



# NATIONAL VETERINARY LABORATORY

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## NEWSLETTER

### Science Matters!®

#### Summer 2020

Evelyn E. Zuckerman, Editor

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#### In This Issue:

The Summer 2020 NVL Newsletter will stress, that in this turbulent time in the world, **SCIENCE MATTERS!** This is not meant to be a political Newsletter but, as veterinarians (veterinary scientists) our profession must champion scientific data versus ideological, political, or even religious push-back on science in governing our approach to our profession, and now the fight against the pandemic caused by the SARS-CoV-2 virus causing the disease COVID-19. We must understand the science behind how we interact with our clients, their animals and the general public as safely as possible. It is not the time for science fiction.<sup>1</sup> Anti-science beliefs have increased within the past 10 years, mainly due to the internet, where anyone can post “publish” opinions masquerading as scientific facts.

#### Introduction:

SARS-CoV-2 spillover from Wuhan, China (below), occurred only 8 months ago and has changed the world, possibly forever. Wuhan is the capital city and the largest city in Hubei Province, the most populous city in Central China, with over 11 million people, more than New York City. It has world-class industrial and medical research institutions, and is by no means a frontier city. Our veterinary profession has weathered the pandemic storm, probably because we have been schooled in epidemics, pandemics and “herd immunity.” We are an essential profession caring for pet and domestic animals and are members of research teams around the world. We now find ourselves in the middle of the pandemic since there are increasing reports of pet cats and dogs, infected in



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their households, by their SARS-CoV-2 infected owners. After almost a 3 month “lockdown” in parts of this country, several states, New Jersey and New York, with the highest incidences, have reduced the numbers of new infections and deaths dramatically. However, more than 35 states, with initial lower incidences, are now having dramatic increases of infections as they try to reopen their economies. What does this mean for veterinary practices? It seems prudent to follow the science recommendations of the AVMA, CDC, WHO, and

other professional associations, who recommend continued caution and preventive measures.

#### WHO Director-General declares COVID-19 a pandemic on March 11, 2020

Dr. Tedros Adhanom Ghebreyesus, the WHO director-general, made the assessment that COVID-19 has the properties of a pandemic. He emphasized that WHO called every day for countries to take urgent and aggressive action. **“We have rung the alarm bell loud and clear.”** After reviewing earlier reports, it is apparent that the first COVID-19 case occurred on November 17, 2019 in another city in Hubei Province, a month earlier than the first case in Wuhan, and was not linked to the Wuhan animal market.

#### Update of SARS-CoV-2 Transmission

An open letter, published on July 6, 2020, from 239 health scientific experts calls attention to a neglected form of transmission and urges the WHO to consider this mode of transmission. The letter’s title is: ***It is Time to Address Airborne Transmission of COVID-19.***<sup>4</sup> In the past, only two types of SARS-CoV-2 transmissions were emphasized: inhaling respiratory droplets from an infected person in your immediate vicinity or - less common - touching a contaminated surface and then your eyes, nose or mouth. Now, in this letter the experts argue that, like other respiratory viral diseases, SARS-CoV-2 can also be spread by micro-droplets (microscopic respiratory droplets) up to several meters, or room scale, and may explain the “super-spreader” reports. This is unlike the known heavier respiratory droplets that don’t travel more than 6 feet before settling which was the reason for the 6-foot social distancing recommendation. Although the heavier droplets are the major vehicle for spread, the micro-droplets increase the distance of SARS-CoV-2 viral spread and should be taken into account when considering prevention methods. This is an important factor to consider for re-opening indoor dining and for veterinary hospitals.

The experts recommend the following measures to be taken to mitigate airborne transmission:

1. Provide sufficient, effective ventilation (supply clean outdoor air, minimize recirculating air) particularly in public buildings, workplace environments, schools, hospitals, and care homes.
2. Supplement general ventilation with airborne infection controls such as local exhaust, efficient air filtration, and germicidal ultraviolet lights.
3. Avoid overcrowding, particularly in public transport and public buildings.

#### Opening Thoughts:

By William D. Hardy, Jr., V.M.D.

