Coccidioides

(C. immitis & C. posadasii)

Dimorphic Fungi

- Histoplasmosis
- Blastomycosis
- Coccidioidomycosis
- Paracoccidioidomycosis
- Sporotrichosis
- Penicilliosis marneffei

ECOLOGICAL ASSOCIATIONS

PATHOGEN	HUMAN	SOIL
BLASTOMYCES DERMATITIDIS	1898	1964
CRYPTOCOCCUS NEOFORMANS	1894	1951
HISTOPLASMA CAPSULATUM	1934	1949
COCCIDIOIDES IMMITIS	1900	1932

Transmission & Epidemiology *Coccidioides*

- The fungus is endemic in arid regions of the southwestern United States and Latin America.
- People who live in Central and Southern California, Arizona, New Mexico, Western Texas, and Northern Mexico, a geographic region called the Lower Sonoran Life Zone, are often infected.
- In soil, it forms hyphae with alternating arthrospores and empty cells.
- Arthrospores are very light and are carried by the wind.
- They can be inhaled and infect the lungs.

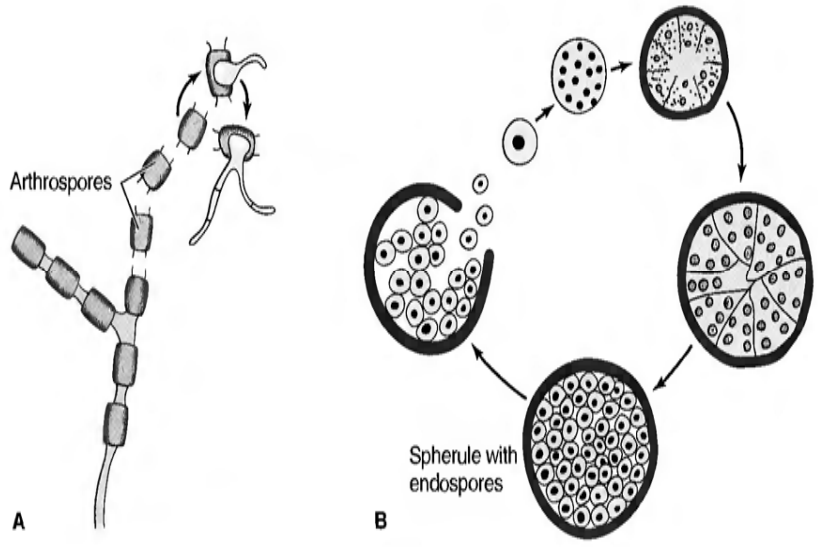
COCCIDIOIDES

- Disease

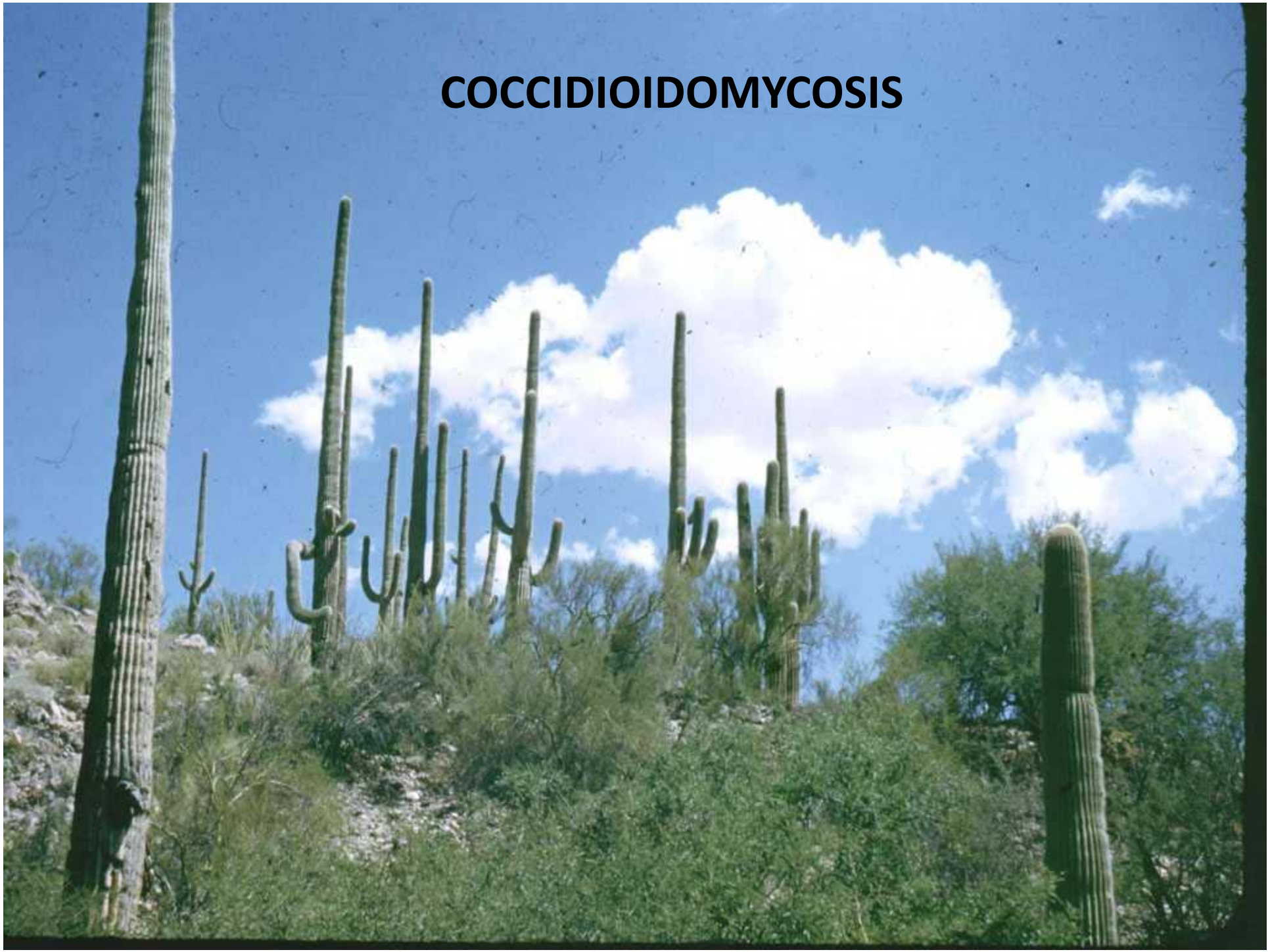
Coccidioides immitis causes coccidioidomycosis .

