

A microscopic image showing a dense network of fungal hyphae. The hyphae are stained with different colors: green, blue, and red. The green hyphae are prominent and form a complex web. The blue hyphae are more numerous and form a background. The red hyphae are scattered throughout. The overall appearance is that of a complex, interconnected network of fungal structures.

Healthcare-associated fungal infections

Professor Rebecca Drummond

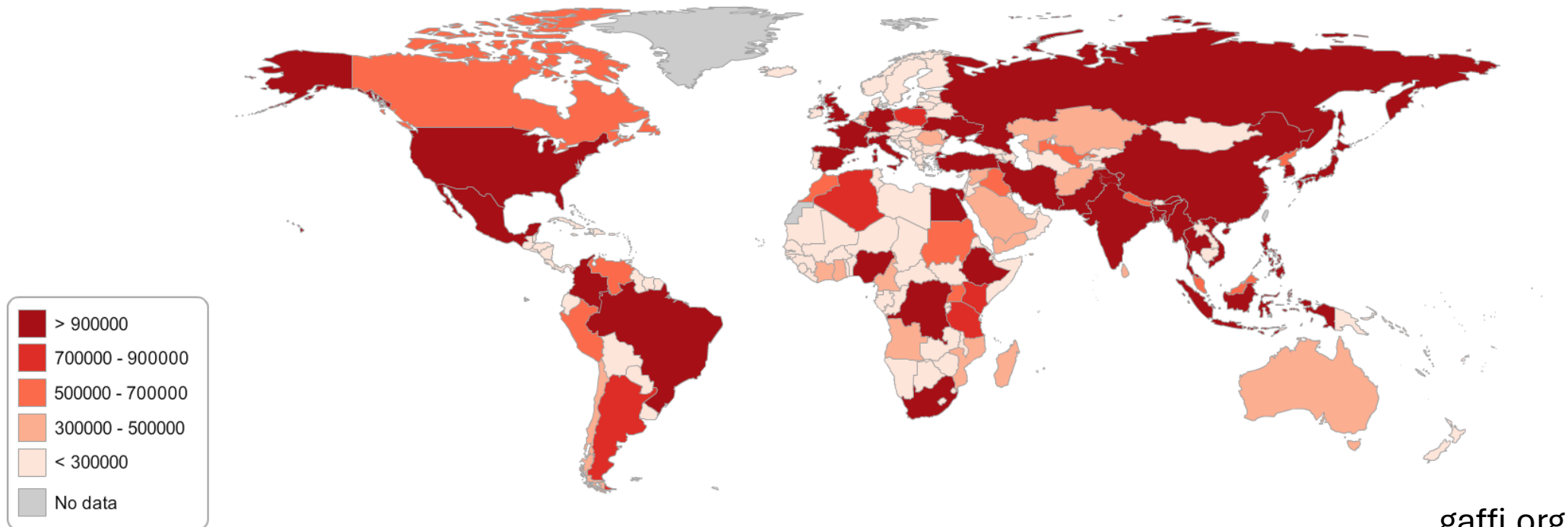
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Why study fungal diseases?

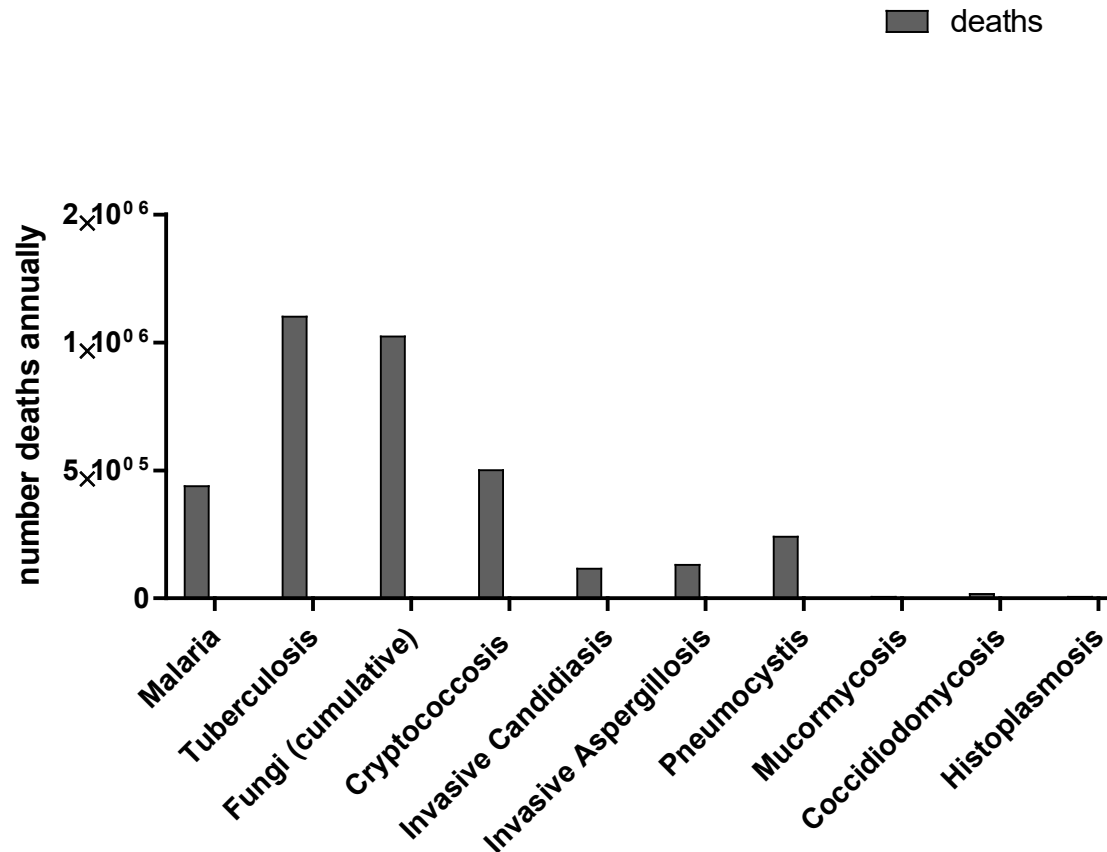
- Fungi are persistent
~25% world's population have a mucosal/skin fungal infection

Global burden of recurrent vulvovaginal candidiasis (rVVC)



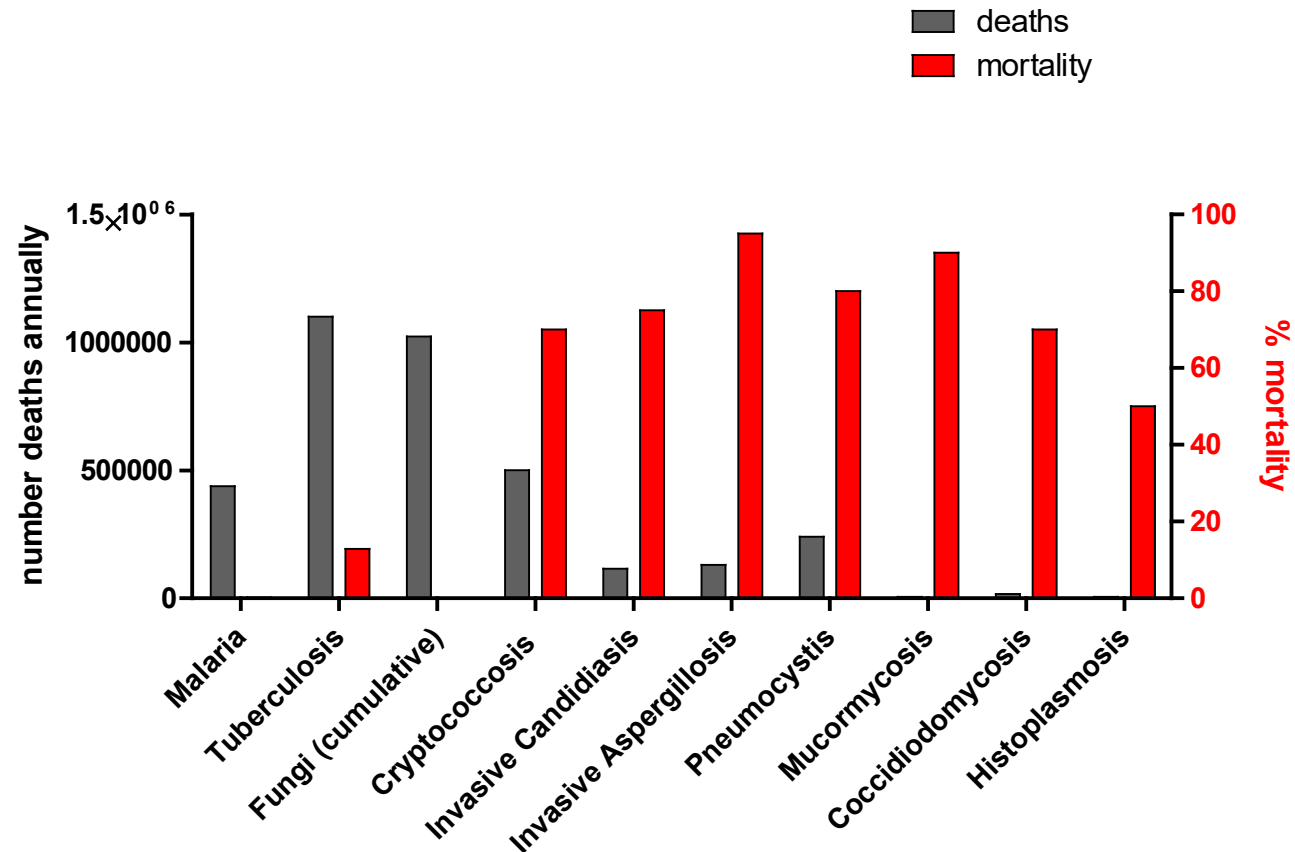
Why study fungal diseases?

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Why study fungal diseases?

