Case report: tuberculosis in introduced American Mink *Mustela vison*

Pablo MARTINO, Mercedes GATTI, Emilia BAUTISTA and Nestor STANCHI

The American Mink *Mustela vison* is not a native species in South America: it was imported to Argentinean farms in the 1920s. Since then, an unknown number of animals have escaped, creating the population of free-ranging mink. Tuberculosis (TB) is a re-emerging zoonotic disease with a wide range of potential hosts (Davis *et al*. 1981). The causative agent of bovine tuberculosis, *Mycobacterium bovis*, is found among a great variety of animals, and transmission to humans constitutes a public health problem. Several authors stated that TB is frequent in captive animals (Wenzel 1982, Nordstoga 1992, Stetter *et al*. 1995). TB can cause severe loss in mink farms (Zimmermann 1972, Martino & Villar 1991) but very little information is available on naturally occurring diseases of wild mink, although there are a few reports of bovine TB in captive and free-ranging canids (Williams & Thorne 1996).

In this report we describe the pathologic findings in two adult dead mink (a 7-yr-old male and a 2-yr-old female) in the last two years during a logging operation in the province of Buenos Aires, Argentina. Carcasses were discovered at different times and locations. At necropsy, the animals were extremely thin (male: 1.4 kg and female: 1.25 kg) and had only thin fur. Multifocal tuberculous lesions (1–2 mm grey or yellowish nodules) were found in different organs and systems, mainly in the lungs, liver, spleen, intestine and mesenteric lymph nodes (Fig.1). Gross necropsy, histological examination including use of Zielh–Neelsen stains, and mycobacterial culturing showed evidence of mycobacterial diseases in both animals. The lesions were fixed in phosphate-buffered 10% formalin, embedded in paraffin, sectioned at 6 µm, and stained with haematoxylin and eosin for light microscopy. Histological examination revealed nodules of varying size separated by dense connective tissue stroma, but typical giant cells of the Langhans type were absent (Fedorov & Domnin 1977, Beck *et al*. 1974, Martino & Villar 1991). Examination of Zielh–Neelsen stained slides of samples revealed numerous acid-fast bacilli bacteria, and aerobic bacterial and mycobacterial culture results were also positive. Histological examination of Zielh–Neelsen stained sections showed numerous acid-fast bacilli bacteria in the pulmonary granulomas, lymph nodes and gastrointestinal organs, and *M. bovis* was consistently isolated from the granulomas. Tissue samples were decontaminated with cetylpyridinium chloride and then inoculated onto pyruvate supplemented 7H11 medium and Lowenstein Jensen media. The strains were identified as *M. bovis* by the following bacteriological criteria: growth stimulation by pyruvate, growth inhibition by thiophen, negative for nitrate reductase and pyrazinamidase activity, and smooth colony morphology. The cause of death was, therefore, determined as disseminated TB, on the bases of cytological and histological examinations, and on culturing test.

Generalisation may sometimes occur, especially when the infecting agent is *M. bovis,* which is more pathogenic both in mink and canids than the avian type (Nordstoga 1992). The predominance of lesions at advanced stages (pulmonary and digestive tract infection) observed in both cases, is either suggestive of an oral (via contaminated feed or water) or respiratory route. The natural route of infection is probably peroral in 90% of mink cases (Beck 1974, Nordstoga 1992). Wild canids are susceptible to bovine TB, but the disease is rare in these species in the wild, except where common in their prey (Williams & Thorne 1996). The two principal routes for TB in animals are respiratory and alimentary, but the relative importance of each route varies between and within species under the influence of factors such as age, nature of diet and behaviour (Jackson *et al*. 1995). Thus, the source of the infection could not be easily disclosed here. Nevertheless, mink from the area studied might probably contract TB via eating infected raw bovine or lagomorph carrion, or via eating insects from point-source cowpats, as it was suggested for Eurasian Badgers *Meles meles* (Hancox 1995). TB has been repeatedly diagnosed in another introduced species, the European Brown Hare *Lepus europaeus* from our country (Kantor *et al*. 1984), where bovine TB is still a major infectious

