



Fungal Infections



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https://www.emedicinehealth.com/fungal_skin_infection_vs_eczema/article_em.htm

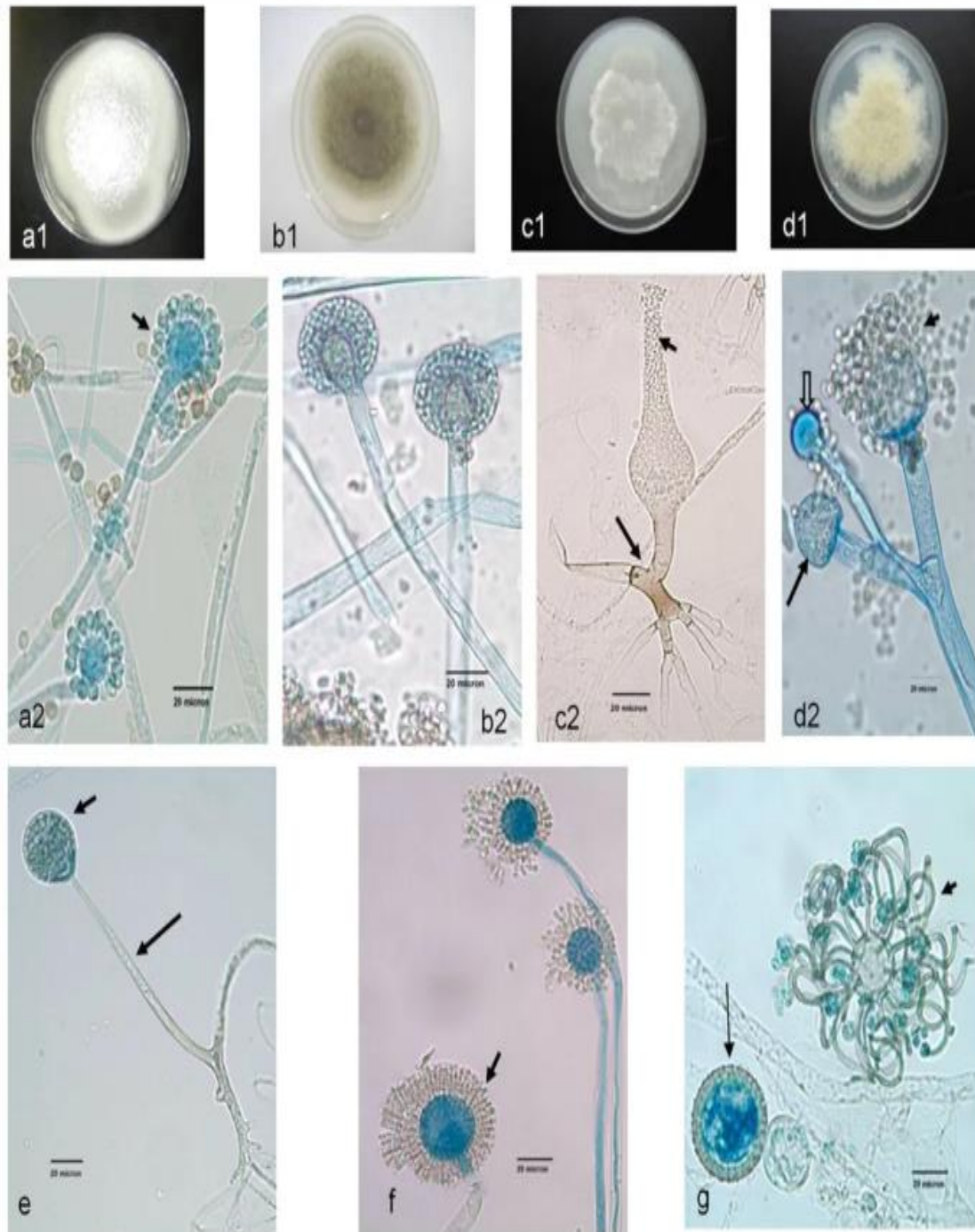


<https://healthcarensickcare.com/7-common-types-of-fungal-infection>





Unusual Mucormycetes

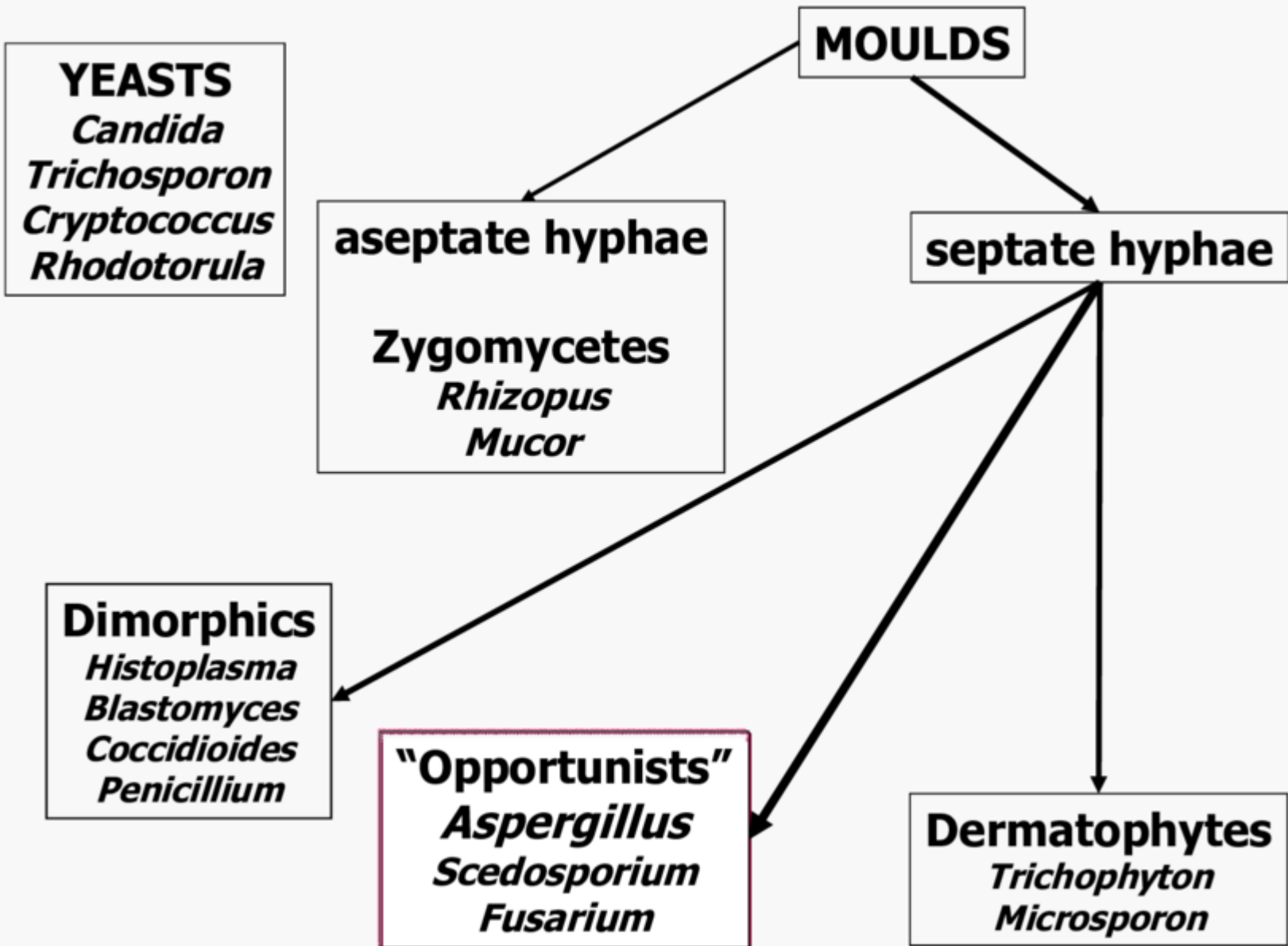


(a2, b2, c2, d2, and e to g) Lactophenol cotton blue mount preparations. (a1, b1, c1, and d1) Potato dextrose agar (PDA) medium plates. (a1) *C. bertholletiae* colony surface on a PDA medium plate. (a2) *C. bertholletiae* sporangiophores in terminal swellings called vesicles, with sporangioles (short arrow). (b1) Colony surface of *R. pusillus* on a PDA medium plate incubated at 30°C for 96 h. (b2) *R. pusillus* sporangiophores with globose sporangia. (c1) *S. vasiformis* colony surface on a PDA medium plate incubated at 30°C (48 h). (c2) *S. vasiformis* sporangiophore arising from a "foot cell"-like hyphal element (long arrow), flask-shaped sporangium, and liberated sporangiospores (short arrow). (d1) *Actinomucor elegans* colony surface on a PDA medium plate incubated at 30°C (96 h). (d2) *Actinomucor elegans* branched sporangiophores, sporangium (long arrow), columella (block arrow), and various sporangiospores (short arrow). (e) Unbranched *Apophysomyces elegans* sporangiophore (long arrow) with a pyriform sporangium (short arrow). (f) *S. racemosum* sporangiophores with merosporangia (short arrow). (g) *C. recurvatus* sporangiolating vesicle (short arrow) and zygospores (long arrow). Bars, 20 µm. (All photomicrographs except panel a1 courtesy of Deanna A. Sutton, reproduced with permission.)

LEARNING OBJECTIVES

AFTER STUDYING THIS CHAPTER, YOU SHOULD BE ABLE TO:

- **Categorize various fungal diseases by body system (e.g., respiratory system, circulatory system, etc.)**
- **Correlate a particular fungal disease with its major characteristics, etiologic agent, reservoir(s), mode(s) of transmission, and diagnostic laboratory procedures**
- **Briefly explain how fungi cause disease**
- **Classify a given fungal infection as being a superficial, cutaneous, subcutaneous, or systemic mycosis**
- **State several diseases caused by dimorphic fungi**