- Fungi are persistent
~25% world's population have a mucosal/skin fungal infection
- They're lethal
- Diagnosis and treatment is limited



NO AVAILABLE
VACCINES



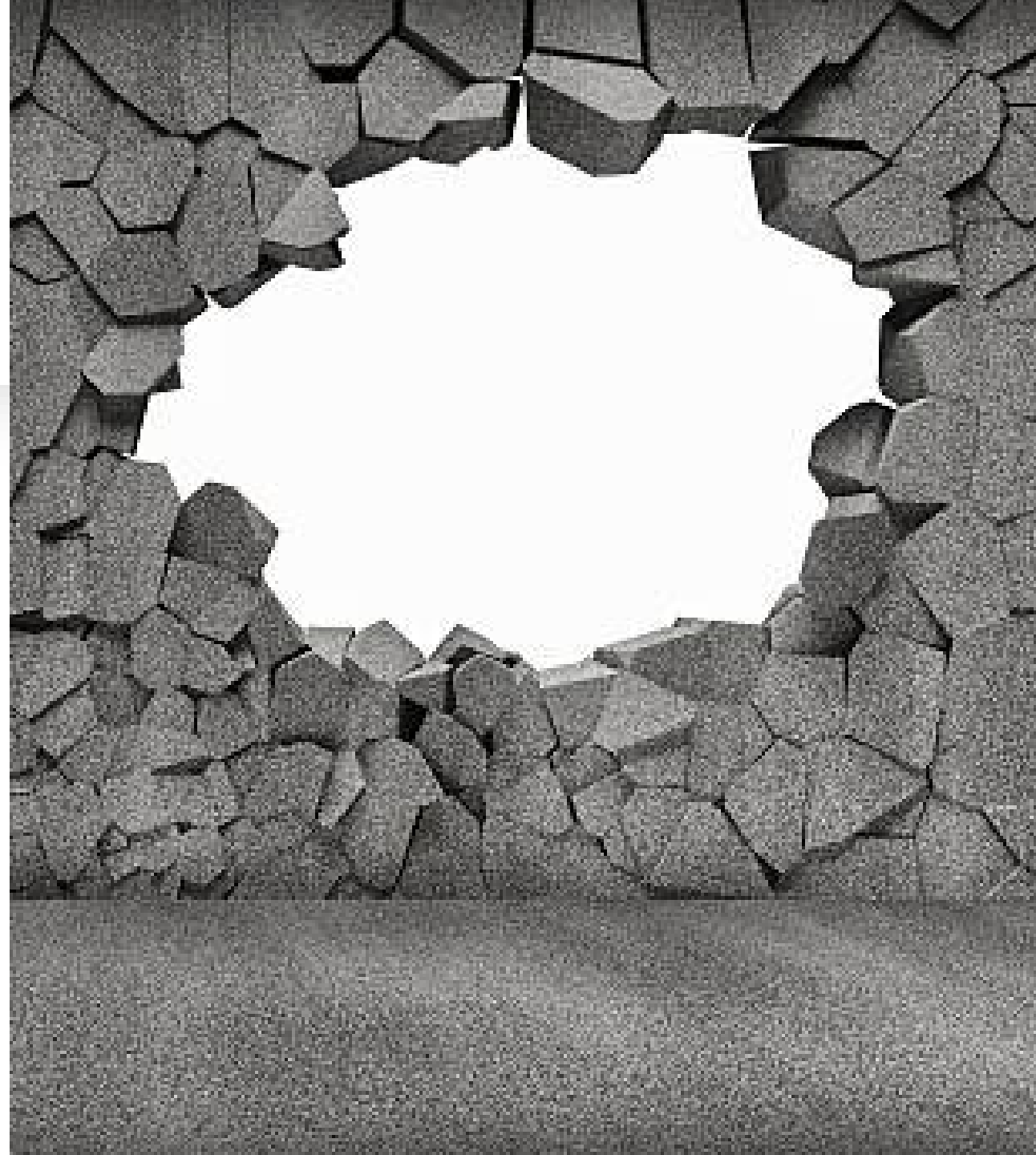
LIMITED ANTIFUNGAL
DRUGS AVAILABLE

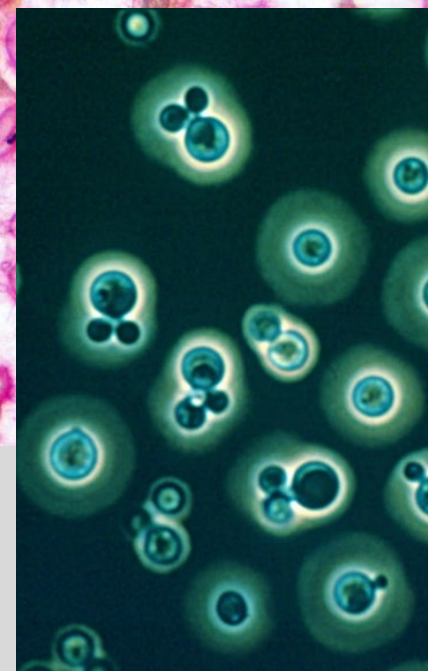
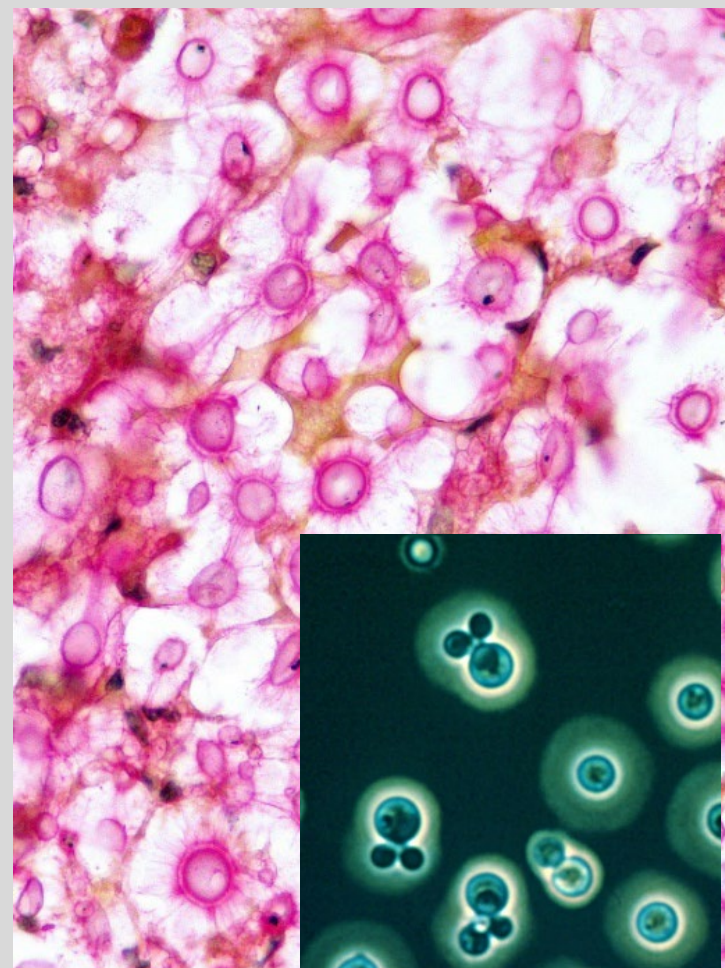
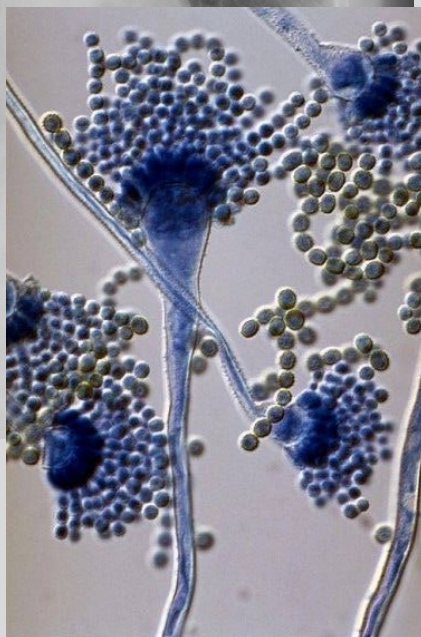
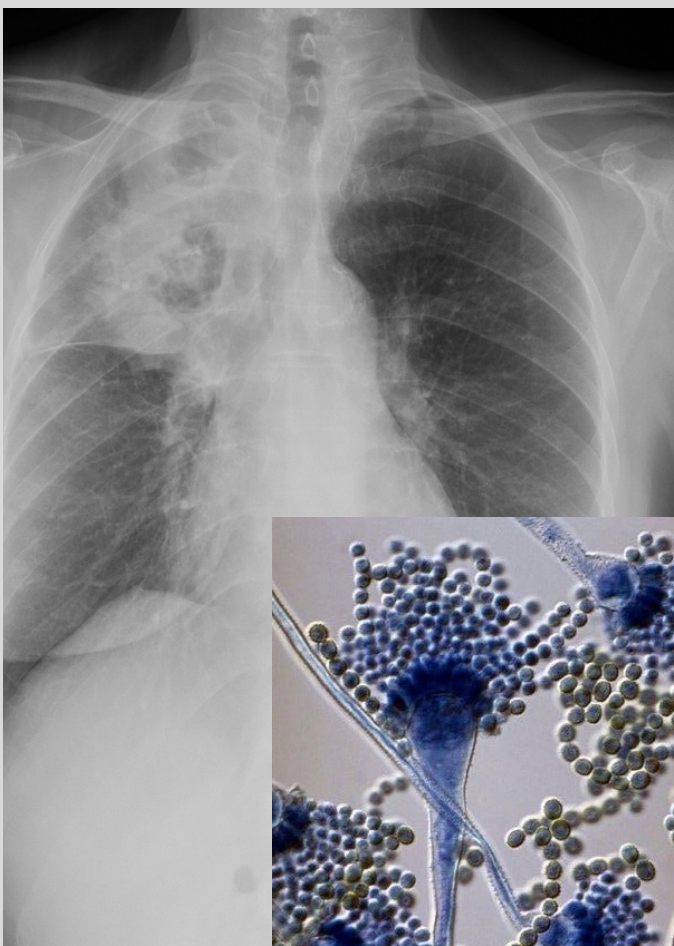
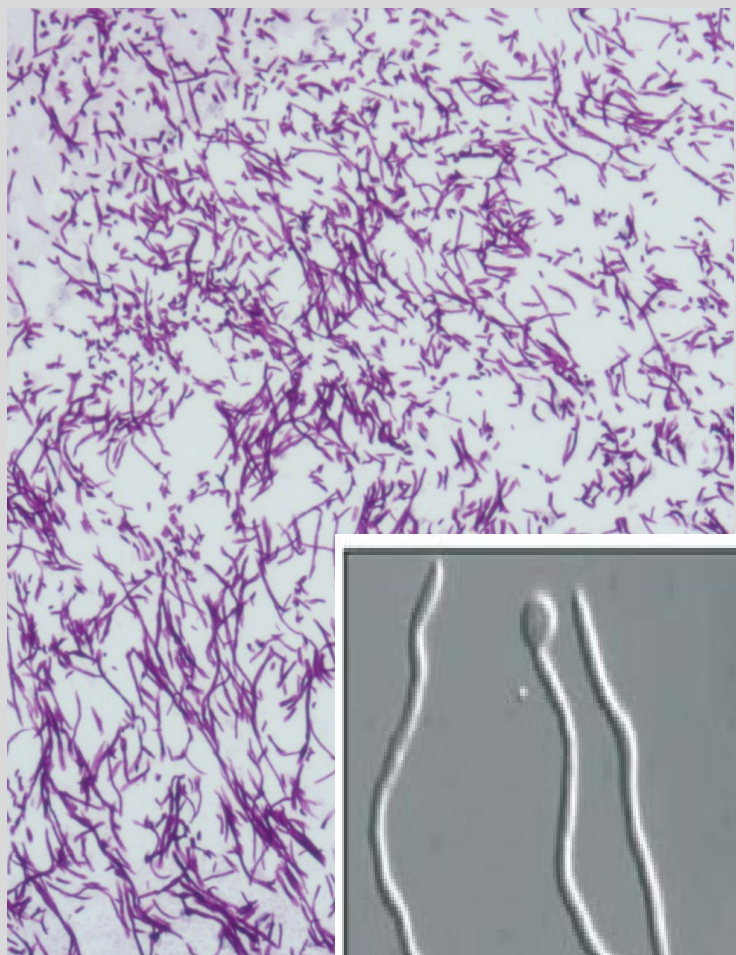


