

ALLAMA IQBAL'S INTEREST IN THE SCIENCES

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For some time in the recent past I had been busy collecting some information about different categories of books that be-longed to Allama's personal library and are now luckily pre-served in the Islamia College, Civil Lines, Lahore as well as in the Allama Iqbal Museum. In Allama's personal library, there were in all, it seems, 520 books in English of which the larger share of 426 books is now with the Islamia College -- this is known as "Iqbal Collection" and has been carefully and quite scientifically catalogued by Professor M. Siddiq of that college.

I propose to consider here only such books of Allama's Library as have a bearing on physical sciences. It is significant to note that under this category there are as many as seventeen books on Einstein's Theory of Relativity alone. On no other subject, or thinker or school of thought are there in Allama's Library as many books as these. On Hegelianism, for instance, there are only nine books; on Bergson and Bergsonianism we have twelve books; in the case of Rumi this number is only seven including six volumes of his own Mathnawi and finally eleven books on Nietzsche, including five scattered volumes of his own works.

Of the seventeen books on the theory of relativity nine can be easily classed as popular works. The titles of some of these speak for themselves: Einstein the Searcher; Easy Lessons in Einstein; Ideas of Einstein's Theory; From Kant to Einstein (39 pages); Life of Space and so on. It may be added that the Allama nowhere in his writings has referred to these popular works or their authors.

Of the other works on the theory of relativity, the more no-table in terms of Allama's philosophical thought and his interest in relativity and sciences may be listed as under:

1. Einstein, A, Relativity: The Special and General Theory: A Popular Exposition, 1920.
2. Eddington A.S., The Nature of the Physical World, 1929.
3. Carr, H.W., The General Principle of Relativity in its Philosophical and Historical Aspect, 1920.

4. Haldane, R.B.,Reign of Relativity, 1921.
5. Rougier, L. Philosophy and New Physics, 1921.

The first book is by Einstein himself and this too is admittedly a popular Exposition. A popular exposition of the theory of relativity from Einstein, the author of the theory, however, is most welcome for in its original highly mathematical form, the theory is altogether beyond the comprehension of the lay readers a fact very candidly admitted by the Allama in *The Reconstruction*.

Einstein is now universally recognised as the most creative intellect in the human history. He earned his doctorate from the Zurich University of Switzerland in 1905; and the same year he had also four of his research papers published in a highly prestigious German Periodical in Physics. Each one of these papers contained a great discovery in physics; and among them was a paper: "On the Electrodynamics of Moving Bodies" embodying Einstein's special theory of relativity. It is generally believed that this momentous paper of Einstein had its beginning in an Essay that he wrote at the age of sixteen. Einstein had his first paper on the general theory of relativity published in 1913. His work on this new theory seems to have been completed by 1916 when he published his paper entitled: "The Foundation of the General Theory Relativity" in the aforementioned German Periodical in Physics. The worth of Einstein's work, however, was not much appreciated in the world of science. The tremendous importance of Einstein's general theory of relativity came to be realised only by the end of 1919. The palpable cause of it was the total solar eclipse of May 1919. A selected team of the scientists made careful studies of all the different phenomena relating to this eclipse. These studies among other things showed that Einstein's predictions of cosmic significance, particularly the one relating to the bending of the ray of light when it passes near a massive star turned out to be true. The confirmation of the new findings of the scientists was formally announced by the Royal Society of London in November 1919.

It is to be noted that Allama Iqbal's own copy of Einstein's work on Relativity was received by him somewhere in July 1921. It is also to be noted that of the other sixteen books on the subject as many as nine had been published by 1922 and the better lot in 1920 when the theory of relativity was universally ac-claimed. From the very quick and uniquely perceptive reading habits of the Allama it is easy to surmise that he must have gone through

almost all these books before his ardent Payam-i-Mashriq (A Message of East) was published in 1923. In the Preface to this work the Allama makes the following lauding observation about Einstein tying him with Bergson.

