

Junior
SKEPTIC

76



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This Issue's Cover features a digital painting by Daniel Loxton, with thanks to Cal and Karla K.



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PLAGUED BY NONSENSE:

HOW MISTAKES, FAKES, AND MISSING
FACTS MAKE EPIDEMICS WORSE

HELLO!

Today we'll confront one of humanity's scariest enemies: epidemic disease. Are we brave enough to face this horror? You bet we are! We've done it every day during the Covid-19 pandemic.

Covid is new. Other diseases have plagued our ancestors since ancient times. Mighty civilizations have been devastated by the invisible invaders we call "germs." But people are not helpless! Over centuries, we learned how to fight back against disease. Our strongest weapons are science and critical thinking. However, germs have a powerful ally: misinformation! How do ignorance and bad ideas help the germs win—and what can we do about that?

Let's Find out!



Image by Jennifer Posthuizen, courtesy of the CDC

MINDLESS ENEMIES

Good information is the key to winning any battle. As the saying goes, "Know your enemy!" When germs cause disease, of course we treat them as enemies. After all, a pandemic disease such as Covid-19 can sicken, injure, or kill millions of people. But here's something else scary that we've learned about germs: they don't know they're the enemy. They don't want to harm us. They don't want anything because they don't have brains. They don't even know they exist.

Many diseases are caused by two different kinds of germs: bacteria and viruses. Bacteria are incredibly tiny single-celled organisms. Most are difficult to see even under a powerful microscope. Nevertheless, bacteria are living things. They grow, reproduce, take in energy from their environment, and produce waste.

Viruses are much smaller and simpler even

than bacteria. Viruses are so simple that scientists aren't even sure if they count as living things. A virus is just a package of genetic instructions (DNA or RNA), sometimes wrapped inside a fatty outer layer.

Viruses can't reproduce or do anything much on their own. However, if a virus' genetic instructions get inside the cells of another living thing, they can force those cells to make copies of that virus.

Neither bacteria nor viruses can think. (Imaginary zombies would be geniuses compared to real

life germs.) But germs have evolved to do one thing really well: multiply in suitable environments. A human body isn't the enemy for germs; it's a *habitat* where some germs can multiply like crazy. That's a problem, at least for us. Multiplying germs can sicken and kill their host.

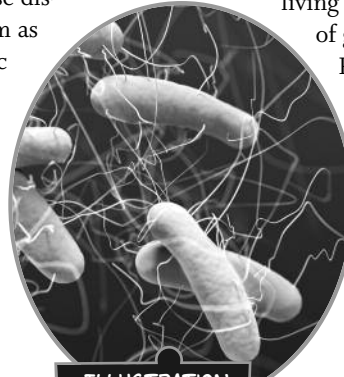


ILLUSTRATION
OF BACTERIA

PLAGUES OF THE ANCIENTS

We can't see germs, but they're all around us, all the time. We live in a soup of microscopic life. There are countless bacteria and viruses on the surfaces we touch and in the air we breathe. Bacteria live on our skin and inside our bodies.

Most of those microbes are not harmful to us. Some are even helpful. When harmful germs do enter our bodies, our immune system is amazingly good at stopping them.

However, germs change over time. They mutate and evolve. Sometimes germs evolve new ways to infect human hosts and get past our immune defenses. That can be serious trouble. New strains of harmful germs can cause dangerous new diseases. That's what happened in 2019 with the new coronavirus that causes Covid-19. A virus that previously lived inside another kind of animal evolved a new ability to infect humans. A new plague was born.

Evolving Plagues

It was difficult for deadly plagues to spread during prehistoric times because people lived in small, isolated groups. Germs could only spread if infected people lived long enough to infect others. A new germ that killed everyone in an isolated tribe would run out of hosts and become extinct.

Germs that kill quickly have to spread even faster. This became possible when ancient people began to live together in cities. Deadly germs could evolve in places with dense populations. The germs could survive by quickly spreading from host to host.

Ancient societies suffered wave after wave of deadly epidemics. Each new disease was as mysterious as it was terrifying. People had no immunity to new diseases, no medicines that could help, and no good explanations for these disasters. Science hadn't been invented. No one knew that germs existed. Ancient people had almost none of the information they needed to protect themselves or fight back against disease.

We can only imagine the plagues that struck before writing was invented. One of those early plagues may have been smallpox. When people began to farm animals, they became exposed to the viruses those animals carried. Smallpox was probably a cow virus that mutated to infect humans. Victims suffered from fever and horrible blisters across the face and body. About a third of them died. Smallpox probably killed a Pharaoh of Egypt about three thousand years ago. His mummified body appears to be covered in smallpox blisters.

Epidemics were a terrifying fact of life for ancient people. When an unknown plague struck Mesopotamia around 3,700 years ago, the people called it "devouring by the god." We know from letters written on clay tablets that they believed the disease was a divine punishment. They imagined that the land was "touched" by the vengeful hand of an angry god.

However, they did understand one critical fact: people who were "full of the punishment of the god" could *spread the curse to other people*. To prevent this spread, authorities said that people from "touched" areas must not enter untouched towns. Sick people were to be isolated in quarantine. Healthy people should not get close to sick people or touch their belongings.

