

# *Biology of Fungi*

## Fungal Spores, Dormancy, and Dispersal

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

## What are Fungal Spores?

- ◆ General definition: *microscopic propagules that lack an embryo and are specialized for dispersal or dormant survival*
  - \* Sexual spores tend to serve for dispersal
  - \* Asexual spores tend to serve for dormant survival
  - \* Some spores serve both purposes

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

## What are Fungal Spores? (cont.)

- ◆ Spores differ from somatic cells:
  - \* Wall is thicker, often with pigments
  - \* Dense cytoplasm, poorly developed cytoplasmic components
  - \* Low water content, respiration rates, and protein/nucleic acid synthesis
  - \* High content of energy-storage molecules, e.g., glycogen, lipids, etc.

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

## Spore Dormancy/Germination

- ◆ Dormancy is a general characteristic of most spores
- ◆ Two groups of spores based upon ability to germinate:
  - \* Constitutive dormancy
    - No germination in 'normal' conditions that stimulate somatic growth/development
    - Need to age or be activated by a specific trigger, e.g., heat shock

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

## Spore Dormancy/Germination (cont.)

- \* Exogenously imposed dormancy – remain dormant in unsuitable conditions, but germinate in response to nutrients
- ◆ Germination process
  - \* Hydration
  - \* Increased respiration
  - \* Increased synthesis
  - \* Outgrowth

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

## Spore Dormancy/Germination (cont.)

- ◆ Constitutive dormancy
  - \* Mechanisms of release
    - Maturation process; or
    - Triggering event that activates trehalase; or
    - Removal of endogenous inhibitors
  - \* Ecological aspects – germination of
    - Coprophilous fungi triggered by digestive tracts of animals
    - Pyrophilous fungi triggered by fire/heat

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

### Spore Dormancy/Germination (cont.)

- ◆ Exogenously imposed dormancy
  - \* Mechanism – fungistasis due to microbial activity in soil
    - Nutrient competition (probably key cause)
    - Release of microbial metabolites
      - + Ethylene
      - + Allyl alcohol
      - + Ammonia
    - Both actions, but not antibiotics

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.


### Spore Dormancy/Germination (cont.)

- \* Ecological implications of fungistasis
  - Plant pathogens wait until exudates (nutrients) become available; crop rotation can inhibit pathogenesis [germination lysis]
  - Release of host-specific molecules that stimulate germination [breed plants that don't release these molecules]

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

### Spore Dispersal

- ◆ Ballistic dispersal – coprophilous fungi



BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

### Spore Dispersal

- ◆ Ballistic dispersal – coprophilous fungi
  - \* Phototropic
  - \* Explosive discharge
  - \* Large projectile
- ◆ Insect dispersal (e.g., bark beetles and Dutch elm disease due to *Ophiostoma ulmi* and *O. novo-ulmi*)

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.

### Spore Dispersal (cont.)

- ◆ Appendages of aquatic fungi
- ◆ Motility of zoospores
- ◆ Airborne spores
- ◆ Rain drops

BIOL 4848/6948 (v. F09) Copyright © 2009 Chester R. Cooper, Jr.