

# Abdus Salam: A Migrant Scientist in Post-imperial Times

*Pakistan's Abdus Salam was the first professor of theoretical physics at Imperial College, London, and the director of the International Centre for Theoretical Physics at Trieste for almost 30 years. This paper looks at the conditions that allowed Salam to emigrate and develop a successful career in Europe as both a scientist and a scientific diplomat. The combination of colonial networks and academic policies in British India, on the one hand, and the post-colonial intellectual milieu in certain British scientific circles after 1948, on the other, provided Salam with an opportunity that would have been virtually unthinkable for the previous generation of Indian scientists. As a Pakistani theoretical physicist in Britain, Salam became one of the most authoritative and influential advocates of science for third world development. Yet, in post-colonial Britain, being from a former colony also put certain limits on Salam's aspirations. Salam's diplomatic and political career as a United Nations officer resulted from his conviction that supranational institutions represented the only chance to overcome the kind of discrimination that marginalised third world scientists in the post-imperial era.*

**ALEXIS DE GREIFF A**

The Imperial College of Science and Technology is revealed as a late Victorian enterprise. Imperialism is now a term of abuse, but during the brief existence of the British Empire the benefits of civilisation, such as they are, were extended to vast areas of the world by British enterprise, largely dependent on British technology and British science. I say British science meaning in fact British scientists.

– An address given by Lord Adrian, Commemoration Day, October 25, 1955<sup>1</sup>

**A**bdus Salam is well known as the founder-director of the International Centre for Theoretical Physics (ICTP), professor of theoretical physics at Imperial College, the first Muslim to win the Nobel Prize and one of the creators of the theory of unification of weak and electromagnetic interactions. However, little is known about his life and how he attained those remarkable achievements. In particular, his early years in Pakistan and education therein, and in Cambridge later, have never been discussed in detail. Further information is available only in scattered sources. None of the authors who have written about Salam have reflected about the fact that he was, above all, an intellectual emigrant. In this paper I wish to explore Salam's life from the perspective of the history of 20th century scientific migration into Britain. It is my contention that his background and experiences in Pakistan are important so as to understand the scientific and political network where Salam operated as a scientific diplomat.

It is commonly believed that Salam's decision to create the ICTP was a natural result of scientific internationalism and that his connections at Imperial College, where he was a professor of theoretical physics, were crucial to create the centre. Some scientists who participated in the creation of the centre insist that the idea of creating a centre under the banner of the UN had been expressed long before by eminences such as Bohr and Einstein. Therefore, the centre is presented as the culmination

of this dream. I have discussed in detail the creation of the ICTP elsewhere.<sup>2</sup> In this paper I rather focus on possible motivations that led Salam to create that institution. I argue that Salam's attraction towards the UN is a product of the obstacles emigrants find in developing a political career in Britain and, thus, is a manifestation of what I will call the limits of transnationality.

In this paper I analyse the reasons that led Salam to seek the UN as the institutional umbrella to pursue his political career. I shall compare Salam's case to that of another two emigrants: S Chandrasekhar and W Arthur Lewis. I argue that these characters may well mark three moments in the history of intellectual immigration into Britain. In the final section, I present the ICTP as an institution created to prevent further scientific emigration from the third world. It was also a perfect institution for Salam to build his own network and concomitantly develop a political career that would eventually lead to the Nobel Prize. I present some conclusions at the end.

## Appointment to Imperial College

The 1950s were years that saw a major expansion of Imperial College, London. In 1953, Nobel Laureate Patrick M Blackett was appointed professor of physics. Around the same time, the government body of Imperial College decided to double the size by 1962.<sup>3</sup> In 1954, the court of the University of London approved the disposition of special funds to build new buildings and create many "key posts". In 1955, the college approved the construction of the new buildings for the physics department.<sup>4</sup> In the same year, Imperial College was the largest postgraduate school in the UK, producing one man in 13 of those trained in any subject in the country, and one in nine in technological subjects.

As part of the planned expansion, there was an increasing interest in reinforcing the basic sciences in the college. Certainly,

an interest in the applied sciences (soil mechanics, statistics, instrument technology, physical metallurgy and so forth) continued to dominate, but it was stressed that the complexity of technology required high quality teachers in basic sciences or, in the words of Sir John Cockcroft, head of the Atomic Energy Authority, that: "in some cases this is a natural development from basic scientific work – the atomic pile from fission, the transistor from solid state..."<sup>5</sup> Hence, in 1957 two young, enthusiastic, brilliant and internationally recognised scientists were appointed as professors at the mathematics department in order to boost research in theoretical physics and pure mathematics. W K Hayman became professor of pure mathematics, and Abdus Salam was appointed professor of applied mathematics. Nevertheless, Hayman's appointment greatly stimulated work in mathematical analysis and projected the college's reputation in the field at an international level. The same is true for Salam.