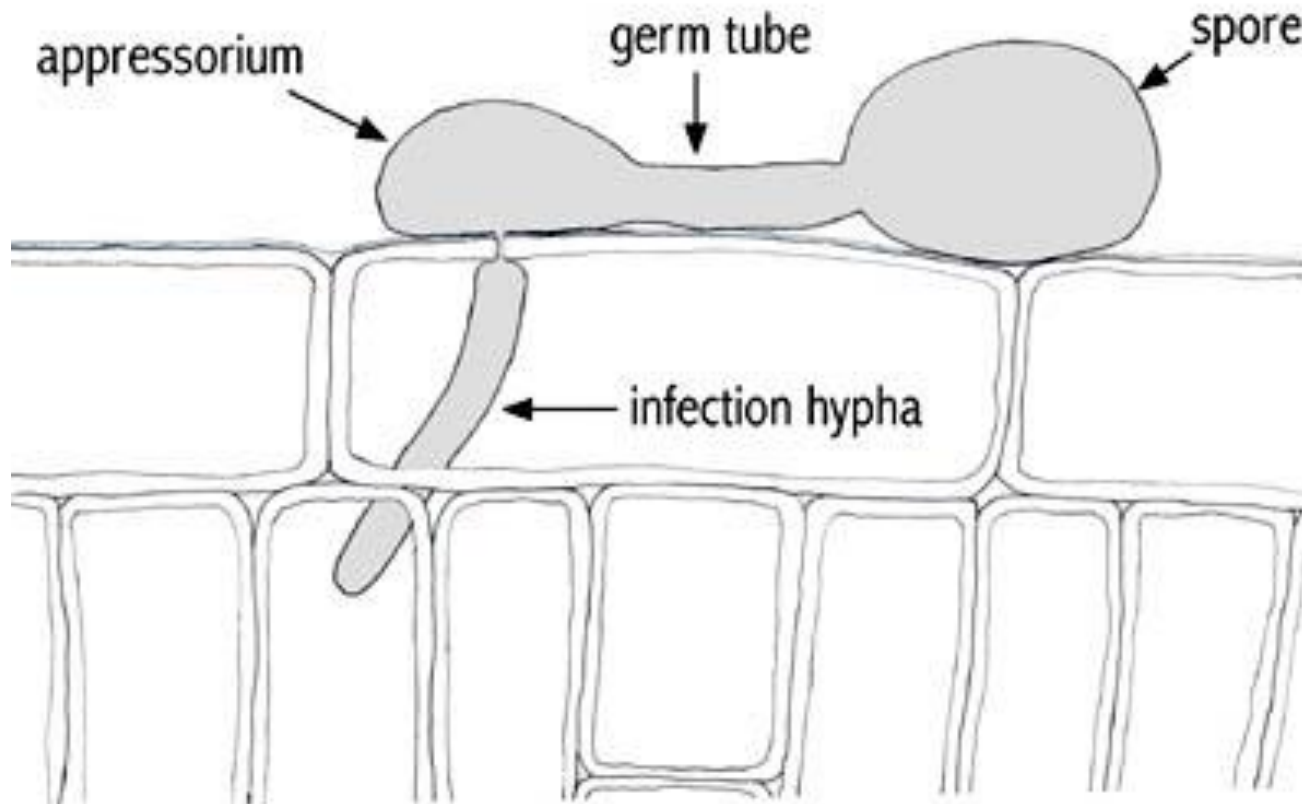


✓ **Fungal infections are also known as mycoses (sing., mycosis).**

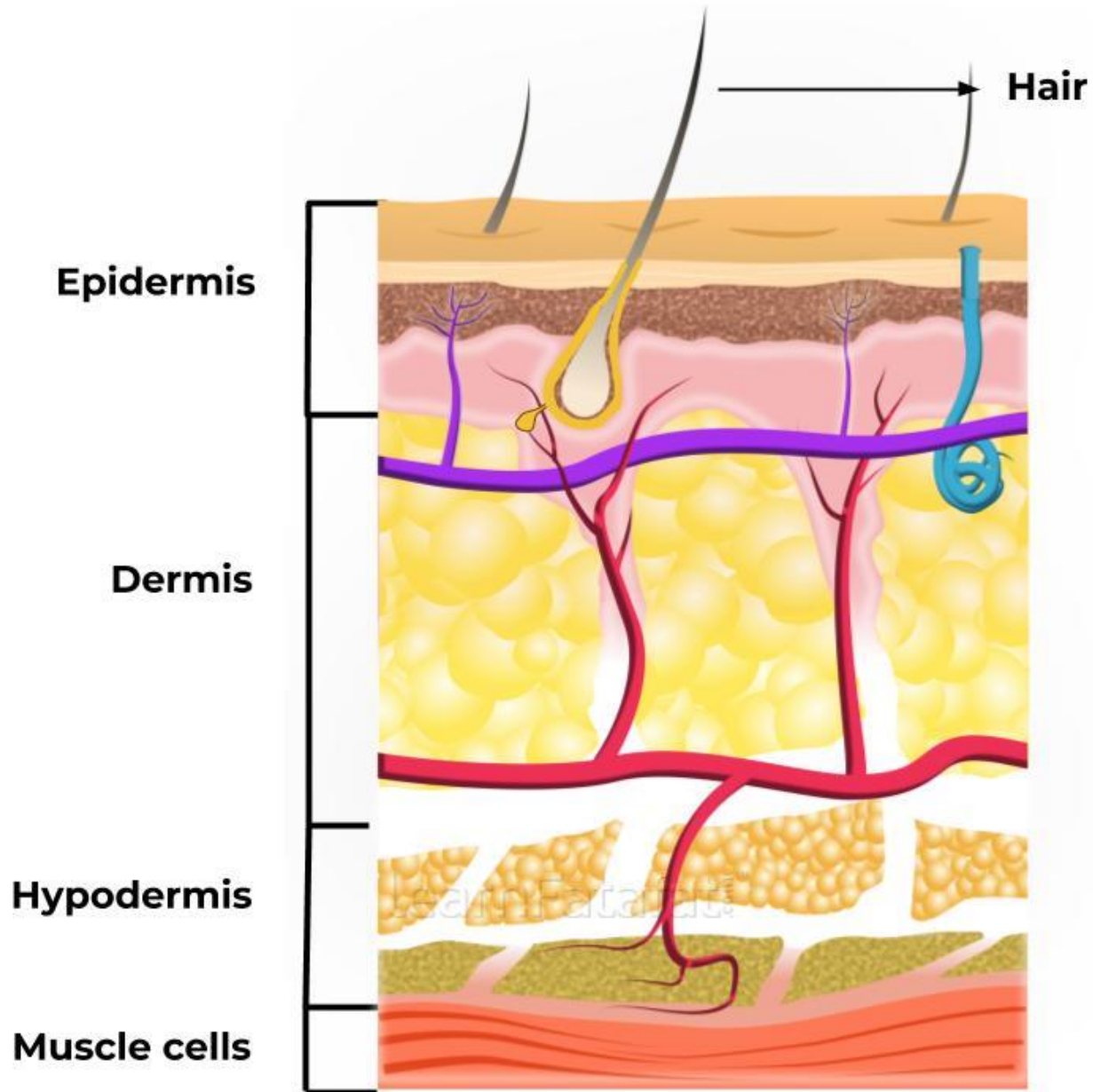
✓ **Mycoses are caused by certain yeasts, moulds, and dimorphic fungi.**