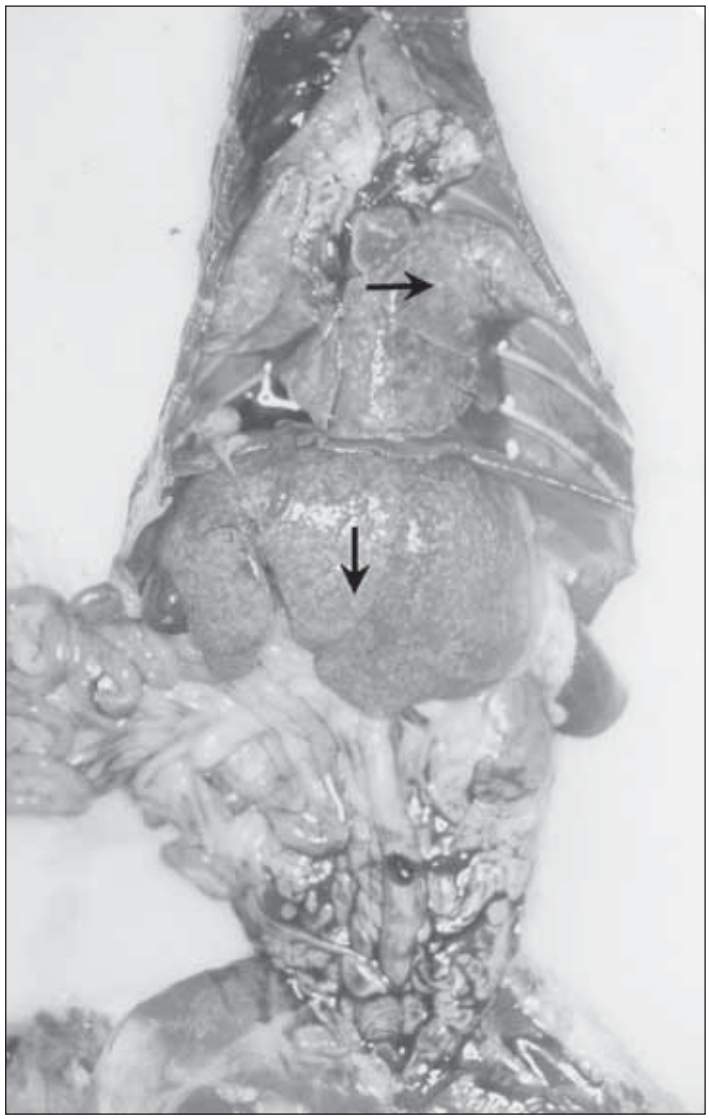

Fig. 1. Disseminated TB in introduced mink with multiple granulomatous nodules in lungs (horizontal arrow) and liver (vertical arrow).

disease among cattle (Kantor & Alvarez 1991, Van Soolingen *et al*. 1994). Wild animal TB represents a permanent reservoir of infection and may pose a serious threat to a disease control and elimination programme. According to Cosivi *et al*. (1998) infection occurs when wild (e.g., mustelids, including badgers; possums) and domesticated animals share pasture or territory.

Deoxyribonucleic acid (DNA) fingerprinting will be performed to compare *M. bovis* strains from these two mink with current bovine isolates from the area. Results could indicate if mink and bovine strains are genetically similar or not, and thus, disclose the responsibility in the infections.

A better understanding of the pathogenesis of TB in introduced mink will also come as our knowledge of details of routes of infection and the immunological response mechanisms improves (Jackson *et al*. 1995).

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Microbiology Department–CIC, Veterinary College,
La Plata University,
CC 296, 60 y 118, (1900) La Plata, Argentina
Email: pemartino@yahoo.com