The current COVID pandemic is far from the first such pandemic we have experienced. In all likelihood, it won't be the last. We offer this glimpse at pandemics from the past with the hope that knowing a bit more about those earlier events will enhance our understanding of our own situation today.

Elizabeth Hoffman, Jeanette Grant and Ann McMillan begin the section with an historical overview of plagues and pandemics from ancient Greece right through to the misnamed 'Spanish' flu pandemic of 1918–20. This is followed by Ralph Smith's epic poem, 'Graveside Thoughts Upon the Spanish Flu,' in which the central character is the grandfather Ralph never knew, because he died of the flu. The section concludes with Paul Pickering's aptly-titled play, 'Long-Term Perspective,' in which a centenarian long-term care home resident, a survivor of the 1918 flu pandemic, discovers some interesting connections she has to her male nurse, who's young enough to be her great-grandson.

Lessons from History

Elizabeth Hoffman, Jeanette Grant and Ann McMillan

According to Merriam-Webster, a pandemic is 'an outbreak of disease that occurs over a wide geographical area… and typically affects a significant proportion of the population' (Merriam-Webster, n.d). Without a doubt, COVID-19 meets the definition. It is not the first outbreak to do so.

COVID-19 was one of the biggest stories in the entire world for 2020 (Cowen, 2020). No weapon in any country's armament had the power to stop it as it rampaged from east to west and to every corner of the earth. It paused the economy of the planet as humankind hid at home awaiting the pandemic's next move. None of us could see it with our naked eye, but we knew it was out there waiting to kill and injure. World news spurred by UN agencies such as the World Health Organization (WHO) alerted us to COVID-19's potential in early 2020 and scientists sent its characteristics throughout the world (WHO, 2020). Health departments everywhere became aware of the possibility of pandemic as the virus moved. Our century had the advantage of scientific knowledge and the support of medical experts and facilities to care for the ill and learn about the disease that older civilizations did not. But have we learned what we could from the previous pandemics we have experienced? Are there lessons that we could have learned to improve how we have responded? Our response has often been linear and predictable, and raises some questions for planners of future pandemic response (Kolata, 2020; Ratliff, 2020; Schmidt and Undark, 2020; and Shiller, 2020).

We know that there were prehistoric pandemics from evidence of fossils and burial sites in Africa and northern Europe. We are fascinated by our Neanderthal ancestors who lived during the period 30,000 to 50,000 BCE. We had thought that Homo Sapiens somehow swept in and eliminated the Neanderthal. Recent evidence shows, however, that most of us with non-African ancestors have Neanderthal genes. Further, there is evidence that COVID-19 is less prevalent with more of those genes. It is possible that the Neanderthal succumbed to a disease that did not also decimate Homo Sapiens. In fact, pandemics have played a more defining role in our history than we generally credit them with (Jarus, 2020; Wade, 2018; Zhang, 2018).

For as long as humans have shared space with animals, they have shared similar germs and diseases. Bubonic plague, measles, smallpox, cholera, yellow fever, malaria and influenza, all major sources of pandemics, can be traced to interactions between humans and animals and their wastes and

infestations. Mosquitoes, fleas, ticks, monkeys, rodents, deer, horses, humans and now bats can all be vectors of transmission (Kahn and Burdeau, 2021; McMillen, 2016; Owen, 2020; Rosenwald, 2021).

The earliest evidence of a particular disease-causing mass death is provided by DNA taken from burial sites in Sweden and China from about 3,000 BCE. It provides the first evidence of the bubonic plague bacteria, *Yersinia pestis*, which would cause havoc many centuries later. *Yersinia pestis* may have been associated with a decline of settlements as the Stone Age gave way to the Bronze Age, as well as the mass migrations that accompanied that transition. We do know that the rise of settled agriculture brought Homo Sapiens and their domestic animals closer together, as they tended to live together and exchange diseases (Callaway, 2018; Szalay, 2016; Wade and Zhang, 2018).