HOW DO FUNGI CAUSE DISEASE?

Fungal pathogens cause disease by invasion and mechanical destruction of tissues and/or obstruction of the flow of bodily fluids.



Structure of skin



Skin fungal infections

Superficial

Cutaneous

Subcutaneous

Causative fungus
Trichophyton rubrum
Aspergillus fumigatus

Causative fungus
Epidermophyton,
Trichophyton,
Microsporum

Causative fungus
Sporothrix schenckii,
Candida albicans

Examples
Tinea versicolor,
white piedra, tinea
nigra

Examples
Tinea faciei, tinea
barbae, tinea capitis,
tinea manuum

Examples
Maduramycosis,
chromomycosis



(A) Tinea pedis (athlete's foot)

B. *Tinea corporis*



(B) *Tinea corporis* (ring worm of the trunk, shown here on the shoulder)

C. *Tinea capitis*



(C) *Tinea capitis* (ringworm of the head)



(D) *Tinea cruris* (ringworm of the groin area)



(E) *Tinea unguium* (ringworm of the nails).

(From Harvey RA, et al. Lippincott's Illustrated Reviews: Microbiology, 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2007.)



Mycetoma of the foot. (From Binford CH, Connor DH. Pathology of Tropical and Extraordinary Diseases, vol. 2. Washington, DC: Armed Forces Institute of Pathology, 1976.)

Subcutaneous mycoses



(A) The cutaneous–lymphatic form of sporotrichosis on a patient’s arm

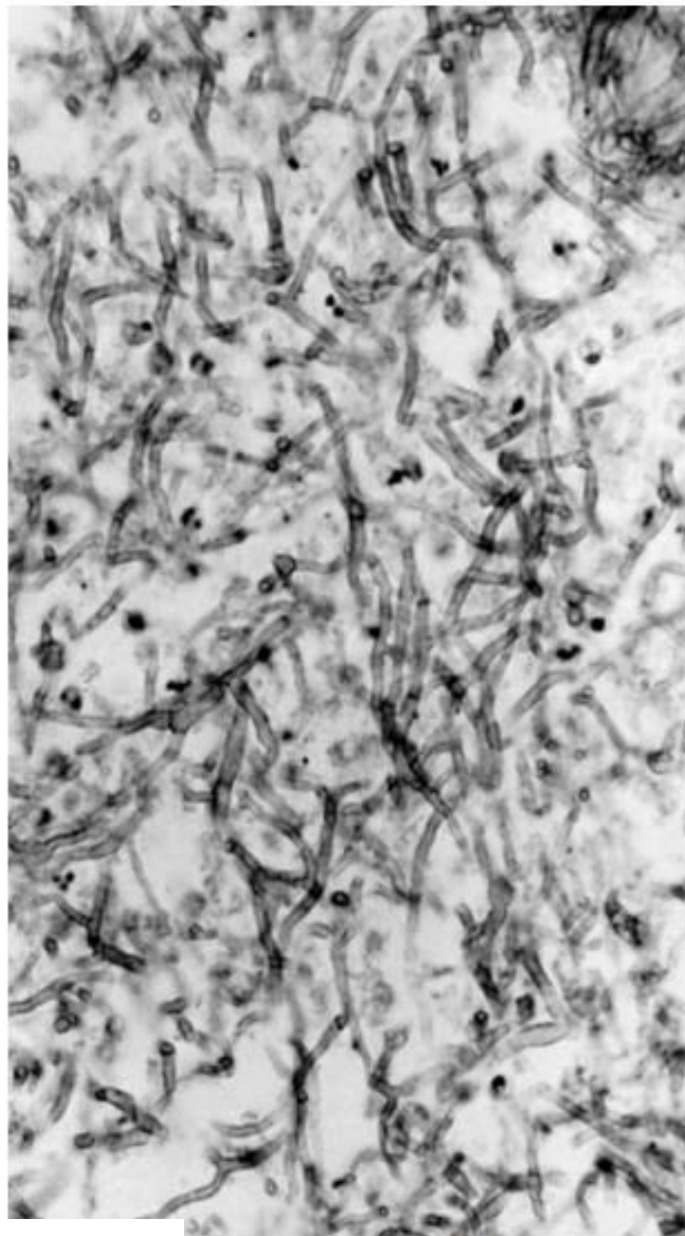


(B) chromomycosis on a patient's leg



(C) Mycetoma on a patient's arm.

