ALBIRUNI'S CONTRIBUTION TO NATURAL SCIENCES.

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A comprehensive study of Abu Raihan Mohammad Ibni Ahmad Albiruni, undoubtedly,one of the most learned Muslim Scholar,is a doubly difficult task,because in those of his works that are easily available,no attempt has been made to deal with this subject, thoroughly and systemetically,and on the other hand the original Philosophical work which he has attempted and in which he has treated this subject more fully,are either rare or extinct.

In order to appreciate his approach to the manifestation of nature,an attempt has been made to assemble small bits from his works,where he gives the reader a glimpse of his views about various aspects of nature.

The long life of Albiruni,which saw so much political turmoil and change in the outward conditions of life in central Asia,Afghanistan and Iran etc,also witnessed considerable change in his interest.Attracted early to Mathematics and Astronomy,in which he became one of the greatest authorities in the annels of Muslim Science,his attention later turned towards Chronology and History and finally during later part of his life,to Optics, Medicine,Minerology and Pharmacology.

The great bulk of the writings of Albiruni,which accord ing to Yaqut(1) were more than a camel load,are mostly in Arabic, and a few in Persian,although his mother tongue was neither of them.His mother tongue was Khawarazmi.According to Yaqut his contribution to Astronomy,Hait,Logic,Medicine are numerous,and he states to have witnesed its catalogue in Jamia-Maro spread over 60 pages in this type.One of his earliest biographers, Shamsud Din Mahmand Shahrazuri writes(2):- "that he(Albiruni) never had apen out of his hand,nor his eyes ever off a book,and his thoughts were alway directed to his studies,with the exception of two days in the year, namely Nourozand Mihrjan,when he was occupied in procuring necessaries of life".Even a few moments before his death he is said to have enquired about a problem on Geometr

In addition to personal contact with numerous Muslim, Christian and Hindu scholars and sages of his time, Albiruni also had access to many ancient works of Greek, Babylonian and Zorustrian Sciences.

Albiruni did not have smooth sailing all the time, while at Mahmand's court he was given scanty facility[3] for scientific research, because Ahmad bin Hassan Maimandi, who was responsible for Firdusi's exit, was not very friendly with him.

In his book on India, Albiruni complains bitterly of the limitations imposed on his movements and the difficulties encountered by him in his Cultural and Litrary persuits.

George Sarton[4] calls him "one the greatest Scientist of Islam and all considered, one of the greatest of all times". He surely was in every way remarkable. Encountered with truth, he was interested in everything; History, Chronology, Geography, Medicine, Philosophy, Minerology, Mathematics and Astronomy. But whatever subject he approached he did so with an open mind, a mind trained to Scientific accuracy. He aimed at genuine scholarship. With great pain and care, he would gather all available data, check his methods and apply the rule of logic in his interpretations as he writes himself[5].

"I have truly done what every one is bound to do in respect of any particular science. That is to accept gratefully, the original contribution of his predecessors, to correct fearlessly the errors that came to his notice and to preserve what he himself discovered and to leave record for the future generations". Nothing angered him more than intellectual deceipt, or false sciences or hiding the truth for the sake of popularity.

In view of his convictions, Albiruni exemplified[6] all the essential qualities of a great scientist in the broadest sence notibly.

1. His burning curiosity, which was desciplined and sustained.
2. A love for truth that was sovereign in all his thinking.
3. A healthy scepticism, ready always to test all assertions.

4. A resolute effort at objectivity and refusal to be beguiled by plausibility or romantic charm, unless supported by proof like a true scientist Albiruni, therefore, insist on the necessity of observation and experiment and is scornful of those who uncritically merely repeat traditions, for example he studied Aristotles views on physics and heavens and often differed from him. Not only that but he discussed these points with Ibni Seena, who was pro-Aristotle in his views. He put to him a number of questions and when he found Ibni Seena's answer not very satisfactory, he made a counter statement to answer them.

Like a modern Scientist he is cornful of Pseudo Sciences and is contemptuous of those, who in their greed for gold, spend a lot of effort on the kind of alchemmy from which they hoped to acquire limitless riches. Alchemmy, according to him is a make-believe science motivated simply by excessive eagerness for acquiring fortune", Although in principle[7] he accepts cosmological principles of alchemmy and the Jabirian theory for the formation of metals while reject the possibility of transmutation because of the lack of evidence, and supports Ibni Seena when he says, "There is no way of splitting up one combination into another". About Alchemmy he further adds, "No nation is entirely free from it, and many intelligent people are entirely given to alchemmy. It was 700 years after these shrewed remarks before Europe gave up its persuit of alchemmy."