There was a series of Egyptian Plagues, described in the Bible. Ten plagues are reported in Exodus, but most scholars agree that this isn't a historical account. However, it is difficult to separate the fact from the myth (Green and Symes, 2014; Jarus, 2020; Rosenwald, 2021).

The first well-documented plague occurred in Athens, Greece, in 430 BCE (Kahn and Burdeau, 2021). Athens at that time was at its height, a city of over 250,000 souls. Warriors returning from battles abroad brought the plague home. Ethiopia, Egypt, Libya and the territory of the Persian King were hit, but nowhere, according to Thucydides, an Athenian, was the effect greater than in the heat of summer in the crowded hovels of Athens.

War had broken out in the Greek world with Athens and her allies in one camp and the Peloponnesian city of Sparta and her allies in the other. Athenian strength was mainly sea power while the Peloponnesians excelled with land forces. With the coming of summer, the Peloponnesians, under the command of the Spartan King, Archidamus, invaded Athens. They set about devastating the countryside in the traditional manner (Mackie, 2020; Szalay, 2016; Thucydides, c.400 BCE).

Pericles, the Athenian general who was in charge of the war strategy, had built walls down to and including the port of Piraeus. These walls allowed the Athenians to withstand enemy land attacks since food supplies came in through the harbour, so ravaging the fields did not compel the residents to go forth and battle in the plains as with previous wars. Farm animals were shipped to the island of Euboea and all the country people of Attica crowded into Athens, which was already crowded. For the newcomers from the country there was no decent housing. The streets were narrow and hygienic conditions deteriorated as the numbers grew. The wealthy fled, but the poor were crowded tightly together so that disease was easily transmissible. (Huremović, 2019; Littman, 1969; Jarus, 2020; Mackie, 2020; and Thucydides, c. 400 BCE).

Then, men who had returned from battles in Egypt brought the plague

into Piraeus, from whence it quickly spread into the upper city. Thucydides wrote:

> People in perfect health suddenly began to have burning feelings in the head; their eyes became red and inflamed; inside their mouths there was bleeding from the throat and tongue, and the breath became unnatural and unpleasant. The next symptoms were sneezing and hoarseness of voice, and before long the pain settled in the chest, and was accompanied by coughing. Next the stomach was affected with stomach-aches and with vomitings of every kind of bile that has been given a name by the medical profession, all this being accompanied by great pain and difficulty. In most cases there were attacks of ineffectual retching, producing violent spasms; this sometimes ended with this stage of the disease, but sometimes continued long afterwards. Externally the body was not very hot to the touch, nor was there any pallor: the skin was rather reddish and livid, breaking out into small pustules and ulcers. But inside there was a feeling of burning, so that people could not bear the touch even of the lightest linen clothing, but wanted to be completely naked, and indeed most of all would have liked to plunge into cold water. Many of the sick who were uncared for actually did so, plunging into the water-tanks in an effort to relieve a thirst which was unquenchable; for it was just the same with them whether they drank much or little. Then all the time they were afflicted with insomnia and the desperate feeling of not being able to keep still. In the period when the disease was at its height, the body, so far from wasting away, showed surprising powers of resistance to all the agony, so that there was still some strength left on the seventh or eighth day, which was the time when, in most cases, death came from the internal fever. But if people survived this critical period, then the disease descended to the bowels, producing violent ulceration and uncontrollable diarrhea, so that most of them died later as a result of the weakness caused by this. For the disease, first settling in the head, went on to affect every part of the body in turn, and even when people escaped its worst effects, it still left its traces on them by fastening upon the extremities of the body. It affected the genitals, the fingers and the toes, and many of those who recovered lost the use of these members; some, too, went blind. There were some also who, when they first began to get better, suffered from a total loss of memory, not knowing who they were themselves and being unable to recognize their friends?'
>
> (Thucydides, 1954 translation, chapter 2, pp 49 and 52)

Even with the clear descriptions of Thucydides, we do not fully understand what disease caused the Athenian Plague. Various researchers support smallpox, measles, bubonic plague, typhus, Rift Valley fever and ergotism (Huremović, 2019; Littman, 1969; Jarus, 2020; Mackie, 2020). Any of these would have been made worse by the cramped conditions.

