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MUSLIM CONTRIBUTION TO MEDICINE

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Part I

The strides that have occurred in all the fields of science and technology - the latter, properly speaking, is also science except insofar as it is the application of science to our day-to-day life - and the discoveries that have resulted therefrom during the last quarter of a century are alone greater than the sum total of scientific achievements since the birth of man to the period twenty-five years ago. But, at the same time, the impression that generally reigns as the result of this impact is that all the scientific laws and discoveries of the past had little significance except as vanguard of the modern concepts and foreshadows of the present day knowledge. It is generally thought that in view of the early day world-fear they were largely speculative and theoretical. The people of Asia have also been associated with this speculative approach and world-fear, although during the period, 9th - 15th century A.D., the Muslims kept the torch of knowledge alight throughout the Dark Ages of Europe, which, basically regarded the world as evil pending Apocalypse.

It is, for instance, thought that The Miracle Plays of the mediaeval day Europe heralded the birth of allegory in which abstract qualities are invested with
personification. \textit{Munis al-Ushshag} (محمد Shelby) by Shaykh Shihab al-Din Suhrawardy \textit{Maqtul} (شيخ شهاب الدين سهروردی منقول) is one of the oldest allegorical stories written during the 12th century. In the book, according to Otto Spies, "a complete doctrine of microcosm is preserved to us".

After the Renaissance, however, thanks to the discovery of the legacy of Greece, European thought was brought to the full figure. Many of the texts, e.g., that of Aristotle’s \textit{Poetics}, "برزاكتاء لارسطوليداتسινι" came to the Europeans because of the Arabs. It is not exactly that the Europeans advanced, it is just that the Muslims stagnated. Induction demands jumps from one point to the other all the time. The Muslims just let things go by. Curiosity which characterized the early mediaeval Islamic thought was lulled into quiescence. Many of the basic features of modern science, e.g., the Linnaean system, had already been discovered by the Arabs, but they required further elaboration and development. This process was nipped in the bud. Names of plants which bore names like \textit{Ikil al-malik} (Mellilotus officinalis), and \textit{Baqda al-Farsiyah} (Moldavic calamint), attest to this fact, and now the field to be investigated is so vast that it is very difficult, if not insuperable, to disentangle the skein of the issue of how far the Muslims had advanced and at what point the West took over from them.

Let us illustrate this point from an example or two. Is Vitamin C, for instance, a Western discovery? Does it not owe its discovery to the Muslim discovery of \textit{uttruj} (العترج = citron) and the Embelic \textit{myrobalan} (المللنج). Is not the science of nutrition largely a Muslim science? Is the present day science of optics and vision not an extension of Ibn al-Haitham’s (Al-Hazen)
theory of vision and the second law of optics? Even the word, lens, is a translation of the Arabic word, 'adasah, (العدس) which means the lentil, and lens is the Latin equivalent for the lentil. Modern investigations have shown that the Polish scientist, Vitellius, and the great English physicist, Roger Bacon, are beholden to that great Arab physicist. Vitellius translated Ibn al-Haitham's book into Latin in the Middle Ages and the original manuscript of Ibn al-Haitham's work Kitab al-Manazir (كتاب المناظر = The Book of Optics), passed into European hands. But now at last the original manuscript of the work has been located and translated by Professor A.L. Sabra into English. The publication of this monumental work should delineate the impact of Muslim science upon the West. The Kitab al-Manazir will then have been established as the centerpiece of the arch of the science of optics.

It is my personal view that it is essential that two approaches should be taken up immediately:

1. As the links governing the history of science lie scattered, and the chain of the history of scientific thought and discoveries is broken up these links have to be rediscovered. In case we are desirous of piecing these links together we should make every effort to rewrite the history of science after the establishment of these links.

To quote an instance, clepsydra (water clock) is taken in the West to be a perforated vessel which would overflow within a specified period. In Central Asia, Iran and China, on the other hand, the early day mediaeval clepsydra consisted of a perforated
vessel which sank within a specific period after being filled with water which passed through a perforation. The principle was the same, the contrivances were different. And yet by the water clock we understand the clepsydra of the Greco–Roman type.

2. The manuscripts of the Muslim times ran into millions. They lie scattered all over the world. Libraries in Istanbul alone house 400,000 manuscripts. The need of the hour is to assess their utility and to retrieve them from the limbo of oblivion.

There is little doubt that a project undertaking these studies would be so enormous as to be insuperable. But it is sufficient to suggest how great the Muslim contribution to science has been. A proper assessment, based upon a study of manuscripts that have escaped the ravages of malfortune, requires not only considerable expense but, more than that, a team of experts which is, by no means, easy to be had. For it is essential that they should be thoroughly grounded in Arabic and Persian and possess imagination and objectivity; these twin attributes being denied to all but few.

