

THE SCIENCE BEHIND THE CORONAVIRUS

By Charles Apple | THE SPOKESMAN-REVIEW

What do we really know about this little bug that's turned our lives upside-down? Quite a bit, actually.

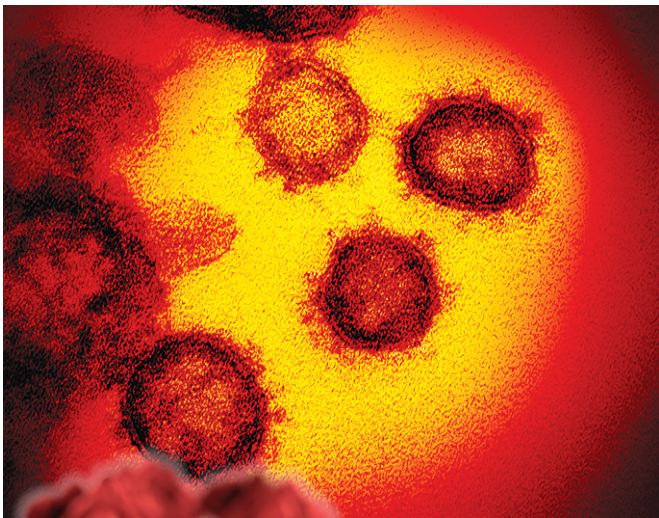
What is a coronavirus?

First off, let's clarify our terms. We've all been calling this thing the coronavirus, but actually, coronavirus is a type of virus. It's called that because the little spiky things protruding from the virus reminded researchers of a crown. "Corona" is Latin for crown, or halo.

You may remember SARS (Severe acute respiratory syndrome) from 2003 and MERS (Middle East respiratory syndrome) from 2012. Both of those were caused by coronaviruses.

For a while, folks were calling this one "the novel coronavirus," meaning it was new. The Centers for Disease Control and Prevention prefer the name COVID-19 for the disease caused by SARS-COV-2.

Coronaviruses affect only birds and mammals.



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Where did it come from?

The short answer: Researchers don't know just yet.

Early research in the U.K. suggested the COVID-19 virus is similar to one found in horseshoe bats. That's not so far-fetched as it sounds: SARS spread from bats to cats to humans. And MERS originated in bats and spread to camels before the first human was infected.

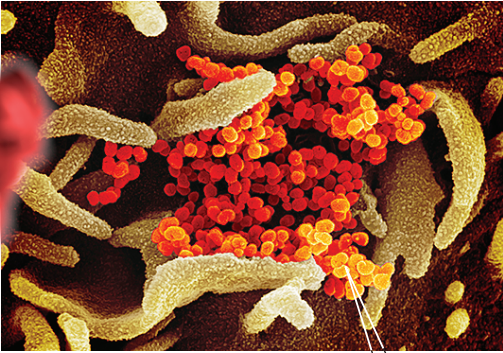
The first human cases of COVID-19 were detected in early December in the Wuhan Province of China. The CDC says the first cases of COVID-19 were linked to a live animal market there. The Chinese government has said they now think the very first case may have been a 55-year-old man who fell ill on Nov. 17 of last year.

From there, the COVID-19 spread around the world.

How does the virus work?

Like all viruses, this one has just one purpose in life: to reproduce. This only becomes a problem when the human body detects the virus and then goes into overdrive to try to rid itself of the virus. Most of the respiratory symptoms a patient suffers are actually brought on by the body's immune system.

Once it's in the lungs, the virus uses protrusions made of spike proteins to latch onto a receptor on a lung cell. Researchers have noted that the COVID-19 virus seems to be "stickier" than, say, the SARS virus. Which may be one reason this strain has spread more quickly.



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The virus then transfers its RNA into the lung cell and hijacks the cell's reproduction machinery. Copies of the virus emerge from the host cells and go out in search of new host cells where they repeat the process.

This electron microscope image shows COVID-19 viruses as they emerge from the surface of host cells in a lab culture taken in February from a patient in the U.S.

How does the virus spread?

COVID-19 can damage the lungs. But how does the coronavirus gain access to the lungs?

For the most part, COVID-19 spreads from person-to-person. An infected person can cough or sneeze, spreading the virus through tiny droplets that are too small to see.

COVID-19 can also live for a period of time outside the body. So these drops can come to rest on a table or counter that can be touched by someone else who comes along later.

This is why we've been advised to not touch our mouths, noses and faces. Cells in our mouth and nasal tissues also have receptors for the spike protein. We can get droplets on our fingers that then multiply and spread to our own respiratory systems.

COVID-19 compared to other pandemics and epidemics

			CASES WORLDWIDE	DEATHS WORLDWIDE	CASES IN THE U.S.	DEATHS IN THE U.S.
H1N1 1918-19	"Spanish Flu"	One-fifth of the world's population and one-quarter of the U.S. population came down with the virus. In one year, the average life-expectancy in the U.S. dropped 12 years.	500 million	50 million	25 million	675,000
H2N2 1957-58	"Asian Flu"	Originated in Singapore, spread to Hong Kong and then to coastal cities of the U.S. Numbers settled down for a while but then resurged in 1958, particularly in the U.S.	Unknown	1.1 million	Unknown	116,000
H3N2 1968-70	"Hong Kong Flu"	Was thought to be caused by a mutated strain of the Asian Flu virus from a decade before. Spread quickly across Southeast Asia to U.S. soldiers returning home.	Unknown	1 million	Unknown	100,000
SARS 2002-03		Originated in China and spread quickly among health care workers before it was identified. Major cities like Beijing and Singapore restricted travel and closed schools.	8,096	774	27	0
H1N1 2009-10	"Swine Flu"	Originated in Mexico, where it was thought to have mutated from a virus found in pigs. It had a resurgence in India in 2015, killing 1,841 people.	6.7 million	19,654	113,690	3,433
MERS 2012-PRESENT		Is thought to have originated in camels in Saudi Arabia. Another outbreak took place in South Korea in 2015 and then again in Saudi Arabia in 2018.	2,506	862	2	0
EBOLA 2014-16		Was first identified in Africa in 1976 but a major outbreak in West Africa in 2014 caused the World Health Organization to declare a public health emergency.	27,000	11,300	4	2
COVID-19 2019-20		First cases were identified in China in December 2019 but last Friday, the World Health Organization declared Europe the new epicenter of the pandemic.	284,566	11,868	19,624	260