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HISTORICAL REVIEW OF MEDICAL EDUCATION

by

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Ever since man has existed, he has been in need of the healing art. In the words of Colonel S.M.K. Mallick: "All phases of human activity - progress and setbacks, poverty and wealth, trade and crafts, arts and literature, poetry and philosophy, laws and social customs, economic strifes and wars - have been interlinked with the healing art, whether it was in the guise of magical rites or in the garb of religious practices, astronomical juggleries or applications to natural phenomena. ... Nations have risen and fallen, wars and revolutions have come and gone, civilizations have appeared, matured, decayed and died; but that noblest expression of human aspirations to deliver men from physical and moral disabilities has maintained its unity of purpose throughout the ages." **

The earliest authentic history of medicine comes from the land of the Nile, through the papyri which were buried in the tombs, and probably goes back to the Pyramid Age (2600-2200 B.C.). The oldest papyrus which contains incantations against a hundred diseases of infants, dates back to the 16th century, B.C. This papyrus, like others which have come to us, is regarded by Sigerist *** and other historians, as a copy of an earlier text, probably of the period of Dynasty III in the time of King Zoser. Papyrus Edwin Smith and papyrus Eber are also both considered to be 1600 B.C. documents. The beginning of papyrus Smith consists of fragments of the "Book on the Vessels of the Heart" and

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** Proc. First World Conference on Medical Education, London, Oxford U. P. 1953 · 30

*** Sigerist, H.E. - A History of Medicine - Oxford U. P. 1955

"Book on Wounds", and contains, "prescription for a woman's disease, cosmetic recipes, one for ailment of the anus and one of great magic to transform the old man into a youth." Papyrus Eber is closely related to papyrus Edwin Smith and contains a collection of monographs and excerpts. Other important papyri are, papyrus Hearst and the Berlin papyrus. From these papyri, one can imagine the development of medicine that had taken place in the Pyramid Age.

Sigerist reports that, when Herodotus (5th century B.C.) visited Egypt he was struck by the fact that there were so many specialists. In his second book he says, "medicine with them is distributed in the following way: every physician is for one disease and not for several and the whole country is full of physicians; for there are physicians of the eyes, others of the head, others of the teeth, others of the belly, others of obscure diseases." * This, according to the visitor, was not a new phenomenon, but had been in existence ever since the Pyramid Age. One may be inclined to assume that the specialization was due to medical knowledge being so highly developed that the individual physician could no longer cover the whole and specialization became unavoidable. The medical profession appears to have been very highly organized as there was, at the time, a strict hierarchy among physicians, and doctors were divided into four major ranks; 1) physician without special attribute, 2) chief of physicians, 3) inspector of physicians, 4) superintendent of physicians. The best physicians were attached to the King's court. For his education as a doctor, the young man had to attend the school of the scribes, and special schools existed for the training of doctors in connection with the Temple. In those early days, existence of medical schools, which flourished and subsided, is revealed by a 6th century B.C. document which gives details of how Darius I of Persia who was then ruling Egypt, sent one of his Egyptian functionaries, chief physician Uzahor-Resenet II to Sais with the mission of restoring the "house of life", which had flourished there in the past, to give instruments and equip the two houses with all their students, and place them under the direction of wise men.

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* Sigerist, H.E. - A History of Medicine - Oxford U. P. 1955

From the papyri we learn that the Egyptian physicians were keen observers and emphasized careful history taking, careful observation and inspection of "not only the sick man's body, but what came out of him - urine, faeces, what came out of the cough and blood." The medical treatment applied was limited and consisted basically in using chemical, physical, biological and psychological forces to act on the patient.

With the invasion of Egypt by Alexander (330 B.C.) Greek medicine started to influence Egyptian teaching; though, no doubt the Greeks also learned a great deal from Egypt. The Hippocratic treatises described some of the practices which we learnt from the papyri. An example that may be given is the method of reduction of the dislocated mandible which is described in papyrus Edwin Smith and also by Hippocrates.

