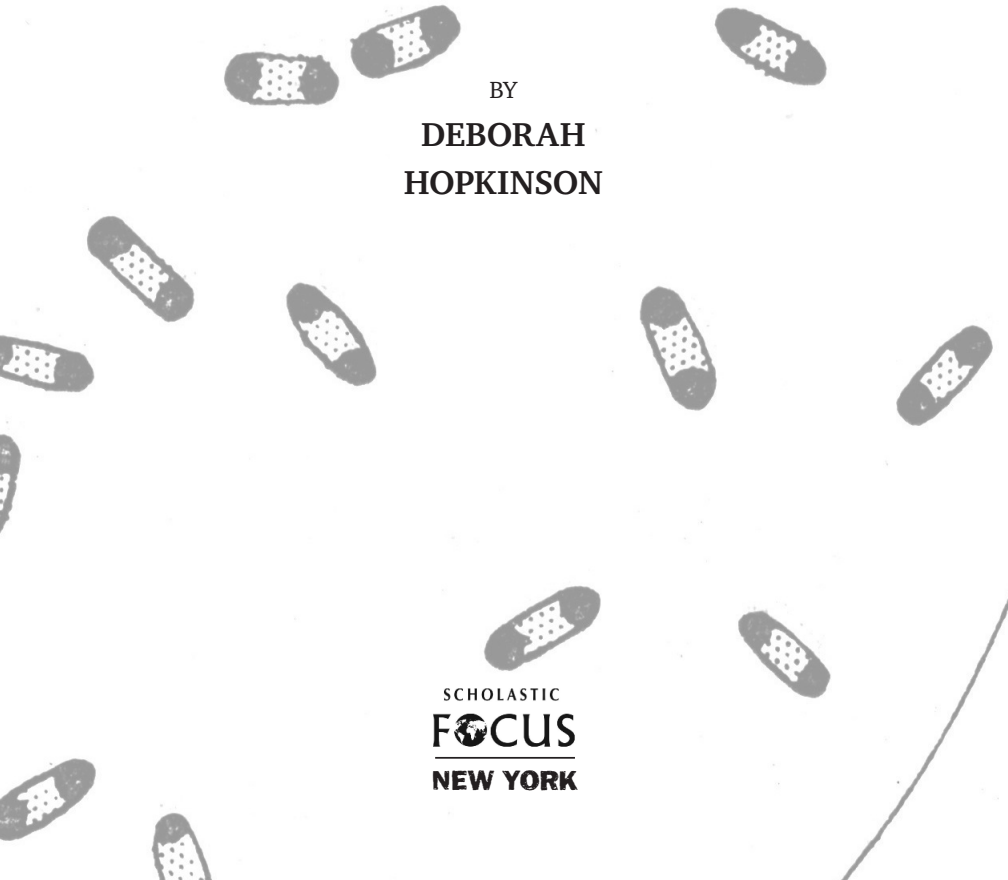
THE DEADLIEST

DISEASES THEN AND NOW



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The distinctive pen and ink illustrations reproduced here were drawn by artist A. L. (Albert Lloyd) Tarter in the early 1940s for an educational film about plague that was never made. They appear courtesy of the Wellcome Trust and the Wellcome Collection, a free museum and library in London dedicated to creating opportunities for people to think deeply about the connections between science, medicine, life, and art.

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Illustration, previous page: A book illustration showing highly magnified plague bacilli. Note the rod shape.

CHAPTER 1
Calling All Disease Detectives

Plague. The very word has the power to make us afraid. No wonder—there's no other disease like it. Powerful and deadly, plague has been around for thousands of years. And because the plague **bacterium** circulates naturally in various animal populations, we can't ever get rid of it. Plague will always be with us.

Plague has sometimes crossed over into humans, causing death, devastation, and major changes to society. It's a complex disease, with different forms, symptoms, ways of spreading, and outcomes. It took humans centuries to understand how it works. It ranks with smallpox as one of the deadliest diseases in history.

Nothing about the story of plague is simple.

Investigating the Great Mortality

Historians estimate that plague has killed more than 200 million people, though there is no way to know for sure. There have been three massive outbreaks, or pandemics, of plague in recorded history. There could have been other outbreaks in the past that we just don't know much about yet. The Great Mortality, which erupted in the mid-1300s during plague's Second Pandemic, was the most ferocious.

The Great Mortality took place from about 1346 to 1353. It caused enormous upheavals in societies across much of the world. In this book we focus primarily on western Europe, where plague reached Italy in late 1347. However, it's important to note that the Great Mortality affected people all across the world, from Central Asia to the Middle East, North Africa, and perhaps Sub-Saharan Africa (the portion of Africa south of the Sahara Desert) as well. In fact, historians now believe that only the Americas, Australia, and Oceania,

a region that includes Micronesia and Polynesia, were spared. Some historians put the Great Mortality death toll as high as 40, 50, or even 60 percent of the population across Eurasia (Europe and Asia together) and Africa. That means that five or six out of every ten people died.

Historians are still uncovering evidence to help us understand more about the Great Mortality and its impact on societies throughout the world. And while many books have been written about how the disaster affected Europe, some questions remain here too. When, where, and why did the Great Mortality begin? How did plague get to Italy in the fall of 1347? What was it like on a plague ship? How did plague spread? And was the Great Mortality caused only by plague, or did people die of other diseases too?

To find answers to these and other questions, historians and scientists use **primary sources**, original artifacts, art, or documents like letters and official records. They apply new scientific techniques

to analyze physical evidence such as teeth from medieval graveyards. They study archaeological remains, to see how the things left behind by people changed over time. Epidemiologists also use computer models to create a more complete picture of how plague spread.