The key figure in Salam's appointment was Patrick Blackett. In 1956, Hans Bethe was visiting Cambridge. He and Blackett had been close friends for many years. Bethe was regarded as someone who knew all the important theoreticians on both sides of the Atlantic, young and old, and had good relations also with the experimentalists. Blackett was looking for someone capable of starting a research school with an international profile. Blackett sought Bethe's advice and he recommended Salam. Thus, Salam's chair in England was offered at the suggestion of one of the most influential physicists in the US.<sup>6</sup> We know that Blackett had developed a close friendship with the Indian physicist Homi Bhabha, so, in one sense, it should not surprise us that he showed no hesitation in appointing a physicist from the subcontinent. Furthermore, Blackett might have thought that Salam's appointment was a stimulus to ease tensions between India and Pakistan through scientific internationalism stimulated from England.

Salam's appointment at Imperial College was a result of special circumstances and the specific historical moment. First, there were some people working at Imperial College in theoretical physics and pure mathematics, but the college was predominantly an engineering school. The dominant areas in mathematics were solid state physics and statistics. There were some works on scattering theory and general relativity, all of them in the mathematics department, but there was nothing like a stable group working in the field.<sup>7</sup> Therefore, Salam's mission was to build such a group. As he was not perceived as a professional threat, he had to compete with nobody at Imperial. Therefore, instead of the kind of local hostility he might have found in institutions with longer traditions in his field, he was supported.

Second, the attitude towards emigration in Britain changed after the second world war. In contrast to the pre-war period, racial discrimination, although deeply rooted in British society, was widely condemned by the British elite. Although the population was not prepared to assimilate and accept easily immigration from the colonies, the Jewish holocaust in Germany and the general consensus that decolonisation should be a peaceful and non-traumatic process, produced a model of tolerance.<sup>8</sup> The problem of immigration was tackled by British political parties without much reflection, but they did it from universalistic assumptions. The 1950s were years of reconstruction and optimism, which marked a new climate for immigrants too. The Royal Commission on Population appointed in 1944 to assess the British government on population needs, in a report published

in 1949, considered population as a way combat to the demographic and economic decline in Britain due to emigration and aging.<sup>9</sup> Indeed, labour shortage and large unemployment stimulated the flow of immigrants in the following decade, especially from the West Indies. The Pakistani and Indian immigration was low by 1955 (5,800 and 1,850 respectively, compared to 27,500 from the West Indies), but rapidly grew; in 1961 the net immigration was estimated 25,100 from Pakistan, 23,750 from India and 66,300 from the West Indies.<sup>10</sup> This increment produced some hesitation in the government, which in the 1960s took measures to restrict access to immigrants. Of course Salam was not part of this mass of labour manpower and cannot be identified in this group. However, this new climate permeated all social relations of non-white immigrants and was a sharply contrast to the conditions experienced by students and intellectual immigrants in the 1920s and 1930s. A case in point is, of course, the astrophysicist Subramanyan Chandrasekhar that I shall discuss below.

The third circumstance was the resolute backing provided by British scientists and intellectuals. Ethnographers know that foreigners need native informants and allies, so as to be introduced to the community and to learn the cultural codes necessary to bridge cultural distances. In the case of immigrants these natives are even more crucial for, besides learning the new codes and meeting the right people, immigrants are there to stay, and therefore need to build channels to gain local political power to defend their interests. Intellectuals, whose work is by definition political,<sup>11</sup> need local allies among that same group. There are several examples that come to the mind, but W Arthur Lewis, is a case in point. Lewis was from West Indies and one generation had studied in London. He began his career in London School of Economics and later moved to Princeton.<sup>12</sup> In an autobiographical note, he recalled that:

The leading practitioner of this art at LSE was Professor Sir Arnold Plant, and though he was a *laissez-faire* liberal and I a social democrat, I am indebted to him both for his incisive no-nonsense criticism and also for *supporting me at crucial moments in the Appointments Committee*.<sup>13</sup>

The tolerance model after the war, in the case of some left-wing and liberal intellectuals, turned into proactive positive discrimination. In their view, opening opportunities to intellectuals from the former colonies would contribute to the development process of the new nations and, concomitantly, to build channels of collaboration with the European metropolis. Intellectual immigrants were seen as a resort for international collaboration. Transnational communities are culturally amphibious and, hence, are agents for the consolidation of the Commonwealth.<sup>14</sup> Salam's ally was indeed an influential scientist and intellectual. Patrick Blackett, 1948 Nobel Prize winner for physics, in turn, had received Salam's name by another distinguished émigré: Hans Bethe. Blackett, was a Fabian socialist and an active anti-imperialist whose connections with the Indian political elite brought him to become a special adviser to the Indian government after independence.<sup>15</sup> Before Salam, Blackett befriended another young and promising scientist from the Asian subcontinent: Homi Bhabha. The relationship between Blackett and Salam was never as close as with Bhabha. However, Blackett was convinced that Salam was the best candidate to build an international, dynamic and young group in theoretical physics. Salam respected Blackett and worked hard to fulfil his expectations. Imperial College, in

fact, became one of the main “centres of calculation” in particle physics in the world.

### Emigration, Internationalism and Limits of Transnationality

I have referred to the cases of Chandrasekhar and Lewis. I believe it is worth exploring their experiences a little bit further. I shall suggest that a comparison between them and Salam might help us to identify three phases in the history of intellectual immigration in the 20th century. Further, I suggest that, although Salam’s situation had improved compared to his predecessors, there were insurmountable limits to transnationality.

