MAGICAL MOMENTS IN MEDICINE
Part 5: Medieval Medicine

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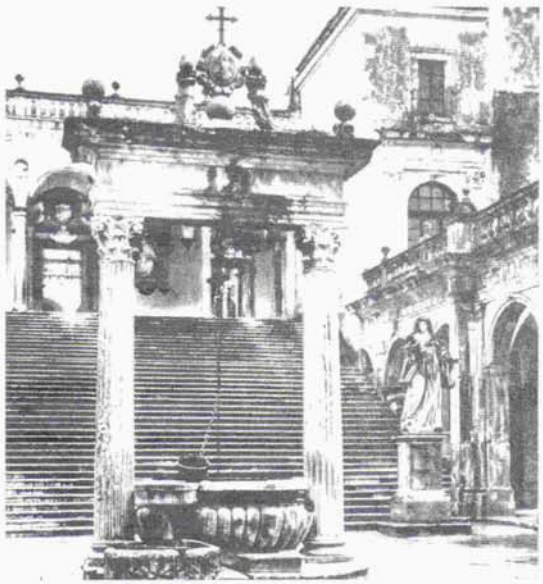
Prologue

As the curtains lift for the next act of this drama on Medical History, we now find the stage dominated by a multitude of characters consisting of clergymen, scholars and doctors, as well as some pestilent epidemics, who steal the show as veritable villains. The Middle Ages, which span a period of a thousand years from 500 to 1500 AD, were so inert, there were no noteworthy advances in medicine during this period. Some historians even consider this era unscientific and unworthy of serious attention. However, this is the time where we see radical changes in perspective, especially about the universe, the human being and the physical and spiritual interaction between the two. In a partial eclipse, religion blurs scientific insight. This naturally causes a lot of emphasis to be shifted on the Creator or the Supreme Being. Historical records lead us to believe that Jesus influenced the course of medicine during his lifetime. Brian Inglis, in his book states that like Prophet Mohammed, Jesus had no interest in disease as such, but was concerned deeply about the sick. The scientific basis of his healing, however, is poorly understood and has been a topic argued right till this day. While some believe that they were healing miracles, others believe that they were either legends or case histories with a natural explanation. However, caring for the sick soon became a noble and charitable notion in the community, emphasised and encouraged by the church. As a result, spiritual intermediaries, namely the Church and the clergy attain importance and exert powerful influence over the public, at least during the early middle ages. Ancient medicine, magical in Egypt, mythical in Greece and methodical in Rome, becomes monastic during medieval times.

When Rome fell to German tribes in the 5th century AD, Constantinople (now Istanbul) the capital of the Byzantine Empire, became the centre of Western learning. Being predominantly Christian, the Church gained power, leading to a complete change in the attitude of the people. People were led to believe that sickness was divine retribution for their sins. Therefore, prayers became prescriptions and meditations became medications. The forceful influence of the Church pushed practitioners to the background and scientific inquiry almost became non-existent. Monasteries became healing centres, which admitted and cared for the sick and the suffering. They later transformed into institutions of hospitality which have, to a very great extent, remained unchanged in some of their conceptions up to the present day - the hospitals.

Hospitals

Hospitals are largely a medieval legacy and possibly the only significant contribution of this era that was otherwise scientifically sterile. However, the concept of hospitals has been known to exist several centuries earlier. Records tell us about the existence of hospitals in Ceylon (now Srilanka) in 5 BC and in India as early as 260 BC. The hospital-like buildings for treatment of troops and the valetudinaria for the care and sick civilians established in ancient Rome were discussed in our previous episode. The first regular hospital or *nosocomium* was established by a nobly born Roman woman called Fabiola in 398 AD. Situated in Constantinople, it could accommodate 7000 patients. Fabiola herself was moved to work among the patients in repentance for her sins. Early medieval hospitals rarely treated the sick. They just received them, supplied their bodily wants and ministered to their spiritual needs until they were well enough to return to work. But soon they became separate entities, with their own identity. Benedictine of Nursia (480-543 AD), the founder of the Benedictine Order, introduced a new concept in health care when he founded the first monastic medical centre in 529 AD in Monte Cassino, (Picture A) among the



Picture A. The first monastic hospital at Monte Cassino.

ruins of a temple of Apollo. He urged the monks in the monastery to read and copy ancient manuscripts of medicine and also encouraged them to practice medicine. Monasteries doubled as hospitals and had pharmacies manned by monks. The monks later started practising "theurgic" therapy, which was religious psychotherapy and physiotherapy based on saints' miracles and magical herbs. Monks practised medicine only within the premises of the monastery. Presumably, religious commitment and sentiment became *sine qua non* for practitioners, since there came a time when a medieval physician first had to be ordained a priest before practising medicine.

