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## Oral Papillomatosis in Canada Lynx (*Lynx canadensis*)

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**ABSTRACT:** We observed 11 cases of oral papillomatosis among 48 free-ranging Canada lynx (*Lynx canadensis*) that had been shipped to Colorado for translocation purposes. Lesions were 1–3 mm, multifocal, nonpigmented sessile masses and occurred on the ventral lingual surface. Adverse clinical signs were not observed. Six of the 11 cases resolved and the remainder appeared to be self-limiting when affected animals were examined  $\leq 4$  mo later. New cases did not develop in previously unaffected lynx while in captivity. Histopathologic lesions included marked hyperplasia of the mucosal epithelium causing thickening of the stratum spinosum and corneum. Ballooning degeneration of epithelial cells with intracytoplasmic inclusions were observed. Papilloma virus was found on negative contrast electron microscopy. Papillomatosis was seen in lynx from three geographically distant sources (British Columbia, five of 21 individuals; Quebec, five of 17; Yukon, one of four) suggesting the causative virus may be widespread among North American lynx populations.

**Key words:** Canada lynx, case report, *Lynx canadensis*, papilloma virus, papillomatosis.

Papillomas are mucous membrane and skin tumors commonly found in a wide range of host species (Sundberg et al., 2001). These tumors are generally caused by papillomavirus (PV), a double-stranded DNA virus. Among wild carnivores, oral papillomatosis has been reported in coyotes (*Canis latrans*) (Samuel et al., 1978; Sundberg et al., 1991; Fitzgerald et al., 2000), wolves (*Canis lupus*) (Samuel et al., 1978), and Asian lions (*Panthera leo persica*) (Sundberg et al., 1996). There are relatively few reports of PV infections in the felid family (Sundberg et al., 2001). Here we report cases of oral papillomatosis in free-ranging lynx (*Lynx canadensis*).

Free-ranging lynx captured in British

Columbia, Quebec, and the Yukon Territory, Canada, during December 2003–February 2006 were translocated to southwestern Colorado, USA, as part of a lynx recovery project (Colorado Division of Wildlife, 2002). Eleven of 48 lynx received in Colorado presented with oral papillomatosis during their entry examination. Lynx from all three sources were affected (British Columbia, five of 21; Quebec, five of 17; Yukon, one of four). Lesions were 1–3 mm, multifocal, nonpigmented sessile masses located on the ventral lingual surface (Fig. 1A). No adverse clinical signs of oral papillomatosis were observed during the  $\leq 4$  mo period that lynx were held for preconditioning. At the prerelease examination, six of the 11 cases had resolved, and the remainder appeared to be self-limiting, but had not completely resolved. New cases did not develop in previously unaffected lynx during their time in captivity.

Selected representative masses from affected lynx were excised and fixed in 10% neutral buffered formalin or placed in virus transport media (Minimum Essential Medium [Irving Scientific, Santa Ana, California, USA] with 1% HEPES buffer (Irving Scientific), 2% fetal bovine serum (Hyclone, Inc., Logan, Utah, USA), 100,000 units of penicillin G (Sigma Chemical Company, St. Louis, Missouri, USA), 40 mg/ml gentamicin (Sigma Chemical), 50 mg/ml kanamycin (Sigma Chemical), 8 mg/ml tylosin (Sigma Chemical), 5 mg/ml amphotericin B (Sigma Chemical)). Fixed tissues were processed for histopathology by standard methods and stained with hematoxylin and eosin for light microscopic examination. Histopathologic lesions included marked hyperplasia of the mucosal epithelium causing

