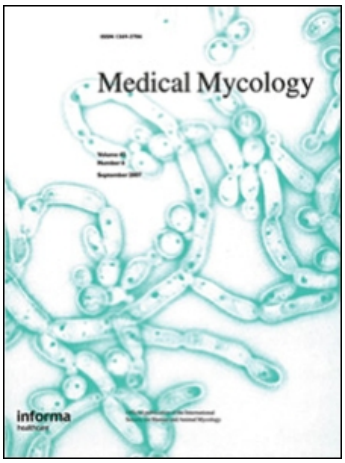

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Mycotic pneumonia caused by Fusarium moniliforme in an alligator

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Mycotic pneumonia caused by *Fusarium moniliforme* in an alligator

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Fatal pulmonary infection in a captive alligator (*Alligator mississippiensis*) is reported. At necropsy, the animal appeared to be in excellent nutritional condition, but a severe necrotizing bronchitis with bronchiectasis was present. Histological examination revealed numerous branched, septate, hyaline hyphae within the necrotic debris lining the bronchi and rarely infiltrating into the adjacent stroma. The fungus cultured from the lung was identified as *F. moniliforme*.

There are several reports of mycotic infections in the Order Crocodilia. The integument and lungs are the two organ systems most commonly involved [8]. *Trichophyton, Aspergillus, Mucor, Rhizopus, Trichosporon,* and *Fusarium* spp. have been isolated from cutaneous lesions [8, 9]; *Candida albicans, Acremonium* (= *Cephalosporium*) and *Mucor* spp. have been isolated from pulmonary lesions [8]. Previous reports of mycotic pneumonia in captive American alligators (*Alligator mississippiensis*) cited *A. fumigatus* and *A. ustus* [8], and *Beauveria bassiana* as etiologic agents [5, 6]. This report documents the first case of fatal pulmonary infection caused by *F. moniliforme* in a captive alligator.

A 114-kg male alligator was submitted to the Regional Veterinary Laboratory, Airdrie, for necropsy. The animal had been housed at the zoo, Calgary, Alberta, for 3 years. The ambient temperature of the exhibit measured between 18 and 24°C with a humidity less than 50%. The exhibit had a concrete floor with a small associated pond. Suspended above the floor were branches from local trees and Spanish moss imported from North Carolina. The animal was housed with two other alligators, one male and one female. They were fed weekly a mixture of herring, rats, and guinea pigs. No clinical signs were present before death.

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At necropsy, the animal appeared to be in excellent nutritional condition and had large amounts of abdominal and subcutaneous fat. The heart, thyroid gland, liver, testis, skeletal muscle, and subcutaneous fat showed no abnormalities. Significant findings were limited to the lungs, the surface of which was irregular. On the cut surface, there were multiple 2–4 mm pale white necrotic foci scattered throughout the parenchyma. There was bronchiectasis and emphysematous bullae formation. Many dilated bronchi were lined with white plaques of fungal hyphae (Fig. 1). The upper respiratory tract including the trachea and major bronchi showed no lesions.

FIG. 1. Lung lobe from alligator with mycotic pneumonia. Note dilated bronchi and bullae lined with white masses of fungal hyphae.

Histologically, many bronchi and alveolar septa were lined with a dense thick layer of degenerating mononuclear acidophilic cells. Underlying this layer was a zone of infiltrating macrophages, lymphocytes and giant cells. There was necrosis of the adjacent epithelium with edema and inflammatory cell infiltration of the underlying stroma. Segmental vascular necrosis and thrombosis were present. A rare granulomatous focus consisting of acidophilic debris surrounded by macrophages, lymphocytes, and giant cells was present in an alveolar septum or in the stroma adjacent to the bronchus. Sections of lung stained by periodic acid-Schiff and Gomori's methenamine silver methods demonstrated a linear zone of hyaline, septate, occasionally branched hyphae embedded in the outer periphery of the dense layer of acidophilic cells lining bronchi (Fig. 2a). Fungal elements did not penetrate the bronchiolar basement membrane. An unusual finding was the presence of numerous conidia produced singly or in short chains within the lumen of the bronchioles (Fig. 2b).