Money for investment into such projects is there, and a good team of scholars is not lacking either. But someone at some time has to give the green light signal. And once the decision is made, we shall bear witness to discoveries that would astound the world, and the waning light of the East shall shine again.

I, for one, am not prepared to believe that Sir Alexander Fleming was the inventor of penicillin in the true sense. He discovered the active principle of *penicillium* spp., a fungus. The use of Parmelia perlata Ach. (family, Parmeliaceae)
a fungal species, has been known to the Greco-Arab medicine for over a thousand years. It is known as charola (چرلا) in the northern part of the Sub-continent and as 'ushnah (عیانه) in Arabic. It yields lecanoric acid and is recommended as astringent, laxative, tonic, and carminative, and is used in dyspepsia, amenorrhoea, and urinary calculi. Polyporus officinalis (the ghariqun = غاریقن of the Arabs) is a lichen which has also enjoyed use as a tonic, laxative, and aphrodisiac. The use of fungus as a poultice was known to Greco-Arab medicine and Ayurveda. The use of egg-yolk was also known to the Arabs far prior to the isolation of Vitamin K by Prof. Dam of Denmark therefrom.

Sir Alexander Fleming knew of these practices. His principal contribution, together with his collaborators, Florey and Chain, was to elucidate its mode of action and to pave the way for its ultimate synthesis. This, in short, is the basic framework of the story of penicillin, and the story is perhaps as long as the history of man.

I am presenting my views upon the share of the Muslims in the history of science, especially medicine, before UNESCO, which is acting as a pioneer in the field of the history of science without being governed or swayed by parochialism, bias, or prejudice. I rightly harbour the expectation from UNESCO that, being an international organization, having as its members, African, Asian, European, and North and Latin American countries, it would embark upon a historical mission, the historical mission of making a survey of manuscripts the world over, to describe these MSS, categorize them, and finally to publish a Union Catalogue based upon them after edition. This Union Catalogue should be readily made
available to scholars, bibliographers and bibliophiles.

The end point of the Catalogue would be that scholars should be able to
 glean useful material from it, evaluate the MSS (through the procurement of
 microfiches and microfilms), and compare them with the present-day state of our
 knowledge. This would enable us to determine (a) how far a given civilization
 had evolved with respect to a given field, (b) what causes led to the stultification
 of further investigations in that particular field, and (c) how far political and
 socio-economic factors were responsible for progress or decline in that particular
 field.

I am fully cognizant of the fact that such a project not only needs untold
 labour but also a widow’s crust of resources by way of finance. But the Muslim
 World has that money and there is no shortage of dedicated personnel who would
 consecrate themselves to this task. And further manpower for such a project
 could be made available. This project would undoubtedly be held to be the most
 major project in the field of learning. I am also fully aware of the fact that no
 one can fully discharge his responsibilities towards such a project which abounds
 in innumerable pitfalls and imponderables. The same limitation applies to the
 Muslim contribution to science. The number of simples, for instance, in Greco-
 Arab medicine had increased by the 18th century A.D., from about 1,500 to
 over 10,000. How much of it was due to the Muslims and how much due to
 extraneous sources is impossible to estimate. This is partly due to the fact that
 most of the information lies packed in MSS which grace the stacks of libraries all
 over the world and very few persons have really bothered to properly assess their
value. Dust upon dust has been accumulating upon this negligence for centuries. May I be permitted to suggest that this indifference constitutes one of the major factors of negligence in the field of learning. This negligence has at its root different motivating factors, but one of the principal factors is indifference towards Muslim contribution.

May I, for example ask, why is it that in the world-renowned Gray's Anatomy, the "Galenic Vein" is mentioned up to the thirty-sixth edition, but finds no mention in the subsequent editions?

It was a Belgian-born American, George Sarton, who clearly established in his monumental Introduction to the History of Science that Ibn al-Nafis, was the first to offer an explanation of the circulatory system of blood. Yet all the textbooks of the East and the West ascribe its discovery to the physician of the Stuart Age, Sir William Harvey. What, similarly, is the position of the Abu-l-Qasim al-Zahrawi in the field of surgery, of al-Jazari in machines for drawing water, of Jabir ibn Hayyan in unit processes, of Ibn Sina in diagnostic medicine, of al-Razi in clinical study, and so on? Very few have really addressed themselves to specific problems of technology. Were sand-glass not in use in Central Asia by the time of Babur, the founder of the Mughal empire, he would not have bothered to describe with such curiosity the water clocks of the Sub-continent in Baburnamah.

