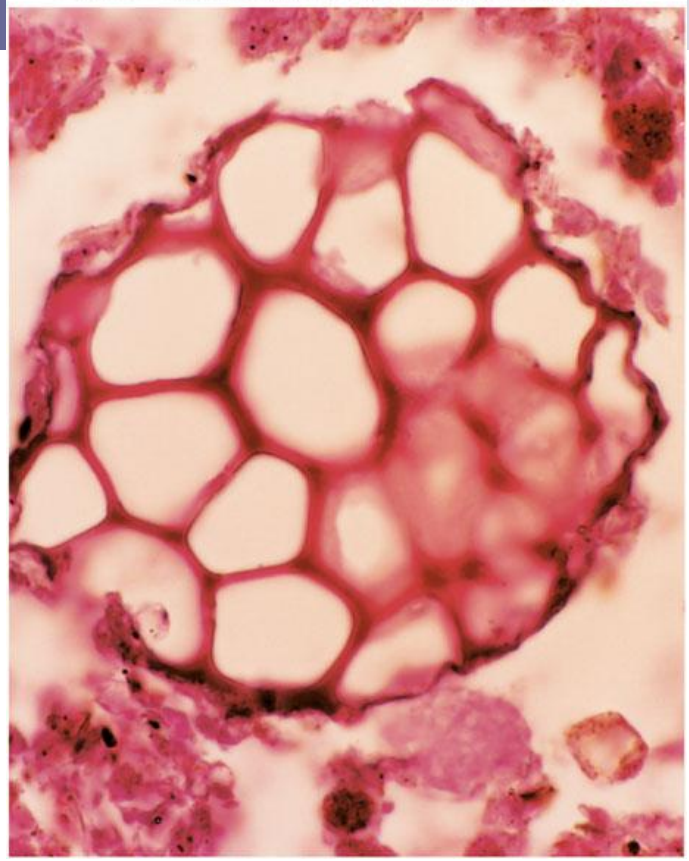


The Fungi of Medical Importance

Chapter 22

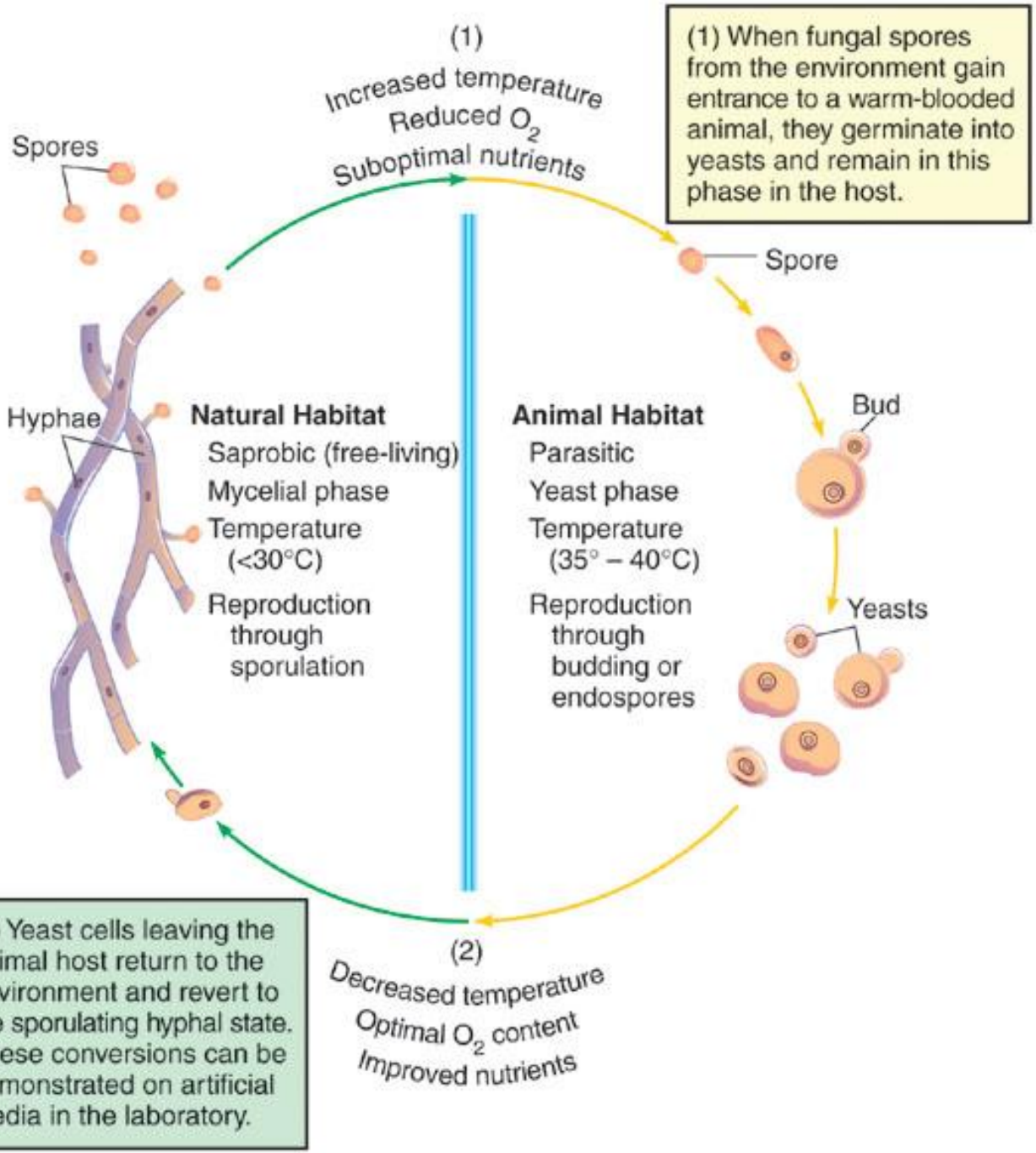
Fungi as infectious agents

- molds & yeasts are widely distributed in air, dust, fomites & normal flora
- humans are relatively resistant
- fungi are relatively nonpathogenic
- of the 100,000 fungal species, only 300 have been linked to disease in animals
- fungi are the most common plant pathogens
- human mycoses are caused by true pathogens and opportunistic pathogens

TABLE 22.2

Comparison of True and Opportunistic Fungal Infections

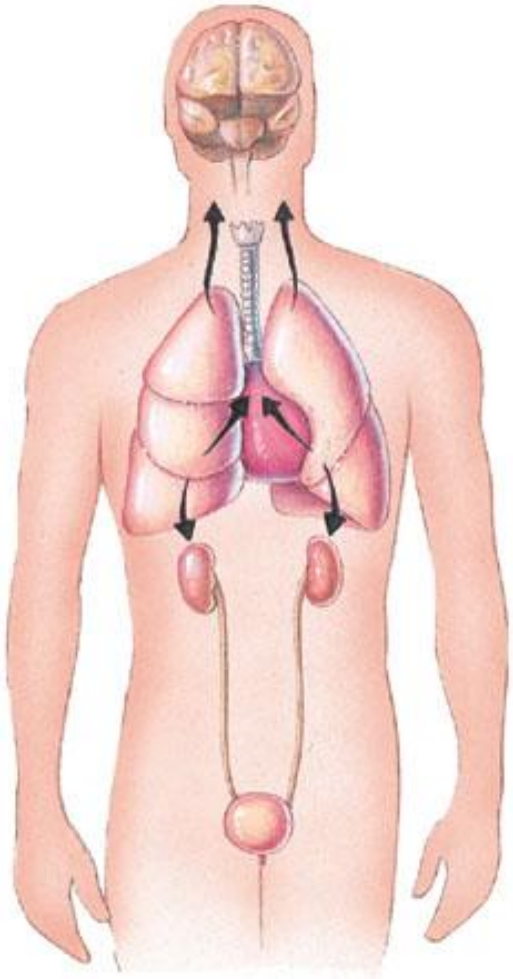
	True Pathogenic Infections	Opportunistic Infections
Degree of Virulence	Well developed	Limited
Condition of Host	Resistance high or low	Resistance low
Primary Portal of Entry	Respiratory	Respiratory mucocutaneous
Nature of Infection	Usually primary, pulmonary, and systemic; usually asymptomatic	Varies from superficial skin to pulmonary and systemic; usually symptomatic
Nature of Immunity	Well-developed, specific	Weak, short-lived
Infecting Form	Primarily conidial	Conidial or mycelial
Shows Thermal Dimorphism	Strongly	Not usually
Habitat of Fungus	Soil	Varies from soil to flora of humans and animals
Geographic Location	Restricted to endemic regions	Distributed worldwide