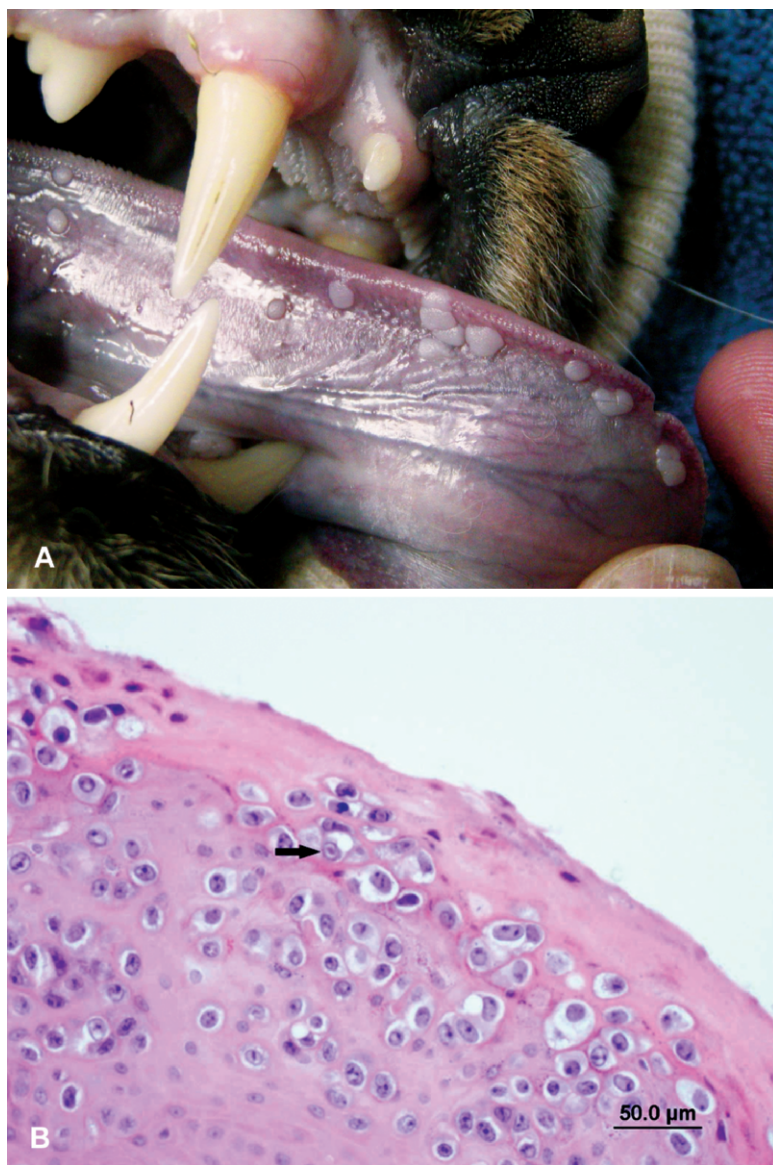


FIGURE 1. Oral papillomatosis in Canada lynx. A. Gross lesions were multifocal, nonpigmented sessile masses located on the ventral lingual surface. B. Microscopic lesions included marked hyperplasia of the mucosal epithelium with ballooning degeneration of epithelial cell and intranuclear inclusion bodies (arrow).

thickening of the stratum spinosum and corneum. Multifocal areas of cellular swelling within the stratum corneum with ballooning degeneration were consistent features. Epithelial cells in the superficial layers of the spinosum contained pale basophilic intranuclear inclusions with margined chromatin. Multifocal mild epithelial erosion was occasionally ob-

served. In the underlying mucosal propria, there were a few perivascular lymphocytes, plasma cells, and macrophages. Papilloma virus was observed on negative contrast electron microscopy (EM) of fresh tissues preserved in virus transport media (Fig. 2).

The lesions observed in the lynx are similar to those described in the Asian lion

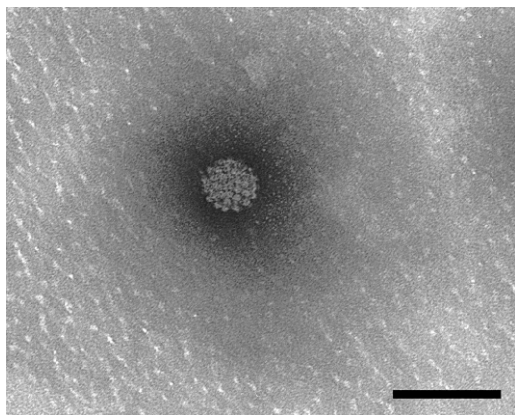


FIGURE 2. Negative contrast electron micrograph of affected tissue showing papilloma virus particle. Bar=100 nm.

(Sundberg et al., 1996). In contrast, lesions in coyotes with papillomatosis are often pedunculated or cauliflower-like masses involving the tongue, lips, and oral mucosa (Trainer et al., 1968). Oral papillomatosis in coyotes is characterized as a mild to severe disease (Samuel et al., 1978), and in some cases can interfere with feeding (Trainer et al., 1968). In the lynx papillomatosis cases, the lesions were mild and were completely self-limiting in six of the animals. Cases of papillomatosis were seen in lynx from British Columbia, Quebec, and the Yukon, suggesting the causative virus might be widespread among North American lynx populations.

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