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PEARLS OF LABORATORY MEDICINE

Diagnosis of Dimorphic Fungi Endemic to the United States

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DOI: 10.15428/CCTC.2017.277061



Mycology Terminology

Fungi

- Eukaryotic organisms that contain a cell wall, a true nucleus, and undergo cellular division
- Can be multicellular or unicellular

Dimorphic fungi – Can exist as either a mold or yeast

Mold - multicellular

- Dimorphic fungi exist in environment or at temperatures below 35C
- Antigenic – recognized by host immune system

Yeast – unicellular

- Dimorphic fungi found within host or at temperatures greater than 35C
- Evade host immunity – can be intracellular



Dimorphic Fungi

Endemic to the United States

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

Similarities between organisms

- Present primarily as pulmonary infections that are capable of dissemination
- At risk populations: immunosuppressed, African or Filipino race

Infections are not communicable



Histoplasma capsulatum

First described in 1906 by a physician in the Canal Zone of Panama

Causative agent of Histoplasmosis

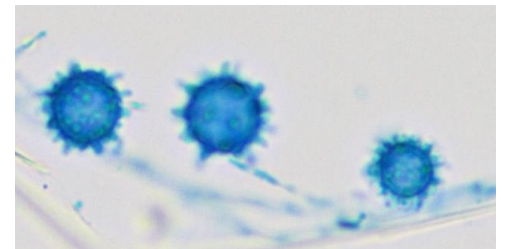
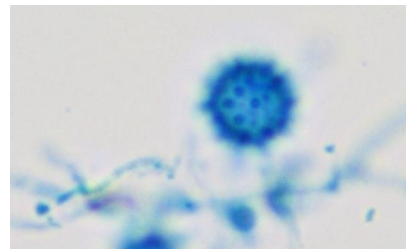
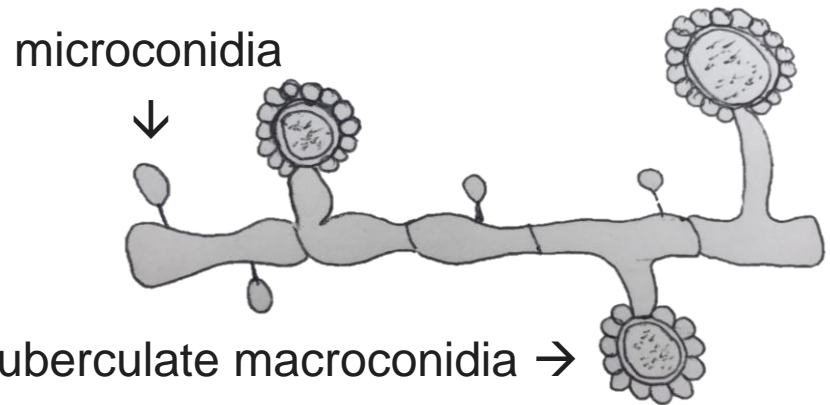
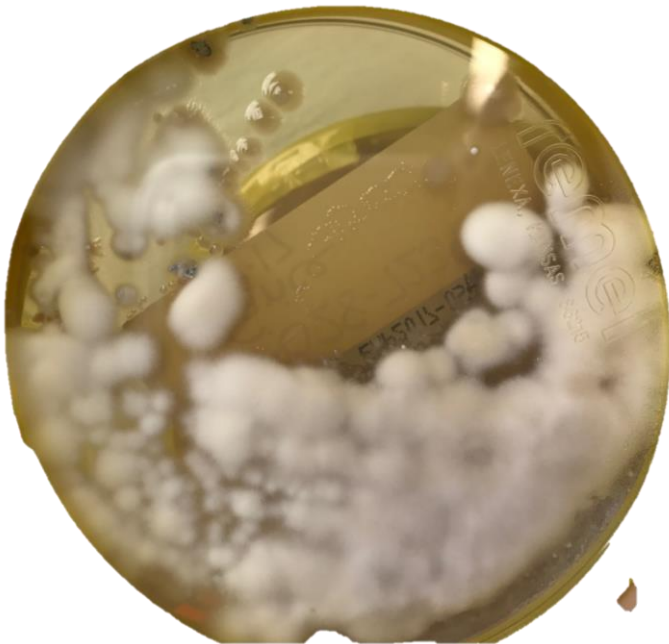
There are two variants:

- *H. capsulatum* var. *capsulatum* – North and South America
- *H. capsulatum* var. *duboisii* – Africa

Found in nitrogen rich soils, particularly in the Ohio and Mississippi River Valleys and in the Great Lakes region

Reportable in parts of the United States

Identification of *H. capsulatum*



Blastomyces dermatitidis

Identified in Baltimore, MD in 1894 by Thomas Gilchrist

Causative agent of Blastomycosis/ Chicago's Disease/
Gilchrist's mycosis

Endemic along the Ohio and Mississippi River Valleys

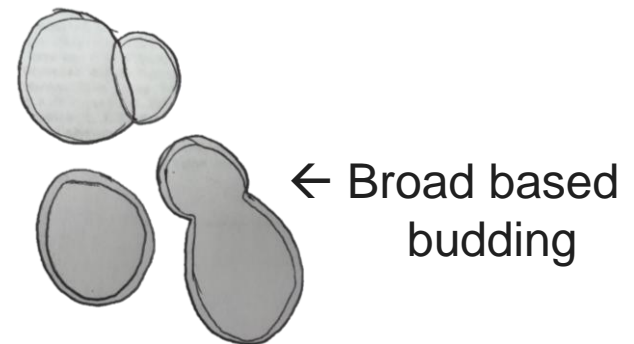
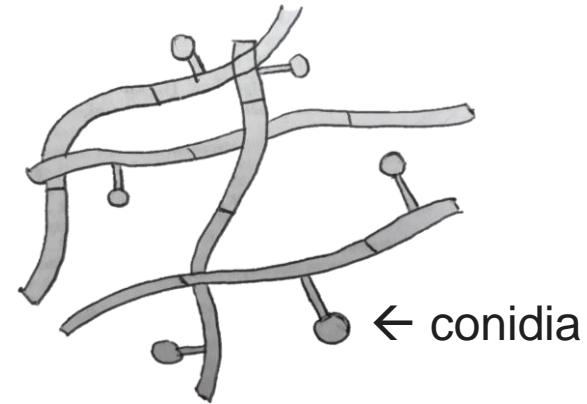
Ten times more likely to infect dogs than humans

