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AN INTRODUCTION TO THE HISTORY OF MEDICINE

BY

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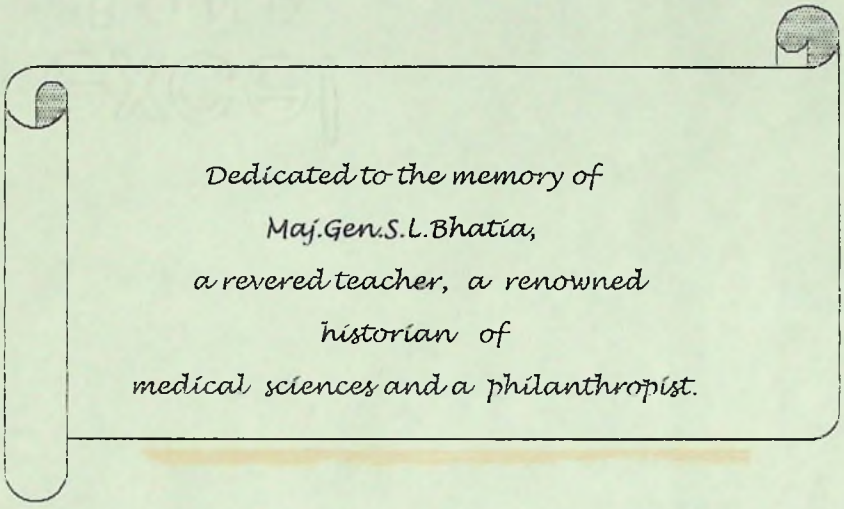
and

SANJAY A PAI

Cover


Dedicated to the memory of
Maj.Gen.S.L.Bhatia,
a revered teacher, a renowned
historian of
medical sciences and a philanthropist.

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FOREWORD

The evolution of medicine as a process of trial and error has marked man's tireless crusade against the ravages of pestilence and disease. This "history of medicine" deserves the attention of medical students and practicing physicians alike, but unfortunately has played a minor role in the medical curriculum todate. Fortunately, I had the privilege of being associated with two colleagues who shared a great interest in the history of medicine: Major General S.L.Bhatia, an Emeritus Professor of the History of Medicine and Dr.Shripad N. Kothare, a pathologist at St.John's Medical College in Bangalore, India. Dr.Bhatia's love and interest in the subject resulted in many publications and in the founding of the Institute of History of Medicine in Hyderabad and later, the Bhatia Museum of St.John's Medical College. Through his generosity, the Museum was well-endowed with his personal collection of books, medical illustrations, and funds. The task of Curator of the Museum was then taken by Dr. Kothare who further organised it and enriched it with his own 13 publications on different aspects of the subject. He has now authored this book with the help of Dr. Sanjay Pai, a young enthusiastic pathologist who is also interested in the historical aspects of the medical sciences. The book provides a comprehensive summary of the vast topic of the practice of medicine all over the world in the preceding six thousand years. This includes the roots of medicine in the third century BC to the Vedas, the arrival of the Aryans, Mohenjo-daro and Harappa, and finally, to our modern medical practices influenced by the arrival of the Portuguese and English. Perhaps the hardships incurred by our predecessors, as is well illustrated in this book, will inspire us in our quest for excellence.

And now, if I may be permitted to end on a more personal note : Shree, as he is known to his friends, has been a good friend and colleague of mine for over 60 years and is noted for his sincerity, patience, diligence, and perseverance in the fields of pathology and now in the history of medicine. I am indeed grateful to him for enabling me and future readers to enjoy his contribution to the education of medical students.

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CHAPTER 1 : INTRODUCTION

This book is compiled with the object of providing the medical student and the layperson an introduction to the evolution of medicine through the ages. Postgraduate students, particularly those writing their dissertations may find useful references to their topics of interest. This attempt to condense the vast information covering a period of six thousand years or more is indeed a formidable task, and carries with it the possibility of errors of omission. For such deficiencies we crave for the indulgence of our readers.

History by definition is a record of events and / or of personalities of respective periods usually in a chronological order. This definition cannot be applied strictly to the history of medicine because of certain shortcomings such as the non-availability of written scripts over a period of several centuries. This lacuna is more acutely felt when it concerns ancient Indian (Hindu) medicine. It is believed that in India, the first known writing was recorded in Bramhi script in the third century B.C. For centuries in India, knowledge was propagated by word of mouth from *Guru* [teacher] to *Chela* [student] and this situation persisted till the arrival of the Aryans. Information on Egyptian, Babylonian and Greek civilizations has been derived by deciphering hieratic, hieroglyphic and cuneiform writings available through archaeological excavations.The excavations of Mohenjo-Daro and Harappa have thrown light on community living and sanitary conditions in ancient Indian civilizations, which even by current standards were commendable. In fact, our present water carriage system of drainage is an improved version of the same. The chief sources of information of ancient Hindu culture and medicine are the four Vedas amongst which the Rig Veda was the earliest and the Atharva Veda, the last. The Atharva Veda, believed to have been composed some time in 1200 B.C.is the most important source of information on ancient Hindu medicine. All four Vedas are in the form of shlokas (hymns), verses, incantations and rites, used on appropriate occasions to propitiate the respective deity, depending upon the need of the afflicted.

It is a far cry from the primitive to present-day medicine. The days of myth, mysticism and religion being related to illness are fast disappearing. The sorcerer, the soothsayer, the witch doctor, the apothecary, the medicine peddlar and such others are being replaced by practitioners of rational medicine. In India, we are fortunate in having different schools of medicine such as the Ayurvedic, Unani and Western. The people of rural India who constitute nearly 80 per cent of the country's population, often look upon Western medicine with suspicion and prefer medicines from the indigenous system because of their easy availability and low cost. Under these circumstances, will it not be prudent to bring about an integration between the existing systems for the greater good of humanity ?

The renowned seats of learning of ancient Indian medicine were Kashi (Varanasi / Banaras) in the East and Taxila (Taksasila) in the West. Sushruta was the teacher of surgery at Kashi while Atreya taught medicine and surgery at Taxila. The Dayanand Ayurvedic College was established in Jullundar in 1898, Takmil-Ut-Tib College in Lucknow in 1902 and National Homeopathic Medical College in Lucknow in 1921. With the Moghul invasion of India, Unani medicine was introduced and the first school of Unani medicine was established in Delhi during the reign of Akbar. By 1990 , there were 11 schools of Unani medicine, 131 colleges of Homeopathic medicine, and 83 of Ayurvedic medicine. There are over 460,000 practitioners of traditional Indian medicine in India today.

With the arrival of the Portuguese, Western medicine was introduced into India (Vasco da Gama arrived at Calicut in May 1498). There were European physicians in the courts of Shah Alam, Haider Ali, Tipu Sultan and Maharaja Ranjit Singh. The first medical schools of Western medicine were established by the English in Madras and Calcutta in 1835 and in Bombay in 1845 as well as by the Portuguese at Mandovi in Goa in 1842. Earlier, in 1703, a rudimentary course in medicine was conducted at the Royal Hospital in Goa. Since then, the number of such schools/colleges in India has been growing steadily. By the end of 1989 there were 125 such institutions with over 14,000 new graduates every year.

The first Indian woman to graduate in Western medicine is believed to be Anandibai Joshi of Pune, in the year 1886. She was the first Brahmin student from Poona (Pune). She took her training in the United States of America in "The Woman's Medical College", Philadelphia and completed her M.D. in 1886. She was greatly encouraged by her husband Gopalrao , a clerk in the postal department who stronly advocated women's education. Soon after her return to India, she was appointed as a physician in charge of the female ward of the Albert Edward Hospital at Kolhapur . (The present Civil Hospital in Kolhapur was formerly known as Albert Edward Hospital). She however died of tuberculosis at the age of 22 years in 1887. Her distant cousin Pandita Ramabai, the poetess and a social worker was invited by the Dean of the college to attend the graduation ceremony of Anandibai. Pandita Ramabai wrote about Anandibai in her book " High caste Hindu woman ". Sharayu Bhatia in her book "The Firsts- Life Sketches of Medical Women in India ' writes that Anandibai Joshi was the first Indian woman graduate trained abroad.

The first four men to qualify in Western medicine from the Calcutta Medical College in 1838 were Uma Karan Set, Dwarka Nath Gupta, Raj Kristo Dey and Nobin Chander Mitter.The first batch of students admitted in the Grant Medical College, Bombay, in 1845, were awarded the diploma "Graduates of Grant Medical College," (G.G.M.C.) in 1851. They were Bhau Daji Lad Parsekar, Sebastian A.D'Carvalho, Atmaram Pandurang Tarkhad, Paul Frances Gomes, Merwanjee Sorabji, Burjorji Dorabji, Anant Chundroba

Dukle and J.C. Lisboa. Information about students of Madras Medical College was not available in books referred to nor could it be obtained from the institution concerned.

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CHAPTER 2 : MYTHOLOGY AND MEDICINE

HINDU MYTHOLOGY

Ancient Indian medicine, in fact Hindu medicine, since Hinduism was the only religion existing those days in India, goes back to 6000 years B.C. or more. According to Hindu mythology, the creator of the Universe, Lord Brahma, was the first teacher to make a compilation of Ayurvedic texts which he later abridged into eight parts , with medicine (*Kayachiktsaya*) and surgery (*Shalya tantra*) as the main subjects. It is believed that Brahma propagated this knowledge through Daksha Prajapati who in turn taught this science to the Aswini Kumars (the twin sons of the Sun God). The Aswinis imparted the science to Indra. Upto this time, the knowledge of Ayurveda was known only to celestial personalities. It is believed that it was Lord Indra who passed on this knowledge of Ayurveda, the "science of life", to sages and rishis (mortals) , the first pupil being Bharadwaja. He, in turn, taught this subject to others including Atreya. He, it is believed, lived in the period 700 - 600 B.C. and became a renowned teacher at Taxila. Due to the profound depth of his teachings, Atreya has been reverentially been considered the "Father of Indian medicine". One of Atreya's disciples Charak, born in Varanasi some time in the year 320 B.C. subsequently migrated to Taxila, and became an illustrious personality like his guru. "Charak Samhita" is essentially a compilation of Atreya's teachings, covering the theory of drugs, diseases and their correlation. Lord Vishnu is also believed to have been associated with ancient medicine. It is said that several sages approached the Lord and begged of Him to help them save humanity from diseases and suffering. In response to their plight and prayers, he ordered the churning of the ocean of milk with the aid of " vasukis " and " asuras ". Dhanvantari then came out of the ocean with the pot of " amrita " in his hands. (There is a sculpture of Dhanvantari in the Somanathpur temple in Karnataka). According to another version, Lord Indra favoured and blessed him with knowledge in Ayurvedic medicine. Dhanvantari, in years to come, became a renowned teacher in the art of surgery and taught this subject to his disciples at Varanasi (Kashi). He was considered the "Patron Saint of Surgery" and later elevated to divinity of classical medical wisdom. He lived some time in the Sixth Century B.C. Sushruta, one of his disciples attained great proficiency in surgery and came to be known as the "Father of Indian Surgery".

Ancient Indian medicine can conveniently be classified into three broad groups :

a) the Pre-Vedic period (from 6000 B.C. upto the Aryan invasion of India , about 1500 B.C.,),

(b) the Vedic period (4000 B.C.- 700 B.C.), and

(c) the Post -Vedic period (800 B.C. - 200 A.D.).

It must be noted that these dates are not authentic but derived from archaeological findings and other available data. Diseases during the Pre-vedic period were attributed to supernatural powers, magic, etc; hence the treatment consisted of prayers, to appease the supernatural powers, and religious rites, talismans, amulets etc. to counter evil magic.

The four Vedas were written during the Vedic period and of these, the Rig Veda, the oldest, was written some time in 4000 B.C. This scripture contains, besides spiritual and philosophical thoughts, some minor contributions to medicine. Atharva Veda which was written some time around 700 B.C. covers essentially medicine - the origin of Ayurveda. Diseases were, as in the earlier period, attributed to evil spirits, magic and the wrath of God. The treatment consisted of prayers and religious rites for appeasement, with addition of medicines of herbal and animal origin.

During the Post-Vedic period (800 B.C. - 200 A.D.) medicine assumed a more rational approach under the great gurus Atreya, Dhanvantari, Sushruta and Charak .

EGYPTIAN MYTHOLOGY

Like ancient Indian medicine, ancient Egyptian medicine dates back to 3000 B.C. and even earlier. During those days, Egyptians attributed diseases to the displeasure of various Gods, the Sun, the Moon and their effects on the human body. Imhotep who lived some time in 2980 B.C. was a renowned architect, astronomer and later a physician. He is in fact, the first physician mentioned in history. He designed for King Zoser of the 3rd dynasty, the free standing step pyramid of Sakkara. A century after his death, he was considered a demigod of medicine by the Egyptians and, later by 525 B.C., he was elevated to the status of God of Healing. Thoth (2000 B.C.) was a scribe and a sage. With his wisdom, he prescribed therapautic measures which were successful and in turn enhanced his reputation as a physician.

Isis (1500 B.C.) was considered the "Divinity of Medicine" and was a renowned teacher of surgical skill. Horus was the son of Isis and had lost his sight in childhood. Isis prayed to Thoth and her prayers were answered with the restoration of the eyesight of Horus. Since then Horus has been worshipped as the "God of Medicine" and the eye of Horus, has become a symbol of protection of health.

The significance of the symbol Rx dates back to 3000 B.C. It was also supposed to have arisen from the eye of Horus. It was a symbol of durability, strength and beneficence of the medical profession and the Egyptian druggist, and is hence conventionally written at the beginning of all medical prescriptions.

GREEK MYTHOLOGY

In Greek mythology, Zeus was considered the God of Gods, as also the weather God and the protector of health. He was the son of Kronos and was married to his own sister Hera. Such marriages between brother and sister were practised among ancient Egyptians and Greeks to maintain the "purity" of the race and of the royal family in particular.

Apollo was considered the earliest Greek God of medicine. Apollo was born in Delos and brought up in Delphi. Here, as the legend goes, the infant Apollo slew a python or a monster that had plagued the site. Following this, Delphi became a sacred place in Greece, where oracles occured ; (oracle : divine advice / solution to problems including those of health and sickness). Apollo is similar to the Egyptian Horus. Apollo was supposed to be the son of Vulcan. Amongst the Greek Gods, Zeus was considered even higher than Apollo. Apollo taught the healing art to Chiron, the gifted Centaur , who is sometimes regarded as the God of Surgery. He taught the art of healing to Achilles, Asculapius (Asklepius) and Jason.

Asculapius may have lived around 130 - 40 B.C. ; he was a physician who cured many patients. He was later diefied as athe son of Apollo. It is believed that Apollo killed his wife and released Asculapius from her womb, because he suspected her of infidelity. Another version states that she was killed by a thunderbolt. Pluto, the ruler of the underworld, fearing that the supply of souls might thereby be depleted appealed to the supreme God Zeus, who promptly slew Asculapius with a thunder- bolt. Asklepieia, the places for cure named after Asklepius, were generally situated in healthy areas with fine scenery, natural springs etc. The important Asklepieia were situated in Tricca, Epidaurus and Cos. Even in its present ruined state, Epidaurus, a place in the Peloponnesian province of ancient Greece where a good Asklepiea was situated, is a lovely place. Asculapius is usually shown with a staff and a single entwined serpent. The serpent is a symbol of health and healing power. The Greeks ate snakes to acquire immortality. The serpent was also revered by Egyptians for its healing abilities. In Asklepieia , serpents were induced to lick wounds as a therapeutic measure.

CHINESE MYTHOLOGY

The primitive Chinese attributed diseases to demons; each disease was due to a particular demon. Hence the treatment was in the hands of priests and sorcerers, who employed divination, incantation and magic including the use of special herbs.

Shen Nung (2838 - 2698 B.C.) was the legendary " Father of Chinese Medicine" . The Chinese medical classic, "Canon of Medicine", is supposed to have been written by Huang Ti, the Yellow Emperor (2698 - 2598 B.C.). It consisted of two parts: the second part was a treatise on Acupuncture. However, prohibition of dissection of the human body due to religious beliefs, retarded the progress of medical science in China. The

dissection of the human body was later permitted by the presidential mandate of November 1913. One of the most famous physicians of China was Pien Chiao (255 B.C.) from the Chou Dynasty. He had a good knowledge of herbal medicine: it is said he made two patients unconscious with a narcotic wine probably containing hemp. He was later assassinated due to professional jealousy.

MESOPOTAMIAN AND HEBREW MYTHOLOGY

Gilgamesh was the only known Mesopotamian God of Medicine and a mythological hero. Not much is known of this personality.

Hebrew medicine was essentially borrowed from the Egyptians and is hence of little importance. Moses (1250 - 1230 B.C.) formulated the Mosaic code, a landmark in health and sanitation with its emphasis on personal hygiene. An outstanding example of this is the practice of circumcision amongst Jews since then.

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CHAPTER 3 : PIONEERS IN MEDICINE

During the period 500 - 100 B.C. great men of learning contributed to the advancement of Indian (Hindu), Chinese and Greco-Arabic medicine (which came to be known later as Unani Medicine) and Persian medicine too. Among these, Atreya, Dhanvantari, Sushruta, Charak, Vagbhata, Nagarjuna , Rhazes, Avicenna, Hippocrates and Galen are some of the most famous personalities.

INDIAN (HINDU)

Atreya (700 - 600 B.C.) was an eminent sage and a pupil of Bharadwaja at Taxilla (Taksasila) situated on the banks of the river Sutlej now in Pakistan. He taught medicine and ushered in the age of scientific medicine through his astute observations of symptoms, disease and their correlation. He is rightly known as the "Hippocrates of Ancient Indian Medicine" as well as the "Father of Indian Medicine". Charak was one of his students. Like Atreya, Dhanvantari (600 - 500 B.C.) at Banaras (Varnasi), became a renowned teacher of surgery and later came to be known as the "Patron Saint of Surgery". Sushruta was one of his pupils.

Sushruta , the greatest surgeon of ancient India lived some time in 400 B.C. He devoted himself to surgery and taught the subject to his pupils. His famous writings known as "Sushruta Samhita" are devoted essentially to surgery. But that was not all: he also wrote on Medicine, Pathology, Anatomy, Midwifery, Ophthalmology, Biology and Hygiene. From the available records, it is evident that major abdominal operations were also carried out. Vesical calculi, even those days, were common and hence the operation for the removal of vesical calculi was well described in Sushruta Samhita. Surgical procedures for anal fistula, fractures, extraction of foetus in abnormal presentation, amputation, excision of tumours, repair of hernia and couching of cataract were also known. Rhinoplasty was commonly performed for restoration of severed or cut noses as punishment for certain offences such as adultery. He carried out plastic surgery, giving his patients a new nose or a new ear by the process of skin grafting. Dr.Hirschberg of Berlin pays his tribute to Ancient Indian Surgery by writing "The whole plastic surgery in Europe took a new flight when these cunning devices of Indian workmen became known to us". Sushruta described many sharp surgical instruments emphasizing the need to get them made of "pure, strong and sharp iron". Several types of knives and needles have been described depending upon their use and tissues concerned. He taught his pupils how to make incisions on the abdomen by using a pumpkin for demonstration purposes. It is believed that the following ingenious method for suturing the severed ends of intestine was employed. The cut ends of the intestine were apposed to each other and big black ants, collected specifically for this purpose were made to bite the apposed ends and their heads severed when their pincers had closed. Thus the pincers remained 'in situ' due to rigor mortis retaining the cut ends of the intestine in apposition for some time. The heads and the pincers of the ants being organic matter got digested in due

course of time, not unlike the catgut of the present day surgery. His works were translated into Arabic by the 8th century A.D. and called " Kitab-i- Susrud ".

Charak, the great Hindu physician lived some time around 320 B.C., There is a lot of uncertainly regarding his parentage, his place of abode and whether Charak was his personal name, the name of the school he belonged to, or a title he assumed for himself, or which was conferred upon him. His teachings are complied into what is known as "Charak Samhita" which forms along with the " Sushruta Samhita " some of the classics of ancient Indian Medicine. Referring to ancient Indian Medicine, Castiglioni writes "....we must admit that Indian Medicine, and especially its surgery, had a development in ancient times that was most probably quite independent of Greek medicine ".

Vagbhata I was another important personality of the time. He probably lived around 200 B.C.. His chief work was "Astanga Samgraha" ,a comprehensive treatise on Medicine, Therapeutics, Hygiene, Anatomy, Surgery and other allied subjects. Vaghabhata II wrote extensively on medicine which is known as " Astanga Hridaya Samhita". A lot of matter in this work appears to be , more or less, a reproduction of Charak's and Sushruta's teachnings. Madhavacharya dealt with methods of diagnosis of diseases. His compilation is known as "Rugvinischaya" and it also includes pathology - "Nidana". Nagarjun was a renowned alchemist and is very rightly known as the "Father of Indian chemistry". He lived some time during the period 100 B.C. - 100 A.D.

CHINESE

In Chinese Medicine the "pulse" is given a lot of importance and is taken on both , the right and the left hand, at sunrise or otherwise. There are 52 types of pulse classified in Chinese Medicine. Chinese therapeutics consists of (a) acupuncture, (b) moxa or moxibustion : Moxibustion is like cauterization but more painful as a counter irritant. (c) massage.

Besides these, a rich materia medica essentially of herbal origin exists. There is also a mention of substances derived from sheep's thyroid for treatment of Goitre and Cretinism and the use of sheep liver for disorders of the blood.

Lin Tan (600 B.C) was also known as Lao Tzu: according to him, health depended upon the interplay of two cosmic forces, - "Yin" and "Yang", - the negative and the positive force. " Yin", the female force was associated with evil and its dominance resulted in disease. "Yang", the male force had an opposite and favourable effect in man. The body was composed of five elements (wood, fire, earth, metal and water), which were kept in balance by " Yin" and "Yang". Their disturbance resulted in ill-health.

Three famous Chinese physicians of antiquity are :

1) Ts'Kung (circa 180 B.C.)

(2) Chang Chungchin (c 168 A.D), also known as"Hippocrates of China" and

(3) Hua T'o (c 190 A.D.), a surgeon. Hua T'o employed anaesthetics (probably Cannabis indica), for his surgical treatment.

Hospitals or hospital-like institutions existed in China since 1000 B.C. With the spread of Buddhism many more hospitals were established till 827 A.D. However, in 845 A.D. under the order of Emperor We Chung, many Buddhist temples were demolished and with these, the so called hospitals for the sick and the infirm.

PERSIAN

Learned men of Indian and Greek medicine were invited by Persian Kings, and were retained in their courts with due recognition of their knowledge and contribution to medicine. Jirjis lived some time in the Eighth Century and was a Persian physician of repute from Jundi Shapur. He was invited by the Caliph-Al-Mansur to Baghbad in 765 A.D., to take charge of the hospital. He came from a family of physicians of six generations.Baghdad was then the medical centre and intellectual capital of Islam under the patronage of a broad minded Caliph, Harun- al -Harun (763- 809 A.D.) and later his son Al Mamun (786-833 A.D.). During this period, in Persia, organized examinations were conducted and a diploma in Medicine was awarded.

The Arab invasion of Persia took place in 636 A.D., with the subsequent capture of Jundi Shapur. Arabic Medicine emerged as an off shoot of alchemy and chemistry. The use of senna, camphor, sandalwood etc. was borrowed from ancient Indian medicine - substantive evidence of the Ayurvedic influence. The Greco- Arabic Medicine was and is even today known as Unani Medicine. Among the well known personalities associated with this system of medicine were Rhazes, Avicenna and Albucasis.

Rhazes (Abu Bakar Muhammed Ibn Zakariya Al Raz (841-926 A.D.) was born in Teheran. He wrote books on medicine and surgery : his original observations were on small-pox, measles, stones in the bladder and kidney and what is, at present, known as "hay-fever". He differentiated small-pox from measles and also described the recurrent laryngeal nerve and the guinea worm. He had varied interests [including philosophy] apart from medicine. His fame as a physician spread far and wide. His encyclopaedia "Kitab-al –hawi" was a source of reference for therapeutics for three centutries. The ruler of Ravy conferred on him the position of the head of the hospital in Baghdad.

Avicenna (980 –1037 A.D.) also known as Ibn Sina (Abn -Ali- Al - Hussain) was another important personality of Persian medicine. His observations on respiration and

pulse could well be considered as pointers to modern concepts on respiratory and cardiovascular physiology respectively. He wrote several books, including his famous compilation "Qanum" on various aspects of medicine.

It is believed that with the invasion of India by Alexander, the Great, in 327 B.C., Unani medicine was introduced into this country, and it flourished under the tutelage of the Moghul Kings. Hakim Ali Gilani was a protagonist of Unani medicine during the reign of Emperor Akbar. The first Unani Medicine school was founded by Haziqul Mulk Hakeem Abdul Majeed Khan in Delhi in the year 1893.

GRECO-ROMAN

Greco-Roman medicine borrowed a lot from the Egyptian medicine. Egyptian medical men were invited by Greeks to practice medicine in their countries and were highly respected.

Pythagoras (570-489 B.C.) was a mathematician and a physicist ; Although known to all as the discoverer of the theorem in geometry which goes by his name, he was also known for his profound influence on medicine. According to him, diseases were due to disturbances of four humours: (1) Black bile was cold and dry. (2) Yellow bile was hot and dry, (3) Phlegm was cold and moist and (4) Blood was hot and moist. There is a similarity between Pythagoras' concept of diseases and the Ayurvedic concept enunciated al teast two centuries earlier.