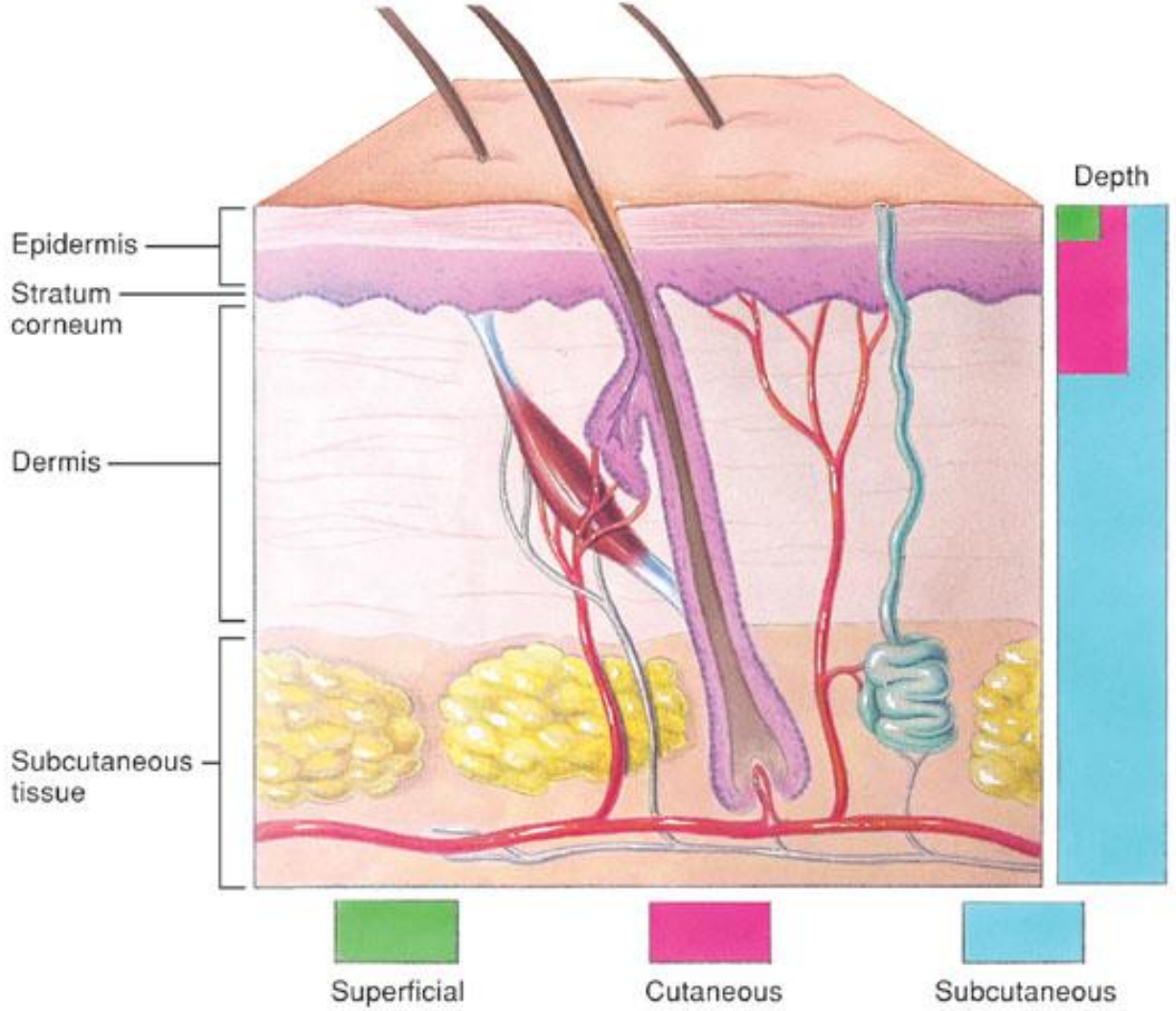


Mycoses

- most fungal pathogens do not require a host to complete their life cycles and infections are not communicable
- dermaphytes & *Candida sp* naturally inhabit human body & are transmissable
- dermaphytoses most prevalent
- most cases go undiagnosed or misdiagnosed
