SARS-CoV-2 infection of felids: COVID-19 case in a tiger in the Bronx zoo. The available evidence, unless there could have been another unknown source of SARS-CoV-2 (virus causing COVID-19), suggests that the animal caretaker who was asymptomatic or pre-symptomatic for SARS-CoV-2 infection, transmitted it to the tiger that was then confirmed positive in an RT-PCR test for the viral RNA (titer of viral RNA was not indicated) in respiratory specimens. Subsequently the other 3 sick tigers and 3 lions were also confirmed as positive for SARS-CoV-2 by testing of fecal samples. They reportedly had mild respiratory disease signs and no deaths and all have recovered. At present there is no report of the isolation of infectious SARS-CoV-2 from the animals or seroconversion (antibody detection in serum).

Infection of Cats. Cats are in the Felidae family with lions, tigers and other wild felids. A report from China (Shi et al Science 2020. DOI: 10.1126/science.abb7015) indicated that cats intranasally inoculated with a high dose of SARS-CoV-2 developed active infection, but with only mild overt clinical signs noted. The report on tigers and the experimental infection of cats suggest that some felids may become infected by SARS-CoV-2, either related to a very high dose of inoculated virus or repeated daily exposure to a SARS-CoV-2 infected owner or caretaker. Besides an infected cat reported in Belgium and in Hong Kong, the first evidence for the infection of 2 pet cats in the US with SARS-CoV-2 was reported by the CDC and NVSL. Both cats had mild respiratory illness and were from NY. One was from a household with no members confirmed ill with COVID-19 (but potentially asymptomatic or mildly ill) and the second from a prior COVID-19 infected household in which another cat showed no illness. The CDC guidelines related to care of cats in COVID-19 quarantined households or by owners with COVID-19 is described below.

Based on this information, staff caring for all non-domestic felids in zoos should not care for the animals if they suspect or develop COVID-19 infection and they should use masks, gloves, etc when caring for the animals to avoid possible transmission of COVID-19 to the felids. If a felid shows clinical signs like the ones reported in the zoo, then that animal should be immediately isolated and quarantined for 2 wks or until tested for COVID-19 and proven negative.

It is important to note that the related coronavirus (80% genetic identity), SARS CoV-1 that caused SARS in 2003 also experimentally infected cats and a few natural infections of cats during the SARS outbreak were reported. However no widespread cases were reported in cats and there was no evidence for the spread of SARS from cats to humans.

Although COVID-19 likely originated from an animal source (suspect bats), this does not mean that all animals can be infected with or transmit COVID-19. Not all coronaviruses
(CoVs) cross-infect other species and some are more species specific. Dogs and cats are susceptible to infections with canine or feline strains of CoVs. They mainly cause gastrointestinal and respiratory disease, and in some cats, a systemic disease (FIPV). None of these CoVs infect humans.

**Infection of Dogs.** Pets that live together with infected persons may be highly and repeatedly exposed to SARS-CoV-2 if no precautions (mentioned below) are taken. However only a few cases are reported (at present 2 dogs in Hong Kong) where the pet has been infected by owners with COVID-19. The dogs did not show clinical signs and they tested weakly positive for SARS-CoV-2 RNA in nasal swabs; in one, live virus was isolated suggesting an active infection (Sit et al Nature, in press). Attempts to experimentally infect group-housed dogs in China with SARS-CoV-2 (Shi et al Science 2020. DOI: 10.1126/science.abb7015) resulted in detection of viral RNA in a few specimens, but failed to confirm an active infection based on detection of infectious virus in the dogs. Thus the experimental dog exposures could reflect environmental virus contamination, since the diagnostic assay used to detect viral RNA is extremely sensitive and the dogs were group housed.

An important point is that there is no evidence to date that dogs or cats can spread COVID-19 to humans.

**CDC Guidelines for pets in COVID-19 infected households.** The CDC has posted guidelines related to pets if you or a family member have COVID-19 (https://www.cdc.gov/coronavirus/2019-ncov/prepare/animals.html). These remain precautionary as would be advised for any new emerging disease where only limited information is available, until additional scientifically validated data is obtained. For the present, do not let pets interact with people or other animals outside the household and keep cats indoors when possible. As far as walking your dog, it should be on a leash and both of you should practice social distancing (6 feet)! The owner should remove the feces hygienically in plastic bags from the environment and immediately wash their hands or use hand sanitizer. Avoid dog parks and public places with other dogs or people.

The CDC recommends that people sick with COVID-19 limit contact with both family members and their pets (petting, being licked, sharing food or dishes and utensils) and wear a mask if possible during the quarantine period. In general, besides for COVID-19, for good hygiene you should always wash your hands before and after contact with pets.

Another precautionary measure is that if you are quarantined at home, the pet should be confined at home as well during the probationary period since it appears that virus shedding in humans can occur prior to the onset of symptoms. If the household with a cat is quarantined then the cat should remain indoors for the same quarantine period and thereafter when possible. Ideally you should prearrange for someone else to care for your pet if you are hospitalized with COVID-19 and have an adequate supply of pet food on hand.