Hippocrates (460 - 370 B.C.) was an astute Greek physician who was born on the island of Cos, but probably practised on Rhodes. He was the first to maintain records of his patients' complaints and his own observations. With this began the study of symptoms and signs and their correlation. With the use of several such records it was possible to diagnose similar conditions in other patients. Among his contributions to medicine are the descriptions of the face in the terminal stages of life [Hippocratic facies]. It was Hippocrates who enunciated the Physician 's oath , now known as the "Hippocratic Oath". The following is an abstract from the famous Hippocratic oath.

" I swear by Apollo, the healer, invoking all the Gods and Goddesses to be my witnesses, that I will fulfil this Oath and this written convenant to the best of my ability and judgment. I will look upon him who shall have taught me this art even as one of my own parents. I will impart this art by precept, by lecture and by every mode of teaching. The regime I adopt shall be for the benefit of the patient according to my ability and judgement, and not for their hurt or for any wrong. In my attendance on the sick or even part therefrom, whatsoever things I see or hear, concerning the life of men, which ought not to be spoken abroad, I will keep silence thereon, counting such things to be as sacred secrets".

His aphorisms are also famous, some of which state :

"Life is short and the art long; opportunity is fleeting, experience fallacious, judgement is difficult."

"In every disease, it is a good sign when the patient's intellect is sound and he enjoys his food; the opposite is a bad sign."

" In winter occur pleurisy, pneumonia, colds, sore throat, headache, dizziness, apoplexy."

It was Hippocrates who gave a humane and philosophical face to medicine. He is rightly considered the " Father of medicine ".

Claudius Galen of Pergamon (130-200 A.D.) at the young age of twenty one, went to Smyrna in Asia Minor to study anatomy. Later he proceeded to Alexandria where he had an opportunity to examine a human skeleton. He also undertook long journeys to Asia Minor in search of new drugs. He was an anatomist, a physiologist, a pharmacologist and a physician. Since dissection of human beings was not allowed during his time, Galen dissected pigs , dogs and Barbary apes and extrapolated his findings onto man. In retrospect, it appears that this dogmatic attitude coupled with the fact that his disciples blindly followed him was responsible for stagnation in medical learning and progress, for over a thousand years. Galen was also a good diagnostician and had a good knowledge of the anatomy of the brain as well as of the bones, joints and muscles. He showed that arteries contained blood and not air and studied the function of the spinal cord by injuring it at various levels. In his writings- he wrote about 500 books ! - he often acknowledged his indebtedness to Hippocrates. He was the physician to the great philosopher-emperor, Marcus Aurelius.

Paracelsus, was the adopted name or nom de plume of Aureolus Theophrastus Bombastus von Hohenheim. Born in Switzerland in 1493 of a physician - father and a hospital superintendent- mother, Paracelsus was exposed to medicine right from childhood. He spent his youth wandering from one university to another in France, Italy and Germany learning bits and pieces of chemistry, alchemy and astrology. He returned to Basel in 1527 and was appointed city physician. Here, Paracelsus discarded the traditional clothes of the physician of the Sixteenth Century (a wig and a scarlet coat) and wore conventional clothes. Further, he taught his students and wrote his prescriptions in German and not in Latin as was the prevailing practice . This was unacceptable to the so-called experts and they denounced Paracelsus. In disgust, Paracelsus burned books of Galen and Avicenna - thereby making permanent enemies and forcing him to leave the city for good. He was the first person to describe "Miner's Lung" or "Pneumoconiosis", the relationship between Goitre and Cretinism, the difference between Mental retardation and Insanity and to use sulphur and antimony as drugs. Paracelsus died in 1541 A.D.

Among those who also contributed to the study of anatomy was Leonardo da Vinci [1452-1515 A.D.]. He is, of course known to the world as the painter of the famous Mona Lisa which is in The Louvre, Paris. He dissected thirty corpses and made remarkable pencil drawings of this findings. He was among the first people to contradict Galen - he drew what he saw with his own eyes and not what Galenic theory stated. Since he did not publish his works, there was little impact on medical science.

In the Sixteenth Century the name of Andreas Vesalius (1514-1564 A.D.) stands supreme. He was a Belgian by birth and spent most of his time in Italy studying Anatomy and contributing to the subject by his personal observations. It may not be an exaggeration to state that the practice of modern medicine or Allopathy really began with this man. Vesalius , after completing his studies at Louvain, and later at Paris went to Padua which was then one of the leading medical schools in the world. By careful observations and performing dissections himself, Vesalius realized that a lot of Galenic anatomy was wrong. In Basle, in 1543, he published his *De Humani Corporis Fabrica* and changed the face of anatomy. It will interest readers to know that 1543 was also the year that Nicolas Copernicus published his revolutionary work *De Revolutionibus Orbium Celestium* in which he demolished the Ptolemic theory that the earth was the centre of the Universe. Thus, two of the most important and influential works in science were published in the same year. In his book, Vesalius pointed out over 200 errors in the Galenic teachings. He also stated that his book was merely a reference book for his students - in order to learn anatomy, they would have to perform dissections themselves. Vesalius later became the court physician to Charles V and later to Phillip II of Spain.

There is adequate evidence that in ancient India, anatomical study of the human body was carried out. This is borne out by the writings in Sushruta Samhita. To quote the appropriate translation, "Any one, who wishes to acquire a thorough knowledge of anatomy, must prepare a dead body and carefully observe and examine all its parts". The method of study was to submerge the body in water and allow it to decompose: an examination of the decomposing body was carried out at intervals to study strutcures, layer by layer, as they got exposed following decomposition.

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CHAPTER 4 : HOSPITALS AND NURSING

In ancient India, hospitals for men and animals, were established during the reign of Maurya and Gupta Kings. Under the Emperor Asoka (260 B.C.), there were schools with attached hospitals. A few religious and charitable endowments in South India established schools with attached hospitals. Such hospitals were known as "Veera Solan". In South India an edict dated 1097 A.D. of Veera Chola Maharaj refers to a sixteen bedded hospital for students of the school attached to the temple at Tirumakundal in Chingleput District. There are also ruins of a hospital at Mahintale near Anuradhpura in Sri Lanka. It is believed to have been constructed by Mahendra,the son of Asoka. Emperor Akbar, in the Sixteenth Century, built a large hospital at Fatehpur Sikri.

Hospitals in China were built as early as the Tenth Century B.C.; subsequently with the spread of Buddhism many hospitals were built by 845 A.D. In the Greco-Roman civilization "Asklepieia," - the helath resorts named after Asklepius – existed, where patients were admitted and treated for their illnesses. Under the patronage of Caliph Harun- Al -Rashid (763 - 809 A.D.) and later his son Al Mamun (786 - 833 A.D.), the first hospital in Baghdad flourished.

In Europe in the Sixteenth Century, certain religious orders were exclusively connected with nursing. Among these the Augustinian Sisters of Hotel Dieu of Paris stand supreme in their service to the sick and the infirm. In Europe the first organised hospital was built in Paris in the year 660 A.D. and named "Hotel Dieu of Paris". The first schools of medicine were started in Montpellier in 1220 A.D. and in Paris in 1270 A.D. In London, St.Bartholomew's Hospital was built in 1123 A.D. and St.Thomas Hospital in 1215 A.D. It is believed that a medieval hospital was built on the Island of Rhodes, during the Crusades by knights of St. John, in 1311 A.D.

In India, Western medicine was introduced by the Portuguese some time in the Sixteenth Century. In 1510 A.D., Albuquerque built the Royal Hospital in Goa. Many years later, in 1703 A.D., an elementary course in medicine was organised in this hospital. The East India Company built a Military Hospital in Madras in 1664 A.D.; later on in 1750 A.D., it was declared open to the civilian population. In Bombay , the first hospital was opened in 1676 A.D. Later, the J.J. group of hospitals, founded in the year 1843 A.D., started functioning in May 1845 A.D. Named after Sir Jamshetjee Jejeebhoy whose munificent donation helped in the building of this hospital, the J.J.Hospital with its Grant Medical College was responsible for introducing modern allopathy to western India. The idea of starting such an institute had earlier been mooted by Sir Robert Grant, then Governer of Bombay in 1835 A.D. Earlier, medical schools had already been established in Calcutta and Madras .

By the turn of the Twentieth Century, however on seeing that less qualified Britishers were preferred over competent Indian physicians for jobs, nationalists decided to build a hospital where Indian doctors could treat patients. This led to the formation of the King Edward VII Memorial Hospital (KEM Hospital) in 1926 A.D. The famous personalities associated with this hospital over the years include Jivraj N Mehta and R.J. Vakil (physicians), R.N. Cooper, A.V. Baliga, P.K.Sen (surgeons) and V.R. Khanolkar (pathologist). The Tata Memorial Hospital (1941 A.D.) and the Cancer Research Institute (1952 A.D.) are in the forefront of India's fight against the dreaded disease, Cancer. The motto of the Tata Memorial Centre , Bombay [comprising the above two institutions] is ' Service, Research, Education'. This centre was built solely out of the personal tragedy. Lady Meherbai Tata was sent to England in 1930 A.D. for treatment of leukaemia. Her husband, Sir Dorabji realized that such a thing would not be possible for most Indians; he decided, therefore, to build a hospital for cancer patients in India. Another institution of repute is the AIIMS (All India Institute of Medical Sciences), New Delhi which was started in 1956 A.D. for the development of excellence in all aspects of health care including undergraduate and postgraduate teaching, training, research and experimentation. The first successful heart transplant performed by P.Venugopal in 1994 was in this hospital.

Perhaps the Indian hospital best known all over the world is the Christian Medical College, Vellore. It is a 1500-bed hospital, based at a town, 130 km from Madras in South India. Ida Scudder, an American Schoolgirl was visiting her parents in India in the late 19th century. Asked to assist in a childbirth, Ida refused since she was ignorant of the procedure. To her horror, all 3 children died. This prompted Ida to study medicine in the USA. On returning to India in 1900, Ms Scudder, started a Clinic in Vellore. Later, she started a school for compounders (1903 A.D.), a school for Nurses (1909) and finally a medical school for women in 1918. From 1947 onwards, males were also admitted.

NURSING

In the ancient Indian Medicine, there is a reference to the qualities a nurse should possess. To quote from Charak Samhita. "Knowledge of the manner in which drugs should be prepared or compounded for administration, cleverness, devotedness to the patient waited upon, and purity both of the mind and body, are the four qualifications of the attending nurse". Those days there were mainly male nurses, but it is probable that women played the role of the midwife in China ; nurses were generally filthy and often under the influence of alcohol . The result was that respectable girls did not enter the nursing field. Florence Nightingale however deeply believed that it was God's will that she take up nursing (much against her parents's wishes) and did a course of training at Kaiserworth in 1851 A.D. She later joined the Hospital for Invalid Gentlewomen at London. Her success there led to her being asked to organise the nursing services in the military hospitals during the Crimean War, fought by the British, French and Turks

against the Russians in 1854 A.D. Miss Nightingale with her team of 38 nurses (24 Sisters and 14 lay-women) then went to Constantinople and later to Scutari. The unhygienic conditions in the hospitals, the dirty linen, poor diet and other factors had led to a mortality rate of 42 per cent. Within months of their starting work, mortality had gone down to 2 per cent. Miss Nightingale not only dressed their wounds but also saw to it that the clothes were washed well, hospitals cleaned and administered better, and diet improved. It is said that every night she covered several miles of the camp carrying a small lamp. Thus she came to be known as the "Lady with the Lamp". An idea of the number of patients she had to attend to may be gauged when one realises that there were four miles of beds , each barely 18 inches apart. Her devotion to duty earned for herself the love and respect of many men whose lives she saved. Prior to this, women were not included in the services of the English Army. This indeed was the beginning of a new era in Nursing. She also authored a book " Notes on Nursing".

Other nurses who have made a contribution to modern medicine are Sister Mary Joseph and Caroline Hampton. Sister Mary Joseph was a nurse at the St. Mary's hospital, a part of the Mayo Clinic from 1899 till her death in 1939 A.D. Once, during her general examination of a patient , she noted a nodule at the umbilicus and pointed it out to Dr. William Mayo. Clinical examination later revealed it to be a metastatic tumour. These nodules, now called Sister Joseph Nodules in her memory represent metastatic carcinomas usually from the stomach , ovary or breast.

The great American surgeon, William Halstead was in love with his chief surgical nurse, Caroline Hampton. She however developed a dermatitis due to the aseptic precaution followed in those days (1889-1890) viz. washing of the arms and hands by soap and water, followed by potassium permanganate , then oxalic acid and finally bichlorite of mercury. Halstead could not bear to see his lady love suffer. He immediately asked the Good Year Rubber Company to manufacture gloves of thin rubber for her. The use of gloves resulted in reduction of her dermatitis - and with the introduction of gloves, a decrease in the incidence of post operative infections was noted. A new chapter in surgery was thus opened. On June 4, 1890, Caroline Hampton married William Halstead.

The nursing profession was brought to India some time in February 1888 A.D. when 10 nursing sisters arrived here from England. Earlier in 1872 A.D. training classes were held in Delhi and later in Madras in the year 1897. The first Indian nurse Bai Kashibai Ganpat of Thane was trained in J.J.Hospital, Bombay in the year 1891. The first Nursing school in India was established at Cama Hospital, Bombay in 1886 A.D. By 1990, there were 23 Nursing Schools/ Colleges in India. The first Nursing School in China was established in the Mission Hospital of Foochow.

Today the role of a nurse in a modern hospital is not limited to mere doling out of medicines and dressing wounds. With the doctor concerned she actively participates in

restoring the patient to health and happiness. She also enjoys the key position between the doctor and the patient, and at times, a very vigilant nurse may ward off an untimely death. Just as medicine has entered a speciality age, so also there are specialities in nursing i.e. oncology nursing, psychiatry nursing. Hence, they are rightly known as "Angels of Mercy".

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CHAPTER 5 : PHYSICISTS AND MEDICINE

Zacharias Jansen and his father Johannes Jansen of Holland in the year 1590, discovered the principle of microscopy and telescopy by placing two lenses together in a tube.

Galileo Galeili (1564-1642 A.D.) was essentially an experimentalist. His doubts regarding accepted facts led him to discoveries such as the rate of acceleration of falling bodies. It is believed that he carried out these experiments by dropping weights from the "Leaning Tower of Pisa". Having heard of Jansen's discovery of the microscope and the telescope, it was he who for the first time in 1609 in Italy, used lenses for magnifying objects. Armed with a telescope he embarked on the study of Astronomy and saw the four moons of Jupiter - the discovery which was in keeping with Copernicus' theory that the sun was the centre of the solar system and not, as was believed then, the earth. It is said that he also made a microscope which fact was not publicised. This was the beginning of the impact of basic sciences on medicine and was also one of the early examples of the experimental method in science.

Anthoni van Leeuwenhoek (1632-1723 A.D.) of Delft, Holland was a very keen investigator. He had a small shop where he sold odds and ends and where he went about grinding lenses. He assembled and used a simple microscope which was only 3 inches (7.5 cm) high . He examined a drop of water from his garden pool under his microscope and saw tiny moving structures - what we now know as bacteria. He later named them "animalcules" as he believed that they were tiny animals. This was the beginning of Microscopy and Microbiology. With his microscope he succeeded in magnifying objects to a magnification of at least 160 and perhaps upto 300 times. Today we have many types of microscopes including the Electron Microscope. Leeuwenhoek showed that muscles are made of alternating dark and light bands and described spermatozoa, red blood cells of different species and studied the flow of blood through capillaries in an eel's tail. He is thus considered to be the " Father of Protozoology and Bacteriology ". Today, the Electron Microscope with its one hundred thousand times magnification can reveal the contents of a cell at the subcellular level. The first Electron Microscope was invented by Knoll and Ruska in 1931.

Wilhelm Conrad Roentgen (1845 –1923 A.D.) was another person whose discovery changed the face of medicine . Roentgen's childhood held no clues to the genius that he ultimately turned out to be. He was expelled from school and even failed his matriculation examination ! He however developed a love for physics and this ultimately led to the discovery of x-rays. On 8th November, 1895, Roentgen (then the Professor of Physics at the University of Wurzburg) was performing an experiment in his laboratory when he accidentally discovered a new phenomenon. He was studying the beam of electrons emanating from the cathode in a low pressure discharge. The electron beam not only emerged from the cathode ray tube but managed to light up some fluorescent

material at some distance. As he was unable to determine what the rays were, he called them 'X-rays'. After working on this phenomenon for a few days, on 22 December, Roentgen informed his wife about it and took an x-ray of her hand. On 28th December , he delivered the manuscript to the Physiological and Medical Society of Wurzburg. It was not long before x-rays and radiology became an important part of the diagnostic armamentarium of the physician. Dr Albert von Kolliker suggested that these remarkable new rays be named 'Roentgenrays' in honour of their discoverer. Roentgen was awarded the first Nobel prize in Physics in 1901. It is significant that he not only refused to patent the discovery, but also donated his prize money for scientific research at the University of Wurzburg.

In Paris, Marie Curie (1867-1934 A.D.) and her husband Pierre Curie (1859-1906 A.D.), were engaged in their laboratory experimenting with various elements and their properties. She saw a luminous object on her desk which she brought to the notice of her husband. Radium was thus accidentally discovered by them in 1898. The use of radium as a therapeutic agent was noted by the French physicist, Henri Becquerel. He suspected that radium could also cause burns which was later confirmed by Pierre Curie in 1901. Deep X-ray, Radium, the Cobalt bomb and the Laser Beam are useful weapons in the hands of modern Oncologists in the treatment of Cancer.

The use of the LASER beam (Light Amplification by Stimulated Emission of Radiation) was first demonstrated by Maiman in 1960, using a synthetic ruby rod. Since then several types of Laser Beams have been evolved. The Laser currently used in surgery is the CO_2 Laser. With the use of the Laser, both superficial and deep seated tumours can be extirpated with minimal damage to the surrounding healthy tissue.

Since the days of Roentgen, Radiology has advanced considerbly. With the use of Closed Circuit Television screen, a patient can see his own internal organs during the examination.

Ultrasound: Firestone in 1940 demonstrated the power of penetration of the high frequency sound beam. He used it for localizing defects in metal castings. Karl Kursik, an Australian psychiatrist, in 1942, used the ultrasound technique to localize intracranial tumours. D H Howry and Ian Donald in the 1960s produced various tissue and organ images using ultrasound equipment. This technique is useful in detection of deep seated tumours, pathological conditions of internal organs, lesions of the heart etc. In obstetric practice it is widely used in following foetal growth and in detection of foetal anomalies.

Computerized Tomography (C.T.): Bracewell, in 1956, developed different techniques of image reconstruction for use in Radio-astronomy. Based on the physical principle that there is a difference in the radiation absorption of various tissues, Sir Godfrey Hounsfield attempted to reconstruct an image of the human body. The first accurate reconstructed

image of the brain was produced in 1973. This was the most significant advance in the field of Radiology since the discovery of X-rays. A whole body scan of a patient can also be carried out by radiological technique known as CAT-scan (Computerized Axial Tomography). For their invention, Allan Cormack and Hounsfield received the Nobel Prize in Physiology in 1972. To our knowledge, they are the only physicists, apart from Francis Crick [1962, structure of DNA], who have received a Nobel Prize - for medicine !

Magnetic Resonance Imaging (MRI): Bloch and Parcell, in the late 1940s, were the first to postulate that certain nuclei with a magnetic moment precessing in a strong magnetic field may emit a detectable radio-signal. In 1973, Lautebur succeeded in producing the first nuclear magnetic resonance image. This technique is employed in visualizing axial, sagittal and coronal sections of different parts of the body and also blood vessels, without resorting to any invasive method, such as catheterization (MR Angiography).

Electro-Cardiogram (E.C.G.) : Electrical phenomenon associated with the contraction of the heart was first noted by R. A. Kolliker and J Muller in 1856. They placed the sciatic nerve of a frog across the contracting heart of the same frog and elicited contraction of the enervated muscle at each systole. The same phenomenon could be elicited by placing a sciatic nerve preparation of one frog across the contracting heart of another frog thus proving conclusively, the origin of the electrical charges from the contracting heart muscles.

Willem Einthoven (1860- 1927 A.D.), a Dutch physicist, devised a galvanometer recording the voltage produced by the activity of the heart on the skin, in 1903. This instrument was the Electrocardiogram and Einthoven was awarded the Nobel Prize in 1924. Thomas Lewis and his coworkers, W H Crab, F N Wilson and others through their research established the foundation of Electrocardiography. Clinical and experimental studies of Lewis, Wiggers, Wilson et al, contributed to the understanding and interpretation of electrical variations during cardiac activity.

Renal Dialysis and Renal Transplant : Thomas Braham first reported "dialysis" through a semi-permeable membrane sometime in the 1860s in experimental animals. Haas, in 1925, was the first to perform dialysis in a patient. In India, the first dialysis was performed at Christian Medical College ,Vellore in 1961. In 1923, Ganter performed the first peritoneal dialysis in a uraemic patient. Subsequently chronic intermittent peritoneal dialysis was introduced by Boen et al in 1962. In 1976, Pepovich introduced the "equilibrium peritoneal dialysis technique" where the dialysate after infusion into the peritoneal cavity was allowed to equilibrate for 5 hours while the patient carried on with his normal activity. Since 1978 the name of this method has been changed to " Continuous Ambulating Peritoneal Dialysis (CAPD)". Through this method, the concept of home dialysis has been popularised.

Heart Lung Machine : For a surgical procedure, on a continuously moving vital organ such as the heart or the lung, complete cessation of its movement and its functions appeared an impossibility about 50 years ago. The concept of a mechanical device taking over the functions of such an organ, albeit temporarily, was first put into practice by John H Gibbon, Jr. of the Mayo Clinic in 1956, - the first heart - lung machine. Later D G Melrose and others devised reusable metal pump oxygenerator. Subsequently such cumbersome machines have been replaced by the present day disposable handy plastic oxygenerator. Through the use of such a device, the heart and lungs are put out of action and eventually cease to move. The so -called "still" heart can be opened and operated upon with ease. After the surgical procedure, the process is reversed.

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CHAPTER 6 THE FOUNTAIN OF LIFE

"The arterial blood of the healthy one, warm and full of spirit, will leap into the sick one and immediately will bring to him the fountain of life and will drive away the languor" - Andreas Libavius.

For centuries, the custom of offering sacrificial gifts of animals and their blood to deities has existed all over the world. Homer wrote that Odysseus revived himself by drinking blood when he was in the realm of the dead . Egyptians, Hebrews and Syrians used blood as a medicament. Roman noblemen drank fresh blood of gladiators and decapitated criminals as a therapy for rejuvenation. In *Bodhisatvapadana Kalpalata*, there is a reference to blood transfusion. It is stated that a benevolent king gave his blood to one of his subjects on the advice of a physician that only a blood transfusion would save the patient's life.

The modern history of blood transfusion begins in the 15th century. In Rome, in 1492, Pope Innocent VIII had an apoplectic stroke; he became weak and went into a coma. His physician advised a blood transfusion as a therapeutic measure for the Pope's illness. He, however, did not benefit from it and eventually died at the end of the year. In 1615, Andreas Libavius had described his technique of blood transfusion which was unfortunately not adequately publicized.

In the early seventeenth century, William Harvey (1578-1657 A.D.) described the functions of the heart and the circulation of blood which was indeed a landmark in the history of blood transfusion. He showed that the heart was a pump and that the pulse wave was caused by the contraction of the heart which expelled blood into the arteries. The same blood then returned to the heart by travelling through the veins. Hence, blood moved in a circle in the body. Harvey was also able to deduce that the function of the valves was to prevent backflow of the blood in the veins. Harvey used to teach this in his lectures as the Lumlean lecturer in surgery at The Royal College of Surgeons from 1615 onwards, but published it first only in 1628. His book, *Exercitatio anatomica De Motu Cordis et sanguinis in animalibus*, which was published in Frankfurt is considered a milestone in medical literature as it was one of the early examples of using experimental observation and reasoning as the basis for scientific thought. Since most of the scientific community accepted his theory by the middle of the seventeenth century, it has been written, with more than a grain of truth, that Harvey was perhaps the only man that ever lived to see his doctrine established in his lifetime.

In 1665, Richard Lower (1631-1691 A.D.) transfused blood of one animal into another . In 1667, he transfused sheep's blood into a man with fatal consequences. In 1667, Jean Baptiste Denis, a French physician, performed a successful blood transfusion and

prescribed it for many ailments. Several such transfusions were not as beneficial and a few even caused the death of the patient and thus the remedy fell into disrepute. Hence, blood transfusion was prohibited by law in France. Then followed a period of stagnation for more than 150 years. James Blundell, an English physiologist and obstetrician was the first to perform a successful blood transfusion in England in 1824.

At the beginning of the twentieth century, with the discovery of blood groups, interest in blood transfusion was revived.The person responsible for this was an Austrian named Karl Landsteiner. Born in 1868, Landsteiner did his medical studies before joining the University of Vienna to do research on blood. In 1901, he discovered that human blood could be divided (based on substances present on the red blood cells) into groups A, B and O. Later his pupil Sturli [in collaboration with de Casteo] added one more group - AB - and thus the four main blood groups were established. In 1903, with Richter, he showed that the knowledge of blood groups could be used in forensic medicine. In addition to his research and teaching, he also found time to perform over 3500 autopsies. In 1908, Landsteiner went to the Wilhelminen Hospital in Vienna where his research showed that polio was a viral disease. This finding led four decades later to the eventual development of the polio vaccine. After World War I, Landsteiner worked for a few years in a hospital in Holland before moving in 1922, to the Rockefeller Institute in New York. Here, in collaboration with Phillip Levine, he discovered 3 more blood groups- M, N and P. Landsteiner published 390 scientific papers and has been called the Einstein of the biomedical sciences. Lansteiner's other work included the elucidation of Paroxysmal Haemoglobinuria [with Donath], the introduction of darkfield microscopy and complement fixation tests for the diagnosis of Syphilis. For his services to mankind, he was awarded the Nobel prize in 1930. Landsteiner passed away in 1943 while working in his laboratory.

