

# Diagnostic Exercise

From The Davis-Thompson Foundation\*

Case #: 106 Month: October Year: 2018

*Answer Sheet*

**Title:** Koala, lymph node, cryptococcosis (*Cryptococcus* sp.)

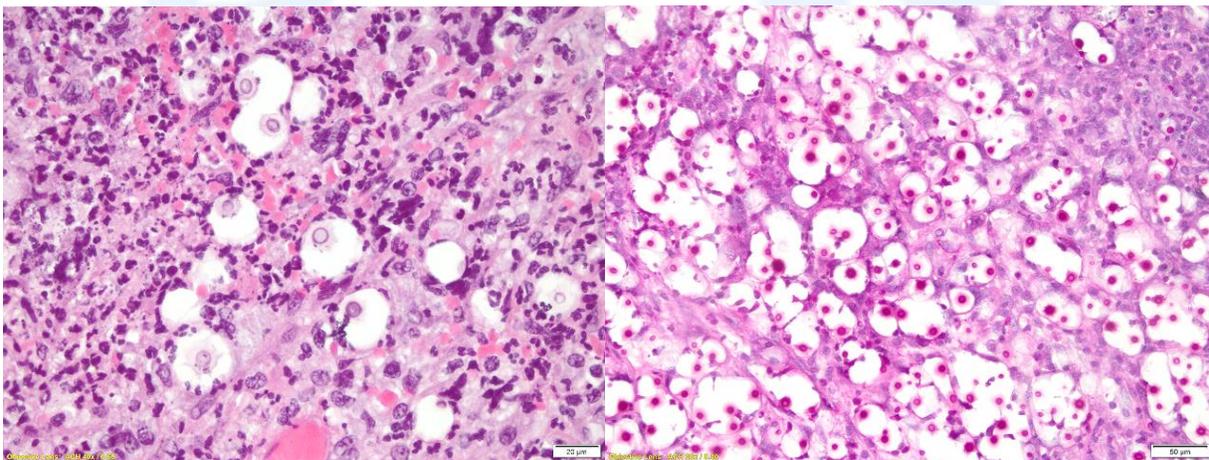
**Contributor:** Andrea Schaffer-White (BVSc, B.A., Postgrad.Dip.Ed.), Independent Veterinary Pathology, Underwood, Brisbane, Australia.

**Morphologic Diagnosis:** Necrotising and pyogranulomatous lymphadenitis with intralesional *Cryptococcus* sp.

Lesion from the right inguinal area, lymph node (original excision): The normal lymph node parenchyma was necrotic in a locally extensive area and the parenchyma was replaced by large aggregates of macrophages as well as neutrophils and reactive fibroblasts (pyogranulomatous lymphadenitis). Within this area were hundreds of fungal organisms containing a 2-10 µm thick clear capsule, enclosing a 3-5 µm diameter, central to eccentric, pale basophilic yeast (*Cryptococcus* sp.). In the adjacent areas, nodal sinuses were widened and filled with dense infiltrates of foamy macrophages and clear space (edema).

Lesion from the right inguinal area (subsequent excision): The submitted sample consists of a section of connective tissue that was multifocally expanded by numerous aggregates of fungal organisms as described above (*Cryptococcus* sp.) as well as large number of infiltrating macrophages and neutrophils. Multifocally surrounding smaller aggregates of fungal organisms were distinct granulomas consisting of concentrically arranged foamy macrophages, multinucleated giant cells, fibroblasts, neutrophils, and lymphocytes with plasma cells.

**Microscopic Findings:**



Koala; lymph node. Figure 1 (H&E, left) - Figure 2 (PAS, right)

**Useful special stains:** Periodic acid–Schiff (PAS, fungus), mucicarmine (fungal capsule), Ziehl-Neelsen (acid-fast organisms).

**Discussion:** Cryptococcosis is the second most common infectious disease of koalas overall, after *Chlamydia* sp. infections, but appears more frequently than *Chlamydia* in captive populations. Cryptococcosis is caused by two species of an encapsulated, saprophytic fungus: *Cryptococcus neoformans* and *Cryptococcus gattii*. Infections are acquired from the environment and the disease is not considered to be contagious. Transmission is by inhalation of airborne cryptococcal organisms. Clinical disease is usually associated with high environmental loads. The fungus is dimorphic and exists as either a yeast form or a hyphal form. The yeast form is large (5-50 µm in diameter) and has a thick extracellular mucopolysaccharide capsule. It is not easily aerosolised and is generally too large to evade normal innate respiratory defenses. Therefore, it is not highly infective but it is the predominant form in diseased tissue. The hyphal form produces small (1-2 µm diameter) basidiospores that can evade host defenses. *C. neoformans* is widespread in the environment while *C. gattii* is commonly associated with a number of *Eucalyptus* trees, particularly the river red gum (*E. camaldulensis*). Almost all koala cryptococcosis cases studied to date have been caused by *C. gattii*. This suggests exposure during feeding as *Eucalyptus* trees of various species are the sole food source of koalas and also their major habitat as arboreal marsupials. Since this infection can be associated with immune suppression, assessing koalas for infection with koala retrovirus (KoRV) is valuable. Queensland koala populations have 100% infectious rates for endogenous KoRV, with high proviral loads. KoRV free populations in Southern Australia appear to have lower disease incidences than KoRV positive populations; however, the contribution of KoRV to disease manifestations in koalas is still being elucidated.

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