

Researchers cast doubt on earlier COVID-19 origins study citing dogs as possible hosts

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A study published earlier this year claiming the coronavirus may have jumped from dogs to humans is scientifically flawed, offering no direct evidence to support its conclusions, according to a collaborative group of international researchers, including scientists at the University of Colorado Anschutz Medical Campus.

"During this time of COVID-19 we are seeing people publish things that make wild leaps to conclusions that are not justified by the evidence," said David Pollock, Ph.D., professor of biochemistry and [molecular genetics](#) at the University of Colorado School of Medicine. "And this seems to be one of them."

Pollock and CU Anschutz alumnus Todd Castoe, an associate professor of biology at the University of Texas Arlington, are lead authors of an academic letter published this week in *Molecular Biology and Evolution* aimed at refuting the earlier study published in the same journal.

Pollock and his co-authors, including Ph.D. student Kristen Wade and colleague Elizabeth Carlton, Ph.D., MPH, an assistant professor at the Colorado School of Public Health at CU Anschutz, took issue with the April 2020 study by biology Professor Xuhua Xia of the University of Ottawa in Canada.

Many scientists are interested in the origins of the novel coronavirus. They want to know which host the SARS-CoV-2 virus, responsible for COVID-19, came from before making the leap from animal to human.

The classic way to address this is by finding viruses with similar genome sequences in a particular animal host. Xia, however, focused on a feature of the coronavirus genome known as CpG content, and found that a distantly-related dog coronavirus had similar CpG content as SARS-CoV-2. Because this distant virus replicated well in

the dog's digestive tract, he concluded that a dog's intestines were the ideal place to have affected the ancestral SARS-CoV-2's CpG content.

"However, there is no evidence for the logical premise of Xia's argument, considering that all mammals have digestive tracts," the researchers wrote.

They showed that dogs aren't special in their content of ZAP and ABOBEC3G proteins, which help safeguard humans from viruses and can interact with viral CpG content.

"Additionally, a recent inoculation study found that while other domesticated mammalian hosts are highly susceptible to SARS-CoV-2, canines exhibited low susceptibility, and no traces of viral RNA were detectable in any dog organs," the scientists wrote.

Pollock and his colleagues said that although the recent origin of SARS-CoV-2 is uncertain, the best current evidence makes it likely that it was passed to humans by [horseshoe bats](#) or possibly pangolins, a kind of spiny anteater in China. There is strong evidence that the virus has recently jumped between humans and these animals or other intermediate hosts.

Bat and pangolin viruses also have CpG content similar to human SARS-CoV-2, so the environment that affected viral CpGs must have happened long ago and possibly in one of these two mammals. They noted that there are signs of prior recombination events among divergent viruses. That suggests that over the years relatives of coronaviruses found in bats and pangolins mixed and mutated to give rise to SARS-CoV-2.

The proposition that dogs were likely recent ancestors of SARS-CoV-2 is not justified by the available evidence, the researchers concluded.

"Xia did not demonstrate that the low CpG frequency in the SARS- CoV-2 genome was driven by a unique selective environment in dog digestive tracts," the authors wrote. "Dogs are not more plausible than most other potential host species, and based on current data, far less plausible than bats or pangolins."

Pollock said determining how the [virus](#) jumped from animals to humans is critical in preparing for the next pandemic.

Even so, he said, in the midst of a pandemic scientific results can be over-interpreted and misused, leading to misappropriation of resources and effort. Rather than promote the speculations of a study based on weak evidence, he noted, it is better to admit uncertainty. If not, the scientific community has an obligation to respond.

"Considering the ramifications, scientists need to be particularly careful in interpreting findings, and avoid rushing to conclusions that are not well supported by solid evidence" co-lead author Castoe said. "We need to get this right."

More information: David D Pollock et al, Viral CpG deficiency provides no evidence that dogs were intermediate hosts for SARS-CoV-2, *Molecular Biology and Evolution* (2020). [DOI: 10.1093/molbev/msaa178](https://doi.org/10.1093/molbev/msaa178)

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