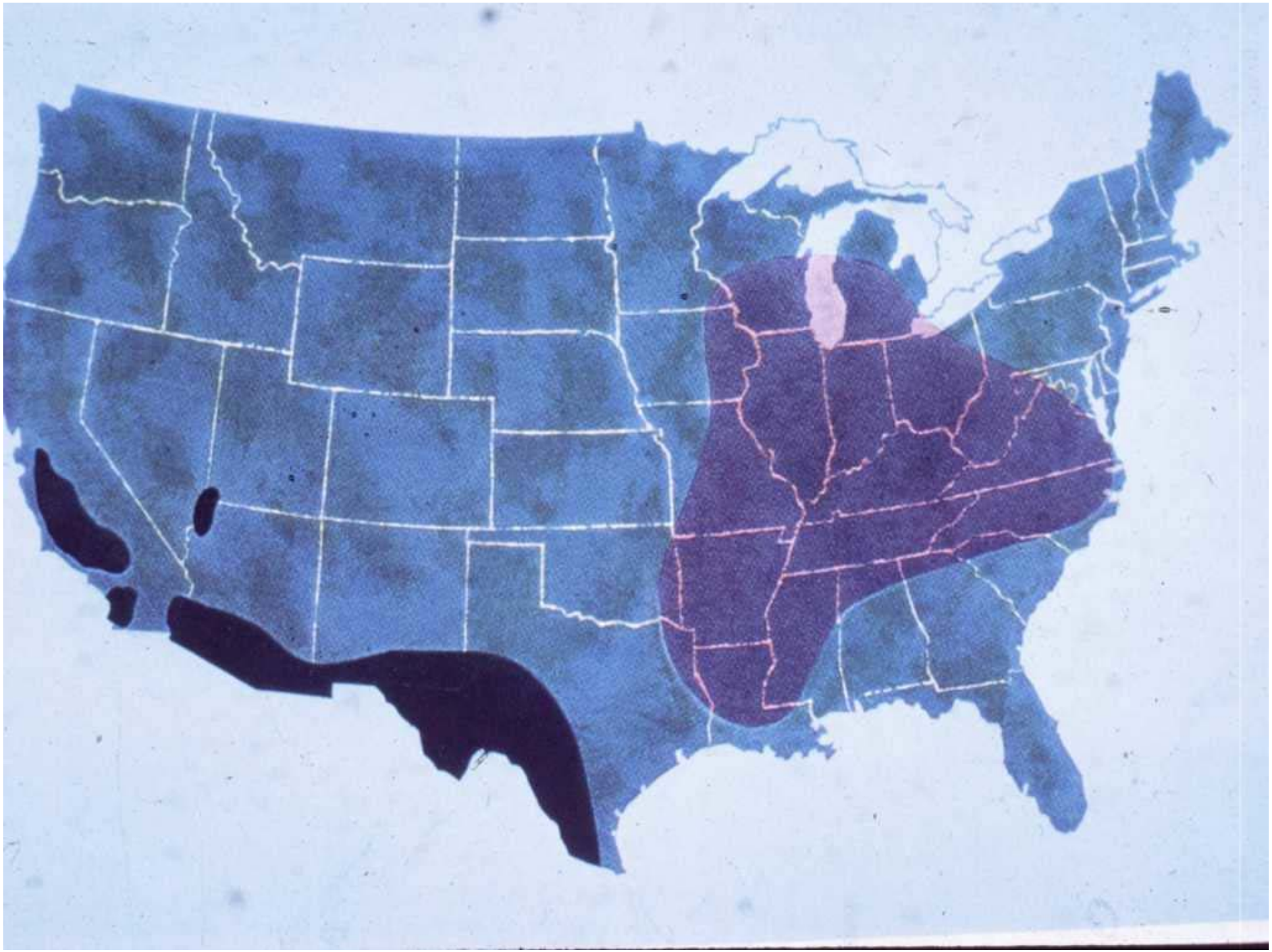
- Properties

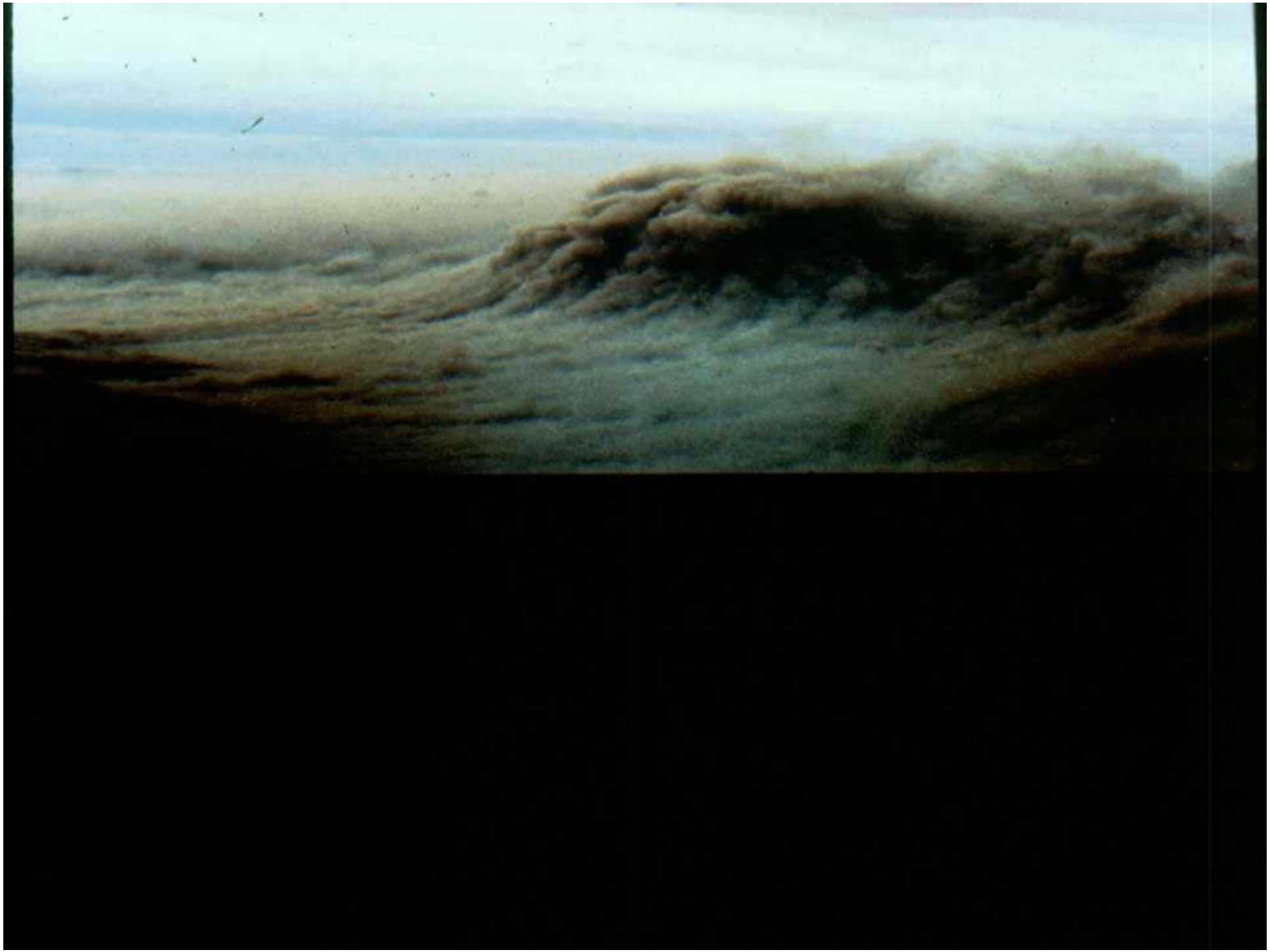
C. immitis is a dimorphic fungus that exists as a mold in soil and as a spherule in tissue



COCCIDIOIDOMYCOSIS







Pathogenesis of *Coccidioides*

- In the lungs, arthrospores form spherules that are large, have a thick, doubly refractive wall, and are filled with endospores.
- Upon rupture of the wall, endospores are released and differentiate to form new spherules.
- The organism can spread within a person by direct extension or via the bloodstream .
- Granulomatous lesions can occur in virtually any organ but are found primarily in bones and the central nervous system (meningitis)
- Dissemination from the lungs to other organs occurs in people who have a defect in cell-mediated immunity.

Pathogenesis of *Coccidioides*

- Most people who are infected by C. immitis develop a cell-mediated (delayed hypersensitivity) immune response that restricts the growth of the organism.
- One way to determine whether a person has produced adequate cell-mediated immunity to the organism is to do a skin test (see below).
- In general, a person who has a positive skin test reaction has developed sufficient immunity to prevent disseminated disease from occurring.
- If, at a later time, a person's cellular immunity is suppressed by drugs or disease, disseminated disease can occur.

Clinical Findings of *Coccidioides*

- Infection of the lungs is often asymptomatic and is evident only by a positive skin test and the presence of antibodies.
- Some infected persons have an influenza like illness with fever and cough.
- About. 50% have changes in the lungs (infiltrates, adenopathy, or effusions) as seen on chest x-ray.
- 10% develop erythema nodosum (see below) or arthralgias.
- This syndrome is called "valley fever" or "desert rheumatism"; it tends to subside spontaneously .
- Disseminated disease can occur in almost any organ; the meninges, bone and skin are important sites.

Clinical Findings of *Coccidioides*

- The overall incidence of dissemination in persons infected with C. immitis is 1%, although the incidence in Filipinos and African Americans is 10 times higher .
- Women in the third trimester of pregnancy also have a markedly increased incidence of dissemination .
- Erythema nodosum (EN) manifests as red, tender nodules ("desert bumps") on extensor surfaces such as the shins.
- It is a delayed (cell-mediated) hypersensitivity response to fungal antigens and thus is an indicator of a good prognosis.