From all the deaths, moral decay and hopelessness in Athens there came one small benefit. The Peloponnesians left Attica earlier than they had intended because they were afraid of the infection. Still, never again would Athens rise to such heights as leader of an empire as she had occupied before the onset of the plague (Kagan, 2003). Later, as the Roman Empire grew in population and influence, there were several plagues. The Antonine Plague of 165 to 180 AD, during the reign of Marcus Aurelius, was caused possibly by smallpox (Watts, 2020). It was preceded by a Chinese epidemic and was brought by armies and traders returning from Asia. Physician Galen, the most revered medic of his time, recognized the importance of hygiene to health. He described five million deaths in total, as many as 2,000 per day (Flemming, 2019, and Littman, 1973).

This pandemic is viewed by some as the beginning of the end of the Pax Romana and the Roman Empire. It is also thought to have contributed to the spread of Christianity. While there were few Christians at the start of the plague, they cared for patients and shared their faith while preaching about the existence of an afterlife, an appealing thought at the time (Rosenwald, 2021, and Zinsser, 1950).

The Cyprian Plague of 249 to 262 AD was similar to the Antonine Plague and was described by Saint Cyprian. It was characterized by dysentery, loss of motor skills and fever, and bleeding from all orifices. Its origin is still debated, but may have been either influenza or a hemorrhagic fever like Ebola. It moved from Asia to Alexandria and from there across the whole empire (Harper, 2017 a & b; Rosenwald, 2021).

The Justinian Plague of 541 to 542 AD followed. It was named for Emperor Justinian, who survived it. This plague moved across the Asian Steppes and killed 35 to 100 million people, about half the combined population of Europe, the Middle East and North Africa. It was the bubonic plague, spread primarily by rats and fleas. Substantial depopulation of townspeople and farmers throughout the Mediterranean, Europe and Eurasia resulted. It is seen as a harbinger of the Dark Ages (Rosenwald, 2021; Zeigler, 2016). Recent research indicates that the bubonic plague became endemic in European mountain marmots at this time (Green and Symes, 2014).

The Black Death of 1348 was also bubonic plague, spread by rats and fleas. It started in China in 1331, with half of the population dying of it. The Mongol empire established by Genghis Kahn, who had died in 1227 AD, began to decline as a result. The plague spread along the Silk Road, which linked the Middle East and Asia to the western world and Mediterranean

trade routes. Fleas could live in bolts of textiles such as silk or wool. Marmots were the source of the 14th century fur trade and the fleas could live in their furs as well, long enough to survive transport along the Silk Road. Once unloaded and spread out, the fleas would leave the textiles and furs to feast on local black rats that lived with humans. One of the first signs of a new infection was the death of large numbers of rats, followed by the fleas biting humans (Green and Symes, 2014; Lawler, 2016; and Szalay, 2016).

The pandemic spread by transition to a pneumonic form, spread by coughed droplets, like today's coronavirus. There were other forms as well, including septicaemic and gastrointestinal. Approximately 75 to 200 million people, or one-third to one-half the population of Europe, died with some large cities experiencing 70% mortality (Green and Symes, 2014).

One contributing factor to the severity of the Black Death was the worldwide cooling temperatures in the late 13th and 14th centuries. This created a favourable environment for plague propagation in the central Asian high plateaus where the plague was endemic. This cooling also contributed to sudden harvest failures in Europe, which impacted people's diet. Cooling temperatures continued and are now referred to as the Little Ice Age of 1303 to 1830 (Green and Symes, 2014).