INCREASING
RESISTANCE

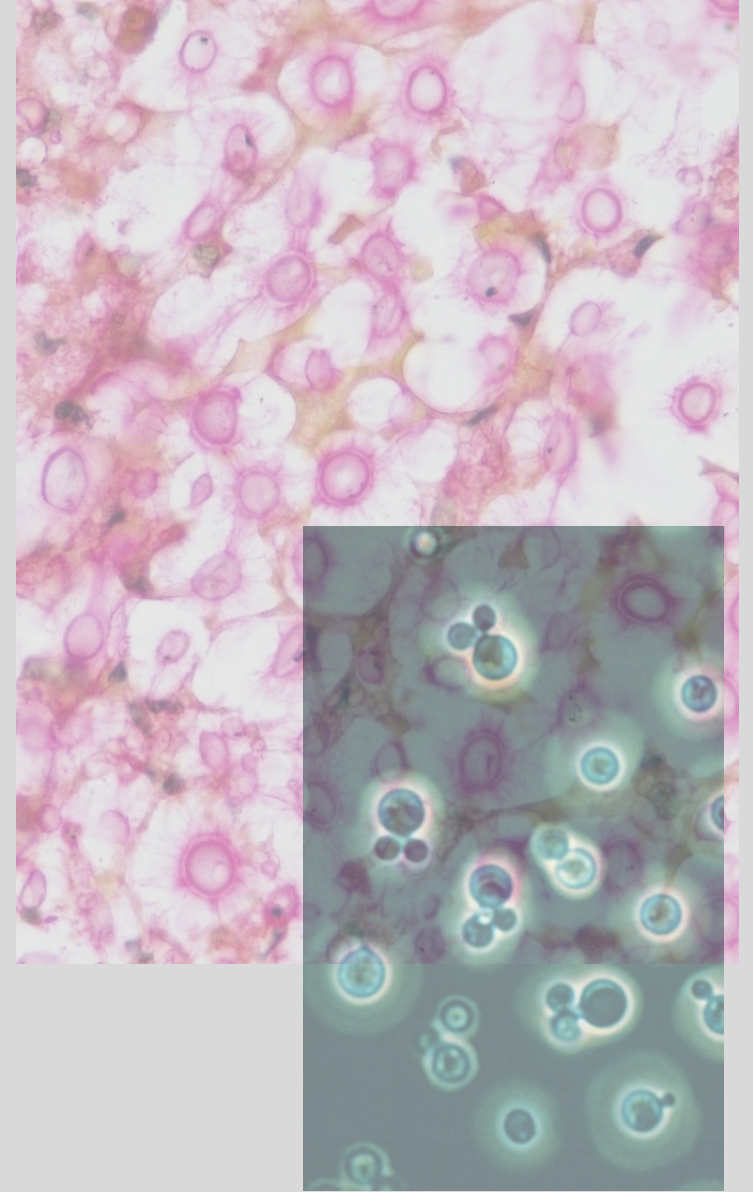
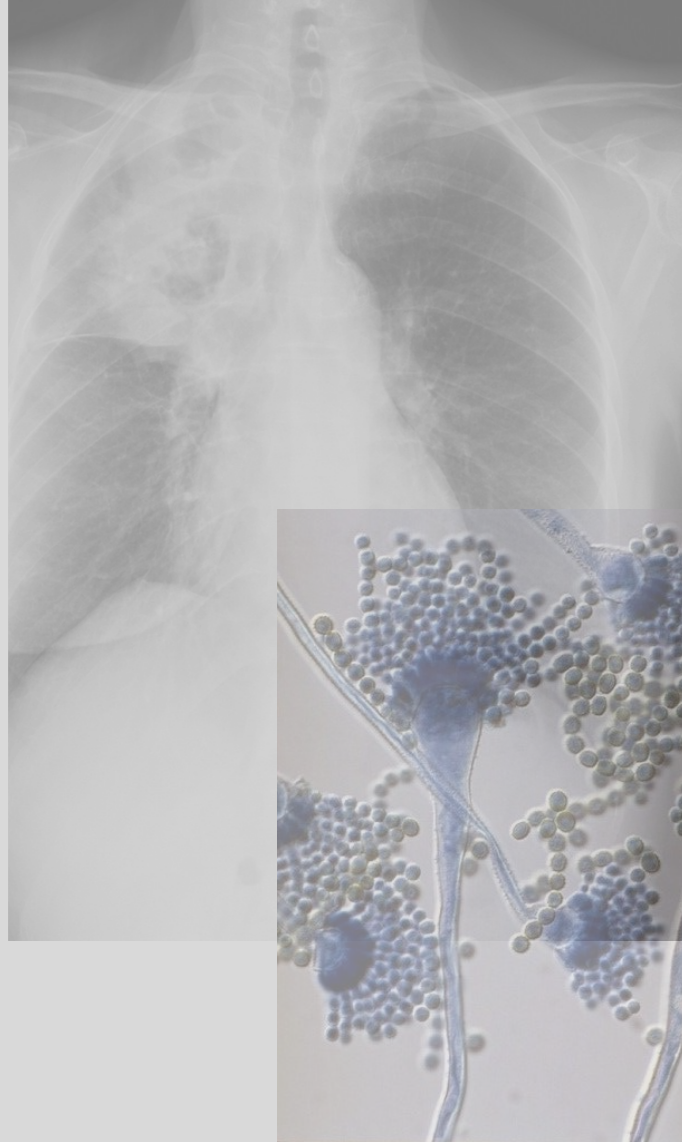
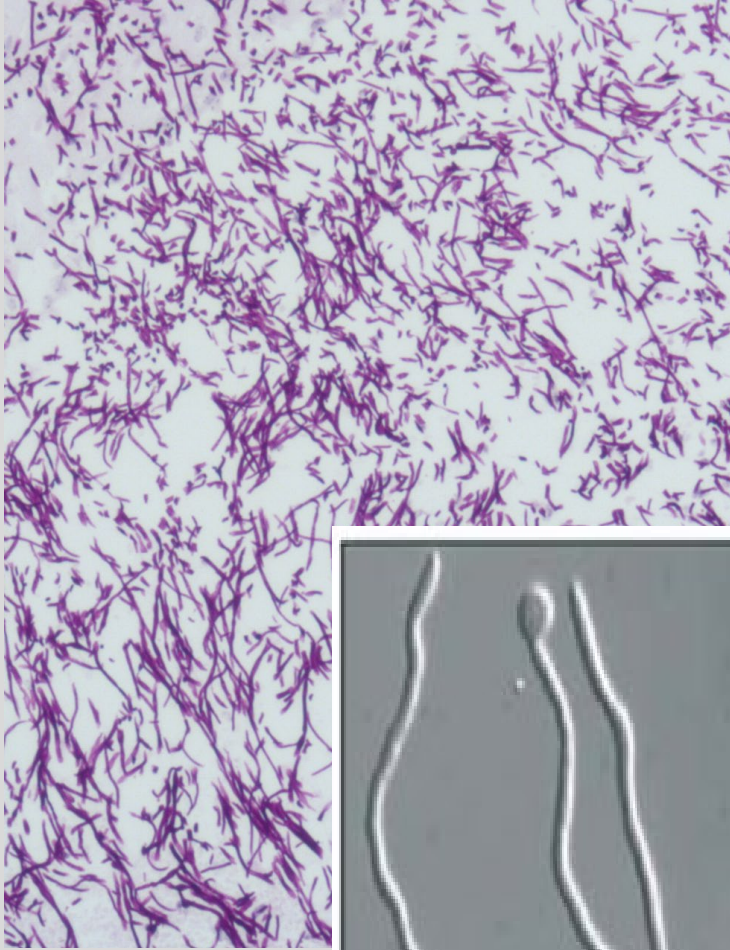
Many fungal infections are healthcare associated

- Most fungal infections occur in people who are vulnerable
- Risk factors include anything that causes immune system dysfunction or disturbance
- These risk factors can be either primary (congenital) or acquired

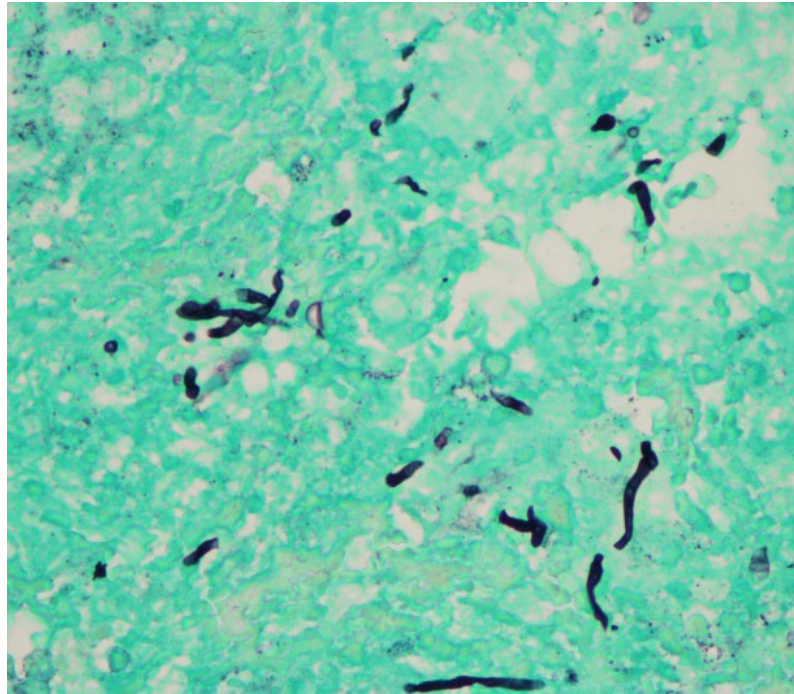
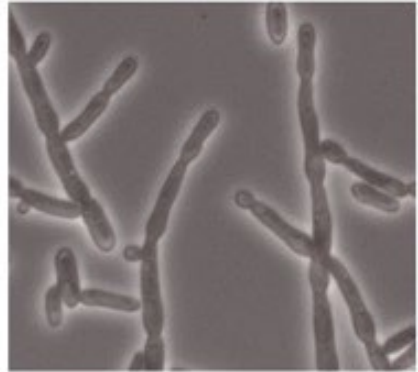
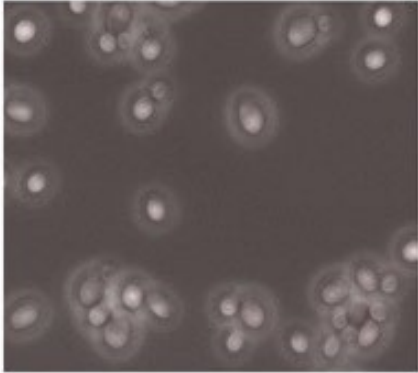