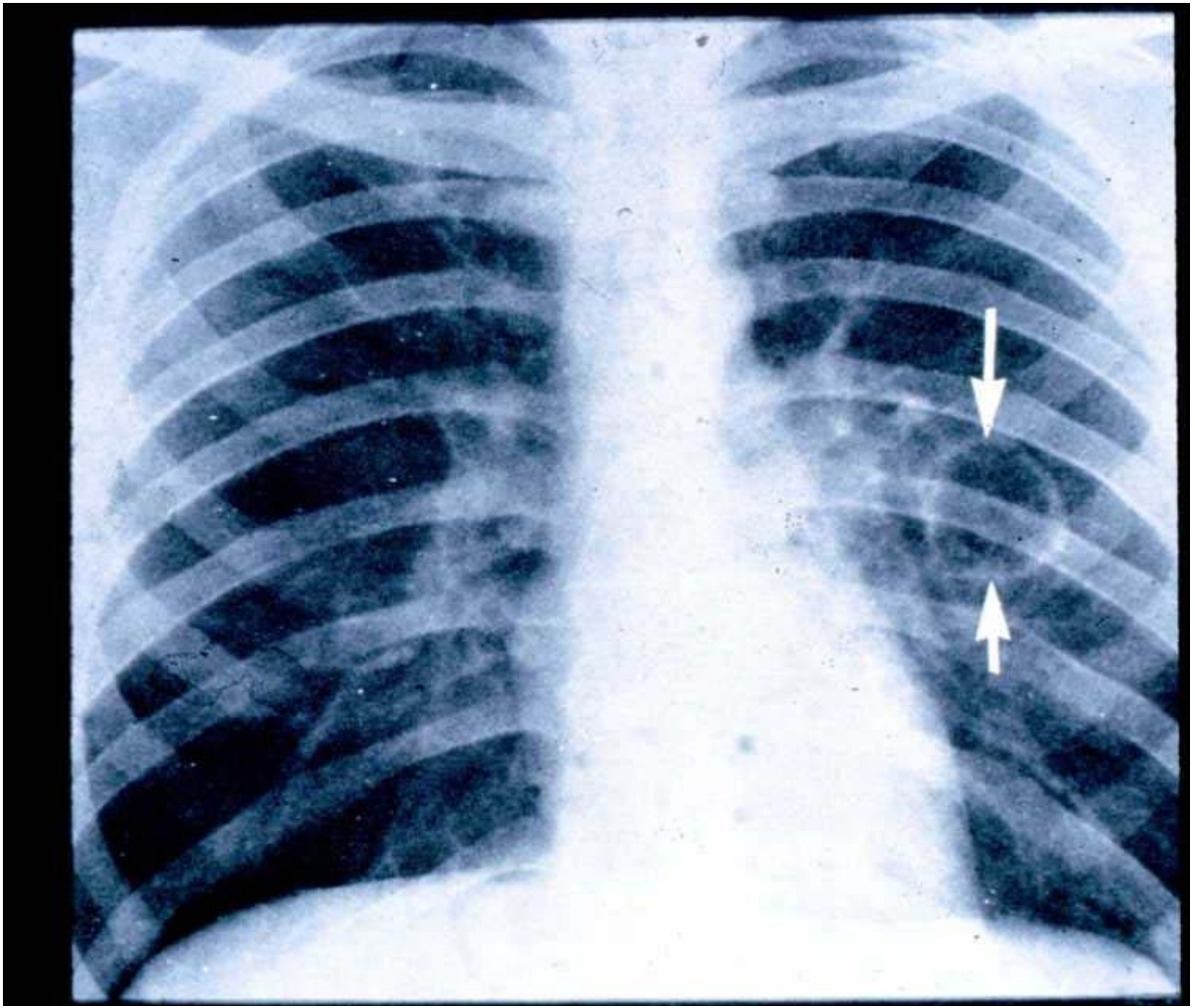
Clinical Findings of *Coccidioides*

- There are no organisms in these lesions; they are not a sign of disseminated disease. EN is not specific for coccidioidomycosis; it occurs in other granulomatous diseases, eg, histoplasmosis, tuberculosis, and leprosy .
- In infected persons, skin tests with fungal extracts cause at least a 5mm induration 48 hours after injection (delayed hypersensitivity reaction).
- Skin tests become positive within 2-4 weeks of infection and remain so for years but are often negative in patients with disseminated disease.

Coccidioidomycosis

Chronic cutaneous granulomatous lesions of the face, neck and chin

Extension of pulmonary coccidioidomycosis showing a large superficial ulcerated lesion



Laboratory Diagnosis of *Coccidioides*

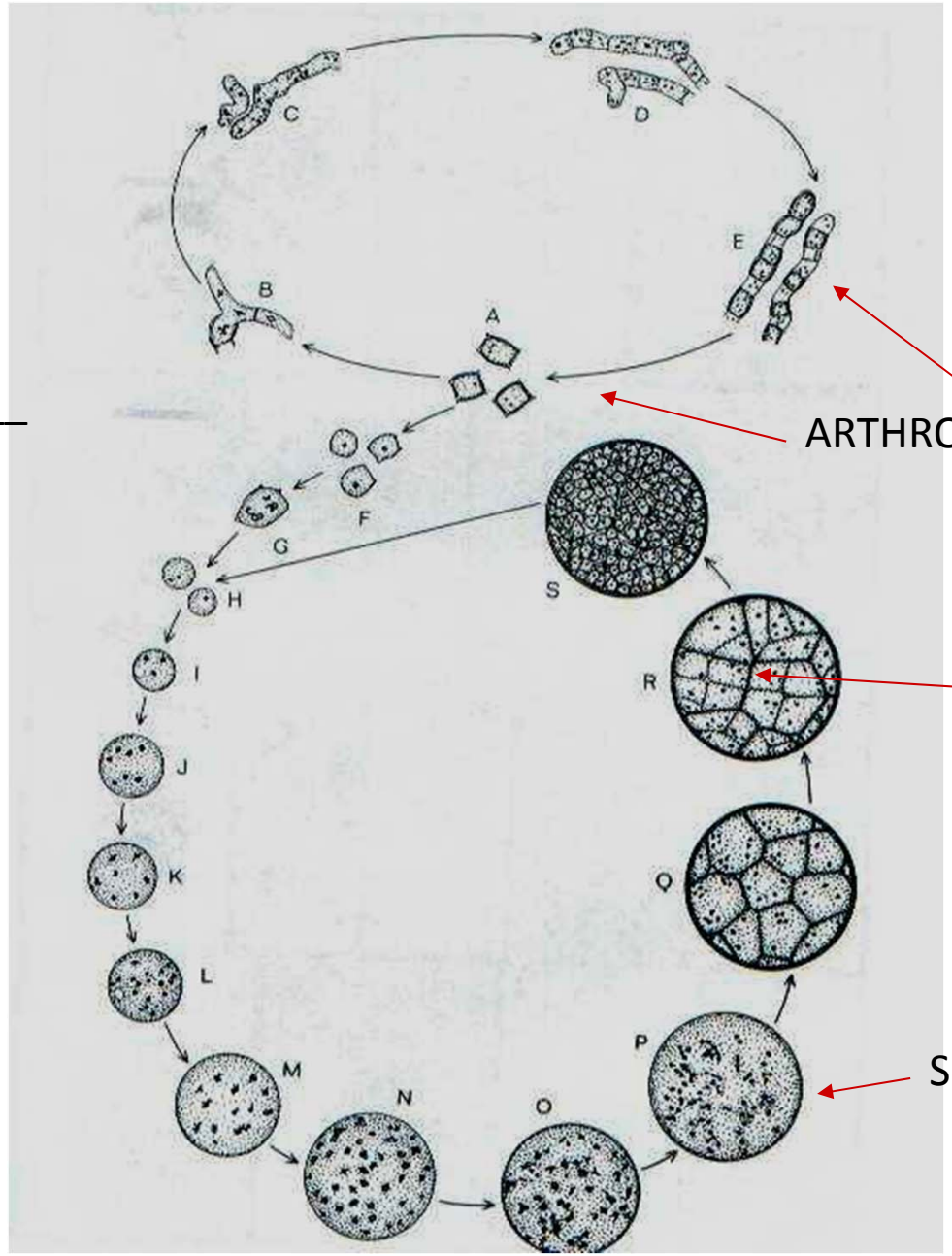
- In tissue specimens, spherules are seen microscopically .
- Cultures on Sabouraud's agar incubated at 25 °C show hyphae with arthrospores
- (Caution: Cultures are highly infectious; precautions against inhaling arthrospores must be taken.)

