RENAISSANCE OF SCIENCES IN ISLAMIC COUNTRIES

Muhammad Abdus Salam

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RENAISSANCE OF SCIENCES IN ISLAMIC COUNTRIES

Muhammad Abdus Salam

edited by

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Professor Abdus Salam

Professor Salam receiving the Honorary Degree of Doctor of Science at the
Aligarh Muslim University, Aligarh, India, in January 1981

Glimpses of the Nobel Prize Award Ceremony

The Nobel Prize

Muhammad Abdus Salam (right) with I. H. Usmani at the launching of Pakistan's first rocket, Rehbar I. Salam was the Founder Chairman of the Pakistan Space and Upper Atmosphere Committee.

Professor Abdus Salam in the ICTP Conference Room

Professor Abdus Salam giving a talk in Turkey

FOREWORD

The author of this book, Professor Muhammad Abdus Salam, holds a unique position in the international scientific community. Pakistani by birth, devoutly Muslim by faith, he is immersed in modern scientific research to the point of deserving the Nobel Prize for Physics, and being counted among the members of the grand European academics, including the Accademia Nazionale dei Lincei, for the originality and importance of his research, which puts him on par with the most eminent Western scientists.

Like many of them, he has meditated on the problem of the relationship between science and faith (in his case, the ancestral faith of Islam) and has reached positive conclusions in this regard. In his long and arduous journey in the field of modern science, Abdus Salam has always cherished constant memories of the scientific splendours of his religion and traditional culture, which in the Middle Ages far surpassed those of Europe; he has dwelt upon the problem of the subsequent decadence and loss of that oriental supremacy, and has felt strongly in himself a sense of purpose and capacity to lift it up again.

With his International Centre for Theoretical Physics in Trieste, Abdus Salam has relit the torch that burned so brightly with such a clear light in Baghdad, Cairo, and Cordoba one thousand years ago, and which one thought had been extinguished forever. May such a revival now progress further.

The reader of this book, scientist or not, believer or non-believer of any faith, will follow with respect and sympathy the effort of a high spirit to preserve the faith in an illustrious past, and to work successfully towards the formation of a better future.

July 1991 Rome

Francesco Gabrieli

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INTRODUCTION

“Men like Abdus Salam do not belong to any community or country. Their place is amongst the most brilliant in the world and therefore they belong to the entire humanity. In my opinion, wherever Abdus Salam has the facilities for work he should stay there and Pakistan should help him to stay there. His personal gain or the gain to his family or to his country would be insignificant as compared to the gain to science to which he is devoted and the advancement he makes will benefit all human beings whichever country they may be living in.”

Truly prophetic! Addressed to Ch. Muhammad Hussain, Professor Abdus Salam’s father, in June 1951 by Mian Afzal Husain, Vice-Chancellor of the Punjab University, the words came true not much later. As a physicist, Salam moved “ahead of the wave, embedding half a dozen notions in omnibus papers . . .”^{*} to win the Nobel Prize in 1979, the first (and so far the only) Muslim ever to receive the Prize in sciences. The Prize signified much more than a personal triumph: as the only living developing country national with a Nobel Prize in the sciences, he symbolised the upsurge of scientific enquiry in Third World countries.

Salam won the Nobel Prize for his theory of unification. “Until two decades ago,” he explained to a group of academics and the country’s President at the Islamabad University (Pakistan) just after the award, “physicists believed that there are four fundamental forces of Nature; the gravitational, the electromagnetic and the two nuclear forces, the weak and the strong. Two decades ago, my colleagues and I suggested that there were indications that the weak nuclear force was not really different from electromagnetic and that the two could interconvert, one into the other. We were searching for a unity, in the tradition of Newton, Maxwell and Einstein and the unified theory was formulated in its final form in 1967, at Imperial College, London, and the International Centre for Theoretical Physics at Trieste with which I have the privilege of being associated, and also inde-

^{*} “Imagined Worlds” by Paul Anderson and Deborah Cadbury, BBC, 1985.

pendently at Harvard. ... The fact that we were seeking a unity among the seemingly disparate forces of nature, is part of our faith as physicists and of mine as a Muslim. Just eight days back, I was asked to reply on behalf of the physics Prize winners to the Banquet address of His Majesty the King of Sweden in the great and glittering Banqueting Hall of Stockholm. With your indulgence, I shall read out part of what I said, for it bears on this faith in the ultimate unity and symmetry of Nature. ...

The creation of physics is the shared heritage of all mankind. East and West, North and South have equally participated in it. In the Holy Book of Islam, Allah says:

مَا تَرَىٰ فِي خَلْقِ الرَّحْمَنِ مِن تَفَوتٍ فَأَرِجِ الْبَصَرَ هَلْ تَرَىٰ مِن
فُطُورٍ. ثُمَّ ارْجِعِ الْبَصَرَ كَرَّتَيْنِ يَنقَلِبْ إِلَيْكَ الْبَصَرُ خَاسِئًا وَهُوَ حَسِيرٌ.

