

UNIVERSALISM IN MEDICINE THROUGH THE AGES – I

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Introduction

In the Indian Holy Book – THE UPANISADS (800 B.C.), man has been described as “the son of the Sublime” (“Amritasya Putra”). It is recorded in the first chapter of the Book of Genesis (First Book of Holy Hebrew Bible [The Old Testament (c. 200 B.C.)]) that God made man in his own image after his likeness as the crowning glory of his creation. The Holy Koran (c. 630 A.D.) says : “God sends down no malady without also sending down no remedy.

Since man was formed in the divine likeness, God being considered as the source of all truth and goodness, so mankind must possess this inherent goodness not, perhaps, always apparent in a world torn by war and bloodshed, famine, greed, oppression and discrimination.

It is, however, this inherent goodness reflected in the healing activities of mankind which every culture and race has given witness to in all periods of time. This positive element in human nature is seen among the most primitive peoples, developing in different cultures in different ways throughout the world as a thread of continuity linking the brilliant discoveries of the medical sciences of our own time with what has gone before. This continuance of humanity’s wellbeing and this positive side of human nature may be further stimulated to ever new medical discovery in the years to come.

There was always interchange of ideas between East and West-that have been a mutual stimulant to medical thought in both hemispheres. It was a stimulus based both on the continuity of the medical heritage of the past in its preservation and development within different cultures and

the contact between these cultures that gave rise to a synthesis of ideas which has been of mutual benefit to all peoples all over the globe.

Following the fall of the Roman Empire around 400 A.D., when Western Europe sank into the Dark Ages (400–1000 A.D.) of semi-barbarism the great corpus of classical Greek medical literature was preserved in the emergent Islamic Empire of the Eastern Mediterranean. Here, many medical works of ancient Greece were preserved in Arabic translation which would otherwise have been lost. Medical knowledge was further advanced especially in the fields of materia medica and Alchemy. Alchemy in the predecessor of modern scientific chemistry. It was an art by which its devotees sought, with the aid of a mixture of mysticism, astrology, practical chemistry and quackery, to transmute base metals into gold, to prolong human life, etc. It flourished from about 500 A.D. till the Middle Ages (1100–1500 A.D.), when it gradually fell into disrepute.

Under the Abbasid Caliphs (749-1258 A.D.) Baghdad became the centre of Islamic science, largely due to the high esteem in which Christian physicians were held who acted as translators from Greek into Syriac and Arabic. The preservation and advancement of scientific knowledge in the medieval Islamic World transcended cultural and religious differences, so great was the admiration of the Arabs for the heritage that had been passed to them.

When Europe began to emerge from centuries of political and social upheaval, the West was again in a position to turn its attention to more positive pursuits for the benefit of its peoples. During the twelfth and thirteenth centuries, European contact with the Islamic world increased, especially following the Crusades (1096-1272 A.D), and interest grew in Islamic science in general and the Hellenistic corpus of medical literature it preserved. Crusades are Holy Wars authorized by the Pope in defence

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of Christendom and the Church. "Hellenistic" is the term used conventionally to refer to the period that runs from the death of Alexander the Great (356–323 B.C.) to the end of the Ptolemaic dynasty and the Roman annexation of Egypt (30 B.C.). Many works were translated from Arabic into Latin, resulting in an intellectual summer of Islamic influence in late medieval Europe. Spanish Jews, fluent in Arabic, were the natural intermediaries from East to West of medical and scientific knowledge preserved in Arabic. Further impetus to this intellectual awakening in Europe was given by the invention of printing in 1454 with moveable type, while the Renaissance (1500–1700 A.D.) followed closely by the Reformation in 16th century Europe aroused fresh interest in the Semitic languages of the East, particularly Hebrew, the language of the Old Testament (Hebrew Bible).

Trade, missionary activity and finally politically exigency brought the great trading nations of the West into contact with the Indian subcontinent. The Portuguese, Dutch and British all came and marvelled at the magnificence of India which was to become the jewel in the British Crown when, in 1858, its administration was transferred from the East India Company. From the early years of Western contact a stream of medical knowledge relating to plants and spices, descriptions of diseases and surgical practices hitherto unknown was brought back to Europe. India in turn benefited from the great developments in the medical world of eighteenth and nineteenth century Europe. Hospitals were established and medical colleges set up to provide instruction in the latest medical techniques. Concurrent with this interchange of ideas between the Western system of medicine and those indigenous to India or long extant in the subcontinent, these systems themselves were interacting, particularly the Ayurvedic system of Ancient India and the Unani or Greek system which had come to India with Islam. Today, the Western and indigenous systems coexist, complementing each other without any concept of rivalry or competition.

Similar medical practices are known to have been carried out in different parts of the world quite independently. Circumcision was performed for reasons of hygiene by quite disparate peoples living in hot climates in different parts of the world. Similarly, variolation was practised by the peoples of Asia and Africa where it was realized from time immemorial that those who contracted smallpox and survived never experienced a recurrence of the disease. The practice of variolation was introduced to Britain in the eighteenth century by the wife of a British Ambassador to the Ottoman Porte, who had witnessed it performed at Constantinople. Although it became

fashionable for a while, risk of infection lost its popularity. Almost a century was to pass before the West could give the East Jenner's vaccination – the use of cowpox as a thoroughly safe means of immunization against smallpox. Countless numbers in both East and West have benefited since, and now smallpox has been eradicated. We are grateful to Edward Jenner (1749-1823).