Laboratory Diagnosis of *Coccidioides*

- In serologic tests, IgM and IgG precipitins appear within 2-4 weeks of infection and then decline in subsequent months.
- Complement-fixing antibodies occur at low titer initially, but the titer rises greatly if dissemination occurs

SOIL

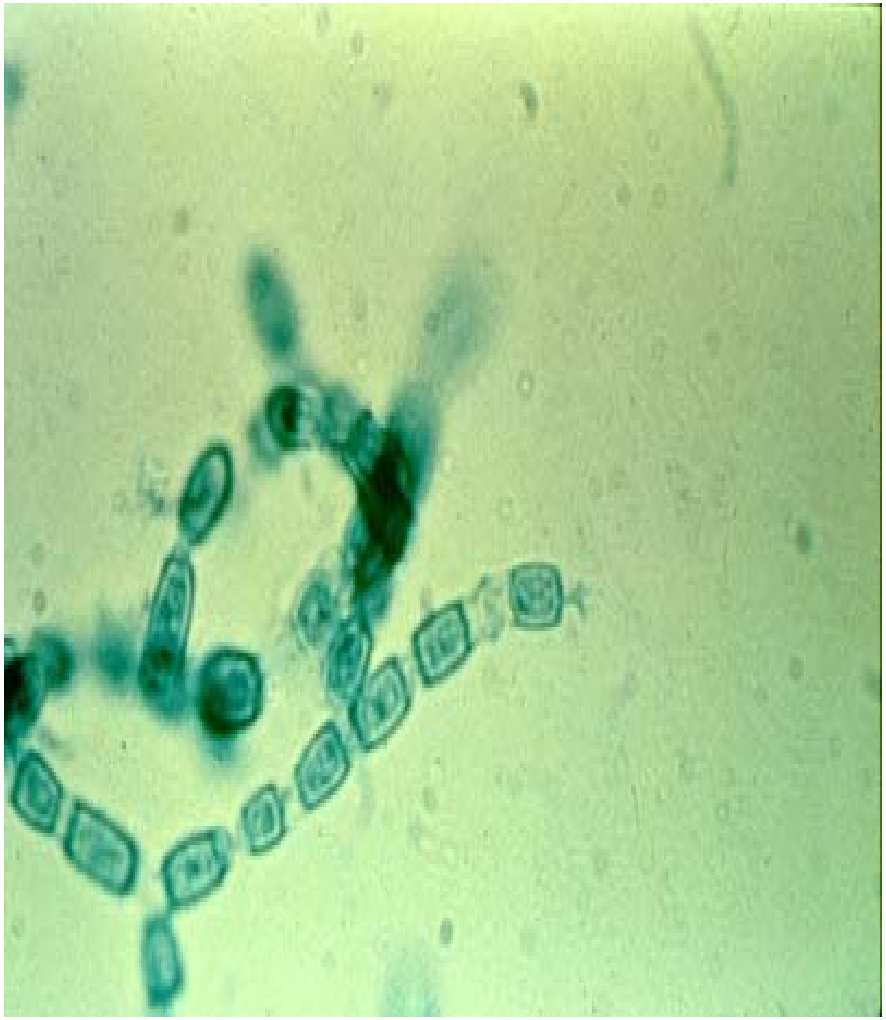
ANIMAL
HUMAN



ARTHROCONIDIA

ENDOSPORES

SPHERULE

