. His relationship with the CSIR certainly continued, although soon Blackett became President of the Royal Society and was even busier. But he didn't lose interest. For example, he received a copy of the confidential report written by C.G. Wynne of Imperial College for the Director General of the CSIR about optical designing.<sup>10</sup> At the same time, Wynne also wrote Blackett a long personal account of his visits to National Aeronautics Ltd, the Glass and Ceramics Institute and commercial firms, lamenting the amount of money wasted in assistance to India and the frustration of talent in research centres like the Glass and Ceramics Institute in Calcutta. He said everyone in India recognized the strategic necessity of developing a high-precision optical glass industry and everyone thought India was proceeding too slowly towards that goal, but everyone blamed someone else. This conformed with the views of a wide range of Indian and foreign opinion on many matters of strategic necessity, and this negative opinion reached the Scientific Advisory Committee to the Cabinet in about 1966–67, thus initiating a review of success and failure in the scientific and industrial community.

In a way the Wynne report about optics gave Blackett his subject for the Nehru Memorial Lecture a year later. Attended by the Prime Minister, Indira Gandhi, and reviewed in all newspapers, his lecture called for new thinking about 'the innovation chain' from research to production, albeit in a somewhat linear way of thinking about innovation. He wanted industry in India involved in the process of innovation from its inception. He criticized the 'sanctity' of basic research. The Nehru Lecture was gleefully received in some government and industry quarters, because it shook things up a bit. Further research should be done on the public debate about Blackett's lecture. Some researchers, whose lives depended on the 'sanctity' of basic research, felt he had

attacked them, and some researchers felt betrayed because Blackett's lecture seemed to undermine them, even in the laboratories founded by Homi Bhabha and so often visited by Blackett himself. This was a widespread reaction among researchers I knew in India, both in Bombay and Calcutta. He probably never heard this view and would not understand that researchers 'in the ranks' thought the support for basic research was fragile. He was now communicating at a level very far removed from researchers 'in the ranks', and to him it appeared, even after Bhabha's death in 1966, that support for basic research was sufficiently strong. A few days after the lecture he wrote to Atma Ram, Director General of the CSIR: '...it has been quite clear in recent months that our ways of thinking are very similar ... I do realise the difficulty you will have in guiding Indian policy in a new direction'.<sup>11</sup> Blackett had not so publicly attacked what he viewed as the irrelevance of much research in India, including basic research, up to this date. This was an extraordinary

period in India because there was uncertainty around the 1967 election and the rupee had just been devalued. The brief thrill of the 1965 war with Pakistan had been forgotten, replaced by concern about a severe drought and famine in Bihar and eastern Uttar Pradesh, confrontation with the American President and the death of Prime Minister Shastri in 1966. Foreign exchange reserves had fallen to their lowest level since independence. The secretly planned and managed devaluation of the rupee in June 1966 from Rs 4.76 to Rs 7.50 to the US dollar (Rs 13.33 to Rs 21 to the UK pound) caused massive curtailment of importation of industrial and scientific supplies and equipment (among other essential items). It also brought even stronger pressures for self-reliance and import substitution. Blackett's Nehru Lecture eight months later, with its call for more realistic thinking about innovation, played on the historical sensitivity among elites that was caused by these other events.

Blackett's influence extended right into the laboratories at this time; for example, to Atma Ram, he criticized 'the otherwise excellent man Varma, talking lightly about starting to design an electron microscope at NPL. It seems that all you and I have been saying has not been taken in at all'.<sup>12</sup> His influence also reached Delhi University, where Blackett had been involved in planning a transfer of a small (obsolete?) accelerator from the Cavendish Laboratories at Cambridge to Delhi; at first Blackett thought it



Figure 3. Patrick Blackett observing lava flows (or birds) near Khandala, in 1962. Reproduced with permission of the Tata Institute of Fundamental Research, Mumbai. The author appreciates the kind assistance of E.R. Deutsch.