(From Harvey RA, et al. Lippincott's Illustrated Reviews: Microbiology, 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2007.)



***Aspergillus fumigatus* hyphae in lung tissue from a patient with aspergillosis.** (From Schaechter M, et al. Mechanisms of Microbial Disease, 3rd ed. Philadelphia: Lippincott Williams & Wilkins, 1999.)



Oral candidiasis (thrush). (From Harvey RA, et al. Lippincott's Illustrated Reviews: Microbiology, 2nd ed. Philadelphia: Lippincott Williams & Wilkins, 2007.)

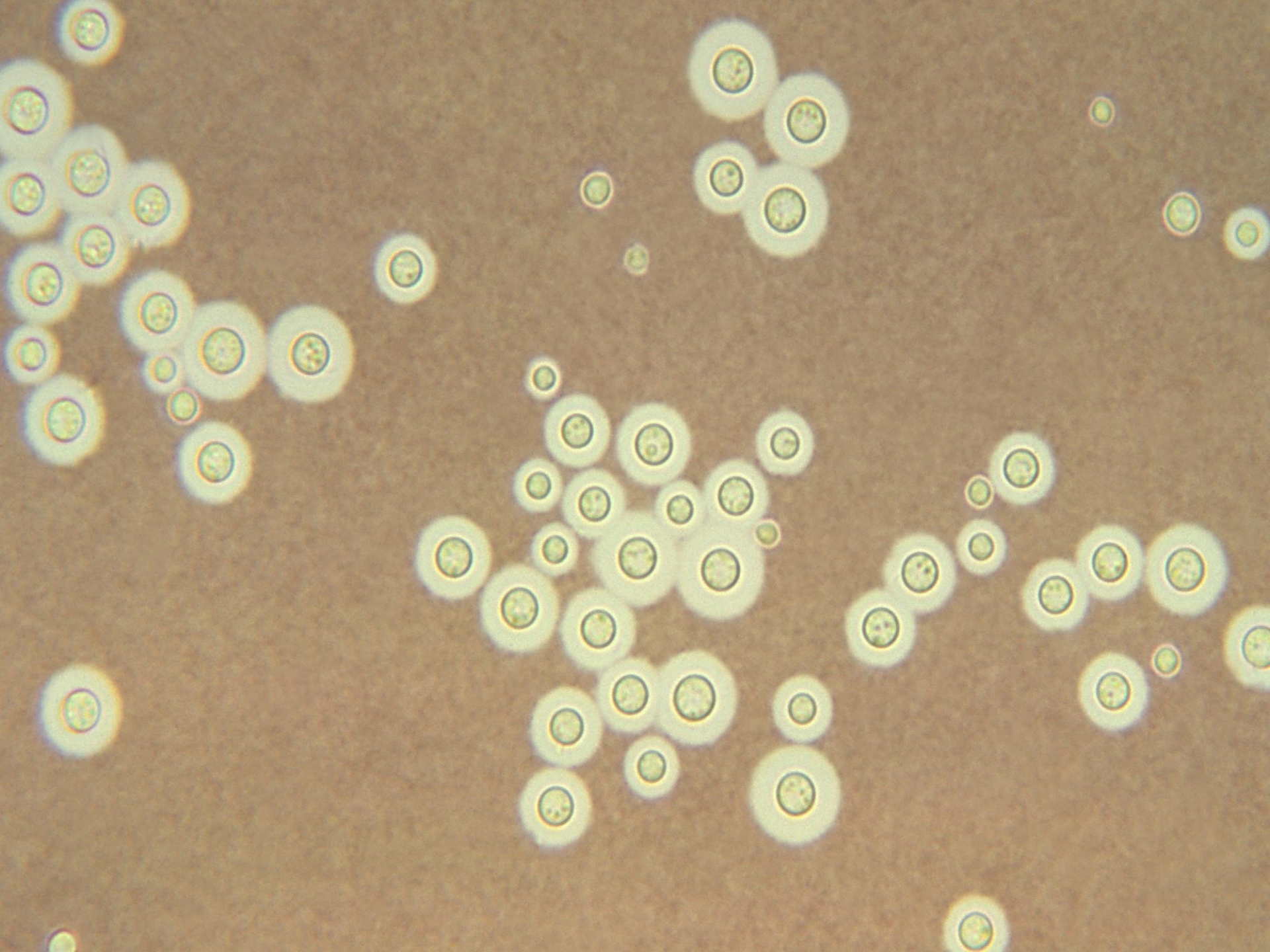
Pigeon



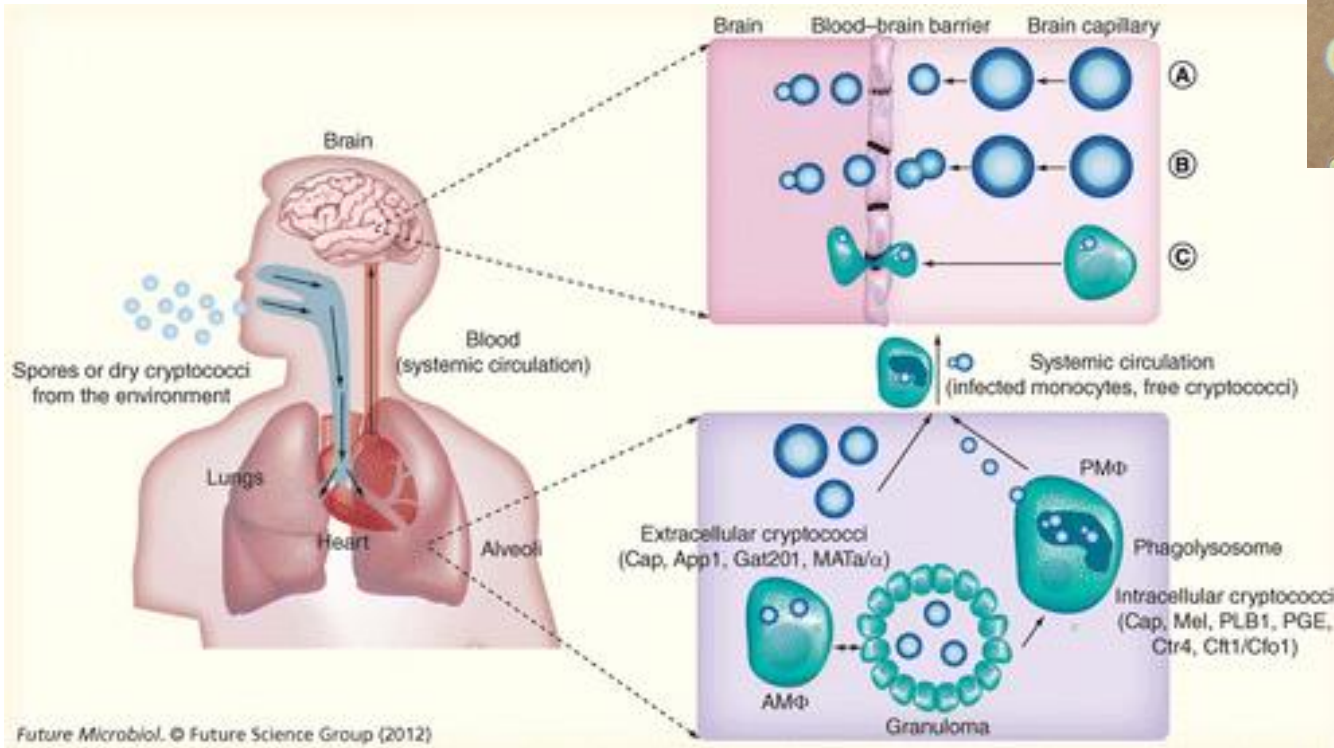
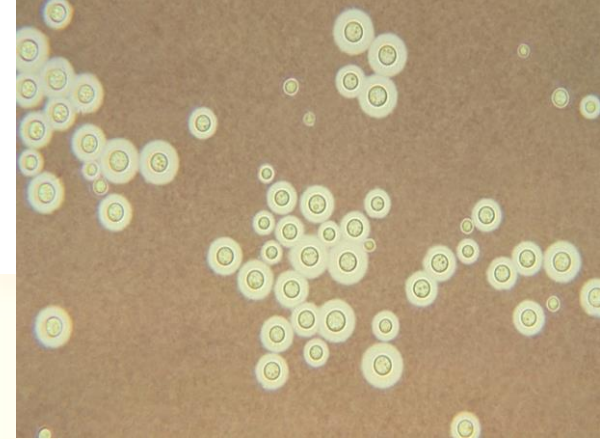