Since the seventeenth century the West has been aware of many of the traditional medical practices of the Far East, especially China. Jesuit missionaries, who were held in high esteem by the rulers of imperial China, recorded much of what they witnessed. It is not, however, until comparatively recent times that the ancient medical skills of China, particularly Acupuncture, have achieved acceptance in the West. Now medical practices employed from antiquity in China are also used in the West to treat numerous disorders. It was not, however, until the nineteenth century that a serious attempt was made to bring the benefits of Western medicine to the peoples of the Far East, when Jennerian vaccination against smallpox was introduced to Macao in 1815. Medical missionaries played a major role in setting up hospitals, dispensaries and colleges for the dissemination of Western medicine and instruction. It was they who saw the need for translations of Western medical textbooks into Chinese and were pioneers in developing a vocabulary to convey medical concepts hitherto unknown to the Chinese. Japan received a large part of her medical heritage from China and it was here that Westerners first saw Acupuncture practised. Western medicine in Japan owed much to Philipp von Siebold (1804-1885), the distinguished German physician and scientist, whose fascination with Japan is an epic in itself.

Preservation of Classical Greek Medicine in the Islamic World

Islam has been defined as a "crossroad of cultures" since it stands at a point of contact between Judaism, Christianity and Islam, between the ancient cultures of the East and West which in turn produced Islam's own distinctive science and culture. This synthesis of ideas was a process which began before the rise of Islam as the inevitable result of contact between different peoples through commerce and trade. With the decline of the Roman Empire around 476 A.D. in Europe and the rise of Christianity, the burden of Greek learning passed from the former to the latter. Under the Abbasid Caliphs (749–1258 A.D) Baghdad became the centre of Islamic science, largely due to Christians acting as translators from Greek into Syriac and Arabic and the famous bayt al-hikma, 'House of Wisdom' directed by Hunayn ibn Ishaq (d. A.D. 873), a

Nestorian Christian priest and physician. The passing of knowledge from one dispensation to another preserved much of the corpus of classical Greek medicine which would otherwise have been lost. In the world of Islam the practical application of medical skills, empirical observation and development, particularly in the field of *materia medica*, further enhanced it until the West was sufficiently civilized to receive once more this corpus of medical literature, apply and yet further develop it into the medical knowledge of Renaissance Europe (1500–1700 A.D.) and later.

Accepted as the Father of Modern Medicine, Hippocrates (460–357 B.C.) is universally acknowledged as one of the greatest clinical physicians of all time. He dissociated medicine from superstition, systematized the empirical knowledge which had accumulated in Egypt and in the schools of Cnidos and Kos, and established inductive and positive medicine. The importance of the Hippocratic corpus was fully appreciated by the Arabs who both translated and thereby preserved much of it and quoted from it in their own writings.

The Aphorisms of Hippocrates (known in Latin as *Aphorismi*) were commented on by Galen (129–200 A.D.), as well as by other physicians. Several Arabic translations were made including one by Hunayn ibn Ishaq entitled *al-fusul*. The work comprises short sentences devoted to general medical science.

The Prognostics of Hippocrates (known in Latin as *Prognosticum*) was a popular work to which also Galen wrote a commentary. Several Muslim writers also wrote commentaries to this work, known in its Arabic translation as *taqdimat al-ma rifa*.

Galen (129–200 A.D.) was known in Arabic as Jalinus. In the annals of medicine in antiquity he occupies a place second only to Hippocrates and, from his numerous dissections, of course, of animals and observations advanced the knowledge of anatomy, physiology, embryology, pathology, therapeutics and pharmacology. Galen's medical works were particularly admired by all later Islamic physicians who translated them in their original form, as well as in summary, commented on them and wrote works based on them, so ensuring that the authority of Galenic medicine should remain unimpaired until the sixteenth century. In fact, he was a "Medical Dictator" till the seventeenth century.

The Christian culture of Armenia also provided a home where medical texts from classical Greece survived that otherwise might have been lost.

Abu Bakr Muhammad ibn Zakariyya al-Razi, (865–925 A.D.) known in the West as Rhazes, was a philosopher, as well as a physician; little of his philosophical writings still exist, but his medical writings have, to a large extent, survived. The most famous of these, *al-Hawi*, known to the West in its Latin translation as *Continens*, comprised an encyclopaedia of medicine drawn to a large extent from Greek, Syriac, Indian and Arabic writings.

The *materia medica* and therapeutics of the Persian physician – Haly Abbas (d. 944 A.D.) was based on the writings of the famous Greek physician and naturalist – Pedanius Dioscorides (1st century A.D.) and Galen, with addition of local indigenous familiar drugs.

Al-Tafsir al-aqqir wa-badalaha is a 'treatise on pharmacy' written by Abu ibn I'Qasim Khalaf ibn Abbas al-Zahrawi, known as Abulcasis (936–1013 A.D.) in the West. He lived in the golden age of Moorish Spain's (711–1492 A.D.) intellectual activity. His great medical encyclopaedia *Tasrif li-man ajiza an al-ta 'alif*, comprising some thirty treatises on a great variety of medical topics, includes the preparation of drugs by sublimation and distillation, but the most important part is the three books devoted to surgery, largely based on the Greek works of Paul of Aegina (c. 640 A.D.). The importance of Abulcasis was largely overlooked in the Muslim world due to Islam's aversion to surgery, but in Christendom Abulcasis enjoyed immense fame and his work was translated into Latin at an early date.