- systemic, subcutaneous, cutaneous or superficial infections

Levels of invasion





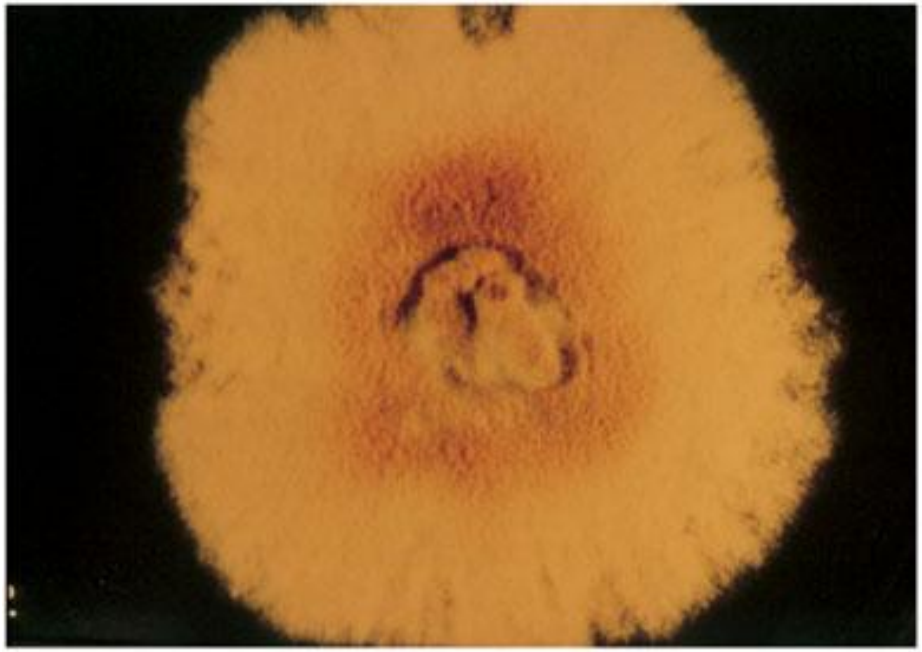
Systemic mycoses caused by true pathogens

- *Histoplasma capsulatum*
- *Coccidioides immitis*
- *Blastomyces dermatitidis*
- *Paracoccidioidomycosis brasiliensis*