Deaths of that magnitude caused major social and economic upheaval. Peasants died in larger proportions than the nobility, who could flee. That led to a labour shortage, giving the peasants greater economic power. Land became cheaper than labour and sheep substituted for row crops. Still, feudal lords tried to impose their will on peasants (Cantor, 2014; Kahn and Burdeau, 2021; Rosenwald, 2021; and Tuchman, 2011).

In Britain, the economic effects of the plague worried the government, and in 1351 Parliament ratified the Statute of Labourers, which set up a rigorous system of wage and price fixing to prevent servants from charging excessive wages. A wide range of labourers were prevented from charging more than the pre-plague prices for their goods or work. They were also committing a crime if they did not serve those who required them. As demand for workers grew, the law quickly became unworkable. Ambitious and wealthy villagers began to dress smartly and affect the appearance of their betters. Parliament approved a re-issue of the 25-year-old sumptuary laws in an attempt to preserve a visible distinction between the classes, restricting the wearing of furs or the popular pointed toe shoes, and also restricting what the lower classes could eat (Jones, 2009).

Peasants revolted in the 1370s, and then migrated to towns where they could be free. This cadre of newly free people contributed to the decline of the Feudal system and supported the flourishing of science, art and literature and the eventual 15th century Renaissance (Cantor, 2014; Lambrecht, 2019; Tuchman, 2011).

The spread of disease became associated with trade, while pressure increased

to find an alternative to the Silk Road by sailing west to what we now know as the West Indies, or south along the west coast of Africa, in hopes of finding an alternate route to India and China. Both Columbus' first voyage to what became known in Europe as the New World, and the Portuguese voyages around the Cape of Good Hope, were undertaken in search of better trade routes to Asia (Newitt, 2005).

During the 16th and 17th centuries, the population of the New World was wiped out by plagues. It is estimated that 80 to 95% of the indigenous population of North, Central and South America died due to smallpox, influenza and measles. Measles was highly contagious, affecting 90% of people exposed, and deadly in a population that had never been exposed and had no herd immunity (Huremović, 2019; Daschuk, 2019).

According to a 2010 paper in the *Journal of Economic Perspectives*, 'Historian and demographer… David Cook estimates that, in the end, the regions least affected lost 80% of their populations; those most affected lost their full populations; and a typical society lost 90% of its population' (Cook, 1998; Nunn and Qian, 2010).

This depopulation may have been a reason that Europeans were first welcomed at Plymouth and Jamestown. It may also have encouraged Europeans to settle farther and farther west (Daschuk, 2019). Finally, the slave trade began because the natives were dying and the conquistadors needed labour. Also, free European immigrants could become landowners themselves, which increased the demand for labour to develop and work plantations (Cook, 1998).

The plague hit Alghero, Sardinia in 1582, brought by travellers, probably from Marseilles. It reportedly killed 60% of the city's population. A doctor named Quinto Tiberio Angelerio stepped forward to help; he had come from Sicily, where there had been a plague epidemic in 1575. When plague patients came forward to him, he pushed hard to quarantine them. Eventually, with the support of the viceroy, a triple sanitary cordon was set up around the city to prevent outsiders from trading. Although the death toll was high in the city, the disease did not spread to surrounding regions. In the booklet *Ectypa pestilentis status Algheriae sardiniae* he described his approach. All meetings and entertainments had been forbidden, only one person per household could go shopping, and citizens were advised not to leave their houses. Six-foot-long canes were to be carried so people would keep their distance. Rails were added to shop counters to maintain distance. Angelerio even understood the possibility that the disease could be transmitted on the surfaces of items, and instructed that houses be disinfected, whitewashed, and ventilated. Suspect textiles were disinfected by smoke. Finally, Angelerio assigned specific tasks such as digging graves to those who had survived the plague, since these were known to be high-risk jobs (Gorvett, 2021).