I have raised these two points in view of the fact that the hesitation behind this lack of interest in such a survey is due to prejudice in unearthing these treasuries of Muslim thought and science. But can such a hesitation be held just
in an era which is dominated by humanistic tendencies?

It can be said without any doubt that the materiae medicae compiled by Muslims and non-Muslims e.g. Moses Maimonides, who wrote Sharh Asma al-Uqqar (شرح أسما الظفار = Exegesis of plant names) and Kitab al-Musta'ini (كتاب المستتين) by Ibn Biklarish al-Israili during the Islamic hegemony have no counterparts in any other literature. From about 500 simples in the time of Dioscorides, by the time of Ibn al-Baitar (13th century A.D.), the number of simples had multiplied tenfold. Dioscorides' description of many of the drugs is rather vague. Muslims, especially al-Biruni and Ibn al-Baitar who possibly knew Greek, not only established the individuality of a plant through description but also through synonyms. They were quite close to the Linnaean system. They could, for instance, distinguish legumes, umbels, boraginaceae, labiates, and liliaceous plants from each other. Another major contribution by them is the discovery of succedanea (substitute = إبدال الأداة). The number of plants incorporated by them as simples in medicines are legion:

Embelic myrobalan (النافورة), Zanthoxylum spp. (البصل), Berberis aristata (الضف)، liquorice (النضوس)، Amberboa divaritica (الغزراة)، Artemisia spp. (البذاردة)، Mélia azadirachta (الزاد درخت)،

Nardostachys jatamansi (النادردين)، spices from East Indies, and many more which need not be mentioned here. Many drugs of the classical times were given new significance. Plants of the family Labiate (الشفرة) are a case in point. Asafoetida (الانجدان) is a Muslim discovery.

Muslims are, in fact, the pioneers and formulators of natural drugs
medicine. They classified the effects of drugs according to humours and temperament, and, by using them for treatment purposes, kept them as close to nature as possible. Keeping in view the enjoinment in the Qur'an and the Tradition that all ills and hindrances should be abjured in the cause of learning, they went unchecked along charted courses in quest of knowledge. And thus we have Abu Hanifa al-Dinawari, the author of the Kitab al-Nabar (كتاب النبات), al-Biruni, Ibn al-Baitar and Ismail al-Jurjani in materiae medicae compilation; Ali bin Abbas, al-Razi and Ibn Sina in therapeutic medicine. The author of the Firdaus al-Hikmah (فردوس الحكمة) al-Tabari, was a Christian who became a Muslim. The contribution did not end with these giants. The very fact that work is still being done upon these simples and that Greco-Arab medicine is being practised all over the Sub-continent attests to the glorious past of the Muslims. Not only this. Man today is fed up with the drastic medicines of the allopathic system, and wishes to seek refuge in natural drugs, so sympathetic so pleasing to the eye, so well-known, and so unfearsome.

It is a fact that every ailment has its cure in a specific plant, and that behind every plant are studies and investigations in an endless chain, it should be acknowledged that we should give credit to the Muslims for their contribution to medicine. Full justice to such a credit and acknowledgement can be given only through an assessment of materiae medicae in the MSS stage and detailed investigations upon them, so that the routes along which diagnostic principles have evolved, active principles from drugs have become converted into synthetic
drugs, and drug therapy has progressed may be studied and Muslim contribution assessed.

It should not be however, forgotten that the therapeutic effects which were formulated by the Ancients and their Muslim successors have not been refuted so far. If anything, investigations on them are continuing. Colchicine (سوزن), ephedrine (المدام), and a host of alkaloids are all plant products. Dindivan and its analogues are the synthetic counterparts of dicoumarol isolated from spoilt clover (الفرنفل). No doubt, these are life-saving synthetic drugs, but, barring a few exceptions, they issue forth from active principles of plants.

Plants taxonomy with respect to natural drugs is something of a problem today. Such problems can be answered by MSS which need to be elucidated.

Part II

Famous Names and their Works

During the rise of Islam in Damascus and the subsequent foundation of the Baghdad University in the glorious days of Harun al-Rashid, the system of learning received a great deal of impetus, and translations of Greek books into Arabic were taken in hand. Valuable books on Unani medicine were written by the Arab physicians and many of them were translated into Latin and other languages. Surgery had a recognized position in the then educated world through the efforts of the Arabs. In fact the Arabs played a prominent part in the spread of various sciences including Unani in the West.
The reputation of Arab medical literature was so high that books by Arab and non-Arab Muslims were included in the curriculae of all the medical institutions both in the East and in the West.

