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Plagues & Diseases ANTH-1913-920

5 May 2016

The Plague of Athens and Typhoid Fever

            Typhoid Fever has ripped through history, touching nearly all parts of the globe and leaving in its wake swaths of dead or dying victims. Up until the development of the first vaccines in the late 19th century, the infectious disease killed without mercy, showing up in some of the most influential moments in the world’s history. It decimated the populations of several New World colonies throughout the 17th century, including Jamestown. It popped up during the Civil War alongside dysentery, killing off more soldiers than were killed through fighting. It hid itself inside who some consider the most famous carrier of the disease, Mary Mallon, who unknowingly passed it on to several individuals without her knowledge due to her being the first known “healthy carrier” of the disease. And yet, though all of these events are etched deep in the annals of history, few hold as much gravity as the Plague of Athens in 430 BC.

            To understand this effective killer, one must obtain a general understanding of the epidemiology of the disease itself. Typhoid Fever, caused by the bacteria *Salmonella Typhi,* is an infectious disease spread through a fecal-oral transmission path route, often contaminating water supplies and food whenever it can, where its sits in wait for the its next unfortunate host. Upon entering the body, the bacteria seeks out the intestines and sticking to the intestinal wall. This has the possibility of causing perforations in the intestines, causing bowel contents to leak into the abdominal cavity, leading to sepsis. While this doesn’t always occur, it is almost certainly a death sentence if it does. Symptoms of Typhoid Fever encompass the general suite of symptoms indicative of nearly all infectious diseases, including fever, nausea, abdominal pains, and malaise. Additionally, in some cases various flat, rose colored rashes appear (CDC). Taking this information into account, in particular its transmission method, it is easy to see why this disease spread with such virulence in the pre-industrial/modern world. Specifically, before the age of hygiene and the dramatic overhauls of modern society’s sewer and waste management system, it is clear to see why this disease had the dramatic and deadly effects that it did whenever it struck.

And yet there is one thing about this disease that aids it tremendously in its spread: its symptoms. At first glance, one might not find anything special about them. But that very thought is what allows the disease to carry on and push through an unsuspecting population with ease. If the disease is not diagnosed or recognized, which in and of itself is incredibly difficult due to its symptoms being so similar to nearly every other infectious disease and other illnesses, the victim could either be mistreated or simply try to tough it out, thinking it to be but a rougher than usual cold or flu. If left untreated, the likelihood of the victim to die from the disease or conditions brought on by the disease (such as sepsis) are upwards of 25% (Buckle, Walker, Black). This disease, with its high mortality rate and multitude of symptoms is, in the eyes of the casual observer and indeed in the eyes of many esteemed historians, a likely candidate for the cause of the horrific plague that afflicted Athens in the late years of the 5th century BC. However, Typhoid was not nailed down as the most likely culprit of the plague until the early 2000s, the reason being obviously due to the fact of a lack of concrete evidence to state otherwise. The only historical records of import that document this period of time of the great city are the writings of the philosopher Thucydides who was a victim and survivor of the terrible plague. His writings and the interpretations of them, until recently, have been the sole evidence by which to determine the causative agent of the outbreak.

Athens, the capital of Greece and considered by many to be one of the most historically important ancient cities of the world, is situated in the Attica basin of Greece, bounded by 4 large mountains and the Saronic Gulf. Three prominent historical bodies of water flow through the city, the Cephissus river, Ilosis stream, and the Eridanos stream. Athens harbored some of the greatest intellectual minds of the BC era, including Pericles, Socrates, and Plato. It is considered to be the birthplace of democracy and the cradle of western civilization (Mark).

According to the writings of Thucydides, the plague that killed roughly 1/3rd of the population of Athens first appeared around the year 430 BC, ravaging its way through the city-state for 2 years before subsiding and then reemerging in 427 BC (Longrigg pg. 211). In his writings, the philosopher describes the years preceding this event, notably highlighting the Peloponnesian War, which occurred in 431 BC. Here, it is historically recorded that the Peloponnesians invaded the Attica basin, forcing the inhabitants of Athens and surrounding areas to jam themselves inside the walls of the city, raising the population inside the city proper exponentially for the duration of the war Taking this information in combination with the notable lack of personal hygiene at the time, as well as the severe lack of any modern concepts of medicine and treatment, it is clear to see how Athens quickly became a veritable paradise for disease and infection. The Plague itself is believed to have “begun in Ethiopia, spread thence to Egypt and Libya and into most of the Persian Empire…its first incidence in Europe occurred at … Piraeus” (Longrigg pg. 212). Once the disease reached Athens, it latched on and took hold, spreading to a vast majority of citizens of the city. Thucydides describes those afflicted as obtaining a burning fever and bloodshot eyes, sneezing, hoarseness, severe coughing, and eventual severe diarrhea which was most likely the main cause of death. He describes those with the fever as being so taken by the heat that they only wished to “throw themselves into cold water” (Longrigg pg. 212). Pausing here, it is best to look back at the transmission method of Typhoid. If those afflicted did indeed as Thucydides stated desire to throw themselves into cold water, it would be no drastic step to believe that at least some of them did so. This, taken with the aforementioned water sources of Athens, it is also no small step to believe that many threw themselves into the Cephissus river to experience at least some relief from the unbearable heat of the fever. This act would have drastically facilitated the spread of the disease due to the river being the main source of drinking water for the city.

Thucydides goes on to explain other observations he had during the Plague, including that many of those who survived lost the use of their extremities, and even some who went blind. Taking into account all of these observations, the possible candidates for the cause of the plague without physical DNA evidence to state otherwise included such diseases as “plague, typhus, Ebola, anthrax, smallpox, Lassa fever, tuberculosis, scarlet fever, and the measles.” (Papagrigorakis). Every disease was put on this list based on the writings of Thucydides and their possible link to the symptoms described there. And yet no definitive answer to this historical was possible until recently.

In 1994-95, a group of scientists desiring to identify this answer uncovered a mass grave in the Kerameikos cemetery of Athens. Inside this grave, roughly 150 bodies of dead Athenians. The scientists gathered samples of dental pulp from the numerous skeletal fragments in the grave, and proceeded to test them for DNA strains of the various diseases described above. Dental pulp, as described in Papagrigorakis’s article, is excellent for determining the disease responsible due to “its good vascularization, durability and natural sterility” (Papagrigorakis). Through enzymatically amplifying the acquired pulp through polymerase chain reaction (PCR), matches can be found through running the found information against a databank of diseases and their respective genomes (Papagrigorakis). Doing this, the group discovered that a nearly perfect match of the Typhoid Fever genome was found in the pulp of one of the samples they collected.

While this is not 100% definitive proof that Typhoid was the exact cause of the Plague of Athens, the implications of this find are enough to put it at the forefront of prospective candidates.

All of this further exemplifies certain diseases, without direct DNA cross-checking, can hide in a population and wreak havoc, spreading without remorse from victim to victim and in many cases taking that victims life in the process. All the while, they hold as their camouflage the very thing which alerts the body that all is not well: its symptoms. Because the symptoms of Typhoid, along with nearly all other infectious diseases (with some exceptions such as Ebola), are so extremely similar that in the absence of modern-day medical and DNA analysis equipment, the likelihood of accurately diagnosing a disease were extremely low. Not only is this seen in the case of the Plague of Athens, but throughout history. A similar technique described above was used to identify the causative agent of the greatest plague in human history, The Black Death. This further solidifies the massive importance of DNA analysis to understand the cause of historical diseases, as well as the importance of DNA analysis when discovering new diseases so as to expand our current databank of known and identifiable diseases.

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