Prevalence of *Cryptococcus neoformans* in avian droppings and tree debris in the North and Northeast, Thailand

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Background

Cryptococcus neoformans is an opportunistic pathogen that causes cryptococcal meningitis and pulmonary cryptococcosis in both immunocompetent and immunocompromised individuals. In environments, this yeast associates with avian droppings (i.e. pigeon, red-billed hornbill and sparrow) and various trees.

Objectives

To investigate the prevalence of *C. neoformans* in avian droppings and tree debris from various provinces in the North and Northeast, Thailand during 2014-2016.

Materials and Methods

The total 149 samples, including 93 samples of bird droppings from pigeon (*Columba livia*), myna (*Acridotheres tristis*), red-whiskered bulbul (*Pycnonotus jocosus*), hill myna (*Gracula religiosa*), drongo (*Dicrurus macrocercus*), weaver bird (*Ploceus hypoxanthus*), parrot (*Psittacula eupatria*), budgerigar (*Melopsittacus undulates*) and oriental magpie robin (*Copsychus malabaricus*), and 56 samples of tree debris from *Eucalyptus* tree, golden shower (*Cassia fistula*), black siris (*Albizia odoratissima*), cork tree (*Millingtonia hortensis*), tamarin (*Tamarindus indica*), cassod tree (*Senna siamea* Lam), barbados pride (*Caesalpinia pulcherrima*), sacred tree (*Ficus religiosa*), frangipani (*Plumeria* spp.), black wattle (*Acacia auriculiformis*), khasiya pine (*Pinus kesiya*), teak (*Tectona grandis*), sentul (*Sandoricum koetjape*) and golden fig (*Ficus benjamina*) from various provinces in the North and Northeast, Thailand were collected to isolate the *C. neoformans/C. gattii* species complex. Microscopic examination, culture, biochemical tests and singleplex PCR using STR1 primers were used to identify for the *C. neoformans/C. gattii* species complex (Figure 1).

Results

Using culture and biochemical assays, ten isolates (6.71%) of the *C. neoformans/C. gattii* species complex were recovered from pigeon droppings from Chiang Mai (Figure 2A). No isolates were found from any samples of tree debris (Figure 2B). Singleplex PCR analysis using STR1 primers showed that all ten isolates belonged to *C. neoformans* (Figure 3).

Figure 2. Numbers of isolates of the *C. neoformans/C. gattii* species complex were isolated from (A) pigeon droppings and (B) tree debris from various provinces in the North and Northeast, Thailand.

Figure 3. Molecular identification of *C. neoformans/C. gattii* species complex using singleplex PCR. Lanes: M, 100 bp DNA ladder; 1, *C. neoformans* CBS 10515; 2, *C. deneoformans* CBS 10513; 3, *C. deuterogattii* CBS 6956; 4, isolate of *C. neoformans* from avian droppings; 5 and 6, isolates of *C. gattii* from tree debris; 7, Negative control.

Conclusion

The occurrence of environmental isolates of *C. neoformans* in the North and Northeast, Thailand is about 6.71%. All isolates were isolated from pigeon droppings, suggesting that pigeon dropping is the common natural habitat of *C. neoformans*.

Figure 1. Diagram of isolation and identification of the *C. neoformans/C. gattii* species complex