At the same time as medicine was developing in the land of the Pyramids, another seat of medical learning grew in Mesopotamia. There, the writing material was not papyrus and ink as in Egypt, but soft clay into which the cuneiform signs were drawn with a stylus. Fragments of cuneiform tablets have been found, which tell of the first period of Mesopotamian history, the classical Sumerian Age (3000-2000 B.C.). The Sumerians developed a culture lasting for thousands of years, elements of which are still in existence today. The early Mesopotamian medicine was dominated by religion, but during the Amosetic rule there took place the divorce of religion from law and, to some extent, medicine. The Code of Hammurabi (1848-1806 B.C.) enshrines the code of medical ethics which raised the standard of medical men to a very high level, first by the remuneration which they were to receive at a substantial figure and secondly by the punishments they received for transgressions due to ignorance. To this the Babylonian physician responded by high standards.

Fragments of the cuneiform tablets of the time contain literature very similar to the Egyptian. First the symptoms are listed, then the observations of the physician are followed by his diagnosis which was magical, rational or aetiological. The art of prognosis seems to have been greatly developed. Mesopotamian medicine has been called rational medicine as diagnosis was based on a rational analysis of symptoms and treatment was logical. Jaundice is described as an important symptom complex - "if a man's body is yellow, his face is yellow..... jaundice is the name of the disease." Gonorrhea is described as an occurrence of renal calculus and a distinction is made between

the hard and the soluble stones. The purpose of diagnosis was not only to ascertain the character and seat of an illness, but also its cause. Mesopotamian materia medica was very similar to that of Egypt; there appeared to be strict laws to safeguard health, and the beginning of public health goes back to those times.

Our knowledge of Persian medicine is on firm ground from the Zoroastrian era. This is believed to have started between the 11th and 7th century B.C. The Avesta or Zoroastrian Bible gives us a great deal of information from ceremonial laws mentioned therein. Zoroaster's sacred book enlarges upon the ideal at which all priest-physicians should aim. This ideal is admirably summed up by Maneckji Nusservanji Dhalla: "The first indispensable qualification of a physician is that he should have studied well the science of medicine. He should be a man who has read much, and remembers much, of medical subjects, who has great experience of his profession, who hears the case of his patients with calmness, who is painstaking in diagnosing the disease of his patient, who knows the various bodily organs and understands their functions, who treats his patient conscientiously, who is sweet-tongued, gentle, friendly, zealous of the honour of his profession, averse to protracting the disease for greed of money and who is Godfearing. An ideal healer who heals for the sake of healing, he is the best among healers. The second in rank in the profession is he who practises his art, actuated by the desire for reward and renown in this world. The third in point of honour works both for the sake of merit and money, but gives preference to the first. The fourth in position of nobility in his profession is the physician who rates money higher than merit. The lowest in the scale is the greedy and heartless physician, who dishonours his noble profession." *

In the Zoroastrian era, public health reached its highest standard. Utmost attention was devoted to removal of dirt, purification of drinking water, prevention of contagious diseases; and the house-fly was described as the most injurious of all creatures. The Achaemenian rulers assumed responsibility for the provision of public health, especially keeping drinking water pure, and it was also their responsibility to build hospitals and provide them with physicians and medicines.

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* Dhalla, M.N. - Zoroastrian Civilization - New York 1921

Zoroaster's code for the physician is like that of Hammurabi. The Avesta requires the healer of the body to undergo a test of his ability, before he is allowed to begin to practise, and the surgeon to perform three operations to prove his skill. The teaching of medicine was done in many places and in large hospitals, especially at Ray, Hamadan and Persepolis. Three kinds of practitioners emerged from the schools: 'healers with holiness', 'healers with the law' and 'healers with the knife'. The first were the most highly trained, and they were probably the physicians. The 'healers with the law', were probably public health workers, who were called the 'masters of health' and they aimed at removing the causes which gave rise to disease. The 'healer of the body', a good physician, should, according to the Dinkard, "be provided with an income that would enable him to live in a house situated in a prominent locality and furnished with the necessary furniture. ... He should have wholesome food, sufficient dress, and swift horses." *