Many of these tools are being used to help expand our understanding of medieval plague in areas outside Europe. Scholars are conducting new research on how plague spread in places such as Anatolia, which makes up modern-day Turkey, and in Africa, including sub-Saharan Africa. The twenty-first century is an exciting time to look back at the fourteenth century!

These amazing researchers are disease detectives. Their work helps us understand what happened in the past—and enables us to prepare for and manage future pandemics.

For us to learn about the Great Mortality, we need to be detectives too. So put on your thinking cap and let's begin.

Tracing the Path of Plague

We started with an imaginary family in Genoa in the fall of 1347, a time of confusion and fear. If you were living then, you'd never know the truth about the disease that threatened your world. But from where we sit, we can piece together the story.

To begin, let's consider what we know about how diseases spread in our own time. Today, someone with an **infectious disease** (one that can be passed from one person to another like a cold or the flu) can get on a plane and fly across an ocean in just a matter of hours. We ride subways and buses to school or work, hop into cars to visit relatives in other cities, and travel long distances by train. And wherever we go, diseases go with us.

What about the 1300s?

Well, it took a lot longer to get around during the medieval era, but the world was more connected than you might imagine. Invading armies marched across vast distances to conquer new territories. People traded and traveled across the seas by ship. Farmers took produce

to villages and towns by carts. Caravans of merchants traveled long distances overland, crossing from place to place, country to country. Closer to home, people visited with family and friends, went shopping, and had many interactions with others in their community.

And just like today, wherever people went, diseases went too.

Of course, piecing together the story of plague isn't like tracking diseases today. In some countries during the 2020 coronavirus pandemic, cell phone applications let users know if they were on the same bus or subway with someone who tested positive for COVID-19. That kind of precise GPS (Global Positioning System) tracking simply didn't exist in the past.

That's why disease detectives have to be a bit like naturalists tracking an animal in the wilderness. We have to look closely for small, subtle clues: a paw print here, a broken branch there, a bit of fur clinging to a twig.

One place to look for clues about plague is in history's written record. Although the printing press wasn't invented until 1440, people wrote on paper, linen, and parchment (treated animal skin). Monks in monasteries copied texts and recorded histories. Sometimes merchants, churches, and cities kept records. Doctors had medical books and records and, much like today, students took notes or made copies of lectures given by teachers and scholars. Rulers liked to have a written account of their achievements and successes in battle.

In addition to these sorts of documents, a few individuals took it upon themselves to record events in a **chronicle**, a written history or record. These **chroniclers** were the journalists, on-the-spot reporters, and history keepers of their time.

They're our guides to the Great Mortality.

The First Clues

To find out how plague burst into Italy in the fall of 1347, we have to start looking far from Europe. We

know plague has always been present in some parts of Central and Eastern Asia, where it still circulates in populations of burrowing rodents called marmots, and sometimes crosses into humans. (We'll talk more about marmots and the science behind how plague spreads a bit later.)

Scholars continue to discover more about the possible origins of the Great Mortality. While people used to think the Great Mortality began in the 1330s, recent research points to earlier outbreaks. In fact, we find our first clue in the mid-1200s, a hundred years before the Great Mortality began. Terrible sicknesses were reported at several fortresses and cities that **Mongol** armies had besieged in what is now Iran and Iraq. These sicknesses were most likely plague.

Many decades later, a chronicle reports that in 1332, a Mongol ruler, only twenty-eight years old, and his sons were all felled by a strange illness. Historians think it's likely they all died of plague as well.

Sometimes disease detectives are lucky enough to find physical evidence. That brings us to our next sighting: Gravestones unearthed from 1338–1339 in central Asia, near Lake Issyk Kul (in what is now Kyrgyzstan) reveal that plague was here then.

How do we know? Well, during these two years, there were more gravestones than usual. Something occurred to cause more people to die. One marker reads: "'This is the grave of Kutluk—he died of plague with his wife Magu-kelka.'"

Scholars once assumed that plague outbreaks moved east to west on the Silk Road, an ancient network of trade routes connecting the East and West. In fact, many older books I consulted for this book say just that. However, knowledge about the history of the Great Mortality is constantly changing and being updated as new evidence emerges.

How do we know? Well, I asked medical historian Dr. Lori Jones to read a draft of this book. (She corrected a lot!) She also shared cutting-edge research, knowledge

that most people haven't heard about. New research by Dr. Monica Green, for example, now suggests plague was spread not just by traders, but primarily as a result of Mongol sieges in the thirteenth century in places like Iraq, Iran, across the Black Sea region, and into the Mediterranean.

Dr. Jones says, "In the 1340s, this new research also finds evidence of plague north of Iran and Iraq, in Azerbaijan. What links all of these distant places together is Mongol conquest and trade networks, and the rodents that accompanied them (this far west, the plague was probably carried now not by marmots, but by another plague host: rats). The same Mongol link brings us to the Black Sea region, a major trading hub of the time, where plague arrived by 1346."

Now, try showing off your new knowledge with teachers or at home.

Today, the Black Sea is bordered by Ukraine, Romania, Bulgaria, Turkey, Georgia, and Russia. Major rivers

flow into it, and ships can pass through the Turkish Straits into the Aegean Sea and the Mediterranean Sea, with access to Italy and other places in Europe. Its central location made it an important place in medieval times—especially to Italian traders.

Let's stop here, in the old city of Caffa. Remember our imaginary merchant from Italy? Caffa was his destination.