would be a good machine for training purposes, but he examined the project carefully when he visited India only to realize:

that the machine was asked for not by physicists at all but by engineers who wanted some way of playing around with high voltages. I do not think they should be allowed to do this, as the techniques have almost no relevance in any other branch of engineering. The fact that they should want to do this shows, I think, the underlying drive towards prestige subjects, which is quite a danger in India as well as here.<sup>13</sup>

Was this remark about disdain for engineers? About preference for training versus ‘playing around’? About conquering the impulse for prestige? Although it is difficult to say, I think it is about Blackett trying to help Atma Ram fight entrepreneurial ‘chaos’ and bring order and control in ‘his’ laboratories, as much as it is about avoiding unnecessary importation. Ram was entering a period of confrontation (including threats of resignation) with a number of his directors of laboratories.

Right through this busy period Blackett kept up with correspondence and visits, until his final visit in 1971 at age 73. The last visit was a nine-week tour through the heat of India in March–May 1971. While there, in March, he observed the re-election of his old friend Indira Gandhi as Prime Minister. Prior to Blackett’s journey, Atma Ram’s intention to resign as Director General of the CSIR had been signalled to Blackett, and the opportunity arose to appoint someone younger. With a reduction of his military contacts, Blackett toured all his familiar scientific sites such as TIFR and the NPL, plus new ones like the Space Research Centre and Bharat Heavy Electronics, and a dozen CSIR institutes. He met the most powerful person in Indian science, Vikram Sarabhai; also M.G.K. Menon, Y. Nayudamma (who soon succeeded Atma Ram at the CSIR) and Pitambar Pant of the Planning Commission. He toured the Trombay Atomic Research Centre (renamed after Bhabha) with the astronomer S. Chandrasekhar from the University of Chicago, someone he had known since the early 1930s. Although the CSIR paid the expenses of Blackett and his wife Costanza on this last journey, he was also invited to advise the Indian Statistical Institute (by P.C. Mahalanobis) and the University Grants Commission (by D.S. Kothari). His conversations with Indira Gandhi would have shown Blackett that though she retained her father’s respect for science and scientists, she had also learned a lot from the debate that gradually linked ‘science’ more strongly to ‘technology’. Indira Gandhi was determined to see more practical results from the state’s massive investment in science-based industries. This was the request she evidently made to Blackett to help her, as is shown below. Whereas her father had aligned science with ‘education’ and ‘culture’, Indira Gandhi aligned ‘science’ with ‘technology’. She was also prepared to redesign institutions to achieve this, and, like her father, took a direct interest in key appointments. For example, during 1971, she agreed that the administration of the Atomic Energy and Space programmes should be divided and that Sarabhai should stick to space.

Various laboratory directors wrote to him in 1971, while in India and afterwards, to ask him to persuade Atma Ram to promote their objectives, improve liaison with CSIR headquarters in Delhi, and provide more freedom for their scientists to innovate. Basically they were lobbying, about which Blackett wrote to Atma Ram later. Without



being opposed to their pleas, he said the central problem facing CSIR laboratories is that they have:

shown a tendency toward rather basic research without always having any very definite practical goal. Some of the work seems to me to be more suitable for university departments than for government research stations, which were undoubtedly set up with the general goal of producing practical results of use to industry and agriculture. This tendency towards purity is by no means only to be found in India [he then mentioned the tendency in the UK]. I think there are two main reasons for this drift to purity. One is that it is often much easier to do good basic research than good applied research of interest to industry. The second reason is the widespread misapplication (in my view) of the principle of the importance of the 'freedom of science'... In the field of basic curiosity-driven research, it is fully established that able research workers should be given the greatest possible freedom to plan and execute their own research... What has gone wrong, I think, in some government research stations is that the principle of scientific freedom has sometimes been applied to mission-oriented R and D, where it is largely inapplicable, instead of only to curiosity R and D where it does apply.<sup>14</sup>

In particular, he said that some laboratories:

do not always seem to understand the importance of directing work towards a market requirement and close collaboration with industry, and so are surprised when their work is wasted. Then there are some individuals in certain stations who don't seem to be trying very hard to do anything useful but think it is more important to advance basic research.