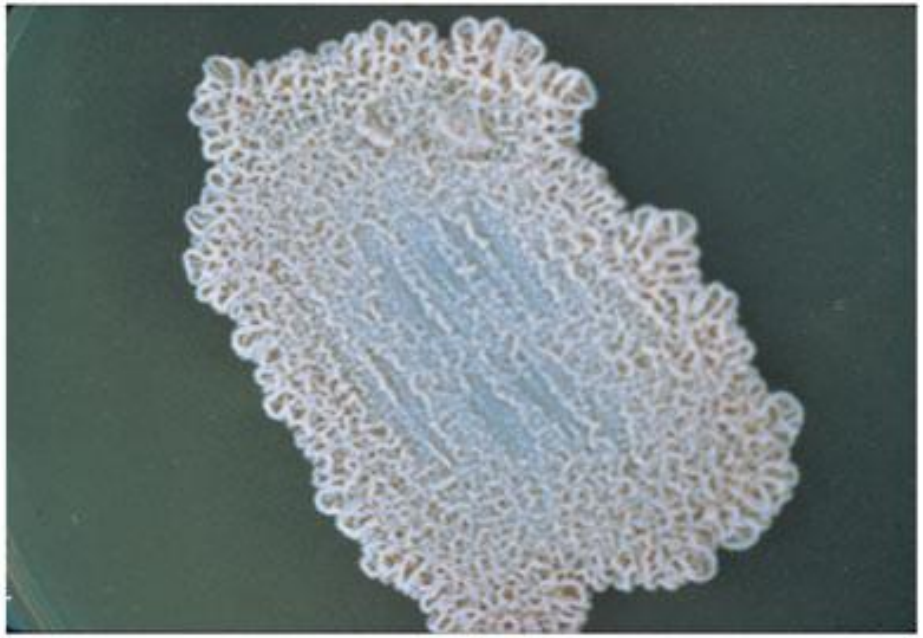
Histoplasma capsulatum

- cause histoplasmosis
- typically dimorphic
- distributed worldwide, most prevalent in eastern & central regions of US (Ohio River Valley) KENTUCKY
- grow in moist soil high in nitrogen content
- inhaled conidia produce primary pulmonary infection that may progress to systemic involvement of a variety of organs & chronic lung disease
- amphotericin B, ketoconazole

