DIMORPHIC FUNGI

An Introduction to *Coccidioides species*

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What Is A Dimorphic Fungus?

A dimorphic fungus is one that can produce 2 different growth morphologies (filamentous mold form – hyphae/yeast or other form) usually based on temperature or based on growth inside or outside of the body.

1. The following are thermally dimorphic fungi in culture (ambient temperature = 25 - 30°C or body temperature = 35 - 37°C:

a. *Blastomyces dermatiditis*
b. *Histoplasma capsulatum*
c. *Paracoccidioides brasiliensis*
d. *Sporothrix schenckii*
e. *Talaromyces (Penicillium) marneffei*

2. ***Coccidioides immitis/posadasii*** is not dimorphic in culture. The mold form is produced in culture at both temperatures, but spherules are produced in the body.

Common Dimorphic Fungi Facts

- Inhalation is the usual route of infection. However, lymphohematogenous spread may lead to the involvement of skin, bone, or other organs and areas of the body (i.e., genitourinary tract).
- Organisms can infect immunocompetent and immunocompromised individuals.
- Most infections are usually self-limiting, but they can cause serious and sometimes fatal infections in immunocompromised individuals.
- The infective dose of these organisms can range from 1 or more spores.

SAFETY FIRST!!!

- A patient's medical history and physical examination should be reviewed and/or updated with each encounter.
- Lab test requests should include notation of suspected pathogens.
- **TRAVEL HISTORY SHOULD BE A ROUTINE COMPONENT OF THIS REVIEW!**

SAFETY FIRST!!!

- Seal specimen containers and all media used for specimen processing if *Coccidioides species* is suspected.
- Perform specimen and culture manipulations in a Class II A2 biological safety cabinet (BSC) away from high traffic work areas and in a negative airflow environment (TB Room).
- Alert all team members in the work area about the risk.
- Clean all work surfaces with fresh 10% bleach solution before and after use
- Alert Infection Prevention department and the manager and/or supervisor on duty of the event.
- Begin documentation of the incident using the QA Variance form.

Where in the world is *Coccidioides species?*

- This organism causes an infection called Valley Fever. It thrives in hot, arid, semi-arid alkaline soil and dust environments.
- ***It is considered Endemic in the:***
  - ✓ Southwestern United States (Arizona, California, Nevada, New Mexico, Texas, Utah)
  - ✓ Northern Mexico
  - ✓ Central America (i.e., Guatemala/Honduras)
  - ✓ South America (i.e., Argentina/Bolivia/Brazil/Colombia/ Paraguay/Venezuela).
- ***It is considered Emerging in:***
  - ✓ South central Washington state
  - ✓ Montana

Who Can Get Coccidioidomycosis?








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Coccidioides immitis/posadasii Growth

Ambient temperature =
25 - 30°C

- Young growth may appear glabrous (yeast-like)
- Mold form –
  - ✓ Growth will radiate outward from the initial colony
  - ✓ Matures in 3 – 5 days

Body Temperature =
35 - 37°C

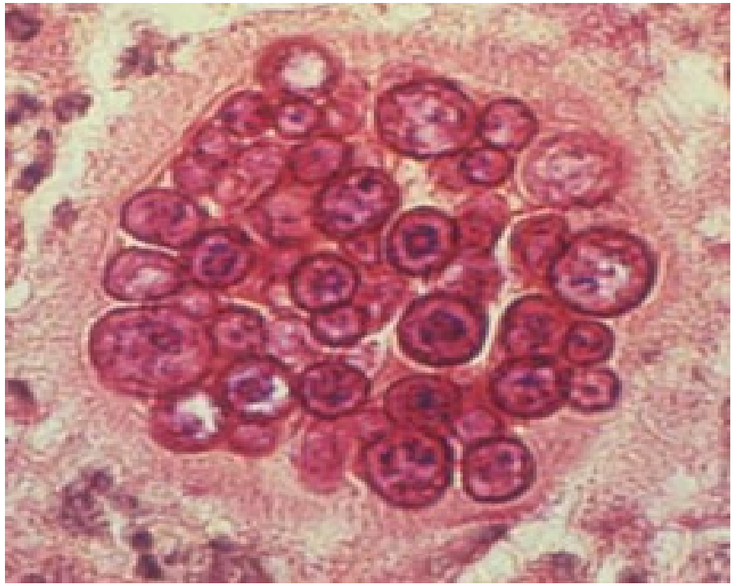
- Does not produce yeast in culture
- Produces spherules (a spherical body containing endospores)

Coccidioides immitis/ posadasii Growth

Mature Mold Form =
Ambient temperature 25 - 30°C

May develop pigment with age

Large Spherule with Endospores =
35 - 37°C in Tissue



These result from the inhalation of arthroconidia.