Abu 'Ali al-Husayn b. 'Abd-Allah ibn Sina Avicenna (980-1037 A.D.) wrote his first philosophical work at the age of 21, but to earn a living he entered the administration where his judgement was appreciated and his counsel sought. Following a court intrigue, Avicenna was forced into hiding and earned a livelihood by medical consultations. He spent the closing years of his life at the court of Isfahan, where he became court physician and lecturer on medicine and philosophy. He died at Hamadan in 1037 A.D., allegedly from overwork and riotous living. Of the two *hukama* (physician philosophers), Avicenna was the better philosopher and Rhazes the better physician. However, much of Avicenna's writings survive, his most celebrated medical composition being *al-Qanun fi al-tibb*, the ordered summation of all medical knowledge all the time, which formed the basis of medical teaching in both Europe and the East. The numerous commentaries on the work witness the regard in which it was held by successive writers.

Al-Qanun fi al-tibb is a monumental encyclopaedia of medicine, which bears a certain similarity to Galen's

writings, to which it refers. There is also a considerable resemblance to Rhazes' earlier al-Hawi, both in the arrangement of the contents and the structure of the indexes. Al-Qanun, however, superseded earlier works, including to some extent those of Galen, and remained supreme for six centuries. It appears in the oldest known syllabus of instruction given in the school of medicine at Montpellier, and Geoffrey Chaucer (1345–1400 A.D.) – the first great poet of the English nation in the Middle Ages (1100–1500 A.D.) – reminds us in the Prologue to his most famous work, though unfinished, *The Canterbury Tales*, that no physician should be ignorant of it. Book III, al-amrad al-juz'iyya – 'Head to Toe Diseases' – begins with diseases of the brain and ends with pains of the joints, sciatica and finally diseases of the nails.

Transmission of Islamic Medicine to Medieval and Renaissance Europe

The preservation of the medical tradition of ancient Greece in the Islamic world, and the synthesis that resulted, was a source of interest to the West which was stimulated following the Crusades. During the twelfth and thirteenth centuries, Europe's contact with the lands of Islam increased, and many medical works were translated from Arabic and introduced to the West, resulting in an intellectual summer of Islamic influence in medieval Europe. In the work of translating from Arabic into Latin, Spanish Jews, who were fluent in Arabic, were the natural intermediaries. The fall of Constantinople in 1453 and the resulting emigration of many Byzantine scholars to the Italian peninsula gave rise to a full-scale revival of interest in Hellenic culture in the West, which was further aroused by the printing of the Gutenberg Bible in 1454, the date acknowledged as the beginning of the use of moveable type. This revolutionized the world of learning and, for the first time, brought the knowledge of science and scholarship to a much larger public. During the following century the Reformation stirred a fresh interest in the original languages of the Bible. Hebrew was studied and some attention paid to the other semitic languages, especially Arabic. An increasing interest in Islam was further aroused by expanding trade with the Near East and travel in the Islamic lands, the collecting of manuscripts, and the teaching of grammar and history.

Zerahiah Gracian (fl. 1280), of a prominent Hispano-Jewish family chiefly connected with Barcelona, translated from Arabic into Hebrew the first two books of al-Qanun of Avicenna. At about the same time Nathan ben Eliezer ha-Me'ati (fl. c. 1290) completed in 1279 in Rome his translation of al-Qanun. Nicknamed the 'Prince of

Translators' he is considered one of the greatest translators of medical works from Arabic into Hebrew.

Of the several works included in the Hippocratic corpus that were made available to the West in Latin translation, the best known and most widely disseminated was the Aphorisms. They were known to the Latin-speaking Church Fathers, St. Jerome and St. Augustine of Hippo, who quoted them in their writings. There is debate as to the earliest translations which generally appeared with a commentary. However, a twelfth-century translation of Burgundio of Pisa (d. 1193) was held in high esteem. It was made from the Greek text and was more highly regarded than the translation from Arabic made by Constantine the African (d. 1087) a century earlier.

The Aphorisms in Latin translation known as Aphorismi, of Hippocrates were still cited in the nineteenth century as 'the physicians' Bible'. The collection of disjointed and terse statements on the medical art, with the well-known opening phrase : 'Life is short, the art long, opportunity fleeting, experiment treacherous, judgment difficult ...' was made synonymous with the medical art by Alighieri Dante (1265-1321 A.D.) [*Paradiso*, Canto XI, 1.4].

The encyclopaedic work, *Kitab al-Hawi*, composed by Rhazes, devoted to medicine, contained many extracts from Greek and Indian authors along with observations of his own. As a result, Rhazes was acknowledged by both the Islamic world and the West as the greatest clinician of the medieval period. It was translated into Latin. The entire work *Kitab al-Hawi*, known in its Latin translation as *Continents*, was first translated by Faraj ben Salim in 1279, together with a glossary. Of Sicilian-Jewish origin, and a physician, Faraj ben Salim was employed by Charles of Anjou to translate medical works, and became one of the greatest translators of the time.

Articella or *Ars medica* was a collection of classical writings brought together in the twelfth and early thirteenth centuries by Salernitan authors to serve as a basic curriculum of medical instruction. At first, the collection comprised the Aphorisms and Prognostics of Hippocrates, a brief Galenic treatise known by various titles including *Ars medica* or *Ars parva*, an Arabic introduction to Galenic medicine composed by Hunayn ibn Ishaq, known in Latin by various titles including *Isagoga ad Tegni Galeni*, and short tracts on the tools of diagnosis employed by the medieval physician.