His recommendations again pointed to strengthening the powers of the Governing Body of the CSIR over the strategic direction of its laboratories (leaving the tactics 'firmly in the hands of the directors'). He said India should study how Harwell Atomic Research Centre and industry cooperated, and how government funds were available to industry scientists (not just to government scientists) to fund this cooperation. He praised the Central Leather Research Institute (directed by Nayudamma) for appointing four economists to its staff, thus providing it with an understanding of its markets and clients superior to other CSIR laboratories. He did not exempt industry from criticism, saying 'the backwardness of much of Indian industry itself' was partly to blame. But Blackett pointed to a CSIR study of 10 years' experience with £10 million expenditure on 23 industrial pilot plants, which concluded that the plants 'brought in little financial return'.

This last tour occurred in the middle of a Review Commission of the CSIR conducted by retired Justice Sarkar, to which Blackett himself made a presentation, and Blackett asked the High Commissioner in London in September 1971 for an early copy of the Sarkar Commission's report. This is further evidence that at age 73 he was passionately interested in India and enjoyed his influence in its scientific community. He felt the scientific community had reached a certain maturity and should be able to tackle the practical problems that confronted India, namely poverty and population. Blackett discussed this with Prime Minister Gandhi, whom he had now known for 24 years (since she was 30 years old). Before leaving India in 1971, he thus wrote personally to Atma Ram to propose a new advisory group for the Prime Minister, to advise her:

about the areas in which efforts should be most concentrated—in a way, a ‘task laying down body’. In order that R & D would have a relation to economic growth, this body should have an economist on it, and to ensure implementation of the assignments should include a high official.... This work should not be hampered on the plea of freedom for scientists. It must be appreciated that scientists are not free to do whatever they wish, certainly not in the field of applied science.... In order that this evaluation of present activities and assignment of future tasks is done unhampered and expeditiously, no lobbying should be allowed and the issues should not be bogged down in those superficial discussions and to and fro arguments which can always be produced. The stakes are high, time is short, and there is no room for irrelevant arguments. Now when conditions have been created in the country, thanks to the thinking generated recently, this is the opportunity to give concrete shape to the R & D related to economic growth. Even in allocation of resources, at the most 10–20% may be earmarked for basic research, the rest should be devoted to applied work bearing on economic growth.<sup>15</sup>

This was the old voice of Blackett from the late 1930s (‘the stakes are high, the time is short’) drawing on his wartime experience advising the Cabinet—in which, nevertheless, there were often ‘to and fro arguments’, few of which were really ‘irrelevant’ even when he disagreed with them. Blackett’s role in the strategic bombing controversy of the Second World War is a perfect example.

Blackett was not alone in his criticism of the scientific community. Writing from New York, Mahalanobis warned Blackett that he did not like what was going on in India: ‘Indian science is in a state of confusion... The immediate future does not look too bright... because we still remain a structured hierarchical system.’<sup>16</sup> By now Blackett would have been at ease with hierarchies, having been so long at their top. His naval experience gave him a permanent ‘captain of the ship’ outlook in each of his institutional positions. Blackett, however, remained an optimist about India, ready to try new things. As an example, while President of the Royal Society, he promoted a new School of Genetics on the campus of the Indian Statistical Institute in Calcutta during 1969–70, before Mahalanobis died. This was the very Institute where Blackett’s friend J.B.S. Haldane had first gone to work when he left Britain to live in India in 1956.

