

Pestilence

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Disease has played a devastating role in the history of mankind. To confirm this observation one need only to consider the chronicles of the past, the revelations of scientific investigation into the causes of deaths over the centuries and the written records of survivors of epidemics. The ravage of disease continues and will persist. In recent time, populations have been decimated by such diseases as smallpox, influenza, malaria and typhoid fever. Epidemics do occur, but seldom has a disease held people in fear as the Black Plague of Europe did in 1348-1349.

Historical reference to plague in man may be found dating back to the 3rd century when Dionysius told of the disease in Egypt, Libya and Syria. Outbreaks of plague, both epidemic and pandemic, have been related through time. The path of death swept across the frontiers of the European countries, but apparently plague was not indigenous to these countries. Hare (1954) states that the first recorded instance of plague entered history in A.D. 540 during the reign of Justinian. The pestilence occurred in Ethiopia and then traveled down the Nile River. Alexandria, Pelusium, Antioch and Constantinople all were affected between A.D. 540 and A.D. 542. In 549, it reached Arles, Marseilles in 587 and Strasburg in 591. Hare (1954) comments, "It is related that when they (a procession led by Pope Gregory) were crossing the Aelian Bridge, they saw the Archangel Michael sheathing his sword in token that the plague was over."

Plague seemed to disappear following the time of Justinian (527-576), but returned again with the pandemic of the 14th century. It apparently had its beginning at Caffa in the Crimea. Trading at that time was predominantly carried out on a city-to-city basis.



The Genoese and Venetians traded with the Tartars who had become peaceful under Ghengis Khan and Batu Kahn. The trading was primarily in silk and furs. For some obscure reason, fighting broke out between the Genoese and the Tartars at Caffa and the Tartars lay siege to the city for several months. This was a serious predicament for the Genoese, but it became even worse when one day the Genoese discovered unusual objects being hurled into the city by the Tartars. These objects were corpses of Tartars who died of plague. Soon the bodies began to contaminate not only the inhabitants of Caffa but also their water and food supplies. Without warning, the siege ended and the Tartars disappeared. Immediately the band of survivors boarded ships and left the walled city to return to Genoa and Venice.

Upon returning to their homes, the traders were greeted and embraced by loved ones and friends. It is possible that in this way plague was brought to Europe. However, Burnet and White (1972) state that none aboard ship showed the sign of plague, but that the black rat with its colonies of fleas had found its way on board ship and consequently the infection traveled to Europe. It would be reasonable to assume, given the exposure to the disease which the traders had and the presence of the black rat and fleas, that plague was brought to Europe in either manner or both, and spread by sea from port to port in other areas of Europe, to Africa and probably to India and China.

A common name given to the disease is black death. Gasquet (1893) relates that the origin of the name is not important. However, in primary septicemic plague, hemorrhages cause black splotches in the skin and, hence, the name "black death" was used.

The plague of 1348-1349 was characterized in the chronology of the age with these four symptoms: gangrenous inflammation of the throat and lungs; violent pains in the region of the chest; the vomiting and spitting of blood; and the pestilential odor coming from the bodies and breath of the sick.

Invariably, the person who possessed these symptoms was a victim of plague. The exact number of victims cannot be established. Perhaps at the time of crisis, most any death may have been attributed to

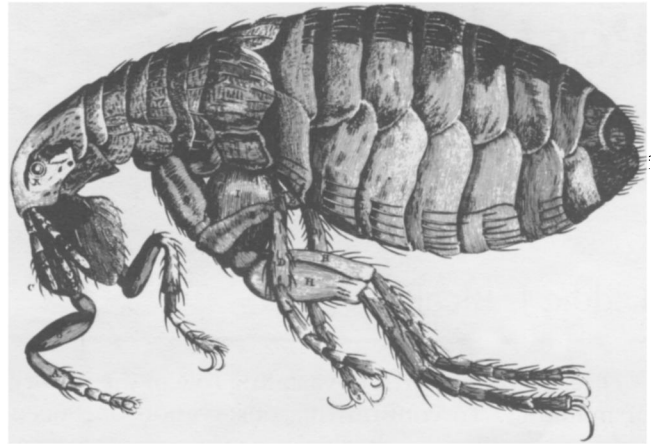
plague. Critical to the establishment of accurate mortality tables would be reliable records of births and deaths in the provinces. Hecker (1844) contends that in the early 14th century many people were yet uncivilized. Cities were walled fortresses; bands of marauders were encamped along the roads; witches and heretics were burned alive; wild passions and cruelty were general. There was little regard for human life; thus, the element needed for precise measurement of the loss of human life, that is, the measurement of exact populations, is lacking. However, Pope Clement of Avignon estimated that 23,800,000 people had been victims of plague. Hecker (1844) has estimated the possible number of deaths at 25,000,000. This number of deaths is not easily substantiated but a sample from the larger cities, whose populations were assessed by the royalty, provides an estimate of the deaths during the great pestilence. The following data from Hecker are representative of sources in Europe and provide an estimate of the number of deaths: Venice, 100,000; Paris, 50,000; Avignon, 60,000; London, 100,000; Franciscan Friars (Germany) 124,434; Florence, 60,000.