The oldest hospital in France was the Hotel-Dieu founded in 652 AD by the then Bishop of Paris. In a new wave that started in 1180, the foundation of the Order of the Hospitalers of the Holy Ghost opened hospitals all over Europe. In Germany, municipalities established and operated hospitals. In 937 AD, during the Saxon times, England instituted her first hospital in York, which was quickly followed by numerous others. St. Barthelomew's of London is one of the earliest hospitals which, since its inception in 1123, has functioned with distinguished elegance.

In the Islamic world, numerous hospitals were erected in major cities. Caliph El Welid is reported to have founded a hospital in Damascus as early as 707 AD and there were more to follow in Baghdad, Egypt, and Cairo. By 1160, Baghdad alone is reported to have had 60 operating hospitals. Al-Mansur, in Cairo, was the greatest of them all, with a reported income equal to about 400,000 ringgit a year. This money came from landed property assigned to the hospital by the royalty as well as philanthropists. It had every facility conceivable, including lecture rooms, a library, isolation wards, diet kitchens, pharmacy and an orphan asylum. Admission was unrestricted and duration of stay unlimited. On top of it all, each convalescent - on discharge - was given a suitable amount of money so that he/she need not have to return to work before having fully recovered.

During the late middle ages we find a radical reorientation of medicine, wherein medieval superstition is gradually abandoned in favour of logic and simple scientific notions. The patient once again becomes the centre and focus of attention. The medical school at Salerno, a Greek colony in Italy, is seen as the cultural melting pot of this era.

Medieval medical schools

The School of Salerno, first heard of in 848 AD, deserves special mention not because it represented medieval traditions, but because it transcended it. Legend has it that it was founded by a Jew, an Arab, a Greek and a Roman. By the 10th century AD, it had become a well-reputed medical school. The director of the school was Nicolaus Praepositus, author of Antidotarium, the first medieval pharmacoepeia. Described as the first secular institution of higher learning in the West, it is said to have had an extensive curriculum and emphasised on practical skills rather than theoretical knowledge. The curriculum included three years of logic, five years of medicine and one year of resident training. The Anatomy department used pigs for dissection in the theatre. The institution seems to have been an equal opportunity employer with a lay faculty, which included several women professors. Dame Trotula, who held the Chair of gynaecology, is dubiously credited with the authorship of two great texts on female diseases. Passionibus Mulierum Curandorum or Trotula Major was written to educate male medics about the female body, because such knowledge was generally lacking. The book comprised of sixty-three chapters and gives information about menses, conception, pregnancy, childbirth, as well as general diseases and their treatments. The majority of remedies are herbs, spices, oils and of animal origin. She recommended long periods of convalescence and a positive mental attitude for good recovery. She asserted that both men and women could have physiological defects that affected conception. This was asking for trouble, since even the thought that a man could be responsible for infertility was a cheeky notion at that time. She also described the use of opiates to dull the pain of childbirth and incurred the wrath of the church, which maintained that women, as sisters of Eve, should suffer the ordeal of childbirth without any relief. Trotula's other book was De Aegritudinum Curatione or Trotula Minor. Dame Trot, seems to be an ethereal character whose sex has been questioned and very existence disputed by some scholars. However, she is generally accepted and acclaimed as a great teacher and midwife.

The Salerno medical school was co-educational. Pretty female students must have inspired boys and tapped their poetic potential as evidenced by the mnemonic, *"Agnes attracts the boys like iron to lodestone."* Most modern day mnemonics are also female-centred (*"She looks too pretty; try to catch her,* " for carpal bones and "*Sister Lucy's powdered face often attracts medical students*" for branches of the external carotid artery) and therefore, I would think that students have not changed much from medieval to modern times. New arrivals were ragged and often compelled to wear costumes depicting animals. However, students in medieval universities led tough lives. Fees were low with scholarships for the poor, but books were expensive. Classes began at six o'clock in the morning. Students wore long cloaks and black, monkish gowns. Long hair, lace and ornaments were prohibited. Teacher and students were seated on straw mats on the floor during academic discussions. Exams were not easy to pass

in Salerno. All examinations were oral and perhaps very aggravating for the student, since some universities had rules against stabbing examiners. It was a common practice by the students to get the masters drunk on the eve of the examination. After about eight years of specialised training, the students had to appear for a rigorous final exam before the faculty and the Royal Commissioner. Successful candidates were rewarded with a ring and a laurel wreath and licensed to practise.

When some of the professors of Salerno sat down to produce a simplified textbook of medicine and hygiene, little did they know that they were about to produce a bestseller. The Regimen Sanitatis Salernitanum, a neat and compact handbook with over 300 rules for healthy living, became famous all over Europe and had 24 manuscript editions, all of which exist till this day. It had eight hundred and forty two lines of verse, to help doctors remember the rules. Here are some catchy jingles from the Regimen:

If thou to health and vigour wouldst attain,
Shun weighty cares-all anger deem profane,
From heavy suppers and much wine abstain.