Candidiasis

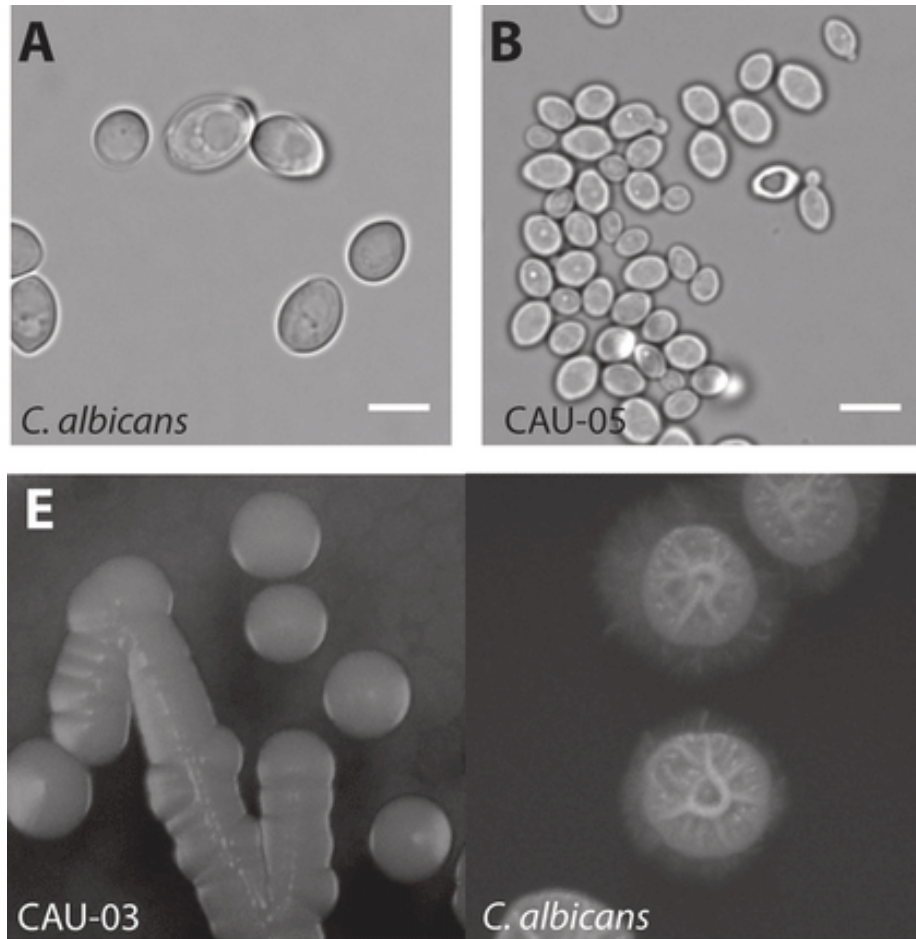


Candidiasis

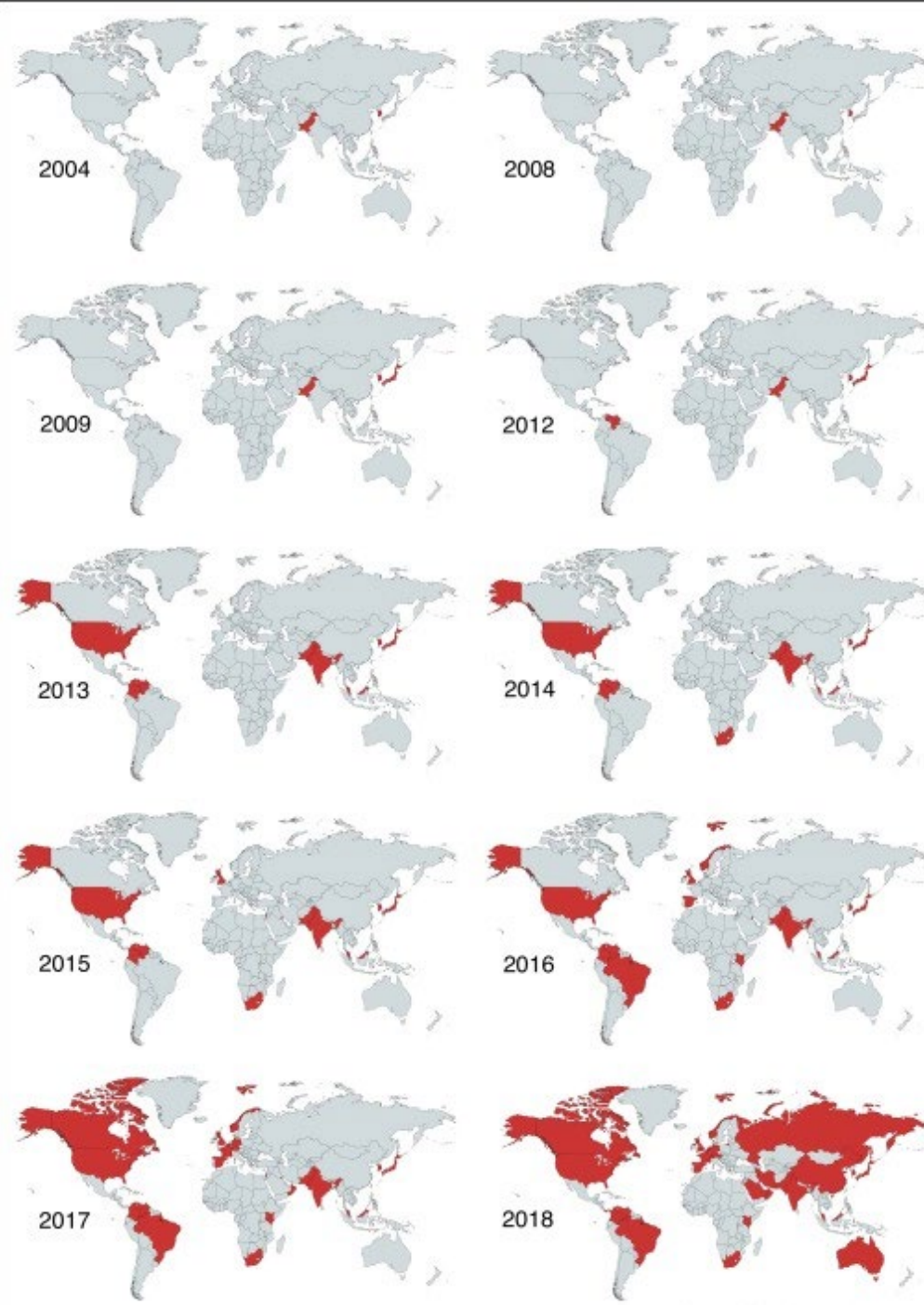


- *Candida albicans*, rise of non-*albicans* species
- ~350,000 patients per year
- Mortality rate: ~40%
- Chemotherapy, **neutropenia**, antibiotics, intravenous catheters

Candida auris: rise of the first fungal superbug

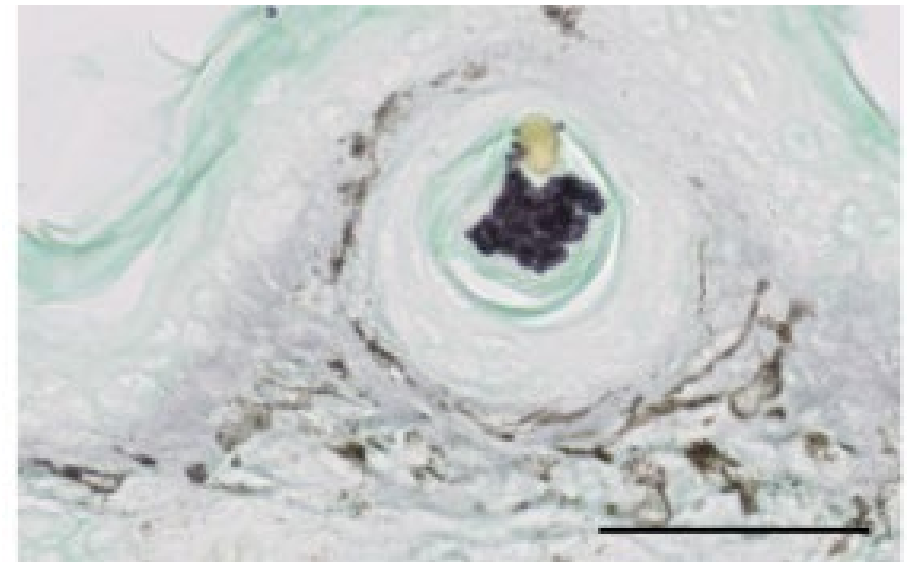
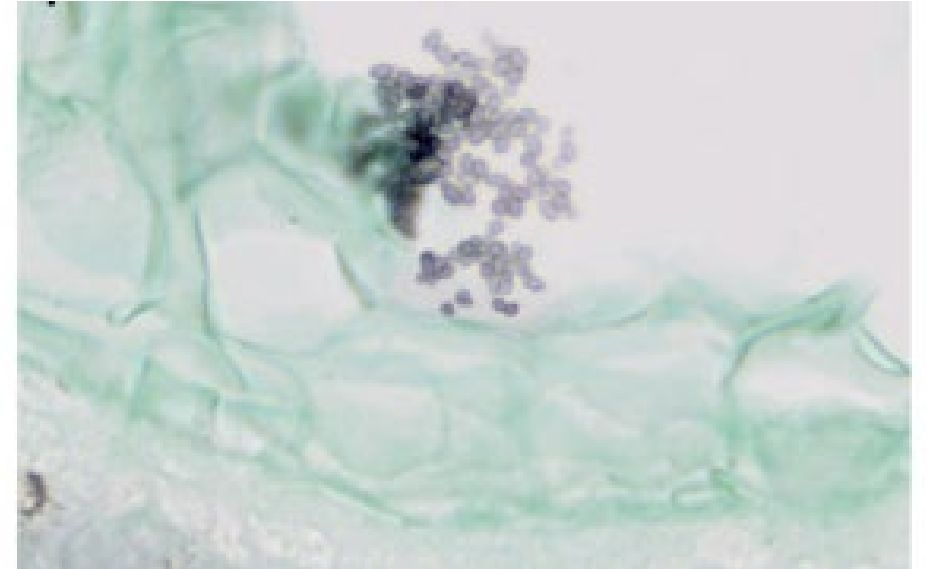
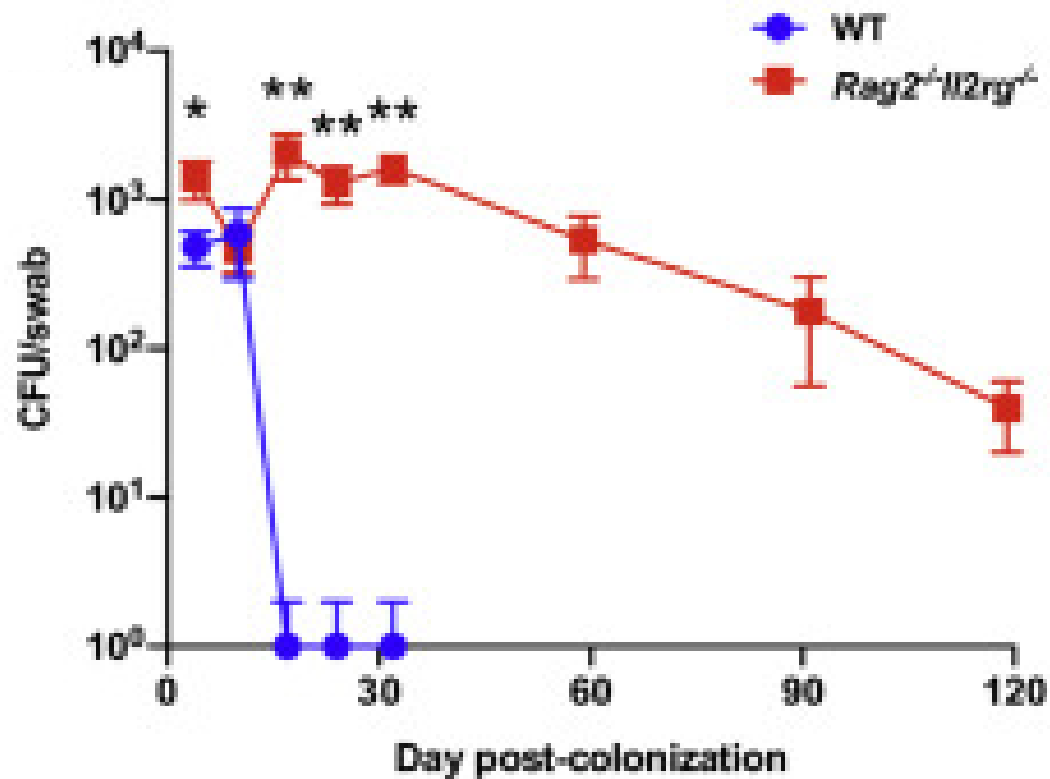