Skin lesions are common in disseminated disease

Reportable in some parts of the United States



Identification of *B. dermatitidis*



First described in in Argentina 1892 by Alejandro Pasadas

Causative agent of coccidiomycosis

Two species:

- *C. immitis* – isolates from California
- *C. posadasii*

Found in soil in arid regions

The disease is known as Coccidioidomycosis/ San Joaquin Valley Fever/ Valley Fever/ Desert Rheumatism

Reportable in some parts of the United States

Identification of *Coccidioides*



Barrel shaped arthroconidia and empty disjunctor cells →

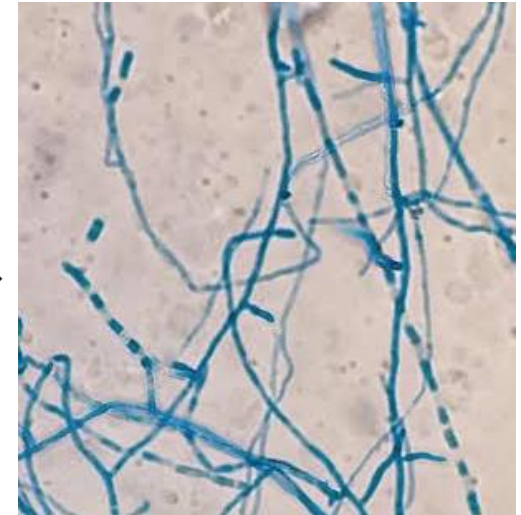
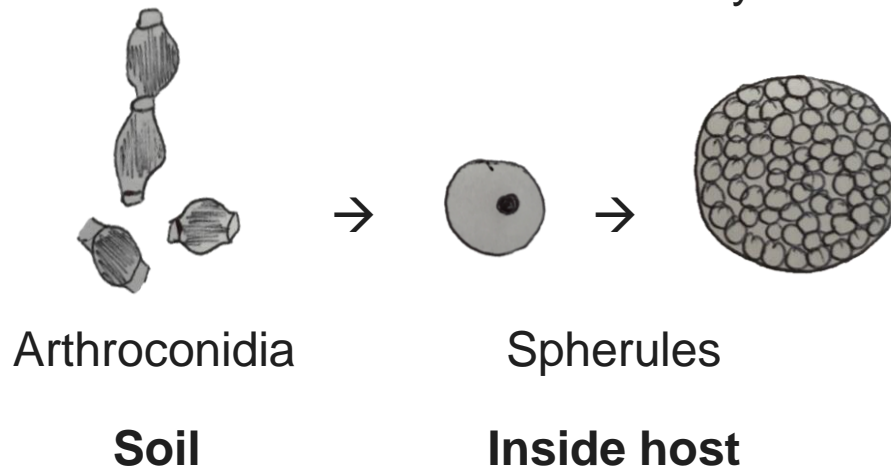


Photo by: Eileen Rojas



Diagnosis

Pulmonary specimen – Sputum, BAL, lung biopsy (All)

Blood – Fungal isolator (*Histoplasma*)

Skin swab (*Blastomyces*, *Histoplasma*)

Molecular (All)

Antigen Detection* (All)

Serology* (All)



IDSA Treatment Guidelines

- Histoplasmosis (2007)
 - Severe pulmonary – Liposomal Amphotericin B IV 1-2 weeks, Itraconazole 12 weeks
 - Mild-Moderate – not necessary unless symptoms >1 month, Itraconazole 6-12 weeks
- Coccidioidomycosis (2012)
 - Oral azole (generally recommend fluconazole, itraconazole) if severe infection
 - In general, recommend patient education, observation
- Blastomycosis (2008)
 - Moderate-severe pulmonary - Liposomal Amphotericin B IV 1-2 weeks, Itraconazole 6-12 months
 - Mild-moderate – Itraconazole 6-12 months



Summary

	Histoplasma	Coccidioides	Blastomyces
<i>Location</i>	Mississippi River Valley	Southwest US	Southeast, Ohio and Mississippi River Valleys
<i>Incubation period</i>	1 to 3 weeks	1 to 3 weeks	4 to 6 weeks
<i>Tissue microscopy</i>	Oval yeast cells 2-4 um	Spherules	Broad-based budding yeast
<i>Culture microscopy</i>	Tuberculate macroconidia	Arthroconidia, empty disjunctor cells	Oval or pear shaped conidia
<i>Immunity</i>	No	Yes	No



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Disclosures/Potential Conflicts of Interest

Upon Pearl submission, the presenter completed the Clinical Chemistry disclosure form. Disclosures and/or potential conflicts of interest:

- **Employment or Leadership:** No disclosures
- **Consultant or Advisory Role:** No disclosures
- **Stock Ownership:** No disclosures
- **Honoraria:** No disclosures
- **Research Funding:** No Disclosures
- **Expert Testimony:** No disclosures
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