*Chandrasekhar, Lewis and Salam – three phases of immigration into Britain:* Chandrasekhar came from India in 1930 to do graduate studies in Cambridge. After being awarded his PhD in 1933, he became fellow at Trinity College, where he met the great astronomer Arthur Eddington. Their relation was severely strained due to the debate about the theory of stellar evolution. Chandrasekhar’s suggestion that after finishing all their fuels stars collapse, for which eventually he received the Nobel Prize in 1983, was ridiculed by Eddington.<sup>16</sup> The effect of the public exchange was devastating for Chandrasekhar, although the Indian physicist preferred to overlook how much he had been damaged by Eddington. Indeed, although he would have preferred to remain in Cambridge, a result of that fight with the English astronomer, he decided to migrate definitively to the Chicago. Astrophysicist Dennis Sciama recalled in an interview to the author a rare occasion in which Chandrasekhar narrated his bitter sweet memories of Cambridge:

Chandrasekhar had a famous fight with Eddington which marked him for the rest of his life...Of course, Chandra was right, but Eddington was the great god in astronomy in England. And don’t forget that in those days India was the colony of England... And so I think Chandra suffered not just because he was young and unknown compared to Eddington, but I think being an Indian must have had a lot to do with it... The great American astronomer, Henry Norris Russell, on one occasion wouldn’t even let Chandra speak at a big meeting of astronomers, because how could he get up and contradict Eddington.

But, was it really because Chandra was perceived by Eddington and the western scientists as “different”? “Not just different but inferior. Come on, there’s no point in it”, replied Sciama vehemently to my question.<sup>17</sup> This kind of racism, that although was evident to all social actors and institutions was never really explicit, characterised the first phase of 20th century intellectual immigration.

Overt racism was considered politically unacceptable and against the scientific internationalism western scientists wished to promote. In the cold war logic, the “free world” should stimulate mutual respect especially between their elites. The kind of discrimination that third world scientists suffered in the post-colonial era is far subtler, just as the new forms of resistance are.<sup>18</sup> Indeed, Salam never faced such discriminatory treatment, also because his early scientific contributions did not contradict any established theory. For the contrary, his works were seen as important steps towards the consolidation of a research programme in particle physics. As Sciama explained:

Abdus’ position was rather different... Abdus was doing important work in trying to improve the final stage of renormalisation theory and it was immediately accepted as an important contribution. So, while on at a social level there may have been forces acting which

I don’t know about but I would guess they may well have been, on the scientific level he was doing important work in this modern subject which was then reasonably advanced.<sup>19</sup>

Indeed, there were social limitations to Salam’s aspirations and in private circles, racism certainly subsisted. Nevertheless, in the 1950s and after, the scientific community tacitly agreed in acting on the basis of a *universal ethos*, to use the Mertonian phrase, coined precisely in those years. Scientific universality was, like “free world”, part of the discourse to characterise the open character of capitalism in general and, in the case of Britain, of the post-colonial system, i.e., the Commonwealth. Salam’s immigration perfectly fits this new phase of intellectual immigration.

Between Chandrasekhar’s and Salam’s worlds there was a transition period in which intellectuals who had emigrated in the 1930s, stayed in Britain during and after decolonisation. W Arthur Lewis, who came to England in 1932 and stayed there until the late 1950s, represents this case. In 1939 he became assistant lecturer and, in 1948, he was made a full professor at the University of Manchester. In 1963 he moved to the US where he was appointed full professor in Princeton University. Despite Lewis’ success in the academic world, he was conscious of the constraints an immigrant had to face, especially if he was “coloured”, as the official documents referred to people from the colonies. This transition period is well described by Lewis himself in the following passage:

Looking backward over my life, it has been a queer mixture. I have lived through a period of transition and therefore know what it is like at both ends, even though the transition is not yet completed. I have been subjected to all the usual disabilities – refusal of accommodations, denial of jobs for which I had been recommended, generalised discourtesy, and the rest of it. All the same, some doors that were supposed to be closed, opened as I approached them. I have got used to being the first black to do this or that, which gets to be more difficult as the transition opens up new opportunities. Having to be a role model is a bit of a strain, but I try to remember that others are coming after me, and that whether the door will be shut in their faces as they approach will depend to some small extent on how I conduct myself.<sup>20</sup>

Indeed, Lewis represents the bridge between the imperial and the post-imperial attitudes towards intellectual immigration. Salam found himself in a less hostile environment than his illustrious predecessor. Yet, it was far from easy for a Pakistani to build his own career abroad in a country that proudly saw her imperial past like those expressed by Lord Adrian in 1955 at the Imperial College’s Commemoration Day (see epigraph of this paper).

The kind of links that intellectual immigrants like Salam and Lewis developed with their own countries are another sign that times had changed. While during imperial rule their careers would have probably have developed without much contact with the colonial government, after independence they became important actors of their new states. They became perfect examples of *transnational actors*: cultural amphibians who hold positions of power and/or influence in more than one national scenario. Their academic prestige in Europe and the US, as well as their affiliation to elite institutions in industrialised countries played a crucial role.