The rise of the Abbasids inaugurated the epoch of greatest power and prosperity. At the very dawn stands the lofty figure of Jabir ibn Hayyan (the Geber of the Medieval Latin literature). He is famous as the father of Arabic alchemy. About a hundred alchemical works ascribed to Jabir are extant.

Hunain ibn Ishaq (809–77) translated the whole corpus of Galenic writings. He translated Galen's *Aphorisms* as well as the great *Synopsis* of Oribasios, *Materia Medica* of Dioscorides and seven books of Paul of Aegina. His own compositions are nearly as numerous as his translations. Among his most renowned books are his *Questions on Medicine* and *Ten Treatises on Eve*.

Thabit ibn Qurra (825–901) of Harran in Mesopotamia prepared 'pandects' which is divided into 31 sections. The subjects treated are hygiene, and hidden and general diseases.

In physics, some 265 works are ascribed to al-Kindi. His *Optics*, preserved in Latin translation, influenced Roger Bacon and other Western men of science.

Al-Razi (865–925) is the greatest physician of the Islamic world and one of the greatest physicians of all time. His scientific output exceeds 200 works, half of which are medical, the most celebrated being "On Smallpox and Measles" (كتاب الجدرى الحصبة) which was translated in various languages and printed 40 times between 1498–1866. *Al-Hawi* (الحاوي في الطب) is his greatest medical work.
Ibn al-Jazzar (d. 1009) produced his work *Traveller's Provision* which was very popular with medieval physicians. It was translated into Latin.

Ali Abbas (Haly Abbas, d. 994) composed an excellent and compact encyclopaedia *The Royal Book* (Liber Regius in Latin), i.e. *Kitab al-Maliki*. It deals with the theory and practice of medicine.

Abu Ali al-Husain ibn Sina (Avicenna, 980-1037) whose influence in European medicine has been overwhelming, is the author of the gigantific work *al-Qanun fi-l-Tibb* (= Canon of Medicine) which deals with general principles and philosophy of medicine, simple drugs, bodily diseases, special pathology, materia medica and pharmacopoeia. Some 15 other medical works of Avicenna are known together with about 100 writings by him on theology, metaphysics, astronomy and philosophy.

Abulcasis (d. c. 1013 A.D.) wrote *al-Tasrif* (التسريف) in 30 sections, the last of which deals with surgery.

Ali ibn Ridwan (Haly Eben Rodan, d. c. 1067) produced a fine topography of Egypt.

Abu Mansur Muwaffaq of Herat wrote in Persian about 975 treatises on simple drugs. *Book of the Foundations of the True Properties of the Remedies* (الابتة من حقائق الأدوية) describing 585 drugs, being the most famous of them.

There were many treatises of the same type in Arabic, among them are those of Masawaib al-Mardini and Ibn al-Wafid. These were translated in Latin and printed some 50 or more times.

Ibn al-Baitar (d. 1248) wrote his pharmacological treatises called
Aqrabadhin. (الاقرباشن) He composed "A Collection of Simple Drugs" which describes more than 1400 medicinal items. It is a work of extraordinary erudition and observation and is the greatest Arabic book on medicinal botany.

Ibn-Zuhr (Avenzoar), died in Seville in 1162. His chief work is al-Taisir (التسير). He linked surgery, therapeutics and pharmacology into a homogeneous whole.

Ibn Rushd (Averroes d. 1198) the disciple of Avenzoar, wrote some 16 medical works. His Kitab-al-Kulliyat fil-tibb (كتاب في كليات طب) General Rules of Medicine was translated into Latin under the title of Colliget.

Ibn Khatimah (d. 1369) wrote a book on the plague which ravaged Almeria in Spain in 1348-49. This treatise is far superior to all the numerous plague tracts edited in Europe up to his time.

As for the bio-bibliographical works of high importance for the study of Islamic medicine and science, the Tarikh al-hukama by al-Qifti (d.1248) contains 414 biographies of Greek, Syrian and Islamic physicians, astronomers and philosophers. It is a mine of information.

No less important is the Source of Information on the Classes of Physicians by Ibn Abi Usaybi'a (d.1270). It deals with the lives and works of over 600 medical men.

SUMMARY

Contribution to Medical Science

(1) The Arabs introduced the principles of observation and experimentation
in the field of all scientific investigations.

(2) Arabian scholars did not accept the Greek doctrine of the four elements. Abul-Barakat vehemently criticized the theory of conversion of one element into another.