In 1939, Levine and Stetson detected an unusual agglutinin in the blood of a woman who had recently delivered a baby. They postulated that the mother was immunized during the pregnancy with the corpuscles of the foetus or its father's corpuscles by the transplacental route. Landsteiner and Weiner, in 1940, while experimenting with monkey corpuscles found that the anti-Rhesus serum agglutinated not only monkey red blood cells but also the red blood cells of 85 percent of the white population of New York. These individuals were labelled as 'Rh positive' and others as 'Rh negative'. It has been subsequently found that 85 percent of individuals in Western countries, as well as in India, are 'Rh positive '. Thus, since 1940, the 'Rh factor in human cells was established. Weiner and Peter described four recipients of blood transfusion with agglutinins against their 'Rh positive donors. Y.M. Bhende and his associates, at Seth G.S.Medical college and K.E.M. Hospital, Bombay, discovered a rare subgroup in 1952 which is now known as "Bombay Subgroup".

With the outbreak of World War I, the need for blood as a life-saving measure was appreciated. It was soon realized that blood had to be stored in a suitable condition for

use at a later date. Oswald H. Robertson of the American army had observed, in 1918, that blood collected in sterile Sodium Citrate solution could be preserved in an "ice box" for a month without deterioration. The concept of the "Blood Bank" was thus formulated. In Russia, attempts at large scale blood storage began in 1936 at the Sklytavosky Emergency Hospital in Moscow. During the Spanish Civil War (1936-1939 A.D.) a regular blood bank was established in Barcelona. In India, first attempt at blood banking was made in 1939-1940 in Calcutta and later in 1942 in Bombay, when the Japanese army occupied Burma during World War II. Now there are several blood banks all over the world. Blood can be stored as whole blood, plasma or serum in liquid or in dried form. However whole blood cannot be stored indefinitely. Modern blood banks also provide separate cellular constituents and plasma fractions. Some of the fractions can be stored in a lyophilised (dehydrated) form for use, at a later date, in a reconstituted form. Cellular components can also be used in specific blood disorders.

ANAEMIA

Sushruta described anaemia as a form of Panduroga or Jaundice. It was believed to be due to the derangement of kapha or phlegm and was manifested by whiteness of the eyes, skin and finger nails. Charaka described another form of Panduroga associated with the habit of eating clay. In 280 A.D., Wang Shu-Ho, using the doctrine of "the pulse", diagnosed the deficiency of blood by a superficial and weak pulse .

In the 16th century ,all anaemias, irrespective of whether they were due to iron deficiency or other causes, were grouped under one category, 'Chlorosis' by Jean Varandal. In 1554, Johann Lange for the first time singled out a case of what may have been hypochromic anaemia, giving a concise and clear clinical picture. He described the symptomatology in a letter to a friend whose daughter Anna had extreme pallor ("as though exsanguinated"), palpitations, dyspnoea, and swelling of the ankles. He used the classical term "morbus virgineus" and attributed the condition to a block in the menstrual blood flow from the liver to the uterus, a pathway which was not fully established at puberty. He drew attention to the fact that although Hippocrates in his book " Diseases of Young Women" advocated venesection, he himself (Lange) advised an early marriage as a therapeutic measure.

Iron was utilized in therapy by European physicians through the Middle Ages and the Renaissance, but the rationale behind the treatment was not understood. In ancient Indian medicine, it is reported that Charaka treated anaemia with iron rust pills prepared by soaking iron powder for seven days in cow's urine along with milk.

In the 17th century, the causative role of iron deficiency in the then prevalent "Green Sickness" or "Chlorosis" of adolescent women began to be recognized. Thomas Sydenham is credited with being the first to identify iron as a specific remedy. In 1681 he

wrote: " To the worn out or languid, blood gives a spur or fillip whereby the animal spirits which lay prostrate and sunken under their own weight are raised and excited".

In 1832 the French physician Pierre Blaud reasoned that Chlorosis arose from a defect in the formation of blood whereby the colouring matter was affected, making it unsuitable for stimulation and maintenance of the organism and its functions. He prescribed ferrous sulphate as a therapy for anaemia - "the veritable pills of Blaud" which his nephew distributed all over the world.

In 1849, Addison described a fatal anaemia, later known as Pernicious Anaemia, and its characteristic blood picture. Whipple, in 1925, demonstrated the curative effect of raw liver in dogs in which simple anaemia had been experimentally produced. In 1926, Minot and Murphy at Harvard showed that liver also cured patients with Pernicious Anaemia. Whipple, Minot and Murphy shared the Nobel Prize in 1934. In 1929, Castle of Harvard found that meat predigested with an artificial gastric juice had no beneficial effect on patients suffering from Pernicious Anaemia; however results were favourable when normal gastric juice was used. The discovery of an "Intrinsic factor" in gastric juice was thus made. Nearly 20 years were to pass before Rickes, Smith and Parker isolated an 'Extrinsic' factor subsequently identified as Vitamin B12. Wills and her associates in 1937 described macrocytic anaemia in women in India that responded to crude liver extracts but not to the purified extract known to be effective in Pernicious Anaemia. This factor was first called "Wills" factor and later, Vitamin M; and still later identified as folic acid, which was recognised and isolated by the Indian scientist Yellapragada Subbarow and his group. Subbarow, working with Paul Gyorgy in 1939, also isolated 'Adermin', later known as Vitamin B6 or Pyridoxine.

Thus, over the years our concepts of the etiology of anaemias have undergone many changes, changes reflecting the advances in laboratory medicine and the discoveries of haematopoietic factors.

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CHAPTER 7 : NUTRITION AND DISEASE

INTRODUCTION

Man has always known that adequate nutrition is a prequisite of good health. Primitive man satisfied his nutritive needs from the vegetation and animal life abounding in his environment. Over the years, with the depletion of vegetation in the immediate neighbourhood, man resorted to cultivation of vegetables and edible crops, domesticating and breeding animals and hunting others for his sustenance. Fish was generally consumed by those living in the vicinity of rivers, lakes and the sea. The availability of human meat, after tribal conflicts, perhaps led to the practice of cannibalism among certain primitive races. Scarcely less revolting, to modern minds, was the gruesome belief of ancient Egyptians, Greeks and Romans in the medicinal value of blood. Blood baths were given to rejuvenate debilitated and aged Egyptian princes. Roman nobles used to rush into the arena to drink the fresh blood of gladiators and decapitated criminals.

Man was evidently aware of the advantages of good nutrition, and had designed balanced diets long before the advent of biochemistry. The South African tribe of the Bantus existed on a diet of mealy meal [food cooked and preserved in a special manner in order to last for a few days], milk and herbs, which was quite adequately balanced; in fact the advent of the white man into their world disrupted their lifestyles, as well as their diets. On long expeditions, American Indians (Red Indians) were known to carry pemmican, a dried meat preparation, supplementing their diet with fresh cherries along the way, to satisfy the vitamin requirement.

It can be concluded that man evolved his eating habits with the sole purpose of attaining physical fitness for survival; early man ate to live, and did not live to eat.

NUTRITION

Both Charaka and Sushruta have dealt with extensively on the subject of nutrition, emphasizing the virtues of a balanced diet, the methods of preparing various kinds of food, the nutritive value of foods as diverse as an alligator and lotus stalk and foods to be avoided in specific conditions.

During the Chou Dynasty of 1121 B.C., Chinese medicine also stressed the importance of moderation in eating; although the diet need not necessarily be exclusively vegetarian. Confucius recommended that the amount of meat should never exceed the quantity of rice in a meal.

In the time of Hippocrates, the art of nutrition was given due importance. Physicians trained in the Hippocratic tradition stressed the role of good nutrition in maintenance of good health. Many Hippocratic writings were devoted to details of particular foodstuffs and their effects on the healthy or the sick individual. In the first century Galen, in his treatise "De alimentorum facultatibus libribus" wrote on the characteristics effects of different types of food. Thirteen hundred years later, Galen's ideas of regulating diet and thereby keeping the humours of the body clean and temperate, were still the dominant theories of medicine. Venetian Luigi Cornaro, an important personality of the Renaissance period, at the age of 83 years, wrote four treatises on moderation in eating and drinking. He also attributed his continued good health and longevity to his eating habits. He died at the ripe old age of 98.

Early in the Nineteenth Century, interest began to be focussed on three classes of foodstuffs which later came to be known as the proximate principles: the proteins, fats and carbohydrates. Although vitamins were identified much later, their deficiency states had been described by earlier physicians.

The first description of Beri-beri, a disease prevalent in the Far East at that time, was that of Jacob de Bondt in his book on Indian medicine (*De Medicina Indorum*) written in 1642. The first modern account, which included description of the cardiac form and the 'wet' form, was published in 1835 by John Grant Malcolmson of Madras, who was in the service of the East India Company. Between 1882 and 1885 Baron Kanchiro Takaki practically eradicated the disease from the Japanese Naval Fleet by supplementing their diet of rice with fish, meat and vegetables. Between 1893 and 1897 Christian Eijkman produced Beri-beri in fowls by feeding them exclusively on polished rice. He, however, interpreted these findings in a manner now known to be erroneous. His successor Gerrit Grijns suggested, in 1901, that Beri-beri was due to the absence in the diet of a factor which was present in the rice polishings. This was further substantiated in 1907, when William Fletcher, working in a lunatic asylum at Kuala Lumpur, showed clearly that about a quarter of those patients who were on polished rice alone developed Beri-beri, while only 2 of 123 patients who received unpolished rice developed the disease. In 1906, Fredrick G. Hopkins emphasized that besides this disease, others such as Scurvy and Rickets, were also deficiency diseases.In 1912, Casimir Funk, at the Lister Institute in London, endeavored to isolate these "accessory food factors' which he called "Vitamines". They were named so because they were believed to be "vital amines " It was later shown that they were amines in chemical composition, and the final 'e' was then dropped, as Funk's assumption was unjustified.

In 1915, a chemist named Elmer McCollum working at an American agricultural experiment station, found that rats fed on artificial diet did not thrive, and developed Keratomalacia, However, when butter was added they were cured. He proposed the term "fat soluble A" for the vitamin present in butter. Later he found a similar accessory factor

which prevented the development of Polyneuritis and, as it was soluble in water, he gave it the name "Water soluble B".

Joseph Goldberger, a United States public health surgeon, began studies on Pellagra in 1914, in orphanages, asylums and prisons, and proved that dietary deficiency was the cause. In 1926, he identified the constituent of the vitamin B complex, later known as Nicotinic acid , which caused the dreaded disease.

The story of James Lind, who in 1753 revolutionized Naval medical practice by keeping large amounts of lime on board his ships is well known . Earlier, when the four ships that came from England to India as the East India Company, it was noted that the sailors on only one of them - the one that carried stocks of lime juice- did not get Scurvy. Although the reason for this was not clear, the Company adopted the idea of supplying lemon juice to all their sailors. James Lind however evaluated this scientifically and wrote about it in his "Treatise of the Scurvy". The practice of the British of carrying lime in their ships led to their being termed as " limeys ", a term which is still used ! "Vitamin C", the preventive factor for Scurvy, was eventually isolated by Waugh and King in 1932 from the lemon fruit.

The first clinical description of "Rickets" was made by Daniel Whistler in 1645. It was based on a study of English children prompting him to name the disease "Paedosplanchnosteocaces" By the middle of the Nineteenth Century, the presence of Rickets was noted in many other countries. Evidence indicated that the disease responded to the administration of the codliver oil as well as exposure to the sunlight and conflicting claims were made for both as the best therapeutic measures. In 1919 , (Dame) Harriette Chick led a team of investigators who studied the population in Vienna, which had suffered considerably from the ill-effects of undernourishment during the World War I. In their final report submitted in 1922, they supported the deficiency theory and emphasized the beneficial role of sunlight.

In 1936, Evans and co-workers at the University of California isolated Vitamin E from wheat germ. The vitamin was named Tocopherol as it was a type of alcohol. It was found to have some relation to sterility as well as to diseases of the muscle in man.

In 1929, Carl Dam of Copenhagen found that chicks fed on a diet poor in fat developed subcutaneous haemorrhage and that their coagulation time was increased. Dam and Edward Doisy in the United States isolated Vitamin K in the pure form in 1939, for which they shared the Nobel Prize in 1943.

The effect of nutrition on health has been extensively studied. One such study, conducted at the Nutrition Research Laboratory, Hyderabad by C. Gopalan et al (1968) investigated

the effect of Kwashiorkor on mental development. The study revealed a significant difference in the performance of intelligence and sensory development tests between subjects treated for Kwashiorkor and the control. The retardation in the experimental group was essentially in the area of perceptual and abstract abilities.

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CHAPTER 8 : ORGAN SYSTEMS

This chapter discusses some of the organ systems in the human body and the scientists who are associated with them.

The heart

Since time immemorial, the heart has been known to be the most important organ in the human body. It has been considered as the seat of the soul, the abode of love and affection. The heart has been mentioned several times as a "lotus with nine gates", in the Atharvaveda as early as 700 B.C. Sushruta and Charaka (500 -400 B.C.) thought that the heart was the central organ and the seat of consciousness. It is but natural that an organ like the heart, which offers unflinching service from the fourth week of our intra-uterine life till the very last moment, should receive our careful and considered attention when dealing with human ailments.

It is interesting to note that the Egyptians, during the process of embalming, eviscerated all organs except the heart, which was left 'in situ' within the thoracic cage, probably due to the belief that it was essential to the individual even after death. In the Papyrus of Ebers, an Egyptian document on medicine, dating back to 3000 - 2500 B.C., there is a reference to the heart's movements and its importance in diseases; there is also a description of an ailment in man's "cardia", with symptoms of pain in the breast and one side of the heart and arm, - probably of Angina pectoris. Charaka and Sushruta considered the heart to be a receptacle and not a pump.

Heart diseases are considered in one of the chapters of Sushruta Samhita (400 B.C.). In one of the types of heart disease, "a pain is felt in the region of the heart in which the heart seems as if being drawn and crushed, pierced and cracked, pricked and split". The descriptions fits in fairly well with the symptoms of Angina pectoris.

Aristotle, the Greek philosopher and writer (384-322 B.C.), speculated on the role of the heart, and concluded that it was the body's nerve centre and the organ of thinking. Erasistratus of Keos (310-250 B.C.), an illustrious contemporary of Herophilus and the pupil of Chrysippus of Cnidus was, according to Finlaysons, the first man to describe the heart as "pump'. According to him, while the heart contracts and dilates "like the bellows of a blacksmith", the pulse moves forward as a wave, a discovery proved correct almost two thousand years later by modern research.

The pulse

In Ayurveda, over 600 different types of pulse readings have been recognized and dealth with. The pulse is regarded as a "meter", which indicates the state of the "soul", embedded within the body - whether happy or sad, whether troubled by heat, cold or air.

Although Chinese pulse-lore is usually credited to Pien Ch'iao (600-500 B.C.), it was Wang Shee-ho (280 A.D.) who popularized the art, by writing a monumental treatise on the pulse, in ten volumes. Diagnosis of any disease in those days depended mainly on a study of the pulse and to a lesser extent on the state of the tongue and the facial appearance of the patient.

In Greek medicine, Hippocrates and his contemporary, Demokritos of Abdern (500- 400 B.C.) have been considered the earliest authors to make a mention of the pulse. Herophilus (400 B.C.), born of Asiatic-Greek parentage at Chalcedon, and tutored by the great Pythagoras, is often regarded as the "Father of Anatomy". He was the first to study the rhythmical wave of the pulse, and described in elaborate terms, the pulse under normal and abnormal conditions. He was also the first to time the beats of the pulse with a "water-clock". It was Erasistratus, who by detecting a sudden leaping of the pulse - the so called "lover's pulse", - while examining Antiochus, son of Seleucus, put down his melancholy to an uncontrollable desire for his step-mother Stratonice. Galen described 27 varieties of pulse readings, according to their length, breadth and depth.

HYPERTENSION

Until the 1920's Hypertension (HT) was considered beneficial to man, as it facilitated the perfusion of adequate amounts of blood through thickened arteries, especially those of the kidney. Lowering the blood pressure (BP) was thought to lead to ischaemia of the kidney and uraemia. At that time HT was classified as reversible and irreversible. There was no known treatment for either of these conditions.

The concept of renal clearance as a rough measurement of renal blood flow demonstrated that temporarily decreasing BP did not reduce kidney perfusion. Reports on Phaeochromocytoma did much to show that HT was not harmless. Harvey Goldblatt's experiment in which HT was produced by clamping the renal artery , demonstrated that Renin from kidney extract was not by itself a direct pressor substance, but converted Angiotensin-I to Angiotensin- II. Observations that persons with high blood pressure were more susceptible to cardio-vascular accidents and " Heart attacks" identified hypertension as a potent risk factor, and helped to initiate the search for anti-hypertensive drugs.

THE EVOLUTION OF THE SPHYGMOMANOMETER

Among the distinguished men who contributed to our present day knowledge of blood pressure and its measurement, was an English clergyman named Stephen Hales. He perhaps was the first to demonstrate, that the blood in arteries is under a great deal of pressure. Stephen Hales, (1677-1761 A.D.) known as the "Physiological Parish Priest" was instrumental in initiating the process of measuring the BP. In recognition of his genius the Royal Society published, in 1733, his two volume work entitled, " Statistickal Essays". His "Volume-I, Vegetable Staticks" dealt with the movement of sap in plants, while "Volume-II, Haemastaticks", described his Haemodynamometer.

Rev. Hales inserted one end of a brass pipe into the ligated left Crural artery of a horse, and to the other end he attached a vertically positioned glass tube, nine feet in length. On untying the ligature on the artery, blood rose in the tube to a height of eight feet three inches above the left ventricle of the heart. This was the first recorded estimation of BP. With this, he determined the quantity of circulating blood in the horse and observed that the Jugular venous pressures was twelve inches when the horse was at rest, and fifty-two inches when excited.

He also demonstrated that the pulse rate was more rapid in small animals than large animals and that BP was proportionate to the size of the animal. One of his more exotic experiments was Leonardo da Vinci's method of injecting wax into the heart chambers of cadavers to determine the capacity of these chambers by measuring the volume of the casts.

John Leonard Marie Poisseuille (1799-1869 A.D.) improved upon the original BP measuring apparatus by substituting the short tube of a mercury manometer for the inconveniently long tube used by Hales. Connection with the artery was established by means of a hollow lead tube filled with potassium carbonate, to prevent coagulation. This was Posseuille's haemodynamometer of 1828, with which he showed that BP rises and falls with expiration and inspiration.

Karl Ludwig (1816-1895 A.D.) improved upon the instrument by adding a float, thus devising a method to measure BP on a recording cylinder. Thus, in one stroke he gave us the kymograph and the application of the graphic method to Physiology.

Karl Vierodt (1818-1884 A.D.) constructed a Sphygmograph - the first instrument with which a tracing of the human pulse wave could be made. By adding weights to little pans attached to a lever, he attempted to estimate the BP. His instrument was cumbersome and his measurements inexact, but he established the principle that the estimation of BP can be accomplished by measuring the outside pressure necessary to obliterate the pulse, - a method we employ even today.

All the above methods required the placing of a tube into an artery and so were unsuitable for routine clinical use. The first instrument which did not necessitate puncturing the skin was developed by Samuel Von Basch in 1880. This was very similar to the apparatus used today, as was the one developed later by Scipione Riva Rocci in 1896. Von Basch's instrument was greeted by the British Medical Journal with the remark : " By such methods we pauperize our senses and weaken clinical acuity".

In 1905, the Russian, Korotkoff , introduced the auscultatory method of estimating blood pressure. Within a few years the Sphygmomanometer took its place with the Stethoscope and the Thermometer as essential to every physician's armamentarium.

RESPIRATORY DISEASE

Atreya's discourse on hiccup and dyspnoea is described in detail in Charaka Samhita. He described five types of cough, each attributed to the disorder of Vata, Pitta, Kapha , pectoral lesions and loss of body elements. The description of one of the disease associated with cough and blood stained, purulent sputum, etc fits in with that of Pulmonary Tuberculosis. Symptoms of each type of cough were described with their respective treatment. In Charaka Samhita it is stated that the word 'cough' (Kasa) is derived from the root " kas" meaning "to move". 'Kasa' causes the movement of phlegm upwards through the respiratory passages.

In Sushruta Samhita, cough is considered to be due to deranged Vayu or Pitta or Kapha, the presence of Kashta (an ulcer) or a wasting process (Kshayaja). Different kinds of pain, such as burning, pricking, tearing in the chest, have been described as being associated with the five types of cough. Kshayaja Kasa was characterized by cough, gradual emaciation of the body, generalized weakness and spitting of blood, streaked with pus.

Other civilisations have also contributed. In Hebrew medicine, from the "Talmud", the authoritative document on Hebrew medicine, it appears that tumours of the lung were identified .

In Greek medicine, Galen is credited with a fairly accurate description of Phthisis [tuberculosis]. He also stressed the need for a healthy climate and good diet including milk in the treatment of this disease. Caelius Aurelianus who is believed to have lived during the 4th or 5th century A.D. has described symptoms of Phthisis in detail, including haemoptysis, hoarseness of voice, fever, rapid laboured breathing, pain in the chest, cough with expectoration and a rapid pulse rate.

Avicenna, also known as Ibn -Sina (Abn-Ali- Al Husain) an important personality of Persian medicine lived during the period 980-1037 A.D. His astute observations on respiration were useful pointers to modern concepts on respiratory physiology.

Marcello Malpighi studied lungs of animals and demonstrated the vesicular structure of the lung and the presence of capillaries, in his article "De pulmonibus" published in 1661. In 1667, Swammerdam pronounced that the lungs of an infant who has breathed even once, will float in water. This indeed turned out to be an important contribution to Forensic medicine in differentiating between stillbirth and infanticide. Giovanni Battisa Morgagni (1682-1771) described Pneumonia with consolidation of the lung. He realized that in Pneumonia, consistency of the lung was like that of the liver, and later the term hepatization was introduced. Corvisart, Napolean's physician, re-emphasized the value of the technique of chest thumping developed earlier by Leopold Auenbrugger of Austria. Auenbrugger, in 1753, discovered how to differentiate the unhealthy lung from the healthy lung, by different sounds produced on percussing the chest. It is believed that as an inn-keeper's son , he used this technique to determine the amount of wine in the barrels and was smart enough to realize its application in medicine. It is admirable that Corvisart refused to accept credit for the discovery of this method.

Rene Theophile Hyacinthe Laennec (1781-1826 A.D.) has given an excellent account of Phthisis, Bronchiectasis, Pneumothorax, Cancer of the lung, Emphysema, and Pneumonia in particular. Years later, Osler, the great physician, used to recommend Laennec's description of Pneumonia to his students. In 1816, Laennec invented the stethoscope, first made of rolled paper and later of a wooden hollow tube. In 1819, he published an account of his work using the stethoscope. By an irony of fate, he died young in 1826, of Pulmonary Tuberculosis, a disease he described in such great detail. Carl Rokitanksy was the first to differentiate between Lobar and Bronchopneumonia while Hurting and Hesse, in 1879, described cancer of the lung in miners.

In France, Jean Fernel described for the first time, an epidemic of influenza in 1544. Influenza appeared again in Europe in 1557 and subsequently in repeated epidemics. The great pandemic of influenza of 1767 in Europe found its echo also in America. A similar pandemic broke out in 1918-19, and spread all over the world with high mortality. Fifty million people were afflicted, with 20 million dead; in India 6 million died. The next pandemic - the 'Asian flu'- occurred in 1957 followed by the so-called 'Hong Kong flu' in 1968. The viral etiology of this disease was established by Smith, Andrews and Laidlaw in 1933. Different outbreaks have been attributed to antigenic changes.

During World War I (1914-1918 A.D.) the incidence of sputum borne infections, particularly Pneunomia, increased both in the civilian population and in the army personnel. Until this time, the treatment for Pneumonia was essentially supportive, with high mortality. All over the world a search for more specific treatment was a natural

William of Salceto (1210-1280 A.D.), a surgeon, in his book 'In Scientia Medicinalis', described dropsy with contracted kidneys, perhaps an early description of chronic nephritis. William Charles Wells (1757-1817 A.D.), an American, who studied in Edinburgh described 'albuminous' urine associated with dropsy. John Blackall (1771-1860 A.D.) stated that dropsy was associated with albuminuria and diseased kidneys.

Richard Bright (1789-1858 A.D.), in his masterly study of 23 cases of dropsy published in 1827 documented his observations on the association between diseased kidneys, albuminous urine and dropsy. He also differentiated between dropsy of renal origin and that of cardiac origin. Bright, an accomplished artist., produced accurate reproductions of his observations on pathologic anatomy in general and the kidneys in particular.

Sir William Bowman (1816 –1892 A.D.), a great Briish ophthalmologist, contributed to the understanding of the structure and the function of the kidney, In 1842, he described the continuity of the glomerular capsular space with the adjoining tubules. At approximately the same time, Ludwig independently concluded that the glomerulus was a filtering mechanism. Heidenheim, in 1874, established the relationship between blood pressure and urine secretion. Cushing, in 1917, also contributed to the knowledge of kidney functions. Marshall and Vickers described the role of tubules in the transport of some substances directly from the blood into the urine.

Herman Senator (1834-1911 A.D.) , a Polish Prussian by birth, published his monograph on kidney diseases in 1896, while Franz Volhard and Fahr wrote a treatise on Bright's disease after a study of several such cases. A.N. Richards and his associates introduced the needle biopsy of the kidney, which contributed to the understanding of renal lesions "in vivo". Kimmelstiel and Wilson, in 1936, described a series of cases of Diabetes with generalized oedema and proteinuria , a syndrome which subsequently came to be known by their names [Kimmelstiel - Wilson kidney] .

