COVID-19 seizes the world in 2020. From the likes of the plague, the Spanish Flu and SARS, invisible enemies have changed our lives, bringing death and widespread fear.

Yet, knowledge and the scientific quest for answers — along with a dogged sense of resilience — are our best weapons in the epic battle against pandemics.

- Who is Patient Zero and what are super spreaders?
- When did the Theory of Germs begin?
- Why did scientists risk their own lives?
- How did history prevail against pesky pandemics?

Former TV journalist Hwee Goh and historian/artist David Liew collaborate on this well-researched, fun book on key milestones of the pandemics that have shaped our world.
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THE ENEMY IS INVISIBLE

There is a Chinese saying, 暗箭难防 (àn jiàn nán fáng). It means that when an enemy is invisible, it is hard to prevent arrows coming at your back. Here’s the game changer: if the enemy is something you can’t see, but something you can learn all about, that’s when you can fight back!

Did You Know?
暗 – dark, or in the dark
箭 – arrow
难 – difficult
防 – to prevent

What’s That?
A game changer is an idea, strategy or even person, that (does something differently and) changes things for the better.

Battlefield BODY
Battlefields are not just where soldiers fight, but battles are also fought against disease. Tiny invaders called germs, which are usually viruses or bacteria, can attack our bodies.

Did You Know?
When infections spread through a community or city of people, it becomes an epidemic. On a larger scale, when the epidemic crosses countries and becomes global, it is called a pandemic.

Gods’ Vengeance
In ancient myth and superstition, disease was often thought to be a punishment from the gods. However, Hippocrates (460–375 BC), known as the father of medicine, believed that disease came from man and his environment.
Did You Know?

Have you noticed that some milk or juice cartons you see in the supermarket don't need to go in the fridge? Such long life or UHT (Ultra Heat Treated) food and drinks are preserved by pasteurisation. Germs are killed, before the food is sealed, to keep it from going bad.

Hippocratic Oath

In many countries, newly-trained doctors still say the Hippocratic oath. This is a pledge that they make to treat patients to the best of their ability. Although known as the Hippocratic oath, we cannot be sure it was written by Hippocrates himself. The oath dates back to ancient Greece, when the roots of modern medicine began.

It’s Just Bad Air

Before the mid 1800s, people used to believe in miasma (mee-az-mur), that disease was caused by bad air and foul smells. This is how malaria was named — in Italian, “mala” means “bad” and “aria” means “air”.

Malaria is one of the first diseases to be discovered. It is actually caused by a parasite spread through mosquitoes. It is now curable by quinine, made from the bark of a tree.

The Theory of Germs

French microbiologist Louis Pasteur debunked the “bad air” theory through many experiments. If he boiled milk, killed the bacteria within, and sealed it, the milk did not go sour. In other words, it is the bacteria in the air that causes food to spoil.

Early Experiments

In 1914, a German microbiologist got his assistant who had a cold, to blow his nose. He mixed the assistant’s mucus into a salt solution, filtered it and put it into the noses of 12 colleagues. Four of them came down with the cold. He tried this again on 36 students — 15 of them fell sick.

Did You Know?

Over time, scientists began to understand that disease was caused by minute organisms invading the body, and could be passed between people.

What’s That?

minute (mai-newt): Very tiny.
Missing Link Found
Scientists quickly develop a blood test to detect the presence of COVID-19 antibodies, which proves the couple had in fact been recently infected. Both had been unwell and had sought treatment, but were not tested for COVID-19 earlier.

Flatten The Curve
Initially the worst-hit country with the highest number of infections after China, Singapore falls much further behind as many countries start to report infection numbers. The strategy is to identify, report and isolate cases with the aim to flatten the curve on the rise of infections. This would enable the healthcare system to cope with infected patients, and not be overwhelmed.

Circuit Breakers
On a day-to-day basis, “social” or “safe distancing” becomes a new buzzword. Since the virus is spread by contact, especially over shared meals and socialising, the only way is to apply circuit breakers to the process. In many affected countries, large gatherings and events are cancelled, schools are closed, and people work from home.

What’s That?
circuit breaker: A device that cuts off power supply in an electrical circuit to prevent damage.

Quick Change Artist
The behaviour of this virus is much harder to pin down. It proves to spread more easily than other deadly coronaviruses and is hard to track, leaving “distancing” as the most effective way to stop it.

- It presents both in the lungs, as well as in the upper respiratory tract (nose and throat).
- It infects young and old patients.
- Some do not show symptoms nor have a fever, but are still infectious.
The Math of Infections
As infections keep rising, mathematicians crunch the global COVID-19 numbers which are increasing exponentially. This means a number starts small, but keeps doubling over time on a steep climb up a graph. Without circuit breakers, these are the perfect conditions for unlimited spread:
1. There is at least one infected person in the population.
2. There is regular contact between the infected and the uninfected.
3. There are large numbers of uninfected hosts with the potential to be infected.
This math confirms the science that if
(a) the infected isolate
(b) most people stay home
(c) and as early as possible
the rate of infection will drop dramatically, and the curve on the graph will flatten.

Did You Know?
A significant number of COVID-19 patients lose their sense of taste and smell. Scientists say the numbers are enough for this to be used as a first symptom to self-isolate, before confirming infection (or not).
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Thank You!

ABOUT

HWEE AND DAVID

Trained at the Northwestern University Medill School of Journalism, former CNA (Channel NewsAsia) reporter and editor Hwee Goh put together this handbook from books and a few hundred sources online. She is grateful to the scientists, doctors, epidemiologists and researchers for their meticulous work in published journals, as well as her journalism colleagues all over the world. Hwee is now a media and editorial consultant. She continues to curate stories on @hweezbooks.

Illustrator David Liew and Hwee were in junior college together studying strange but true moments in 15th and 16th century Europe. David continued on to be a history teacher before becoming illustrator to many bestselling book series. David’s art often takes on humorous angles appreciated by his fans, young and old. It is with this added layer of art, that the Change Makers team hopes to engage young readers on their own journey of discovery into this world’s unknowns.