Galen's commentary on the Aphorisms of Hippocrates in the Latin translation of Constantine the African (d. 1087) forms part of *Articella*. Constantine the African was the

first great translator from Arabic into Latin. Many of his translations were medical writings. Having travelled extensively in the East, he became proficient in Arabic and for a time taught at the school of Salerno, Italy, the earliest scientific school in Christendom. He enabled the school to take advantage of his Islamic experience, as well as its own Greek tradition and so to become the earliest distributing centre of medical ideas in Europe.

Al-Qanun fi al-tibb was translated into Latin by Gerard of Cremona (1114-1187 A.D). Although the importance of al-Qanun for medical instruction in both the East and the West had previously been unquestioned, the Renaissance brought a strong reaction against it. Leonardo da Vinci (1452-1519) rejected the anatomy of Avicenna but, for want of another vocabulary, used Arabic terms. Aureolus Theophrastus Bombastus von Hohenheim Paracelsus (1493-1541) burnt a copy of the Canon at Basle and William Harvey (1573-1657) dealt it a final blow by publishing his discovery of the major circulation in 1628.

Gerard of Cremona, an Italian, spent most of his life in Toledo, where he translated over 70 works, a formidable record by any standard. It is thought that he possibly directed a school of translators in Toledo and that some seemingly later translations were ascribed to him due to his reputation as the translator par excellence. From this translation of al-Qanun a number of new technical terms were introduced to the West which were derived from Arabic, e.g. saphena (safun), vena basilica (al-basilig).

Medicine in India : Coexistence and cooperation

Over two thousand years ago a national system of medicine covering all aspects of health and disease was developed in India. It was known by the Sanskrit word Ayurveda, which means “the knowledge of life”. The most ancient Indian medical works extant—encyclopaedic compilations of medical knowledge—date from between 200 B.C. and 200 A.D. They discuss in detail the types of illness suffered, their causes, diagnosis and treatments, the conduct and training of doctors and the preparations of herbal remedies. With increase in communication these works became familiar outside the subcontinent. They were translated into Arabic and quoted by Physicians in their writings in Persia and the Near East.

The Muslim invasions of the twelfth century by Moghul Emperor Zahiruddin Muhammad Babur (1493-1530) brought to India the Islamic system of medicine known as unani medicine, based on the ancient Greek theories of Hippocrates and Galen, which had been developed by Islamic philosophers and physicians such as

Rhazes and Avicenna. Ayurveda and Unani medicine were not mutually exclusive, but enjoyed a complementary coexistence.

With the Portuguese, who occupied Goa on the west coast of India in 1510, came ideas and influences from the West. Later, the Jesuits, associated with Portuguese trading, introduced aspects of European science during 1556-1605 A.D. to the Mogul court of Akbar (1542-1605). The Dutch and French East India Companies brought with them scientists and physicians who introduced many of the new ideas and advances of seventeenth-century Europe and, at the same time, brought back from India medicinal plants and knowledge hitherto unknown in the West. In 1600 the English East India Company was established. This was to have far-reaching implications for the subcontinent where British influence became by far the strongest of Western influences. In the centuries that followed there was an interchange between Western and indigenous systems of medicine, which today exist side by side complementing each other both in the subcontinent and in the West.

Between the 5th and 4th centuries B. C., Susruta compiled an abridgement of Ayurveda in sections in the form of dialogues, which were re-edited a century or so later. Susruta is thought to have been a member of a commission of eight sent to study medicine under Dhanwantari, Raja of Benares. The work, known as Susruta Samhita, covers a wide range of medical topics, including pathology, embryology, anatomy, therapeutic and surgical treatment, and toxicology. It gives special emphasis to surgery, describing techniques and about 1,000 surgical instruments, with pre- and post-operative care. Susruta was translated into Arabic under the title Kitab Susrud and referred to by Rhazes.

The replacement of the nose by plastic surgery was described by Susruta in Chapter 16 of the Section called sutra-sthana from the Susruta Samhita. Susruta's description in Sanskrit describes how a flap of skin in size corresponding to the mutilated nose was raised from the cheek and sutured in place after being correctly shaped. The operation was dressed with red sandal wood powder and white cotton soaked with sesame oil. Susruta is considered as the “Father of Ancient Surgery”. On October 9, 1794, an operation to replace the nose, hitherto unknown in the West, was reported in the Gentleman's Magazine.

Cowasjee, a Mahratta, who had served in the British army as a bullock driver, was captured by Tipu Sultan and mutilated by having his nose and one of his hands cut off. Twelve months later his nose was replaced by an operation thought to have been practised for centuries in India and similar to that described by Susruta.

The operation was carried out by placing a thin plate of wax against the truncated nose, which was flattened and then laid against the forehead. An outline was cut around the wax on the forehead. A slip between the eyes was preserved to allow circulation between the old and new parts. An incision was then made in the stump of the nose which passed around both alae and went through the upper lip. The skin was then brought down from the forehead and being twisted half round its edge was inserted into this incision, so that the nose was formed with a double hold above and with its alae and septum below fixed in the incision.

After various minor adjustments, a dressing was applied and the new nose healed into place and was secure. The scar on the forehead after a time became scarcely noticeable (*The Gentleman's Magazine*, 64(2), 1794, pp. 891, 892).

Surgical instruments were classified in two groups in Ayurveda – the blunt instruments (yantras) and the sharp (sastras). There were 101 yantras, but the hand was considered the most important, since the use of all instruments was dependent on it.