What knowledge man had in 1348 concerning plague was based on a paucity of scientific information. The medical faculty of Paris, the most celebrated of the 14th century, was asked to render a statement about causes of plague. This august body delivered its learned opinion with declarations concerning rays of the sun being combatted by constellations; corrupted waters; stinking and deleterious rains. Citizens were advised by the faculty that sleep in the daytime was detrimental; drink little at breakfast; going out at night could be harmful because of dew; too much exercise is hurtful. Many restrictions aimed at avoiding the disease point toward the exposure to and use of water . . . for example, rain water must not be used in cooking. Hecker (1844) states, "This famous faculty of Paris found themselves under the painful necessity of firing a point blank shot of erudition at an enemy who enveloped himself in a dark mist, of the nature of which they had no conception."

Scientific knowledge is cumulative and the impact on science and medicine of events encountered in plague was profound. We have come from an era of superstition and fear with little information concerning the dreaded disease to recent history when scientific investigation has been successful in identifying the cause as being a bacillus designated *Yersinia pestis** discovered simultaneously by Yersin and Kitasato in 1894 (Burrows 1969).

Dubos and Hirsch (1965) describe bubonic, septicemic plague and pneumonic plague as follows:

* The bacillus earlier was designated *Pasteurella pestis*. Smith (1984) designated the bacillus *Yersinia (Pasteurella) pestis*.



A typical case of severe bubonic or septicemic plague presents a characteristic picture: sudden onset, high temperature, rapid pulse, white coating of the tongue, nervous symptoms varying from restlessness to great prostration and fatigue, bloated appearance and conjunctival suffusion, slurred speech and staggering gait, apathy and mental confusion. Eventually, there is pain in the groin, the armpit or the neck, where the bubo appears. Intense pain directs the patient's attention to the inflamed node, which may remain small, hard and tense, but more frequently enlarged to the size of a walnut or goose egg and is embedded in boggy edema. In the septic variety, nervous and cerebral symptoms supervene with striking rapidity; although the temperature is rarely above 100 degrees F., epistaxis, hematuria and involuntary evacuation appear in rapid succession. Pneumonic plague begins with rigor, malaise, severe headache, nausea, vomiting and general pain, temperature of 102 to 105 degrees F., difficult and hurried breathing, cough and expectoration. The sputum watery and frothy, becomes blood tinged but is rarely viscid or rusty, as it would be in acute pneumonia.

Burrows (1969) cites three forms of plague bacillus. The focus of infection from Variety I (*Y. pestis orientalis*), is in the orient, India, Burma and China and was the agent responsible for the epidemic of 1894. Also, it is responsible for the wild rodent (sylvatic) plague in the Western United States. Variety II (*Y. pestis antiqua*), comes from central Asia and has moved west to the Nile valley and into central Africa where it now persists. Variety II may have been responsible for the plague during the time of Justinian. Variety III (*Y. pestis mediavalis*), may be a form of Variety II and spread from the Caspian Sea throughout all of Europe, causing the Black Death of 1348-1349.

Just as *Y. pestis* has been isolated as the causative organism for plague, so have the black rat and the flea been identified as integral agents in the dissemination of *Y. pestis*. Dubos and Hirsch (1965) cite the work of Ogata in 1897 and The British Plague Research Commission in 1905 and 1906 as contributing to the understanding of the rat-flea relationship in transmission of the plague to man. The rat flea *Xenopsylla cheopis* transmits plague bacilli from rat to rat. The bacilli multiply in the stomach of the flea and are

regurgitated during the sucking act of the flea. Thus man's association with these animals under the environmental conditions of the 14th century placed him in the path of the bacterium. According to Benenson (1975) it is now recognized that in many areas of the world plague may be potentially dangerous since wild rodents may come in contact with domestic rats or their fleas and be involved with an outbreak of the disease. Also, Benenson indicates that pneumonic plague may be spread by the inhalation of airborne droplets from victims of primary pneumonic plague or from persons who develop terminal plague pneumonia from bubonic plague.

