

The Origins of SARS-CoV-2

Hit as badly as we are by this pandemic called COVID-19, we wonder where it came from. Within this past week, the origin of the virus SARS-CoV-2 which causes COVID-19 has been the subject of some stimulating verbiage. On April 15, Secretary of State Mike Pompeo said: "What we do know is we know that this virus originated in Wuhan, China. We know there is the Wuhan Institute of Virology just a handful of miles away from where the wet market was. There is still lots to learn. The United States government is working diligently to figure it out." He seemed to be alleging that the virus may have been leaked out of the research laboratory, and by implication he is damning the Chinese for releasing on the human race this nasty pandemic. President Trump has continued these implications by calling it "the Chinese Virus."

China had previously blamed the emergence of the virus on transmission to humans from animals in Wuhan's wet market. Naturally, they were quick to reiterate that blame in response to Pompeo's and Trump's implications.

What do we really know about this stuff?

First, since the emergence of HIV in the early '80's, that part of the medical world which has been concerned with Infectious Diseases and Public Health has been loudly warning that new diseases have been emerging from the natural world to infect us humans. Ebola, SARS, MERS, Swine 'flu, Lyme disease, etc. Actually, since the start of the 20th century, when our knowledge of the microbial world began to explode, we have come to understand that many of the microbial epidemics that have attacked us in the history of the world have come from animals. Tuberculosis probably originated from cattle when we first turned to living with farm animals. Smallpox may well have also originated in cattle. Rabies has always come to us from animals. Influenza viruses are really viruses of birds that are passed to humans directly from birds or through animals like pigs. Lyme disease comes from ticks. Ebola comes from bats in Sub-Saharan Africa. The 2003 SARS virus, called SARS-CoV-1, probably came somehow to humans from horseshoe bats in the Guangdong province of China.

We know that bats harbor a great number of viruses. Interestingly, those viruses don't seem to make bats sick. There are intriguing speculations about why that is, which relate to how their immune systems work, but I won't go into these. What is important is that bats can harbor coronaviruses. Chinese scientists have been active in studying coronaviruses from bats, including in that Wuhan Institute of Virology.

It is certain that the SARS-CoV-2 did emerge in Wuhan. Wuhan has a "wet market." What is that? It is a large market space where many vendors gather together to provide food products popular in the culture, including fish, birds and animals. In China, they like to purchase their dinner ingredients alive, then have them killed to take home fresh. Imagine a busy market with cages of live birds and animals plunked on top of each

other. You can then imagine very stressed animals pooping out viral-laden stuff onto the cages below. Human hands have to deal with the animals and their poop.

It has not been made clear that the Wuhan market sold bats. However, a strange mammal called a pangolin was for sale there. Pangolins are armor-plated like an armadillo, and are ant eaters. They have been demonstrated to be infected with the coronavirus, almost certainly given to them by bats. So a speculation is that someone picked up SARS-CoV-2 from a pangolin in the market, and then began spreading to family and neighbors. The first reported case of COVID-19 reportedly had no connection with the wet market. That isn't important, since we know that people can be infected and can be contagious without having any symptoms that bring them to medical attention. Someone from the market could have been infected and easily passed it along to the patient who first surfaced.

Or someone could have been infected in the lab and passed it along. Or SARS-CoV-2 could have gotten to us some other way. I have no doubt but what the origins of the virus will be carefully studied, but we may never know for sure. It is clear from genetic studies, however, that the virus is of natural, not man-made, origin.

There has been a hue and cry from groups like the World Wildlife Fund and even the Chinese government to close down wet markets all over China since they seem to be such a likely place where animal viruses can come over to the human population. That appeals to us, of course, who aren't comfortable with thinking about where our meat comes from. But wet markets provide food for huge cities, provide jobs and income. Importantly, they are long-standing parts of the culture. It is very difficult to change culture. So barring a police action, wet markets will probably survive.

Beyond the wet market conundrum, there is this: the human race is ever-expanding in number and therefore in the need to harness previously wild land for our living needs. That inevitability means we are probing into wilderness with animals and microbes we as a race haven't experienced before. Then there is the crowding of peoples together. And there is the modern phenomenon of travel. These mean rapid mixing of peoples in one place and from one part of the earth to another...together, of course, with the microbes we are carrying.

These are the reasons why we have all these infectious diseases emerging among us, and why we can absolutely count on seeing many more, including some more really nasty ones, in the future. We sure do need to be better prepared for these inevitabilities.

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