Histoplasma capsulatum

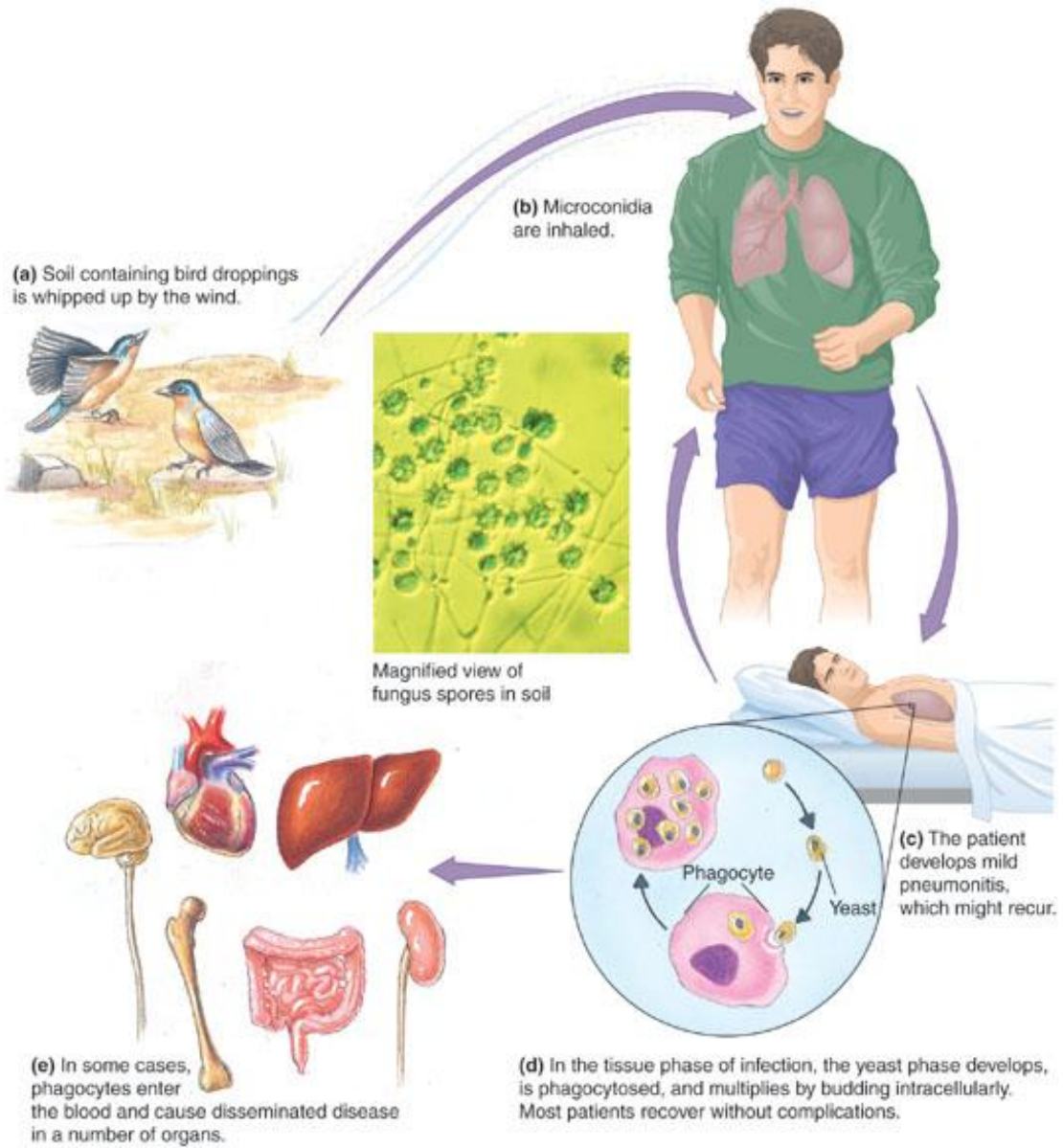


(a) A colony at 25°C produces a fuzzy mycelium.



(b) A yeast colony (37°C) is dense and waxy.

Histoplasma capsulatum



Candida albicans

- widespread yeast
- infections can be short-lived, superficial skin irritations to overwhelming, fatal systemic diseases
- budding cells of varying size that my form both elongate pseudohyphae & true hyphae
- forms off-white, pasty colony with a yeasty odor

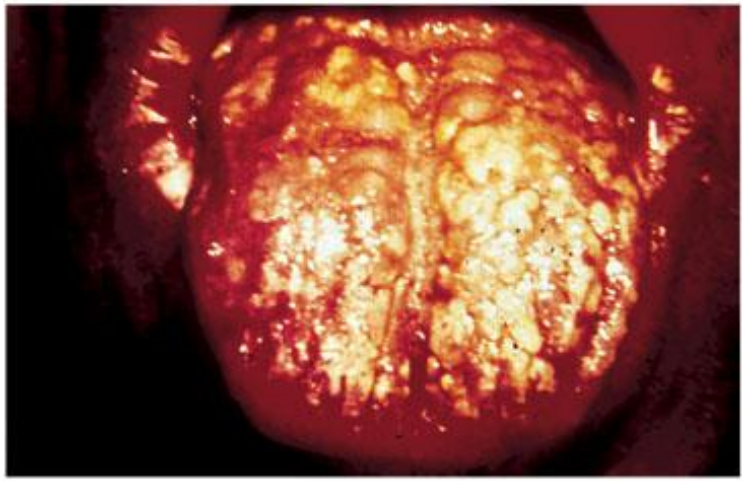
Candida albicans

- Normal flora of oral cavity, genitalia, large intestine or skin of 20% of humans
- Account for 80% of nosocomial fungal infections
- Account for 30% of deaths from nosocomial infections

Candida Albicans infections

- Thrush – occurs as a thick, white, adherent growth on the mucous membranes of mouth & throat
- Vulvovaginal yeast infection – painful inflammatory condition of the female genital region that causes ulceration & whitish discharge
- Cutaneous candidiasis – occurs in chronically moist areas of skin and burn patients