"Europe's Great War was a catastrophe which destroyed the old world order in almost in every respect; and now out of the ashes of civilization and culture. Nature is building up in the depths of life a new Adam and a new world for him to live in, of which we get a faint sketch in the writings of Einstein and Bergson." Then in the Payam-i-Mashriq there is also a poem on Einstein (as there is one on Bergson) This poem ends up with the following lines:

کرد و زردشته ز نسل موسی و هارون ظهور
من چه گویم از مقام آل حکیم نکه سخ

What can I (say about this subtle-minded sage Except that from
The race of Moses and of Aaron there has come A Zarathustra in our age.

In Lecture II of his celebrated The Reconstruction the Allama is, however, rather critical of Einstein; this to my mind is very largely on account of this greater spell on him of Bergson's notion of duration or non-serial time. He puts his own philosophical construction on Einstein's space-time continuum and concludes that "time as a free creative movement has no meaning for the theory of relativity". It is, however, interesting to note that a little earlier in the same Lecture, the Allama pays a, glowing tribute to Einstein by saying that "his discoveries have laid the foundation of a far-reaching revolution in the entire domain of human thought. "This in fact is an echo of a passage to be found in Lecture I: "the theory of Einstein has brought a new vision of the universe and suggests new ways of looking at the problems common to both religion and philosophy.

A really significant passage in The Reconstruction is the one which combines the highly empirical and particularistic outlook of the Quran with the teachings of the theory of relativity: "The Quran has no liking for abstract universals. It always fixes its gaze on the concrete which the theory of Relativity has only recently taught modern philosophy to see".

Of the other writers on the theory of relativity, the most important, of course, is Sir. A. Stanley Eddington, the renowned astronomer, mathematician and physicist. In 1919 he in fact was the leader of the team of

the Scientists who through their investigation relating to the solar eclipse provided the requisite data for the confirmation of Einstein's theory. He was the earliest expositor of relativity in the English language. His first book on this subject entitled Report on the Relativity Theory of Gravitation, written on the request of the Physical Society, London, appeared as early as 1918. In 1923 he wrote his remarkable book: Mathematical Theory of Relativity; commenting on this work, later Einstein said: "It is the finest presentation of the subject in any language."

It may be noted here that Eddington held strong Quaker beliefs, came as he did from the family of the Quakers, and further that he expressed his religious views even in his works on philosophy of science such as the one in Allama's library. The last chapter in The Nature of the Physical World is captioned as "Science and Mysticism" (28 pages). In The Reconstruction, the Allama quotes from this chapter of the book and not from its chapter on Relativity and Quantum Theory. Eddington's this book (Gifford Lectures of 1927) was in fact published in November 1928 and Allama's copy of it was of its 3rd impression of February 1929; i.e. the time by which the Allama had completed his writing of all parts of his work dealing with the subject of Relativity. He did, however, give a fairly long quotation from Eddington's earlier work Space, Time and Gravitation published in 1920.

The next writer on relativity in our list is H. Wildon Carr who for a long time was the Secretary of Aristotelian Society, London and also its President from 1916 to 1918. It may be re-called that it is this very society which invited the Allama to de-liver a Lecture, (now "Is Religion Possible?") at its session in December 1932. It is interesting to note that there are many more books by Carr in Allama's library than by any other con-temporary philosopher. One palpable reason is that Carr was the first to introduce Bergson and Bergsonianism to the English readers and also was one of the earliest writers on the theory of relativity.

It is interesting to note that the Allama gives a sizeable quotation from Carr's present work: The General Principle of Relativity in its Philosophical and Historical Aspect in The Reconstruction without naming the author or the book. This quotation, in fact, looks more as Russell's; own argument against the Greek philosopher Zeno rather than Carr's exposition of it given in his General Principle of Relativity. The Allama though quotes also from Carr's second book on relativity, he does not seem to think very highly of

Carr and outright rejects his view that the theory of relativity inevitably leads to monadistic idealism of Leibniz, a German Philosopher of whom Carr was as fond as of Bergson.