The Plague of Athens

A dozen centuries later, the ancient Greek city state Athens was one of the jewels of the world. Athens was wealthy, powerful, and sophisticated. The Athenians invented a radical new system of government—democracy. They had some of the world's best sculptors, playwrights, and philosophers, all protected by the region's mightiest navy.

Then disaster struck. Around 2,450 years ago, war broke out between Athens and its rival, Sparta. When the powerful Spartan army invaded the lands controlled by Athens, people from the countryside fled inside Athens' city walls. Instead of safety, these refugees found only catastrophe.

The overcrowded city was struck by a deadly plague. This was a disaster "beyond description," said the historian Thucydides, who caught and recovered from the disease. Patients burned with fever, suffered uncontrollable coughing and vomiting, and died by the thousands. The epidemic killed around a third of the city. Even their leader died.

Neither doctors nor "any other human skill" did any good. Doctors caught the disease from their patients. People who tried to care for sick loved ones "caught the infection" and "died like sheep." The "disease carried off all alike"—strong and weak, good and bad, rich and poor.

Society broke down. "Corpses and the dying lay one upon the other and half-dead people reeled about in the streets," Thucydides wrote. People felt utterly doomed. They no longer cared about honor, customs, or even the law, because "no one expected that he would live to be brought to trial and punished." Some begged the Greek gods for help. Others saw that prayers were useless. They decided to use their final days to "live for pleasure and to enjoy themselves quickly."

In the midst of disaster, good information helped. For example, the Athenians noticed that the "disease did not attack the same person twice, at least not fatally." This meant that recovered people could safely tend to the sick.

Bad information made things worse. Rumors claimed that their Spartan enemies caused the disease by poisoning the water supply. Those who believed this was the end of the world took unsafe chances, broke laws, and failed to work together. That surely cost lives. Others mistakenly believed that those who recovered from the plague became immune to *all* diseases. This false sense of protection put them in greater danger from other diseases.

EMPIRES AND EPIDEMICS

Athens never completely recovered from its devastating plague. The Athenians lost the war against Sparta and much of their power. In the centuries since, many great empires have learned the same hard lesson: a plague can suddenly cripple the most powerful nations.

The Antonine Plague Slams the Roman Empire

Six centuries after the Plague of Athens, the Roman Empire was at the height of its power. The empire was vast and wealthy. It was the mightiest military power on the planet. Romans believed they were the world's greatest civilization, with the best art, culture, laws, monuments, and roads. They had a wise Emperor, Marcus Aurelius.

The empire seemed almost invincible. But it wasn't. In the year 166, a plague broke out among the soldiers of the Roman Legions. This deadly disease soon raged throughout the empire and spread beyond, becoming a "pandemic" (an epidemic that spreads to many countries). The empire struggled with wave after wave of infections over several years.

Many historians suspect that the disease was smallpox because it caused blisters on the skin. What's certain is that it was terrifyingly lethal. Millions of Romans died, rich and poor alike. One Roman wrote that there were so many bodies that they "were removed in carts and wagons." Another estimated that 2,000 people died every day in the city of Rome at the peak of the epidemic.

The army was so badly weakened that the Emperor had to turn slaves, gladiators, and even bandits into soldiers. He ordered the government to pay to bury the countless dead. To raise money and boost public morale, he auctioned off the fine furnishings and valuables from his palace.

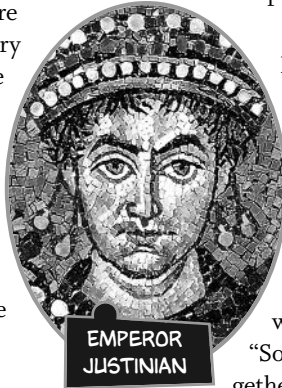
Doctors and leaders rushed to learn more about the disease and hold society together. As always, missing and false information cost money and lives. Rumors once again said this new plague was a punishment from the gods. The empire invested fortunes into temples and religious ceremonies. This did nothing to help.

Worse, scam artists took advantage of people's terror. Sadly, this is typical. During times of plague, fakers make money selling bogus cures and useless protections against the disease. In this case, a scammer named Alexander of Abonoteichus sold a supposedly magical verse to be hung on people's doors. Alexander claimed that this useless charm would protect homes from the plague. It actually did the opposite. As a skeptic named Lucian of Samosata explained, "people put too much confidence in the verse, and lived carelessly"—making them more likely to die.

The Roman Empire never fully recovered the peace, power, and prosperity it enjoyed before these crushing pandemic years. This plague was the beginning of centuries of decline. Eventually the empire broke apart.

The First Bubonic Plague Pandemic

Four centuries later, the remains of the Roman Empire lived on as the Byzantine or Eastern Roman Empire. The Byzantine Empire was strong under the Emperor Justinian. That strength was about to be badly tested by a horrifying new pandemic disease: bubonic plague.