- *C. auris* grows up to 42C; this is unusual for fungus
- *C. auris* is naturally resistant to up to 3 classes of antifungal drugs
- This fungus colonises human skin
- Unlike other types of fungal infections, we see outbreaks and clusters of *C. auris* cases in care homes and hospitals

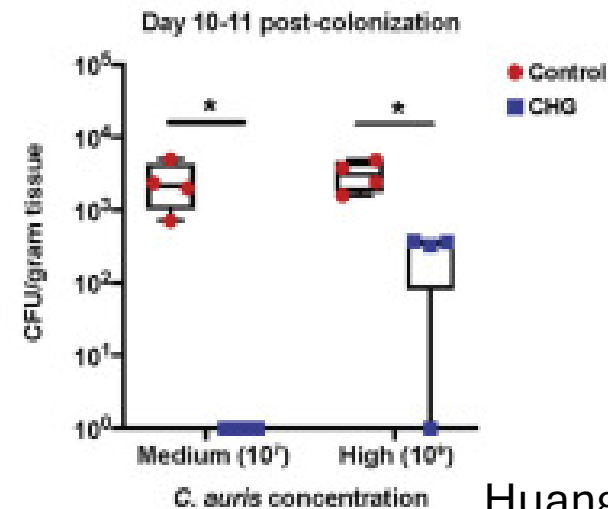
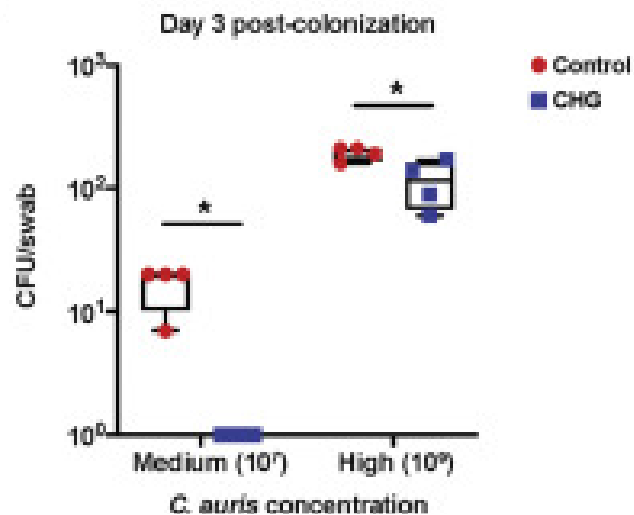
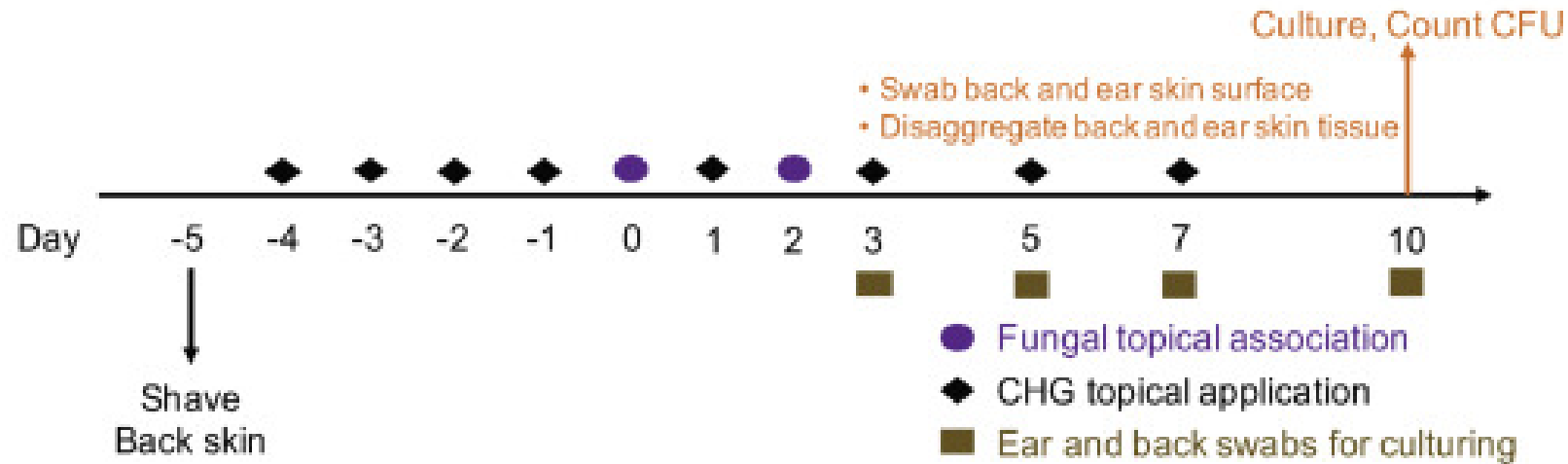