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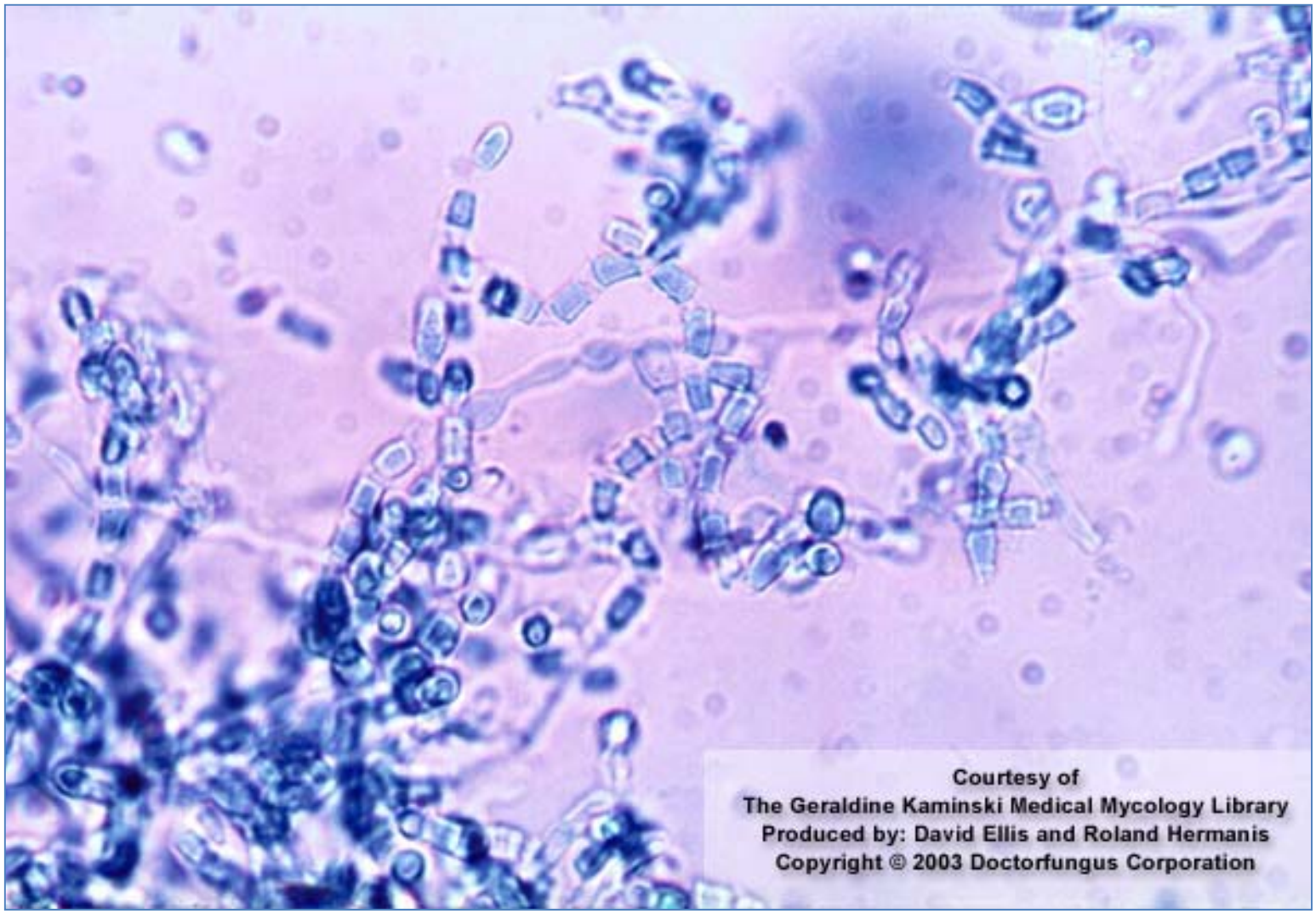
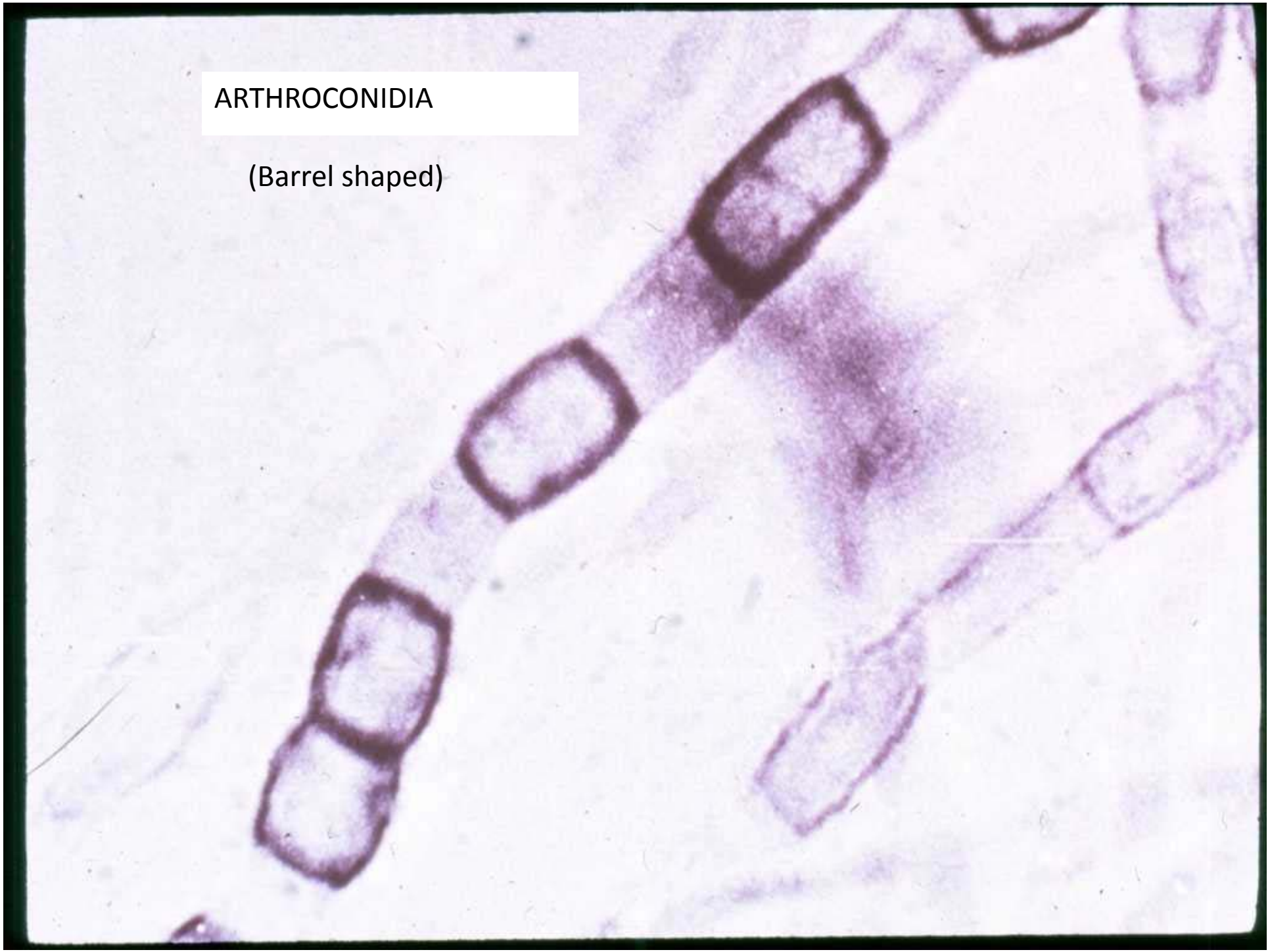
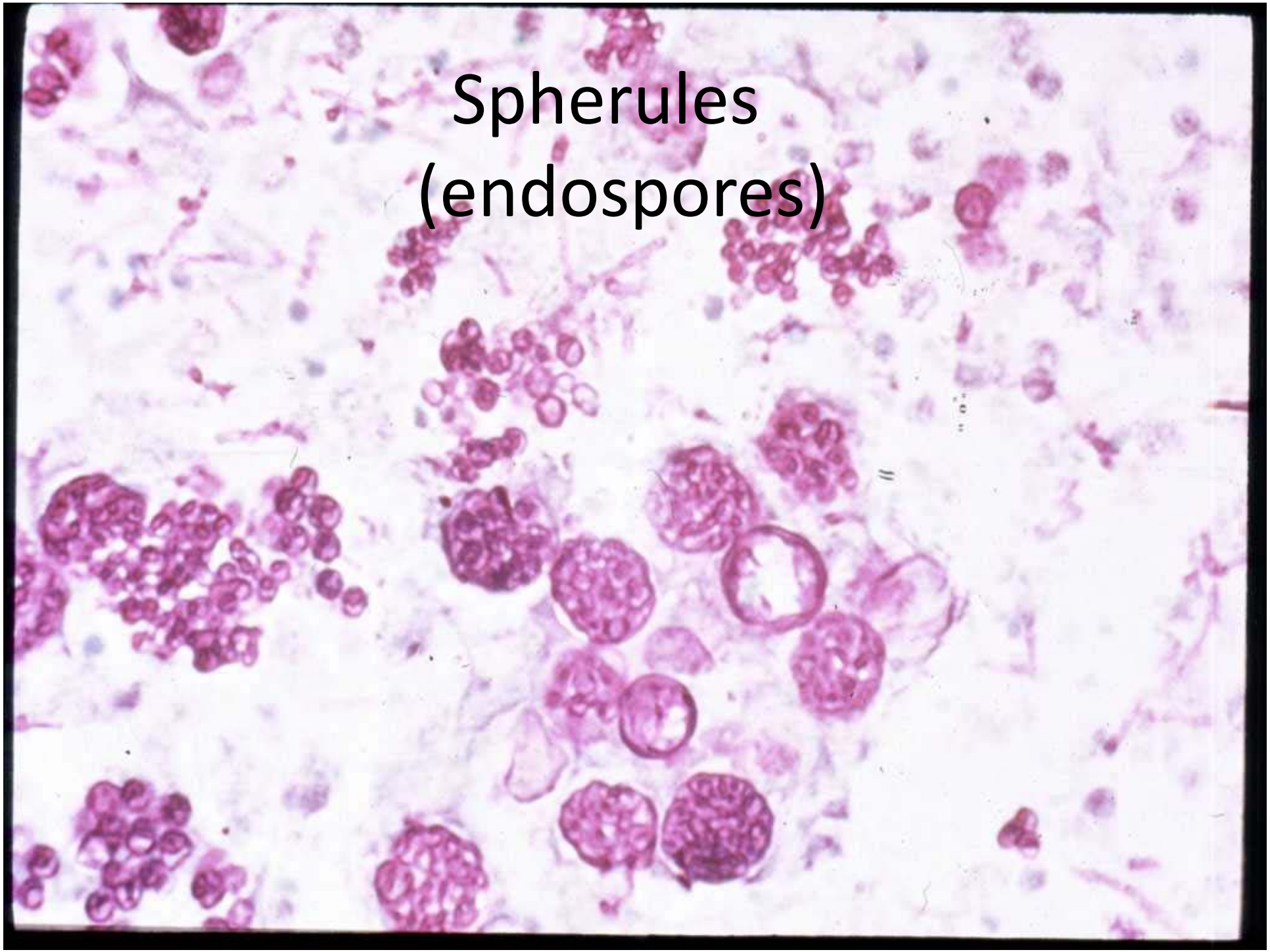
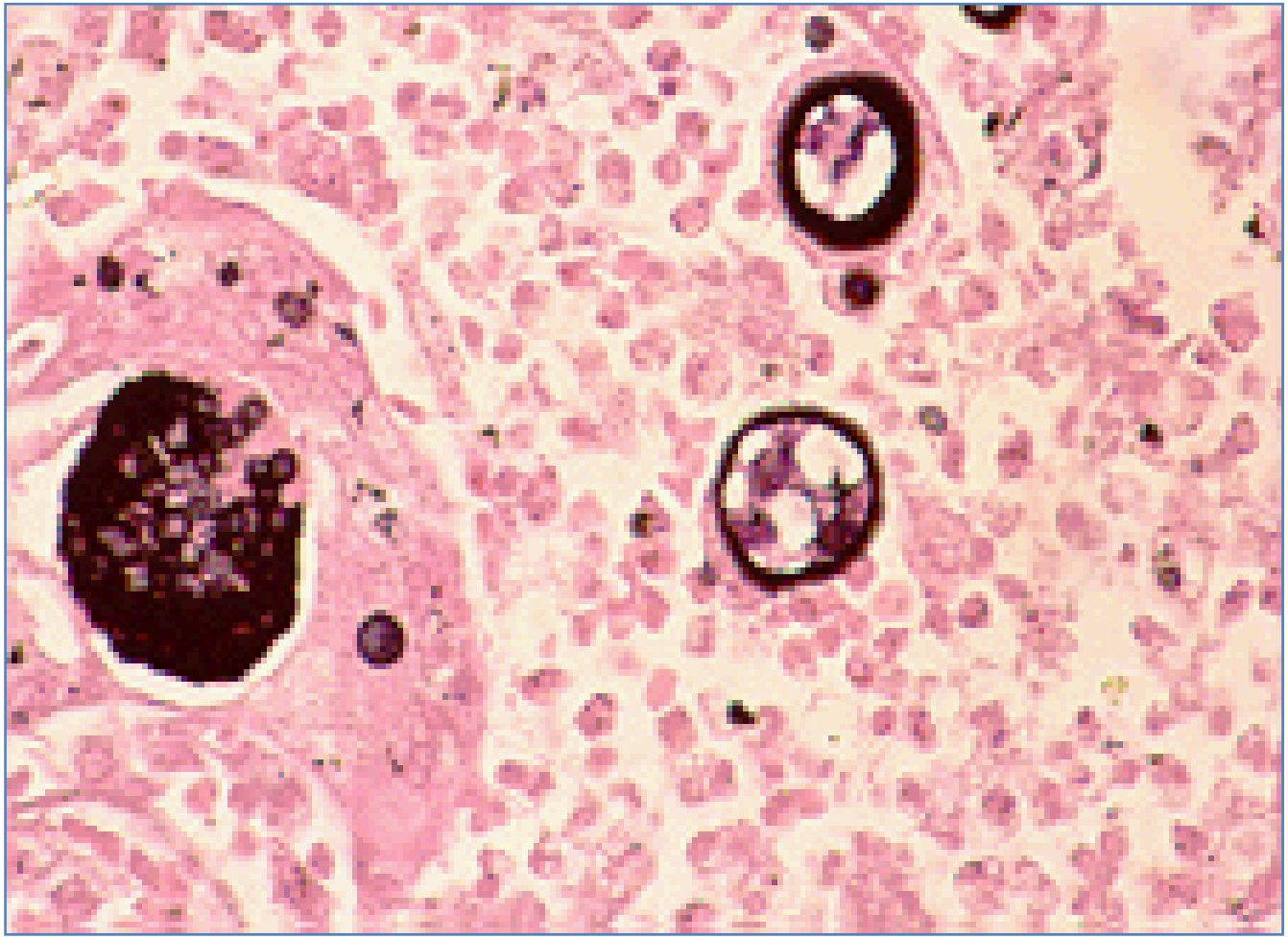