If in your teeth you hap to be tormented,
Burn Frankincense (a gum not evil scented)
And in a tunnel to the tooth that's hollow,
Convey the smoke thereof and ease shall follow.

Shun idle slumber nor delay
The urgent calls of nature to obey.

But as all practice shows, no doctor can
Make life anew, though he may stretch its span.

Nor trivial count it after pompous fare
To rise from the table and to take the air.

Use three physicians still-first Dr. Diet
Next Dr. Merryman, third Dr. Quiet.

In 1170 AD, Roger Frugardi of Salerno brought out the first ever western book on surgery. Guy de Chauliac revised the same and published the book Great Surgery in 1363 AD. Although principles of surgery were taught in Salerno, practice of surgery was still done by barbers and barber surgeons. Surgical procedures were often crude, but nevertheless effective. Finely chopped hair of the hare (called 'mummy powder') was used as a styptic to coagulate bleeding wounds. Anaesthesia was administered with sponges impregnated with narcotics (opium or mandragora) and placed in the nose or mouth. Torn intestines were reportedly sewn together over an animal's trachea. Plaster of Paris was yet to be invented, but Salernitians used bandage and a flour-and-egg mixture just as effectively to splint fractured parts. The adjustable surgical operating tables, designed to tilt the patients to optimal positions, are just Trendelenburg's reintroduction of the equipment and procedure used by Salernitians. (Picture B)

Picture B. The tilting operating table. Invented by Salerno doctors and reintroduced by Frendelenburg in 1881.

The doctors of Salerno were real trailblazers in the field of medical practice and education. The medicine man, until now known as '*medicus*' was renamed '*physicus*' or physician, which emphasises the doctors' scientific skills over and above their medical skills. For the first time, a curriculum based on medical textbooks was established. The title 'doctor' was first legally used here to denote a physician in 1180 AD.

Formal medical education spread from Salerno to various parts of Europe, England, France and most of Northern Europe with the establishment of several new universities in Paris, Bolgna, Padua, Montpellier and other major cities. But medieval men could not, however, digest the idea of women practising medicine. Women were rejected from Universities and refused medical practising licenses. Jacqueline Felicie de Almania was one of five women who defied the law in Paris in 1322. In spite of eight patients testifying that she was able to cure them when male doctors had failed, she was found guilty by a chauvinistic Court of Justice and punished.

The University of Bologna was a 'lay' university administered by students themselves. Among its best outgoing students were Dominican friar Theoderic of Lucca, who first used a sponge dipped in opium and mandrake oil for anaesthesia and Copernicus, the great astronomer. In 1281 AD, students of Bologna witnessed perhaps, the first autopsy in history. Anatomy advanced in Bologna under Mondino de Luzzi, author of *Anathomia*, who was also the first man to dissect a cadaver in public in 1315 AD. Bologna had rigid rules for its teaching staff and stipulated that teachers could not be absent for lectures even for a day. If a teacher had to leave town for whatever reason, he had to deposit a certain sum to insure his return.

The school in Paris, by contrast, was managed by masters and more rigid and bureaucratic in its principles. In order to retain their titles as doctors, students were forced to be bachelors. The University rejected Lanfranc, an Italian surgeon, when he tied the knot. He is famous for coining the words "healing by primary intention" found in the opening chapters of most textbooks of pathology. He must have been worldly-wise and a practical man, since he is quoted to have said, "Do all you can for the poor, but get all you can from the rich". His contemporary Henri de Mondeville, a gifted teacher, however was cynical about fee collecting. With a passion to 'preach' and not 'practice', he used anatomical wall charts to enliven his lectures and his efforts represent the first known audio-visual teaching attempt in the history of medical education. Albert Magnus, the most famous medieval physician and Roger Bacon, the first modern scientist who described the magnetic needle and reading glasses (and also reportedly predicted radiology and the discovery of America) were from this school. Petrus Hispanus, who later became Pope John XXI was also from this school. Being the only physician to attain this office, he authored Thesaurus Pauperum and Liber de Oculo. In the former, he advises blowing pepper and salt up the patient's nose in hysterical fainting to make the patient come around. In the latter, he prescribes infant urine as eyewash for ocular infections.

Uroscopy was given great importance during medieval times as evidenced by medieval art, where every medical scene invariably has a physician, in his unfathomable wisdom, poring pensively over the urine glass. Telemedicine began when people carried urine in handsome flasks in wicker baskets and travelled great distances for expert opinion and accurate diagnosis. Physicians had remarkable skills in analysing urine. Duke Henry of Bavaria sent a lady's urine to Notker, a monastic physician, labelling it as his own. Notker inspected the urine and declared that God is about to work a hitherto unheard of miracle, whereby a man would be giving birth to a child. The Duke, failed in his attempt of crafty deception, blushed and accepted defeat.