"Justinian's Plague" erupted across the Byzantine Empire as a completely unknown new disease. Witnesses described a "pestilence, by which the whole human race came near to being annihilated." Infected people developed fevers, and then huge and painful lumps in their neck, armpits, or groin. (These swollen "buboes" are why the disease is called "bubonic" plague.) The terrifying epidemic "spread over the whole world, always moving forward," killing millions. "Some cities were so severely afflicted as to be altogether depopulated," said one man who caught the plague himself. He recovered, but lost "several of my children, my wife, and many of my kin" to the killer disease. In Constantinople, the empire's capital city, thousands died every day at the peak of the initial outbreak. Around 40 percent of the city's population died in a four month period.

The disaster was so huge and frightening that it seemed like the end of the world. People thought it could only be divine punishment—the "wine-press of God's wrath" crushing all humanity at once.

However, there were problems with the divine punishment theory. First, it was only a guess. If it was a punishment, why was humanity being punished? Also, why didn't prayers or religious ceremonies seem to help? People died anyway. Most troubling, the disease killed people of every religion. It took good people and bad. Why would God punish the purest hearts just as harshly as the most wicked?

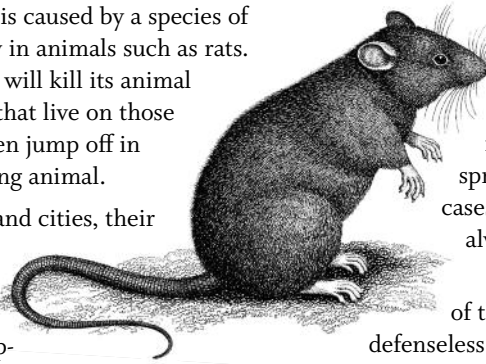
Islamic thinkers puzzled over that religious mystery as the plague raged across Muslim countries. If the plague was God's will, they reasoned, it must be a sin to fight or flee from it. They decided the plague was a punishment for other people, but a blessing for Muslims who would go straight to heaven. This dangerous guesswork put Muslim lives at risk.

Bubonic plague shattered societies across half the world—and then it came back to do it again and again. European civilization was changed forever. It was the beginning of the medieval period (which has sometimes been called the "Dark Ages"). The plague couldn't be stopped because the key facts were completely unknown. This plague was not spread from person to person. It was spread by rats and fleas.

Scientific Facts about Bubonic Plague

The cause of the plague remained a mystery for over one thousand years. It took modern science to solve that mystery. Today we know that bubonic plague is caused by a species of bacteria. This bacteria lives naturally in animals such as rats. Under some conditions, the bacteria will kill its animal hosts. When that happens, the fleas that live on those animals begin to starve. The fleas then jump off in search of blood from some other living animal.

When infected rats live in towns and cities, their fleas may bite human beings. Unfortunately, a rat flea's bite can transmit the plague bacteria to people, causing disease. This still happens even today, because bubonic plague still



exists in animals. Thankfully, we can now cure plague with modern antibiotics. Before antibiotics, 50–60 percent of infected people would die.

Bubonic plague does not easily spread from person to person. Usually it is spread by insect bites. In rare cases, however, the bacteria can build up in the lungs so that infected people can spread the disease when they cough. Such cases of “pneumonic” plague are almost always fatal.

Unfortunately, medieval people had none of that information. Without it, they were defenseless when a second great bubonic plague pandemic exploded across the world in the 1300s.

THE BLACK DEATH

The medieval pandemic known as the “Black Death” may be the most devastating disaster in human history. “The best estimate is that from 1349 to 1450 European population declined between 60% and 75%” from repeated waves of bubonic plague, writes historian Robert Gottfried in his book *The Black Death*.

Medieval society had been relatively stable for a few centuries before the Black Death. Kings ruled, knights enforced the peace, and peasants toiled in the fields. Harvests were often good. Europe's population grew. However, this stable period did not last. The climate changed for the worse. Harvests failed more often. There was starvation in many places.

Then the plague hit like a tsunami smashing through medieval society. It started in Asia and spread west. It arrived in Constantinople in 1347. It spread to Egypt, through the Muslim Middle East, and into Africa. Ships full of dying sailors brought the plague to Italy.

The disease was so lethal that society broke down completely. Witnesses were overwhelmed by the horror of what they saw. As one Italian witness wrote, “almost everyone became stupefied seeing the pain. It is impossible for the human tongue to recount the awful truth.” So many died so quickly that “none could be found to bury the dead for money or friendship.” Instead, “great pits were dug and piled deep with the multitude of dead.” As people “died by the hundreds, both day and night,” anguished families “brought

their dead to a ditch as best they could” without help from anyone. “And as soon as those ditches were filled, more were dug.” This witness recalled in despair that he “buried my five children with my own hands. ... And so many died that all believed it was the end of the world.” With countless bodies littering the streets, “a dead man was then of no more account than a dead goat,” said another witness.



All normal business stopped. Streets emptied. Rich nobles and “cowardly priests” fled the cities, leaving mansions and churches empty and unguarded. Others huddled at home until they too sickened and died. “The houses of the dead stood open, with all the jewels, money and treasures in full view, and if someone wanted to enter there was nothing to stop them,” wrote another witness. There was no rule of law, “for the plague struck so suddenly that at first there weren't enough officials and then there were none at all.”

There was widespread panic. Many simply fled. “Father abandoned child, wife husband, one brother another,” recalled a witness. Believing that all were doomed, others decided to party until the end, with “singing and free living and gratification of the appetite in every possible way... Day and night they went from one tavern to another, drinking and carousing unrestrainedly.”