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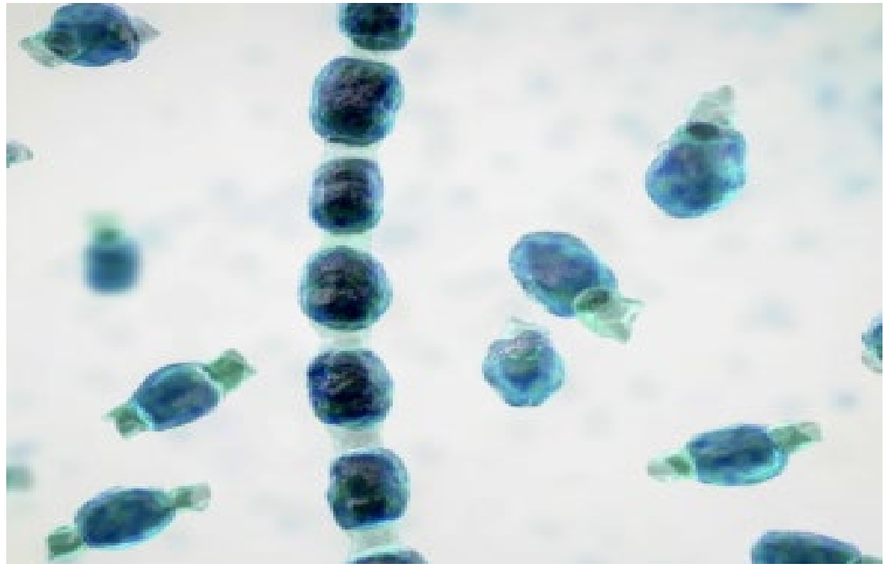
Malbranchea species – Microscopic Mold Mimic

Coccidioides Arthroconidia With Fringe



Arthroconidia break off and take a part of the connecting fringe.

Malbranchea Arthroconidia Without Fringe

Arthroconidia break off evenly.

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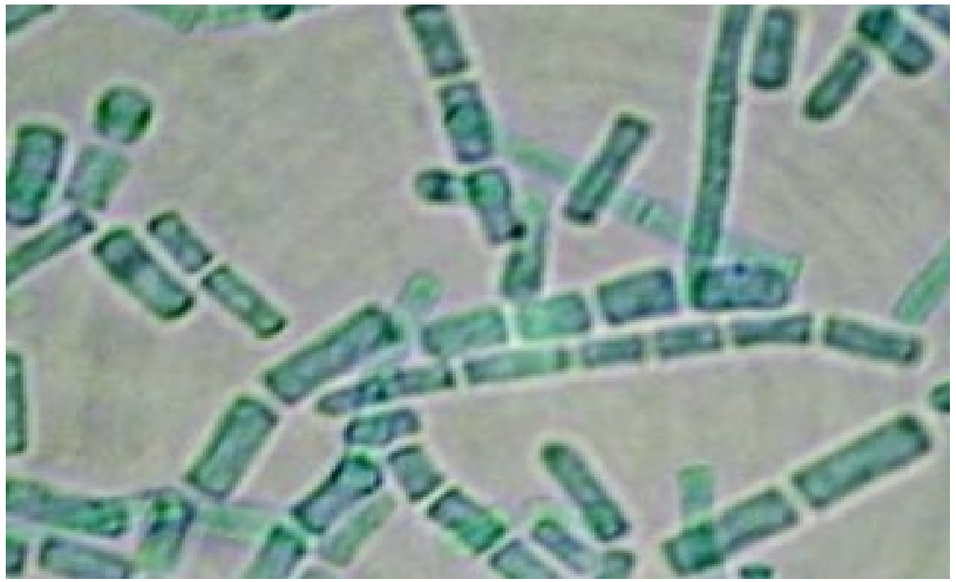
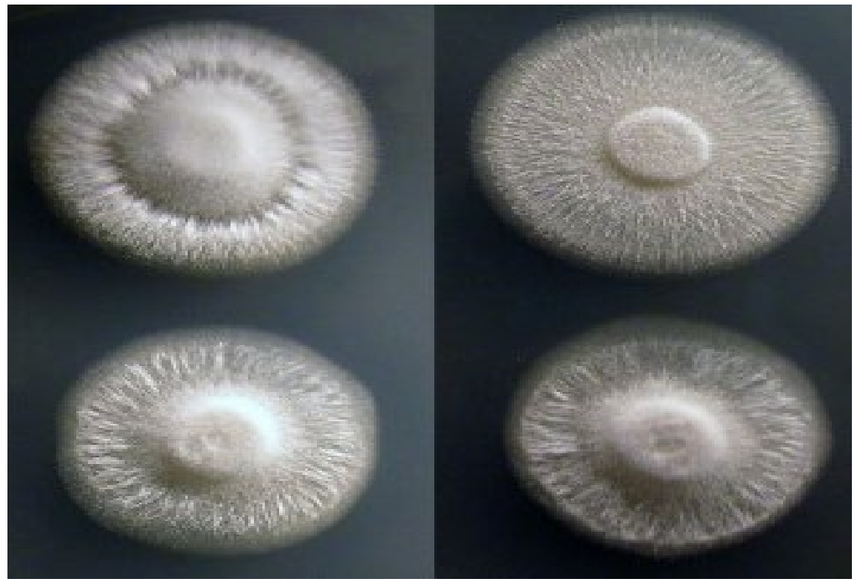
Geotrichum candida = A Yeast Mimic