Description of *Rauwolfia serpentina* is given in Chapter 5 of *Kalpasthanana* of *Susruta samhita*, where it is referred to by its Sanskrit name *Sarpagandha* as a drug that should be administered on its own or with two or three others as an antidote to poison.

Rauwolfia serpentina, referred to in *Susruta Samhita* as *sarpagandha*, is a word derived from the Sanskrit *sarpa*, a serpent, and *gandha*, a snake. *Susruta* prescribed the root as a decoction used as an antidote for bites of poisonous reptiles and insect stings, but it was also used in India as a sedative. During the latter half of the twentieth-century scientific analysis has isolated some of the alkaloids in *Rauwolfia serpentina*, the most important being reserpine, which was identified in 1952. It established its place in the treatment of hypertension and anxiety. It is no longer used as such, because it causes severe depression, but it is an essential experimental tool in the exploration of autonomic nervous system.

Charak-Samhita (1000 B.C. –1000 A.D.) is considered to be classic of ancient Hindu Medicine (Ayurvedic Medicine). The Indian materia medica was extensive and consisted mainly of vegetable drugs, all of which were from indigenous plants. *Charak* knew 500 medicinal plants, and *Susruta* knew 760. They also used minerals (sulphur, arsenic, lead, copper sulphate, gold, etc.) as drugs. The physicians collected and prepared their own vegetable drugs. Among those that eventually appeared in Western

pharmacopoeias are cardamom and cinnamon. The original *Charaka-Samhita* is a record of the work of *Atreya's* pupil, *Agnivesa*. In its present form, it is a combination of works of three authors – *Agnivesa*, *Charaka* and *Drdhaval*. In the 8th century A.D. this work was translated in Persia and Arabia.

In the past there has been much speculation as to whether the Greeks derived any of their medical knowledge from the Hindus (India). Mid-20th century expert opinion held that there was certainly inter-communication between Greece and India before the invasion of India by *Alexander the Great* (356-323 B.C.) in 328 B.C. Medicine is today, and was in the past, always universal. In fact, the famous German archeologist and historian, *Hugo Winckler* (1863-1913) discovered clay tablets written in Hittite and Cuneiform hieroglyphics around the 13th–14th century B.C. at *Boghazkoy* in Turkey (Hittite Empire of the day), where names of Vedic gods and ancient Indian systems of medicine were mentioned. The clay documents are now kept in the museums at *Ankara*, *Istanbul* in Turkey, and some in *Berlin*, Germany. *Winckler's* account of his work on the excavation at *Boghazkoy* was first published in 1907 and then in 1913.

Unani medicine (Unani meaning Greek system of medicine) was the medicine practised in classical Greece which had been preserved and nurtured by the Arabs. With the Islamic conquests of India and the establishment of Mogul rule came *tibb-i unani*, which functioned alongside the indigenous ayurvedic system. Muslim rulers patronized practitioners of the unani system, who were known as *Hakims*, as well as practitioners of ayurvedic medicine, or *Vaids* as they were called.

The Unani medicine was translated into Punjabi – entitled "*Khair marukh*" – and was composed in verse by a poet called '*Isa* and completed at *Lahore* in 1744. The treatise describes various diseases and disorders along with their cures. It gives in detail various types of tuberculosis (*diqq*) and the different oils and extracts from plants used as a cure.

The coexistence of the Ayurvedic and Unani systems of medicine in medieval India was due to some extent to the similarity of both systems, especially in relation to the humours of the body. Although the Ayurvedic system was based on the three humours, air, bile and phlegm, and Unani developed the four-humour hypothesis of blood, phlegm and yellow and black bile, practitioners of both systems attempted to correlate the two. It is an example of this syncretism of the two systems. *Kavi-tarang* was composed by *Sitaram* in 1703 and written in devanagari. In the

introduction the author explains how physicians came from a foreign land to Hindustan and compared their medical system with that of Caraka and other Ayurvedic writers.

The Portuguese arrived in India in 1510 when they captured Goa. Later, in 1534, Garcia d'Orta (1501-1569), a Jewish physician, was appointed personal physician to the fleet bound for India at that time. Possibly d'Orta left Portugal out of scientific curiosity and adventure and to escape religious persecution.

From his observations, d'Orta composed his *Coloquios dos simples, e drogas he cousas medicinaes da India ...* printed by J. de Endem in Goa in 1563. This work has the distinction of being the first medical work printed in India, and only the third book to be printed on any subject in the subcontinent. The book written in the form of a dialogue includes a classic description of Asiatic cholera hitherto unknown in Western Europe. D'Orta consulted with native physicians and was not afraid to contradict the accepted medical authorities of the time. D'Orta's observation of plants constitutes the beginnings of pharmacognosy as we know it today, scrutinizing almost all the important drug plants and species of the East. The importance of these studies can be best appreciated when it is remembered that Europe had little or no information on any of these drugs. Indeed *Nux vomica*, from which strychnine is derived, was entirely unknown.

Christobal d'Acosta (c.1515-1580), a member of a prominent Jewish family, embarked for India in 1568 as physician to the Portuguese Viceroy. During his sojourn in India he met Garcia d'Orta whose *Coloquios* he much admired. However, he noted the lack of illustration in the *Coloquios*, which he made good in his own publication *Tractado de las drogas, y medicina de las India orientales, con sus debuscada al bivo*, printed in Burgos in 1578. Much of the text was lifted from d'Orta's *Coloquios*.