As the plague spread, scenes of similar death, horror, and social breakdown unfolded everywhere. Around a third of the people in Europe died over five years. In some places, the death toll reached 50 or even 70 percent.

FIGHTING THE PLAGUE

The Black Death took time to spread across Europe. Many places had warning and tried to prepare. Cities organized health boards to protect public safety.

Medieval people believed that unclean conditions created “bad air” that could make people sick. They were half right. Medieval streets were filthy with garbage and sewage. This filth could spread diseases such as cholera and typhoid fever by contaminating food and water.

People also had experience with a skin disease called leprosy. Leprosy causes horrible skin sores that eat away victims’ fingers, toes, and faces. People knew that leprosy was contagious. They isolated leprosy victims in “leper colonies” so they would not infect others.

Authorities tried to stop the plague using the best knowledge available. They cleaned streets, imposed quarantines on ships, and turned sick people away from the city gates. These were smart precautions that would have worked against other diseases. However, “Neither knowledge nor human foresight” stopped the plague from invading city after city. For example, the wealthy Italian city of Venice quarantined ships and isolated plague victims. Nevertheless, around 60 percent of Venetians died during the height of the plague.

Unfortunately, these measures could not stop the rats and fleas that spread the plague. Infected rats climbed down the ropes of quarantined ships, slipped unseen into locked down cities, and carried fleas into socially distanced homes.

Attempted Explanations

No one even suspected the true cause of the plague. The best medical authorities in Paris reported that the “cause of this pestilence was...the configuration of the heavens.” They claimed that a “deadly corruption of the air” was created by a “conjunction of three planets in Aquarius.” They also suggested “the escape of the rotteness trapped in the center of the earth as a result of earthquakes” as another possible cause. These pseudoscientific explanations were as wrong as they were useless.

As in past epidemics, most people believed that the Black Death was a punishment from God. They prayed for mercy

and held countless religious ceremonies. An extreme religious movement even tried to calm God’s rage by stripping off their shirts and whipping themselves bloody in public squares. These “flagellants” were popular at first, but their movement lost support as the plague continued to spread.

Deadly Misinformation

Tragically, there was one other popular explanation for the disaster. Widespread rumors claimed that evil forces created the plague on purpose by poisoning the water supply. These rumors led to history’s most horrifying example of the danger of misinformation during times of plague.

There were Jewish communities in many towns and cities across Europe. Because of they practiced their own religion, Jews were distrusted and mistreated by their Christian neighbors. When the plague began, that distrust turned deadly. False rumors spread the “strong suspicion” that the Jews “planned to destroy the Christians by means of poison, and that they had secretly put poison into wells, springs, and rivers so that Christians would drink it.”

In 1349 “Jews were seized and put in chains and into prison everywhere, in all the places where they dwelt.” Many were tortured until they “confessed” to imaginary crimes. (A person will say anything to stop the pain of torture.) These fake confessions claimed that every “Jew above the age of seven” was part of vast poisoning conspiracy. These absurd accusations turned fear of the plague into murderous rage against the Jews:

Accordingly the whole world brutally rose against them, and in Germany and in other countries which had Jewish communities many thousands were indiscriminately butchered, slaughtered and burnt alive by the Christians.

Hundreds of Jewish communities were wiped out by savage mobs. Other Christians realized that it was a mistake to blame the Jews for the plague. As one pointed out, no poisoning plot could have caused “so great a plague or killed so many people.” Also, Jews and Christians drank the same water. The Pope demanded that the violence be stopped. He argued that “it cannot be true” that Jews caused the plague because “the Jews themselves and many other races” also suffered from the plague.



THE BATTLE CONTINUES

There were many more waves of deadly bubonic plague. The Black Death returned just 10 years later, killing around 20 percent of the population, and then again a few years after that. Waves of plague continued for centuries.

Even after the rise of science and the discovery of bacteria, missing facts and wrong ideas made epidemics worse. When bubonic plague broke out in British-ruled India in 1896, the government sent search parties door to door. Infected people were isolated in hospitals. Everything was sanitized. In the city of Bombay (now Mumbai), sewers were flushed clean every day with three million gallons of disinfectant and sea water. Two years later, science finally discovered that rat fleas transmit the plague bacteria. Flushing the sewers forced infected rats above ground and into people's homes!

The British also failed to convince the people that their measures were necessary. People didn't like being strip searched by soldiers, or isolated in hospitals to die. They began to hide infected family members. Violent riots broke out in protest against the harsh measures.

Fighting Smallpox on American Soil

Health authorities need two things to fight an epidemic: accurate information, and a trustworthy way to share that information with the public. We'll see that American health authorities have not always gotten these two things right.

While India was still fighting the plague, humanity's old enemy smallpox returned to the United States. When cases were detected in New York in 1900, health authorities declared, "We are not afraid of smallpox." They felt confident because science had learned how to stop smallpox: isolate sick people, and then vaccinate everyone around them.

