

Science You Can Use

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Dear Science: I've heard that the virus that causes COVID-19 escaped from a Chinese laboratory. Is this true? -- Buck R.

Dear Buck: The short answer is that there is no good reason to believe that the virus that causes COVID-19 escaped from a Chinese laboratory.

Here's a longer answer. COVID-19 is an easily transmitted respiratory disease caused by a member of the "severe acute respiratory syndrome (SARS)" family of viruses. COVID-19 produces no symptoms in about half the population it infects (which makes the disease diabolically hard to track by testing). It can also look like a common cold, act like flu, or cause acute respiratory failure ending in death.

The virus that causes COVID-19 is technically called "severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)". As of 1 May 2020, SARS-CoV-2 had infected at least three million people worldwide, and 200,000 people had died from it. In the US alone, over one million people have been diagnosed as "infected" by the virus, and about 60,000 of these have died from it. As of May 2020 no vaccine or antiviral drug has been shown to significantly mitigate the disease.

Let's call the claim that SARS-CoV-2 escaped from a Chinese laboratory the "Chinese-lab conjecture". Most variants of this story also assert that the Chinese have conspired to lie about the escape.

In order to assess whether the Chinese-lab conjecture is likely to be true, we first have to be clear what kind of answer to that question we can practically hope to obtain. We can't be certain of the answers to many questions that arise in everyday life, but this does not deter us from acting as if we had such answers. For example, we can't absolutely *prove* that our cars won't explode upon starting, but the *preponderance of evidence* tells us that they are safe enough when started.

Let's look at what the preponderance of evidence says about the Chinese-lab conjecture.

1. The genetic sequence of SARS-CoV-2 differs little from the genetic sequence of one of the naturally occurring SARS viruses. SARS viruses mutate. SARS-CoV-2 could easily have arisen over the last few years, given observed SARS mutation rates, from a naturally occurring SARS virus. Whether the SARS-CoV-2 escaped from a lab or arose in nature, therefore, makes little practical difference from a public-health-management perspective.
2. Another virus whose genetic sequence differs little from the sequence of SARS-CoV-2 is found in wild bats that live near Wuhan, China, the presumptive geographic origin of the COVID-19 pandemic. Some cultures consider bat meat a delicacy. Bat meat is widely available in China, including in the Wuhan region. Merely touching a bat, or any other animal including a human, is one way to encounter a virus it might carry. Fortunately,

our immune systems routinely protect us from almost all of these viruses. SARS-CoV-2 is an exception.

3. There is a SARS virus research laboratory near Wuhan, China. We have no evidence, however, that SARS-CoV-2 in particular is studied there. That laboratory has one of the most advanced bio-agent containment facilities in the world, and its operating procedures have been vetted by an international team of experts. Everyone who works in such a laboratory would likely be the first victims of indifference to or ignorance of its safety protocols, so presumably has high motivation to follow scientifically approved procedures. It is thus highly unlikely that SARS-CoV-2 escaped from this lab, even if the virus existed there.
4. In every country, it has proven extremely difficult to test enough people, often enough, to get more than a rough picture of how the COVID-19 pandemic has evolved. Even China would have found it exceptionally difficult to test at the level required to show, with high confidence, that the outbreak originated from a particular lab.

Why does the Chinese-lab conjecture persist? There are at least two reasons belief in a conspiracy theory like the Chinese-lab conjecture survives. Such theories:

- a. Can make inexplicable, frustrating, and sometimes painful experiences seem to have definite, assignable, and manageable causes (e.g., “we angered the gods by not planting on the day of a full moon”, or “a careless technician failed to follow reactor shutdown procedures”, or “my teachers don’t like me”). Imagining that manageable causes underpin such experiences, even if those causes don’t exist, helps many people avoid feeling powerless “in a universe”, as Bertrand Russell once said, that seems “indifferent to our fate” (see M. Marchlewsk, A. Cichocka, and M. Kossowska, “Addicted to answers: Need for cognitive closure and the endorsement of conspiracy beliefs”, *European Journal of Social Psychology* 2018, pp. 109-117).
- b. Are sometimes used to manipulate the beliefs of others for personal or political gain.

In summary, at present we (including China) don’t have enough information to prove or disprove the Chinese-lab conjecture. But given the preponderance of evidence as of 1 May 2020, we should “attribute not to malice what chance alone is sufficient to explain” (Isaac Newton).

For further information, see: Johns Hopkins University, Coronavirus Map, <https://coronavirus.jhu.edu/map.html>; <https://allianceforscience.cornell.edu/blog/2020/04/did-covid-19-escape-from-a-lab/>.

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