The four-humour theory of Hippocrates evolved into a humoural theory of complexion or temperament, which described the social, psychological and physical characters of a person. A person was thought to be made sanguine by excess of blood, phlegmatic with excessive phlegm and choleric due to yellow bile, while black bile caused melancholy. (Picture C). As a result, people bled themselves at least twice a year (during spring and fall) to keep in tune with the climatic conditions. In fact, bloodletting or phlebotomy was almost a fashion during the Middle ages. It was a voluntary and often pleasant ritual, which according to the Regimen, brought joy to the sad, kept minds of monks from mundane thoughts and even helped flirtatious women to forget lovers and remember husbands. Therefore barbers and barber surgeons had good business. However, in their zealous enthusiasm, some tactlessly went overboard by displaying buckets of blood and hanging bloody rags on poles to advertise their services. The people must have taken this ethical violation quite seriously, since the University of Paris subsequently started obtaining sworn declarations from all aspirants to the medical school that they would never perform surgery.

Herbs

Herbs were used extensively during the Middle ages. Europe's oldest surviving Herbal that was written in the vernacular is The Leech Book of Bald, and was written in the first half of the tenth century. In this book some of the most used herbs of the Saxon times were Wood Betony, Vervain, Mugwort, Plantain, and Yarrow. The herbalists believed that the outward appearance of the plant lets you know what illness it could cure. Unbelievably, this was often accurate. For example, Lady's Mantle was said to look like a woman's cervix, and thus was deemed useful in childbirth. Anything that was yellow was thought to help liver conditions, or choleric conditions, and one of these plants was the Dandelion. Till this day we find Dandelion featuring in natural health and beauty care catalogues, claiming that it helps to enhance the flow of bile from the liver and assists in healthy digestion. Galen created a system for food, classifying it into categories of hot, cold, dry, and damp and food intake was thought to have a great effect on the four humours, described by Hippocrates. The Upanishads of India (500 B.C) stressed the importance of food in the saying, "From food are born all creatures, which live upon food and after death return to food.

Choleric: Violent

Melancholy: Daring

Sanguine: Loving

Phlegmatic: Lazy

Picture C. The Four Temperaments

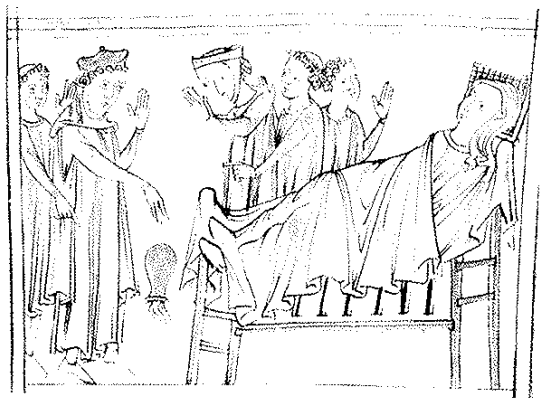
Food is the Chief of all things. It is therefore said to be the medicine of all diseases of the body." The medieval housewife realised this and knew how to make a Galenical balanced meal by adjusting her ingredients. When cooking fish, she would add "hot and dry" fennel; she would add pepper to foods that were "cold and moist", like beans. Hot foods would include onions and almonds.Asparagus and coriander were considered dry foods. Damp foods were grapes and barley. Lettuce would be a cold food.

Yarrow (Achillea mullefolium) is said to have been used in the Trojan War to treat the wounds of the soldiers. Its folk name,"nosebleed",proves that it was used as a styptic to stop bleeding. In medieval times it was a remedy for toothache. Even today, Yarrow is considered a "heal-all" reputed to cleanse your system and reduce inflammation. St. John's Wort (Hypericum perforatum) contains tiny oil sacs that have red oil in them. When the sun shines on it, the plant looks like it is covered with red holes.This herb was used for stopping bleeding and as an antiseptic. It was proven helpful for burns, sprains, cramps and also believed to dispel evil spirits. In the thirteenth century, physicians of Mydafai, Wales, prescribed it for mental illnesses. Amazingly, the early herbal healers were right on target. The aerial tops of the plant can be taken internally and science proves that it lightens mood, lifts the spirits, acting as a nerve tonic for anxiety, irritability, and nervous exhaustion. Of course, they had no means of knowing that St. John's Wort contains the active ingredient hypericin, which contains flavonoids and xanthones, which are monoamine oxidase (MAO) inhibitors. We now know that MAO inhibitors increase the level of the nerve impulse transmitters in the brain that maintain normal mood and emotional stability. A weed called Plantain (Plantago species) was called "waybread" and was an important healing herb. It is still widely used for medicinal purposes, especially for bee-stings. The seeds of a related species, P. pysllium, are sold over-the-counter as a natural laxative. Look for these and other simple, inexpensive ancient herbs, packaged in all those expensive health products being sold straight to you!