Unsurprisingly, Salam’s appointment at Imperial College, London, boosted his political and administrative career in his home country. In 1958, the tensions between the eastern and western wings of the country led to a coup d’état orchestrated by the army commander in chief and former chief martial law

administrator, Ayub Khan – the person who had stopped the anti-Ahmadiyya riots. His regime lasted for 11 years and marked the beginning of a new era for the country.<sup>21</sup> Pakistan was thus subjected to a massive modernisation programme of the productive sector. It consciously promoted inequalities as a way to increase savings and stimulate competition. According to some historians, the land reform programme did not alter landlordism.<sup>22</sup> As was the case years later in Chile with the Chicago school of economics, Pakistan was a laboratory for 1960s Harvard modernisation theory.<sup>23</sup> Despite the profound contrast between the official line of a flourishing country emerging from their programme and actual reality, these plans encompassed the ideology of a peaceful revolution, a country finally projected toward the future, and a new generation of technocrats ready to take Pakistan out of underdevelopment. Promoting science was part of the discourse surrounding this “revolution.”

Ayub Khan tamed the intelligentsia through repression, but also through seduction. He invited the national scientific community to join the new crusade. During his time in power, the Atomic Energy Commission, the Council of Scientific and Industrial Research and the green revolution became symbols of the progress of the nation.<sup>24</sup> Salam, who identified Kahn’s “revolution” to the new scientific revolution that would produce the renaissance of Islamic countries, played a crucial role in the development of several institutions committed to the modernisation of Pakistan.<sup>25</sup>

In an unprecedented act for a Pakistani president, he opened the 1958 annual meeting of the Pakistan Association for the Advancement of Science. There he announced that his government was actively considering the creation of a “scientific service on par in respect of its dignity and prospects, with other national services”.<sup>26</sup> Prince Philip, Duke of Edinburgh, another special guest to the meeting, made a speech about scientific cooperation in the Commonwealth. After referring to Rutherford, Sir Ronald Ross and Sir Claude Inglis as examples of such cooperation, the prince mentioned Salam. “I was delighted to meet him last night”, he commented.<sup>27</sup> The implicit comparison with distinguished scientists honoured in England brought Salam to Ayub’s attention. In his mind, Salam’s scientific reputation in the west, his youth, humble origins, and determined, but charismatic personality were ideal features to make of him a symbol of the scientific spirit of modern Pakistan. Ayub saw in Salam the ideal diplomat that his regime needed in the west. In August 1959, Ayub inaugurated the Scientific Commission. At its first session, the president expressed his satisfaction in Salam’s acceptance to take part. He concluded his address by observing that “his attainments in the field of science at such a young age are source of pride and inspiration for us and I am sure his association with the commission will help to impart weight and prestige to the recommendations”.<sup>28</sup> That same year, Ayub appointed Salam as an advisor to the Education Commission. Two years later, in 1961, Salam became the chief scientific advisor to the president, a post he held for 13 consecutive years.

This new turn in Salam’s life finally reconciled his father’s desire to see Salam enrolled in the Pakistan civil service with Salam’s own ambition to pursue a scientific career. Salam became a scientific diplomat, a representative of different communities acting in different social and political settings. He was a diplomat who represented the third world before the audience of industrialised countries, at the same time, he represented the international scientific community and western progress in Pakistan. His own life seemed to embody, indeed to represent these diverse worlds.

As a scientist he carried great authority before politicians in Pakistan, and as a Muslim born in poor Pakistan, he seemed to be naturally invested with the authority to speak on behalf of the third world. His double identity as a third world citizen and as a professor at a British university made of him a cultural amphibian, “a man of two worlds”:<sup>29</sup> the world of physics and the world of the politics for development, the first and the third world.

### Limits of Transnationality

Salam’s and Lewis’ careers present interesting similarities. Both were trained in Britain; witnessed the decolonisation processes of their own countries; worked and acted as special advisors for their own governments after independence; and, besides their administrative activities in their home countries, both pursued their academic careers in the west (Britain and the US in Lewis’ case). Moreover, despite the enormous differences between them about the role of science and technology in third world development, both developed models of development which received international recognition.<sup>30</sup> In 1979, Lewis and Salam were awarded the Nobel Prize; the former for his contributions to the understanding of the economy of third world development, the latter for his contributions to the construction of a standard model of particle physics and, implicitly, for his efforts to promote science for third world development. More interestingly, in the late 1950s, both intellectuals felt attracted towards the UN system: Salam through the Atoms for Peace Conferences, and Lewis through the UN technical agencies for development. In 1957 Lewis was UN economic adviser to the prime minister of Ghana, deputy managing director of the United Nations Special Fund. As for Salam, after his appointment as secretary at the Geneva Conference in 1955 and again in 1958, Salam was elected member of the board of governors at the International Atomic Energy Agency for 1962-63. It is worth noting that he got access to this UN technical agency through his own government, which nominated him as a member of the Pakistani delegation. Between 1964 and 1975 he was member of the United Nations Advisory Committee of Science and Technology and from 1970 to 1973 he was member of the United Nations Panel and Foundation Committee for the United Nations University. This list is not exhaustive of his international political career, which included the directorship of the International Centre for Theoretical Physics starting in 1963 (until the early 1990s). Yet, it illustrates his engagement in the diplomatic and political worlds of science and development.