Cryptococcus neoformans

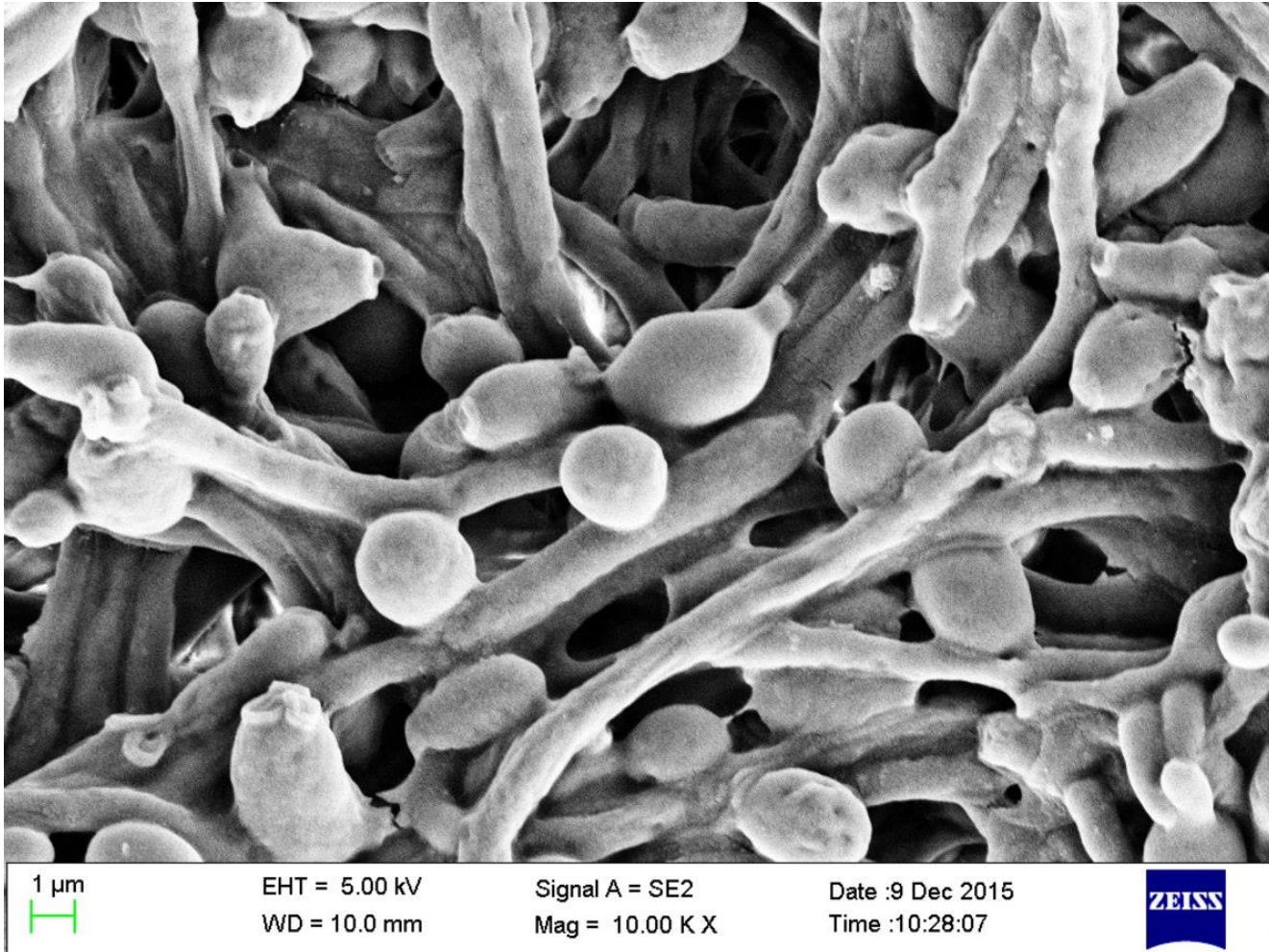


Future Microbiol. © Future Science Group (2012)



Candida albicans

(เชื้อราในช่องคลอด)

