

MUNI
PHARM

Mycology

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CC: RimmaKhaz

Types of microorganisms

Parasites:

Fungi:
yeasts, molds; eucaryots

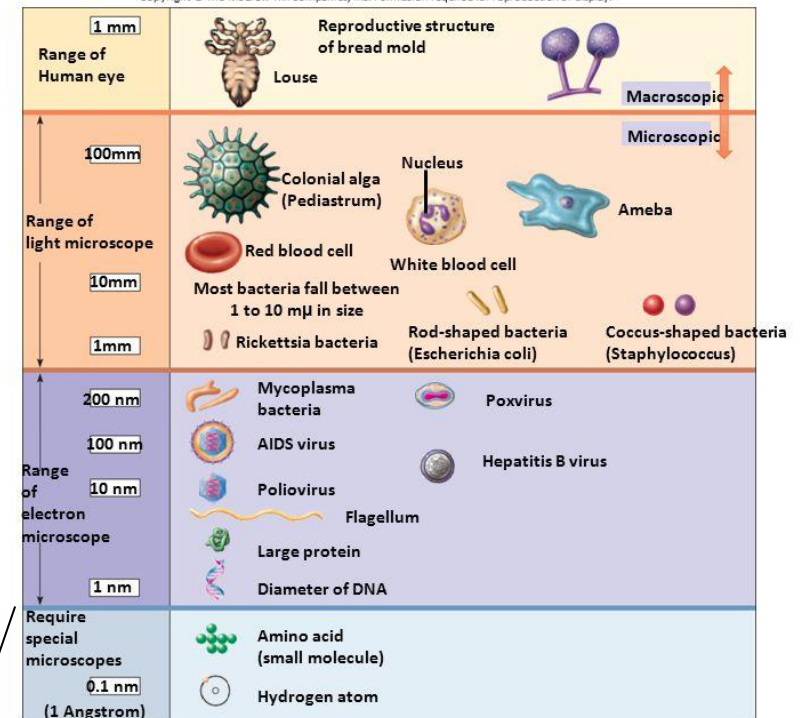
Bacteria:

Viruses:

Prions:

Size Range of Microbes

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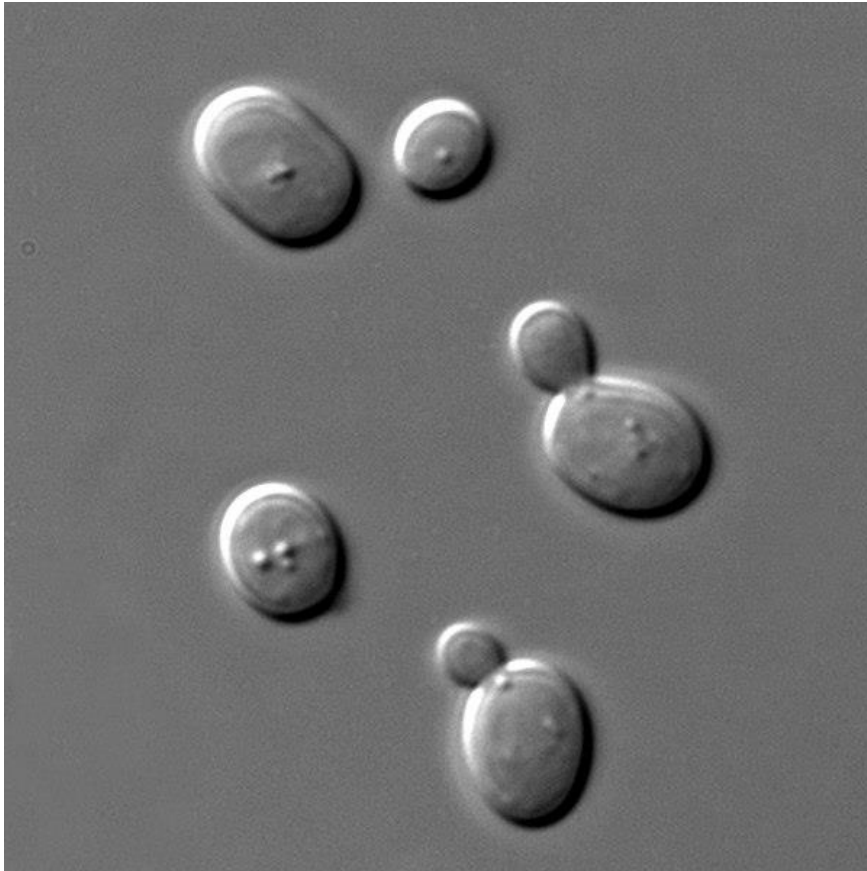