#### BLACKETT AND VIKRAM SARABHAI

Quite far from the politics of the CSIR, Blackett had formed a friendship with Vikram Sarabhai, the Cambridge-trained physicist who was appointed Bhabha’s successor as Secretary to the Department of Atomic Energy in 1966. Sarabhai studied at Cambridge as a teenager and then returned after the war to complete his doctorate in 1947. Because the war had changed the composition of the Physics Department at Cambridge so greatly, there was no one present to examine Sarabhai’s thesis in cosmic ray physics. So Blackett was asked to be the examiner and Sarabhai (aged 28) was sent to Manchester for the examination. Evidently they got on well, because Sarabhai became known in the Blackett household as ‘my father’s student’. They met in India in 1948, and 10 years later Blackett went to Ahmedabad to dine at the Sarabhai house and see the Physical Research Laboratory that Sarabhai was building. Perhaps Blackett recognized that Vikram Sarabhai, who was then 39, would be an important force in

science in India. He may have heard that Sarabhai had been discussed for a possible role in the CSIR after Bhatnagar's sudden death in 1955. After dinner, Sarabhai wrote to Blackett to discuss their mutual interest in the explanation of the latitude effect anomalies in the divergence of the actual terrestrial magnetic fields from an ideal single dipole field. Sarabhai was beginning to direct his gaze to India's role in space. A further dinner in London was proposed to talk about State support for scientific research, because Sarabhai was building an industry-funded textile research laboratory at the time and his own physics laboratory.<sup>17</sup> Blackett grew to like Sarabhai and saw him when he was in India or in London. He wrote a moving obituary for Sarabhai at the international cosmic ray conference in Jaipur. Unfortunately, there are no other letters between the two men in the Royal Society archives.

#### PATRICK BLACKETT AND HOMI BHABHA

Along with their love for physics, Blackett and Bhabha shared a love for mountains. When these pleasures were combined, the joy was great. They both visited the cosmic ray laboratory up in the Alps. Blackett wrote to Bhabha in 1951:

we have nearly 60 photographs of V tracks from the Pic du Midi and it looks as if there are at least three separate neutral masses, two being greater than protonic mass! Herr Gott certainly has made the world very complicated.<sup>18</sup>

Long forgotten was the disagreement over the mass of the penetrating component of cosmic rays at sea level. Little did Blackett know that this is where Bhabha's plane would crash 15 years later. In February 1955, Dag Hammerskjold announced that Bhabha would be the president of the first UN conference on the peaceful uses of atomic energy in Geneva that year. W. Bennett-Lewis of Atomic Energy Canada Ltd was on the planning committee for the conference, and the discussion of Indo-Canadian cooperation blossomed between them there. Considerable pressure had been brought from Nehru through Krishna Menon (then in New York) to ensure that someone (Bhabha?) from a 'neutral' country would be chairman. In the end British support for Bhabha was decisive. Nehru cabled Bhabha in Geneva giving him full freedom to negotiate the terms of collaboration with Canada on the Canada-India Reactor. Though more heavily involved with the Indian military at this time, Blackett helped Bhabha set up a geomagnetic laboratory in a barrack hut at the TIFR in 1955, before the new building was completed. Blackett was deeply involved in research about geomagnetic reversal. They brought E.R. Deutsch of Imperial College to the TIFR for a year to calibrate and train people with the very sensitive magnetometer that Blackett had developed. It was a favourite exhibit of the Krushchev-Bulganin visit to the TIFR in November that year, and continued functioning for many more years.

By the end of 1955 the USA and USSR had exploded both fission and fusion (thermonuclear) bombs, and the UK had exploded three fission bombs. Bhabha and Blackett had formed the opinion that these were unlikely ever to be used in war. Evidently they also agreed with the view that the original Hiroshima and Nagasaki