A *Fusarium*-like fungus was isolated from the lung. On subculture at the University of Alberta Microfungus Collection on Phytone yeast extract agar (BBL) and on Pablum cereal agar [13] incubated at 25°C, the fungus (UAMH 4950) measured 90 mm in 14 days and was dense, cottony to felted. Colonies derived from single germinating conidia were initially creamy white, darkening to lavender, with a dark violet surface growth, reverse violet. Conidiophores were lateral, simple to sparingly

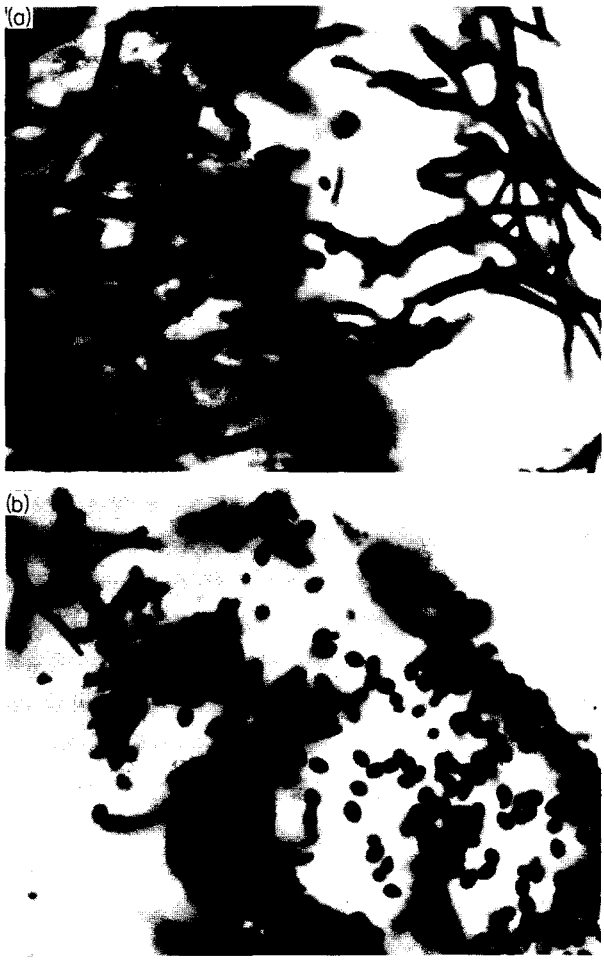

FIG. 2. *Fusarium moniliforme* in lung. (a) Numerous branched hyphae in the outer lining of the bronchi. (b) Numerous conidia produced singly or in short chains in the lumen of the bronchioles. GMS, ×1000.

branched, bearing subulate monophialides, 20–30 μm long, 2–3 μm wide at the base, tapering to 1–1·5 μm diameter at the tip. Microconidia were produced abundantly, adhering in heads or occurring in short chains, and were hyaline, single-celled, clavate, 2–3×4·5–10 μm.

Because microconidial chains were rare, the fungus was thought to be either *F. oxysporum* or *F. moniliforme.* The presence or absence of microconidial chains is an important characteristic differentiating species of *Fusarium* Section *Liseola* [12]. Confirmation of the isolate as *F. moniliforme* was made at the Fusarium Research Centre, Pennsylvania, by growing the fungus on 1·5% water agar containing KCl (8 gl^{-1}) to induce formation of microconidial chains [4]. When grown on carnation leaf agar [12], the fungus produced macroconidia and monophialides typical of *F. moniliforme.*

Species of *Fusarium* are among the most common fungi encountered in soil and on dead and living plant material; *F. moniliforme* occurs widely in tropical and subtropical regions as a pathogen of a range of hosts including rice, sugar cane, banana, cotton, maize, etc. [3]. There are numerous reports on the toxicity of *F. moniliforme,*

and on mycotoxicoses in farm animals following exposure to contaminated feeds [2, 7, 10, 11, 14].

Despite the widespread occurrence of *F. moniliforme*, invasive infections in man and animals are relatively rare [1, 15, 16]. Austwick [1] correlated *Fusarium* infections in vertebrates with the stress of confinement, and suggested that the high incidence of cutaneous infections, particularly in aquatic reptiles, may be due to contaminated water. In the two reports of pulmonary infection caused by *B. bassiana* in captive alligators, stress brought about by sudden changes in the ambient temperature of the pens was considered to play a role in the infections [5, 6].

In the present case, the animal appeared healthy before death and may have become infected from exposure to contaminated material. Stress may also have been a contributing factor, since the death of the alligator coincided with an artificial cold period and a period of semi-hibernation. Food consumption and activity were depressed.

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