That highly effective strategy began a thousand years earlier. People in ancient China and India noticed that no one caught smallpox twice. Those who recovered were immune for life. This observation led to a technique called inoculation. Smallpox blisters were ground up and either blown up people's noses or scratched into their skin. This usually gave people mild cases of smallpox, followed by immunity. This technique was introduced to America in the early 1700s by

preacher, science writer, and infamous Salem witch hunter Cotton Mather. It was later used to protect George Washington's troops during the American Revolution.

Inoculation worked, but it was dangerous. Smallpox usually killed around 25–30 percent of infected people. Smallpox inoculation killed up to two percent. Also, patients recovering from inoculation could infect other people with smallpox.

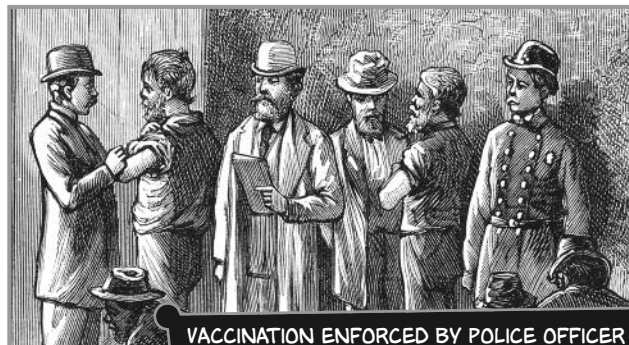
In 1798, an English doctor named Edward Jenner announced a safer option. He investigated rumors that people who raised and milked cows rarely got smallpox. He learned that they were often exposed to an illness that caused sores on the udders of cows. Cowpox did not make people seriously sick, and it had an amazing side effect: people who recovered from cowpox became immune to smallpox! Jenner's experiments revealed that it was much safer to inoculate people with cowpox instead of smallpox—and just as effective. This new technique was called vaccination after the Latin word for "cow."

When the 1898–1904 American smallpox epidemic began, vaccination was a well known and effective weapon against the disease. Various states and cities ordered mandatory smallpox vaccination. When smallpox cases were discovered, doctors and police swooped in to isolate the sick and vaccinate everyone exposed.

However, this epidemic proved harder to control than health authorities expected. As usual, bad and missing information created problems. First, the authorities rarely shared enough information to convince people to cooperate. Instead, they used police force to *make* people accept isolation and vaccination. Americans hated that. They hid the sick, ran from the police, and even rioted in protest.

Worse, health authorities spread inaccurate information. This strain of smallpox was less deadly than doctors warned. Doctors also said that smallpox vaccination was safe and effective. That wasn't always true. At that time, *anyone* could make and sell vaccines. No one checked that those vaccines were made properly! Some didn't work at all. Others were contaminated with bacteria. People knew that vaccines might make their arm sore, or worse. The problems with smallpox vaccines became obvious when a number of children were killed by a vaccine contaminated with tetanus.

MAN WITH SMALLPOX



VACCINATION ENFORCED BY POLICE OFFICER



SOLDIERS IN KANSAS SICK WITH SPANISH FLU

THE SPANISH FLU

Modern history's deadliest pandemic began in the United States in 1918, during the First World War. The so-called "Spanish flu" was first detected in Kansas farm country. It then spread to crowded American military training camps. From there it spread to soldiers fighting in Europe—and to civilians across the whole of the world.

Deadly Mutation

"Flu" is short for "influenza." Regular seasonal flu viruses are common, and more dangerous than most people realize. Most of us have personally recovered from flu infections at some point in our lives. Not everyone does recover. The seasonal flu kills around 50,000 Americans every year, and hundreds of thousands around the globe.

Many other flu viruses live naturally in animal hosts such as pigs or chickens. When mutating animal influenza viruses evolve a new ability to infect humans, they sometimes become deadlier than the regular seasonal flu.

The 1918 flu virus would prove nightmarishly lethal.

Double Disaster

The new virus broke loose at the worst possible time: during a world war. Many of history's previous epidemics also erupted during times of war. This is not surprising. Wars pack crowds of soldiers close together, sometimes in unsanitary conditions. Soldiers and war refugees travel, often great distances. That makes it easy for diseases to spread. In most wars of the past, diseases killed more soldiers than fighting.

In 1918, the war and the virus were a double disaster. As soldiers got sick by the thousands, the virus made it harder to fight the enemy. At the same time, the war made it harder to fight the virus—even at home.

The U.S. government had all of its attention focused on the war. Everyone did. The entire country was united behind the war effort. Everyone was expected to do their part. Young men were drafted into mandatory military service. Old men bought war bonds to help pay for ships and tanks. Women knitted sweaters for "our boys overseas." Even kids helped out by collecting peach pits (which were used to make charcoal for gas masks).

Americans contributed out of patriotism, but they were also bombarded by propaganda and expected to follow wartime laws. One new law made it illegal to "utter, print, write, or publish" any statement "disloyal" to the government or the war effort. American newspapers censored themselves and repeated government propaganda. In allied countries such as Canada and Britain, strict censorship laws banned newspapers from printing bad news.

This all added up to a perfect storm. The Spanish flu was a deadly pandemic, during a world war, during an epidemic of misinformation.

The Pandemic Begins

During the spring and summer of 1918 the first wave of influenza infections spread around the world. Many soldiers got sick. Most recovered. But the virus was evolving as it spread. New outbreaks became more severe as the summer wore on. The virus was becoming a killer.

