Tawny frogmouths and brushtail possums as sentinels for *Angiostrongylus cantonensis*, the rat lungworm

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**Introduction**

Adult *Angiostrongylus cantonensis* live in the pulmonary arteries and right ventricle of Norway and black rats, the most important definitive hosts. Ingested larvae penetrate the intestines and spread via blood and lymphatic vessels to the brain and spinal cord where they damage neuronal tissues in non-target species (humans, dogs and wildlife).

*A. cantonensis* is the most common cause of eosinophilic meningitis in humans and its incidence in endemic areas as well as its geographical range appears to be increasing (Graeff-Teixeira et al. 2009). Two infants with eosinophilic meningitis presented concurrently to two paediatric referral hospitals in Sydney in April, 2011. One died and the other had significant developmental arrest, cerebellar ataxia and hydrocephalus requiring surgical drainage (Britton et al. 2011).

This study determined the prevalence of angiostrongylosis in tawny frogmouths and brushtail possums with neurological disease and describes the clinicopathological features in both species.

**Cases:**

Histological examinations of the brain, spinal cord and other tissues from 100 tawny frogmouths and 31 brushtail possums with signs of neurological disease in metropolitan Sydney between October 1998 and June 2010 were examined. Angiostrongylosis was responsible in 80 tawny frogmouths and 11 tawny brushtail possums. A tawny frogmouth with neurological signs and head trauma had concurrent angiostrongylosis. Angiostrongylosis was diagnosed in 4 of the 31 brushtail possums. Cases in tawny frogmouths followed a strong seasonal pattern peaking through late summer and autumn.

**Histopathology:**

Eight tawny frogmouths had nematodes within the brain or spinal cord with no associated lesions, 25 had a mild to moderate, multifocal non-suppurative meningitis, encephalitis or myelitis and 28 had marked multifocal non-suppurative and granulomatosus meningitis, encephalitis or myelitis. Non-suppurative meningitis consisted of perivascular cuffs of lymphocytes, plasma cells and variable numbers of eosinophils. The meninges were often locally thickened with similar infiltrates (Fig. 4) and larval nematodes were often within the parenchyma of the brain or spinal cord away from inflammation (Fig. 5 & 6). Cases with granulomatous infiltrates tended to have more severe inflammation than those with only non-suppurative infiltrates. Granulomas were composed of macrophages, multinucleate giant cells and varying numbers of eosinophils, often with central necrosis with cross sections of degrading nematodes (Fig. 4 arrow).

**Discussion**

This study indicates *A. cantonensis* is highly prevalent in tawny frogmouths presenting with neurological signs and is the most common cause of neurological disease in this species in Sydney. The results also reveal angiostrongylosis is emerging in brushtail possums and appears to have emerged recently in Australian wildlife as it was not detected in previous histological surveys of neurological disease in tawny frogmouths or brushtail possums in Sydney in 1993 (Hartley 1993).

Infection is probably the result of ingestion of slugs, snails or their slime contaminating food bowls and similar incidents have been reported in other captive marsupials (McKenzie et al. 1978, Higgins et al. 1997).

The apparent high susceptibilities of tawny frogmouths and brushtail possums to *A. cantonensis* imply no evolved resistance from the endemic *A. mackerrasae*, which completes its life cycle in native rodents (Bhalubala 1968, Spratt 2005a).

The lack of clinical improvement in over 60 cases of angiostrongylosis in this study suggests the debilitating disruption of the spinal cord and brain by migrating larvae is likely to be permanent.

This study supports the proposal by Spratt (2005b) that the tawny frogmouth may be a suitable sentinel for *A. cantonensis* as tawny frogmouths are common across the continent and surveillance to monitor morbidity and mortality in the species may serve as an early warning of the geographical spread of the parasite in Australia. The severity of the disease and the loss of the ability to fly rendered affected birds highly conspicuous.

This survey may underestimate the prevalence of angiostrongylosis in tawny frogmouths. Further surveys of tawny frogmouths with neurological signs are warranted to establish and monitor the geographical range of *A. cantonensis* in eastern Australia and thus the risks posed to people, especially young children.

**Contact**

Please contact Dr Derek Spielman for further information on these cases and for any potential collaborative opportunities (derek.spielman@sydney.edu.au).

**References:**