Jacobus Bontius was the youngest son of J. Garaert de Bondt, the first occupant of the chair of medicine at Leyden University. In 1626 he was appointed doctor-apothecary and surgical inspector in the Dutch East Indies and requested by Leyden University to collect herbs in India for study in the university's botanical garden. Although a close student of Garcia d'Orta and Christobal d'Acosta, he recognized that they accepted many facts second-hand.

Bontius described beri-beri disease, so called from the Singhalese word meaning weakness. This is one of the first descriptions of the disease endemic in India and the East.

Georgius Everhardus Rumphius (c. 1627–1702) sometimes known as 'the Pliny of India', was sent by the Dutch East India Company to the island of Amboina – part of modern Indonesia – to study useful and otherwise remarkable plants on the spice islands. Pliny – the Elder (23–79 A.D.) – in full name, Gaius Plinius Secundus, was a Roman scholar and wrote a 37 volume encyclopaedia – the *Historia Naturalis* (77 A.D.). Chiefly remembered as the author of *Herbarium Amboinense*, a classic repeatedly published, he described "all such plants, herbs, animals, etc., as I came across during my time of residence in India...". *Rauwolfia serpentina* was apparently first illustrated in the *Auctuarium* of this work published in 1755.

Modern Medicine in British India

'The Governor and Company of Merchants of London trading into the East Indies' was founded by Queen Elizabeth I on 31st December 1600. The first expedition of four ships under James Lancaster left Torbay towards the end of April 1601 to return from Sumatra with a cargo of spices in 1608.

Captain Hawkins obtained an imperial firman from the Mughal Emperor (1605–1627) Salim Jahangir (1569–1627) to build a factory at Surat in 1612, which marks the beginning of British settlement in India. Although the early British presence in India met with opposition from the Portuguese and Dutch, and later the French, British influence ultimately prevailed and in its wake Western medicine took root in the subcontinent. Following the Indian Mutiny, the administration of India was transferred from the Company to the British Crown. The first Viceroy was appointed on the 1st November, 1858, at a grand durbar held at Allahabad, and Queen Alexandrina Victoria (1819–1901) proclaimed Empress of India. In 1947 India gained its independence as a republic within the British Commonwealth.

In 1613 John Woodall (1556–1643) was appointed Chirurgeon General to the East India Company. He had already served as a surgeon to Lord Willoughby's regiment in 1591 and subsequently spent several years in Germany, Poland and France before returning in 1603 to London, where he apparently acquired a large practice. Although widely travelled and holding a position in the East India Company, Woodall never in fact visited the subcontinent. On his appointment as Chirurgeon General he was in his own words charged with the duties of 'ordering and appointing fit and able surgeons and surgeons' mates for their ship and services and also fitting and furnishing of their surgerie chests with medicines, instruments and other

appurtenances thereunto, which credit and weightie charge so nearly concerning the lives of their servants reposed in him, instigated him to employ all his endeavours to answer thus so great trust imposed upon him.'

Woodall fell from favour and was discharged from his duties as Chirurgeon General but continued to furnish the surgeons' chests till 1643, which he resigned. He died later that year.

Woodall advocated fresh fruit juice in the prevention and cure of scurvy over a century before the Scottish doctor, James Lind (1716–1794), published his treatise on scurvey in 1753.

Hospitals and Medical Education in European India

The first hospital established by Europeans in India was founded by the Portuguese following the capture of Goa in 1510. It was administered by the Jesuits and from 1703 provided rudimentary medical education, which later developed into the School of Medicine and Surgery founded in 1842.

The East India Company established the first hospital under its auspices in Madras in 1664. This hospital was later used by the military, but others were erected in the eighteenth and nineteenth centuries in Madras, Bombay, and elsewhere in British India.

The first institution of some importance for medical instruction was a School of Native Doctors founded with the government's approval in Bengal in 1822. In 1827 medical classes in the Unani system of medicine began in the Calcutta Madrassa, and the Sanskrit College began to teach the ayurvedic system. These institutions of medical instruction came to an end in 1835, when a committee appointed by Lord William Henry Cavendish Bentinck (1774–1839), Governor General of India (1828–1835) recommended a medical college for instruction in the various branches of medical science in the most approved European system. The college was established in 1835, and the first examination held on 30th september, 1838. The Medical College Hospital was established in 1848, and the Medical College affiliated to the University of Calcutta in 1857. The Calcutta Medical College is the oldest in India.

Lack of text books in the vernacular was a great problem to the teaching of Western medicine in India. The problem was addressed by Frederic John Mouat (1816–1897), who was Assistant Surgeon in the Bengal Army, Secretary to the Council of Education of Bengal and Professor of Materia Medica and Medical Jurisprudence in the Calcutta Medical College. In the introduction to his

anatomical atlas Mouat wrote : 'During the past year much attention has been paid to the want of class-books in their own vernacular language for the pupils of the military school.... The only works upon European medicine extant... are....chiefly in the Nagree character which is only understood by Hindu native doctors....'. Mouat was assisted in the preparation of his atlas by Moonshi Nusseerudin Ahmad. It shows the anatomical structure of the shoulder, arm and hand described in Urdu.

Smallpox inoculation – Oriental, African and Occidental

The practice of smallpox vaccination is a tale of global transmission of medical knowledge, even in those days when distance mattered. For centuries immunization against smallpox had been practised by variolation in the East before its introduction to the West.