"Thou seest not, in the creation of the All-Merciful any imperfection. Return thy gaze, seest thou any flaw. Then return thy gaze, again and again. Thy gaze comes back to thee dazzled, aweary."

This, in effect, is the faith of all physicists; the deeper we seek, the more is our wonder excited, the more is the dazzlement for our gaze.

"I am saying this, not only to remind those here tonight of this, but also for those in the Third World, who feel they have lost out in the pursuit of scientific knowledge, for lack of opportunity and resources."

This was the first time that the Holy Book was recited in the Banqueting Hall of Stockholm.

Salam's second achievement — that of providing a rendezvous for developing-country physicists — came earlier in 1964 with the establishment of the International Centre for Theoretical Physics in the idyllic surroundings of Trieste, Italy.

These accomplishments on the two fronts — physics and nurturing science in developing countries — have won accolades for Salam. In the words of Professor J. Song, State Councillor and Chairman, State Science and Technology Commission, China, Salam's "wholehearted devotion to the promotion of science and technology in the Third World countries, first reflected in the founding of the International Centre for Theoretical Physics and, more recently, in the initiative of setting up the Third World Academy

of Sciences and its affiliated organizations, has won admiration from all over the international scientific community An internationally renowned scientist who was born in a Third World country, who is dedicating his life to the development of science in the Third World countries, and who has won honour for the Third World, you, of all others, will always be respected as a pioneer in attempting to narrow the gap between the industrialized countries and the developing countries in science and technology."

Yet, all through the years, Salam has nursed a passion for the rejuvenation of science in the Islamic World — once a bastion of innovation and creative impulse — as the papers appearing in this volume show. They are based on lectures delivered by Salam in various scientific meetings and fora to review the state of science in the Islamic countries and to suggest measures for its improvement.

The papers convey the simple message: The Muslims have a scientific past in accordance with the commandments of the Holy Book and the Prophet of Allah. It is their religious duty to strive for a scientific future.

Salam is intimately familiar with the golden era of Science in Islam and contends that modern science is not a creation only of the Western, Judeo-Christian tradition as is often claimed — but that contemporary scientific advances have their roots in innovations and discoveries made earlier in Islamic lands. In making the claim, he is neither argumentative nor contentious but rational and scholarly, quoting extensively from eminent historians and researchers. Thus, we have Briffault testifying, "The Greeks systematized, generalized and theorized, but the patient ways of detailed and prolonged observation and experimental inquiry were altogether alien to the Greek temperament What we call science arose as a result of new methods of experiment, observation and measurement, which were introduced into Europe by the Arabs. (Modern) science is the most momentous contribution of the Islamic civilization." These thoughts are re-echoed by George Sarton, the great historian of science: "The main, as well as the least obvious, achievement of the Middle Ages was the creation of the experimental spirit and this was primarily due to the Muslims down to the twelfth century."

Salam quotes Charles Singer who contests the Eurocentrism of Western historians in *History of Technology* and makes the observation, "Europe, however, is but a small peninsula extending from the great land masses of Afrasia. This is indeed its geographical status and this, until at least the thirteenth century A.D., was generally also its technological status." In

skills and inventiveness during most of the period A.D. 500 to 1500, Singer continues, "the Near East was superior to the West For nearly all branches of technology, the best products available to the West were those of the Near East Technologically, the West had little to bring to the East. The technological movement was in the other direction."

Salam, however, does not confine himself to a study of the Islamic past. He talks of the present and the future and poses the following question to contemporary Muslims: "The 20th century has been a century of great synthesis in science — the syntheses represented by quantum theory, relativity and unification theories in physics, by the Big Bang idea in cosmology, by the genetic code in biology, by ideas of plate tectonics in geology; likewise in technology, the conquest of space and the harnessing of atomic power. Just as in the 16th century when the European man discovered new continents and occupied them, the frontiers of science are being conquered one after another. Do you not feel as passionately as I do that our men in Arab-Islamic lands should also be in the vanguard of making these conquests?"

The exhortation is not an exercise in rhetoric. Salam suggests practical steps for rejuvenating the "Islamic Commonwealth of Science" and gives the blueprint for the establishment of an "Islamic Science Foundation" to "turn the pages of history back and again lead the world in the sciences". He appears convinced that "it does not need more than a decade of enlightened science policy to bring about a wholesome change. First and foremost, our society — and here, I include our young men and women, their parents, their career-advisers, their teachers and our merchant-princes — must develop a commitment to the scientific enterprise, a commitment like the one which was recently developed in Japan, USSR, India, China and North Korea. This will happen when our ministers and princes undertake generous patronage of sciences, and our industrialist and our agriculture entrepreneurs begin to believe that there is a profit in science and technology — particularly in science based on high technology." The renaissance of sciences within an Islamic and Arab Commonwealth, according to Salam, is contingent upon five cardinal preconditions: "passionate commitment, generous patronage, provision of security, self-governance and internationalisation of the scientific enterprise".