Lord Haldane's *Reign of Relativity* despite its giving us short mathematical treatments of some aspects of relativity is on the whole a compendium of idealistic metaphysics. It has been rightly described as "a wedding of Hegelianism with the theory of relativity." A highly metaphysical theory of relativity typical of this work was expounded by Haldane in his Gifford Lectures of 1903-1904 i.e. even when nobody had heard of Einstein or his theory. It is said that when Einstein came to lecture at Kings's College, London in 1921 he told Lord Haldane that he did not believe that his theory had any metaphysical implications. In the Preface to the third edition of the *Reign of Relativity* published in August 1921 Haldane refers to this meeting with Einstein and adds that he had, therefore, revised a few of the unphilosophical paragraphs in the book.

Allama Iqbal, be it noted, refers to Haldane's work only in connection with the philosophical idea of the degrees of reality. It may be added that Whitehead and Haldane were quite close to each other and would often exchange notes on many philosophical problems. This explains largely the fact that Haldane in his work has quite sympathetically elaborated Whitehead's views on relativity. This makes Haldane's *Reign of Relativity* vitally important to us for the Allama at critical junctures of his discussion often refers to Whitehead's presentation of relativity and also makes a very significant though difficult statement that "Whitehead's view of Relativity is likely to appeal to Muslim students more than that of Einstein.

The last work on relativity in our list is Louis Rougier's *Philosophy and New Physics* (1921). On my scanning of Allama's personal copy of this work I have strongly felt that the Allama had skipped over most of the earlier technical and rather abstruse parts of the book till he came to the section twenty on the "Physics of the Discontinuous". It is from this section that the Allama has quoted a passage in lecture III of *The Reconstruction* obviously in support of the Asharites view of time and matter. There is also an invisible reference to this book in the Lecture I where Allama says that "With the advance of scientific thought even our concept of intelligibility is undergoing change". This is very close to what is given in a passage on page 146 of Rougier's book and the Allama has even drawn a marginal line against the

passage. It may be added that Rougier both in the footnotes and the Bibliography of his work has referred to very many French writers on physics and mathematics; not even half of these writers have been listed or even named in the Index in the sixteen volume Dictionary of Scientific Biography. Rougier thrice refers also to the French social psychologist Gustave Le Bon and his work *Evolution of Matter*, a copy of which incidentally is also to be found in Allama's library.

I may be allowed here to refer also to Spengler's *Decline of the West*. It is perhaps the only major work which aroused Allama's interest in quite a few areas of science and mathematics. Spengler, be it remembered, was as well-versed in mathematics and natural sciences as in history and philosophy. His *Decline of the West* is in two volumes: the first was published in April 1926 and the second in November 1928. The Allama does not seem to have had received his copy of the first volume of the *Decline of the West* even by April 1927. No trace of Spengler's work is to be found in Allama's first reportedly long lecture in English on "the Spirit of Muslim Culture" delivered at the forty-second session of the Anjuman-i-Himayat-i-Islam, Lahore on 16th April 1927. The second volume of *Decline of the West* must have been received by him soon after its publication. From a few good words he had said about the first volume, one would gather that he was keenly looking forward to having a copy of the second.

On reading of the *Decline of the West* the Allama was fascinated by many of its parts but he was also vexed and perturbed by some of Spengler's statements. One such statement is that "the mathematical idea of function was the symbol of the West of which no other culture gave even a hint." The Allama immediately felt that it could not be true and went into a bit of real hard work to find out the position of the mathematical idea of function in other cultures, and especially in Muslim culture. This resulted into a remarkable research paper which the Allama named: "A plea for Deeper Study of the Muslim Scientists" and presented it as his Presidential Address at the Fifth Oriental Conference held in Lahore from 20th to 22nd November 1928. I may be allowed to call this Presidential Address Allama's Second Lecture on the Spirit of Muslim Culture".