From 1665 to 1667, Oxford and Cambridge closed due to the plague. Sir

Isaac Newton was a student at Cambridge and while home from the quarantine he did much of the research on gravity, calculus and optics that became his magnum opus, *Principia* (Fara, 2018). He referred to 1666 to '67 as his Year of Wonders, the title of a fictionalized account by Geraldine Brooks of the town of Eyam, which became infected by the plague as the result of a tailor ordering bolts of cloth from London. Encouraged by two ministers, one Puritan and the other Anglican, the residents of Eyam voted to quarantine themselves for the duration of the plague to prevent spreading the disease to other villages. They even held church services and other meetings outside when the weather permitted. The Earl of Devonshire agreed to provide provisions if the town enforced its quarantine. About half of the residents of Eyam died (Brooks, 2002). Clearly, people then understood the basic nature of disease transmission and how to control its spread through distancing and isolation.

By 1720, the city of Venice, Italy, had set up a quarantine program involving all of the port cities around the Italian peninsula, including Marseilles, France. A ship known to be carrying the plague left Lebanon, stopping in Cyprus and Greece, before heading to Italy. Venice alerted cities and harbour-masters to turn the ship away or burn it in the harbour; there are letters in the Venetian archives demonstrating compliance with this advice. When the ship reached Marseilles, it was first quarantined in the harbour and was about to be turned away or burned. But Marseilles was suffering from famine and people clamoured to at least unload the grain. Merchants wanted the silks and cloth aboard. As a result of the decision to unload the ship, 50,000 people died in the city, as did another 50,000 from surrounding cities and towns. Finally, a virtual wall was erected around the city and countryside and leaving the city was made punishable by death (Cippolla, 1981). This incident confirmed the understanding of disease transmission and the measures that would be necessary to control the spread.

By the 17th and 18th centuries, the underlying cause of the plague was still unknown. Most educated people, however, knew that bolts of cloth and transported grain spread the plague. They knew that quarantines and social distancing helped to prevent spread. They also knew that face coverings helped to prevent spread, since they helped to contain the pneumonic form of the plague, which accounted for pandemic spread (Cippolla, 1981; Green and Symes, 2014).

The last bubonic plague epidemic started in China in 1855, and spread to India, Hong Kong in 1894, Hawaii in 1899, and finally San Francisco in 1900. It caused 10 to 15 million deaths, mostly in India. During this plague, the bacterium (*Yersinia pestis*), which causes plague, was finally discovered in 1894 by Alexandre Yersin, working in Hong Kong (Achtman, *et. al.*, 2004). The knowledge of the source of the infection has led to effective controls which, along with the discovery of antibiotics, have essentially eliminated the

threat of this disease (Achtman, *et. al.*, 2004; Green and Symes, 2014).

In addition to the bubonic plague, there were pandemics of cholera, typhoid fever and yellow fever in Europe and the Americas in the 18th and 19th centuries. Both cholera and typhoid fever are spread by dirty drinking water; thus, sewers and safe water supplies virtually eliminated cholera in North America and Europe (Harvard, c.2020; Marineli, et. al, 2013). Yellow fever was brought to the New World by the slave trade. It is endemic in Africa and spread by mosquitoes there. Draining swamps and eliminating a particular African mosquito vector (*Aedes aegypti*) in North America eliminated the threat (Prinzi, 2021). However, yellow fever caused a major epidemic in Philadelphia in 1793 with nine percent of the population dying (Fenn, 2001).

The Spanish Flu was so-called because only Neutral Spain reported on it during World War I. This flu was actually caused by the H1N1 type-A influenza virus with pneumonia and bacterial infection complications. While the initial source is disputed, it was spread rapidly by troops moving and then returning home from World War I. The 'Spanish Flu' was made worse by malnutrition and wounds of war, so young men and pregnant women suffered the highest mortality from it. Eventually, about 500 million people around the world were infected, which was about one-third of the world's population. Estimates of death range from 17 million to 100 million, making this one of the deadliest pandemics in history. The flu came in four waves: Spring, 1918; Fall, 1918 (the deadliest wave); Spring, 1919; and Spring, 1920. Fall, 2018 coincided with Armistice Day, November 11 (Bristow, 2012; Porter, 1965; and Taubenberger and Morens, 2020).

