

## **First report of canine distemper in the Andean fox (*Lycalopex culpaeus*) in Ecuador**

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The Andean fox is the second-largest canid in South America, typically difficult to see due to its nocturnal habits and rustic brown and grey fur. It is native to western South America, from southern Colombia to Tierra del Fuego (Jiménez et al., 1995). The Andean fox, as well as other members of the Canidae family, face human/animal conflicts in areas where it preys on young livestock and poultry (Castellanos et. al, 2020). Farm owners deal with the natural predator/prey relationship by killing the predator instead of properly securing their farms or implementing a livestock guardian dog program. Besides, Andean foxes are hunted for their tails in Ecuador because they are considered good luck charms according to popular belief. Nonetheless, the Andean fox has been classified as Least Concern by the IUCN (Luchereni, 2016).

Canine distemper virus (CDV) is a pantropic Morbillivirus with a worldwide distribution that causes a lethal disease in dogs. Infected animals develop dyspnea, diarrhea, neurological symptoms, and immunosuppression. The systemic infection by CDV, which resembles distemper in domestic dogs (Beineke, 2015), can also be found in animals other than dogs. Both natural and experimental CDV infection has been reported in animals belonging to various orders including Carnivora (twelve families), Rodentia (four families),

Primates (two families), Artiodactyla (three families) and Proboscidea (one family) (Martinez-Gutierrez & Ruiz-Sáenz, 2016).

Canine distemper has been reported in some wild South American carnivores including jaguars (*Panthera onca*) and pumas (*Puma concolor*) (Nava *et al.*, 2008). Several *Pseudalopex sp.* have also tested positive via serology testing, and in few cases CDV has resulted in the animal's death (Moreira and Stutzin, 2005).

These findings led us to suspect that the Ecuadorian Andean fox, *Lycalopex culpaeus*, might also be susceptible and/or is being exposed to CDV due to the presence of feral dogs in our study areas.

In the present study, five Andean foxes were captured using Tomahawk traps within the *Cayambe Coca National Park* and in the *Pasochoa Wildlife Refuge* of Ecuador as part of a radio-telemetry and health study. All captures were approved by the Ecuadorian Ministry of Environment. Following capture, the animals were anesthetized using a combination of Ketamine hydrochloride and Xylazine hydrochloride. Once the animals were safe to be handled, they were removed from the trap and subjected to a thorough physical examination. Specimens were also monitored for body temperature, heart and respiration rates, and presence of ectoparasites. Biological samples including blood, serum, and feces were collected for assessing health status and disease exposure. Out of five captured animals, two were fitted with a radio collar. Analysis of serum samples from a male Andean fox named "Tash" (Fig. 1) using the Antigen Rapid CDV/CAV Ag Test Kit revealed that he was positive for CDV on August 3<sup>rd</sup>, 2019.



**Figure 1.** "Tash", a young male Andean Fox fitted with a radio-collar and positive for CDV. This animal presented a mature abscess on the right jaw some months after its capture. Photo by Carlos Navarro.

On November 2019, upon visual examination "Tash" was found to have developed abscesses on both jaws, near the parotid region. One of these abscesses had spontaneously opened. Attempts to recapture the animal to

treat the abscess were unsuccessful; and it was found dead on December 10, 2019. The carcass had deteriorated significantly, and no necropsy was conducted; however, we suspect that the abscess might have become infected, leading to sepsis and death.

This is the first report of CDV infection in the Andean fox in Ecuador. Since CDV can affect several species, we suspect that other wild carnivores including the Andean bear (*Tremarctos ornatus*) may be at risk of CDV infection. Although some species of bears have been reported to be exposed to CDV via serological tests, clinical manifestation of distemper in ursids is rare (Beineke, 2015). However, CDV infections have caused deaths of Giant Pandas (*Ailuropoda melanoleuca*; Fen et al. 2016) and of a captive neonate Andean bear (Schönbauer *et al.*, 1985).

Currently, at least nine lineages of CDV have been reported and two variants of the virus have been discovered in South America. One was found in Colombia and another in Ecuador, both classified as the South America 3 lineage (Abarca *et al.*, 2015). Despite the widespread occurrence of CDV in the region, few feral dogs were vaccinated against CDV. Furthermore, vaccination of wild carnivores is often controversial since host-pathogen interaction modifications can impact in host population abundance, which in turn can have an impact in ecological communities (Artois *et al.*, 2011). We suspect that the risk posed by infected domestic dogs is widespread in Ecuador and warrants immediate attention (Cespedes *et al.*, 2010; Panzera *et al.*, 2015). Even if vaccination programs for domestic dogs are implemented, the growing population of feral dogs inside and around national parks implies a high risk of disease transmission to the Andean fox and other wild carnivores (Cleaveland *et al.*, 2002). Therefore, there is an urgent need to: conduct systematic studies focused on the surveillance of domestic dogs, as well as in wild carnivores going in and around various protected areas in Ecuador; and to document the different variants of CDV in these populations, to get a better understanding of the factors influencing spread of infection between species (Berríos & Pincheira, 2016).

Finally, urgent action is needed to control populations of feral dogs near protected areas through sterilization. Failure to implement these actions may threaten the survival of the Andean fox and other wild carnivores in Ecuador.

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