According to Elgood,** "The status of medicine, therefore, in primitive Persia, judging from such fragmentary knowledge as has survived, was more advanced than that of Assyria. It is not too bold to go even further and claim that the Persians taught the Greeks the elements of their system of medicine, which has been known ever since as Greek medicine. In 700 B.C. the Greeks showed no sign of culture, much less of science. Yet 200 years later so developed were their sciences that Hippocrates was able to write medical treatises that gained for him the title of Father of Medicine. It is hardly possible that the Greeks should have evolved for themselves the system which is now known as the Hippocratic system in those two centuries. Besides, the vocabulary of Hippocrates gave every evidence of being newly made. There are no signs of dialectic decay. Structures are called after every-day objects. Parts of the body are in many cases given a name of Indo-European origin. Other names are frankly Babylonian. Even the Greeks themselves recognized their humoral theory to be an exotic product and in the fashion of the time labelled it Persian. Though by this they only meant foreign. ...The doctrine of the humours is taught in unmistakable terms in the holy books of Hindus which were composed prior to 2000 B.C. From India the theory seems

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* A Medical History of Persia, C. Elgood, Cambridge University Press, London 1951:18

** ibid 19

to have spread to Persia, and the Persians, who seem in matters scientific always to be torch-bearers rather than torch-lighters, carried the doctrine on....."

* With the invasion of Alexander close contact between the Greeks and the Persians developed. The Greek texts were translated by masters like Hunayn. In Persia of that period, workers of all faiths cooperated and the frontiers of medical science were without any limit. The teaching of Hippocrates, Galen and Avicenna had come to stay, and many schools of medicine developed.

The great school of medicine at Edessa, which was followed by a still greater school at Jundi Shapūr, about 350 A.D., was at its height when the Arabic invasion took place early in the 7th century A.D. and was left undisturbed. Under Islamic influence, the school at Jundi Shapūr became the greatest centre of medical learning; but the growth of the Caliphs' capital at Baghdad, during early 9th century A.D., drained it of its best teachers. A special development of the school was the emphasis laid on the bed-side teaching of medicine in the hospital, which was also followed at Baghdad. The medical teaching centre of Baghdad prospered till the start of the Mongol period.

A medical event of some interest is that about the middle of the reign of Nushiran (6th century A.D.) a general meeting of physicians was held by his orders at Jundi Shapūr to discuss medical problems of the time. The assembly was presided over by the Royal Physician Jibra II, the Iranian Durustpāt.

Many illustrious figures of prolonged and global fame emerged from the period of Islamic medicine. Abu Bakr Mohamed Ibn Zakaria Al Razi (841-926 A.D.), known in the West as Rhazes, was the first physician to start a modern highly organized hospital service. He introduced the practice of medical consultants under which patients were seen by increasingly skilled attendants until only the complex problems came to the master. Rhazes wrote abundantly and his works are among the most important of the Islamic School of Medicine; his chief works are: Al-Hawī or "Continens", which was translated into Latin for King Charles of Anjou in 1279 and printed at Brescia in 1486; and Kitab-ul-Hawīfi il Tibb or "System of Medicine" some of which has been translated into English

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* For the following historical material, useful references may be obtained from: Browne - Arabian Medicine, Cambridge University Press, London 1921
Campbell - Arabic Medicine, London 1916

by Professor Browne and also by Max Meyerhof. Husayn bin "Abd-Ullāh Hasan bin Aly bin Sina" (known in the West as Avicenna) (980-1030 A.D.), who has been called by Sir William Osler "Prince of Physicians", and his great "Canon of Medicine", "Al Qanun", "the most famous medical textbook ever written and the medical Bible for a longer period than any other book", had great depth and breadth in his writing of one million words; this book was used in the medical schools of Europe for seven hundred years. It has been recently translated into English by Gruner (London 1930).

As is evident from the writings of Ibn El Shanun in the 9th century, and Ibn El Gamaa in the 14th century, in that period medical education was codified and a new philosophy developed. This is depicted by Nizami (1140-1203 A.D.) in his book "Gehar Maqala" (Four Discourses), when he gives the qualifications of a physician of those times as: "The physician should be of tender disposition, of wise and gently nature and, more specially, capable of deriving the unknown from the known; and no physician would be of tender disposition if he fails to recognize the nobility of man, nor of a wise and gentle nature unless he be acquainted with logic, nor an acute observer unless he is supported by God's guidance." * The same philosophy is illustrated by one of the well-known prayers of a 12th century physician, Ebn-e-Maymoun: "Oh, Lord, grant me an opportunity to improve and extend my training, since there is no limit to knowledge. Help me to correct and supplement my educational defects as the scope of science and its horizon widen day by day. Give me the courage to realize my daily mistakes, so that to-morrow I shall be able to see and understand in a better light what I could not comprehend in the dim light of yesterday. Bless me with a spirit of devotion and self-sacrifice, so that I can treat and heal Thy suffering servants and prevent and preserve health to the best of my ability and knowledge." **