Carl Rokitansky was the first to describe Amyloid disease of the kidney. Rudolph Virchow more than a century ago identified this substance in organs by the mahogany brown colour it gave when smeared with Iodine solution. Because of this chemical reaction, he presumed it had a cellulose component and starch. A large series published by Bellin in 1946 focussed the attention of physicians on Amyloid Kidney. In India, the first report of this rare renal lesion was an autopsy study of a male aged 27 years with Generalized Amyloidosis, published by Louis Monteiro of the K.E.M. Hospital, Bombay in 1942.

Renal Hypertension: Goldblatt of Chicago, in 1928, demonstrated that experimentally produced renal ischaemia in animals, resulted in hypertension. These experiments

conclusively established the association between ischaemic kidneys and hypertension in man. N. Goormaghtigh, in 1932 and in 1940, described in detail the juxtaglomerular apparatus as a source of pressor substance and its role in experimentally produced hypertension in dogs and rabbits with ischaemic kidneys.

In 1919, Goodpasture described autopsy findings of blood in the alveoli of lungs, associated with a kidney lesion. The patient was an 18 year old man who died after an attack of influenza, during which he had symptoms of blood stained expectoration and chest pain. The condition came to be known as the Goodpasture Syndrome.

Analgesic Abuse and the Kidney: The association between prolonged and heavy consumption of analgesics containing phenacetin and kidney disease, was first pointed out by Spuhler and Zollinger in 1953. The kidney lesions were described as Chronic Interstitial Nephritis and Papillary Necrosis

Pyelonephritis: Staemmler (1932) appears to have been the first to report on upper urinary tract infection, then known as pyelitis and later rightly recognized as pyelonephritis. Weiss and Parker (1939) pointed out the association between Chronic Pyelonephritis and Hypertension.

Nephrosis: At one time Nephrosis was considered to be a variant of nephritis with heavy albuminuria. Friedrich Muller coined the word " nephrosis" in 1905. Munn, in 1913, preferred the term "Lipoid Nephrosis"' his choice being based on the morbid anatomy and histology of the kidney in this condition. In 1914, Volhard and Fahr described Nephrosis in detail and established the correlation of the kidney lesion with clinical features. They were the first to recognise the disease as an entity quite distinct from Bright's Glomerulonephritis.

OTHER ORGAN SYSTEMS AND SCIENTISTS

In a small book of this size, it is not possible to address all the organ systems and physicians associated with them. It would however be inappropriate to close this chapter without mentioning, in brief, some of the other noteworthy achievements in the field of medicine.

Most of our concepts of digestion, particularly the role of the stomach were because of the fortuitous association between Dr William Beaumont and Alexis St. Martin in the early part of the Nineteenth Century. St Martin, a Canadian trapper of French origin accidentally shot himself in his abdomen. Beaumont, a physician at an army camp nearby was called to treat him. Beaumont cleaned the wound and expected the patient to die. To his surprise, St Martin improved. The growth of granulation tissue partially closed the

wound forming a gastric fistula and St Martin was able to lead a reasonably normal life. However, this gave Beaumont the opportunity to see the inside of the stomach in a living person. Suffice it to say that he was the first person in the world to do this and in Sir William Osler's words " The man and the opportunity had met ". Beaumont introduced pieces of food into the stomach by tying them with a piece of string, and on drawing the string put after some time, he found , to his amazement, that the food had disappeared [digested]. He was also able to study the response . ... The relationship between the two was strange - and strained. While St Martin needed Beaumont for financial sustenance, Beaumont himself could not do his research without St Martin. The rude behaviour of Beaumont antagonised St Martin who disappeared without warning one day. Inspite of returning because of financial constraints, he again disappeared, - never to return.

Sir William Osler (1849-1919 A.D.) has been aptly described as "the world's greatest doctor". This was in 1949, 30 years after his death. Almost 50 years later, this statement remains true. Osler gave to modern medicine, what Hippocrates did thousands of years ago. He gave it a soul. Osler's contribution to the medical world can fill up textbooks - and indeed, it has. No physician or scientist has ever had so much written on him over the years. Significantly, not even one of these many works has ever criticised him. Osler was responsible for starting the system of bedside teaching in the wards, a practice taken for granted today. It was he who wrote the first comprehensive textbook of medicine " The principles and practice of medicine " in 1892. He also wrote prodigiously and taught students - at University of Pennsylvania, Johns Hopkins Hospital and at Oxford - amidst his busy practice. He found the time to describeTrichinella spiralis [as a young physician in Canada] and the Osler- Weber- Rendu syndrome [Hereditary Haemorrhagic Telangiectasia], Vaquez- Osler Syndrome [Polycythemia vera] and Osler's nodes of Infective Endocarditis. The " Quarterly Journal of Medicine " was founded by him.

Genetics and immunology are probably the fields in which great advances are being made. This is only natural because they deal with subcellular organelles and their functions. The future of medicine probably lies in understanding the genetic and biochemical basis of life. Genetics however, is not a new field. Its founder was an Austrian monk, Johann Gregor Mendel (1822-1884 A.D.) who lived in his monastery in Brno and who carried out his experiments on the pea plant. He used smooth and wrinked peas, as well as green and pink ones and used over 28,000 plants in his experiments. His work was not known to the outside world until 1900.

One of the most important discoveries in biomedical research was made about 40 years ago. In a celebrated letter to the editor to the journal *Nature*, James Watson and Francis Crick described the double helix structure of the DNA molecule, the molecule of life. They [along with Wilkins] were awarded the Nobel Prize in 1962 for this discovery. Today, gene therapy has been successfully attempted in select diseases in the USA and may become more important in years to come. From the structure of DNA in the 1950s to

genetic engineering later; and now gene therapy in the 1990s, medicine has indeed come a long way, in the latter half of this century.

Immunology, too, is not a new subject since its principles were introduced to clinical medicine by Edward Jenner. The greatest impact of this field in recent years has been in the manufacture of monoclonal antibodies in diagnosis and therapeutics. These were discovered by Georges Kohler and Cesar Milstein in 1975, for which they were awarded the Nobel Prize in 1984.

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CHAPTER 9 : SOME COMMON DISEASES

This chapter traces the history of two relatively common diseases - Diabetes Mellitus, which is very common and Cancer; the latter which is possibly the most feared disease. For the sake of completion, it may be stated that the other common diseases- Hypertension, Tuberculosis, Anaemia, AIDS, Nutrition disorders, etc, have been addressed to in other chapters.

DIABETES MELLITUS

Centuries ago Diabetes Mellitus was known to our ancestors and references to this are found in Indian, Egyptian and Greek medicine.The Papyrus of Ebers, written probably in the first half of the 16th century B.C. in Egypt, mentions, amongst other ailments, the passing of excessive urine. This perhaps refers to Diabetes or Cystitis. Surprisingly, there is no reference to Diabetes in Chinese, Persian and Greco-Arabic (Unani) medicine as could be ascertained from available reference books. In Charaka Samhita, 20 varieties of *"Prameha"* or polyuria are ,mentioned. One such variety of *"Prameha"* caused by "disturbance of air", is described with symptoms of flabbiness of flesh, dryness of the mouth and throat, sweet taste of the saliva, burning of palms and soles and passing of sweet urine. The sweetness of the urine was attributed by the ancient Hindu physicians to the presence of honey and hence the disease was known as " *Madhu Meha*". This was corroborated further by their observation that insects and ants were attracted towards such urine. This description is highly suggestive that the ancient Hindus were familiar with Diabetes Mellitus.

In the writings of Aretaios (Aretaeus) of Cappadocia, a Greek physicianswho lived during the period 120-200 A.D., there is a reference, probably to Diabetes. Amongst the disease described, he mentioned a condition associated with unquenchable thirst, excessive drinking of water and excessive passing of urine. The word "Diabetes" is perhaps derived from a Greek word signifying a siphon, appropriately describing how in the disease the fluid cannot be retained in the body. Greek physicians, like ancient Hindu physicians, used to taste the patient's urine to detect abnormal constituents. The practice, though unpleasant, perhaps enabled them to detect diabetic patients.

Then followed a long period of several centuries between the 3rd and the early 17th Century A.D during which the disease did not evoke any special interest amongst medical men, till after the "Renaissance". During and after the 17th century, several researchers contributed towards the better understanding of this malady. In the present century the emphasis has been essentially on the evolution of the treatment of Diabetes mellitus.Thomas Willis, in 1764, observed that the urine of a diabetic patient was sweet and he surmised that it contained either sugar or honey. Francis Home (1719-1813 A.D.) of Scottish origin, was the first observer to report fermentation of sugar in diabetic urine

by yeast, some time around 1765. In 1776, in Liverpool, an Englishman named Mathew Dobson was the first doctor to experimentally detect the presence of sugar in the urine of a diabetic patient , by evaporating the urine. He also observed the sweet taste of the serum from a known diabetic, thus establishing beyond doubt, the state of hyperglycaemia. That the sugar in the diabetic urine is glucose, was established by Michael Eugene Chevreul of France in 1815.

In 1846, Claude Bernard, a Frenchman, found that a wound in the floor of the brain near the cerebellum produced transient diabetes in animals. This perhaps marked the beginning of experimentally induced diabetes in laboratory animals. Adolf Kussmaul (1822-1902 A.D.), a German, described a peculiar type of breathing associated with diabetic acidosis now named after him "Kussmaul's Air Hunger". This observation turned attention of researchers to the biochemical changes in Diabetes. Karl Petreu (1868-1927 A.D.) a Swede, studied various metabolic disorders including Diabetes mellitus and recommended a special diet (Petreu diet) for diabetics which consisted of low protein and high fat content because of the belief that protein was the chief ketogenic factor in these patients. This, however, was eventually proved to be an incorrect concept following the work of Knoop in 1904 regarding the origin of ketogenic bodies.

Joseph von Mering (1849-1908 A.D.) and Oscar Minkowsky (1858-1931 A.D.), both students of Bernard Naunyn, in 1889, at the suggestion of their teacher, produced Diabetes in a dog by complete extirpation of the pancreas. Minkowsky also, in 1906, noted the formation of acid in diabetic coma and coined the term "acidosis". Animal experiments by Naunyn, von Mering and Minkowsky pinpointed the role of the pancreas in Diabetes. Earlier in 1893, E.Lagnesse had drawn attention to the role of the islets of Langerhans, described earlier by Langerhans, in the production of an internal secretion responsible for the well-being of an individual. George Zucler, a German, in 1900 obtained the pancreatic extract which he named "Acomatol". It contained insulin but its use was discontinued due to serious side reactions. However, with this observation a new era dawned in the treatment of Diabetes.

In 1912 Frank demonstrated the presence of an anti-diuretic hormone in the posterior lobe of the pituitary gland which controlled Diabetes insipidus. Evans on the other hand produced Diabetes mellitus in experimental animals by injecting anterior pituitary extract. Young, in 1937, confirmed the role of anterior pituitary extract in induced diabetes. B.A. Houssay (1887-1953 A.D.), a South American, described the role of Hypophysis in Diabetes mellitus in experimental dogs - known later as the famous "Houssay Dogs". For this and other related researches Houssay shared the Nobel Prize in 1947. Earlier, in 1916, the term " insulin" was coined by Edward Sharpey-Schafer for the internal secretion of the pancreas. Opie described lesions of the islets of Langerhans in fatal Diabetes.The problem of the relationship between insulin , the pancreas and

diabetes was finally solved by Banting , John James Richard MacLeod, Best and Collip [refer to the chapter on drugs].

Janbon and co-workers, in 1942, accidentally discovered sulfonamide induced hypoglycaemia. Following this discovery, several other orally effective organic compounds were made available. Human insulin was prepared by cloning of DNA in E. coli by Frank and Chance in 1983. This has now been put to practical use in the treatment of Diabetes Mellitus.

CANCER

The term "Cancer" is used in this article in a general sense meaning a malignant growth, irrespective of tissue of origin. The word "Cancer" is derived from the Greek word "Karkinos" meaning crab, - the body of the crab representing the main tumour mass, and the legs, by its extensions, resulting in the spread of the tumour. This, indeed was an astute observation in the absence of any magnifying device. Paleo-pathology has contributed considerably to our historical knowledge of cancer, through the discovery and study of bones and fossils that show evidence of tumours. References to cancer are found in the Hippocratic writings and so also in Galenic writing ; the latter, an ardent admirer of Hippocrates, refers to a cancerous growth as a hard mass of malignant tissue with or without ulceration.

During the last hundred years, numerous workers have published their findings on benign and malignant tumours, experimental cancer, transplantable tumours, and the role of viruses and immunity. As William Boyd writes "Everything under the sun, including the sun itself causes cancer ". In this brief account, it is possible to cover only a few of the historical aspects of Cancer.

In Indian medicine, there are detailed descriptions of tumours by both Charaka and Sushruta, who refer to them as "Arvuda", - all types of these having their origin in 'deranged' flesh and blood. The preponderant action of the deranged blood would lead to "Rakta-arvuda', while a dominant action of deranged flesh would cause the 'Manasarvuda' type - both types being incurable.

Treatment at that time consisted of application of poultices and plasters, some of them containing curd-cream, so as to encourage worms and parasites to consume the tumour. Any part being left would then be cauterized with fire. Superficial tumours were excised or cauterized, care being taken to ensure that no part was left behind, as these parts would, they warned, lead to fresh growths and "bring on death, just as the least particle of an unextinguished fire will lead to a renewed conflagration".

Paul of Aegina (625 - 690 A.D.), a Byzantine physician, some time in the first half of the 7th century wrote seven books "On Medicine", in which he referred to Cancer in general, and to that of the uterus and breast in particular. For cases of uterine cancer, he did not recommend removal because of the rapid progress of the disease and early recurrence.

Rudolf Virchow recognized Cancer as a disease entity, but his concept of its origin from the pluripotential connective tissue cell needed rectification, and this was carried out by Remak and Waldeyer. Remak (1815-1865 A.D.) differentiated tumours into two broad classes, those of epithelial and those of mesodermal origin. Later Waldeyer and his associates established the fact that the mode of spread of malignant tumours involved lympatic and vascular channels. Lisfranc (1833) is believed to be the first surgeon to successfully treat Rectal Cancer using the perineal approach.

EXPERIMENTAL CANCER

It is now well known that tumours, both benign and malignant, can be experimentally produced in animals through the medium of physical, chemical and infective agents, and that heredity is an important predisposing factor. In 1915, Yamagiwa and Ichikawa produced epithelioma by repeated application of tar to the skin of animals. With this discovery, attention was drawn to the causative role of hydrocarbons in certain cancers.

SMOKING AND POLLUTION

In 1949, Richard Doll and Austin Bradford Hill first reported the association between cigarette smoking and lung cancer. At the time, this disease affected more than 278 per million persons in Britain; they also found that most victims of the disease had been chain smokers for over twenty years. There is also evidence that atmospheric pollution contributes to a higher incidence of lung cancer in industrialized cities. In 1955, D.D.Banker reported an increase in the incidence of lung cancer among city dwellers of Bombay. Amongst Indians, the role of chewing tobacco and slaked lime in the causation of cancer of the Oral cavity, has been demonstrated by L D Sanghvi, Kasturi Rao and V.R. Khanolkar in 1955.

PHYSICAL AGENTS

Skin cancer, in exposed parts of the body is a well-known example for the carcinogenic effect of Sunlight, particularly among the Australians. Rusch and Bammann experimentally confirmed in mice that these lesions are caused by the ultraviolet component of the Sunlight. In India, "Kangri cancer " of the skin and "Chutta cancer" of the oral cavity are examples of chronic irritation due to heat, reported by E.F.Neve in 1900 and Kini and Subba Rao in 1937 respectively. Khanolkar also documented the Dhoti Cancer [squamous carcinoma of the skin caused by the wearing of tight dhotis] and Khaini Cancer of the lip in 1945.

Radium and radioactive substances used as therapeutic measures in the treatment of malignant neoplasia can also prove to be neoplasm-producing agents, if used indiscreetly. The use of Radium (discovered by Marie Curie in 1898), as a therapeutic agent was noted by the French physicist Henri Becquerel. He also suspected that Radium could cause burns, a fact that was confirmed by Pierre Curie in 1901. The first series of cases with malignant disease were reported by Martland and Humphrey in 1929. Girls employed in an American watch factory to paint dials with luminous paint containing Radium and Mesothorium were in the habit of reshaping their brushes with their lips, thus swallowing small amounts of these substances. Over the years, this led to the formation of osteogenic sarcoma in these workers.

HORMONES

The relationship between excess of Oestrogen and breast cancer was conclusively established by Lacassagne in 1935. Several years earlier, Lathrip and Loeb had demonstrated, in experimental animals, the association between breast cancer and ovarian hormones.

VIRUSES AND PARASITES

In 1911, Peyton Rous established that a cell free filtrate from a malignant tumour in a fowl, when injected into another fowl, could produce tumours in several succeeding generations. This tumour subsequently came to be known as Rous Sarcoma. Andrews, in the course of his research from 1931-33, succeeded in demonstrating antibodies in the serum of tumour -bearing fowls: this observation supported the infective theory of tumourigenesis, further justifying the search for the infective agent. In 1957, the first report of Herpes simplex as a premalignant condition was made by R. Wyburn Mason. Malignant tumours in association with parasitic infestation, have been known to occur in lower animals, though rarely. Cysticercus fasciolans, the cystic stage of T.crassicollis, is known to promote sarcoma in the liver of rats.

IMMUNITY

In recent years, numerous studies have focussed attention on the immune system as a means for sustaining a non-neoplastic state, or for developing a specific mode of anti-cancer therapy. This focus on the immune system centres around the belief that given an intact, competent immune system, surveillance mechanisms would destroy cells bearing new surface antigens.

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CHAPTER 10 : PATHOLOGISTS AND MICROBIOLOGISTS

Information on pathological lesions in ancient times, particularly of the early stone age, is available through paleopathology and paleoodontology, the study of bones and teeth of the early stone age. Evidence of tuberculosis of the spine and other bone lesions is derived through the study of Egyptian mummies. Archaeological findings of sculptures, dating back to the Mohenjo-daro and Harappa Civilizations, ancient Greek pottery with paintings of deformed bodies and votives on Asclepieia, are indeed precious contributions.

In 1987, William Turnbull and his associate Bruce Rothschild detected chemical traces of the "Syphilitic Organism" in the 11,000 year old vertebra of a bear in the collection of Chicago's Museum of Natural History. The well known adage says " Dead men tell no tales". But the anthropologist Geroge Armelagos of University of Massachusetts has a different version. To quote him, " Well, dead men and women tell us a great deal about the problems we are facing now."

Hammurabi (1948- 1905 B.C.) is believed to have contributed to Pathology as surmised from materials available fron the library of Ashurbanipal who lived during the period 669-626 B.C. Hippocrates recorded good clinical descriptions of many diseases including Cancer but did not contribute to Pathology.

Avicenna in 1000 A.D. differentiated Haemolytic jaundice from the Obstructive type. He also believed that wound infection with pus formation (laudable pus) was a favourable sign. Albucasis (25 B.C.-50 A.D.) described dental deformities. Celsus (25 B.C. - 50 A.D.) described the signs of inflammation viz. tumor [swelling], calor [warmth], dolor [pain], rubor [redness] as well as the symptoms of Rabies and Appendicitis in man. He described Carcinoma as a fixed tumour having two states, the earlier being the "non-ulcerating " and the later being the " ulcerating" ; the latter being the most malignant.

During the medieval period (500 A.D. - 1500 A.D.) there was generally no progress in learning and hence this period is known as the "Dark Ages". There were of course a few exceptions to this. Fracastorius (1483- 1553 A.D.) from his observations in diseased persons postulated that certain diseases were transmitted from the diseased to a healthy individual - the contagious nature of diseases. The acceptance of the practice of dissection of dead bodies opened a new vista. It was then possible to correlate a disease, its symptoms and its appearances. Leonardo da Vinci , Vesalius and a few others were important contributors through their dissections and their faithful drawings. Ambroise Pare described carbon monoxide poisoning in the year 1575.

Paracelsus considered himself superior to Celsus; his revolt against Galenism and its dogmas gave direction to the search for new concepts of disease. His account of "Miners' Phthisis", though published posthumously, has been considered as a great contribution to the understanding of the disease.

Marcello Malpighi (1624 –1694 A.D.), the Professor at Bologna and later at Pisa, was the first anatomist to make use of the microscope. He saw red blood cells flowing through the capillaries of a frog's web, thus confirming William Harvey's concept of blood circulation. The Malpighian corpuscles in the kidney and the Malpighian layer of the skin are named after him.

Giovanni Morgagni (1682-1771 A.D.) was an Italian pathologist who was one of the founders of morbid or anatomic pathology. He wrote a book *called De sedibus et causis morborium per anatomen indagatis* in 1761, in which the clinicopathologic corelation between clinical symptoms and gross anatomy were demonstrated. Morgagni described Cerebral Gumma, Syphilitic Aneurysms and Tuberculosis of the kidney.

John Hunter (1728-1793 A.D.) and his elder brother William (1718-1768 A.D.), through their meticulous study of medicine in general and pathology in particular, collected a large number of specimens over 13,000, - and established the first museum of Anatomy and Pathological Anatomy in London. The best known specimen was that of Charles Bryne, the Irish giant. Bryne tried his best to prevent Hunter from getting his body after his death but Hunter ultimately bribed people and suceeded in retrieving the body. John Hunter was a great surgical pathologist and did research on inflammation and on gunshot wounds and was also the first to establish the presence of collateral circulation.

Marie Francois Xavier Bichat (1771 – 1802 A.D.) was another French pathologist who contributed handsomely to his favourite subject. He established that the tissue, rather than the organ, was the important biological unit; this was the beginning of "Cellular Pathology". He also differentiated twenty one types of [non-microscopic] tissues in the human body and was the first to recommend division of Morbid Anatomy into two parts which we now understand as 'General Pathology' and 'Systemic Pathology'.

Rene Theophile Hyacinthe Laennec (1781- 1826 A.D.) the discoverer of the art of auscultation and the inventor of the stethoscope, described lung sounds and the clinical manifestations and pathology of Pulmonary Tuberculosis. It is indeed an irony of fate that he, at a young age, died of the same disease. His name is associated with several pathological conditions of the lung. He also described a condition of the throat for which he coined the term Diphtherite' - now known as Diphtheria.

Carl Rokitansky (1804 – 1878 A.D.) like Morgagni, was a gross descriptive pathologist of eminence. He described " Periarteritis nodosa" , differentiated between Lobar and

Bronchopneumonia as well as between Bright's disease of the kidney and Amyloid kidney. He described several anomalies of the human body particularly congenital heart defects. His learned discourses attracted students from far and wide and the Viennese School of Medicine soon became a well known seat of learning, particularly of Pathology. It also came to be known as the 'Mecca of medical students'. Rokitansky personally performed 30,000 autopsies, supervised over 70,000 autopsies and collected a wealth of pathological specimens over a span of 50 years, - no mean an achievement considering the period he lived in.

Rudolf Virchow (1821 -1902 A.D.) was a multifaceted scholar. His contribution to Pathology can provide material for an entire chapter. Some of his more important contributions were the separation of Pyaemia from 'Leukaemia', [which terms he coined], and the discovery of the phenomenon of embolism as well as of myelin. He was the first to stain amyloid with iodine and sulphuric acid as well as describe onychomycosis and describe pigments of the body. His publication *Die cellular pathologie*, in 1858 is one of the classics of medical literature. In it, he postulated "The cells are the loci of life and also the disease " and " Ominis cellula a cellula" or ' a new cell can only arise from an old one". He also believed that pathology was altered physiology and that the latter had a direct bearing on pathological anatomy. Thus was born the concept of "Cellular Pathology" and subsequent studies in the following centuries, were based on furtherance of the above concept. Over 50 medical terms including 'Hyperplasia' ,' Ischaemia',' Psammoma' , " Amyloid" , Pyaemia, "Leukaemia" and "Giant cell" were first used by Virchow. He was also responsible for starting the journal "*Archiv fur pathologische anatomic and fur Klinische medizin*" (Virchow's Archives, a journal that is still published). How good a teacher he was may be judged by the brilliance of his students. Suffice it to say that his students included Paul Langerhans Jr. , von Recklinghausen, Conheim, Klebs, His and Hoppe-Seyle. Medicine apart, Virchow found time to be a politician and a social reformer. He played a major role in the construction of hospitals, canals and sanitation in Berlin. He also did research in Anthropology and Archaelogy. In fact, a study of his had shown that only a minority of German were blond and blue-eyed ; contrary to the popular belief that most Germans were blonde and blue -eyed. This finding of course was contradictory to what Adolf Hitler wanted to propogate about 70 years later about Aryan phenotype and superiority ; as a result, Hitler tried to suppress Virchow's findings.

With the enuciation of Virchows's concept, the collaboration with physiologists became imminent. Several physiologists through their experimental research contributed in unraveling pathological processes. Amongst these, Claude Bernard's concept of the 'milieu interior' (internal environment) was an outstanding contribution based purely on the physiology of a cell, its surrounding, intercellular fluid and its dynamic role in maintaining the health of the cell. Bernard (1813 - 1878 A.D.) for the first time, introduced experimental study of disease in the living . He is also known for his experimental production of glycosuria which he did by puncturing the fourth ventricle. Bernard also described the functions of the liver, the digestive action of the the pancreas,

the nature of curare poisoning on muscle , oxygen carrying capability of the RBC; it is said that if Nobel prizes had existed in his time, he would have bagged at least four !

Between 1840 and 1932 Mohr, Frolich, Simmonds and Cushing were associated in the understanding of the pathology of lesions of the Central Nervous System.