Health and life style

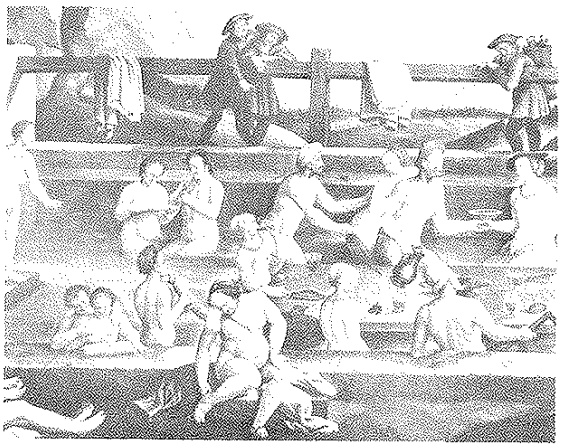
Medical treatment was available mainly to the wealthy, and those living in villages rarely had the help of doctors, who practised mostly in the cities and courts. Though most remedies were herbal in nature, the medications also included ground earthworms, urine, and animal excrement. Medieval doctors stressed prevention, exercise, a good diet, and a good environment. Apart from uroscopy, one of the best diagnostic tools of that time, other diagnostic aids existed, including taking the pulse and collecting blood samples. Treatment ranged from administering laxatives and diuretics to fumigation, cauterisation, and the taking of hot baths and herbs.

Professionals often have dramatic ways of declaring their judgement; judges who pronounced a death sentence broke the nibs of the pen used; medieval doctors dropped urine glasses to signal bad prognosis. (Picture D)



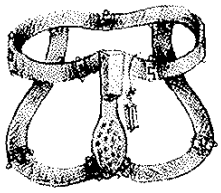
Picture D. Doctor dropping urine glass as a sign of bad prognosis.

To begin with, the lavish baths of Roman society did not find a counterpart during early medieval times. But when Charlemagne built a *therma* in his palace grounds, the interest was revived and the custom of hot baths gradually spread. A weary knight, resting in an aristocratic home, could enjoy a sauna bath being scrubbed by the ladies of the manor. By the end of the twelfth century, when public bathhouses were instituted by the Town Hall, they became an enthusiastic diversion for noblemen and common men alike. Men and women bathed together with spectators watching from a balcony (Picture E).With time, modesty became non-existent and bathing houses became base brothels. Fun and frolic with song, drink and dance escalated as people "scratched each others' back" among other things. Defeating the good intentions with which they were built, they became centres of public contagion. By the 14th century, civic authorities began to restrict entrance to the public baths. Syphilis dealt the death



Picture E. The bathing mania. Men and women frolic in a communal bath as spectators watch from a balcony. From A History of Medicine.

blow to public bathing, when the rapid incidence of the disease instilled fear in the community, leading to the eventual closure of all public bathhouses. Decreasing moral values led to an increase in venereal diseases. Paradoxically, a concurrent increase in female promiscuity led to a decrease in male trust leading to the development of the chastity belt, a typical middle age invention. (Picture F)



Picture F. Chasity belt Illustration from medieval manuscript.

The Black Death

Even as we live in a civilised and technologically advanced world, we are grappling with HIV, flesh-eating bacteria and the Ebola virus in recent years, not knowing when, where and how we would be able to conquer them. During the Middle Ages, our ancestors had the same predicament with two diseases, which by relative standards were no less scary or miserable. Plague and leprosy were the greatest villains of their time and many uncertainties still linger regarding the origin, impact and future threat of these catastrophic perils.

In 1346 rumours reached Europe of strange and terrible things happening in the East. People heard stories of a horrible scourge supposedly arising in China and spreading to India, Persia, Mesopotamia, Syria, Egypt and all of Asia Minor, told of a devastating death toll. India was reported to be depopulated, whole territories covered by dead bodies. There were no actual eyewitnesses, but a Flemish priest, basing his remarks on a letter from a friend at the papal court, mentioned that in a certain eastern province, unheard of tempests overwhelmed for three days. A rain of venomous beasts and reptiles on the first day, massive hail stones on the second and fire on the third supposedly slew most of the population. This was the first exaggerated news that the Europeans heard of impending disaster. But this phantom enemy, which had no name yet, caused little concern in Europe, since stories of natural disasters from the East were common and without the concept of contagion no serious alarms were felt. They were for a period, nonchalant about the rumoured pestilence, which, with unprecedented magnitude would soon be embracing them, shattering lives, families, institutions, and the very fabric of medieval society.

The Black Plague, or bubonic plague, appears to have begun in the eastern provinces of China, perhaps a result of the forced movement of peoples under the Mongol Empire. However, the plague bacillus was alive and active as early as the 6th century, when Europe suffered an epidemic (albeit in minor proportions) known as the Justinian plague. But the disease had lain relatively dormant in the succeeding centuries. Scientists say that the climate of Earth began to cool in the 14th century, and some think that perhaps this so-called little Ice Age had something to do with the rejuvenation of the bacillus.