The deadly second wave began in the Boston area in early September. Navy sailors began to fall sick. Then the virus took root among soldiers training nearby at Camp Devens. The base hospital saw a trickle of serious new flu cases. That trickle quickly became a raging flood. The base hospital was designed to handle 1,200 patients. In two weeks, it was overwhelmed by 6,000 severely sick and dying soldiers. Another hundred died every day. Sick patients were crammed togeth-

er on floors, porches—any space the exhausted nurses and doctors could find. Then the medics themselves began dying.

Dangerous Dishonesty

An epidemic is an emergency. Leaders must act as quickly as possible. Emergency measures must be organized while infection numbers are still low. The public must be warned with accurate information about the rising danger.

The exact opposite happened as Spanish flu spread across America. Leaders first ignored the problem, and then said it was no big deal. The Spanish flu was “nothing to cause any worry,” claimed one Boston newspaper. Camp Devens had only one “death that can by any stretch of the imagination be attributed to Spanish influenza,” claimed a military spokesperson. “The worst of the Spanish influenza epidemic is past,” claimed Boston’s health commissioner as cases soared across the city. A week later, Boston had almost 1,500 dead. Hundreds more died every day.

It was the same everywhere: misinformation, mayhem, and death. On September 19th, Philadelphia’s top health authority reassured newspaper readers that he had “little fear that the disease would spread to any great degree among citizens.” He allowed a massive parade to go ahead. This was a terrible mistake. Public gatherings were finally banned five days after crowds of thousands cheered for the parade. It was far too late. By October 7th, that same official admitted there were 200,000 cases in the city, with hundreds dying daily.

Living in Terror

As the disease raged across America, an awful truth became clear: there was a nation-wide shortage of health care workers! Thousands of the nation’s best doctors and nurses were overseas caring for wounded soldiers. The shortage got worse as heroic health care workers sickened and died. Hospitals were completely overwhelmed—not only overflowing with dying patients, but also badly understaffed.

At first, brave citizens rushed to volunteer in emergency hospitals or drive makeshift ambulances. But as the situation worsened, people were simply too scared to help. They huddled at home with their families. Society stopped functioning. Businesses closed. City streets stood silent and empty.

The Spanish flu was utterly terrifying. “The fear in the hearts of the people just withered them,” one survivor recalled. “They were afraid to go out, afraid to do anything. . . . It was a horror-stricken time.” As another man reflected, “You were constantly afraid. . . . because you saw so much death around you, you were surrounded by death.”

Death from Spanish flu was ghastly, and sometimes shockingly fast. A person who felt fine at breakfast could be dead by dinner. The virus attacked the lungs, but also other parts of the body. Some patients recovered with permanent brain damage. In 5–15 percent of cases,

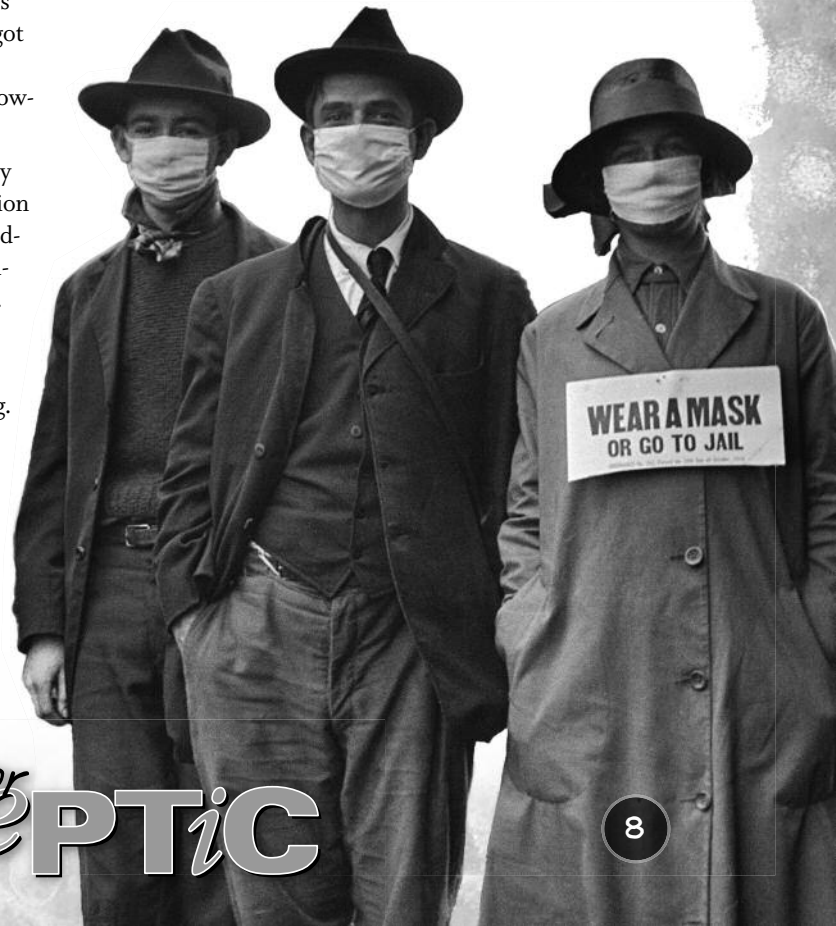
Spanish flu resembled the modern Ebola virus: victims vomited blood and bled from their nose, ears, or eyes.