However, by the beginning of the eighteenth century a number of reputable British and European physicians became aware of this and reported their observations of immunization which they had witnessed when visiting the Near East. The Scots physician, Dr. Peter Kennedy, described variolation in his book, *An Essay on External Remedies*, published in 1715, and Dr. Emanuel Timoni's account of variolation as practised in Constantinople was reported to the Royal Society in 1714. However, variolation was not seriously accepted until introduced by Lady Mary Wortley Montagu (1689–1762), wife of Edward Wortley Montagu, who was sent as British Ambassador to the Ottoman Porte in 1716. While in Turkey, Lady Mary became much interested in variolation and had her son, Edward, inoculated in 1718. It was however, the interest which Lady Mary aroused in the Prince and Princess of Wales on her return to England and the subsequent inoculation of Princess Amelia and Princess Caroline that made inoculation fashionable in England.

Due, However, to risk of infection to those inoculated and to those around them, variolation was not widely accepted by the medical profession in Britain until Jenner's discovery of vaccination with cowpox was published in 1798. Variolation was nevertheless widely practised in different ways, but on the same principle by many of the peoples of Asia and Africa. It had long been recognized that those who contracted smallpox never experienced a recurrence. From this observation it became obvious that a mild occurrence of the disease gave immunity from it. This was achieved by injecting the matter from infected pustules, which activated a mild infection and resulted in immunization. The Arabs among others practised this technique and referred to it as 'bringing the smallpox'.

The first detailed account of smallpox to have survived was composed by Rhazes in the tenth century. It was a masterpiece of Islamic medicine in which he carefully described the symptoms of smallpox and measles. The work in its original Arabic entitled *Kitab al-jadari wa-l-hasba* was translated at an early period into Syriac and Greek. Thirteen translations from Greek into Latin were printed between 1498 and 1586 under the title *De pestilentia*. The first translation direct from Arabic into Latin did not appear until 1747 under the title *De variolis et morbillis*. This famous translation of John Channing (c. 1702–1775), an apothecary, described as ‘natu et civitate Londinensis’ on the title page was printed in London by William Bowyer in 1766. This remained the definitive translation until the beginning of the present century.

William Sherard, the British Consul in Smyrna, to whom the Royal Society turned for collaboration of Dr. Timoni’s account of variolation, made enquiries from his friend Dr. Pilarino, who had previously lived in Constantinople, where he had witnessed variolation as early as 1701. In reply to Sherard, Pilarino published a short treatise printed in Venice by Gabriel Hertz in 1715 under the title *Nova et tuta variolis excitandi per transplantationem methodus, nuper inventa et in usum tracta*. This was forwarded by Sherard to the Royal Society, where it was introduced at the meeting held on 24th May, 1716, and reprinted in the Society’s *Philosophical Transactions* that year. Although a more critical account than that of Timoni, both reported the same method of engrafting the matter taken from the pustules of an infected patient into a healthy patient, so activating a mild occurrence of the disease and consequent immunization.

Pilarino’s treatise was dedicated to William Sherard, British Consul in Smyrna.

A letter written by Lady Mary Wortley Montagu, wife of Edward Wortley Montagu, Ambassador Extraordinary to the Ottoman Porte, from Adrianople to her friend, Mrs. Sarah Chiswell of Nottingham, described the practice of variolation which she had observed in Constantinople. She described the scratching open of the vein with a large needle and putting ‘into it as much of smallpox venom as could lie on the head of the needle’. On her return to England, Lady Mary had her daughter Mary, later Countess of Bute (1718–1794), inoculated, the first person inoculated in Great Britain.

Following the initial excitement of its introduction, variolation as practised in the Near East and introduced to Europe during the first decades of the eighteenth century

was not widely practised due to risk of infection. It was not until the end of the century that the major discovery of vaccination against smallpox was made by Edward Jenner (1749–1823), who observed that a person inoculated with the cowpox virus, instead of smallpox, would develop a mild case of cowpox and then recover, having thereby achieved immunity from smallpox although, curiously enough, not from cowpox.

He published his discovery in his epoch-making book *An Inquiry into the Causes and Effects of the Variolae Vaccinae*, London, 1798, which is displayed. The opening exhibited describes how the matter was taken from the hand of a dairy maid (see illustration displayed) who had been infected by her master’s cows and was then inserted into the arm of a healthy eight year old boy. Jenner reported that the boy reacted to the inoculation, but when subsequently inoculated with the matter from the pustules of a smallpox victim, experienced no ill effects.

Variolation had been practised in Africa for many centuries and was known in some parts as ‘buying the smallpox’. In 1728, Cassem Aga, the ambassador from Tripoli to Great Britain and a Fellow of the Royal Society, described inoculation against smallpox as it was then practised in Tripoli, Tunis and Algiers. In his account he described how he, with his brothers and sisters, were brought to the house of a girl infected with smallpox, where they were all inoculated by engrafting matter from pustules of the smallpox victim into an incision on the back of the hand between the thumb and forefinger. A mild infection followed, resulting in immunization.

In his report to the Royal College of Physicians, John Holwell (1711–1798), a survivor of the Black Hole of Calcutta, commended the Indian technique of inoculation and its success which he claimed had been used in India to prevent smallpox ‘since time out of mind’. Although the method fell short of Jenner’s use of cowpox, the use of matter drawn from the pustules resulting from inoculation was an improvement on the method introduced to the West by Lady Mary Wortley Montagu, which used matter from the pustules of a smallpox victim with the resultant risk both to patient inoculated and those around. Holwell’s account was published in 1767.