Countries in
red = reports
of *C. auris*
cases

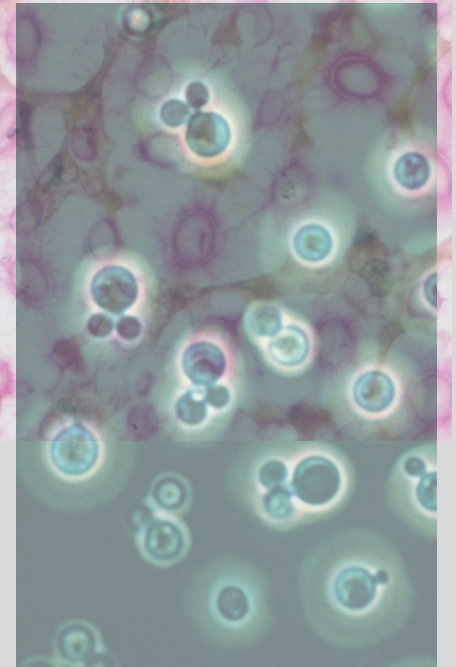
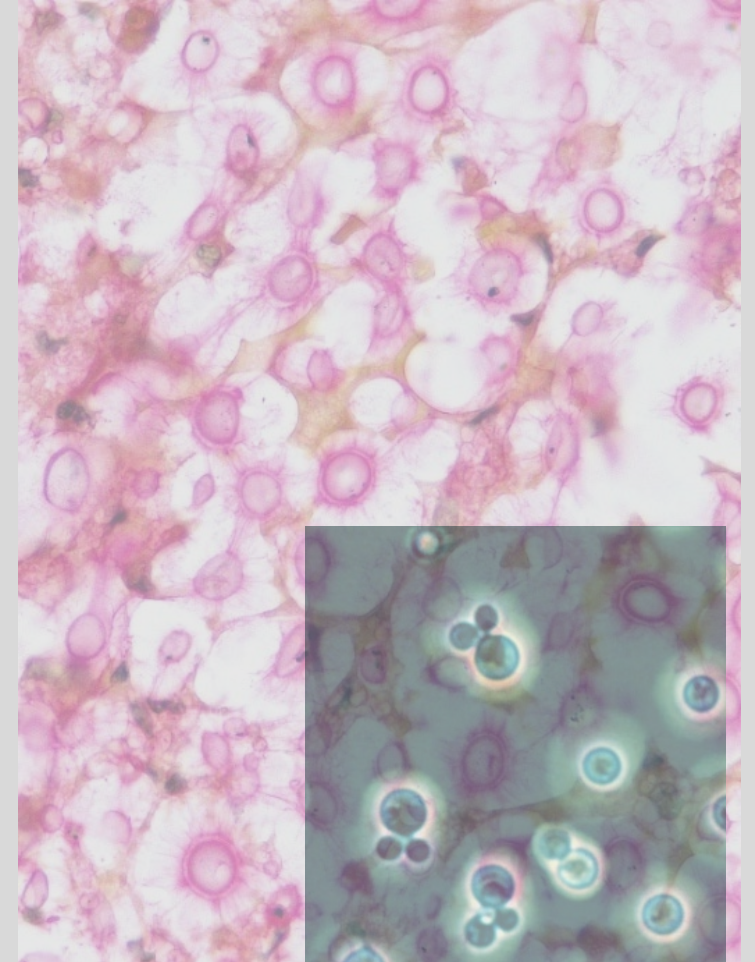
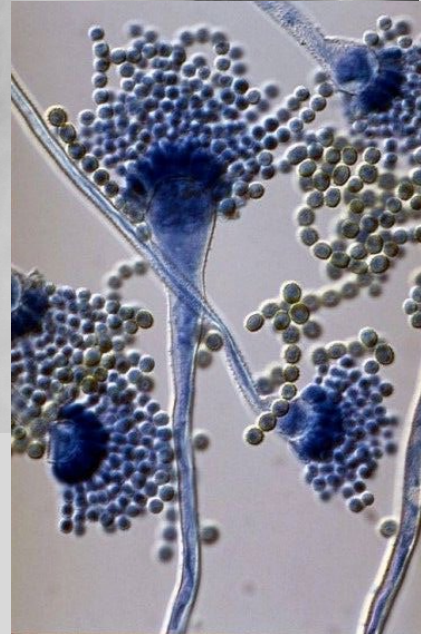
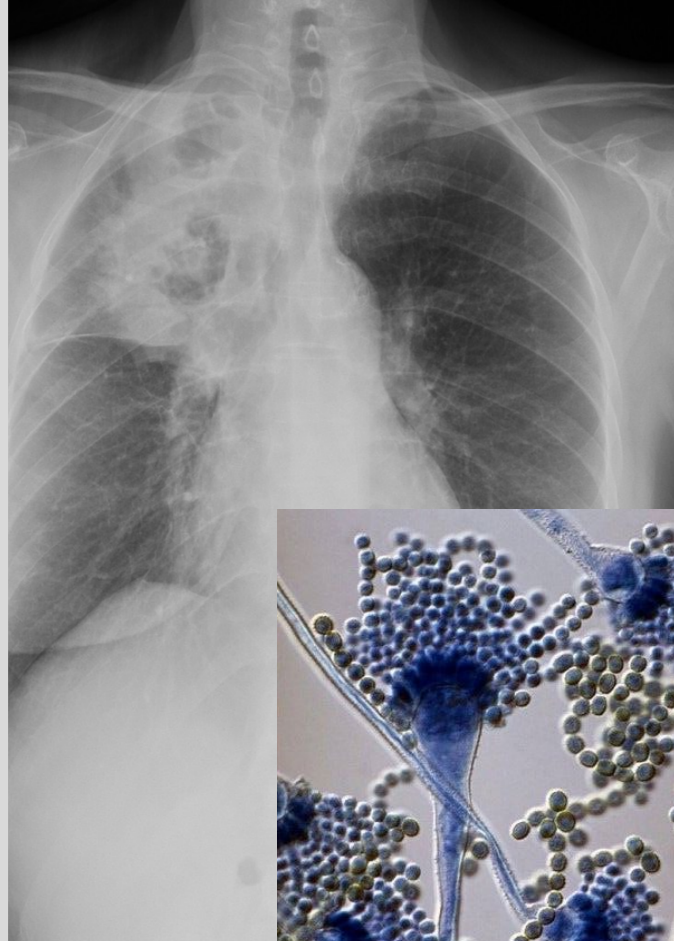
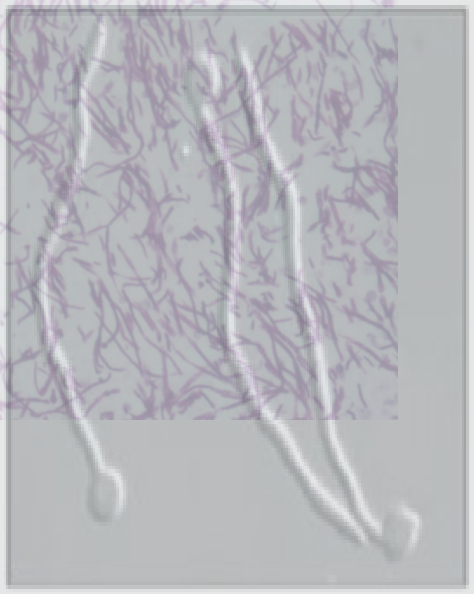
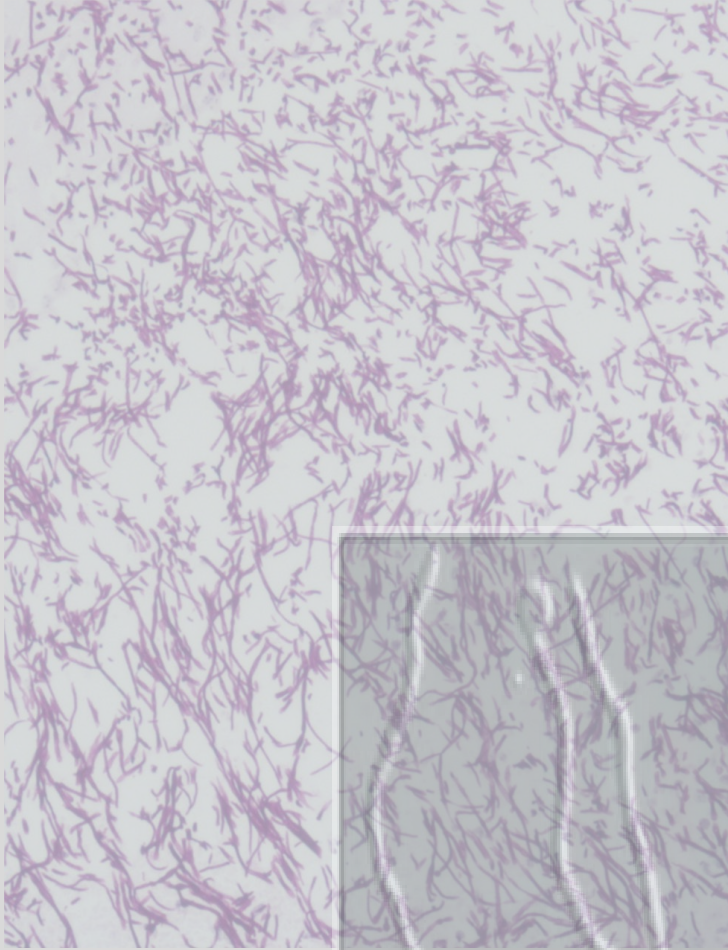
Candida auris resides on skin for long periods of time



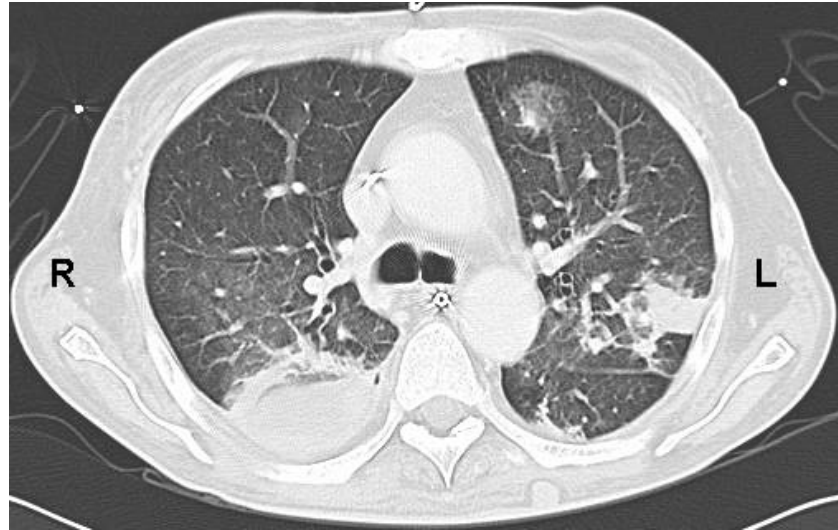
Chlorhexidine wipes can help control *C. auris* spread



Aspergillosis & Pneumocystis

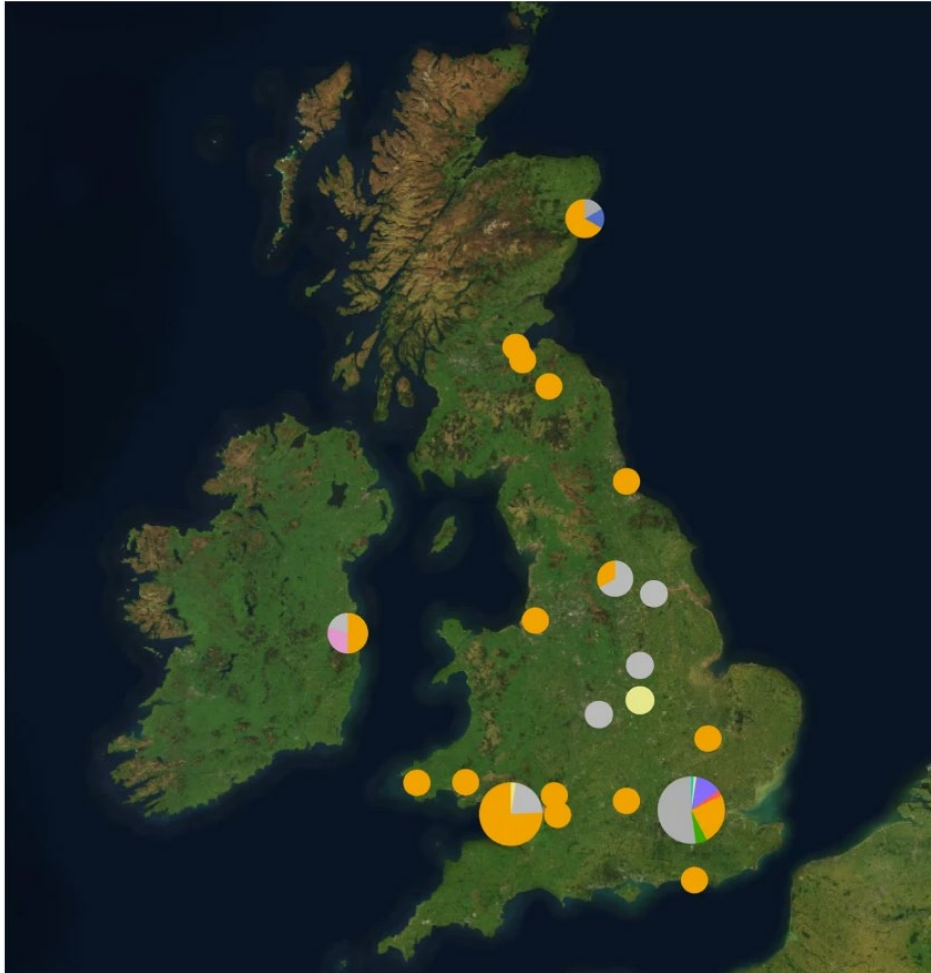


Aspergillosis & Pneumocystis



- *Aspergillus fumigatus*, *Pneumocystis jirovecii*
- 300,000 patients per year
- Mortality rate: 30-90%
- Risk factors: acute leukaemia, stem cell transplants, lung transplants, cystic fibrosis, prior lung pathology/problems

Drug resistance can be acquired in the environment



- Fungi can acquire mutations that make them resistant against antifungal drugs
- Environmental isolates of the fungus can carry the same mutations as we see in patients
- Wide-spread use of antifungals in agriculture is a contributing factor