As I began to formulate my thoughts for the Summer Newsletter on July 6<sup>th</sup>, I remembered it is on this day scientists celebrate World Zoonoses Day, which honors the first vaccination against rabies administered by Louis Pasteur on July 6, 1885, 135 years ago. This pandemic is a harsh reminder of the persistent threat posed by zoonotic pathogens. Sixty percent of human pathogens come from animals, while 75% of new, emerging and re-emerging diseases are zoonotic. Worldwide, it is estimated that around 2.6 billion people suffer from zoonotic illnesses and around 2.7 million die from these diseases every year.<sup>2</sup> How coincidental, that our laboratory concentrated, over the past 20 years, on testing for *Bartonella*, a zoonotic bacterial pathogen and we are now in the midst of one of the worst viral pandemics, the COVID-19 disease caused by the coronavirus SARS-CoV-2. And yet, despite the CDC guidelines, USA infections >3,000,000 and >130,000 (4.3%) deaths, the effect on the US economy, the stress on medical systems, there are many Americans who feel the pandemic is hyped by scientists, medical experts and the press.

#### Science and Anti-Science History:

**Science definition:** Science is the investigation of natural phenomena through observation, theoretical explanation, and experimentation, or the knowledge produced by such investigation. Science makes use of the scientific method, which includes the careful observation of natural phenomena, the formulation of a hypothesis, the conducting of one or more experiments to test the hypothesis, and the drawing of a conclusion that confirms or modifies the hypothesis.

**Anti-Science** is a philosophy or way of understanding the world that rejects science and the scientific method.<sup>3</sup> People holding antiscientific views do not accept science as an objective method that can generate universal knowledge. Many Americans feel they are entitled to their own views on diseases and their liberty and rights are at stake, if they must comply with rules established, with the guidance of scientists, by government entities. The internet is greatly responsible for the surge in anti-science thinking in the world, where anyone can post information on any subject whether it is correct or not.

**Politics and Anti-Science** The previous administration established a White House

Pandemic Response Team, after the SARS and MERS outbreaks, which was disbanded in 2018 by the present administration, with no plausible justification, just a year before the present pandemic struck. They also disbanded the Expert Committee on Invasive Species, whose budget was a mere \$1.5 million dollars a year, again with no explanation. And finally, they recently defunded America's contribution to the WHO in the midst of the pandemic. At this writing, 3 million Americans have been infected with SARS-CoV-2, the virus that causes the disease COVID-19, and more than 130,000 Americans have died of the disease and the pandemic remains out of control. **Great Britain:** The British Prime Minister expressed his opinion that the COVID-19 pandemic was nothing to fear and flaunted much of the medical advice at the start of the pandemic. He became infected and had a relatively severe disease before recovering and now seems to be abiding by scientific advice.

**Brazil:** The president of Brazil, an anti-science devotee, allowed the pandemic to increase alarmingly in his country, through misinformation and neglect, by not adhering to medical advice. He also recently became infected with SARS-CoV-2 and is being treated with the clinically tested, but proven ineffective drug, hydroxychloroquine.

**United States:** Our administration, from the beginning of the pandemic, sought to downplay the dangers, calling it a bad flu, a hoax, and giving advice that was contrary to their own Pandemic Advisory Committee regarding lock downs, wearing face masks, and social distancing. Misinformation and disregard for scientific findings has contributed greatly to the >3,000,000 infected Americans (about 1% of the American population) and >130,000 deaths. **Other Countries:** Many other countries, including China, Japan, countries in Europe, Australia, and New Zealand have followed scientific and medical advice and have their pandemics under control at this time.

**Anti-vax Groups:** Many people presently don't use vaccines and a recent poll showed that 30% of Americans would not take a SARS-CoV-2 vaccine if, and when one, is developed.

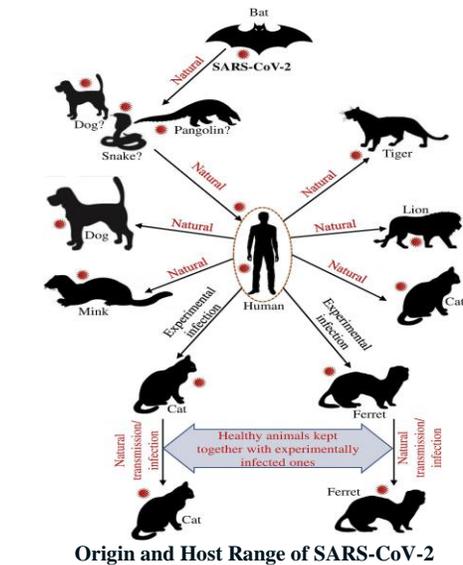
## Science Matters:

### Animals and SARS-CoV-2 and COVID-19 Reverse Zoonotic Updates:

There are increasing reports of SARS-CoV-2 infections of cats and dogs from their infected owners.<sup>5-19</sup> There is no evidence, to date, of reverse zoonoses by SARS-CoV-2 from infected cats or dogs to people. However, as with many other aspects of this pandemic, we still do not know conclusively if this is possible.