Definitions and key topics

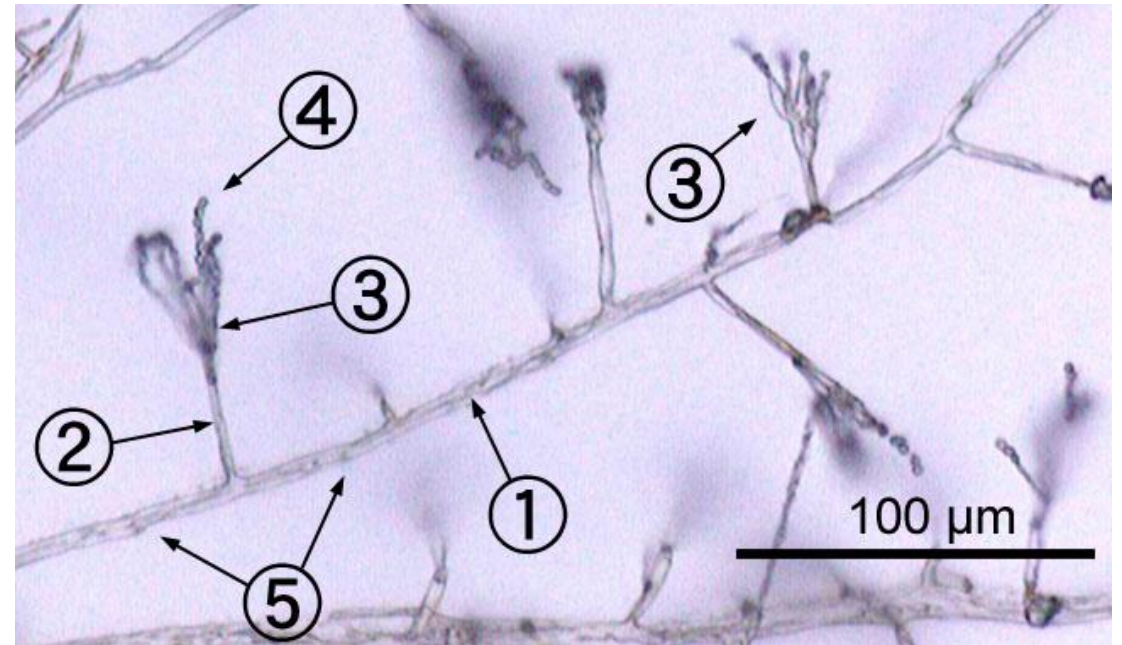
- separate kingdom (*Fungi, Mycetes*) – microbiology: **micromycetes**
- originally *Plantes* – why NOT?
 1. no **chlorophyll** (-> ~~photosynthesis~~; saprophytes, parasites)
 2. complex saccharide in wall: **chitin**
 3. CPM: **ergosterol**
 4. alternation of **sex. (spores)** a **nonsex. (conidium)** reproduction

Morphology

blastoconidium – yeasts



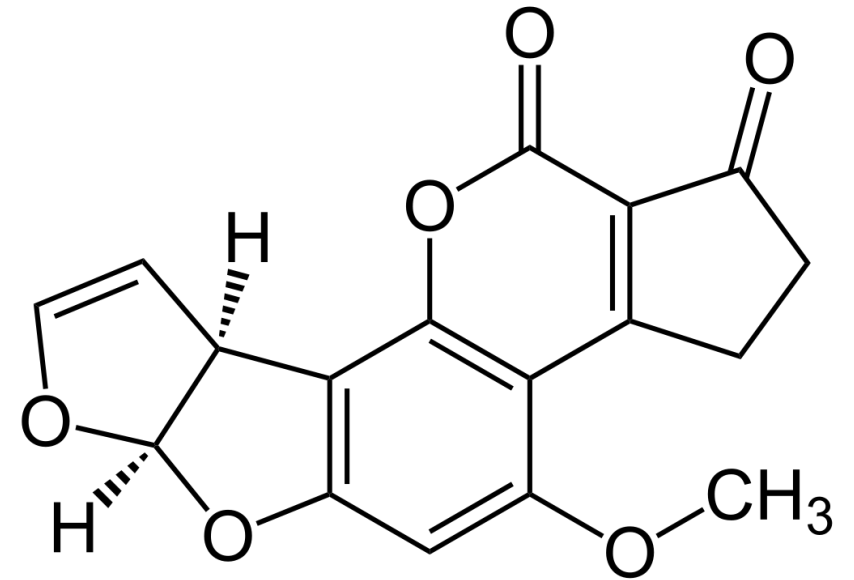
hyphae (mycelium) – molds, filaments



CC: Adrian J. Hunter

Mycotoxines

- molds – sec. metabolisms
- *mycotoxicosis*: acute or chronic
- beginning of '60 England: **aflatoxin B1**
(*Aspergillus flavus*) – hepatocancerogen –
contamination of peanuts and cereals