Global Tragedy

The virus returned for a third deadly wave in the winter of 1918–1919 before it finally faded away. According to the U.S. Centers for Disease Control and Prevention (CDC), the Spanish flu caused “at least 50 million deaths worldwide.” Around 675,000 Americans died. Tragically, the death toll was highest among pregnant women and otherwise healthy young people in their 20s and 30s. Native Americans and other communities with lower immunity also suffered terrible losses. Entire Inuit villages were left empty.

Amazingly, the U.S. government did almost nothing to stop this catastrophe. Cities were abandoned to struggle through the crisis on their own. Many cities closed theatres, banned gatherings, or ordered people to wear masks. Most people were eager to follow emergency orders, but some people protested against San Francisco’s mask law. In Philadelphia, police went door to door recovering bodies. Steam shovels dug mass graves.

President Woodrow Wilson ignored the pandemic. The virus was still raging out of control when the Allied forces defeated Germany. The President was negotiating peace terms when he caught the disease himself. He survived, but never fully recovered. The virus affected his brain. The mentally weakened President then allowed France to impose harsh terms on Germany—terms that Wilson had strongly opposed before falling sick. These terms angered Germans, and later fueled the rise of the dictator Adolf Hitler. Once in power, Hitler started the Second World War.



FIGHTING DISEASES TODAY

Over the past century, medical science has won many victories in the age-old battle against contagious diseases. The discovery of penicillin and other antibiotics have helped tame ancient enemies such as leprosy and bubonic plague. Vaccines made Americans safer from measles, whooping cough, and polio. In fact, polio has been almost entirely defeated. There hasn't been a single case in the United States in decades. Doctors hope to eliminate the virus everywhere within a few years.

Medicine's most astonishing success is the defeat of smallpox. Once a global killer, smallpox was especially devastating to Native Americans after Europeans introduced it to North America. Epidemics of smallpox and other European diseases may have killed 95 percent of some Native American populations. In modern times, scientists and doctors waged war on the deadly virus with a global vaccination program. In 1980, world health authorities declared total victory: all cases of smallpox had been eliminated from the Earth. The virus was extinct in the wild!

Despite these successes, germs are fighting back. Their main weapon is evolutionary change. The germs' main ally? Our old adversary, misinformation.

Vaccination can control many diseases, but it only works if people take vaccines. In recent decades, conspiracy theorists have spread dangerous falsehoods about vaccination, such as the claim that vaccines cause autism. That's definitely not true. Scientists have tested that claim repeatedly; vaccines do *not* cause autism. However, misinformation has convinced some people to refuse vaccines. Lowered vaccination rates cause dangerous outbreaks of preventable illnesses such as whooping cough and measles.

Evolving Enemies

Germs also adapt. Bacteria that were once easily defeated by antibiotics are constantly evolving new resistance to our best drugs. Antibiotic resistant tuberculosis is one such disease. Scientists are in a race to discover new medicines before the germs defeat our old ones.

Animal viruses continue to evolve and infect humans. When new viruses adapt to human hosts, brand new diseases are born. Covid-19 is just one example. This has happened many times, and it will happen again in the future.

The problem with a new disease is that it's *new*. By definition, there are no experts on a new disease because no one has ever seen it before. It takes time for doctors and scientists to learn how a new disease spreads, what it does to

infected people, and how to fight it. Misinformation arises during that learning process.

When a new disease appears, medical experts normally make mistakes. They may tell the public one thing, then say something different when they've gathered more evidence. It's good for experts to share better information as they learn more. But changing advice can confuse the public.

Incomplete facts and public confusion are a recipe for baloney. Politicians may pick and choose which facts and opinions they want to believe. News stories may make a new disease sound more or less dangerous than it is in reality. Conspiracy theorists may spread complete rubbish. And, scammers may rush forward with bogus claims about the disease or how to cure it.

Good and Bad Advice

Medicine was very primitive in medieval times. It's not surprising that doctors promoted a lot of nonsense about the Black Death. For example, many believed that nice smells protected against the disease. If only that were true!

Other medieval plague advice *would have worked well against a different disease*. Medieval people were told to eat well, get rest, and "above all mix little with people... it is best to stay at home until the epidemic has passed." One church leader sensibly warned, "In pestilence time nobody should stand in a great press of people because some man among them may be infected." Also, "it is good to wash your hands oft times in the day," he added.

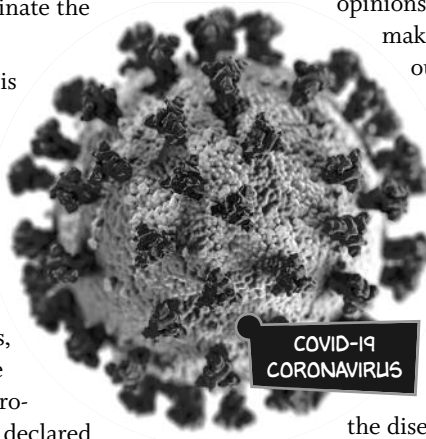
Sadly, this advice proved practically useless during the Black Death. The disease rarely spread between people in crowds. It spread through flea bites at home.