It is not clearly known how or when exactly the plague first reached Europe. G.G. Coulter, a 20th century medieval historian wrote that it reached Constantinople in 1347, and from there followed the well-established Silk Road, making its way across the Eurasian continent until it reached the Middle East and the Eastern Mediterranean. From here, much of the Eastern spice and silk were carried in galleys to European merchants. A Flemish chronicler records that in January, 1348, three galleys from the East, laden with a variety of spices and other valuable goods put in at Genoa. The sailors were horribly infected and irremediably infected other people. Other accounts say that infected trading ships had reached Messina in October of 1347 with dead and dying men at the oars. At any rate, by January 1348 the Black Death had established itself in Sicily and on the Italian mainland, penetrated France via Marseilles, and North Africa via Tunis. From Marseilles it spread westward to Spain and northward to Avignon. It soon hit Rome, Florence and Paris. Crossing the channel, it reached southern England and crossing the Alps it conquered Switzerland before moving eastward into Hungary.

Michael Platiensis, in his account of the plague says that the disease appeared so virulent that anyone who only spoke to the patient was seized by a mortal illness and in no manner could evade death. The infection not only spread to everyone who had intercourse with the diseased, but also to those who had touched or used any of their things. Soon men hated and shunned each other- mother abandoned child; father abandoned son. Many drew their last will and testament and confessed their sins to the priests. Corpses lay forsaken in the houses. Since no man dared to enter, hired servants were paid high wages to bury the dead. The hired help incidentally helped themselves to all the valuables, gold and jewels of the house. However, the plague raged with such vehemence that soon there was a shortage of servants and finally none at all. People who migrated to flee from the epidemic, only transmitted the disease.

What the world didn't know at this time was that this was bubonic plague, a contagious, fatal epidemic disease caused by the bacterium *Pasturella (Yersinia) pestis*. The bacteria were transmitted by fleas, which travelled by virtue of *Rattus rattus*, the small medieval black rat that lived on ships, as well as the heavier brown or sewer rat. This infection was transmitted from person to person by normal contact or by the bite of fleas from an infected host. The flea infected the human by regurgitating the blood containing the bacteria from the rat. The rat dies. The human dies. The flea usually lives happily, unaffected by the bacteria, but may be choked to death by them

when they multiply in millions within the flea's alimentary tract. Nature sure has a morbid sense of humour.

The disease progression of plague was typical. The blood stream of the bitten or infected person then carried the bacteria throughout the body. The body temperature rose to about 104 degrees Fahrenheit and the victim became very ill, disoriented, vomited and experienced severe muscular pain. Swellings about the size of an egg or an apple appeared in the armpits and groin due to inflamed lymph nodes (buboes). Suppurated swellings oozed blood and pus and were followed by spreading boils and black blotches on the skin from internal bleeding. This gave the disease the name of "Black Death." The sick suffered severe pain and died quickly within five days of the first symptoms.

A second form, known as the Pneumonic Plague, was the most contagious and virulent form of the disease. It ravaged concurrently with its sibling. Respiratory contact and droplet infection spread the infection. The bacteria invaded the victim's lungs, which filled up with frothy, bloody liquid. The victims of this type, who vomited blood died in about twelve hours, or even less. As the disease progressed, the symptoms were continuous fever and hemoptysis, rather than bubonic swellings. These victims coughed and sweated heavily and died within three days or less, sometimes in 24 hours. In both types everything that issued from the body — breath, sweat, blood from the swellings and the lungs, bloody urine, and blood-blackened excrement — smelled foul. Depression and despair followed the physical symptoms, and before long "death is seen seated on the face." The malignancy of the pestilence appeared particularly terrible because it's victims had no idea of what was killing them, knew no prevention, and had no remedy.

Ignorance of this medical knowledge only augmented the horror of the time. The 14th century had no suspicion that rats and fleas were the carriers, perhaps because they were so common, familiar and perhaps, even innocuous. Fleas, a common household pest, were never mentioned in contemporary plague writings. Although folklore did associate rats with pestilence, they were not even suspected guilty in the plague crime. This is evident from the legend of the Pied Piper of Hamlin, which originated after a minor outbreak in 1284. The actual plague bacteria were to remain undiscovered for another five hundred years.

Leaving a strange pocket of immunity in Bohemia and Russia unattacked until 1351, the plague had passed on to most of Europe by mid-1350. The effects were devastating. In the words of Jean Froissart, the most famous historian at that time - "A third of the world died." By modern calculations, we now know that the population decreased from 125 million to 90 million- his was quite an accurate estimate.