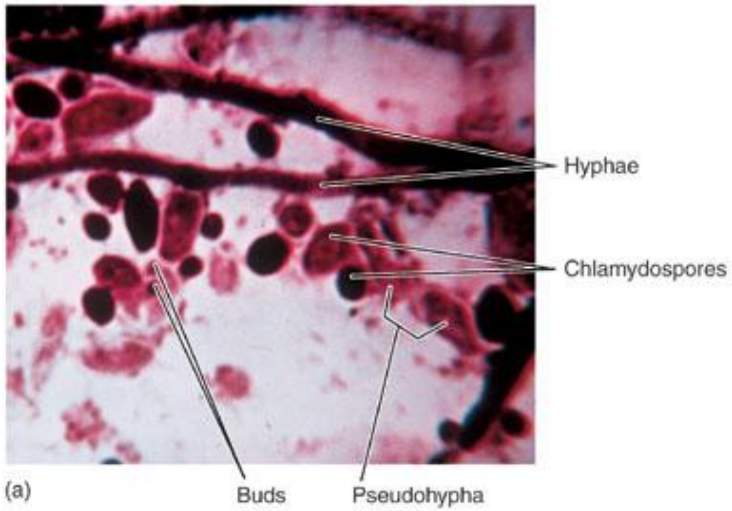
Candida albicans



(a)

(b)

Candida albicans



(a)

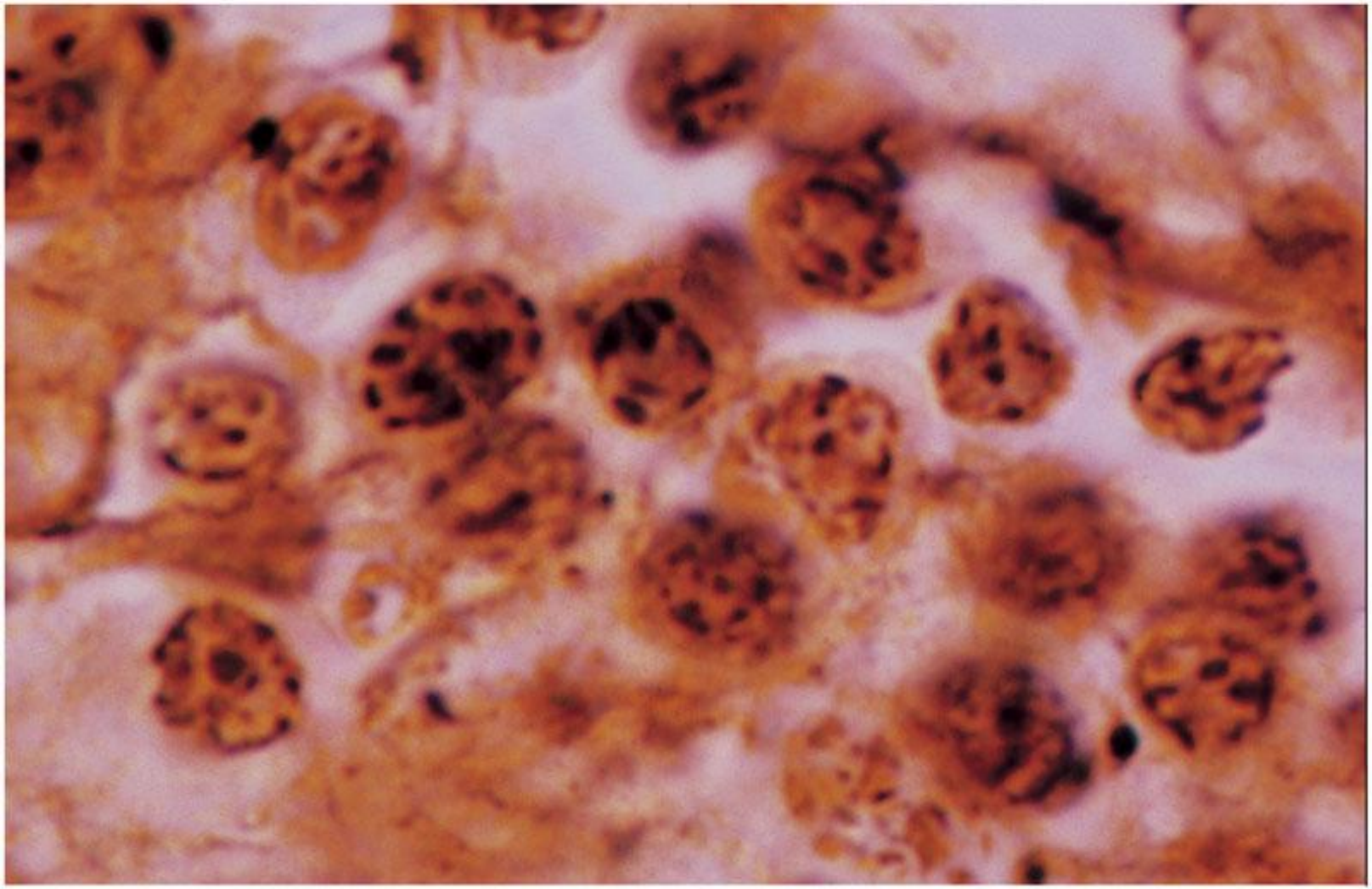
(c)

