• Pathogens with Intermediate Virulence
  Dermatophytes
• opportunistic Pathogens
  – Cryptococcus neoformans
  – Candida albicans
  – Aspergillus species
  – Pneumocystis carinii
Dermatophytes

• Named for *derma* “skin”
• *Cause cutaneous mycoses* – strictly confined to epidermis and its derivatives (hair and nails)
• All are communicable diseases
• Well adapted to breaking down keratin; termed keratinophiles
• Most diseases are termed “ringworm” or *tinea* because they develop in circular scaly patches
• Treatments include topical antifungal cream, debridement of skin and UV treatments
• Difficult infections can be treated with griseofulvin; however, this drug is both hepatotoxic and nephrotoxic
Cutaneous mycoses

• infections strictly confined to keratinized epidermis (skin, hair, nails) are called dermatophytoses - ringworm & tinea
• 39 species in the genera *Trichophyton*, *Microsporum*, *Epidermophyton*
• communicable among humans, animals, & soil
• infection facilitated by moist, chafed skin
Closely related and morphologically similar
Epidemiology and Pathology of Dermatophytes

- Ringworm of scalp (tinea capitis) affects scalp and hair-bearing regions of head; hair may be lost.

- Ringworm of beard (tinea barbae) affects the chin and beard of adult males; contracted mainly from animals.

- Ringworm of body (tinea corporis) occurs as inflamed, red ring lesions anywhere on smooth skin.
• Ringworm of groin (tinea cruris) “jock itch” affects groin and scrotal regions

• Ringworm of foot and hand (tinea pedis and tinea manuum) is spread by exposure to public surfaces; occurs between digits and on soles

• Ringworm of nails (tinea unguium) is a persistent colonization of the nails of the hands and feet that distorts the nail bed
(a) Tinea pedis

(b) Tinea unguium
• opportunistic Pathogens
  – Cryptococcus neoformans
  – Candida albicans
  – Aspergillus species
  – Pneumocystis carinii
Cryptococcus neoformans: Cryptococcosis

• Widespread; associated with birds, and bird guano
• Transmission is through spore inhalation
• Common infection of AIDS, cancer or diabetes patients
• Infection of lung leads to cough, fever, and lung nodules
• Dissemination to meninges and brain can cause severe neurological disturbances and death
• Systemic cryptococcosis requires immediate treatment with amphotericin B and fluconazole over a period of weeks or months
Diagnosis and treatment

• Initially: negative staining of samples to detect encapsulated budding yeast
• Confirmation by pigmentation on birdseed agar
• Birdseed Agar: - Cryptococcus neoformans produces phenol oxidase, which breaks down the substrate resulting in the production of melanin and developing dark brown or black colonies. Other yeasts will appear cream-colored.
• Systemic cryptococcosis requires immediate treatment with amphotericin B and fluconazole over a period of weeks or months
Cryptococcus neoformans
Cryptococcus neoformans

Figure 22.24 disseminated case of cutaneous cryptococcosis

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Secondary Pathogens

– Cryptococcus neoformans
– Candida albicans
– Aspergillus species
– Pneumocystis carinii
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
- Can cause short-lived superficial skin irritations to fatal systemic disease
- Candidiasis is usually endogenous, but can be communicable
Candida albicans: Candidiasis

• 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
• Cutaneous candidiasis – occurs in chronically moist areas of skin and burn patients
• Esophageal candidiasis – afflicts 70% of AIDS patients, causing painful bleeding ulcerations, nausea and vomiting
• Treatment: topical antifungals; amphotericin B in systemic infections
Diagnosis of Candidiasis

• Presumptive diagnosis by observing budding yeast cells and pseudohyphae in specimen
• Culturing on selective and differential yeast media ie trypan blue media – *Candida* appears light blue
• Also rapid yeast identification kits (multiple biochemical tests)
Stain of a vaginal smear

Pale blue colonies

Rapid ID test
Figure 22.21 Candida albicans infection of the mouth (oral thrush)