A reference to Indian contributors will not be out of place. Vasant Ramji Khanolkar (1895-1978 A.D.) was born and brought up in Quetta. He took his M.D. in Pathology from the London University in 1923. On his return to India, in 1924, he was appointed Professor of Pathology and Bacteriology at the Grant Medical College, Bombay, which post he relinquished in 1926 to join the staff of Seth G.S . Medical College and K.E.M. Hospital, Bombay as the Professor and Head of the Department of Pathology and Bacteriology. Later, he was the Director of Laboratories of Tata Memorial Hospital, Bombay [1941 - 1952] before becoming the Director of Indian Cancer Research Centre (ICRC) from its inception in 1952, till his retirement in 1963. At Tata Memorial Hospital and I.C.R.C., he carried out a number of research projects on experimental cancer and related topics. He established the role of tobacco as a carcinogen in the causation of Cancers of the mouth region. He could rightly be called the " Kennaway of India" for his contributions to the subject of carcinogenesis in general. He was also interested in Leprosy and through his studies the mode of spread of M. leprae in neural leprosy was established. Under his guidance attempts were made to cultivate M. leprae " in vitro" ; a strain has been isolated. He was also a linguist. Besides English, German and French he knew Marathi - his mother tongue, Pushtu and Urdu. He was the recipient of national and international honours, including the Padma Vibhushan in 1955 and the first National Research Professorship of the Government of India in 1963.

P N Wahi (1908-1991 A.D.) was born at Moradabad in Uttar Pradesh. He graduated from King George's Medical College, Lucknow in 1932, took his M.D. from the same college in 1934 and M.R.C.P. (London) in 1938. He joined the Department of Pathology of the S.N.Medical college, Agra in 1935 and became the Professor and the Head of the Department in 1941. He was appointed the Director of I.C.M.R. in 1969 and retired in 1974. His well known observations on the precancerous and cancerous lesions of the uterine cervix, oral cavity and others, contributed in no small measure in planning of the National Cancer Control Programme. He was the recipient of several national awards for his outstanding contributions to medical education and research.

Y.M .Bhende (1911-1998) graduated from the Grant Medical College, Bombay in the year 1935. He took his M.D. in General Medicine in 1940 and later , M.D. in Pathology and Bacteriology in 1945 from the Seth G.S. Medical College, Bombay. That same year he was appointed the Professor and Head of the Department of Pathology and Bacteriology. In 1952 he resigned and joined the B.J. Medical College, Ahmedabad. Since his early days, at P.G. Singhanee Hindu Hospital, Bombay, when working under Raghvendra Row, he had an interest in Haematology and he continued to pursue his interest in this subject. Subsequently he published several studies on Anaemias in Indians and threw new light

The authors heard the sad news of passing away of Dr Y.M. Bhende on December 2, 1998.

on their aetiology and pathogenesis. He and his associates discovered in 1952 , a new blood sub-group which is now known as the "Bombay blood group". During his tenure at B.J. Medical College, Ahmedabad, he contributed several papers on Amyloidosis in India and published his experimental work on the role of Argemon oil and its relation to Epidemic Dropsy. He was subsequently transferred to the B.J. Medical College, Poona (Pune) and retired due to superannuation in the year 1967.

In eulogizing anatomic pathologists, one cannot forget the important role played by workers in allied subjects. Studies of Louis Pasteur (1822 – 1895 A.D.) and Robert Koch (1843 – 1910 A.D.) conclusively established that many diseases were caused by invading bacteria. This observation had an important bearing on subsequent researchers in Pathology and Microbiology. Subsequently, research has been directed towards the understanding of various kinds of tumours and their origin. The introduction of the tissue culture technique has unravelled several mysteries in Oncogenesis.

MICROBIOLOGY

The concept that diseases are caused by tiny organisms, goes back to Marcus Terentius Varro (127- 116 B.C.). Girolamo Fracastorius, in 1546, hypothesized the existence of invisible living "Semina" through which diseases spread. Augustino Bassi (1771- 1856 A.D.), an Italian law graduate had varied interests including Anatomy and Physiology. In 1835, he described a disease of silk worms due to a parasitic fungus- known later as " Bortrytis bassiana" and its treatment.

Olive Wendell Holmes (1809-1894 A.D.) an American, though a graduate in medicine, was keenly interested in literature and poetry. In 1843, he had observed that puerperal sepsis was transmitted through contaminated hands. This observation, though made three years earlier was not known to Semmelweiss, when he published his observations on the same subject in 1846. Holmes is also well known for his statement , "if all the drugs in the world were sunk to the bottom of the sea, it would be all the better for mankind and all the worse for the fishes ", a statement which indicates the state of therapeutic medicine then.

Edward Jenner (1749- 1823 A.D.) was the favourite student of John Hunter. Jenner used to write to Hunter for advice. In one of his replies [regarding hibernating hedgehogs], Hunter wrote : "Your suggestion is just ; but why think, why not try the experiment ?"; advice often quoted even today to young researchers. Jenner had been told by a milkmaid that she would not ever suffer from Small-pox as she had already had Cow-pox , having handled animals with Cow-pox infection . Jenner through his ingenuity, introduced Cow-pox vaccination in 1796 with the pious hope that it would serve as a prophylaxis against Small- pox; it did work. With this observation began the era of vaccination as a prophylaxis against infectious diseases and the role of immunization in combating disease. During ancient times, in India and China there existed a practice of

"variolation" in which protection against Small-pox was produced by inoculating live organisms from pustules.

Louis Pasteur (1822 –1915 A.D.), a Frenchman, was born in Dole. He obtained his doctorate in Sciences in 1848. His first research was highly acclaimed by "Academie des Sciences". As a renowned chemist, he was called upon by the French Government to resolve problems in the manufacture of wine. He continued his studies in the fermentation of alcohol and lactic acid. Later he announced that fermentation of sugar into alcohol and carbon dioxide was due to round globules, later identified as yeast cells. His proof of the existence of germs in the air led Lister to apply the same principles in Surgery. He also described a method of sterilization at 60^0 C, known as "Pasteurisation". He coined the term "vaccine" and prepared vaccines against Anthrax, Chicken Cholera and Rabies. His experimental approach to confirm the efficacy of his Anti-rabies vaccine, is indeed commendable considering the circumstances and facilities prevailing then. He was fortunate to get an opportunity to try out his vaccine on a nine year old boy - Joseph Meister - who was bitten by a rabid dog on 6th July 1885. The treatment was a success and soon patients bitten by rabid dogs came to Pasteur for his miraculous treatment. In recognition of his achievements, the "Academie des Sciences" of France recommended the establishment of an institution for research named "Institute Pasteur" after the illustrious chemist turned microbiologist.

Another outstanding personality in the latter half of the 19th century was Robert Koch (1843-1910 A.D.) who was born in Klansthal in Germany. He developed, by painstaking effort, a procedure to cultivate Bacillus anthracis on laboratory media. Earlier, in 1850 Davaine and Pollender had demonstrated Anthrax bacillus in the blood of animals dying of this disease. Koch, in 1881, published his new method of solidifying a meat infusion of culture medium for the growth of bacteria by the addition of gelatin. This has been considered by some as the greatest contribution to Microbiology. Employing his staining technique, which he had devised earlier, he confirmed in 1882, the presence of tubercle bacilli in the sputum of patients suffering from Pulmonary Tuberculosis and in 1883. Vibrio cholerae in the excreta of patients suffering from severe diarrhoea, now known as Cholera. He designed the hanging drop procedure for the study of micro-organisms. He prepared Tuberculin as a treatment for Tuberculosis but failed. Tuberculin, however, has an application in the diagnosis of tuberculosis. Finally he has given us the Koch's Postulates according to which proof that an organism can cause disease exists only when certain criteria are met, viz., the organism must be present only in the diseased animal and not in normal animals, the causative organism must be isolated from the diseased animal and grown in pure culture, must reproduce the disease when the organism is introduced into a susceptible animal and the organism must be re-isolated from this animal. Koch received the Nobel Prize in 1905 and with Pasteur, can truly be called the "Founder of Bacteriology".

Waldemar Mordecai Haffkine (1860-1930 A.D.) was born in Odessa, Russia, of Jewish parents. He took his degree of Doctorate of Science from the University of Odessa. His

interest in Cholera was aroused during the years 1888 and 1889 when there was an epidemic of this disease in Russia. Earlier in 1883, Robert Koch had established the causal relation between Vibrio cholerae and the disease. Taking the cue from this observation, Haffkine prepared an Anti-cholera vaccine and after testing the efficacy in laboratory animals, he persuaded his colleague to inject the same into his arm to prove not only its harmlessness but also its beneficial effects as an immunizing agent. This was reported to the Biological Society of Paris in the year 1892. In 1893, the then Governor General of India, requested the services of Haffkine to combat the Cholera epidemic which was raging in Calcutta and its surrounding regions. In March of the same year he arrived in Calcutta and with the assistance of local doctors embarked on a programme of mass inoculation as a Prophylactic measure and succeeded in bringing down the mortality by 70 percent. He, in his modesty, admitted his inability to evaluate the degree of immunity and its duration. In 1896, an epidemic of Bubonic Plague broke out in Bombay and once again the British Government reassigned Haffkine to Bombay. He arrived at Bombay in October 1896 and set up a one room laboratory, in the corridor of Framji Dinshaw Petit Laboratory of the Grant Medical College, Bombay. By December of the same year , he started experimenting on laboratory animals with his Anti-plague vaccine and was soon convinced of its efficacy in preventing the disease and its spread. In January 1897, he persuaded Dr. F.N. Surveyor, to inoculate him (Haffkine) with the vaccine in the presence of the Principal of the Grant Medical College. This is an example of self-experimentation in medicine, a feature which was not uncommon in those days. The next day he was at work inspite of the local and general reaction following the inoculation. He urged the Government to introduce mass inoculation programme in epidemic diseases, as a preventive measure. Following this there was a great demand for his plague vaccine from countries all over the world. He founded the Plague Research Laboratory which was subsequently moved to the "Old Government House", Parel, Bombay. In 1925, this laboratory was renamed "The Haffkine Institute" in his honour. In recognition of his devoted work and research, several Indian and International awards were bestowed upon him. In 1915, he retired from Haffkine Institute due to superannuation.

Ronald Ross (1857- 1932 A.D.) was born in India during the days of the British Raj. After his medical education in England, he was commisioned in the Indian Medical Service in 1881. A chance meeting with Sir Patrick Manson in London influenced him greatly and he decided to do research on Malaria. In 1880, Alphonse Laveran, a French army physician discovered the Malarial parasite as the causative agent of Malaria by demonstrating it in the red blood cells of man. After much painstaking reseach, Ross discovered pigmented cells in the stomach of the Anopheles mosquito in 1897. This was published in The Indian Medical Gazette in 1898. In 1899, Sir Ronald Ross went back to London where he was a Lecturer in Tropical Medicine and later Professor of Tropical Medicine at Liverpool School. Ross received the Nobel Prize in 1902.

Walter Reed [1851-1902 A.D.] was a doctor in the American army. He went to Cuba in 1898 to study Yellow Fever, a disease which caused high morbidity and mortality. His

experimental work there proved Carlos Finlay's theory that the mosquito bite of the Aedes led to the development of this disease.

Raghvendra Row (1873-1953 A.D.), was born in Honavar in North Kanara. He graduated from the Grant Medical College, Bombay. He proceeded to London for further studies and returned to India in 1911. He was the first Indian to take the degree of Doctor of Medicine from London. On his return to Bombay, he was appointed as honarory Physician at the J.J.Group of Hospitals, Bombay. In 1926, the Government of Bombay Presidency, (as it was known then) persuaded him to accept the post of the Professor of Pathology and Bacteriology at the Grant Medical college, Bombay, which had fallen vacant due to the resignation of Dr. V.R. Khanolkar. Besides General Medicine, he was also intensely interested in Parasitology. In order to pursue research in Malaria, Kala Azar and Leprosy, he established a Research laboratory at the above Institute at his own expense. The aim of his research was to cultivate parasites of the above mentioned diseases and also Lepra bacilli (M. leprae) in the laboratory and eventually prepare a vaccines. In a suspected case of Rat Bite Fever, he injected the patient's blood, intraperitoneally into a mouse and succeeded in demonstrating the Spirillum minus in the peripheral blood of the mouse. This was reported in the Indian Medical Gazette in 1941. He published seventy two scientific papers and in recognition of his work, he was awarded the Degree of "D.Sc." (London). After his retirement from the Grant Medical College in 1931, he joined P.G. Singhanee Hindu Hospital, Bombay as a Physician and Pathologist. One of his valued patients was H.H. the Maharaja of Mysore. He donated all his earnngs from the private practice to this hospital. He was both, an astute scientist and a philanthropist. Row died in 1953.

C G Pandit (1895-1991 A.D.) joined the Elphinstone College in 1910. He proceeded to London and was the first recipient of the Ph.D. in Bacteriology from the London University. On his return, he joined the Medical Research Deparrment and was posted at the King Institute, Guindy, Madras in 1924 and later as the First Indian Director of the same Institute. He is known for his contributions on Rabies, Cholera and other Tropical Diseases. His interest in Filariasis, in and around Madras, culminated in the discovery of the "adhesive phenomenon " in 1929 in individuals suffering from Filariasis. This test was confirmed by Japanese and American scientist nearly 35 years later. His peliminary studies on "Endemic Fluorosis" and its association with high fluoride content in the drinking water published in 1940 initiated further studies in this field. He was the recipient of National and International awards. He published his autobiography " My World of Preventive Medicine". In recognition of his contributions to microbiology he could justifiably be called "The Indian Microbe-hunter".

Shambu Nath De (1915-1985 A.D.) completed his MBBS from Calcutta Medical College and later his Ph. D. In London. He began research on Cholera in 1949 and discovered the cholera exotoxin with an animal model in the ligated loop of a rabbit's small intestine.

Dharmendra (1900 – 1991A.D.) was one of the most eminent leprologists in the world. He was born in Lahore and graduated in Medicine in 1928. He later took his Diploma in Bacteriology from the London University and joined the Calcutta School of Tropical Medicine in 1933. For the next 22 years, he was involved in various research projects on Leprosy. In 1957, he was appointed as the Director of Central Leprosy Teaching and Research Institute (CLTRI) at Chingleput, Madras, which post he held till his retirement in 1966. His contributions to leprosy research eventually culminated in his well known skin test with an antigen prepared by him, which was later known as "Dharmendra Lepromin" test. He published books on various aspects of Leprosy. For his outstanding contribution to Leprosy, National and International awards were bestowed upon him.

Several viruses are now implicated as etiological agents in Oncogenesis: but the first to draw attention to the association of viruses and malignancy were Ellerman and Bang in 1908, through their tissue culture technique. Peyton Rous in 1911, discovered filterable Sarcoma in fowls which was a prelude to the discovery of viruses. It is of interest to note that he received the Nobel Prize as late as 55 years later [1966] - a world record for the longest period taken by a scientist to achieve `recognition'. With the discovery of electron microscope by Knoll and Ruska, viruses could be visualized, resulting in rapid advances in viral diseases and their pathology. Twort, in 1915 and D'Herelle, in 1917, independently discovered a lytic agent of bacteria which was subsequently known as " Bacteriophage".

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CHAPTER 11 : DRUGS

A drug is defined as any substance or product that is used or intended to be used to modify or explore physiological systems or pathological states for the benefit of the recipient. Drugs in the distant past were generally of herbal or animal origin. Heavy metals and their salts, though sparingly used, were also included in the ancient physicians's armamentarium. With advances in chemistry, specially during the last two centuries, various chemicals were introduced as drugs, and in this century many drugs have been also synthesized in the laboratory. The spurt of progress in the search of antibiotics and newer drugs began with the discovery of Penicillin. The antibacterial activity of the fungus Penicillium notatum was accidentally discovered by Alexander Fleming in 1928 . However, the use of mouldy bread as a home remedy for certain ailments, was known to our ancestors many centuries ago, and was practiced by the Mayans and others.

References to medications dating back to the Pre-Vedic period, 6000 years B.C. and even earlier, are found in Hindu Mythology. It is believed that Lord Vishnu when approached by the sages to provide relief for mankind's ailments, ordered the churning of the ocean of milk with the aid of "*Vasukis*" and "*Asuras*". Out came Dhanvantari with the "*Amrita*" pot in his hand, a potion which could not only alleviate human suffering but also bestow immortality upon the consumer.

In the Siddha System of Medicine which dates back to almost 5000 B.C., there are references to medicinal preparations of plant, animal and mineral origin. Fruits such as the lemon and leaves of certain plants, were frequently prescribed becuse of their medicinal properties, such as Margosa leaves for Small-pox. Similarly, in Ayurvedic Medicine, drugs, of vegetable origin (fruits, leaves, bark and roots), of animal origin, and minerals such as gold, copper, iron, are available. In the Charaka Samhita 2000 such drugs are included. A few such ancient drugs are still in use in modern medicine in their refined form; the well known examples being Quinine from Cinchona bark, Reserpine from Rauwolfia and Bromhexine from Adathoda vascica.

Nagarjuna lived some time during the period 100 B.C.- 100 A.D.: he was a great alchemist and was later known as the "Father of Indian Chemistry". He was the first to use metal oxides, black sulphide of Mercury (Kajjali) and other Mercury preparations in medicine.

Bhava Mishra (1600 A.D.), the author of "Bhava Prakasha" makes a mention of drugs brought from outside India after his contact with the Portuguese, who came here as traders.

Sumerian and Babylonian Medicine is nearly 5000 years old. Mesopotamian physicians used drugs of herbal origin, such as Hyoscyamus, Hemp, Mandrake, Opium, Belladonna, etc., besides those of mineral and animal origin. "Assyrian herbal", a document written on clay tablets in cuneiform script, from King Ashurbanipal's library, was deciphered by Thompson. In this document he has reported 250 drugs of vegetable, and 120 of animal origin.

Ancient Egyptian Medicine was equally advanced, and dates back to nearly 3000 B.C. Their custom of mummification of bodies, a few of which are fairly well preserved, offers ample proof of their thorough knowledge of preservatives. The Egyptian "Papyrus of Ebers", probably written in the 16th century B.C. in hieroglyphs and cuneiforms, deciphered later by Prof. Ebers in 1873 is a medical compilation now considered a classic. Many prescriptions mentioned in this document date back to 3000-2500 B.C.

Ancient Chinese Medicine is perhaps as old as Indian and Egyptian medicine. It, however, remained unknown to the rest of the world for a long time due to the physical isolation of the country. According to ancient Chinese medical theory, diseases are due to the imbalance between the "*Yang*" (male) and the "*Yin*" (female) principle. Drugs are classified on this basis; stimulants, resolvents, expectorants, etc, belong to the Yang group and astringents, purgatives, bitter substances, etc. to the Yin group. Chinese pharmacology is essentially of herbal origin. The great herbal "*Pentsao Kang Mu*" written by Shen Nung probably in the 16th century B.C., contains 1,892 remedies and 1000 prescriptions. Out of the 365 drugs mentioned in this document, 240 are of vegetable origin. From this Chinese classic, it is evident that they had a thorough knowledge of the medicinal properties of plants and vegetables.

Ancient Egyptian and Mesopotamian Medicine obviously had a certain amount of influence of early Greek Medicine. Greek Medicine and its influence extended over a period of a millennium, from the time of Hippocrates to 500 A.D. This was followed by the Medieval period from 500-1500 A.D. which was generally a period of stagnation and decline.

Chemistry was well advanced in Arabia, - in fact, some of the words used in chemistry eg. alchemy, alcohol, alkali and aldehyde are of Arabic origin. Jabir who lived some time in 900 A.D. tried to convert lesser metals into gold and silver by alchemy and hence was known as the "Father of Arabian Alchemy". Arabs introduced new drugs such as senna, camphor, sandalwood, cassia, tamarind, nutmeg, cloves, aconite and mercury. Solvents such as rose water, orange water and tragacanth were also known those days. Arabs were aware of the anaesthetic effect of Cannabis indica and Hyocymus.

The period of the Renaissance (1500-1700 A.D.) saw a resurgence of scientific curiosity leading to renewed research in various fields including chemistry, which, in turn, contributed to advances in medicine. Perhaps the greatest medical personality of the period was Paracelsus. He introduced powdered tin as an antihelminthic and used mercury, antimony, zinc and their salts as medicines. He also advocated the use of pure chemicals for specific diseases. This practice led to the birth of rational medicine.

Louis Pasteur (1822-1895 A.D.), the chemist-turned-microbiologist, applied his knowledge of microbes to the process of fermentation and brought about a great improvement in wine production. His subsequent work on Anthrax in animals, and Chicken Cholera, led to the development of vaccines and antitoxins. With this discovery new biological products were introduced as remedies. The outstanding example is the Rabies vaccine that Pasteur gave to the world, which has saved thousands of lives. By the end of the 19th century the "Germ theory" of many diseases became an established fact, and the search for more specific medicines was intensified.

At the dawn of the Twentieth Century, the science of chemistry was making rapid advances, specially on the European continent. During this period the name of Paul Ehrlich (1854-1915 A.D.) looms large on the horizon of the medical world for his outstanding contributions in Chemotherapy. He and his Japanese assistant Sahachiro Hata, in 1910, discovered "Salvarsan" (Agent 606), an anti-syphilitic arsenical compound. Later, he and his associate synthesized "Neosalvarsan" which was extensively used in the treatment of Syphilis until the advent of Penicillin. Ehrlich may thus be regarded as the "Father of Modern Chemotherapy ".

In the first three decades of the present century, many chemotherapeutic substances were in use as drugs. One such drug was Quinine, which was then the only drug effective against malarial parasites. In 1677 Cinchona bark was found effective in fever associated with a feeling of "cold" and "shivering". However, the quinine alkaloid was isolated from Cinchona in 1820 by Polletier and Couventou and its use as a specific therapeutic agent in Malaria was appreciated thereafter.

Gerhard Domagk (1895-1964 A.D.) in 1935, synthesized Prontosil with anti-bacterial properties. Following this discovery several other drugs with the sulfa radical were synthesized, tested for their anti-bacterial activity and toxicity, and made available to the medical profession.

The history of antibiotics is comparatively of recent origin. In 1899 Emmerich and his colleagues isolated a pigment, Pyocyanin, a bactericidal substance from Pseudomonas aeroginosa. The next outstanding contribution was the dramatic discovery of Penicillin by Alexander Fleming (1881-1955 A.D.) in the laboratory of St.Mary's Hospital in London in 1928. He noticed that a mould which had accidentally contaminated a culture

of Staphylococci, inhibited the growth of this micro organism. To his surprise, he found that the same mould had similar effect on other pyogenic organisms. The significance of this discovery, however, was not understood till 1939, when scientists at the Sir William Dunn School of Pathology, Oxford, applied their minds to the study of this substance. With the outbreak of World War II, the need for antibiotics to treat wounded soldiers increased and hence research was directed towards manufacturing large amounts of Penicillin. Howard Florey and Ernst Boris Chain were already experimenting with Penicillin at Oxford. Their observations were released to the scientific world through *The Lancet,* dated August 24, 1940 . They then went to Peoria in the USA to produce large amounts of Penicillin for clinical trials. By 1944, large amounts of the drug were being manufactured. Thus, the development of this drug was largely due to a war; like many of the surgical skills developed in the middle ages. Florey, Chain and Fleming shared the Nobel Prize for medicine in 1945.

In 1943, Selman A. Waksman [1888-1973 A.D.] isolated a strain of Streptomyces griseus which produced an antibiotic which he named "Streptomycin" . This antibiotic had a bacteriostatic effect on Mycobacterium tuberculosis and proved to be a great boon to patients suffering from Tuberculosis. For this, he was awarded the Nobel Prize in 1952. After 1947 many broad spectrum antibiotics have been synthesized in laboratories for human use including Chloramphenicol and the Tetracyclines. Amongst the latest additions to the ever lengthening list is Moxalactan.

Equally fascinating is the story of insulin. Frederick Banting was a young Canadian Orthopaedic Surgeon who , having failed in his practice at the age of 30, decided to carry out research in Diabetes at the University of Toronto. He worked along with a graduate medical student, Charles H. Best and later Collip. Based on a grant of a hundred dollars and ten dogs, these three men - who were most unqualified for the job - managed to solve a problem which even the experts could not solve. They were given eight weeks to discover the cause of the disease. Since John J R McLeod [1876 - 1935 A.D.] the Professor of Physiology was on leave in Europe, they decided to work on, - and were successful. The Nobel Prize in Medicine was awarded to Banting [who shared it with Best] and McLeod [who in turn shared it with Collip] in 1923.

ANTIHYPERTENSIVES - A STRANGE CASE OF NEGLECT

The initial step in the elaboration of antihypertensive agents was the work by Sir Henry Dale (1906) and Burn and Dale (1914), who showed that Ergot contained vaso-active substances, and that tetra-ethyl ammonium chloride compounds blocked autonomic ganglia and decreased the blood pressure. Dale showed the action of Acetylcholine and was awarded the Nobel Prize in Medicine in 1936. Quarternary ammonium compounds were not greeted very enthusiastically as the blockade of both Parasympathetic and Sympathetic Systems led to what was humourously called " The Hexamethonium Man", who was deprived of his important and enjoyable functions.

In the early 1930s attempts were made to decrease blood pressure with Thiocyanate. Alfred Adson performed anterior nerve root section known as 'Surgical Mayhem". The operation did not decrease the BP but miraculously reversed the malignant syndrome in a few. The other treatment then available was a salt restricted diet, rest, abstinence from smoking, and strangely, tonsillectomy ! Headache was treated with nitrites, catharsis and hot mustard foot baths: if the headache persisted, lumbar puncture was resorted to.