Medical thinking, trapped in astrology and leechcraft, stressed air as the communicator of the disease, ignoring sanitation or visible carriers. Absurdity reached dizzy heights when people widely accepted rumours that the plague was caused by a corrupted cloud of mist or smoke carried by "foul blasts of wind" into Europe. Some declared that the sun had drawn up this cloud from the stagnant depths of the sea. Others blamed zodiacal influences and planetary alignments. In France, King Philip VI asked the medical facility of the University of Paris for a report on the affliction, which was threatening all human life. With careful thesis, antithesis, and proofs, the doctors ascribed it to a triple conjunction of Saturn, Jupiter, and Mars in the 40th degree of Aquarius said to have occurred on March 20th, 1345. They acknowledged, however, effects "whose cause is hidden from even the most trained of intellects." The verdict of the masters of Paris became the official version. Borrowed, copied from Latin into various vernaculars, and carried abroad, it was accepted everywhere, even by Arab physicians, as the scientific answer. But to the people at large there was only one real explanation - whether from bad air or planets, the plague was the wrath of God and divine punishment upon mankind for its sins.

When the plague eventually extinguished itself by the end of 1350 AD, the survivors were totally disillusioned. They believed that they were saved by the grace of God, chosen to inhabit the "better-conditioned, humble and virtuous" world. But society was never to be the same again. Feudalism started to decline. The church, unable to stop the pestilence or even come up with a satisfactory explanation for what was happening, lost much of its credibility and importance, when the common man realised the helplessness of the Church during the epidemic. The seeds of the Renaissance were planted.

The last outbreak in England was the Great Plague of London in 1665. During this epidemic, doctors began wearing a robe of toile-cirée, which was linen coated with a wax paste (Picture G). The idea was that the plague came from "venomous atoms" which infected salubrious air making it "miasmatic" or disease causing. These atoms were "sticky", clinging to things the way smoke or perfume clings to things. The waxed robe presumably provided no surface to cling to. The breathing tube beak was filled with materials imbued with perfume. A priest in Italy complained that the robe was useless against plague, saying, "it is good only to protect one from the fleas which cannot nest in it". This friar (who came close to guessing the cause of the plague without knowing it) complained of being "devoured by fleas, armies of which nest in my gown."

The sensible thing to do when the plague struck was to get out of town. Aristocrats could do this because they had estates in the countryside. The poor, who had nowhere to go, had no option but to remain and die. One of those in 1665 who had a country estate was a young Cambridge professor, Isaac Newton. He had been working on some theories and mathematical problems regarding the physics of motion, but his teaching duties allowed him little time to work on them. The plague of 1665 forced him into isolation and idleness. It was while at his country estate in the summer of 1665 that Newton solved the mathematical problems associated with his theory of gravitation. So, the plague was not without any virtue, after all.

Picture G. The plague robe of a medieval doctor.

The bubonic plague has not gone away. It still exists, everywhere in the world. In 1994, outbreaks of bubonic and pneumonic plague were reported in northern India. Because most of the reports were unconfirmed, the extent of the outbreaks is unclear. Following reports of a rat die-off, a few cases of pneumonic plague were reported, followed by several pneumonic plague cases and numerous deaths. It is quite common among rodent populations—rats, of course, but squirrels, rabbits and skunks as well. The Rocky Mountains in the US is one of the places where it is still endemic. Every few years, a hunter contracts the disease. Although we now have a cure for it, the disease progresses very quickly and there have been many instances where the patient doesn't make it.

The plague phenomenon has so far been very much a paranormal activity. But the plague is still very much with us. And the bacillus is out there.

Leprosy

Leprosy, which is supposed to have come from the East through Sicily, was the other disease, which became a pandemic in the twelfth century. Lepers were treated shabbily and with utter disgust. The all-powerful Church considered them unclean and unfit to be part of society. In a gruesome ritual, the victim was forced to wear burial shrouds and lie in a coffin before the altar, when earth was thrown on the afflicted and the priest declared him officially dead. From then, he had to wear gloves and fur shoes, clack a rattle warning others of his approach and beg for a living (Picture H). However, during the 12th century, the Church itself started building rehabilitation homes for them. This saw the emergence of more than 19,000 leprosoria all over Europe during the 13th century. By ostracising the patients, medieval society had unwittingly contained the contagion, which eventually led to the complete removal of this dreadful health threat by the 16th century. The plague, by natural decree, also did its part by wiping out a majority of leprous victims.

Picture H. Leper with his rattle.

The Dancing mania

Amidst our people here is come
The madness of the dance.
In every town there now are some
Who fall upon a trance.
It drives them ever night and day,
They scarcely stop for breath,
Till some have dropped along the way
And some are met by death.

Thus goes a grim ditty from the Straussburgh Chronicle of Kleinkawel, Germany in 1625, describing another outbreak of 'dancing mania', the last mass contagion of the Middle Ages. Manic dancing was first mentioned in the 14th century in Germany and sporadic outbreaks are described right until the 17th century. The first major outbreak of dancing mania was in Aix-la-Chapelle in July 1374, where a group of people was seen to dance uncontrollably in the streets, foaming at the mouth and screaming of wild visions. They kept on dancing until they collapsed from exhaustion, but even then they flailed about in agony. They had to be forcefully restrained in swaddling clothes, the primitive version of the straightjacket. The mania caught on and spread rapidly throughout France and some parts of Europe and had its peak around 1418.