Coccidioides immitis showing typical single-celled, hyaline, rectangular to barrel-shaped, alternate arthroconidia


ARTHROCONIDIA
(Barrel shaped)


Spherules
(endospores)

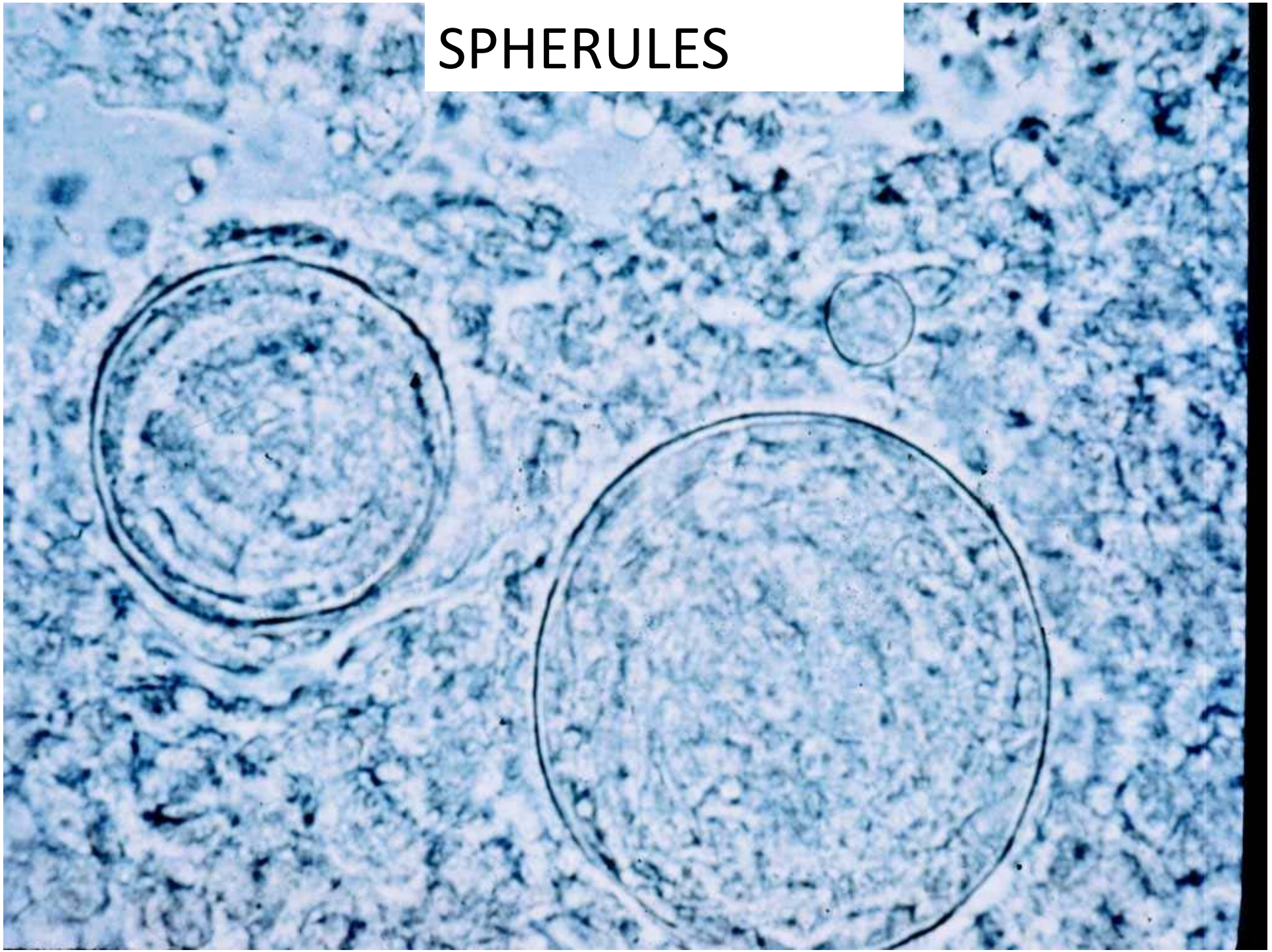
Coccidioidomycosis



Tissue section showing typical endosporulating spherules of

C. immitis

SPHERULES



Treatment & Prevention of *Coccidioides*

- No treatment is needed in asymptomatic or mild primary infection.
- Amphotericin B (Fungizone) or itraconazole is used for persisting lung lesions or disseminated disease.
- Ketoconazole is also effective in lung disease.
- Fluconazole is the drug of choice for meningitis.
- Intrathecal amphotericin B may be required and may induce remission, but long-term results are often poor.
- There are no means of prevention

  except avoiding travel to endemic areas.