The first clue in search for the function idea in Muslim Culture came from the Allama himself. He tells us that he "had a vague recollection of the idea of function in Al-Biruni". It is to be remembered that the Allama had

studied Biruni's two major works during his doctoral research on the Development of Meta-physics in Persia. These works however were on history and not on Biruni's mathematics so the Allama in his search for function idea in Biruni sought the help of Dr. Zia-ud-Din of Aligarh, a renowned Muslim scholar of mathematics of his days. Dr. Zia-ud-Din had the privilege of having studied at the University of Gottingen (Germany) during the great days of Professor Karl Schwarzschild, one of the world's foremost astronomers and relativity-physicist. Interestingly enough Dr. Zia-ud-Din during his stay at Gottingen had called the attention of Professor Schwarzschild to the passages in Biruni's Qanun-i-Masudi such as embody his application of function in Trigonometry. The Professor was much surprised but finally convinced. Biruni's position was firmly established.

Function in mathematics refers in fact to a relationship of correspondence between two variables called independent variable and dependent variable. It is expressed by saying that "y is a function of "x" which means "y" changes with "x", so that for a certain value of "x", "y" has a certain value or values. In history of mathematics in Europe the term "function" in the full mathematical sense was first used by the German Philosopher and mathematician Leibniz in 1694. The theory of function, however, had already emerged with the analytic geometry of Fermat in 1629 and that of Descartes published along with his better known Discourse on Method in 1639. With the introduction of the function idea in mathematics in Europe, the entire course of its history was changed. Soon such rapid advance started taking place in mathematics that within fifty years or so it almost evolved into its modern form. The idea of function also had its great impact on the development of the sciences, particularly the experimental sciences. "Not until the theory of functions was fully evolved", says Spengler, "could this mathematics be unreservedly brought to bear in the parallel sphere of our dynamic Western physics."

Allama Iqbal's work on Spengler's Decline of the West, how-ever, did not stop with the discovery of the function idea in Biruni. He continued his search for new ideas in the Muslim scientists and mathematicians this time also to explode Spengler's central but patently fallacious thesis that cultures as organic wholes are completely alienated from each other so that in the period of growth or development a culture as an organic whole is not influenced by other cultures. The Allama was keenly and even poignantly

aware of the very powerful impact of the Muslim culture on the European culture from the twelfth century onward --certainly because of the presence of Islam in Spain.

Happily there was a book in Allama's library: *The Mystery of Space (A Study of the Hyperspace Movement in the light of the Evolution of New Psychic Faculties)* by Robert T. Browne. The merit of this work is that the information supplied in it has very largely been derived from the then current learned articles on science and mathematics published in the well-reputed British and American periodicals. There is, however, also some psychic or spiritualistic stuff in this work which it is rather hard to gulp. From the point of view of Allama's search for new material there is a commendable chapter in this book on the historical development of non-Euclidean geometry. The Allama seems to have gone through this chapter carefully with his usual marginal lines.

Allama's statement in' the above-mentioned Presidential Address that Tusi's work was printed in 1594, and that John Wallis introduced it to the University of Oxford about the middle of the 17th century has been more or less taken from Browne's *Mystery of Space*. Browne has also referred to Tusi's effort to improve the parallel postulate of Euclid. The rest of the passage referring to the derivation of non-Euclidean geometry by Gauss and Riemann from the earlier work on parallel postulate is Allama's own.

It is to be noted that John Wallis was a mathematician of a very high stature. He was the contemporary of Newton; and Newton has admitted in his writings that his work on binomial theorem and on the calculus arose from his profound study of the works of Wallis. Wallis knew Greek, Latin and Hebrew. He in fact translated Tusi's short treatise on parallel postulate in Latin and explained it to professors of mathematics at Oxford. It may be added that the problem of parallel postulate has been the very pivotal problem in the discovery of non-Euclidean geometries and that the non-Euclidean geometry of the form developed by Riemann (whom the Allama has particularly named in his passage on Tusi) is the most indispensable instrument for the theory of relativity.