bombs had been unnecessary. Perhaps Bhabha had grown to accept Blackett's 1946 view that these bombs were the first act in a cold diplomatic war with Russia, to limit the USSR's expansion in Asia. (It should be remembered that even for people with their connections (e.g. both of them knew Robert Oppenheimer well), the Manhattan Project evidence before August 1945 was still secret, and thus their interpretation of that situation would have been based on an understanding that some of the facts were concealed from them.) Therefore, when an authoritative American source revealed something it was considered valuable. Bhabha wrote to Blackett quoting with approval the views of Admiral William Leahy, the Chief of Staff who served under both President Roosevelt and President Truman, that the atomic bomb was not tactically necessary. Although this is now clearer than it was then, we should not miss the point—meaning that Bhabha was well-informed and did not believe some of the mythology surrounding the use of the bomb in the ending of the war.<sup>19</sup> Moreover, at the time, Bhabha was participating in a year-long review of declassified evidence on the use and effects of nuclear explosions, published by the Government of India with a Foreword by Nehru.<sup>20</sup>

Because Bhabha confided in him, Blackett kept abreast of current strategic thinking in Delhi and in atomic energy/nuclear weapons circles elsewhere. I think this larger view was made possible, despite their differences, by a common background in physics and a sense of belonging to an international community of scientists. Blackett's passionate interest in the role of science and technology in developing countries matched Bhabha's. Blackett's role in strategy matched Nehru's and Bhabha's because he probably knew things they did not, even in the late 1950s and early 1960s when he is said to have been out of the British policy loop. According to Nye, Blackett realized in the early 1950s that he underestimated the lethal effects of radioactive fallout and the rapid development of missiles able to deliver small hydrogen bombs. 'However, Blackett continued to argue during the 1950s and 1960s that conventional and nuclear disarmament should be negotiated in parallel.'<sup>21</sup> I do not know what Blackett would have thought if he knew that his friend Homi Bhabha was the person who, had he lived, would have been in charge of the decision to test nuclear weapons in 1974, in consultation with the Prime Minister. It is interesting to note that Blackett tried to bring Bhabha into the Pugwash Conference in 1961. Bhabha replied that it would take him too long to study the issues for that particular meeting and instead recommended Vikram Sarabhai. By this time, Bhabha was, I think, more caught in an official net than he realized and felt constrained to speak even among scientists about nuclear policy. India was taking a strong stand for disarmament in the Test-Ban Treaty negotiations in 1961, and when Bhabha spoke, even informally, it reflected national policy. Nevertheless, Bhabha arranged and attended a lecture by Blackett in Delhi in early 1962 on 'Military policy and disarmament', and he and Blackett did both attend the Pugwash meetings in 1963.

One year later, after Nehru's death, the first Chinese atomic bomb was exploded in October 1964. Bhabha complained that there was no protection for countries capable of making atomic bombs but which had refrained from doing so. He said that a climate favourable to such countries must be created immediately. Bhabha probably got the new Prime Minister's agreement to a project that prepared India for an

underground nuclear explosion, in late 1964. A few months later Bhabha announced that India could make a nuclear bomb in 18 months, saying “We are still 18 months away from exploding either a bomb or a device for peaceful purposes, and we are doing nothing to reduce that period.” Eighteen months was the figure Dr Bhabha cited a year ago and he said the situation had not changed since then.<sup>22</sup>

What Blackett might not have understood or accepted at the time was that nuclear weapons were becoming seen in India as a great symbol of national prestige, a symbol around which political parties and non-political groups would gradually join together people of otherwise differing views. Of course there were other motivations, but this one was crucial. It is not clear what position Blackett took with respect to Bhabha’s preparations for nuclear tests in 1964–65, but it is highly unlikely that they failed to discuss them. The question of national prestige had confronted Blackett before, in Britain’s nuclear weapons programme, and he had argued against prestige there too.

