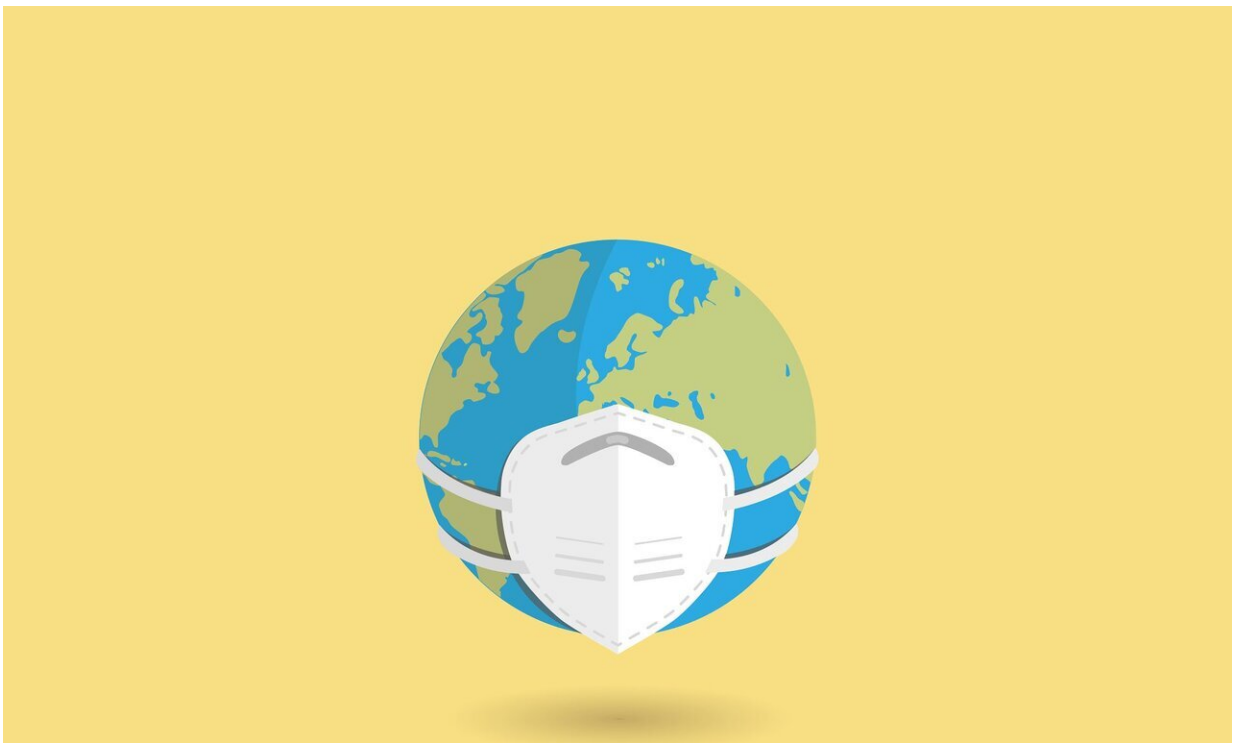


Museum scientists: Prepare for next pandemic now by preserving animal specimens in natural history

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It's been more than a year since the first cases were identified in China, yet the exact origins of the COVID-19 pandemic remain a mystery. Though strong evidence suggests that the responsible coronavirus

originated in bats, how and when it crossed from wildlife into humans is unknown.

In a study published online Jan. 12 in the journal *mBio*, an international team of 15 biologists say this lack of clarity has exposed a glaring weakness in the current approach to [pandemic](#) surveillance and response worldwide.

In most recent studies of animal-borne pathogens with the potential to spread to humans, known as zoonotic pathogens, physical specimens of suspected wildlife hosts were not preserved. The practice of collecting and archiving specimens believed to harbor a virus, bacteria or parasite that's under investigation is called [host](#) vouchering.

"Vouchered specimens should be considered the gold standard in host-pathogen studies and a key part of pandemic preparedness," said Cody Thompson, co-lead author of the *mBio* paper and mammal collections manager at the University of Michigan Museum of Zoology.

"But host vouchering has effectively been nonexistent in most recent zoonotic pathogen studies, and the lack of this essential information has limited our ability to respond to the current COVID-19 pandemic," said Thompson, who is also an assistant research scientist in the U-M Department of Ecology and Evolutionary Biology.

To fill this knowledge gap, Thompson and his co-authors urge researchers who conduct host-pathogen studies to adopt vouchering practices and to collaborate with [natural history](#) museums to permanently archive host specimens, along with their tissue and microbiological samples.

The authors of the *mBio* article include experts in mammalogy, bat biology, microbiology, natural history, ornithology, bioinformatics,

parasitology and host-pathogen biology. Most of them have ties to natural history museums.

"In essence, vouchering provides both an offensive mechanism for pandemic prevention—by expanding the surveillance of wildlife hosts and associated pathogens—and a defensive mechanism by providing a verifiable archive for baseline comparisons," said study co-lead author Kendra Phelps of EcoHealth Alliance, a global nonprofit that works to prevent pandemics and promote wildlife conservation.

"This problem becomes especially critical in navigating novel viral zoonoses, such as the COVID-19 pandemic, where it is necessary for the [scientific community](#) to swiftly and efficiently leverage its collective knowledge and resources to effectively understand and contain the spread of novel pathogens at a time when lockdown restrictions hamper on-going sampling efforts."

The emergence of infectious diseases attributed to novel pathogens that "spill over" from animal populations into humans has increased in recent decades.

The COVID-19 pandemic, in particular, has demonstrated that a previously unknown pathogen can emerge from wildlife species and threaten public health on a global scale within months. Experts from the World Health Organization are expected to arrive in China this week for a long-anticipated investigation into the pandemic's origins.

During spillover events, vouchered specimens in [museum collections](#) and biorepositories can help disease sleuths quickly track a pathogen to its source in the wild. The authors of the *mBio* study highlight three examples—yellow fever, hantaviruses and parasitic worms—of host-pathogen research that successfully incorporated natural history collections into collaborative research programs.

Vouchered host specimens can help answer fundamental biological, ecological and evolutionary questions about host-pathogen dynamics. The specimens allow for scientific replicability, they help ensure correct taxonomic identification of the host species, they establish a baseline for future studies, and they provide biological samples that can extend research as new technologies emerge.

At the same time, archiving host specimens in natural history collections provides access to a "vast, largely untapped biodiversity infrastructure" within museums, according to the authors of the *mBio* paper.

"We need to think of natural history collections as resources for preventing future pandemics, with the potential to promote powerful interdisciplinary and historical approaches to studying emerging [zoonotic pathogens](#)," said U-M's Thompson.

As part of their study, the *mBio* authors surveyed more than 100 microbiologists—bacteriologists, parasitologists and virologists—from around the world to assess their vouchering practices when conducting host-pathogen research.

Fewer than half said they voucher host specimens from which microbiological samples were lethally collected. In the cases where host specimens were obtained, most were deposited in the collections of natural history museums.

To help foster collaborations between microbiologists and curators of natural history collections, the authors also provide recommendations for integrating vouchering techniques and archiving of microbiological samples into host-pathogen studies.

More information: Cody W. Thompson et al. Preserve a Voucher Specimen! The Critical Need for Integrating Natural History Collections

in *Infectious Disease Studies*, *mBio* (2021). [DOI: 10.1128/mBio.02698-20](https://doi.org/10.1128/mBio.02698-20)

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