At the same time as the Egyptian, Babylonian and Persian were developing, there also grew up the Indus Valley civilization, which is approximately five thousand years old. Our knowledge about medical development in this civilization

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* Quoted by Tigani El Mahi in his paper on the Undergraduate Teaching of Psychiatry and Mental Health Promotion at the WHO Expert Committee on Mental Health in 1960.

** Quoted by Jehan S. Saleh - Proc. Second World Conference on Medical Education, Chicago 1959 . 641

is meagre but, as has already been stated, we know that the humoral theory of disease was developed by the Hindu physicians about 2000 B.C. The importance that medical education received at that time is evident from the emphasis that was placed on the quality of the pupil and the qualifications of the medical teacher. Sushurta Samhita (1000 B.C.), is the most representative book of Ayur Veda or Hindu Medicine, and lays down the qualifications for those who plan to study the healing art: "He should be of tender years, born of a good family, possessed of a desire to learn, strength, energy of action, contentment, character, self-control, of good retentive memory, intellect, courage, purity of mind and body, and simple and clear comprehension..." * The attributes of a teacher, have been specified by one of the great Hindu teacher physicians, Charaka (500 B.C.) "whose precepts are sound, whose practical skill is widely approved, who is clever, dextrous, upright and blameless; one who knows also to use his hands, has the requisite instruments and all his senses about him, is confident with simple cases and is sure of his treatment in those which are difficult; of genuine learning, unaffected, not morose or passionate, and who is likewise patient and kind to his pupils." (Lakshmi Pathi 1944) **

In the Far East, the healing art was also developing. During the Sung dynasty (960-1280 A.D.), the court physicians were the teachers in the canonical books of medicine. During the Mongol dynasty (1280-1368), the Emperor Khublai introduced medical examinations and a system of licensure based on examinations. The first medical school in China was established under the Ming dynasty (1368-1644 A.D.) at Peiping.

In the Western World, medicine was developing under the Greek civilization. In south-western Italy, a medical school had been established at Croton (5th century B.C.), Democritus (5th century B.C.), Hippocrates (460-350 B.C.) and Galen (130-200 A.D.) further expanded the theoretical and practical aspect of Hellenic medicine, which spread far and wide to the east as well as the west. Throughout the Greek world, as examplified by the Hippocratic oath, teaching was through the relationship of the physician-father, and medicine was learned

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* Quoted by S.M.K. Mallick - Proc. First World Conference on Medical Education, London, 1953 : 33

** Quoted by John F. Fulton - Proc. First World Conference on Medical Education, London, 1953 · 18

by apprenticeship. Two types of doctors were trained: free doctors and those who were merely to become their assistants (Laws of Plato). Medical teaching of the time was based rather on experience than on books, practical training being acquired from the physician-father. Books were used, but only as adjuvants and never replaced practical experience.

The first school of medicine of mediaeval times in the Western World came into existence probably in the 9th century on the shores of the Tyrrhenian Sea in the town of Salerno and was inspired by the cultural forces of the Greeks, Latins, Jews and Arabs, which had persisted through the Middle Ages. By the 12th century, in Europe the students from Salerno founded medical schools in France, Spain, Portugal and England; the earliest were those of Paris and Montpellier. At Montpellier, the receding tide of the 8th century Arab invasion which had left its mark, must have influenced physicians trained there.

Medicine of the Middle Ages was closely linked with theology, since the clergy were the most learned men of the time. Roger Bacon, one of those theological physicians, was the first to emphasize the importance of acquiring knowledge through original research, rather than from existing authorities.