The interest of both these intellectuals in the UN model is hardly surprising. The privilege of transnationality has a price for intellectuals like Salam and Lewis; psychologically both were “displaced men”, individuals with a deep sense of ‘desarraigo’ (uprootedness);<sup>31</sup> politically, the fact of being a foreigners did not allow them to aspire to positions of power beyond academia. Furthermore, in emblematic institutions of British culture such as the Imperial College and LSE, it would have been extremely difficult to ascend through the administration. On the other hand, in their own countries they were always perceived as visitors and, therefore, seen with suspicion by the local intelligentsia. They might master the social and cultural codes and be perfect transcultural actors, but there were also local interests and mechanisms of political exclusion that acted against foreigners in all countries. I argue that Salam’s career as a scientific diplomat reflected the political limits imposed by transnationality.

Like his distinguished jurist and diplomat uncle, Sir Muhammed Zafrulla Khan, Salam thought out that a supranational government like the UN was to be the only alternative for the protection of the rights of minority groups, such as the Ahmadiyyas. Salam expanded the idea to argue that the UN technical agencies were the most suitable instrument to protect another group that was marginal in and crucial for third world countries – scientists. Salam attracted as many Pakistani students as he could to Imperial College, becoming the institution that trained the first generation of physicists in that country.<sup>32</sup> However, Salam believed that a massive programme was needed for training a critical mass of scientists required to develop a country like Pakistan. In the UN he realised that the Pakistanis were not the only ones interested in science and technology. A small but growing scientific and influential scientific communities in other third world countries were making similar demands on their governments and the industrialised countries. Local demand put serious constraints on access to institutions such as the Imperial College, to mention just an example. For an intellectual with one foot in Pakistan and the other in Britain, the only chance was represented by the UN. At Imperial College Salam could train only a group of physicists, while in Pakistan his links to the Ahmadiyya movement had led to his emigration and conditions were not amenable to his returning to build a scientific institution there. Moreover, he was not willing to put at risk his career; despite the constraints, London was a better option than Lahore for a theoretical physicist who aspired to the Nobel Prize. Salam believed that the only alternative to gain the power forbidden for him in Pakistan and Britain, was through a career as a scientific diplomat working at the UN. His affiliation as professor of theoretical physics at Imperial College was complementary and functional to his political goals.

Salam was convinced that international scientific collaboration should take place in a neutral space. He was aware of the difficult conditions in which south Asian scientists had to work in national western institutions. He himself experienced the rigour of the asymmetrical relations of bilateral cooperation. Salam may have experienced discrimination during his student years in Cambridge. The limits imposed by his Pakistani origins on his opportunities at Imperial College can be inferred from a letter by S James Gates, Jr, a black professor at MIT. During a visit to the ICTP, the two physicists had discussed the problem of racism in the US and England and how it affected their careers. Eventually, Gates resigned his position at MIT. Explaining his reasons for making the decision, he reveals Salam's own motives for building a (scientific and especially political) career in a supranational institution (under his command):

You asked me, 'Are you tied to MIT? Look at what might have happened if I had stayed in England! It is completely clear to me in hindsight that to have stayed there under the circumstances would have meant the end of my career.' That brief conversation was the catalyst which began the final maturation in my views of being a Black American theorist in such a system.<sup>33</sup>

International collaboration should take place in a neutral space in order to "avoid the psychological host-guest feelings inevitably associated with national centres".<sup>34</sup> Salam envisaged this space as a place where third world scientists could come *as a matter of right*. The UN represented the most suitable organisation under which an institution could operate free from unequal opportunities for non-white, non-western scientists. Salam did not make

references on gender; after all he belonged to an Islamic movement deeply rooted in certain conservative and traditional values.

### ICTP: Alternative to Third World Immigration

What was the meaning of the ICTP viewed from the point of view of emigration? What role did it play in Salam's career? How can we judge its results? Before trying to find an answer to these questions, it is worth recalling the main features of an institution like the ICTP.

In 1964, after long and difficult negotiations at the IAEA, the International Centre for Theoretical Physics was founded in Trieste. The ICTP became the most important institution for training and research for third world physicists and an emblematic centre for international collaboration. Its impact has not been measured, but the centre makes an estimate that, according to my own work, is reasonable: it has been visited by at least one physicist of every institution devoted to theoretical physics in the third world. Statistics carried out by the centre indicate that the number of visitors have risen up to 60.000 people from 150 countries since 1965. It was conceived as a space for international collaboration between scientists from the industrialised and the third world countries.<sup>35</sup>

The ICTP was created on the assumption that third world scientific backwardness was due to the national and international isolation of local scientific communities. Scientists were a marginalised group in need of international support. The negotiations at the IAEA had shown Salam and other advocates of the ICTP idea that industrialised countries had other priorities than helping third world scientific development. Third world science relied on the scientific communities and their capacity to gain political support from local political elites. The centre was thus a new institutional space to stimulate scientific research as well as to spread the word of science for third world development; Salam's books were widely translated and his theses about the role of science in development repeated by local scientists in the third world. From this point of view the ICTP became the realisation of Salam's missionary vocation. What Salam did by creating the ICTP was applying the Ahmadiyya's survival strategies to the cause of science in the third world. His interpretation of the doctrine found a perfect identification between scientific practice and religion. Following the revivalist tradition of Islam, science would lead Islam to its renaissance.<sup>36</sup> As an emigrant his role was to build bridges between industrialised and third world countries in general and Islamic nations in particular.