Cryptococcosis

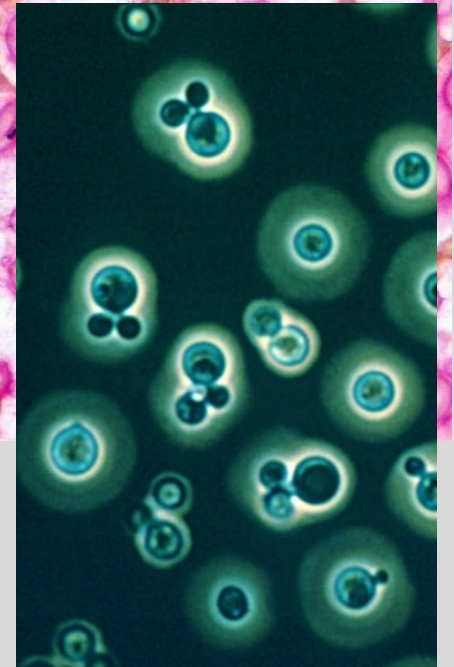
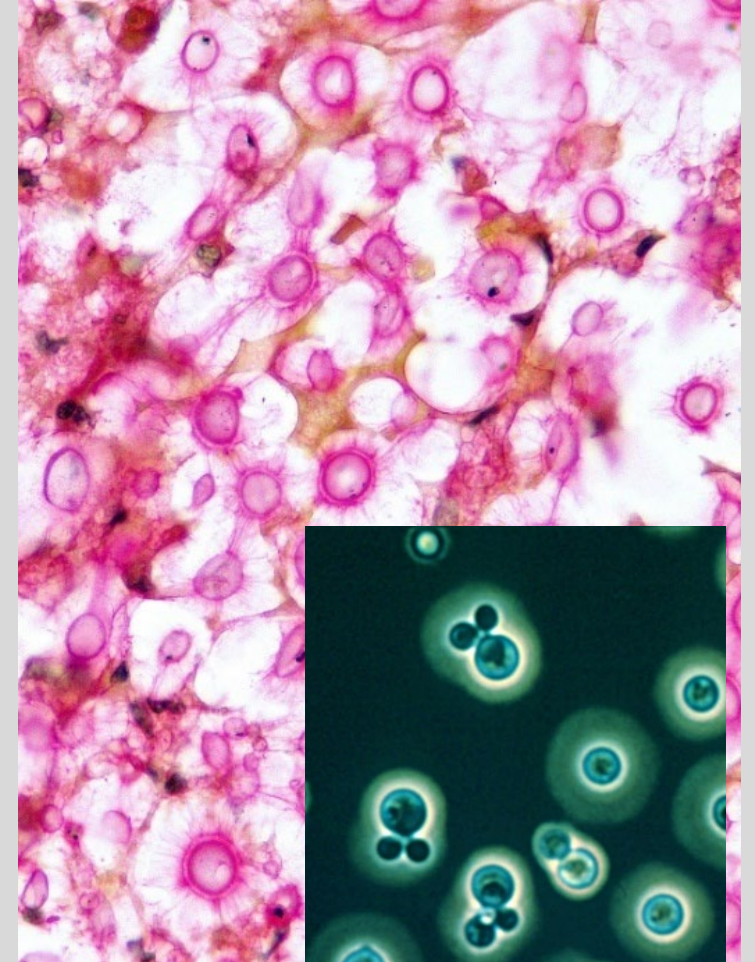
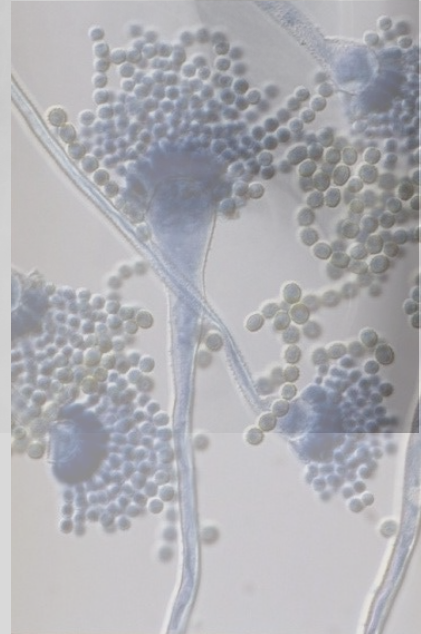
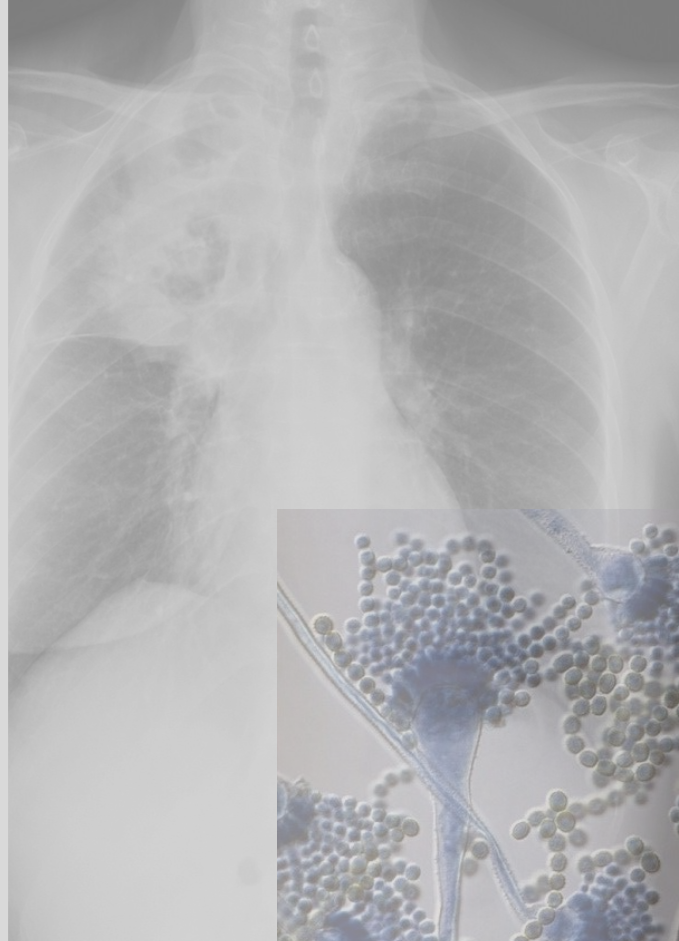
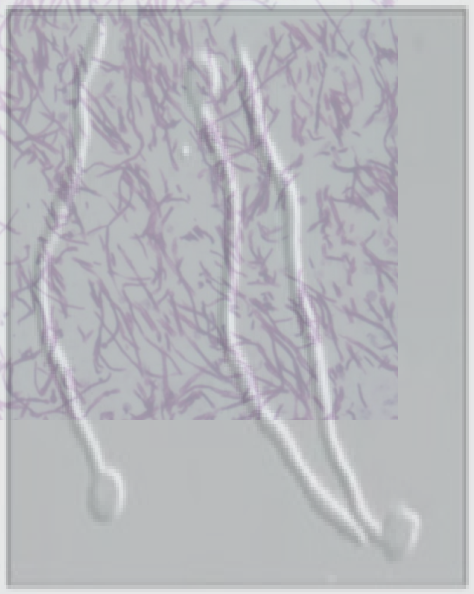
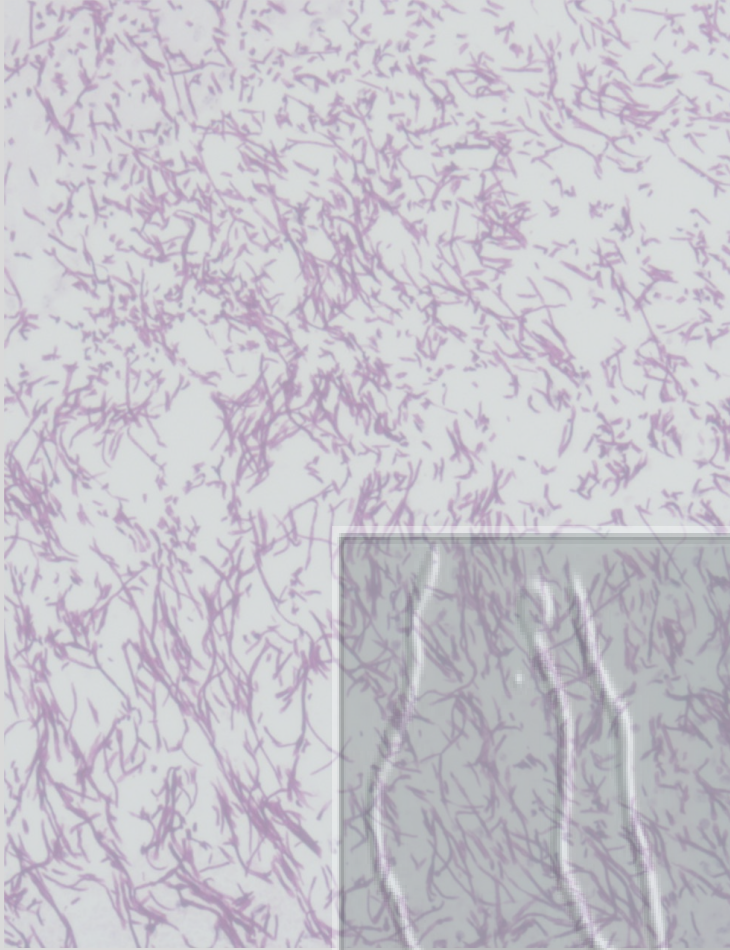


Fig. 1. WHO fungal priority pathogens list (WHO FPPL)

Critical Priority Group



Cryptococcus neoformans



Aspergillus fumigatus



Candida auris



Candida albicans

High Priority Group



Nakaseomyces glabrata
(*Candida glabrata*)



Eumycetoma
causative agents



Histoplasma spp.



Mucorales



Fusarium spp.



Candida parapsilosis



Candida tropicalis

Medium Priority Group



Scedosporium spp.



Lomentospora prolificans



Coccidioides spp.