Should we now have a quick glance at Allama's Presidential Address: "A plea for Deeper Study of Muslim Scientists" and compare it with all his previous writings in English and Urdu we would find that the following titles, names and topics have been used for the first time.

A) Titles:

- 1) Bacon, Francis, *Novum Organum* (Bacon's celebrated work on scientific method)
- 2) Biruni, *Qanun-i-Masudi* (An encyclopaedic work on astronomy)
- 3) Briffault, R., *The Making of Humanity* (A book which, the Allama recommended to every student of the history of culture)
- 4) Browne, R.T, *The Mystery of Space* (A rare book according to the Library of Congress Catalog)
- 5) Iraqi (*Ain al-Qudat Hamadani*), *Ghayat al-Imkan fi Dirayat al-Makan* (a rare manuscript received by the Allama from Maulana Sayyid Anwar Shah Kashmiri)
- 6) Kant, I, *Prolegomena to any Future Metaphysics* (embodies Kant's views on mathematics; not available in Allama's Personal Library)
- 7) Spengler, O, *The Decline of the West*, Vol-1.

B) Names:

- 1) E. Bevan: 2) Euclid: 3) Gauss: 4) Haji Khalifah; 5) Riemann; 6) Shaikh Mahmud and 7) Wallis.

C) Topics:

- 1) Aristotelian idea of fixed Universe
- 2) Function
- 3) Geometrical proof of the interpolation formula
- 4) God as the Omniposyche of the Universe
- 5) Hyperspace movement
- 6) Infinite continuum
- 7) Newton's formula of interpolation
- 8) Non-Euclidean geometry
- 9) Parallel postulate

These are in all twenty-three entries of which thirteen pertain to science, especially to mathematics; the size of Allama's Address now in printed form is eleven pages (Sherwani, *Speeches, Statements and Writings of Iqbal*, pages 133-143). From this one would reasonably gather that Allama's Address is a real research paper; he must have had read a lot (must more than the above listed books) and he must have had also given his mind to many subjects. Further, this research paper also clearly leans towards science subjects.

Allama's research in the sciences was, however, destined to continue for

another full year for he was to deliver his third lecture on the "Spirit of Muslim Culture" at Aligarh in the last week of September 1929. This new Lecture, now Lecture V of The Re-construction, is considered by some Western scholars to be one of the rarest Muslim presentations on the subject so far.

If once again we compare the scientific contents of this Lecture with those of the Presidential Address at the Oriental Conference we would find that the Allama within the span of much less than a year had come across many new titles, new names and topics in connection with Muslim science and culture. The more important of these are as follows:

A) Titles:

- 1) Bacon, Roger, Opus Majus 2 Vols; 1268 (the first ever English translation of the work by R.B. Burke, Philadelphia -- the original is in Latin)
- 2) Ibn Haitham, Kitab al-Manazir (In Allama's time avail-able only in manuscript or in Latin -- Arabic text and its English translation is being currently prepared at Harvard University)
- 3) Ibn Khaldun, Prolegomena (The Muqaddima) (Among other things, a mine of Muslim Sciences; this work was very dear to the Allama)
- 4) Ibn Maskawaih, (Al-Fauz al-Asghar (a work that the Allama had used for his doctoral research on the Development of Metaphysics in Persia)
- 5) Khwaja Parsa, Risalah dar Zaman-o-Makan (a unique and rare manuscript)
- 6) Spengler, The Decline of the West, Vol II, 9th November 1928.

B) Names:

- 1) Dhuring, Karl E; 2) Ibn Haitham; 3) Jahiz; 4) Khwarizmi; 5) Kindi and 6) Ptolemy.

