Newfound DNA data indicates wild animals at Wuhan market were infected with SARS-Cov-2

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The journal *Science* and *The Atlantic* magazine published accounts of a recent discovery of the DNA sequence from a wild animal likely infected with SARS-CoV-2 at the Huanan wet market in Wuhan, the epicenter of the outbreak of early infections that led to the COVID pandemic. Dr. Florence Débarre, a senior researcher at the National Center for Scientific Research in France, and theoretician in evolutionary biology, uncovered the data.

The discovery deals a massive blow to the conspiracy theory that COVID-19 originated in a leak of genetically modified viruses from the Wuhan Institute of Virology (WIV). This has relied on, as one of its few science-based arguments, that none of the animals tested at the Wuhan market had been positive for SARS-CoV-2. Now one may well be.

Débarre has meticulously researched the origin question, posted her findings on her Twitter account and taken many advocates of the "lab-leak" conspiracy theory to task. She told Jon Cohen of *Science* that she "randomly" came across the "previously unknown sequence data" while doing research on GISAID, the Global Initiative on Sharing Avian Influenza Data, the Munich-based data bank that allows scientists to share research results on an open-access basis. She said it took several days to assess the implication of the sequences and recognize their importance.

These were sequences from swabs taken by the Chinese Centers for Disease Control in the wet market after closing the facility on January 1, 2020. The sequence was part of the DNA of a raccoon dog, found together with RNA from SARS-CoV-2. These wild animals were known to have been illegally sold at the market and are possibly a suspect for intermediary host for the virus, between bats and humans. However, the data that was posted on GISAID was not part of the earlier data set provided to the WHO or other scientific bodies during the 2021 origin investigation and subsequent publication titled "Surveillance of SARS-CoV-2 in the environment and animal samples of the Huanan Seafood market."

Débarre initially contacted Kristian Andersen, evolutionary virologist at Scripps Clinic, California, and Michael Worobey, evolutionary biologist at the University of Arizona, to discuss the implications of the sequences.

However, once these researchers attempted to contact former head of the Chinese CDC, George Gao, the data was removed from GISAID. It may very well be that the work being conducted by Gao and colleagues is pending review. In the arena of scientific authorship such high-impact topics are kept under wraps until the day of publication.

As Jon Cohen notes, "The team's [Gao] preprint recently had its status on Research Square—which is linked to the *Nature* family of journals—change from 'posted' to 'under review.' Journals often require data deposition before publication, so an imminent publication might originally have prompted Gao's team to submit the data to GISAID."

Still, given concerns that the sequences were removed and lack of disclosure on why they were placed there and not shared earlier with the WHO or in their subsequent publication in 2022, Débarre and colleagues contacted the lead scientist at WHO on COVID, Dr. Maria Van Kerkhove, and provided her with the bombshell report of a likely infection with SARS-CoV-2 of an animal at the Huanan market.

On Friday, at the WHO press brief on COVID, Director-General Dr. Tedros Adhanom Ghebreyesus made it a focus of his opening remarks. He said, "Even as we become increasingly hopeful about the end of the pandemic, the question of how it began remains unanswered. Last Sunday, WHO was made aware of data published on the GISAID database in late January and taken down again recently. The data, from the Chinese Center for Disease Control and Prevention, relates to samples taken at the Huanan market in Wuhan, in 2020."

He continued, "While it was online, scientists from a

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number of countries downloaded the data and analyzed it. As soon as we became aware of this data, we contacted the Chinese CDC and urged them to share it with WHO and the international scientific community so it can be analyzed. We also convened the Scientific Advisory Group for the Origins of Novel Pathogens, or SAGO, which met on Tuesday. We asked researchers from the Chinese CDC and the international group of scientists to present their analyses of the data to SAGO. These data do not provide a definitive answer to the question of how the pandemic began but every piece of data is important in moving us closer to that answer and every piece of data relating to studying the origins of COVID-19 needs to be shared with the international community immediately. These data could have and should have been shared three years ago."

The question of a natural origin versus laboratory leak has been at the heart of political discussions since the publication by a renowned international team of virologists published the "proximal origin of SARS-CoV-2" report in March 2020 in *Nature.* All evidence since that pathbreaking study points to a zoonotic spillover into human populations while no data to date has pointed to a possible lab leak.

In fact, many of the scientists involved in the original research on COVID origin, including Drs. Débarre, Worobey and Andersen, had previously acknowledged they had initially believed the outbreak was caused by a lab leak until the weight of the accumulated evidence demanded they accept the alternative and most likely hypothesis, a natural origin.

Most important in these was the investigation conducted by the World Health Organization (WHO) and China in 2021 on the origin question which found that a significant number of early COVID cases who were attended at regional hospitals in December 2019 were linked to the market and not the WIV.

These were later corroborated by studies conducted by scientists Michael Worobey, Kristian Andersen and others in their epidemiologic and phylogenetic studies utilizing the WHO data. Most cases, both those with and those without personal links to anyone at the market, were nonetheless geographically linked to it. In other words, it was their proximity to the market that led to their infection.

Additionally, the two lineages of the virus (also both linked to the Huanan seafood market) that had been sequenced at that time had no preceding intermediary version, meaning that at least two separate spillovers must have occurred in and around the market that eventually led to achieving a sustained outbreak of infections that began to spread across Wuhan in late winter of 2019.

It is telling, moreover, that there were no linkages between staff or employees of WIV and SARS-CoV-2 nor were any of the early cases geographically linked to the institute, which would have supported a lab-leak hypothesis. Perhaps an even more compelling question to ask the conspiracists: What is the probability that two different versions of the virus housed at the WIV somehow were leaked within a few weeks of each other to the middle of the same wet market that employs 1,500 people in a city of 11 million, the size of London.

The identification of a raccoon dog at Huanan market who was very likely infected comes with considerable political impact at the present moment.

On March 8, 2023, while Republican and Democratic Congress members were holding hearings on the origin of COVID to politically legitimize their lab-leak conspiracy claims, Dr. Michael Worobey's opinion piece was published in the *Los Angeles Times*, providing a lucid and thorough account on the scientific merits for the natural origin of COVID and its emergence at the Huanan Seafood Market.

Worobey is a professor and the head of the department of ecology and evolutionary biology at the University of Arizona who has dedicated his recent work to the origin question. Near the end of his account, he wrote, "There is now a large body of peer-reviewed scientific research consistent with a zoonotic origin of this pandemic. However, there is no credible, peer-reviewed research pointing to a lab leak. Had the evidence gone in the other direction, I'd be reporting that. But it hasn't. The 'evidence' in favor of a lab leak consists fundamentally of discredited talking points. The lack of a positive sample from an animal sold at the Huanan market, for example, supposedly undercuts the market-origin hypothesis. But not a single relevant live animal was tested there before the market was closed."

In little more than a week after Worobey's account, the sequence showing a wild animal linked to SARS-CoV-2 has made the headlines.

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