The association of the rat with flea, and both with man, was unknown to the physicians and lay people in the 14th century. The origin of plague was thought to be of various sources: pestivorous winds which spread poisonous odors preceding an earthquake on the island of Cyprus; the consequences of foul vapors from swamps caused by innumerable floods; volcanic eruptions; and the infection of the air by fiery meteors.

Whatever the origin of the disease and wherever the first encounter with the pestilence occurred, one observation in the literature is constantly borne out; that is, the disease literally killed millions of people and laid havoc to the very existence and morality of the populations. Lay people became frightened, terrified and bent to superstition as a consequence of the lack of guidance and help from the religious orders, the royalty and the professionals. Fortunately, a few men and women of the cloth and some of the medical profession responded to the oath they had professed, to aid the dying and the bewildered. But, far too many churchmen, physicians and princes deserted their fellowman to seek personal sanctuary and escape from the pestilence. The agony and disruption created for individuals and families can be recounted in an anecdotal way, from events chronicled in church records and from the reports which emanated from civil sources which were not accustomed to preserving the vital statistics of the public.

The literature devoted to a recounting of the pandemic contains many illustrations of the horror precipitated by plague. The primary sources for these illustrations are the chronicles of churches of the 14th century and accounts by early writers. The disease is spoken of as being caught by relatives and friends and leaving houses bereft of inhabitants. Parents abandoned children and dissolved all ties with their kindred. People seemed to be struck as if by lightning and died on the spot, the young and strong more frequently than the old; the flight of people from the cities was of little avail since the germ clung to those who fled and they died in their country houses; and, whole cities became infected and total

populations died because for the most part these cities were narrowly built and were kept in a filthy state.

Perhaps one of the more vivid descriptions of the horror of plague of 1348-1349 may be read in Boccaccio's *The Decameron* in "The Author's Introduction," (translated by Musa & Bondanella 1979). Boccaccio who lived from 1313 to 1375 may be considered an eyewitness to plague in Florence. He tells of the rags of the poor who died of the disease being thrown into the street and then of pigs shaking the rags and going into convulsions and falling dead; of valiant men and beautiful women who dined with relatives and friends in the morning but took supper with their ancestors in another world; and of people carrying flowers, spices or sweet-smelling herbs to ward off the disease which they thought was borne on the air from the stench of dead bodies. Boccaccio relates this grim daily routine:

Many ended their lives in the public streets during the day or night, while many others who died in their homes were discovered dead by their neighbors only by the smell of their decomposing bodies. The city was full of corpses. The dead were usually given the same treatment by their neighbors, who were moved more by the fear that the decomposing corpses would contaminate them than by any charity they might have felt towards the deceased: either by themselves or with the assistance of porters (when they were available), they would drag the corpse out of the house and place it in front of the doorstep where, usually in the morning, quantities of dead could be seen by any passerby; then, they were laid out on biers, or for lack of biers, on a plank.

Many reports indicate that merchants gave up their worldly goods and delivered gold and treasures to the doors of the monasteries, but all their gifts to the monks brought only death. Queens, bishops and hundreds of other distinguished persons died in a day under the care of the sisters of charity, whose courage was a display of human virtue. Churchyards soon were unable to hold the dead and houses fell to ruins; at Avignon the water of the Rhone was consecrated so that bodies could be thrown in and disposed of speedily. In Vienna, where 1,200 inhabitants died daily, churchyards were no longer used to bury the corpses, but rather large pits were formed outside the city and thousands of bodies were arranged in layers. Funeral services became impractical; morals deteriorated everywhere, and churches were deserted, bereft of priests.

Nohl (1926) provides this concise statement in his book entitled *The Black Death*:

Plague—how the word still echoes with the dread it once inspired. The stealth of its coming, the mounting terror of its incidence, and the relentless way it reduced men to bestiality, have left a track across European history quite unlike any other disaster. . . . When it passed, as unaccountably as it began, the

forces of life, health and goodness raised men once again from the depths of this medieval abyss of confusion and superstition.

Vaccines and antibiotics, the result of research by scientists like Jenner, Pasteur, Fleming and Jonas Salk, have contributed monumentally to alleviating the distress caused by many diseases suffered by man. As Smith (1984) has indicated, experiments of the past have provided information upon which modern science advances. Perhaps the antibiotics of today may be traced to the ancient Egyptians and their use of "moldy wheat loaf."

Plague is no longer the pandemic threat it once was. We do not live in fear of *Yersinia pestis* as we do not necessarily need to live in fear of the agents which cause polio, smallpox and other diseases. Now, our anxieties have turned to cancer, vascular disorders and those maladies which make us quite aware of our ignorance in and vulnerability to the versatility of nature.

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