The 15th century was the age of the Renaissance, when the great Italian schools, specially those of Padua and Pisa flourished. In the following century students crossed the Alps in great numbers and in each university there were different national groups. From those times, efforts have continuously been made throughout the world to improve the principle and practices of medicine by modifications in medical education. In England, Thomas Linacre who studied medicine in Italy, must have realized the forces that he was creating to influence medical education in the future when in 1518 A.D. he founded the Royal College of Physicians in London and also established medical lectureships at the Universities of Oxford and Cambridge.

In the 16th century the "New Learning" transformed medical education in the Western World, and in the 17th century, "Experimental Philosophy" infused new spirit both to medicine and to science. The spirit of the time is reflected in the teachings of Locke and Sydenham. To quote Sir George Newman * (1918),

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* Some notes on medical education in England. A memorandum addressed to the President of the Board. Great Britain, Board of Education - 1918

"Locke and Sydenham...taught that, over and above the university spirit and a university standard of learning, the medical student requires (i) a training in observation and the inductive method, (ii) exercise and practice in his craft, and (iii) some apprehension of the rationale and laws and limitations of Medicine. His dormant faculty of observation will be awakened in his preliminary study of science, and indeed all through his medical curriculum it can be trained and stimulated to become a talent and a habit of keen, serious, patient, continuous seeking, of honest perceiving and of valid reasoning. The student must also have ample opportunity of everyday practice. Medicine is the art of healing not less than the science of disease. 'Our art', wrote Sydenham to Dr. Mapletoft, 'is not to be better learned than by its exercise and use' - not an exercise of healing only in the sense of curing a particular patient, but of learning from each patient increased power in the art of healing all similar patients."

Early in the 19th century students began to find their way more often to French schools, where Corvisart, Laennec, Bischat and Larrey were the harbingers of modern medicine. Later in the century it was to Germany where practical laboratory teaching was first established with the universities, that the progressive students of medicine sought admission. It was in those laboratories that the sciences of chemistry, physics, pathology, physiology, and eventually bacteriology matured through the efforts of such leaders as Liebig, Helmholtz, Virchow, Muller, Cohnheim and Ludwig. England offered no formal medical education, except through the apprentice system, till 1858 A.D., when the London schools started enrolling medical students. Medical education in USA was influenced both by the French and German systems of teaching, but the strongest ties were with Edinburgh and London. In America, medical teaching remained as apprenticeship and the more ambitious of those wishing to enter the profession went to Edinburgh, London, Paris and Leyden. The first American School of Medicine was founded in 1765 A.D. at Philadelphia by William Shippen and John Morgan after their studies in Edinburgh.

*The 19th century, started the era of scientific study in medicine. By the mid-century, medicine was an advancing science with scientific facts accumulating, methods developing and the spirit of investigation and observation widely extending.

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* Acknowledgement to the Editor, The Medicus - Pakistan, where some of this material was first published.

Laennec had developed auscultation; John Bright described nephritis; Pinel introduced humane treatment of the insane; Scarpa described arteriosclerosis; Louis founded medical statistics; Bentham directed attention to the important science of preventive medicine and Claude Bernard showed the immense possibilities of experimental medicine and created modern physiology.

A hundred years ago, the march of medical science was being accelerated by some of the greatest research workers of all times, who then guided its progress. Anatomy, especially comparative anatomy, was developing under the influence of masters such as Owen and Gegenbaur and the broad lines of embryology were being put on a firm basis by von Baer; physiology was becoming the main scientific background of clinical medicine of our times due to the work of the famous trio - Müller, Ludwig and Claude Bernard - the fathers of experimental medicine; chemical physiology was developing under the guidance of von Liebig who not only improved the methods of organic analysis, but synthesized the first organic compound - urea; cellular pathology was being introduced by Virchow; mysteries of fermentation and immunology were being unfolded due to the efforts of Pasteur; microbiology was developing under Klebs; biology, especially the origin of species was beginning to be understood through the writings of Darwin; the fight against the ravages of peurperal fever was being won due to the observations of Holmes and Semmelweis; the contagion of disease was being proved by Lister who, by introducing antisepsis, started a revolution in surgery; medicine was fast progressing under great physicians such as Romberg, Charcot and Broca; preventive medicine was beginning to assume the role of the important force that it is today, due to the work of Chadwick; and modern methods in nursing were introduced by the selfless efforts of Florence Nightingale.