THE GOLDEN AGE - 1950s AND EARLY 1960s

The anti-hypertensive effect of Rauwolfia serpentina has been recognized in Indian as early 1918, and was conclusively demonstrated by Rustom J. Vakil in 1949. But Reserpine was isolated only in 1954 by Muller Schlittler and Bein (CIBA). The discovery of Alpha-methyl dopa (1955-Merck) and Sodium nitroprusside (1956-Roche) soon followed.

A major breakthrough in the chemotherapy of Hypertension came with the Thiazide diuretics, Chlorothiazide (1957-Novella and Sprague-Merck), and Dihydrochlorothiazide (1958-CIBA). The 1960s and 70s brought Spironolactone, Clonidine, Pronetholol and Captopril in quick succession.

Another significant advance was the demonstration by Powell and Slater of Eli Lilly and Company, that a dichloro analogue of isoproterenol blocked the inhibitory but not the excitatory effects of sympathomimetic amines. Studies by Moran and Perkins showed selective blocking of the positive inotropic and chronotropic effects of adrenergic stimuli, and it was left to Black and Stephenson of Imperial Chemical Laboratories to introduce the beta-receptor blocking compound, the Pronetholol. This drug was the first of a large and important group of anti-hypertensive agents that were synthesized and continue to be synthesized by the dynamic pharmaceutical industry. The role of pharmaceutical companies in promoting research on antihypertensive drugs was, and continues to be impressive. Most of the drugs came into being, as a result of the industry's early recognition of the importance of drug therapy for hypertension.

Cancer Chemotherapy is another field where medicine has made great advances. Although cancer is far from being conquered, there are today, cancers which are potentially curable - a statement that could not be made about 30 years ago. In fact, even the first edition of Goodman and Gilman's textbook of pharmacology made no mention of Cancer Chemotherapy. Ironically, these same authors later described drugs for the treatment of Cancer, - Mustard gas for Leukaemia, in the 1950s.

The team formed by George Hitchings and Gertrude Elion made great advances as they isolated 6-mercaptopurine and thioguanine for the treatment of Leukaemia. They also

isolated pyrimethamine as an antimalarial and azathioprine for organ transplants and allopurinol for Gout. Hitchings and Elion shared the Nobel Prize for medicine in 1988 for their discoveries in Chemotherapy. Sir James Black was the third person who shared the prize with them. Black had isolated Propranalol in 1964. In 1972, his research led to the discovery of Cimetidine or the H2 antagonist drugs. He was the Director of Therapeutic Research at the Wellcome Research Laboratory from 1978 to 1984. Thus, it can be stated, without exaggeration, that two of the most commonly used drugs at present came from the laboratory and scientific genius, of one man.

Cancers that can now be controlled include the non-Hodgkin's Lymphomas, Hodgkin's Disease, Germ Cell Tumours and Choriocarcinoma. Antifolate drugs, used for Choriocarcinoma were based on the work done by Subba Row.

Indians have also contributed in a small way to the therapeutic measures that a modern physician now possesses. Rauwolfia serpentina was known to the ancient Indians and used in Unani medicine by Hakims Ajmal Hussain and Jamal as a cure for insanity [hence called ` *puglee ka davaa* ']. Another example of a herbal remedy which has found its way into modern allopathic medicine (the other being Digitalis) is Reserpine which was introduced by Rustom Jal Vakil after a careful study which was published in the *British Heart Journal* in 1949. Suffice it to say that as recently as 1988, Krikler wrote "no other paper has had such a great impact on the management of hypertension" . Vakil was a popular professor and Cardiologist at the K.E.M. Hospital, Bombay and in 1957 was awarded the Albert Lasker Award for Medical Research. He was the first Asian to receive this award. He was also the recipient of the Magsaysay and other Indian awards for his contributions to Medicine.

Sir Upendranath Bannerjee (1875-1948 A.D.) who taught medicine at different medical colleges in Calcutta is known for his discovery of the use of Ureastibamine for the treatment of Kala Azar. He also performed research on Infantile Biliary Cirrhosis. Another well known name in pharmaceutical research is that of Yellapragada Subba Row (1895-1948 A.D.). Row isolated an antibiotic Aureomycin as well as folic acid and his work led to the discovery of antifolates. He also isolated Vitamin B12 from the liver but did not specifically identify it. He devised the colorimetric method for determining the amount of phosphorous in body fluids and co-discovered phosphocreatine and ATP .

Even a brief History of Pharmacology will be incomplete without the mention of the "Thalidomide Tragedy". Thalidomide was introduced in Germany in 1958 as a sedative and hypnotic and was widely used until 1961 when it was realized that Thalidomide caused congenital anomalies in children born of women who had taken the drug during pregnancy. The abnormalities included Cardiovascular Anomalies, Neuropathies and the one which was most striking and crippling - Phocomelia, - failure of development of arms and legs. It must be stated that Frances Kelsey who was in the Food and Drugs

Administration Office of the USA was never convinced of the safety of this drug and hence did not grant the drug a license in the USA. President Kennedy awarded her the Congressional medal for Bravery in 1962 for her act.

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CHAPTER 12 : SWEET SLUMBER

The importance of developing painless surgery is obvious. For centuries, people were terrified of surgery because of the immense and torturous pain that they had to undergo. The quest for an agent that blocked pain is centuries old. Pundit Ballala has mentioned in "*Bhoj Prabhanda*" (980 A.D.) that Raja Bhoja's skull was trephined under the influence of some plant " *Sammohini*", as an anaesthetic. The same was also applied as a healing balm to surgical wounds. A drug called "*Sanjivani* " was administered to revive him and help him regain consciousness. The ancient Chinese used opium as a means of stopping pain. The Egyptians beleived that Mandragora [Mandrake] was a gift of Ra, the Sun God. Both Mandragora, as well as opium have been mentioned by William Shakespeare in his plays as substances which can induce painlessness. Hashish also was a popular agent for the purpose of relieving pain in ancient times.

Pedanios Dioskorides who lived during the first century, having noted the soporific effect of Opium and Mandragora, was possibly the first Greek to use the word Anaesthesia. Through his travels with Roman armies he collected information on the medicinal properties of herbs, plants, fruits, metals and animal substances. He wrote his famous book on this subject in 77A.D. Hua T'o (190 A.D.) employed anesthesia during surgical procedures. It was probably Cannabis indica mixed with wine.

Theodoric De Lucea (1205 – 1298 A.D.), an Italian practitioner, used a sponge soaked in hot water and a mixture of Mandrake with Opium in difficult surgery. Valerius Cordus and Paracelsus synthesized Ether in 1544 but its properties were not known then. In 1776 Joseph Priestley prepared Nitrous Oxide. However it was Humphrey Davy, in 1800 who had noted that his headache had disappeared with the use of this gas . He then suggested the use of Nitrous Oxide as an anaesthetic and also coined the term "laughing gas". The suggestion, was however not taken up seriously.

Michael Faraday (1791-1867 A.D.) some time in 1816, noted the anaesthetic effect of Ether. William E. Clerk, a chemistry student in Rochester, United States of America, in January 1842, used Ether as an anaesthetic. Earlier he and his friends indulged in "Ether Frolica" by inhaling Ether and getting "high".

It can be stated without fear of contradiction that few events in medicine have been shrouded in as much controversy as the discovery of anaesthesia. The individuals concerned in this sad story are the following; Crawford William Long, Horace Wells, William Thomas Green Morton, Charles Jackson.

Crawford Williamson Long was the first to use Ether as an anaesthetic in Jefferson, Georgia, in the year 1842. He first used it to excise two tumours from the neck of a patient named James Venable. Following this, he used it successfully for thousands of operations including amputations of the fingers and toes over the next few years. Unfortunately, he did not choose to either publish or publicise the matter until almost 1849, when other people had also discovered the process of painless surgery. In fact, he was practically forced by his friends to stake his claim as the true discoverer of anaesthesia when William Morton applied to the American Congress for a reward for having discovered anaesthesia. Long was never given the credit for the development of anaesthesia. He died a disappointed man in 1878. The manner in which he died was appropriate for a pioneer of anaesthesia. Moments after having delivered a baby from a woman who had just been given Ether to relieve the pain of labour, Long had a stroke and became unconscious. He died a few hours later, unaware that his last conscious act was obstetric analgesia.

Gardner Quincy Colton had a travelling show in which he showed audiences the pleasure of using Nitrous Oxide as a laughing gas. Horace Wells, a dentist in the audience in Hartford, Connecticut, on 10th December 1844 noticed that one of the volunteers appeared to feel no pain inspite of having injured himself. He then introduced Nitrous Oxide as an anaesthetic in his Dental practice. In the true spirit of the pioneers, he experimented on himself and found that it succeeded in making tooth extraction painless. He discussed this with his student William Green Morton, who in turn mentioned it to his colleague, Charles T Jackson. Unfortunately Wells' first public demonstration in the lecture room of Dr John Collins Warren at Cambridge College, Massachussets, was deemed a failure, with the result that it went into obscurity for a long time. The unfortunate truth is that the man rendering the anaesthetic agent had probably given less than was required, with the result that the patient felt a little pain - though not as much as was usually felt. The damage was, however, done and Wells was denounced and the entire process was called "humbug". William Thomas Green Morton experimented with Ether as an anaesthetic in his surgical practice and discovered its anaesthetic effects. On 16th October 1846, he used it sucessfully during an operation on Gilbert Abbot, a young man with a tumour at the angle of the jaw. The surgery was performed by Dr Warren who later remarked " Gentlemen, this is no humbug. " In the meanwhile, a frustrated Wells continued to use anaesthesia for surgery. In 1847, in Paris, he met C Starr Brewster who sympathized with him and tried to help him. The Paris Medical Institute had already given financial aid and recognition to Jackson and Morton for their alleged discovery of anaesthesia. The newspapers too treated Wells kindly and considered him a pioneer. But in America, the rivalry between Jackson and Morton , compounded by the challenge of Chloroform anaesthesia, discovered by Simpson, led him to despair. In 1848, Wells anaesthesised himself with Chloroform and slashed his Femoral artery with a razor. A few days later, a letter from Brewster reached his house intimating that the Paris Medical Institute had, on deliberation, decided that it was Wells who deserved the credit for the discovery of anaesthesia.

Charles Thomas Jackson was an eccentric charlatan. He claimed to have discovered the telegraph before Samuel Morse, gun cotton before Schonbein and probably tried to steal material [gastric juice] from William Beaumont if he had had the opportunity. His claim that he had discovered anaesthesia is not very strong. Jackson, a chemist, had actually been consulted by Morton because his own [Morton's] concepts of chemistry were not very clear. After the Paris Medical Instutute initially gave him credit for the discovery, it was withdrawn. Jackson spent the rest of his life trying to get recognition and died insane in an asylum in 1880.

Sir James Young Simpson of Edinburgh used Ether in Obstetric practice in 1847 and also tried Chloroform as an anaesthetic and found it was a better agent. The first professional anaesthetist was John Snow of London who had the privilege of administering Chloroform to Queen Victoria on two occasions. John Snow is also well known for having proved that the spread of Cholera in Broad Street in London was due to contamination of the water supply. He removed the handle of the pump , thereby preventing people from using it - and thus limited the further spread of the epidemic. This again, is one of the earliest known examples of preventive medicine.

Joseph Thomas Clover (1825 – 1882 A.D.), in England, invented a device, the Chloroform Inhaler, for the administration of anaesthesia. Albert Niehann of Germany, in 1860, isolated the alkaloid of Cocaine from the Peruvian Coca leaves; its anaesthetic property was demonstrated by Alexander Bennet in 1873. Karl Koller, in 1884 recommended the use of Cocaine as a local anaesthetic and used it in his Ophthalmic practice with success. Sigmund Freud also was an enthusiastic user of Cocaine for anaesthetic purposes.

Between 1884 and 1899 the names of Corning Quinicke and Bier were associated with the discovery of spinal anaesthesia and its advance. It was Dogliotic who popularized lumbar, epidural and caudal anaesthesia.

For the first time intra-tracheal intubation was carried out by Macewan, O'Dwyer and Kuhn. Ivan Magill (1888- 1986 A.D.), the most distinguished pioneer of endotracheal intubation, had many innovations to his credit such as Magill's Endotracheal tube, Laryngoscope, Endobronchial tube, etc. Ralph Water (1883-1979 A.D.) has been considered as the "Founder Father of Academic Anaesthesiology".

The first to employ mesmerism to relieve pain in surgical procedures was Jules Cloquet, a French surgeon, some time between 1776-1780. James Esdaile, a medical officer with East Indian Company, tried mesmerism as an anaesthetic and it is reported he carried out 261 painless operations under mesmerism.

With the turn of the Twentieth Century, mechanical devices were introduced to administer anaesthesia in America and Germany. Later several modifications were introduced; some of the more sophisticated ones were introduced by Druegar and Sons. The most widely used machine has been designed by Robert Boyle, which is currently used widely.

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CHAPTER 13: THE ROMANCE OF SURGERY

"Surgery is the first and the highest division of the healing art, pure in itself, perpetual in its applicability, a working product of heaven and sure of fame on earth" - Sushruta (400 B.C.)

Through the study of palcopathology and recovery of bones of prehistoric man, it is evident that diseases similar to those of the present time, were also prevalent. There is ample proof from recovered skulls that different methods were employed in trephining as treatment for headaches, epilepsy, etc. The purpose was to permit the "devil" causing the disease to escape. Surgical instruments were made of sharpened stones and flint. Further knowledge on the subject of surgery is derived from scripts written during respective periods. Surgery, however, was practised in a very limited manner. During the Roman period, frequent wars gave an impetus to war surgery, particularly to Trauma Surgery.

ANCIENT TIMES

The Egyptian practice of embalming or mummifying the body contributed to a certain extent, to the knowledge of anatomy, surgery and bandaging. Among the ancient Egyptians , circumcision of males was practiced as early as 5000 B.C. This was the archaeological finding of Eliot Smith, in excavations of the prehistorical cemetery of Naga-adder. Circumcision of the prepuce of the clitoris in females was also practised. The Edwin Smith Papyrus is a surgical treatise probably written some time between 3000-2500 B.C., It is, surprisingly, the most important and complete treatise on Surgery in ancient Egypt. It dealt essentially with traumatic surgery. The most important surgical instrument of that time was the knife made of stone. By 1600 B.C., it was made of bronze and iron.

The Ebers Papyrus of Egyptian Medicine dates back to 1500 B.C. Its surgical section dealt with treatment of Carbuncles, Cutaneous tumours, Hernia, Hydrocele etc. Cautery was also used for checking excessive bleeding during operations.

In ancient India , advances in surgery took place through wars and battle wounds. Aryans used their knowledge of herbal, mineral and other drugs effectively besides their surgical skill. It is believed that Visapala, a woman related to Raja Chola, accompanied him into the battle field and lost a leg. The Vedic surgeons Aswinis fitted her with an artificial leg. Also described in Rig Veda as the legend has it, that Raja Bhoja's (980 A.D.) skull was trephined to relieve him of his severe headache and to remove the malignant portion of the brain. After the surgical procedure, the Raja was cured of the pain. The contribution of Sushruta has been discussed in the chapter on Pioneers.

In Ancient China, surgery was practised in a very limited manner. Hua T'o (190 A.D.) has been quoted in ancient Chinese medical scripts as the leading surgeon. In order to produce eunuchs for the Imperial Court, castration with amputation of the penis was

performed prior to 1000 B.C. Chinese surgery apparently made no progress after the advent of the Tang dynasty (619-907 A.D.) due to strong prejudices.

In ancient Greek Medicine, reference is made to surgeons in one of the Homeric poems written some time 1000 B.C. Therein, it is stated "One surgeon was worth an army of men" recognizing the value of a surgeon during frequent wars that raged those days. It was also believed that Hippocrates found in surgery, rational methods of treating certain diseases.

MEDIEVAL TIMES

Albucasis, an Arab, was born in Spain in the Tenth Century. In ancient Arabic medicine he has been hailed as an outstanding physician and an able surgeon. With special instruments devised by him, he removed polyps and tonsils; he frequently used branding iron and cautery in his surgical practice. He also described obstetric instruments.

Roger Frugardi of Salerno wrote the first Western book on Surgery in the year 1170; later it was re-edited by his student Ronald of Parma. Roger recommended oral administration of seaweed ashes for Goitre, not unlike the present day iodine therapy. His surgical skill was exhibited in his technique in suturing severed intestines together over an elderwood tube or an animal trachea.

Theodoric de Lucea (1205-1248 A.D.) postulated scrupulous cleanliness in surgical procedures as the basis of success. Lanfrane, an Italian by birth, was educated in Milan: he subsequently moved to Paris and settled down in practice as a surgeon. He spread the Italian gospel of "healing wounds by first intention" some time in 1295.

In England, John of Arderne (1307-1390 A.D.) established himself as a reputed surgeon and later by 1376 became the pioneer proctologist. He wrote a treatise on Fistula-in-ano and the use of rectal injections. He described his famous operation for Haemorrhoids - the excision of the thrombosed vein. He also advised rectal examination to differentiate between fistula-in-ano and anal cancer; the latter having a stony hard feel to the examining finger.

Guy de Chauliac (1300- 1367 A.D.), a renowned French surgeon, in his book "Chirurgia magna" stipulated the qualities of a good surgeon. To quote : " A good surgeon should be acquainted with liberal studies, with medicine and above all with anatomy; he should be courteous; bold in security, pious and merciful, not greedy of gain, but looking for his fee in moderation, according to the extent of his services". These lines hold as true today as they did 600 years ago.

SURGERY OF THE RENAISSANCE AND POST-RENAISSANCE PERIOD

With the discovery of the gun powder in the Fifteenth Century and the use of the explosives in war weapons, extensive soft tissue injuries and fractures of bones became quite common. The nature and severity of wounds called for dexterity on the part of the medical personnel and ingenuity for improvisation. In fact war-time was a boon for surgeons with skill and intelligence. Amongst these surgeons, Ambroise Pare (1510-1590 A.D.), a field surgeon became an outstanding surgeon of the Sixteenth Century and indeed, one of the greatest of all time. He wrote extensively on gun shot wounds and published a treatise in 1545. He advocated the use of ligatures to control bleeding and a limited use of cautery in amputation. He is well known for showing that a mixture of eggs, oil of roses and turpentine gave better results than boiling oil in gun-powder wounds - a serendipitous discovery made due to the lack of oil. It is said that on the battle field Pare was considered equivalent to 10,000 men because soldiers believed that with Pare around, their chance of survival was the greatest. He was a "Barber Surgeon" but his skill and achievements were better than the so-called surgeons of those days. He was grudgingly admitted to the College de St Come despite the fact that he did not know Latin. Pare abolished the common procedure of castration during herniotomy and also invented the artery forceps. He is thus considered the 'Father of Surgery'. Pare is best known for his statement " I dressed him, God cured him " , a statement that shows the humility of the man and serves as a lesson to surgeons of all ages.

SURGERY DURING THE SEVENTEENTH, EIGHTEENTH AND NINETEENTH CENTURY

In the Seventeenth Century in England, Surgery was in the hands of "Barber Surgeons". They carried out both simple procedures like pulling out a painful tooth as well as a complicated operation such as amputation of the leg. For anaesthesia, they made the patient unconscious by giving him a knock on the head with a wooden hammer. During the Eighteenth Century several British men of Medicine contributed to the advancement of Surgery. Only a few of these are mentioned here due to limitations of space.

Percival Pott (1713 –1788 A.D.) was famous for his treatise on wounds, fractures and dislocations and less known for his work on Hydrocele and Cataract. Sir Percival himself had a fall on London Bridge and fractured his tibia [Note that this is not Pott's fracture]. The story goes that Pott refused to be treated at his own hospital, St.Bartholomew's , saying that the only good surgeon there had injured himself and was not in a position to heal others. He used the door of the nearest house as a splint and went to Guy's Hospital for treatment. Pott however, is remembered for otherobservations such as his description of Tuberculosis of the Spine (Pott's Spine) and more importantly his observation of Carcinoma of the Scrotum in chimney sweeps. Pott realised that this devastating disease was caused by the soot remaining in contact with the skin, (the young boys had to climb naked into the chimneys) and described a simple cure - a daily bath. This not only marks the beginning of concept of occupational disease, but also of

preventive medicine. Two hundred years later, the age of specialisation has termed this field Preventive Oncology.

John Hunter (1728-1793 A.D.), the brother of the Anatomist and Obstetrician William Hunter, was a great surgeon and an experimentalist. It is said that it is he who found surgery a mechanical art and introduced it as an experimental science. He proved the existence of collateral circulation by his experiments on antlers of deer and made studies in Comparative Anatomy, Botany and Zoology. Hunter, in 1767, inoculated himself on his forearm with what he believed to be gonococcal pus to prove that Syphilis and Gonorrhea were the same disease. His deductions were fallacious as the man from whom he extracted the pus had both the diseases. His experiment, however showed the contagious nature of the disease. Hunter, as a result, is reported to have suffered from a syphilitic affliction of the blood vessels for the rest of his life. In fact, he suffered from Angina pectoris in his later years and always said " My life is in the hands of any rascal who chooses to annoy and tease me " . Nevertheless this experiment led to the use of the term "Hunterian Chancre". Hunter died precisely as he had predicted, - he collapsed after a heated discussion with someone, in a pub.

Astley Paston Cooper (1768-1841 A.D.) was a student of John Hunter. He had a passion for Anatomy which brought him in touch with body snatchers through whom he obtained bodies for dissections. He made London the surgical centre of the world in the early Nineteenth Century. He was the first to ligate the abdominal aorta. He successfully excised a lesion in 1820, probably a sebaceous cyst from the head of King George IV, for which he was awarded a Baronetcy. The anatomy student would have heard of his name in the ligaments of Cooper in the breast.

More or less at this point of time the use of Ether and Chloroform as anaesthetics turned out to be a milestone in the development of complicated surgery. With the improvement of the technique of prolonged anaesthesis, surgeons resorted to more complicated techniques, as the duration of the surgical operation was not any more an important factor. However, deaths due to post-operative infections continued to be a major obstacle.

James Syme (1799-1870 A.D.) was born in Edinburgh. He made several contributions to the surgical literature including the Symes Amputation for the ankle joint. In 1823, in Great Britain he was the first to perform a hip disarticulation. He was also probably the first European surgeon to adopt ether anaesthesia and later, Lister's antiseptic technique. Joseph Lister , his house-surgeon- and later, his son- in- law , derived a lot of inspiration from his illustrious teacher.

James Paget (1814-1899 A.D.) is associated with two conditions, Paget's disease of the nipple and Paget's disease of bones.

It is said that the history of surgery may be divided into 2 parts - before and after Lister. Lord Joseph Lister (1827-1912 A.D.) was a multifaceted individual. In the early part of his career he described two distinct muscles in the iris of the eye, the dilator and the sphincter, and also muscles attached to hair follicles. Contraction of these elevated the hair, resulting in goose skin appearance. In Glasgow, as a Professor of Surgery, Lister pondered over the fact that while simple fracures usually healed without problems, most compound fractures got infected and led to the patient's death. A professor of chemistry named Thomas Anderson put him on the right track by introducing him to the papers of Louis Pasteur. Pasteur had just shown that grape juice when exposed to air fermented, due to the presence of some agent that fell from the air, leading to the formation of wine. Extrapolating from this concept, Lister thought of the possibility of a similar agent falling into the open wounds of a compound fracture and leading to the infection.

During his dialogues with others on this topic, Lister learned that the use of carbolic acid (phenol) had destroyed the stench of the sewers in Carlisle. He then decided to experiment with carbolic acid on a patient with a compound fracture. The first patient died. However, his second patient survived, - practically a miracle in those days, - and antiseptic surgery was born. Lister in a letter to his father in June 1866 wrote that he had discovered " one of the 10 most important things that have ever happened to the human race". He published his paper in the Lancet in March 1867 and later read it a British Medical Association meeting - and was scoffed at. He also used the 'donkey spray' with which carbolic acid was sprayed over the field of the operation in order to destroy the microbes from the air during surgery. Lister stuck to his beliefs, and propogated them strongly. Two events took place that aided him greatly. First, he successly drained an abscess for Queen Victoria - using his antiseptic technique. Later, In the Franco - Prussian war, surgeons made use of Lister's antiseptic surgery - and saw a decrease in the incidence of hospital gangrene. Lister also invented the sinus forceps, aortic tourniquet, wire-needle and catgut ligature. In 1897, he was elevated to the Peerage as Lord Lister for his surgical achievements.

A mention must be made of Lord Lister's wife, Agnes. She typified the saying " Behind every successful man, there is a woman". Agnes not only supported her husband throughout in his beliefs [which were then controversial], but directly played an important role in his work. It was she who translated Pasteur's work from French into English for the benefit of her husband.

In Germany, Christian Albert Theodor Billroth (1829-1894 A.D.) was making a name for himself through his surgical skill, particularly of the gastro-intestinal tract. He, for the first time, resected the oesophagus and also performed the first laryngectomy. In 1881, he performed the first resection of the Pylorus for cancer. Besides his professional achievements, he was also an excellent painist and a great friend and admirer of Johannes Brahms.

Theodore Kocher (1841-1917 A.D.), a Swiss surgeon, was the first to surgically excise the Thyroid gland as a means of treating Goitre, which was cosmetically disfiguring. Kocher was the first surgeon to be awarded the Nobel Prize in Surgery [in 1909], an award he richly deserved.

Paul Broca (1824-1880 A.D.) was a multifaceted individual who was a Neurosurgeon, Orthopaedic surgeon, Neurologist and Anthropologist. He described the area 44a, also called Broca's area, which is the centre for articulate speech and was the first to use a trephine to drain a brain abscess. He established scientific societies and built up a medical museum and even became a senator in his later life. Ironically, this pioneer of neurological sciences died of a burst aneurysm in the brain.