Philadelphia did not cancel a Liberty Loan parade on September 28, 1918 and 200,000 people attended. More than 12,000 people died in the next six weeks. St. Louis did cancel and had only 500 deaths. This was another difficult lesson about the necessity to isolate and socially distance to avoid spreading disease (Barro, 2020).

And what about today? Do we need to fear the diseases that have caused pandemics in the past? Smallpox, measles, cholera, yellow fever, typhoid fever and the flu all have vaccines that are effective against them. Arguably, the development of vaccines has been one of the most significant contributions of medical science to the health of populations, since they limit the spread of our most contagious diseases (Snowden, 2019).

The plague is now better understood, and although a few cases occur world-wide each year they are treatable with antibiotics. Also, with modern hygiene and avoiding touching dead animals and being bitten by fleas, cases are rare (Green and Symes, 2014).

There are a number of similarities amongst all the pandemics discussed. Rapid and efficient disease transmission was a factor in the seriousness of the outbreak. The wealthy could often escape to second homes or to the homes of family members who lived in less densely populated places where

they could socially distance. The poor, the infirm, the malnourished and marginalized, and those who could not escape high densities were usually hit the hardest (Rosenwald, 2021; Snowden, 2019).

People hate quarantines and will violate them if possible. During the London quarantine, plague houses were nailed shut, while during the Marseilles pandemic people would be killed if they tried to leave. Some people comply, some believe rumours and false information, some blame the 'Other', some throw caution to the winds, and some join religious cults… every time! (Cippolla, 2012; Green and Symes, 2014; Johnson, 2006).

Back in the time of the Athenian plague, Thucydides observed that:

> The catastrophe was so overwhelming that men, not knowing what would happen next to them, became indifferent to every rule of religion or of law. All the funeral ceremonies which used to be observed were now disorganized, and they buried the dead as best they could.

He continued:

> [There began] a state of unprecedented lawlessness… It was generally agreed that what was both honourable and valuable was the pleasure of the moment and everything that might conceivably contribute to that pleasure. No fear of god or law of man had a restraining influence. As for the gods, it seemed to be the same thing whether one worshipped them or not, when one saw the good and the bad dying indiscriminately.
>
> (Thucydides, c. 400 BCE)

This behaviour was also common in later accounts of plagues, and we can see similar tendencies today as rules about isolation and societal closures have tightened.

Most programs developed to control the spread of COVID have been based on past history and on science. Isolation and quarantine have been common elements, as have distancing and preventing droplet spread. While in the time of COVID-19 we have had conspiracy theories surrounding the virus to challenge the health experts, most of us believed what facts were given us by government leaders. 'No-mask' groups march but most of us play it safe and cover our faces. Partying is seen as not a good idea when public records show how the disease spreads in these venues, and public exposure shames party goers. Both knowledge and shaming have mainly eliminated licentiousness.

In much of the world medical and health experts have been heard and respected. While, as in many past pandemics, the exact nature of the disease being fought was at first not known, uncertainty was reduced as the pandemic progressed. The tried-and-true approaches: restrict movement, isolate,

maintain distance and wear masks, and adapt workers have worked well.

With vaccines on the scene in 2021, hope is returning to the world. The isolation that has kept many of us alive will end. Health officials broadcast improvements daily through the news media. Memories and stories of COVID-19 will fade, just as all the others have done, until the next pandemic drags it back into the present. We should try to remember that there will be a next time, and make sure that we continue to be careful in indoor settings, particularly those involving large numbers of people, so that the 'next time' will be later rather than sooner.

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