A hundred years ago, in 1862, the learned physician must have practised the art of percussion taught by Auebrugger (1761) and used the stethoscope devised by Laennec (1681). The microscope was made by Leeuwenhoek (1632-1723), the ophthalmoscope introduced by Müller (1858) only four years earlier and the sphygmograph two years earlier by Marey. The hypodermic syringe which had been introduced nine years earlier by Pravaz (1853) was gaining popularity and thus opening a new field in the administration of drugs. Maladies in the Eastern Mediterranean area were the same as those in the West where, at that time, there was abundance of malaria, plague, cholera, typhoid, dysentery, etc.,

It may be mentioned that during 1850-1860, according to Charles Singer,* "the proportion of malaria cases to the total number of patients at St. Thomas' Hospital, London, varied between twelve per thousand at the lowest to over sixty per thousand at the highest;" and the average annual death rate during 1871-1880 in England and Wales from typhoid was 332 per million living. Singer estimates that there were in those years "over one-twentieth of the patients in a large London hospital suffering from what we now regard as tropical diseases."

Therefore, to the physician in the Region, a hundred years ago, there came many a patient suffering from ague, which must have been malaria and was successfully treated with "Jesuit's bark" or quinine which had been isolated forty-two years earlier; but the world awaited Laveran (1880) to demonstrate the malarial parasite, Manson (1894) to suggest mosquito-malaria hypothesis and Ronald Ross (1897) to demonstrate the malarial parasite developing in the stomach of an anopheles. Prolonged fever patients must have come, and after Gerhard (1837) must have been classified as typhoid and typhus fever, but two decades were to elapse before Eberth showed the causative organism of typhoid fever and another decade and a half before Widal (1896) found the means of diagnosing this fever by antibody reaction and only in 1944 Schaltz, Bugie and Waksmann gave the world Chloramphenicol for the drug treatment of typhoid fever. Patients suffering from the "bloody flux" must have been successfully treated with ipecacuanha root, which had once cured a French princess, or by its alkaloid emetine; but it was two decades later that Losch (1879) showed E. histolytica in a stool of chronic dysentery and Balengal (1881) described the scientific distinction between bacillary and amoebic dysentery. Haematuria in Egypt had been described in papyrus Eber, but its cause was not known till Theodor Bilharz discovered the agent in the mesenteric vessels of man in Cairo (1852) and Leiper experimentally proved its life cycle, (1918) and the world had also to wait for McDonagh to demonstrate its scientific treatment with intravenous tartar emetic (1918). Angina pectoris was diagnosed after Heberden (1768), but the sphygmomanometer was not available for another two score years until introduced by von Basch (1881) and Einthoven's string galvanometer was not known till the early 20th century (1903). Acute coronary thrombosis with myocardial infarction, now so commonly diagnosed, was not recognized for another half a century until described by Herrick (1912).

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* Singer, C.J. - Short History of Medicine - Oxford Clarendon Press, 1928.

However, patients suffering from dropsy were relieved with a decoction of foxglove, regarding the use of which Withering (1749) had given explicit directions, or by its alkaloid digitalis. Tuberculosis took its toll of health then as now, but it was only in 1883 that Robert Koch discovered the acid fast bacillus, and towards the close of the 19th century that Röntgen (1895) invented the X-ray to visualize the diseased lungs. Cholera which has always been endemic must have been treated with saline infusions into the veins after the method of Sir Christopher Wren, but the vibrio was discovered only after two decades (Robert Koch 1883). Treatment of syphilis with mercury was known, but syphilis must have caused difficulties in the differential diagnosis, as it was only half a century later that Wassermann (1904) suggested his test for diagnosis from the blood, and still a year later, when Treponema pallida was found by Schaudinn (1905) and another five years passed before Salvarsan was made available by Ehrlich (1910). Patients passing copious sweet urine and withering away, as Ibn Sina (1005) had so ably described, must have been many, but the cause and the treatment was not known till von Mering and Minkowski (1890) showed the relationship of the pancreas with diabetes mellitus, and it was only after the first World War when Banting and Best isolated insulin that control of this disease was made possible. Smallpox was endemic and uncontrolled before Jenner's invention of vaccination (1796). The introduction of morphia injections must have been a real blessing to patients suffering from pain and those in agony.