Dancers filled the streets around the clock, accompanied by musicians. In the High Middle Ages, music was considered a cure for the ills of the mind as well as the society. (Picture I) The wild gyrations of the dancing mania were treated by the playing of music, similar to the way seizures were treated at that time. In Straussburg, Germany, where the disease was at its worst, thousands had either been afflicted with the

dancing mania, or caught up in the dancing, or trying to help, or gawking from the sidelines, that the normal activities of the town were brought to a complete standstill on several occasions. The frenzied people danced to the tunes of instruments through the streets until they dropped down exhausted. They were eventually exorcised in the chapel of St. Vitus, who soon became the patron saint of the dancers. A clinical condition called as Sydenham's chorea was also known 'St. Vitus' Dance' because of the similarity of symptoms in both. However, it is unrelated to manic dancing. According to the Cologne chronicle, many dancers became victims of much "fraud and knavery" and more than a thousand women and virgins in Cologne became pregnant during the dancing epidemic.

leads to another hypothesis that the manic dancers (at least some of them) were victims of ergot poisoning. Ergotism, known in the Middle Ages as "St. Anthony's Fire", is a toxic condition in humans and animals who inadvertently eat rye and other grasses parasitized by *Claviceps purpurea* (ergot). This small brown fungus produces an amazing array of dangerous chemicals, including lysergic acid diethylamide (LSD). Symptoms of ergotism may include psychotic delusions, nervous spasms, spontaneous abortion, convulsions, and gangrene. LSD, in particular, causes intensely coloured hallucinations, perhaps explaining the visions of some of the dancers, like those who claimed to have seen the heavens open up to reveal the Gods. Ergotism is also frequently fatal and could have been the cause of the death of the dancers.

Picture I. The Dancing Mania. Drawing by Brueghel (1564) showing hysterically dancing women restrained by their companions, as musicians continue to provide music - from A History of Medicine.

In the late 15th century, one particular outbreak in the town of Taranto in Southern Italy gave rise to an actual dance form. Here, it was believed that the manic dancing was caused by the bite of a local spider. Again, music was employed to try to cure the dancers. The name of the local dancing mania became known as '*tarantism*', after the town of Taranto, and the indigenous tarantula spider. This species is not poisonous and could not have been responsible for the mania.

The dancing mania eventually died out or assumed other forms, leaving others to wonder as to how and why it happened. The manic dancers are first described in the late fourteenth century, a time of beautiful art, music, and poetry. Several hypotheses exist to explain the dancing manias and the true cause will perhaps never be known. One hypothesis suggests that the dancing mania arose as a form of mass hysteria. The spectre of the Black Death could have struck massive terror and despair, engendering mass hysteria and manic dancing could have been an expression of this hysteria. The dancing mania may also have had a physical cause. The descriptions of the symptoms of some of the sufferers

Conclusion

In a curious coincidence, the Middle Ages began and ended with the catastrophic plague; between them the plagues of the sixth century and the fourteenth century wiped out a big percentage of the population. The Middle Ages saw leprosy at its worst. Victims of leprosy, with their peaked hood, grey sackcloth and sinister rattle became the dreaded phantoms of this age. Latin replaced Greek as the new universal language. The Church wielded great authority during the early half of this period, but lost its supremacy when the public lost confidence, observing the helplessness of the Church during the plague epidemic. In fact, the decline of monastic medicine started even in the twelfth century, when the Church authorities realised that monks were far too preoccupied with healing activities and neglecting their religious vows and commitments. So, for a period, monasteries employed lay physicians on a contractual basis, paying them meagre salaries. However, famous ones like John de Bosco, were given beer and a horse, in addition to the remuneration.

Monastic practice was finally banned in the early part of the thirteenth century, but by that time the ancient knowledge had been transmitted to the lay schools and universities.

Medieval medicine has been largely described as an uneventful night. However, Greek medical thought transmitted through the Islamic world was preserved in the vaults of the monasteries and transmitted to European universities. The changes that occurred during this period are numerous; they include the introduction of gunpowder, increased importance of cities, economic and demographic crises, political dislocation and realignment, and powerful new currents in culture and religion. In a dark, hostile and violent environment, tormented with epidemics and punctuated with wars (especially the Crusades), learned men tried to light candles and strove hard to bring light. The greatest boon derived from this age was the establishment of hospitals and the development of formal medical teaching in universities. The late medieval times also saw some enforcement of public health measures. The concept of quarantine arose during this period when Italy first enforced *quarantenaria* – a forty-day isolation period for suspected disease carriers. In short, the pillars of modern medicine were erected and the stage is now set for the Renaissance and the beginning of science.

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