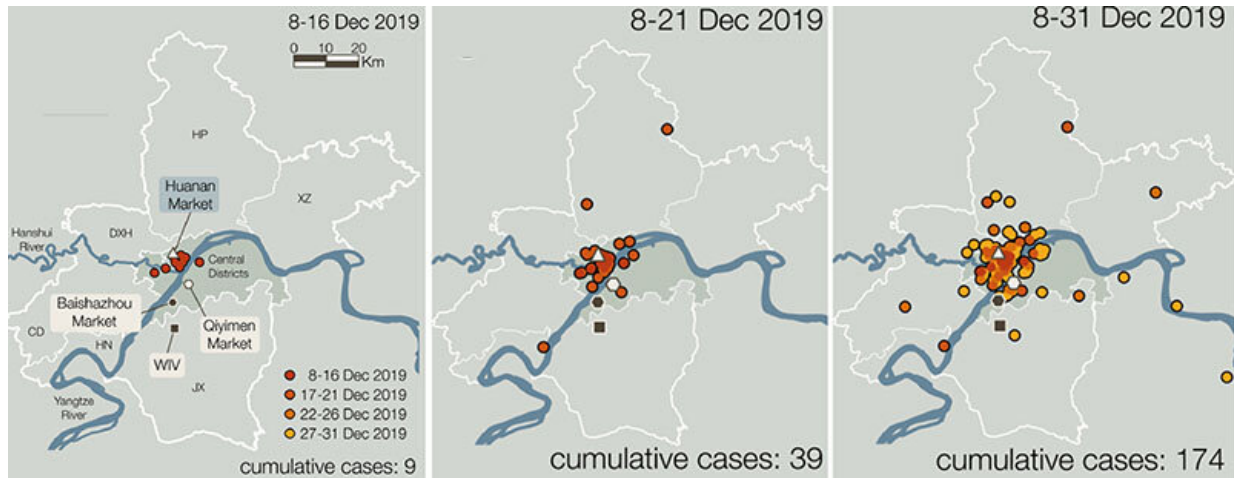


Report: COVID-19 lab leak theory unlikely

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Maps showing the first documented cases of COVID-19 in Wuhan, China.
Credit: *Cell*

Today's COVID-19 pandemic likely began when an infected animal passed the SARS-CoV-2 virus to a human at a live animal market in Wuhan, China. In a critical review published in the peer-reviewed journal *Cell*, 21 scientific experts from across the world present evidence that this scenario is much more probable than the novel disease originating from a laboratory accident, a theory that has received attention in the media.

"The discussion over the origins of the pandemic have become politicized and heated, and we felt the time was right to take a critical

look at all of the available evidence," says Stephen Goldstein, Ph.D., an author on the paper and evolutionary virologist at University of Utah Health. Corresponding authors are Edward Holmes, Ph.D., The University of Sydney, Australia, and Andrew Rambaut, University of Edinburgh, UK. "Preventing future pandemics requires the political will to cut off the routes by which these viruses enter the [human population](#). Focusing in the wrong direction will preclude those efforts from occurring."

The experts laid out the evidence. Learn more in an [interview with Goldstein](#).

Animal markets are an epicenter for early COVID-19 cases

Maps pinpointing geographic locations of the first wave of COVID-19 cases in December 2019, show they initially emerged close to the site of the Huanan Seafood Wholesale Market in Wuhan, China, as well as other markets reported to have live animal trading. In the weeks following, cases radiated outward geographically. Those cases were followed by excessive deaths in January 2020, a second marker of how the [virus](#) spread through the population. Similarly, those deaths were initially localized to near the animal markets.

"It tells us where the epidemic began and where intense transmission began," Goldstein explains. "This suggests that the epidemic began in markets in this district: the Huanan [market](#) and possibly other markets as well."

Lack of evidence for laboratory leak

The Wuhan Institute of Virology, often cited as the source of a lab leak,

is also marked on the map, but is a distance away from the live animal markets. None of the very first documented cases—or excessive deaths within the first week of emerging—were located near the institute. None of the first documented cases were reported as being related to staff at the laboratory. There is no evidence that researchers at the institute worked with SARS-CoV-2 nor a closely related virus.

Human infectious disease frequently originates in animals

COVID-19 isn't the first coronavirus-based infectious disease associated with animal markets. The 2002 and 2003 outbreaks of SARS, the disease caused by the SARS-CoV virus, were associated with markets in China that sold live animals. In addition to SARS-CoV and SARS-CoV-2, five other coronaviruses have crossed into humans from animals in the past 20 years. Combined with the observation that the majority of viruses in humans, both coronaviruses and other virus types, came from infected animals, it would not be unexpected for SARS-CoV-2 to have entered the human population in the same way, the authors say.

No signs of man-made changes to the virus

A recurring argument for the lab leak theory is that the virus, SARS-CoV-2, carries a specific short genetic code that is sometimes engineered into laboratory products, called a furin cleavage site. To investigate, researchers have previously analyzed genetic sequences from multiple coronaviruses and found the code in question to be commonplace among them. The authors of this review further determined that the specific code in SARS-CoV-2 is imperfect and therefore would not perform its function well.

"There is no logical reason why an engineered virus would utilize such a

suboptimal furin cleavage site, which would entail such an unusual and needlessly complex feat of genetic engineering," the authors write. Examination of the virus' sequence has not turned up other potential signs of deliberate manipulation.

While a substantial body of scientific evidence supports SARS-CoV-2 originating from wildlife, those [animals](#) have not been found. "We can't rule out the possibility of a lab accident," Goldstein says. "It can't be dismissed entirely, but it is highly unlikely. There's no evidence for it right now."

More information: Edward C. Holmes et al, The Origins of SARS-CoV-2: A Critical Review, *Cell* (2021). [DOI: 10.1016/j.cell.2021.08.017](https://doi.org/10.1016/j.cell.2021.08.017)

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