Surgeons, a hundred years ago, were experts at traumatic surgery and satisfactorily used anaesthesia, ether and chloroform, which had been discovered a decade and half earlier. They must have started to wash their hands before operations rather than afterwards, as had been advocated by Oliver Wendell Holmes. Many cases of lock-jaw must have come to them, but the true nature of its cause could not be understood till the work of Lister (1867) and the discovery of Cl. tetani by Robert Koch (1889). The daring surgeon may have attempted to emulate Thomas Spencer Wells at trying his hand at abdominal surgery, but the infection which killed forty-three per cent of Lister's amputation cases during 1864 to 1866 in the pre-antiseptic era, must have discouraged the boldest among them.

The obstetricians of the time made an impression on the public by reducing maternal mortality, due to puerperal sepsis, by insisting on midwives washing their hands before confinements.

The Galenic system of therapeutics with a hundred or more drugs to be included in a single prescription, was the fashion of the early 19th century; although it was about then that Oliver Wendell Holmes (1860) wrote "I firmly believe that if whole materia medica as now used could be sunk to the bottom of the sea, it would be all the better for mankind and all the worse for the fishes." He was further of the opinion that drugs of use were, "quinine for malaria and mercury for syphilis with the possible addition of digitalis for heart disease, colchicum for gout, iodine for goitre and ipecacuanha for dysentery."

New knowledge, new facts, new theories and new methods have all been continuously pouring in with the result that the concept of medicine and the practice of its clinical aspect has throughout remained progressive and dynamic. Imagine the tremendous change that must have taken place in 1867 when Lister introduced antiseptic surgery and less than two decades later when Bergmann (1886) advocated steam sterilization and thus ushered in aseptic surgery. Discovery of the vast microbe kingdom at the rate of nearly one a year; discovery of viruses (Iwanowski 1892) and their disease potential which is increasing every day; the introduction of laboratory medicine, X-rays and radium, have all opened new avenues to our knowledge during the last half of the 19th century. We must not forget that the last year of the last century gave us aspirin (1899).

The 20th century opened with the discovery of blood groups (Landsteiner 1900) which has made such a difference in the clinical practice of our times; and within six years Hopkins (1906) had started us on the modern "band wagon of vitamins", as Walshe calls it. When the present century was only a decade old, Ehrlich (1910) introduced salvarsan and a whole field of chemotherapy was thus opened, which two decades later, Domagk (1932) further extended; Fleming's discovery (1929) of penicillin ushered in an antibiotic age, while Hench and Kendall's (1949) report started a new fashion of steroid therapy. These may be called the highlights of the first half of the present century.

The beginning of the second half of the 20th century, has opened in the age of atomic medicine which has made such bold strides over the past decade that one may compare its future potential with the work of Pasteur and the discovery of the microscope. Atomic medicine has assumed an exciting new role. Now it is replete with a dynamic arsenal of cobalt "bombs", high-energy beams, atomic pellets, atomic thread, and many new techniques which provide eyes for the early diagnosis of diseases and also help in their quicker cure. For the first time,

scientists can get a living and progressive picture of certain physical processes, which was not possible with older research techniques. With tracers and other radioactive research instruments endless new vistas are opening for the atom scientists in the health field. The physician will depend on transducers, Geiger counters, tape-recorders, television cameras and telecommunications, so that everything will be automatically recorded continuously and signalled to him.

In the present era, in countries of the Eastern Mediterranean Region, which have been the cradle of medical science in the past, medical education and scientific development of medicine, have not progressed to the same extent as in other countries of the world. The oldest medical school in this Region is Kasr el Aini, Medical Faculty in Cairo, which was founded in 1828. This was followed by the Faculty of Medicine of the University of Teheran in 1850, King Edward Medical College Lahore in 1860, the American University of Beirut in 1867, the Faculté Française de Médecine, Beirut in 1883, and the Faculty of Medicine, Damascus in 1903. Between the two World Wars, medical schools were started in Khartoum in 1924, and Baghdad in 1927. After the second World War, ten new medical schools have been added, two of them in 1960.