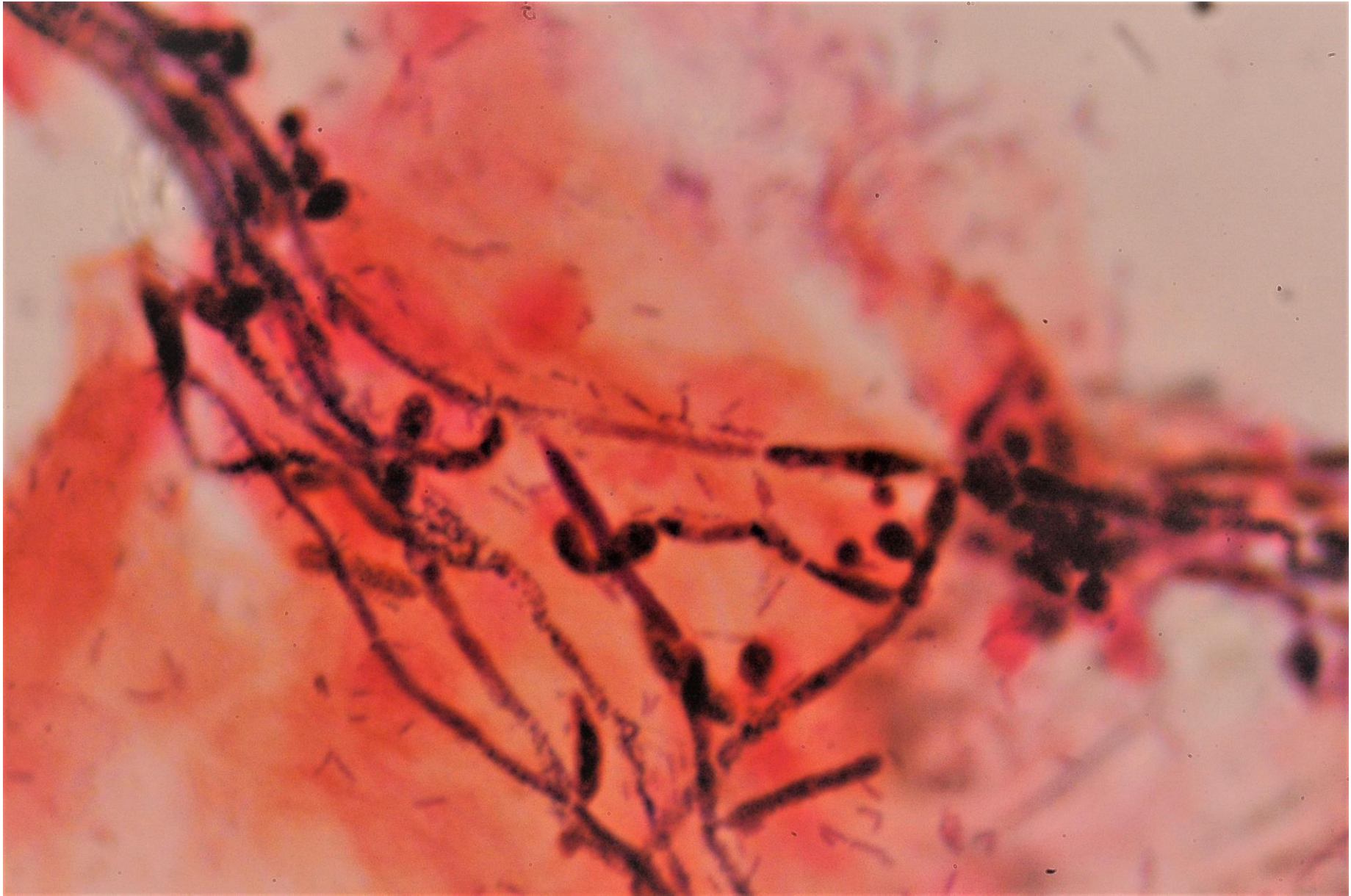




Candida albicans
on the vaginal walls



A yeast infection is
caused by the fungal
organism
Candida albicans



https://en.wikipedia.org/wiki/Vaginal_yeast_infection

Recap of Some Major Fungal Infections of Humans

DISEASE	FUNGAL PATHOGEN
Aspergillosis	Various species of <i>Aspergillus</i> (moulds)
Black piedra	<i>Piedraia hortae</i> (a mould)
Coccidioidomycosis	<i>Coccidioides immitis</i> (a dimorphic fungus)
Cryptococcosis	<i>Cryptococcus neoformans</i> (an encapsulated yeast)
Dermatomycoses	Various filamentous fungi (moulds), collectively referred to as dermatophytes
Histoplasmosis	<i>Histoplasma capsulatum</i> (a dimorphic fungus)
Penicilliosis	Various species of <i>Penicillium</i> (moulds)
Pneumocystis pneumonia	<i>Pneumocystis jiroveci</i> (formerly <i>Pneumocystis carinii</i>) (a nonfilamentous fungus having both protozoal and fungal properties)
Sporotrichosis	<i>Sporothrix schenckii</i> (a dimorphic fungus)
Tinea nigra	<i>Hortaea werneckii</i> (a mould)
Tinea versicolor (pityriasis versicolor)	<i>Malassezia furfur</i> (a mould)
Thrush	<i>Candida albicans</i> (a yeast)
White piedra	Usually caused by <i>Trichosporon beigelii</i> (a mould)
Yeast vaginitis	<i>C. albicans</i> (a yeast)
Zygomycosis (mucormycosis, phycomycosis)	Various zygomycetes, including bread moulds

WHO fungal priority pathogens list. (World Health Organization)

Critical group



*Cryptococcus
neoformans*



Candida auris



Aspergillus fumigatus



Candida albicans

High group



Nakaseomyces glabrata
(*Candida glabrata*)



Histoplasma spp.



Eumycetoma causative
agents



Mucorales



Fusarium spp.



Candida tropicalis



Candida parapsilosis

Medium group



Scedosporium spp.



*Lomentospora
prolificans*



Coccidioides spp.



Pichia kudriavzevii
(*Candida krusei*)



Cryptococcus gattii



Talaromyces marneffei



Pneumocystis jirovecii



Paracoccidioides spp.

TABLE. OVER-THE-COUNTER TOPICAL SKIN ANTIFUNGALS⁶⁻¹¹

Medication	What is it used for? / Dosage	How does it work?	Potential adverse effects	Brand names
Terbinafine	<ul style="list-style-type: none"> • Athlete's foot • Jock itch • Body ringworm <p>Dosage: Refer to terbinafine cream for specific instructions; other products are used 1x/day for 1 week</p>	Creates a deficiency in ergosterol, a key component of the fungus' cell wall; this causes the fungi to die ⁷	Flaking, peeling, itching, redness ⁷	Lamisil (cream, gel, or spray) ⁷
Butenafine	<ul style="list-style-type: none"> • Athlete's foot: 2x/day for 1 week, or 1x/day for 4 weeks • Jock itch: 1x/day for 2 weeks • Body ringworm: 1x/day for 2 weeks⁸ 	Creates a deficiency in ergosterol, a key component of the fungus' cell wall; this causes the fungi to die ⁷	Burning, stinging, itching, redness ⁷	Lotrimin Ultra (cream)
Ketoconazole Miconazole Clotrimazole	<ul style="list-style-type: none"> • Athlete's foot • Jock itch • Body ringworm <p>Refer to product description for individual directions^{9,10}</p>	Alters the permeability of the fungal cell wall and inhibits essential intracellular elements ^{9,10}	Localized burning, stinging ^{9,10}	Ketoconazole External; Micatin (miconazole); Desenex (miconazole); Clotrimazole External
Naftifine	<ul style="list-style-type: none"> • Athlete's foot: 1x/day (1% cream) or 2x/day (1% gel) for 2 weeks, up to 4 weeks • Jock itch: 1x/day (1% cream) or 2x/day (1% gel) for up to 4 weeks • Body ringworm: 1x/day (1% cream) or 2x/day (1% gel) for up to 4 weeks^{7,21} 	Creates a deficiency in ergosterol, a key component of the fungus' cell wall; this causes the fungi to die ¹⁸	Burning, dryness, itching, redness ⁷	Naftin External (cream or gel)

Tips to Prevent a Fungal



Eat plenty of fruits and vegetables



Consume foods with live cultures, like yogurt



Talk to your healthcare provider about taking probiotics (if you are taking antibiotics or steroids)



Keep skin clean and dry



Avoid taking antibiotics unless absolutely necessary