The ICTP has been presented as an alternative offered to scientists who are ready to emigrate to industrialised countries for the lack of stimulus and support in their own countries. He viewed the ICTP as a new Toledo, or a new Gondasipur and identified third world scientists with the story of Michel the Scot:

Seven hundred and fifty years ago, an impoverished Scotsman left his native glens to travel south to Toledo in Spain. His name was Michael, his goal to live and work at the Arab universities of Toledo and Cordova... His interests lay in the sciences of astrology and alchemy, then fashionable in Scotland. But once in Toledo, Michael formed the ambitious project of introducing Aristotle to Latin Europe, translating not from the original Greek, which he did not know, but from the Arabic translation taught in Spain [...] Toledo's school, representing as it did the finest synthesis of Arabic, Greek, Latin and Hebrew scholarship, was one of the most memorable of international essays into international collaboration.<sup>37</sup>

Once again, the autobiographical reference is apparent, and has been pointed out by his contemporaries.<sup>38</sup> In Salam's cyclic theory of history, the present situation was symmetrical, but the roles had been inverted: it was now the new Michaels from the south who had to come to the north to learn science. The important was that they should return to their countries. For that the ICTP created a mechanism called the "associate scheme" in which scientists who work in the third world visit the centre for periods from one to three months during five years. In Salam's words "the idea was that a deserving young man may spend his period of vacation in an invigorating environment...and charge his batteries with new ideas, still spending the remaining nine months of his academic year back at home working in his own university."<sup>39</sup>

This discourse matched perfectly with the concern about the brain drain in the 1960s. Concomitantly there was a practical reason for seeking alternatives to emigration. In contrast to the 1950s, strict measures against immigration started to be implemented in England in the early 1960s.<sup>40</sup> Salam realised not only the great cost emigration represented for the third world, but also that there would be severe restrictions in the future for immigrants. The argument that systematic visits to an international centre such as the ICTP was enough to prevent scientific emigration is naive. Yet, the ICTP became a symbol of the kind of international collaboration that could contribute to maintain scientists in their home countries.

Finally, what was the role of the ICTP in the development of Salam's career? As director of the ICTP, Salam became the most influential third world scientific diplomat. He epitomised the cause of science for development in the poorest countries and became the symbol of a successful third world scientist in the west. From the ICTP Salam built a transnational network of which he was the indisputable leader and the ICTP its centre. From his 1956 experience, Salam had drawn the conclusion that networks were important. He also knew that the Swedish Academy awarded not just scientists but especially symbolic figures. The 1979 Nobel Prize for physics was not an exception. The prize was to recognise his contributions to theoretical physics, but implicitly it was the third world efforts to establish a scientific (western) tradition what the Academy was awarding. Salam was happy to play his role and, although he had not lived in Pakistan in the last 25 years, he dressed a typical Pakistani dress. A few years later, another third world intellectual would break the protocol by not dressing in the traditional expected manner but a typical dress. Gabriel García Márquez was deliberately demonstrating that his country and his isolated region was given recognition by the world elite. In that hall he was Colombian and a Caribbean, just as Salam was a Pakistani, a Muslim and an Ahmadiyya. Both presented themselves as images of the third world talent that had been able to conquer spaces previously reserved to Europeans.

## Conclusions

Exploring Salam's cultural and social roots, as well as his first contacts with western institutions, is important so as to grasp some features of his political and scientific career as a scientific emigrant.

The competitive spirit engenders a particular relationship between peers and authority. Later in Salam's life, we will find valuable collaborators and detractors, but perhaps with the exception of Matthews, Salam did not have close friends; nobody

seemed to have known his deep motivations, ambitions, and strategies. There are no letters available which express his personal opinions about any aspect of his private or public life. In one sense, despite having a lot of people around him, Salam was a lonely scientist and a lonely politician. I suggest this is closely associated to his condition of a displaced man deeply engaged in a transnational political and administrative race for recognition. Salam's goal was to demonstrate that marginal communities could compete successfully with the western intellectual elite in fields if they break internal and international isolation.

During these years, Salam's contributions to meson theories first and two-component neutrino theory later brought him to be a member of the "invisible college" of theoretical physics. He became not just part of an intellectual élite, but of a political network as well. Between 1950 and 1960, Salam learned how to move around the network of scientific diplomats – men of science representing the interests of their nations, the scientific communities of their countries, and the ideology of the "republic of science." Likewise, I have stressed Salam's belonging to the Ahmadiyya community. It is important to note that it embraced not only a heavy cultural heritage, but also a special set of *social* connections clearly expressed in his relationship with Sir Chaudhri Muhammad Zafrulla Khan. Indeed, the fact of being part of a heterodox and persecuted sect carries a special kind network of loyalties and ties. Such a connection, not previously noticed in Salam's biographical accounts, would prove of great importance for his future diplomatic career. Moreover, the marginality of the movement, and the hostile environment in which it emerged, point at the crucial role of its trans-nationalism as a defence strategy. Internationalism is an ideology that supports this aim in the sense of looking at supranationality as a space created to protect local communities in trouble. This logic could as well be applied to a persecuted and fragile religious movement as to the weak scientific community in a third world country.