It was finally at Bhabha’s unfortunate death in an air crash in the Swiss Alps in 1966—at which there was little opportunity for Blackett to mourn—that friends of Bhabha were drawn closer together. Blackett spoke on the radio most feelingly about Bhabha; this may have been re-broadcast in India, and was certainly widely quoted in Indian papers, because Bhabha was considered a national hero. Letters were sent to Blackett, thanking him for his speech, and recognizing that Blackett himself had lost a special friend; letters came from men and women who liked Bhabha greatly, like the new Prime Minister Indira Gandhi. Blackett was identified in these letters as a true friend of India, on an emotional level. Blackett knew he had been tough on India and had openly shown his frustration with its conditions. At the same time, he had created a circle of affection through his friendships there, and had found talented and effective people who were doing the kind of things he believed in. His wife, Lady Costanza Blackett, said that in the later years of his life he cared more passionately about his work in India than he did about most other things.<sup>23</sup>

#### BLACKETT’S LEGACY

It is for historians and scientists of India to try to judge what Blackett achieved in India and what consequences his work had. We know little of how Blackett was appraised outside the charmed circle in which he normally moved, and we know that historical research is necessary to understand how this new type of defence consultant was viewed by others. If Britain made use of Blackett as a source of intelligence in this period, we do not yet know how. The evidence here shows that whatever Blackett achieved, he did so only through cooperation with a number of powerful people and through the prestige he brought from British science and politics. His worldly reputation as a consultant, a term he himself used, says a great deal about the continuity and interconnection of the Indian and British scientific, military and political elites at the time. It also says much about Indian awareness of British politics and the continuing Indian participation in British institutions such as the Royal Society and universities such as Cambridge.

This story suggests that there is sometimes an interesting, creative and useful role for outsiders as intermediaries. If, in another 50 years, we look back on Blackett's role in this formative period, I think we would find that his objectives to be enduring. That is, to improve the working conditions of people doing research, to distinguish carefully between the objectives of institutions, to cut away the bureaucratic brambles that grow up around the practice of research, to think carefully about the things that can be developed locally instead of being imported and to balance the State's insatiable desire for technical prestige with enhancing ordinary peoples' abilities to provide a better life for themselves.

Not long after Bhabha's death, when Blackett received his Order of Merit in 1967, he received a letter from senior civil servant, A.J. Kidwai. His words capture the perspective in which Patrick Blackett was viewed by a certain generation as part of the lineage of people considered as friends of India. It also captures the spirit in which he seems to have gone about his work. 'To no other people outside this country', says Kidwai, 'have you given the same sense of belonging. And no one after Harold Laski has had the same impact on Indian minds as you.'<sup>24</sup>

#### VISITS BY PATRICK BLACKETT TO INDIA

According to his note in the Blackett Papers, Royal Society, Patrick Blackett visited India in 1947, 1948, 1950, 1953, 1954, 1955, 1963, 1964, 1965, 1966, 1967 and 1971.

#### *Institutions visited (usually many times)*

Universities (Delhi, Bombay, Calcutta, Madras, etc.); Tata Institute of Fundamental Research, Bombay; Saha Institute of Nuclear Physics, Calcutta; Indian Institute of Science, Bangalore; Indian Statistical Institute, Calcutta; Physical Research Laboratory, Ahmedabad; all Laboratories of the Council of Scientific and Industrial Research, e.g. Glass and Ceramics, Metallurgy, Roads, National Physical Laboratory, National Chemical Laboratory, National Aeronautical Laboratory, National Metallurgical Laboratory; all Defence Laboratories and all Defence Production sites.

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cooperation. Two conferences on Blackett in 1998, one by the Royal Society at Imperial College, London, and the other by the Royal Navy at Magdalene College, Cambridge, have benefited me enormously, and I gratefully acknowledge the insights and information that I received there, including from Nicholas Blackett and Giovanna Bloor. For further information see the collection of essays about Blackett, *Patrick Blackett: Lord, professor, lieutenant*, which will be edited by Peter Hore and published in 2000 by the Royal Naval Museum. This research was completed while I was Visiting Fellow at Corpus Christi College, Cambridge. This essay is necessarily work-in-progress: there may be other unseen documents and letters that (if known) may change or contradict the picture drawn here. I alone am responsible for the interpretation I have made.

## NOTES

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