Pichia kudriavzevii
(*Candida krusei*)



Cryptococcus gattii



Talaromyces marneffei

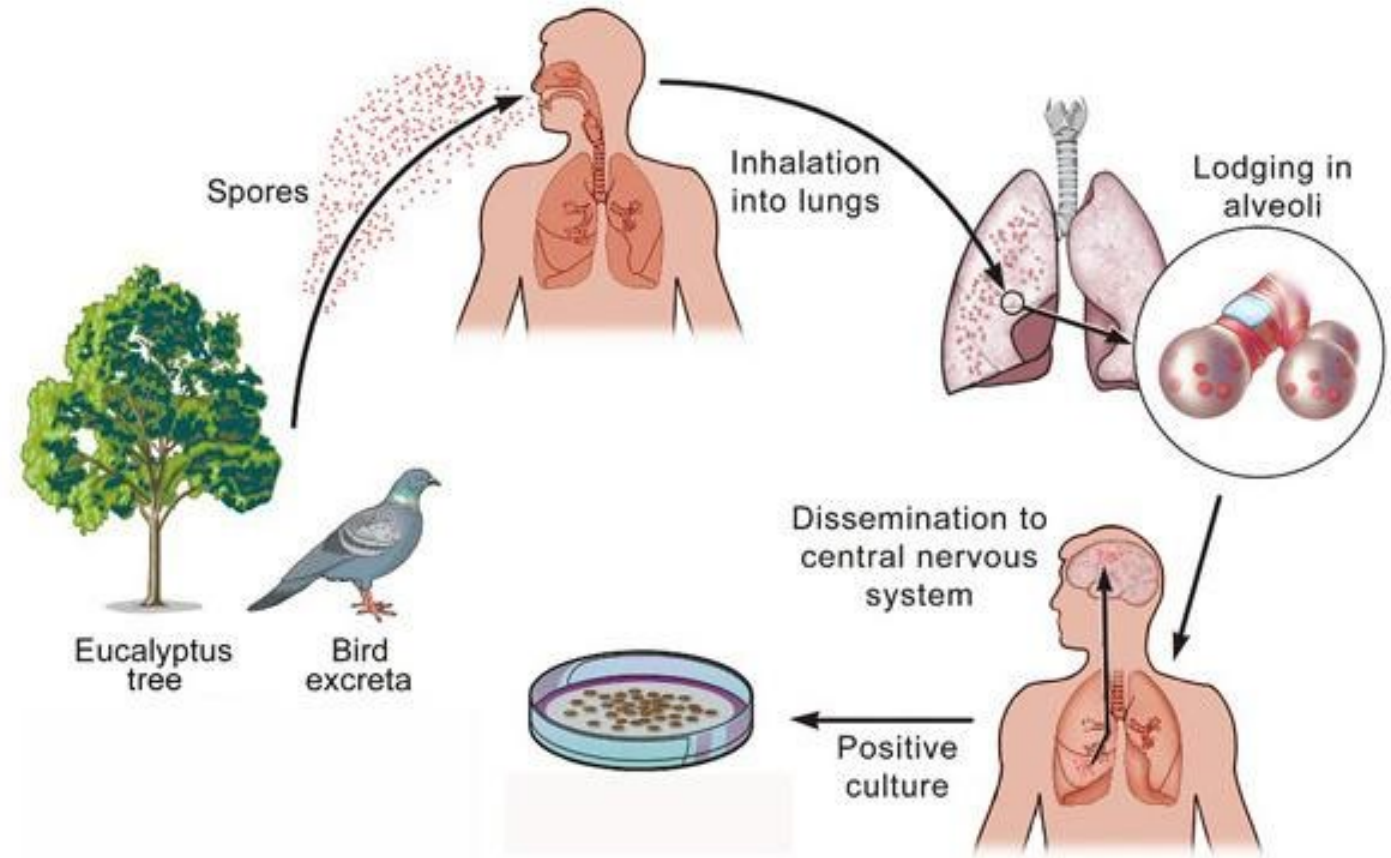


Pneumocystis jirovecii

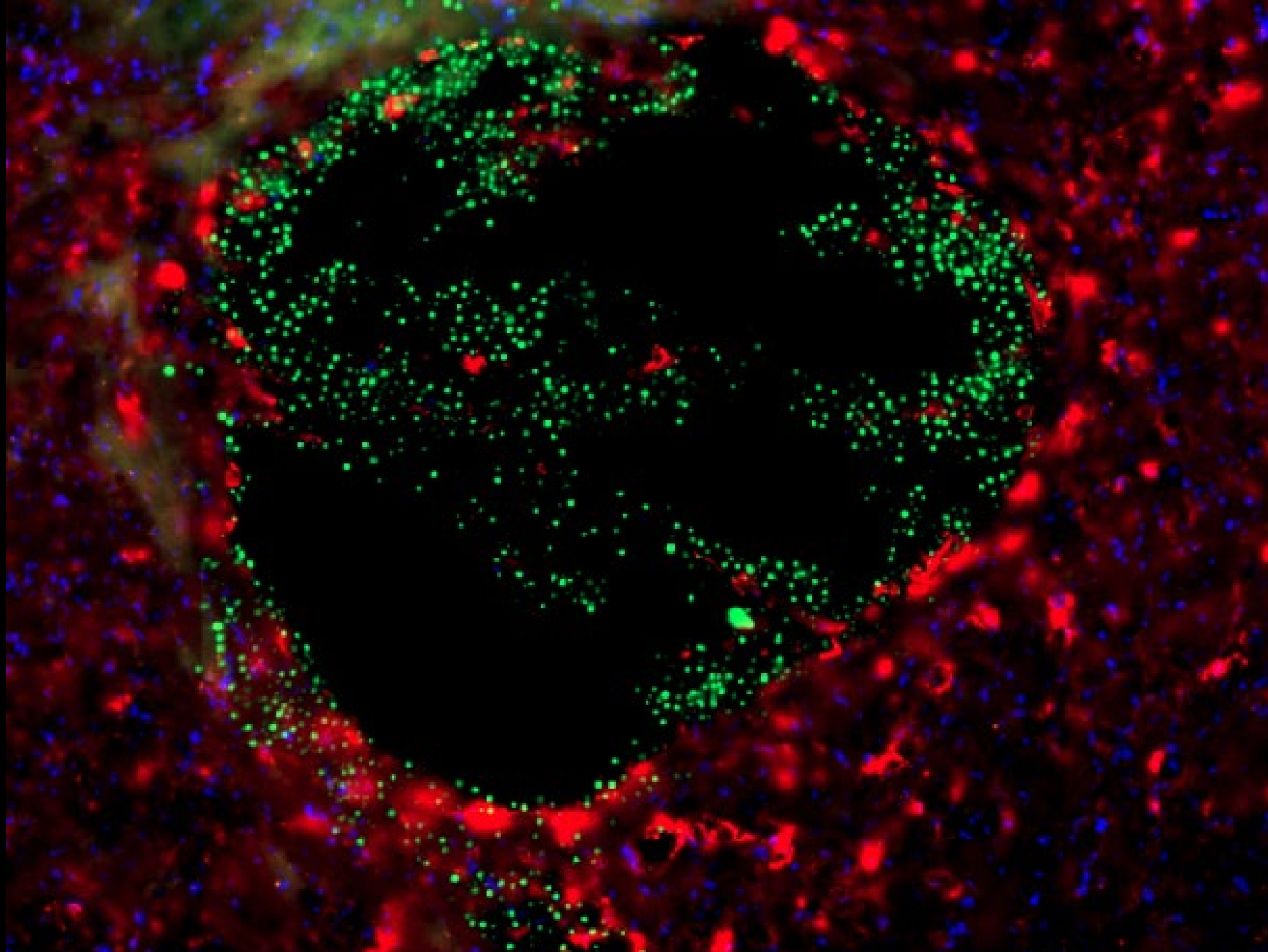


Paracoccidioides spp.

Cryptococcal Meningitis



- Kills 10-15% of HIV-infected patients
- 1 million cases every year
- Mostly in sub-Saharan Africa
- Increasing frequency in patients with cancer and transplants



Fungus

Immune cells

Nuclei (cells)

UK cases of cryptococcal meningitis – link with roosting pigeons?

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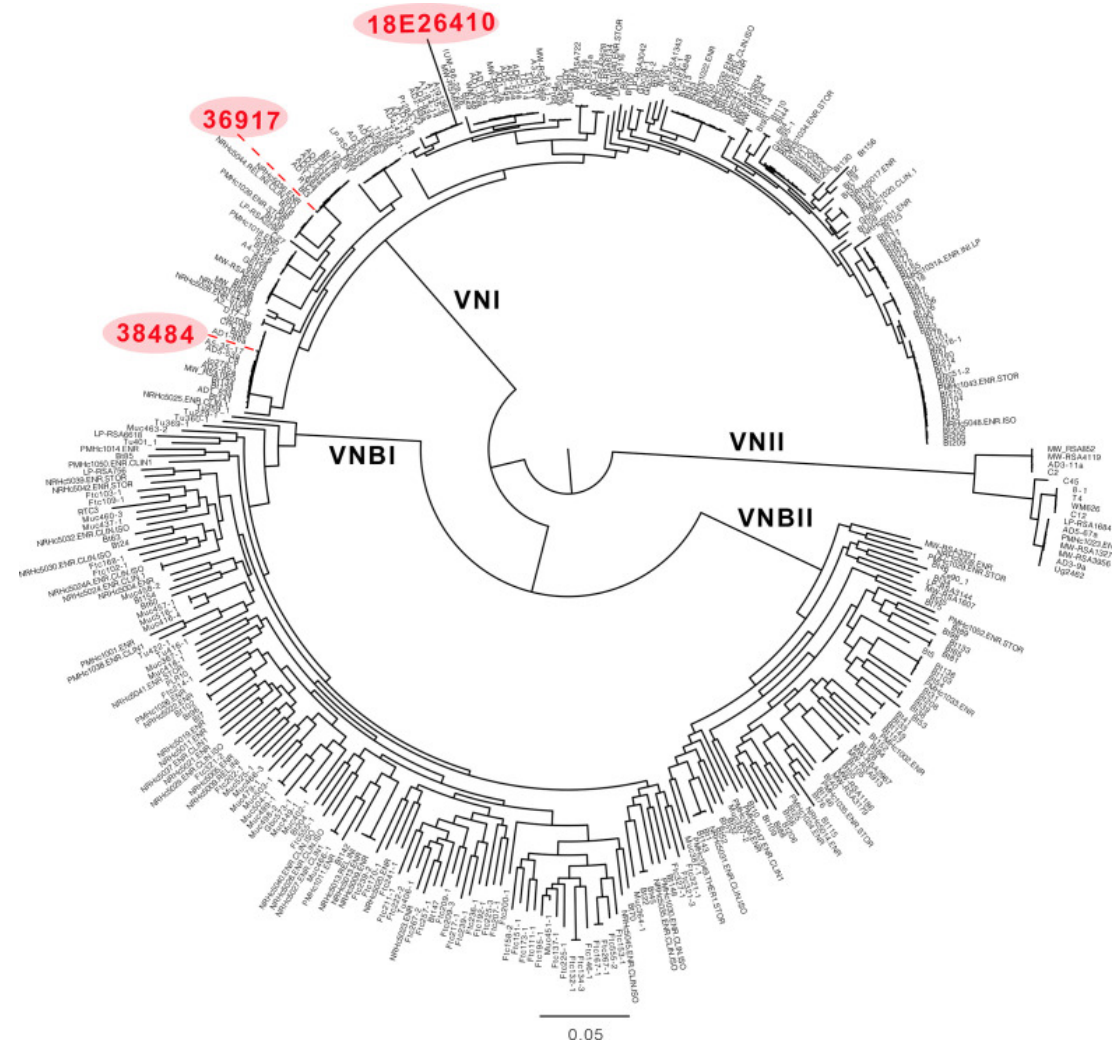
Two dead after pigeon dropping infection at hospital

🕒 19 January 2019



BBC 2019

UK cases of cryptococcal meningitis – link with roosting pigeons?



Looking ahead



**WIDER RANGE OF
ANTIFUNGAL DRUGS**



**MORE RESEARCH AND
INVESTMENT**



**INCREASED AWARENESS
AND EDUCATION**

Acknowledgements

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