Microscopic
Arthroconidia With No Fringe



Arthroconidia break evenly with no connecting fringe between spores.

Macroscopic Growth



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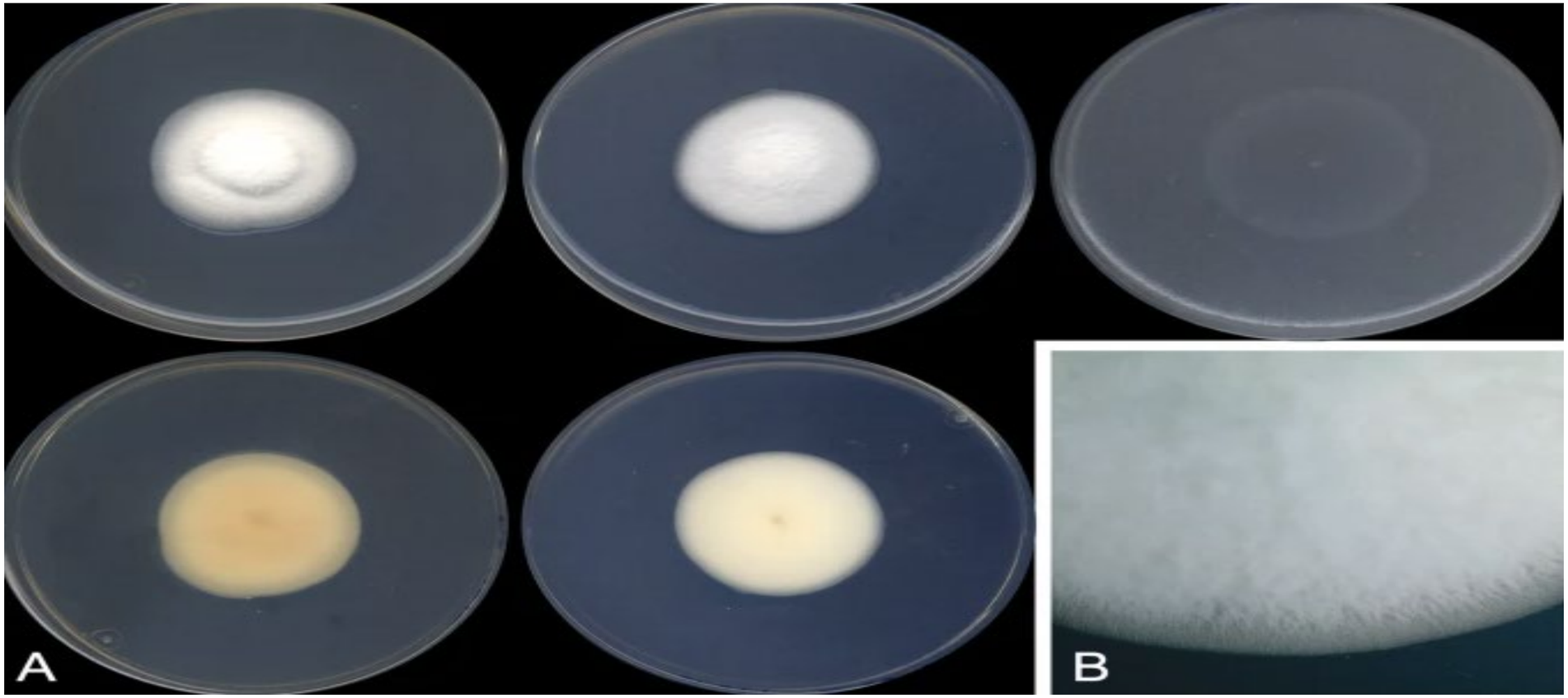
Malbranchea species - Mold Growth Over Time



Coccidioides species - Mold Growth Over Time