However, this same advice is what modern medical experts recommend to control the Covid pandemic: maintain social distance, and wash your hands. This is excellent advice for this new disease. (Please follow it and stay safe!)

Unfortunately, medical authorities have also spread *bad* advice about Covid. Early in the pandemic, there was a shortage of masks to protect doctors and nurses working on the front lines. The U.S. Surgeon General told the public,

STOP BUYING MASKS! They are NOT effective in preventing [the] general public from catching Coronavirus, but if healthcare providers can't get them to care for sick patients, it puts them and our communities at risk!

To prevent germs from spreading in hospitals, doctors combine fitted medical-grade masks with gowns, gloves, and face shields. It's true that a simple cloth mask is weak protection for the person wearing it. However, this was still bad advice that confused the public. Evidence shows that it *does* slow the spread of Covid when *everyone* wears a mask.



DEFEATING COVID-19

Pandemics like Covid-19 pose immense and difficult problems for society. “But the biggest problem lies in the relationship between governments and the truth,” warned historian John Barry in his book about the Spanish flu, *The Great Influenza: The Story of the Deadliest Pandemic in History*. In a pandemic, Barry explains, “Those in authority must retain the public’s trust. The way to do that is to distort nothing, to put the best face on nothing, to try to manipulate no one.”

Americans could not trust the news or the government during the Spanish flu. Newspapers were censored and full of wartime propaganda. Health authorities downplayed the danger until it was too late. The President did nothing.

Our situation during Covid is much better in some ways. State and federal health authorities have generally done a good job by sharing sensible advice and accurate information. Mainstream news media have been helpful as well. People around the world can access information in seconds to tell them where Covid cases are under control, and where they are dangerously rising.

In other ways, sadly, the Covid situation is as bad or even worse than the problems in 1918. Conservative news and entertainment sources such as Fox News have misled people about the dangers of the pandemic—especially at the beginning when it was important to act swiftly.

Tragically, some politicians have also spread dangerous misinformation about the pandemic. President Trump in particular has misled the public with numerous incorrect statements. As coronavirus cases first soared in March 2020, Trump said “We’re doing a great job with it. And it will go away. Just stay calm. It will go away.” Of course, Covid did not “go away.” By the time I wrote this story, the U.S. had already suffered almost five million cases and around 160,000 deaths—far more than any other country. Around 1,000 Americans were dying of the disease every day.

President Trump has done very little to stop Covid. Worse, he instead pressured states to reopen businesses and lift emergency measures *before* the virus was brought under control. Health experts warned that opening too soon was likely to cause an explosion of new cases, hospitalizations, and deaths. That’s exactly what happened. However, Trump has denied that reopening caused the surge in new cases.

People get confused when political leaders say one thing and health authorities say another. When messages are so mixed up, the public doesn’t know who to trust or what to believe. This makes it much harder to work together to stop

the virus.

Public confusion also makes it easier for scammers and conspiracy theorists to spread yet more misinformation. The U.S. Federal Drug Administration has already warned numerous companies for “selling fraudulent products with claims to prevent, treat...or cure” Covid. The internet and social media are crawling with bizarre false claims about coronavirus. Some claim that the virus was released by evil people on purpose. There’s zero evidence of that.



Coronaviruses routinely jump from animals to people naturally through evolution. Others think there’s some mysterious connection between the virus and “5G” cell phone signals. That doesn’t even make sense. Nevertheless, conspiracy believers have actually burned down a number of cell phone towers!

The most dangerous conspiracy theories convince people to put themselves or others in danger. For example, scientists are working hard to develop a safe and effective Covid vaccine. If they succeed, some Americans may feel scared to get vaccinated. One conspiracy theory claims that Microsoft founder Bill Gates is plotting to hide tracking microchips inside coronavirus vaccines. It’s true that Gates is using some of his fortune to pay for vaccine research, but the microchip claim is silly. (There would be much easier ways to track people. For example, your smartphone already knows your location.) Other conspiracy theories claim that Covid is less deadly than doctors believe, or even that the virus doesn’t exist.

Some Americans feel fiercely opposed to wearing masks in public. Conspiracy theories claim that masks can dangerously restrict oxygen from reaching our lungs. However, oxygen passes right through commonly used mask materials. (Wearing a mask does not prevent surgeons from breathing while they work!) Others claim that masks do nothing to stop germs. The reality is that a cloth mask will trap many of the droplets we release into the air when we speak and breathe. If we were infected and did not know, wearing a mask could protect other people from getting our germs. If *everyone* wore a mask, it would be difficult for *anyone* to become infected. “Cloth face coverings are one of the most powerful weapons we have to slow and stop the spread of the virus,” advises the CDC.

Humanity has battled countless epidemics throughout history. We’ll get through this one by learning the lessons of the past. To beat Covid, we need be kind to one another, take smart steps to keep each other safe, and always seek out accurate, factual, science-based information. Now more than ever, misinformation is a germ’s best friend.