American surgeons have contributed in no small way to our knowledge of surgery. William Steward Halsted (1852-1922 A.D.) has already been mentioned [in the chapter on Nurses] as being responsible for the introduction of gloves. He also performed the Radical Mastectomy as a treatment for Carcinoma of the Breast, an operation called " the Halsted" in his honour. Finally, it was he who first used Cocaine as a local anaesthetic. Unfortunately, he also became a life-long addict to the same substance. The Mayo family is known throughout the world for their surgical skill. The father, William Worell (1819-1911A.D.) founded the Mayo Clinic in Rochester, Minnesota while his sons Charles Horace (1861- 1939 A.D.) and William James (1865-1939 A.D.) founed the Mayo Foundation for Medical Education and Research. Charles was renowned for his thyroid surgery and William, for his gastric surgery.

At this time, Harvey Cushing (1869-1939 A.D.) was making news as a Neurosurgeon. He published his observations on the role of the Pituitary and Sexual Infantilism, which was further supported by experimental work. His classic publication on "The Pituitary body and its Disorders" in 1912 is a masterpiece of meticulous observations and their correlations. He was a prolific writer and published interesting papers on History of Medicine including a biography of his great teacher entitled "Life of Sir William Osler". Walter Dandy [1886-1946 A.D.] , also an American Neurosurgeon was responsible for introducing Pneumoencephalography as well as surgery for prolapsed intervertebral discs, arteriovertebral malformations and intracranial aneurysms. Sir Victor Horsley was the first to operate on spinal cord tumours and for epilepsy.

Subsequently, surgery made rapid strides in the latter half of the Nineteenth Century and the early part of the Twentieth Century, consistent with rapid advances in basic sciences. As a result, specialization in surgery was envisaged and introduced to improve the quality of surgical practice.The most outstanding surgical achievement in the latter half of the Twentieth Century is 'Transplant Surgery'.

Attempts at transplant of the skin were made by Sushruta. In 303 A.D. the twin brothers, Cosmos and Damian, physicians of Arab origin, amputated the leg of a Caucasian and

attempted to graft in its place the leg of a recently deceased Moor. John Hunter successfully transplanted the spur on the cock's comb. With this was reborn the concept of transplants of tissues and organs. In 1905, organ transplant was attempted by Alexis Carrel, a French surgeon, - an autotransplant of a dog kidney. Although the attempt was unsuccessful, he was awarded the Nobel Prize in medicine in 1912 for this experiment. The first heart transplant was performed by Christian Barnard of South Africa in the Groot Shuur Hospital, Cape Town, on 3rd December, 1967. In India, the first heart transplant was attempted at the King Edward VII Memorial Hospital, Bombay on 16th February, 1968 by the late Prafulla Kumar Sen, who was then the Professor and Head of the department of Cardio-thoracic Surgery. The first successful heart transplant in India was performed by P Venugopal at the AIIMS in 1994. Other organ transplants are being undertaken such as that of kidney, lung, bone marrow etc. The first kidney transplant at K.E.M. Hospital, Bombay was attempted in 1966. The first successful renal transplant in India was performed at Christian Medical college, Vellore in 1977 by Mohan Rau. Bone marrow transplants are the only transplants that do not fall within the purveiw of the surgeon. The first bone marrow transplant in India was done by a team of doctors at the Tata Memorial Hospital in 1983. The patient, Vandana Kadam, who then had Acute Myeloid Leukaemia is still alive and well. Subsequently, the Christian Medical College, Vellore and the AIIMS have started bone marrow transplants.

The Nobel Prize in Medicine is awarded to persons making a significant achievement or advance in that field. It would be fitting to conclude this chapter by mentioning the surgeons who have won this coveted prize. They are Theodore Kocher (1909 - for his contributions ot Thyroid Surgery and Physiology), Allvar Gullstrand (1911- for his work on Dioptrics, the science of refracted light of the eye), Alexis Carrel (1912- for Vascular Surgery and Organ Transplantation), Robert Barany (1916 - for Physiology and Pathology of the Vestibular apparatus), Werner Forssmann (1956- for his contribution to Cardiac Catheterization), Charles Huggins (1966 - for hormonal manipulation of Prostatic Carcinoma as a means of palliating or curing patients) and Joseph Murray (1990 - for Renal Transplantation). Other surgeons who have won the Prize for non-surgical work are Sir Frederick Banting, Sir Alexander Fleming (he had received his Primary FRCS in 1909) and Walter Hess (1949- for research on the interbrain).

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CHAPTER 14 : OBSTETRICS AND GYNAECOLOGY

Obstetrics deals with pregnancy and childbirth while Gynaecology is concerned with diseases and treatment of the female reproductive and genital tract. The history of Obstetrics and Gynaecology must, for obvious reasons be as old as man himself. In ancient times, when all doctors were males, they were forbidden from witnessing childbirth. The Kahun papyrus [2000 B.C.] , the Papyrus of Ebers [1550 B.C] as well as Ayurvedic books [1200 - 500 B.C] included gynaecologic diseases in their text. Deliveries were, therefore performed by midwives and relatives.

The Lex Caesara, a law passed in the Seventh Century B.C. in Rome stated that all pregnant dying women should have abdominal surgery done in order to deliver the baby, hence the term "Caesarian" delivery. Much later, Ambroise Pare started a school for midwives in Paris. Obstetrics, as we know it today, began some time in the Eighteenth Century with the work done by William Smellie [1697-1763 A.D.] . Smellie established a school of midwifery in London in 1752 and wrote " A treatise on the theory and practice of Midwifery ", which was one of the earliest books devoted to this subject. One of his students was the elder brother of John Hunter, named William Hunter, who also became a famous Obstetrician and Anatomist.

The most fascinating part of the history of obstetrics is the story of the forceps. The forceps are a two- bladed instrument made of metal which acts as pincers and holds the infants head during delivery. It was the invention of the Chamberlen family. The Chamberlens were French Huguenots who fled France in 1569 to escape persecution. Dr. William, the father settled down in Southampton and later, in London. His sons, Peter, the elder and Peter, the younger were barber surgeons and obstetricians. One of them, probably Peter the elder, invented the obstetric forceps, the instrument that helped them perform many difficult deliveries and brought them fame. Both were, however, prosecuted by the Royal College of Physicians for breaking its rules. The Chamberlens kept their instrument a close secret. Indeed, they carried it in a huge box and used it only when the woman was blindfolded. This enabled them from preventing others from seeing what their ' magical' instrument looked like. Peter, the Younger, had a son, also named Peter, who continued the family tradition and practised obstetrics. His son, Hugh, decided to sell the family secret for a sum of money. He was asked to demonstrate the efficacy of his instrument on a rachity dwarf. Naturally he failed to save the baby or the mother, - and to sell his secret. He tried later to deceive the Dutch physician, Rogier Van Roon Huyze into buying some secrets, which were in reality not those of the forceps. His son, Hugh Jr. divulged the secret. In 1733, Edmund Chapman published the first detailed account of the forceps and instructed physicians and midwives about its use. The Chamberlen forceps was finally discovered in 1813 in the family home in Essex. The Chamberlens have been criticised for having kept secret for centuries, an instrument which would have saved many lives. It is however incorrect to pass judgement on someone who lived 400 years ago, by applying today's principles and ethics. The use of

this instrument probably gave them the fame, the name and the money that they wanted. In this context, it is worth remembering that Roentgen and Waksman refused to patent their discoveries - X-rays and Streptomycin respectively - as they felt it should be dedicated to mankind. Today, however, patenting a discovery is quite common and often there seems to be a fine dividing line between pure science and business.

The greatest fear regarding childbirth was the development of Puerperal Fever, which was often fatal. Ignaz Philipp Semmelweiss, (1818-1865 A.D.), was a Hungarian physician. As a medical student he had noted that deaths of young mothers were due to puerperal infection, then known as "childbed fever" .The death of his pathologist friend, Jacob Kolletschka, from a wound infection acquired during the examination of a women suffering from "childbed fever", prompted him to surmise that infection to maternity wards was spread by students and ward attendants through their contaminated hands. In 1846, he suggested simple measures such as the washing of hands with soap and water and/or chlorinated water before attending to women in labour. With the introduction of this simple practice, the morbidity and mortality rate fell dramatically. This simple measure was subsequently quoted by Joseph Lister and was the basis of his concept of prophylaxis of surgical wound infections with the use of antiseptics. Semmelweiss' story , however, is one of the great tragedies of medicine. He was disbelieved by all and sundry and eventually fled the city. Much has been made of the ironic manner in which he is supposed to have died. Generations of medical students have been told that Semmelweiss died of a septicaemia due to an accidental injury afflicted on himself during an autopsy. In his splendid book " Doctors" , Sherwin Nuland has re-examined the evidence and questioned it. Based on the history and notes of his last few days, it now appears that Semmelweiss died of injuries inflicted on him by the staff in the asylum where he had been admitted.

The test tube baby is a recent development. Louise Brown was delivered in 1978 as the worlds first test tube baby. The persons responsible for this were Robert Edwards and Patrick Steptoe. The word "test-tube" of course is colloquial for " in vitro " fertilisation, wherin the sperm is allowed to fertilise the ovum in vitro, before it is placed into the uterine cavity.

The name of V N Shirodkar (1899- 1971 A.D.) stands supreme among internationally known Indian obstetrician-gynaecologists. It was he who developed the Shirodkar suture, a circumferential suture applied in the incompetent cervix of women who repeatedly abort in the second trimester.

Diseases of the female genital tract have been known to exist right from the time of the ancient Egyptians, the Old Testament and the early Greeks. The modern practice of Gynaecology , however, started only in the early 19th century when it was separated from general surgery as a speciality. The first recorded case of gynaecologic surgery took place

in 1809 when Ephraim McDowell of Kentucky was called to deliver the 38 year old Ms.Crawford of suspected twins. The "twins" however turned out to be a large ovarian tumor. McDowell took the risk of performing the first ovariotomy without anaesthesia or aseptic precautions. It would interest readers to know that people in the town had gathered outside the house with a noose as they planned to hang him if he failed in his "butchery" ! McDowell performed twelve more ovariotomies without failure, an incredible feat in those days. Retrospectively, it has been realised that the reason for this astounding sucess was that McDowell, unlike surgeons of his time, used clean sheets for his surgery. He would boil the sheets in water in order to wash away the blood - and inadvertently, sterlise it as well. In subsequent years, Auguste Nelaton, Sir Spencer Wells and the Atlee brothers - John and William- also performed ovariotomies with sucess.

In 1855, the world's first hospital devoted to diseases of women was set up in New York by James Marion Sims. Earlier, in 1849, he had devised an operation for the treatment of vesico-vaginal fistula and had published it in 1852. In addition, he fashioned the Sims's speculum and was responsible for determining Sims's position for pelvic examination. Robert Lawson Tait [1845-1897 A.D.], another pioneer gynaecologic surgeon was among the first to perform surgery for a tubo-ovarian abscess [1872], Hysterectomy [1874] and Ectopic Pregnancy [1883], in addition to thousands of ovariotomies.

Significant additions were made to this field by Sir James Young Simpson who introduced iron wires for abdominal sutures during ovariotomies, sponge forceps for dilatong the cervix and chloroform for general anaesthesia during labour.

FAMILY PLANNING AND CONTRACEPTIVES

In Ancient Times pregnancy, culminating in the successful delivery of a baby, was believed to be one of God's blessings; whereas infertility was attributed to the wrath of the Almighty or the effect of Evil Spirits. Hence the treatment for the latter problem revolved around propitiating God or the Evil Spirit by supplication, incantation and various kinds of religious rites including the sacrificial offering of animals. In primitive society, the growth of population was checked by several factors such as natural calamities, wars, high death rate and short life span. The control of disease led to a higher standard of health, a gradual decline in the death rate, and increased longevity. All these factors resulted in a rapid growth of the population, consequently producing pressure on available living space. Under these circumstances it was but natural for man to attempt to limit the population growth, without sacrificing the biological instinct of mating. Thus the concept of family planning to limit the population is not new, although the methods suggested have varied from time to time, depending upon the materials available and the level of understanding of the processes of procreation and conception.

TRIBAL MEDICINE AND CONTRACEPTION

Amongst the ancient tribals, in various parts of the world different types of contraceptive methods were practised. It is reported that prolonged breast feeding was a well known method of safeguarding against pregnancy amongst the African and South American tribals. The commonest, the simplest and the most widely practiced method was "ceremonial abstinence" more or less similar to the present day "rhythm method". Coitus Interruptus was also known. In South America another method was the use of a "Female Condom". This was made of a vegetable pod with one of its ends cut off to convert it into a tube with a blind end. This was introduced into the vagina to accomodate the phallus - a reversed concept of the present day condom. Another method involved the insertion of foreign bodies into the vagina to obstruct the introduction of penis, a practice widely used by Arabs to prevent pregnancy in caravan camels. Surgical procedures though crude, were also resorted to, usually on the vagina or the male sex organs. Amongst the Abyssinian tribals infibulation in females by sewing together the lips of the vagina was practised. In males an artificial opening in the urethra was made by splitting it at its base; the seminal fluid was thus voided outside the vagina.

ANCIENT MEDICINE AND CONTRACEPTION

The Kahun Papyrus, an Egyptian treatise on Gynaecology of that time, mentions such contraceptive methods as the use of a vaginal suppository containing crocodile dung mixed with honey and Sodium Carbonate. In the Papyrus of Ebers, another ancient Egyptian document on medicine, the recommended method was to insert into the vagina. Acacia tips containing gum arabic which, when dissolved in water, liberated lactic acid, - not unlike some of the present day contraceptive jellies containing lactic acid. In the available literature, references to contraceptives in Ancient Indian Medicine are conspicuous by their absence, presumbaly because the population growth at that time was not alarming, and the pressure on the land was not too great.

Roman women enjoyed equal rights with men; in particular, they enjoyed a sexual freedom which permeated through the various strata of their society, resulting in a demand for contraceptives and abortificients. Soranus (98-138 A.D.) the great Roman Gynaecologist, who was trained in Alexandria and practised in Rome, suggested the following procedures as contraceptive measures:

1. To insert into the mouth of the womb a plug of lint,
2. To smear the cervix with rancid oil or honey or a decoction of cedar oil.
3. To introduce into the vagina an astringent pessary.

Aetius of Amida (500-550 A.D.) of Mesopotamia, who studied medicine in Alexandria and eventually settled down in Constantinople, recommended the use of contraceptive methods only in those cases where pregnancy jeopardized the life of the woman. To prevent contraception, he advised smearing of the cervical os with honey, opabalsam, etc.

It is also mentioned that he prescribed pessaries to bring about sterility but the details of these prescriptions are not known.

With the dominance of the Catholic Church and the spread of its teachings during the Medieval period in Europe, the subject of contraception was neglected till about the Sixteenth Century. The beginning of the birth control movement can be traced to the formation of the Malthusian League after the famous Bradlaugh-Besant trial of 1877 for their advocacy of the use of articifical devices of control conception.

In America, after 1880, articles discussing the merits and demerits of various contraceptive methods were freely discussed and published. Needless to say, there was some opposition to such publications. However, in 1888 the Medical and Surgical Reporter published a Symposium on Contraception. This, though giving an impetus to the birth control movement, did not contribute to the advancement of techniques.

THE CONDOM

Legend has it that the condom was the creation of one Dr.Condom, during the reign of King Charles II (1660-1685 A.D.) . It is believed that the King, alarmed at the number of his illegitimate children, publicised his need for a device to prevent pregnancy. His court physician, named Condom, then invented the condom. Earlier, in Europe, it was recommended as a prophylactic measure against venereal diseases in the Sixteenth Century. An Italian physician Fallopia,in 1564,was the first to recommend the use of a linen sheath moistened with a lotion,as a protection against venereal diseases. In 1597, Hercule Saxonia published a description of a modified version, impregnated with inorganic salts and allowed to dry. The word "Condom" was derived from the Latin word "Condus" meaning a receptacle. Interestingly, while the French referred to it as "La capote anglaise", the English termed it the "French letter" (envelope). In the Eighteenth Century it was known as "Preservative", "Machine" or "Armour". Condoms in those days were made of caeca of sheep or other animals. Its use became very popular in England and was mentioned in the erotic poetry of the time. The famous English writer Boswell wrote in his London Journal on 10th May 1763 that he "picked up a strong young jolly damsel, led her to Westminister Bridge and there, in "Armour" complete, did I enjoy her upon this noble edifice". In the 1890s rubber was introduced for the manufacture of condoms and from the 1930s latex condoms have been in use.

THE SAFE PERIOD

That periodic abstinence from coitus, enables women to avoid pregnancy has been known since ancient times in various parts of the world. In 1853, in Europe, there was a strong belief that the menstrual period was the most fertile period and the middle of the cycle was an infertile period. Naturally, this erroneous concept spelt disaster for several couples. In 1929, Knaus in Austria and Ogino in Japan independently propounded that ovulation occured 14 days before the onset of the next menstruation and hence recommended avoidance of intercourse during the mid-cycle phase. This resulted in the proper understanding of the term "Safe period" and the introduction of the Rhythm Method.

Diaphragms and Cervical Caps

In all these devices the basic principle is that of occlusion of the cervical os. Since Ancient time, a variety of gums, leaves and seed pods have been in use. The precursors of the cervical cap of the Eighteenth Century was one half of a lemon squeezed of its juice and placed over the cervix; the residual citric acid provided an additional safeguard because of its spermicidal action. By 1823, these caps were made of rubber and popularized by Dr. F.A. Wilde as a "comfortable and effective" method of birth control. Due to the shortage of materials during World War II, Marie Stopes in 1943 advocated the introduction of wool, soaked in rancid butter into the vagina.

Chemical Contraceptives

Chemical and physical properties are considered important constituents of a reliable vaginal contraceptive, the former as a spermicide and the latter as a barrier to sperm penetration. In England W.J. Rendell in 1885 introduced a suppository containing Cocoa-butter and Quinine. The majority of the suppositories, jellies, creams and foams contained Quinine, Boric acid, Lactic acid, Chinosol, Hexyl-resorcinol, Ricinoleic acid, Formaldehyde, etc. Foam contraceptives were first introduced in Germany in the early 1920s.

Intra-uterine Devices

It is believed that Arabian and Turkish camel owners used stones as an intra-uterine device to prevent pregnancy in camels. Guttmacher's anthropological research has revealed the use of such devices since ancient time in various strata of the society. The stem pessary was first described and illustrated in the Lancet in 1868. Casanova's preference for the use of gold ball as a pessary is well known. Gold or gold-plated "Wishbone" or "Collar stud" pressaries were popular in England and Germany. In the 1920s Grafenberg in Germany and Norman Haire in Britain popularized the intrauterine device in their countries. In Japan Kondo and Ishihama produced rings made of nylon and polythene. Subsequently, several devices of various shapes and designs made of polythene and stainless steel were released in the market.

Oral Contraceptives

The history of oral contraceptives is of recent origin, although claims have been made in the distant past, of the efficacy of certain herbs and their products. The thrust in this direction began with the discovery, by John Beard in 1897, of the role of the Corpus luteum in inhibiting ovulation during pregnancy. The role of the Pituitary in controlling the ovarian cycle, and the subsequent discovery by Moore and Prince in 1932 of the pituitary feedback mechanism, opened up possibilities of inhibiting ovulation with hormonal therapy. Sturgis and Albright, in 1940, injected oestrogen to relieve dysmenorrhoea and inhibit ovulation. The next logical step was to discover a product, which when given by mouth, would be equally effective. Ethisterone, discovered in 1938, was found to be weakly active when orally administered. By 1956, Syntex released Norethisterone, a powerful oral progestational agent which proved to be an effective contraceptive. In 1963, Goldsieher et al, introduced a sequential regime of Oestrogen and Progestogen. In due course it was found to be a reliable and easy contraceptive and was labeled the "Pill".

Immunological Methods

These methods, to prevent pregnancy, were first tried by Landsteiner in 1899 and Baskin in 1932. Initially attempts were made to bring about aspermatogenesis in male animals and subsequently apply the methods to man. In the recent past several immunological approaches have been tried; one of these is the immunization of women with a vaccine prepared from the Beta sub-unit of HCG (Human Chorionic Gonadotrophin) carried on tetanus toxoid. The vaccine is under trial and its long term effects are awaited.

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CHAPTER 15 : EVOLUTION OF PSYCHOLOGY AND PSYCHIATRY

In the past, mental disturbances were considered under neurological disorders, without any distinction being made between the two. Psychiatry, as a separate speciality of medicine, is of recent origin, - some time in the early 19th century and in India, in the early Twentieth century.

In the primitive society, a mad person was considered to be possessed by a spirit or demon which had taken the place of the habitual and natural resident. Changes in personality were thus attributed to displacement of the customary spirit by some new and utterly foreign usurping spirit. The belief in demonical causation of mental diseases still persists, not only in India, but all over the world.

ANCIENT TIMES

In Ayurveda, Psychology and Psychiatry are treated as a unit and designated as Bhutavidya. Bhutavidya referes to diseases which originate from the influence of Bhutas (Graha). Eight types of Grahas were mentioned in the Sushruta Samhita and were attributed to superhuman powers, which varied from the most benevolent type (Devas) to the most devilish types such as Rakshasas (monsters) and Pisachas (filthy goblins). The manifestations of the last two grahas were similar to those of Schizophrenia, Paranoia and Manic Depressive Psychosis. From the writings of Charaka and Sushruta, it appears that they did not strongly subscribe to the view that mental disorders were caused by demonic possession, but attributed mental disorders to indigenous factors, the result of disturbances of the three humours, or exogenous factors, - possession by supernatural powers.

The treatment consisted of worship, sacrifices, yagnas, etc., to satisfy and gratify favourites like Gana and Rudra. Amongest the vegetable preparations, roots of certain plants were recommended. Perhaps Rauwolfia serpentina was also included in this group. Besides these, weird concoctions of animal origin were also prescribed. In the Siddha System of Medicine, a preparation called Peranda Bhasman was prescribed for psychiatric disorders., consisting of human and dog skull bones ground together into a powder.

Descriptions of mentally disturbed individuals are found in the writings of the Greek philosophers and writers Sophocles (496-406 B.C.) and Cicero (143 - 106 B.C.) In the Greco-Roman period 'Hysteria' in women was attributed to the wandering of the uterus (the word 'hysteria" is derived from the Greek word for uterus). Hippocrates offered the theory of an anatomical, physiological and psychological basis for mental illness. He emphasized, like Freud later, that dreams were the expression of one's desires. Celsus who lived some time during the first half of the first century showed concern in his

writings over the treatment of the mentally ill. He advocated sudden fright as a therapeutic measure, - shock treatment. Galen ascribed mental disturbance to organic lesions of the brain, and to a sympathetic response of the brain to an illness in another part of the body, now referred to as Psychosomatic Illness.

THE MIDDLE AGES

The Codex Theodosianus of 438 A.D. recommended the prosecution of the so called possessed, - witches and sorcerers, as such illnesses were believed to be the handiwork of the Devil. Torture, Immolation, etc., were the recommended weapons against disorders of the mind. In Europe, the early Christian and Medieval period is known as the Dark Ages due to the stagnation in various intellectual activities. The dominance of the Church and its teachings proved largely detrimental to the advancement of sciences in general, and medicine in particular. Mental disease were attributed to the influence of Satan, and torture, sometimes leading to death, was often resorted to. The belief also led to the practice of burning witches and sorcerers, which continued untill the Eighteenth Century. In 1782, the last witch was executed in Europe (Switzerland). The Middle Ages, however, were not completely devoid of men of a more rational and compassionate temper. Caelius Aurelianus (5th or 6th Century) was against chaining, flogging, etc., for the mentally imbalanced. His course of treatment included well lighted rooms, a humane approach and hydrotherapy. Johannes Aetuarius, a 13th century court physician at Constantinople, ascribed certain mental symptoms to physical disabilities, and did not believe that mental disorders were caused by the activity of evil spiritis.

RENAISSANCE AND POST-RENAISSANCE

During the Renaissance, notable advances were made in the study of mental illness. Paracelsus' monograph on 'Diseases that deprive man of his reason ' is a classic on mental disorders of the time. G.B.D' Monte identified melancholics as a separate group and advocated baths and blood letting for them, while Girolamo Mercuriale hypothesized that Melancholia was due to a disturbance of the imaginative faculties. Among the other noteworthy names of this period in Europe were Felix Plater (1546-1614 A.D.), Prospero Alpino (1553-1617 A.D.), and Jerome Cardan (1501-1596 A.D.), Valsalva (1666-1723 A.D.), Vincenzo Chiarugi (1759-1829 A.D.) and Philippe Pinel (1745-1826). All these men shared a common conviction that a more humane approach to mentally disturbed patients was called for. Pinel, physician to the Bicetre Hospital for the insane in Paris, described his experiences in his "Traite medicophilosophique sur l'alienation mentale on la manie'; and strongly attacked the use of mechanical restrains such as chaining and caging. It is noteworthy that in India, a mental hospital at Dhar near Mandu in Madhya Pradesh was established by Mohammed Khilji (1436-1469 A.D.), with Maulana Fazulur Lah Hakim as physician in-charge.

Benjamin Rush, an American, published in 1812 'Medical Inquiries and Observations upon the Diseases of the Mind', a landmark in medical history. Having been incharge of

the mentally ill patients in Pennsylvania Hospital for 30 years, he was in an excellent position to study and explain the role of heredity, traumatic injuries, malformation of the brain, the effect of drugs, etc., in the causation of mental diseases. He is regarded as the first American Psychiatrist.