A somewhat marginal but important conclusion relates to the dynamics of scientific emigration in the period studied here. While the young generation of US physicists in the 1920s came to Cambridge or Göttingen for training and research in physics, after the war the flow was the other way around. It had started with the scientific émigrés during the 1930s, though, as we have seen, from the late 1940s bright young theoreticians such as Salam, Matthews, and before them Dyson,<sup>41</sup> went to places such as Princeton, Harvard and Cornell. This reveals to what degree the US arose as the centre of gravity for the scientific élite. From 1945 onwards, England was peripheral at least in theoretical particle physics. [27]

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## Notes

[The following abbreviations are used: ASP, Abdus Salam Papers, NCUAS catalogue no 99/4/1, "Abdus Salam" International Centre for Theoretical Physics Library, Trieste; TKP, Tom Kibble Papers, Tom Kibble's personal archives.]

- 1 Imperial College Archives, AR 1955-1956.
- 2 Alexis De Greiff, 'The Tale of Two Peripheries: The Creation of the International Centre for Theoretical Physics in Trieste', *Historical Studies in the Physical and Biological Sciences* 33 (2002), 33-59, Special Issue, Alexis De Greiff and David Kaiser (eds).
- 3 See the inaugural address to the 1955-56 academic year by the Rector, R P Linstead, 'The Future of the Imperial College', *Imperial College*