C) Topics:

- 1) Algebra (originated with Khwarizmi)
- 2) 2, Biruni's reaction-time (actually Ibn Haitham's as given in Allama's Development of Metaphysics in Persia, page 64)
- 3) Evolution (Allama's first clearest exposition of Ibn Maskawaih views)
- 4) Optics (Allama's comparison of Roger Bacon's work on Op-tics with that Ibn Haitham remarkable close to Sar-ton's: Introduction to the History of Science, Vol. II, page 957 1937, i.e. seven years later)

- 5) Sensation is proportionate to stimulus (Kindi's foreshadowing of a law in the modern science of psychophysics)
- 6) Spengler's charge of Magianism against Islam and Allama's forceful refutation of it -- Magianism and inductive and empirical spirit of Islam stand opposed to each other.

Allama's above keen interest in the sciences is clearly evinced in some of his very profound observations in *The Reconstruction*. In one of these he equates the scientist's absorption in his study of Nature with someone's "virtually seeking a kind of intimacy with the Absolute Ego" and he adds: "The scientific observer of Nature is a kind of mystic-seeker in the act of prayer". According to him of all the other scholars it is the scientist who would get a "visions of the total infinite which philosophy seeks but cannot find." Two of his more noteworthy philosophical observations on the subject are as under:

- 1) The Scientific observation of Nature keeps us in close con-tact with the behaviours of Reality, and thus sharpens our inner perception for a deep vision of it (*Italics mine*).
- 2) The Quran, recognising that the empirical attitude is an indispensable stage in the spiritual life of humanity, attached equal importance to all the regions of human experience as yielding knowledge of the ultimate Reality which reveals its symbols both within and without. One indirect way of establishing connections with the reality that confronts us is reflective observation and control of its symbols as they re-veal themselves to sense perception (*Italics mine*).

I firmly believe that should we employ the profound meanings embodied in the above two passages to the study of very many sign -- verses of the Quran, verses referring to the symbolised manifestation of God in all the phenomena of nature, we would soon evolve a very viable Islamic scientific theory of knowledge, most urgently needed in the contemporary world of Islam.

Dr. Fazl-ur-Rahman

(1918-1988)

Professor of Islamic Studies at the University of Chicago, Dr. Fazl ur-Rahman died in Chicago on July 26, 1988.

He was a modernist in his Islamic interpretations, committed to making Islamic values relevant to modern times. In this sense, he drew inspiration from poet-philosopher Dr. Muhammad Iqbal and Sir Sayyid Ahmed Khan.

Born in Abbottabad in the Northwest Frontier Province' he received his early education from his father, who was a graduate of the traditionalist Islamic Academy of Deoband in India. Steeped in dars-i-Nizamiya' the orthodox syllabus of Islamic education in the subcontinent' Dr. Fazl-ur-Rahman acquired profound knowledge of Arabic and Persian. His graduate studies in the West, however, made him an exponent of modernist Islam. He authored several books and numerous articles, which have become landmarks of modern Islamic scholarship

During the 1960s' President Ayub Khan of Pakistan appointed hi Director of the Institute of Islamic Research. The Institute w established by President Ayub Khan to deal with certain Islamic subjects which the orthodox ulama (religious scholars) were determined to have incorporated in Pakistan's constitution. Dr. Fazl-ur-Rahman modernist thrust touched off violent political demonstrations, which were ignited by the ulama. Consequently, Dr. Fazl-ur-Rahman sought refuge as a faculty member at the University of Chicago' where! remained until his death. In a real sense' the creative soul of the East found repose in the West!

Possessing a sense of honor and warmth of generosity towards students and friends' he was the acme of a modest' but confident scholar. To me Personally' he was always—brother Fazl—an object of affection and high regard.

He will be affectionately missed. May his soul rest in God's grace

Hafeez Malik