Julius Wagner von Jauregg, an Austrian, advocated febrile therapy for patients suffering from Psychoses; he proved his point on June 14, 1917, by infecting three psychotic patients with Malarial parasite as a treatment and thereby improving their mental condition. Sigmund Freud, born in Freiberg, Moravia in 1856 and brought up later in Vienna, was initially interested in Botany and Chemistry, and later in Neuropathology. His interest in Psychology was aroused by his friend, Joseph Breuer. Breuer, while treating a female patient with hysterical symptoms, used hypnosis to help her recollect circumstances of the origin of the disorder. On being made conscious of the origin of Hysteria, her symptoms disappeared. This marked the origin of the theory of the "Unconscious mind", described in detail in a book 'Studien uber Hypnose' jointly written and published by Freud and Breuer in 1893. Subsequently, Freud investigated cases of Psychoneurosis and established the role of the unconscious in these cases. Freud died in 1939, as a refugee in England. How he died is of some interest, - over the years, he was operated 33 times for a carcinoma of the tongue, probably the result of his chain-smoking. He finally persuaded his friend Max Scheur to inject him with I.V. morphine - an early example of euthanasia, a subject of much debate in recent times.

With the deeper understanding, over the centuries, of the processes involved in mental disturbances and their manifestations, the treatment of the mentally disturbed has undergone radical changes. In the modern climate of opinion, it is difficult to believe that in the past lunatics were caged in isolated premises and exhibited, against the payment of a small fee, as strange animals. A case in point, Phillippe Pinel not only recommended humane treatment for the mentally ill, but even lived with them in order to understand their habits and personalities; as such he should be credited for originating the concept of investigating such individuals as a whole, taking into consideration their environmental and social influences. To quote - " The modern trend is to combine biologic, psychologic and social intervention in a tailored approach to a particular patient with a specific disorder".

In India, Psychiatry as a separate subject was introduced into the medical curriculum in the 1930's. Since then, despite considerable progress in the treatment of the mentally ill, few significant contributions to psychiatry in general have been made. An exception is the development of the concept of Family Therapy. The development of Yoga as a mode of treatment is no doubt beneficial in some psychiatric conditions, but further study is required.

Modern treatment is available in the metropolises and in a few of the larger cities, and for various reasons, benefits only a few patients. The large rural population (nearly 80 percent) is obliged to seek treatment from local temple priests, astrologers, soothsayers

and traditional healers, all of whom provide inexpensive and easily available treatment, which however has the disadvantages of being ineffective and occasionally harmful.

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CHAPTER 15 : SEXUALLY TRANSMITTED DISEASES AND SKIN DISEASES

In Ancient Indian Medicine, Charaka and Sushruta have dealt with the subject of disease of the male and female genital tract in great detail. Sushruta described an inflammatory condition called Upandansa, the Raktaja and Sannipatika types which have features very similar to those of Syphilis. Both Charaka and Sushruta stressed modes of transmission other than sexual contact, such as the use of bristles of a water parasite (Suka) which on pricking the penis produce an abnormally elongated penis, apprently a common practice at the time. The treatment available was also varied, consisting of medications which included douches and tampons with interesting ingredients; one such being yeast mixed with honey, which may have been the beginning of the antibiotics therapy as we know it today.

Chancres have been described in Ancient Chinese literature as early as the Seventh Century A.D. However, the original texts are too brief to ascertain if the sores described in these writings were true chancres or not. Most Chinese scholars agree that Syphilis came to China only in the Ming Dynasty (1368-1662 A.D.) . It is believed by some Chinese authorities that it was brought to Canton by Portuguese travellers from India, and was then carried to Japan; from whence it spread to the rest of the world. Mercury also seems to have played its role in China, the earliest record of its use being in the form of calomel.

Hippocrates (460 B.C.), in his writings described a form of lumbar pain designated as "Tabes dorsalis" with coexisting penile discharge. In accordance with his humoral doctrine, Galen attributed this group of diseases to foul humours and explained the formation of ulcers and bubos as an escape route for such humours, with a subsequent cure - undoubtedly an erroneous concept.

SEXUALLY TRANSMITTED DISEASES

SYPHILIS

In 1987, the researchers William Turbull and Bruce Rothschild found "chemical traces of Syphilis Bacteria in the 11,000 year old vertebrae of a bear," in the collection of the Museum of Natural History, Chicago. The controversy as to whether Syphilis existed in Europe before the return of Columbus or whether it was brought by his crew returning from the first voyage to Haiti in 1493, rages to this day. The first to enunciate the Columbian origin theory was the Spanish physician Rodrigo Ruiz Diaz de Isla in his writings. He reported that on the return voyage, one of the Pinzon brothers, who was the pilot of Columbus, acquired a "dreadful skin condition". de Isla also claims to have treated some of the diseased sailors of Columbus ships upon their return to Barcelona. The absence of syphilitic bones of pre-Columbus origin in Europe further supports this point of view. However, in 1946, E.Herndon Hudson in his book entitled

"Treponematosis" questioned the above theory. In Europe, prior to the return of Columbus, Leprosy was considered to be highly contagious. It was believed to have been transmitted through sexual contact, display hereditary features and respond to mercury therapy. Hudson erroneously identified Leprosy of that period with Syphilis. However, the characteristics mentioned are similar to those of the latter than those of the former.

Whatever be its origin, there is no doubt that Syphilis wrought havoc in Sixteenth Century Europe. It is believed to have crossed over to Italy with the French troops, was named "Morbus gallicus" or the "French disease". It continued to be referred to as such till Fracastorius in 1530, published his famous poem about the shepherd, "Syphilus", who was afflicted with the disease because of the wrath of Apollo whom he had insulted. The rapid spread of syphilis was aided by public baths, an old Roman custom which was revived in the Thirteenth Century. With ablution came debauchery and the baths flourished as centres of public contagion, till they were closed down following the ravages of Syphilis. Initially, Syphilis was treated with an abundant use of purgatives and antitoxic drugs, prepared by complicated processes such as the theriacum (the origin of the word "Treacte") and the mithridaticum. This was followed by the infamous "Mercury cure" which consisted of anointing the skin with a burning mercury salve and incarceration of the patient in a stove for 30 days on a starvation diet. Intelligent patients chose to die from the disease rather than go through this ordeal. Soon cases of mercurial poisoning were encountered and as the French satirist Francois Rabelais noted "With their faces sharp as a butcher's knife, their teeth rattling like the key-board of a broken down spinet". A second form of treatment was then introduced in the form of the "Holy Wood" or Guaiac. The remedy was particularly popular in Germany where the poet humanist Ulrich von Hutten recommended it strongly in his book published in 1519, recounting his own suffering due to the disease. With the advent of printing and the wide diffusion of knowledge, Syphilis never assumed the pandemic dimensions of Leprosy and Plague. Attempts to study Syphilis led to unusual experiments such as the self-inflicted Syphilis of John Hunter. It was Philip Ricord who in 1831, after a series of experiments involving 2,500 inoculations, proved that Gonorrhea was different from Syphilis and went on to describe the three stages of Syphilis, including the bone and muscle lesions .

Jean Alfred Fournier described, between 1876 and 1894, other syphilitic conditions such as Tabes dorsalis and Congenital Syphilis. The early Nineteenth Century brought the identification by Fritz Richard Schaudinn and Paul Erich Hoffman of the protozoal parasite which causes Syphilis, initially named Spirochaeta pallida, in 1905. In the following year August von Wasserman, an assistant of Koch, developed the test named after him. This was followed in 1910 by the breakthrough of Paul Ehrlich and Sahachiro Hata, when they discovered the trivalent arsenical compound 606, "Salvarsan", and released it to the world as the "Magic bullet" against Syphilis. Two decades later, Alexander Fleming with his discovery, made Penicillin the drug of choice.

GONORRHOEA: Gonorrhoea is reported to have existed from pre-historic times. It was familiar to the Chinese more than 5,000 years ago and was known to the ancient Arabs, Greeks, Indians and Romans. Galen gave it the name in the mistaken belief that it was an involuntary flow of semen (gono-seed, rhoia-flux). But it was not until the Nineteenth Century that the so-called "cold of the spout" was studied as a separate entity in Great Britain.

Albert Neisser discovered the gonococcus in 1879, and although no treatment was available at the time,in 1884, C.S.F. Crede, introduced instillation of the silver nitrate in the eyes of the newborn as a step to prevent blindness due to this disease, a practice prevalent even today.

CHANCROID: It was not until after 1850 that a "soft chancre" was distinguished from the initial lesion of Syphilis and designated Chancroid. A. Ducrey in 1889 identified the micro-organism which was later accepted as the causative agent.

LYMPHOGRANULOMA VENEREUM: This was first described as a clinical entity in 1913. Detailed information became available only in 1922 following studies by Joseph Nicolas, Maurice Favre and J. Durand.

GRANULOMA INGUINALE: The first description of this disease was recorded in 1882. In 1905, C. Donovan noted a "body" found in the diseased tissues. In 1945 the "Donovan body" was cultivated in the yolk sac of the chick embryo by Dunham and Rake.

AIDS:

Acquired Immune Deficiency Syndrome (AIDS) was first noted as a disease entity in the year 1981. The etiological agent, a virus, was first isolated from a West African patient sufferIng from generalized lymphadenopathy by Luc Montagnier et al in 1983 at the Pasteur Institute, Paris, in France. They labelled it as "Lymphadenopathy Associated Virus" (LAV). In 1984, Robert Gallo and his colleagues from the National Institutes of Health, USA, reported the isolation of a virus from AIDS patients. Subsequently , the International committee on Virus nomenclature in 1986, gave the generic name "Human Immunodeficiency Virus (HIV)" for these viruses. Unfortunately, there has been much controversy about the discovery ; however, it now appears that Montagnier and colleagues deserve the credit.

Initially believed to be restricted to homosexuals, haemophiliacs, Haitians and heroin addicts, it is now clear that AIDS can affect almost anyone. The virus spreads through sexual contact , through blood transfusion and also through the placenta - hence people of both sexes and all ages, including the unborn foetus are at risk. Doctors and laboratory

workers exposed to the blood of patients with AIDS as well as drug addicts are also at risk. Fortunately, kissing,casual contact with patients or the sharing of clothes and utensils does not carry even the slightest risk of disease transmission.

Researchers have attempted to determine exactly how long this disease has been in existence. There is evidence suggesting the existence of human infection with an HTLV III / LAV-like virus in Central Africa as early as 1959. It has been suggested by Robert Gallo et al that HIV originated in Africa from where it spread to the Caribbean and from there to the United States in the late 1970s. However, reports now suggest the presence of the AIDS virus in USA, prior to this. In 1969, doctors in a St.Louis Hospital were baffled by the death of a 15 year old boy with widely disseminated Chlamydial Infection. Autopsy revealed extensive Kaposi's Sarcoma. Western Blot and Antigen capture assays on serum and tissue, frozen since 1969, showed that the sexually active teenager was infected with a virus identical or closely related to HIV type-1.

The billions of dollars that have been spent in research have cleared a lot of our concepts about the disease. However, an AIDS vaccine is years away and the drugs used presently [Sulpha drugs and Zidovudine (AZT)] offer only short term relief. In fact, even the diagnostic test [the Western Blot test] has its deficiencies as it cannot conclusively detect every case of AIDS. Like Leprosy, in earlier times, AIDS provides an example of man's inhumanity to man. Education and counselling are the key words to the management of AIDS. The media are being used to disseminate knowledge on AIDS. The emergence of this problem emphasizes the importance of social and cultural factors in disease.

SKIN DISEASES

Primitive ways of life associated with poor hygiene and close personal contact, favoured the development and rapid spread of numerous skin diseases that flourished at the time. The scantiness of the clothing made these conditions apparent and patients were open to suggestions for treatment such as the hot springs of Magna Graecia, the copper and asphalt deposits of Asia Minor, the sulphur streams of Syria and even the brine of the sea. In ancient India, Sushruta and Charaka give detailed accounts of skin lesions, comparing their colour of texture to that of a particular fruit and flower. Thus Psoriasis is described as the colour of bitter-gourd flowers.

Among the Greeks and Romans of later years, the attention paid to regimen and hygiene, with the emphasis on social bathing, would lead us to assume that skin disease were less common. But from the writings of Hippocrates it is obvious that he had come across several dermatologic complaints. He described these in great detail, and it is to him that we owe such terms as "Alopecia, Lichen, Lepra and Pityriasis."

The first author to write a specific work on Dermatology was Galen in his "De tumoribus praeter naturum". He organised diseases on a humoral basis and divided them into those affecting the hairy part s of the head, and those affecting the rest of the body. The Arabic writers improved upon this, making further differentiations; such as the distinction made by Rhazes between Measles and Smallpox. Avenzoar (1092-1162 A.D.) too is known for his original theories, including his observation that Scabies was due to the itch mite.

Till the Nineteenth Century, classifications were based on the symptomatic nature of diseases. The first rational nomenclature, based on the appearance of lesions, was proposed by the English physician Robert Willan (1757-1812 A.D.) in 1807. His pupil, Thomas Bateman completed his work, and their treatise, with its beautiful illustrations and accurate descriptions, remains to this day a classic work of modern Dermatology. To Baron Jean Louis Albert (1768-1837 A.D.) we owe the identification of such diseases as Mycosis fungoides and Keloid. His clinic at the Hospital St.Louis was for many years the world's centre for Dermatology.The pathologist, Ferdinand von Hebra (1816-1880 A.D.) was the first to acquire a sound knowledge of skin diseases based on pathologic anatomy. His pupils, including his son-in-law Moritz Kaposi, carried on the great tradition of the Viennese School of Dermatology which he had founded. To this school, is attributed the first account of diseases such as Kaposi's Sarcoma, Rhinoscleroma and Lichen ruber. The United States, which until this time reflected the ideas of Europe in this field, began to make significant contributions, especially to advances in dermatological education. James C.White (1833-1916 A.D.) was the first to lecture at Harvard on the subject.

LEPROSY

The Sushruta Samhita (600 B.C.) gives a clear description of "Kushta" or Leprosy as a contagious disease, and adds that one type produces "loss of preception of touch". A tubarak oil, (believed to be hydnocarpus oil), is mentioned as its treatment. The disease is said to have then reached China from India and was noted there first in the Sixth Century B.C. and treated with diaphoretics, purgatives and arsenic. One of Confucius's own pupils, Pe Nieu died of the disease. Leprosy entered Greece following its conquest by Darius, the Persian King, in 480 B.C. It was subsequently introduced into Europe by Roman soldiers of Pompeii in 62 A.D. and spread rapidly during the Middle Ages due to the Crusades. It reached its peak during the Thirteenth Century when there were more than 2,000 leprosaria in France alone. In 1235 A.D. St. Elizabeth, patron saint of those with Leprosy, was canonized four years after her death at the age of twenty four. She was the daughter of the King of Hungary and died in the service of those afflicted with the disease. By the Eighteenth Century, Leprosy had spread from Spain to South America and on to the Southern United States. In 1823 we find the first reference to Leprosy in the Hawaiian Islands. In 1854, Chaulmoogra (hydnocarpus) oil was introduced into Western medicine. The pathology of the disease was extensively studied by the Norwegian school and especially by Boeck and Danielssen. In 1858, the latter inoculated himself and nine other volunteers with lleprosy material in an effort to study the transmission of the disease. In 1859, Rudolf Virchow visited Danielssen and demonstrated the "Brown bodies" which we now know to be "globi". Virchow went on to describe the "lepra cell"

in 1864. But the identification of the causative bacillus came only in 1873 when Gerhard Armaquer Hansen discovered M.leprae. In the same year Father Damien took up residence with patients on Molokao, Hawaii, and after a dedicated service died in 1889.

Chaulmoogra oil remained the only treatment available till 1941, when Guy Faget of Carville initiated the use of Sulfones in therapy. This was followed by the introduction of DDS by R.G. Cochrane in the same year. The first Lepromin reaction was described by Mitsuda in 1919: subsequently, a standardized, refined lepromin was prepared by Dharmendra in 1942. Much work has been done, particularly in India, with regard to research and reconstructive surgery towards rehabilitation of patients, suffering from Leprosy . Dr Paul Brand of the CMC, Vellore did pioneering work on plastic surgery for these patients. V.R. Khanolkar's leprosy research in the 1950s has been appreciated all over the world and has subsequently led to work on a possible leprosy vaccine. A sustained propaganda effort is called for to remove prejudices against the afflicted person and to establish that the disease, if treated properly and adequately, is curable.

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CHAPTER 17 : MEDICAL EMERGENCIES

INTRODUCTION

Before the advent of a written script, information on diseases was transmitted in the form of hieroglyphic (pictorial) and hieratic characters, and was consequently, scanty and disorganized. The emergence of a written script, the understanding of the use of the paper and the printing press, and of course, the zeal of medical scientists through the ages, have enabled medicine to evolve into an organized science. In this chapter, a few topics arising as emergencies in medical practice are discussed from a historical perspective, though in a limited manner.

ACUTE ABDOMEN

The catastrophic potential of abdominal problems that are currently recognized under the category of "Acute Abdomen" were recognized even in the time of Hippocrates. Earlier, in 1552 B.C., Ebers recommended dieting for Hernia. Intestinal obstruction was observed and treated by Hippocrates and the earliest recorded operation was performed by Praxagoras (350 B.C.) who created an entero-cutaneous fistula to relieve the obstruction. However, non-operative treatment, such as opium for pain, orally administered mercury and lead shots to open an occluded bowel, gastric lavage and electric stimulation, was preferred to operative treatment. There are occasional references to operations for acute abdomen, but it was not until 1709 that Jean Louis Petit reported successful surgical intervention in a patient with a Strangulated Hernia.

In 1836, Johann Friedrich Dieffenbach reported the first successful resection of the small intestine, in a patient with a gangrenous sgment of the bowel. In 1776, Pillore of Rouen performed the first Caecostomy. In 1797, Fine of Montpellier performed the first Transverse Colostomy.

Hartwell and Hongent in 1912, observed that parenteral administration of saline prolonged the lives of experimental dogs with intestinal obstruction. In 1930, the use of the naso-gastric tube to relieve distension of the stomach was employed. From the 1940s antibiotics have played an increasingly important role in the treatment of intestinal obstruction.

Appendicitis, under such names as Perityphlitis and Iliac Passion, has been known to man for the last 500 years. In 1827, Melier ascribed the origin of purulent iliac tumour to inflammation of the appendix. Nicholas Senn was among the first surgeons to diagnose Acute Appendicitis and to perform a successful Appendicectomy. In America, Reginald Fitz at Harvard Medical School, in 1886 published his classic paper on "Appendicitis", -

a term he coined. Charles McBurney, in 1889, described the location of the point of maximal tenderness, and proposed a new site of incision for Appendicectomy [McBurney's point and incision, respectively] Others to contribute to this field were John Murphy who recommended surgery in the early stages of the disease, and George Thomas Morton [son of William Green Morton, a pioneer of anaesthesia] who performed the first appendicectomy in America. Appendicitis, or rather Perityphlitis, as it was then called, became a household word in Britain in 1902 when the coronation of Prince Edward VII was postponed because of his Appendicitis. Late diagnosis resulted in the development of an appendicular abscess. He was subsequently operated by Sir Federick Treves, Lord Lister and Sir Thomas Barlow.

HEAD INJURIES AND NEUROLOGICAL EMERGENCIES

Though neuro-surgical procedures for head injuries have been practised only during the past century, trephination existed in the Neolithic period 7000-3000 B.C... A triangular knife fixed in a wooden handle was used for trephination. The bony defect was filled with gold, and the wound was closed by tying the hair on either side across the wound. The Edwin Smith Papyrus (1600 B.C.) contains descriptions of brain injuries affecting functions of other parts of the body and causing Hemiplegia and Quadriplegia. For wounds which penetrated to the bone, treatment consisted of drawing the edges together and stitching them; fresh meat was then bound to the wound. If the stitches were undone, the edges were drawn together with two strips of plaster and treated with grease and honey. Hippocrates realized that a blow on one side of the head is followed by convulsions or paralysis of the contralateral limbs and recognized the poor prognosis of the patient with a head injury complicated by dural laceration. In 1614, Fabricius Hildanus mentioned head injuries amongst the causes of psychosis. Wepfer, in 1658, established the relationship between Cerebral haemorrhage and Apoplexy.

The word "Epilepsy" comes from a Greek word meaning "to be seized by forces from without". Hippocrates recognized Epilepsy as an organic process of the brain. Ancient writers, however, considered "Seizures" to be the work of supernatural forces. Hippocrates emphasized that heredity played an important role in the etiology of Epilepsy. Caleres Aureliam differentiated Epilepsy from Hysteria. In 1875, John Hughlings Jackson [1834-1911] postulated that "Seizures" were caused by "Occasional, sudden, excessive, rapid, local discharges of grey matter".

TRAUMA, SHOCK AND PARENTERAL THERAPY

Surgeons in the 18th century, were unaware of the causes and effects of infection resulting from trauma. Whenever battle injuries involved fractures, amputation was resorted to. The word "Shock" was first used as a medical term in 1743. At the end of the Nineteenth Century surgeons recognized Shock as a clinical entity. In 1899, George Crile published an experimental study in animals in "Shock" and observed that they responded to intravenous administation of warm saline. During World War I, Sir Walter

Cannon and William Bayliss advocated the use of intravenous replacements to combat Shock caused by haemorrhage and fluid loss. Cannon noted that a fall in the alkali reserve was due to accumulation of fixed acids and advised the administration of Sodium bicarbonate. Maintenance of haemostasis is recorded in ancient Chinese literature. However, Hippocrates and Celine advised a limited use of ligatures in maintaining haemostasis. It was Archigenes who advocated preliminary ligation of vessels. In 1552, Pare rediscovered the ligature and employed it to control haemmorhage while amputating the leg of an officer. The origin of the resuscitation process which uses expired air for ventilation, can be traced to the Hebrew midwives who resuscitated newborn infants (1300 B.C.) with this technique. The manual technique of Sharpey-Schafer was introduced in 1904, but Bahnson was the first to apply the technique of pressure on the sternum for external support of the circulation.

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CHAPTER 18. VERSATILE PERSONALITIES IN MEDICINE

A complete History of Medicine would have to include many references to subject items such as the Philosophy and Ethics of Medicine, Scientific literature and their impact on medicine. This is not possible in a book of this nature. We wish to conclude by making a mention of some multifaceted individuals who could not be mentioned in the previous chapters, which have been largely system-based, rather than in a chronological order, as is usually the case in books on the History of Medicine.

There have been people who have graduated in medicine but have had a greater impact on other fields. Some of them include Sun-Yat-Sen [1866-1925 A.D.], Chinese revolutionary, W G Grace [1848-1915 A.D., English cricketer], Sir Roger Bannister [the first Englishman to run a mile in less than four minutes, and a distinguished Neurologist], Socrates [contemporary Brazilian football player and a Paediatrician] and Joshua Pim [1870-1945 A.D., winner of the men's singles title at Wimbledon in 1893 and 1894]. Literature, however, seems to be the field in which many doctors have shifted their allegiance too. William Somerset Maugham [1874-1965 A.D., author of The Moon and Sixpence, The Razor's Edge etc], A J Cronin [1896-1981 A.D., author of The Citadel, Adventures in Two worlds], Anton Chekov [1860-1904 A.D., Russian playwright and author of short stories], John Keats [1795-1821 A.D., English poet], Arthur Conan Doyle [1859-1930 A.D., creator of the fictional detective Sherloch Holmes and his colleague, Dr Watson], Oliver Wendell Holmes [1809-1894 A.D., American litterateur] and William Carlos Williams [1883-1963 A.D., American poet and posthumous winner of the Pulitzer Prize].

There have also been medical missionaries. Not satisfied by the thought of helping their fellowmen in their cities, they went to other countries to help the poor and the downtrodden. Some of them are named below:

David Livingstone [1813-1873 A.D.], a Scotsman, was an explorer in addition to being a missionary. He introduced Western Civilisation, and trade and commerce in Africa. He discovered the Victoria Falls. During one of his expeditions, he travelled so far into the heart of Africa and lost to the Western world, that it was feared that he was dead. An American journalist, Henry Stanley, then set off in search of him and on finally meeting him in 1871 at Ujiji, greeted him with the exclamation "Dr Livingstone, I presume !" - inspite of the fact that there could have been no other white man in the area.

Albert Schweitzer [1875-1965 A.D.] , called the "White Gandhi" was a Frenchman who settled down in Lambarene, Gabon in 1913. Schweitzer was a Theologian who decided to study medicine when he was in his early thirties , so as to serve the ill and the poor in Africa. He was awarded the Nobel Prize for Peace in 1952. Norman Bethune [1890-

1939 A.D.], a Thoracic Surgeon and blood transfusion pioneer worked on the front during the Spanish Civil War and later in China , when Japan invaded it. Dr Kotnis, a doctor from Bombay did likewise and was immortalised in V. Shantaram's movie " Dr Kotnis Ki Amar Kahani " [The story of the immortal Dr Kotnis].

The contribution of women to medicine in earlier centuries was negligible because of the fact that they were not allowed to enter a medical school. Fortunately, that is a thing of the past. The first woman to study medicine was James Barry (1797-1865 A.D.) who dressed up as a man and impersonated and even served in the British Army. It was only on her death that the truth was discovered. Elizabeth Blackwell (1821-1910 A.D.) practised Obstetrics and Gynaecology in New York and later in London. Anandibai Joshi has already been mentioned earlier. Other women who made important contributions in the field at a time when medicine was largely dominated by men, include Augusta Dejerine [nee Klumpke, 1859-1927 A.D.] who described Klumpke's paralysis which is caused by damage to the lower part of the Brachial plexus, Rebecca Lancefield who classified Streptococci, Mary F Walker who described Anticholinesterase in Myasthenia Gravis, and Helen Taussig (1898-1986 A.D.) who devised (with Alfred Blalock) the Blalock -Taussig Shunt for Fallot's Tetralogy.

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