Divisions of micromycetes

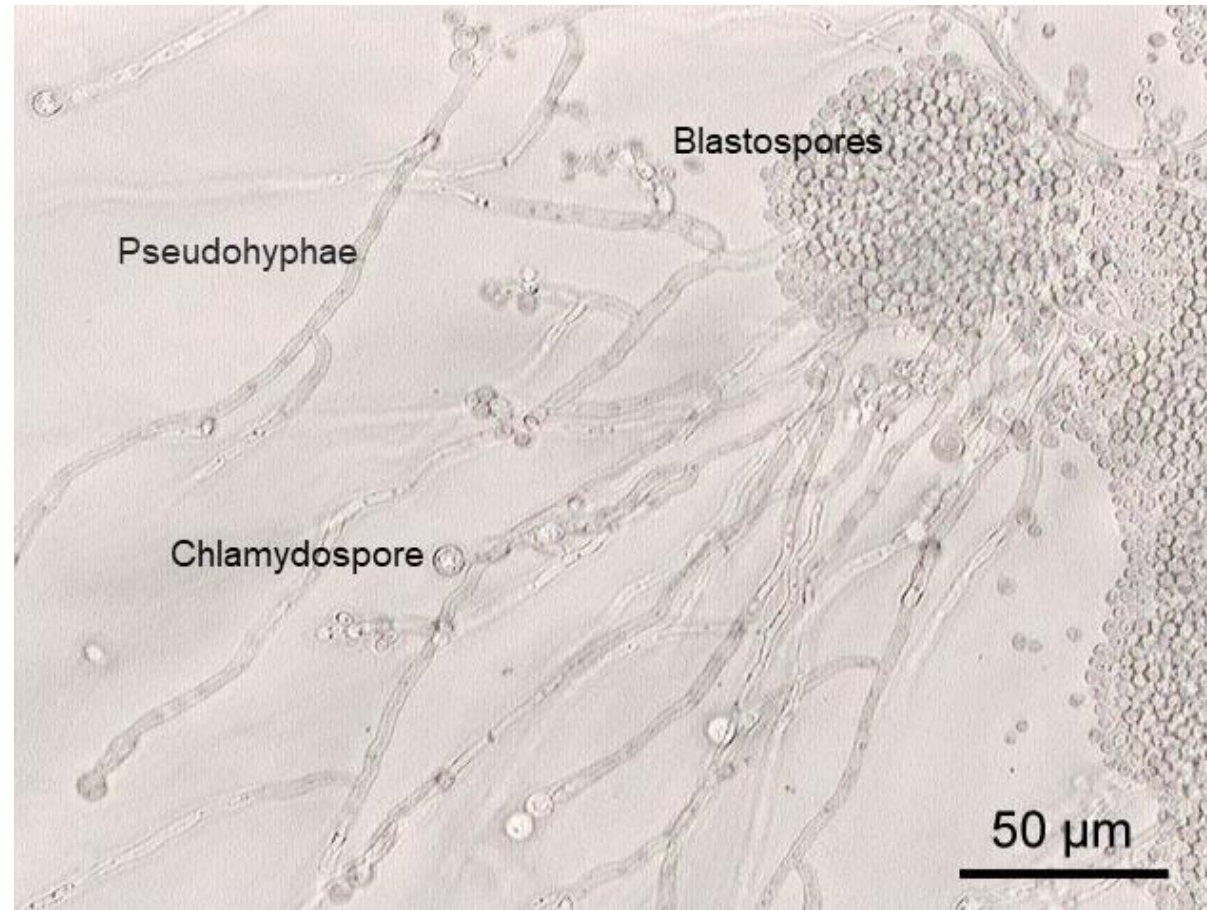
– more aspects; complex systematics -> combination of **morphological** and **clinical** point of view (surface or systemic mycosis)

1. **yeast** micromycetes
2. **dimorphic** micromycetes
3. **fibrous** micromycetes

Yeast micromycetes

- oval eucaryo. cells – diameter 3 – 15 μm – **whitish** colonies
- reproduction: budding; there are also sexual cycles
- *Candida* (pseudohyfae); *Cryptococcus* (polysacch. capsules)
- **Sabouraud dextrose** agar (pH **5,6**)
- pathogenesis: diabetes mellitus, broadspectrum ATB, long-term catheters, too much sugars in meals