(3) The humoral doctrine was accepted by the Arabs as well as the theory of Individual Nature (Tabiat-al-Insan = طبيعة الإنسان). Avenzoar made many changes in therapeutics and proved that Nature rules over the human body, and is, by itself, capable of curing many diseases.

(4) They also believed that blood is always in circulation, food is fuel for maintenance of body heat, and digestion is in reality a kind of decomposition.

(5) They knew the existence of three small auditory ossicles in the internal ear.

(6) Arab anatomists established that the mandible bone is a single bone, and not two separate bony pieces as believed earlier. Similarly the skull comprises eight and not seven bones.

(7) Ali Abbas mentions that there are three layers in the walls of blood vessels.

(8) Hunain ibn Ishaq (809–873) in his book Ten Dissertations on the Eye (العشر مقالات في العين) says that the brain, though it appears very soft, has a structure similar to that of a nerve.

(9) Abul Faraj known as Ibn al-Quff in his Al-umdatat Fil Jarahat says that in the nerves there are canals and passages through which the impulses of sensation and movement travel along the body.
(10) Ali Husain Gilani in his commentary of the Canon has referred to the movements of intestines (حركه الأمعاء الدودية).

(11) Arab physicians also proved that absorption of nourishment was mostly effected through intestines rather than from stomach.

(12) They also knew that chyle passed to the liver from the intestines.

(13) They knew that the process of digestion began in the mouth, when food was acted upon by certain digestive secretions.

(14) They knew about sour juice in the stomach.

(15) Liver, according to them in addition to producing other humours, is also a source for blood formation.

(16) The Arabs knew of the presence of the lens in the eye and of the theory of vision.

(17) The modern germ theory has a close reference to Avicenna's discussion on it.

(18) Abul Hasan Tabari was the first to describe the itch-mite (Qarad-i-Jirb).

(19) Razi first described the difference between smallpox and measles.

(20) Tuberculosis was material infiltration and that organs other than the lungs could be affected by it independently.

(21) Dry dressing was stressed by Avicenna.

(22) Spinal paralysis was due to injury within the medulla or cord according to the Arabs.

(23) Soft cataract was treated by the Arabs by the lens through a hollow needle.
Trocar and cannula were used by them for removing the peritoneal fluid in abdominal dropsy.

They knew well the use of stomach tube with which they performed gastric lavage in cases of poisoning.

**Contribution to Surgery & Midwifery**

The Arabs used preparations like *hashish*, *(Cannabis–indica)* with alcohol for inducing unconsciousness prior to surgical operations.

The Arabs were the pioneers in midwifery.

Abu–I-Qasim al-Zahrawi was the greatest Arabian surgeon and invented many surgical instruments.

The Arabs performed operation of brachetomy.

They introduced operation for crushing and removing stones from the bladder.

They knew the procedure of stopping haemorrhage by cold applications, thermocautery of wounds, use of other cauterizing agents and application of silk ligatures.

**Discovery of New Drugs & Therapeutic Agents**

Razi was the first to introduce mercury ointments and to use cold water application in typhoid.

The use of water-bed *(farshma)* is an Arab contribution.
(34) Extractives and extracts ( العناصر ) confection, ( العناصين ) elixirs, ( الأكاسير ) decoctions, ( الفنفوغ ) infusions ( الطبيخ ) aquas and distillations, plasters, pills, chemicals like sulphuric acid and nitric acid, alcohol and vinegars were introduced in therapeutics by them.

(35) Chemistry (al-kimya) was introduced by Jabir ibn Hayyan.

(36) Arab contribution to medicine abounds. Many new drugs like cassia, rhubarb, camphor, senna leaves, tamarind and alcohol were introduced by them in pharmacology.

(37) They introduced the system of diagrams and illustrations.

(38) They knew the use of zinc and other metallic pipes in water supply system.

We admire the wonders of science, but the greatest wonder of all is their genesis. It is an incontrovertible fact that modern medical science is an "accumulated goodness of centuries". Twentieth century science, if analysed very carefully will reveal an abundance of medieval roots. What the Arabs have discovered and added to the Hippocratic and Galenic tradition has been so profound, so far-reaching and so imperceptibly merged into the corpus of modern medical knowledge, that it is almost easy either to ignore them or to underestimate their influence. The medical world that the Arabs left as a legacy to posterity was visibly different from the world that they inherited. Today when we are celebrating the passage of fourteen hundred years of Islam and advent of the 15th Century Hijri, it behoves the Islamic World in particular and the rest of the World in general not to lose sight of this fact. In the words of George Sarton "It is the best part today of our inheritance and tomorrow of our legacy, and we must be worthy of it".