Toxoplasma gondii and other zoonotic endoparasites in foxes and lynx in Arctic and Subarctic Québec, Canada

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ABSTRACT:
The Canadian North is undergoing unprecedented climate and landscape change, which may alter distribution and prevalence of parasites. Understanding current trophic relationships and parasite ecology is key to predicting the potential for altered zoonotic risks for northern human populations. We are establishing baseline host and geographic distributions for zoonotic endoparasites of wild carnivores in Nunavik and subarctic regions in Québec, including helminths such as tapeworms (Echinococcus multilocularis and E. granulosus/E. canadensis), roundworms (Trichinella and Toxocara spp.), and protozoans (Toxoplasma gondii, Giardia, and Cryptosporidium spp.). Carcasses of red and arctic foxes (Vulpes vulpes, V. lagopus; n=227), and lynx (Lynx canadensis, n=81) were collected by trappers during the winter of 2016/2017. We used morphological, molecular, and immunological methods to detect zoonotic parasites. Fecal samples were analyzed by sugar flotation to detect parasitic eggs. Real-time PCR and melting curve analysis were used to detect and identify DNA from coccidian species in feces. Adult worms were collected from the small intestines by the scraping, counting, and filtration method. We detected DNA of T. gondii in foxes and lynx using a magnetic capture technique on brain and heart tissues. Lynx are the proposed definitive host of T. gondii in subarctic regions, but intestinal infection has not been definitively demonstrated. As high trophic level carnivores, fox and lynx provide a better idea of distribution and transmission of zoonotic parasites, especially foodborne parasites, in northern ecosystems. This work generates significant information on status of zoonotic parasites in wildlife of Québec, which will inform future predictive models.