Yeast micromycetes



CC: Y tambe

genus *Candida*

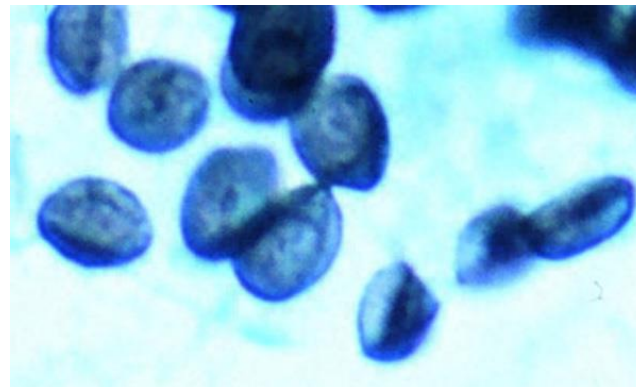
- most often cause of infections from this genus: *C. albicans* (lat. *candidus* = white; *albico* = whiten)
- phenotype switch: white colonies -> grey
- microbiota in GIT and vagina of adult women; often symptom **oral thrush** (*candidosis*) – white lesions in mouth (children; +AIDS); further vaginal candidosis (e.g. after ATB); systemic inf. rare

genus *Cryptococcus*

- yeasts usually found in soil and bird droppings (pigeons)
- representative: *Cryptococcus neoformans*
- in people with weak IS cause of fatal pneumonia, meningitis and sepsis

genus *Pneumocystis*

- unicell. parasitic fungi – previously classified as *Protozoa*, but it is actually *Ascomycota* – no ergosterol, but cholesterol
- *P. jiroveci* – Otto Jírovec (Czech parasitologist) – **pneumocystic pneumonia** in immunocompromised (AIDS, chemother.) – droplets – trophozoites in alveoli – th.: cotrimoxazol



Dimorphic micromycetes

- at temperature **upto 30 °C** grow in **filaments (fibrous)**; **35 – 37 °C** in **yeast** form – but may cause infection
- *Blastomyces dermatitis*: disease blastomycosis, endemic in USA; inhalation of filamentous form in dust – pneumonia or skin infection
- *Histoplasma, Coccidioides*

Fibrous micromycetes

Zygomycetes:

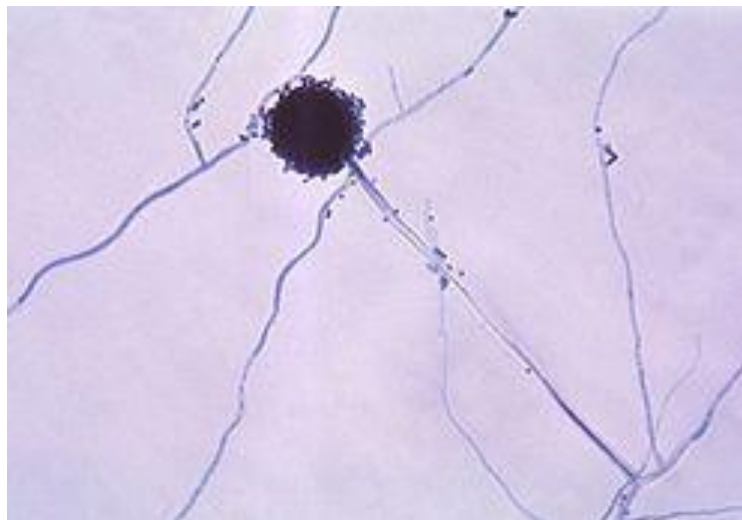
- systemic zygomycoses – saprophytes of plant substrates
- e.g. genus *Mucor* causing rhinocerebral mycoses and otomycoses
- therapy: amphotericin B



Fibrous micromycetes

Conidia as chains in filaments:

- fast growing, colored colonies; conidial head (-> sprinkler)
- molds from genus *Aspergillus* (*niger*, *flavus*): systemic (endocarditis, rhinocerebral inf.) and surface mycosis + production of aflatoxins



Fibrous micromycetes



Causes of feohyphomycosis:

- pigment melanin; all types of infections – g. *Alternaria*

Causes of eumycotic mycetomas:

- bounded granulomatous infection of skin or subcutaneous tissue:
pus + filaments – g. *Curvularia*, *Madurella*

Fibrous micromycetes

Dermatomycosis:

- keratinophilic fungi -> infection of skin, hairs and nails – attachment in place of damage – after 24h germination of conidia and growth into *stratum corneum*
- infection of skin: *tinea* – *Epidermophyton*, *Microsporium*, *Trichophyton*

CC: Doc Heilman