Now turning to Natural Sciences, we discover that Albiruni was a master of observation, not only in Astronomy, Geology, Minerology and Geography, but also in the study of natural Phenomenoa. His description of Flora and Fauna shows him as a master observer of the smultiple forms of nature. He showed himself to be the true picture of the Quranic injunction.

(5) وَيَتَفَكَّرُونَ فِي خَلْقِ السَّمٰوٰتِ وَالْأَرْضِ - رَبَّنَا مَا خَلَقْتَ هٰذَا بَاطِلًا ۔

(3/189)

"And Contemplate the (Wonders of) creation in the heavens and the earth (with the thought)" our hord, not for naught hast Thou created all this" 1 (3/190).

His Geological observation(8) mentioned in passing in several of his work, such as Al-Asarul Baqia & Tahdid Niha-atul Amakin, are astounding for their exactitude and depth and include the correct judgement about the sedimentary natureof the Indian-Basin. On the experimental side, he worked out the Sp. gravity of 18 precious stones and metals, that is remarkabily accurate. He knew that the speed of light is immensely greater than that of the sound. He also explained on the hydrostatic principles, the ascent of water in natural springs and artesian wells. As a keen observer of natural phenomena, he marked carefully the succession of changes in the light of the sky at dawn and dusk and was first accurate observer and describer of Zodical Light. He also tried to explain why the sea water becomes saltish and bitter. For his interest in Zoology we may quote his description of abnormility(9) of child birth, including the Siamese Twins. It is interesting to note that Albiruni mentions specifically the monkey as the last animal through whom man has migrated to reach his present state. Some have agreed, this passage annouaces the modern theory of Evolution, 800 years before Darwin, while other believe that He said this as an instance of the function of nature as the preserver of Species".

Albiruni has a feeling for harmony and for the role of Geometry in nature. For example about flowers(10) he observes, "Among the peculiarities of flowers there is one realy astonishing fact viz the number of their leaves, the tops of which form a circle, when they begin to open, is in most cases, comfortable to the law of geometry.

Generally they agree with the chords formed by the laws of (Plane) Geometry, not with conic section. You scarcely ever find a flower of 7 or 9 leaves, for you cannot construct them according to the laws of Geometry in circle or isosceles triangle. The number of their leaves is always 3, or 4, or 5, or 6 or even 18.

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This is a matter of frequent occurance possibility one may find, among the species, hitherto know, such a number of leaves, but on the whole one must say, nature preserve its genera and species such as they are. If you could for example count the number of seeds of one of the many pomegranates of a tree, you would find that all the other pomegranates contain the same number of seeds, as that the one seed of which you have counted first. So, too nature proceeds in all other matter".

Another instance of the use of measurement by Albiruni is in his well known determination of density of minerals described in his book Kitabul Jawahir(11), here he applies Hydrostatic principles. He weighed the body first in air, then in a conical vessel in water, water thus thrown through a hole or a spout was its volume. He thus calculated the Sp. Gravity.

This method of finding the Sp. Gravity is attributed to Archemedes, but the credit for the accuracy of result upto second place of decimals undoubtedly goes to Albiruni.

Values found out by him are reproduced below:-

	Albiruni's values	Correct values at present.
Gold..	19.05 — 19.26	19.29
Copper.	8.72 — 8.83	8.85
Mercury	12.74 — 13.59	13.56
Brass	8.55 — 8.67	8.40

In this way he gives the Sp. Gravity of 9 metals, based on the weight of gold and for 9 gems based on the weight of "Oriental Sapphise". These values as given above differ only slightly from modern measurement.

These examples demonstrate, Albiruni's role as a careful observer and experimenter. He has often been admired by modern scholars for this aspect of his research, because it is this particular approach to nature, which has been so actively persued since 17th century.

To conclude, I would like to state that despite a great deal of research carried out by scholars of many countries on the writings of Albiruni, much remains to done, considering the extent of his writing and the numerous desciplines, with which they are concerned. His books are to be traced, translated and published, so that the common may know the breadth and depth of his writings.

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R E F E R E N C E S.

1. Ali Asghar.....TarikhFilasfa Iran----------PP.

2. V.Courtois.....Albiruni----------PP.11

3. Ibid.....----------PP.13

4. Ibid.....----------PP.15

5. Albiruni.....Qanun-i-Masudi-------

6. Albiruni.....Commomoration Volume Iran Society Calcutta-------=.---- PP.284

7. Syed Hussein Nasr--An introduction to Islamic cosmological Dectorine.------ PP.247

8. Syed Hossein Nasr-- Abu Rahan Albiruni Pamphlet. PP. 6

9. Syed Hossein Nasr-- An introduction to Islamic Cosmological Doctrines.---- PP. 147

10. Ibid.....---------- PP. 127

11. Ibid.....----------PP.130—131.

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