(b)

Pneumocystis carinii

- a small, unicellular fungus that causes pneumonia (PCP), the most prominent opportunistic infection in AIDS patients
- this pneumonia forms secretions in the lungs that block breathing & can be rapidly fatal if not controlled with medication
- pentamidine & cotrimoxazole

Pneumocystis carinii



Fungal allergies & mycotoxicoses

- Fungal spores are common sources of atopic allergies

- Fungal toxins lead to mycotoxicoses usually caused by eating poisonous or hallucinogenic mushrooms

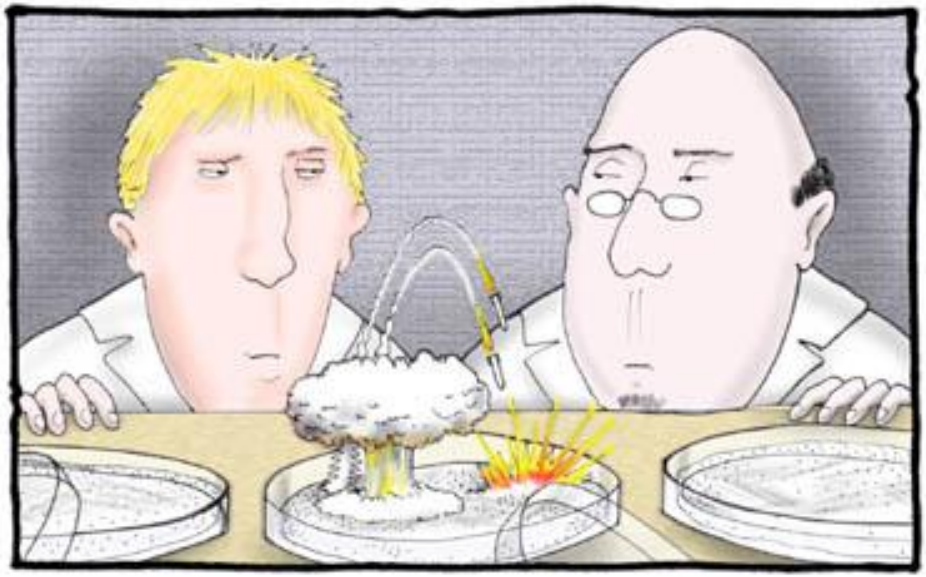
Examples of Fungal Allergies & Mycotoxicoses

1. asthma, often occurring in seasonal episodes
2. farmer's lung, a chronic & sometimes fatal allergy of agricultural workers exposed to moldy grasses
3. teapicker's lung
4. bagassosis, a condition caused by inhaling moldy dust from processed sugarcane debris
5. bark stripper's disease caused by inhaling spores from logs

Y

Yeast, n.

Gregarious single-celled organism whose first evolutionary priority was to develop the capacity to synthesize alcohol. Usually well behaved, but can become rowdy in groups.



Once again, war breaks out in the middle yeast.