#### SARS-CoV-2 Naturally-Infected Animals

	Animal	Date	Location	Ref.
1	Cats	1-2020	Wuhan	6
2	Dog	2-28-20	Hong Kong	7,8,9
3	Dog	3-18-20	Hong Kong	10,11
4	Cat	3-27-20	Belgium	12
5	Cat	3-31-20	Hong Kong	13
6	Tigers	4-5-20	New York	15
7	Lions	4-15-20	New York	15
8	Mink	4-2020	Netherlands	16,17
9	Cat	4-21-20	New York	15
10	Cat	4-21-20	New York	15
11	Mink/Cats/Dog	4-23-20	Netherlands	16,19
12	Mink/Cats	4-25-20	Netherlands	18
13	Cat	5-29-20	France	14
14	Mink/Dog	6-17-20	Netherlands	18
15	Dog	7-1-20	Georgia USA	5



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### Natural Animal SARS-CoV-2 Observations:

In January of 2020, a group in China did a serological survey (see Table) of the natural infections of SARS-CoV-2 in pet and stray cats from Wuhan.<sup>6</sup> Serum samples were obtained after the COVID-19 outbreak, and 39 negative control samples taken before the outbreak. 15 of 102 (14.7%) cat sera collected after the outbreak were seropositive for SARS-CoV-2 virus by ELISA and by western blot. Among the positive samples, 11 had SARS-CoV-2 neutralizing antibody titers ranging from 1:20 to 1:1080. Three of the pet cats, with high neutralizing antibody titers, were owned by people with COVID-19 disease. This study demonstrated that the human SARS-CoV-2 virus infected pet and stray cats in Wuhan during the initial outbreak.

A February 2020 study from Hong Kong found 2 pet dogs, from separate households with people diagnosed with SARS-CoV-2 infection, to be infected. Neither dog showed clinical signs. In the Netherlands 3 cats and a dog, the dog had respiratory signs, were infected from an infected owner. Also, in the Netherlands, mink at >20 breeding farms showed signs of respiratory illness and were found to be infected with SARS-CoV-2. They likely were infected from farm workers. Subsequent studies found evidence of mink zoonotic spread to humans and that infected stray cats were responsible for spread of the virus between farms. **This implicates interspecies transmission, from cat to mink, and reverse zoonotic transmission, mink to human.**<sup>17,18,19</sup>

There are increasing reports (see Table) of animals, including pet cats and dogs, infected by exposure to infected owners in households in Europe, Hong Kong, and the United States. A cat living in Belgium with a COVID-19 patient tested positive for the virus and showed clinical signs of cough, shallow breathing, diarrhea and vomiting, signs similar to those seen in people with the virus.<sup>12</sup> A dog in Georgia was recently infected.<sup>5</sup> In France, a pet cat was also found to be infected while living with a COVID-19 owner. In New York, a veterinarian tested a cat due to mild respiratory signs. The cat was SARS-CoV-2 positive, but no person was positive for the

virus in the household. The cat must have been infected outside the household from a person or even from an infected cat in the area. Finally, at the Bronx Zoo in New York City, 4 tigers and 3 lions, who had been exposed to a COVID-19 positive zookeeper, developed respiratory signs and tested SARS-CoV-2 positive, all recovered.

### Commentary:

Studies found that pet cats, ferrets, mink, tigers, lions, hamsters, monkeys, and apes are susceptible to SARS-CoV-2 infection, whereas dogs are less so. Veterinarians must play significant One Health roles in protecting animals and humans from this SARS-CoV-2 spillover threat and more that are likely to emerge. It is only logical to speculate that reverse-zoonosis may occur from infected pet cats to their owners during periods of extended lockdown, despite no evidence that it has occurred. Can SARS-CoV-2 mutate in cats to effectively increase its infectious zoonotic potential? Even though the CDC, AVMA, and other organizations state that there is no evidence (yet) that cats can re-infect people, we need more studies to be sure.

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