- Annual Report of the Governing Body of Imperial College of Science and Technology* (1955-56), AIC.
- 4 As it can be seen in the Rectors Reports from the academic years 1954-55 and 1955-56 in *Imperial College Annual Report of the Governing Body of Imperial College of Science and Technology* (1955-56), AIC.
  - 5 'Sir John Cockcroft's Commemoration Day address', *Imperial College Annual Report of the Governing Body of Imperial College of Science and Technology* (1955-56), AIC.
  - 6 See Salam and Vauthier, *Abdus Salam*, 17.
  - 7 In 1955, for instance, G. Stephenson produced some articles on unified field theories, but by 1956 there was no one publishing in that area. In 1954-55, only four out of 31 publications were in pure mathematics.
  - 8 Emmanuel Todd, *El destino de los inmigrantes. Asimilación y segregación en las democracias occidentales* (Barcelona: Tusquets Editores, 1996 [French Ed., 1994]), 109-110. .
  - 9 Zig Layton-Henry, *The Politics of Immigration. Immigration, 'Race' and 'Race' Relations in Post-war Britain*, Blackwell, Oxford, 1992, 28.
  - 10 Zig Layton-Henry, *The Politics of Immigration*, 13.
  - 11 While the scholar is a person whose life is devoted to the study of a discipline, intellectuals have an additional concern of the political problems of their time and, therefore, participate in the political sphere either as activists, administrators or opinion makers.
  - 12 Lewis was awarded with the Nobel Prize for Economics in 1979, the same year of Salam's award.
  - 13 *Nobel Lectures*, Economic Sciences 1969-1980, in <http://www.nobel.se/economics/laureates/1979/lewis-autobio.html> (in 2003), my emphasis.
  - 14 Prince Phillip eloquently expressed the idea in his address to the 1958 Pakistan Association for the Advancement of Science annual meeting when, referring explicitly to the young Abdus Salam, he said that the main thing about scientists like Salam, was that, despite his not working in Pakistan, his work continued to be "available to Commonwealth and world science wherever he work[ed] in the free world", Prince Phillip, 'Cooperation in Science in Commonwealth', *Pakistan Journal of Science*, 11 (1959) (3): 128-36.
  - 15 Robert Anderson (1999), 'Patrick Blackett in India: Military Consultant and Scientific Intervener', Notes and Records of the Royal Society, London.
  - 16 Kameshwar Wali, *Chandra: A Biography of S Chandrasekhar*, Syracuse University: University of Chicago Press, 1991.
  - 17 Dennis Sciamia, interview with author, June 1999. Transcribed and deposited at the American Institute of Physics, College Park, MD.
  - 18 On the shifts of black cultural politics in 20th century Britain, see Stuart Hall, 'New Ethnicities', *Black Film, British Cinema*, ICA Documents 7, Institute of Contemporary Art, London, 1989 in Bill Ashcroft, Gareth Griffiths, Helen Tiffin (eds), *The Post-Colonial Studies Reader*, Routledge, London and New York, 1997, 223-27.
  - 19 Dennis Sciamia, interview with author, June 1999.
  - 20 William Breit (ed), *Lives of the Laureates* (Lecture presented September 27, 1984), Mit Press, Cambridge MA. See [http://www.trinity.edu/departments/economics/nobel\\_files/Lewis.htm](http://www.trinity.edu/departments/economics/nobel_files/Lewis.htm) (in 2003).
  - 21 See O Noman, *Pakistan*; I Talbot, *Pakistan* (and references therein).
  - 22 Talbot, *Pakistan*, 165.
  - 23 G F Papanek and Mahbub-ul-Haq were the most influential adapters of Rostow's model to Pakistan conditions.
  - 24 Between 1960 and 1965, agriculture grew 3.7 per cent per year, while the implementation of green revolution programmes this figure rose to 6.3 per cent (O Noman, *Pakistan*, 40, Table 2).
  - 25 Abdus Salam, 'Technology and Pakistan's attack on Poverty', Address to the XIII Annual All Pakistan Science Conference 1961, F 2, ASP. The Japanese case was often used by Salam to support different points about the relation between theoretical physics, technology and development; see, for instance: Anon, 'Lonely Scientists' in Salam, *Ideals and Realities*, 433-40, see pp 434 and 437; Abdus Salam, 'Science and Technology in the Emerging Nations' in *Science in the Sixties*, D L Arm (ed), 32-41: U of New Mexico, Air Force Missile Development Centre, The Air Force Office of Scientific Research, 1965); and Idem, 'The Isolation of the Scientists in Developing Countries'.
  - 26 A Kahn, 'The President Opens 11th Science Conference', *Pakistan Journal of Science*, 11 (1959) (2): 75-76. For many years, influential scientists had called for their integration to the bureaucratic structure, S Siddiqui, 'Need for the Creation of a Scientific Civil Service in Pakistan', *Pakistan Journal of Science*, 3 (1951) (3): 82-92.
  - 27 Prince Phillip, 'Cooperation in Science in Commonwealth', *Pakistan Journal of Science*, 11 (1959) (3): 128-36.
  - 28 Singh, *Abdus Salam*.
  - 29 In an interview, Salam is described as follows: "Salam, physicist, FRS, Moslem born by the banks of the Chenab, passionate advocate for the third world, has the heart of a poet and the mind of a scientist. He loves beauty and looks for it in his science. He is an excellent physicist concerned with deep pattern; he is also a deeply compassionate man. These two threads intertwined through his life" (Robert Walgate, 'Man of Two Worlds', *New Scientist*, no 26, August (1976): 444-46; reproduced in Abdus Salam, *Ideals and Realities: Selected Essays of Abdus Salam*, C H Lai and A Kindwai (eds), Third ed (World Scientific Publishing Co, Singapore, 1989), 451-56). Twenty years later, Pakistani physicist and former fellow of the ICTP Pervez Hoodbhoy, recalled that: "The Salam of the days gone by was a man visibly possessed by two passions. First, an urge to understand the nature of physical reality using the tools of mathematical physics. Second, the desire to put Pakistan on the high road to prosperity through science" (Pervez Hoodbhoy, 'Abdus Salam – Past and Present', *The News International*, January 29, 1996).
  - 30 Salam, Blackett and Lewis' debate about the relation between science, technology and development has been analysed by me elsewhere (see Alexis De Greiff, PhD dissertation)
  - 31 Todorov, *El hombre desplazado*.
  - 32 In the late 1960s, the scientific elite in Pakistan was represented by the group of physicists trained at Imperial College. They founded the physics department in Islamabad. They played a crucial role in training the generation that were responsible for the achievements of the Pakistani Atomic Energy Commission in the 1970s and 1980s.
  - 33 Letter from S James Gates, Jr to Salam, January 5, 1989, B 242, ASP.
  - 34 Salam, 'Twelfth Meeting with the Panel on Science and Technology'.
  - 35 S Silvan Schweber, 'Abdus Salam' in *Oxford Companion*.
  - 36 Salam wrote extensively on this issue. See for instance, his *Ideals and Realities*.
  - 37 Abdus Salam, 'The United Nations and the International World of Physics', *Bulletin of Atomic Scientists*, February 1968, 14-15. See also Idem, 'Science and Technology in the Emerging Nations'; Idem, 'The Advancement of Science for the Developing Countries' in Arne Tiselius and Sam Nilsson, (eds), *The Place of Values in a World of Facts*, 269-80, Sydney, Stockholm, New York, London, Wiley Interscience Division and Almqvist and Wiksell, 1969; and Idem, 'Gauge Unification of Fundamental Forces'.
  - 38 "Salam saw himself in some ways as a latter-day Michael", writes his colleague Tom Kibble in his Obituary (Tom Kibble, 'Muhammad Abdus Salam, January 29-November 21, 1996', *Biographical Memoirs of Fellows of the Royal Society* 44, 1998:385-401).
  - 39 Abdus Salam, 'Address to the UNESCO Executive Board' in Z Hassan and C H Lai (eds), *Ideals and Realities*, 204.
  - 40 See Zig Layton-Henry, *The Politics of Immigration*.
  - 41 Silvan Schweber, 'The Empiricist Temper Regnant: Theoretical Physics in the United States 1920-1950', *Historical Studies in the Physical and Biological Sciences* 17, no 1 (1986): 55-98. Despite Peierls' efforts, Dyson never obtained his DSc at Birmingham. In 1951, after his visit to the Institute for Advanced Studies, he replaced Feynman at Cornell.