Salam firmly believes that the laws, traditions and modalities of science are universal and deprecates the diversionary slogans of "Islamic" ("Christian" or "Buddhist" or "Hindu") science. He contends that "Islamic Science is a slogan with no meaning". To some, it may mean that Islamic ethics

should be applied to science. "But Islamic ethics are universal anyway — care for the environment, lack of specialisation, care for wholeness and so on. To call this Islamic science is an absurdity." He also maintains that science and faith can live in harmonious complementarity.

Elaborating on this point, Salam explains, "Unfortunately, some of us Muslims believe that while technology is basically neutral, and that its excesses can be tempered through an adherence to the moral precepts of Islam, science — on the contrary — is value-loaded. It is believed that modern science must lead to 'rationalism', and eventually apostasy; that scientifically trained men among us will 'deny the metaphysical presuppositions of our culture'. Leaving aside the fact that high technology cannot flourish without high science and also leaving aside the insult to the 'presuppositions of our culture' for implied fragility, I believe that such an attitude towards science is a legacy of the battles of yesterday when the so-called 'rational philosophers' with their irrational and dogmatic belief in the cosmological doctrines they had inherited from Aristotle found difficulties in reconciling these with their faith."

Lamentably, the current state of science in the Islamic World, which embraces almost a fifth of humanity, leaves much to be desired. The miniscule investment in indigenous research and development is indicative of the low priority generally accorded to science.

Citing recent figures, Salam laments the frail base of Science in Islam: "Around 45000 research and development scientists within the Islamic World (as given in the Background Paper submitted to the first meeting of the Science Commission of the Organisation of Islamic Conference during May 1983) compared to one-and-a-half million in the USSR and four hundred thousand in Japan . . . an analysis of these and similar figures reveals that as far as physics is concerned, the Islamic community is around one-tenth in size and one-hundredth in scientific creativity in research publication compared to international norms." Salam quotes Francis Giles writing in *Nature*, "Some of the Islamic states are busy fighting wars which cost billions of dollars — no doubt they have little time for science. Trade structures are dominated by imported technology and most countries have economic and scientific systems geared to imitation rather than originality."

Also included in this book is a 1977 memorandum signed by Arab physicists visiting the International Centre for Theoretical Physics in Trieste addressed to "a few chosen men in high positions of scientific, cultural and educational leadership" to create a fund "for increased participation

of Arab scientists in activities at the Centre and for regional activities, like winter colleges and conferences, organized in collaboration with the Centre. The latter are particularly important as a prelude to the realization of an independent Arab Physics Centre in the future Regretfully, the response to the memorandum has been, and still remains, one of complete indifference.

This "zero patronage" of science evokes Salam's deepest anguish. "The Arabs have been building palaces, but no palaces of science." They "will talk of fighting the West, but no one talks of science" What is particularly appalling is that the science communities are not self-governing and are "run by bureaucrats — not scientists" who "frown at internationalism", an attitude typical of most Islamic states. No wonder that "of all civilizations on earth, the Islamic — both Arab and non-Arab — is the weakest in science today."

It is painful and agonizing that Salam's sustained strivings for the promotion of science in Islamic countries have remained largely unheeded. His passionate pleas in interviews with the Islamic Heads of State have elicited verbal support but no action. His quest for a twentieth-century Haroun-ur-Rashid who could put on the mantle of a Patron Saint to nurture science in the Islamic World remains an elusive dream.

Mirroring deep frustration, his recent Faiz Lecture at Lahore, Pakistan, ended on a pessimistic note. Salam cited the example of Sir Syed Ahmad Khan, the great educationist among the Indian Muslims, who showed enterprise and courage in imparting English education to the Muslims. Sir Syed was opposed by the orthodox diehards who loathed English education. Driven to desperation, Sir Syed ultimately had to say: "You may disown me, you may call me an infidel — a Kafir — but allow me to educate the nation's youth for the sake of the future just as you allow a non-Muslim mason to build a holy mosque." In the mould of Sir Syed, Salam repeated Sir Syed's plea and suggested that he too would be content with the status of a non-Muslim mason building a holy mosque.

One of Salam's papers begins with Alfred North Whitehead's words: "In the conditions of modern life, the rule is absolute: the race which does not value trained intelligence is doomed ... Today we maintain ourselves, tomorrow science will have moved over one more step and there will be no appeal from the judgement which will be pronounced ... on the uneducated."

We end this brief recital of the work of the greatest scientist in Islam since Ibn-ul-Haitham and Ibn Sina with the above words.

8 July 1988
Trieste, Italy

M.H.A. Hassan
Hassan Dalafi

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