Dr. James Moore (1763–1834) made a thorough investigation into the origins and treatment of smallpox in various parts of the world. He claimed that its antiquity in India was witnessed by the sacred books and mythology of the Hindus. Dr. Moore described how inoculation was practised from remote antiquity by Brahmins. The skin

material from a slightly infected patient, so minimizing the risk of infection. These methods are described in the 60th volume of I-tsung chin-chien, 'The Golden Mirror of Medicine', a compendium of medical works composed by 84 scholars under the editorship of Wu Chiten in compliance with an imperial order and first published in 1742.

The first official record of an epidemic of smallpox in Japan dates from 735 A.D. and is claimed to have come from Korea. Through the centuries the Japanese employed various methods to control the dreaded disease, such as hanging ropes of plaited straw at the entrance to homes.

Following the success of vaccination in India, the East India Company sent a supply of vaccine to Canton. It arrived there in October 1803, but turned out to be a failure. It was not until the Spring of 1805 that Jenner's inoculation using cowpox was successfully introduced to China, when a Portuguese merchant, acting on the orders of the King of Spain, inoculated members of his ship's company during the voyage from the Philippines. Dr. Alexander Pearson (d. 1836), one of the East India Company's most distinguished surgeons, was present in Macao at the time and he, along with Portuguese practitioners in Macao, proceeded to vaccinate some of the local population, usually drawn from the poorest in the community. The populace were already aware of the importance of inoculation, so that the successful introduction of Jenner's vaccination provided a firm foothold for Western medicine in China.

Alexander Pearson wrote a treatise on the European style of vaccination in Chinese entitled *Ying-chi-li kuo hsi-ch'u chung-tou ch'i-shu*. The translation was by Sir George Staunton (1781–1859), son of Sir George Staunton (1737–1801), historian of the celebrated embassy of Lord MacCartney to the Emperor of China in 1792.

In the Report of the National Vaccine Establishment for the year 1816 it was reported from Canton that "Dr. Alexander Pearson of the Factory of the East India Company writes that vaccination is very favourably received there and is extended throughout the whole of the province of Canton. He has sent us a Chinese treatise on was rubbed by a piece of cloth which afterwards became the prerequisite of the Brahmin. A few slight scratches were made on the skin and some cotton which had been soaked for a year in variolous matter moistened with a few drops of holy water drawn from the Ganges was bound on the incisions. Prayers were recited to propitiate Sitala, the goddess of smallpox. The bandage was removed in six

hours and the infection developed, after which the patient recovered and was immunized.

Inoculation against smallpox using Jenner's method of cowpox vaccination did not reach India until 1802. Since cowpox did not affect cattle in India, the matter generated by the pustules for vaccination was unavailable and had to be imported from Europe. However, due to the length of time taken to reach India by sea, it was not possible to keep the vaccine in an active state, except by transferring it overland, John Shoolbred (d. 1831) described how the Earl of Elgin, British Ambassador in Constantinople, having had his own seven-day-old infant vaccinated, had some vaccine forwarded to Bombay. This, however, failed and it was not until early in 1802 that vaccine reached Bombay via Baghdad and Basra through a chain of inoculated patients. The first person to be inoculated in India was a three-year-old girl, Anna Dusthall, in 1802. From this patient the precious cowpox vaccine was sent to Poona, Surat, Hyderabad, Ceylon and Madras. Later that year vaccination reached Bengal and Calcutta.

The successful inoculation of Anna Dusthall in Bombay provided the inoculum matter that enabled vaccination to be brought to several places, including Ceylon. Thomas Christie (1773–1829), Medical Superintendent in Ceylon, published in 1811 a description of how the vaccine reached Ceylon.

Smallpox has long been known in China. It was first described by Ko Hung in the third century A.D. He referred to it as Hun pox because it was thought to have been introduced into China at the time of the conflict with the Huns at Nan yang. Inoculation was probably introduced around the first millennium, several different methods being used. These included smallpox scabs rubbed down in water and inhaled, the pulverizing of smallpox scabs for inhalation through a silver tube or placing the undergarment of an infected child on a healthy one. Great care was always taken to use only vaccination, in the original, together with a translation by Sir George Staunton".

Proof of the popularity which vaccination had reached in China by 1817 is witnessed by the publication in that year of the first Chinese tract on the subject. Yin-tou lüeh, composed by Ch'iu-Hsu, a pupil of Pearson. Ch'iu-Hsu included the tract of 1805, but added his own observations and incorporated many Chinese ideas. The "discovery of vaccination is ascribed to a western foreign doctor named Chan-na (Jenner) and the story of its journey from Manila to Macao by ship which had children on board for the purpose of keeping up the supply of lymph, is related".

(to be continued)

Key Facts & Summary. Medical knowledge during the Middle Ages was derived from antiquity (in particular from Hippocrates and Galen). Medieval civilisations carried out medical practices that today are considered unhygienic, hazardous, and unreasonable. Its Regimen Sanitatis, a compendium of domestic medicine in the form of proverbs, was among the most popular books of the Middle Ages. Women were admitted to the School, but it is not certain whether as nurses, midwives, or physicians. Mundinus of Bologna dissected two cadavers, but he saw them through the eyes of Galen and Avicenna, and added nothing to the development of anatomy. The University of Paris outlawed surgical operations and clinical examinations.