A microscopic image showing several blue-stained, circular fungal structures, likely spores or conidia, against a light-colored background. Some long, thin hyphae are also visible.

# Medically Significant Fungi

Clinically Significant Agents of Opportunistic Mycoses

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# Disclaimer

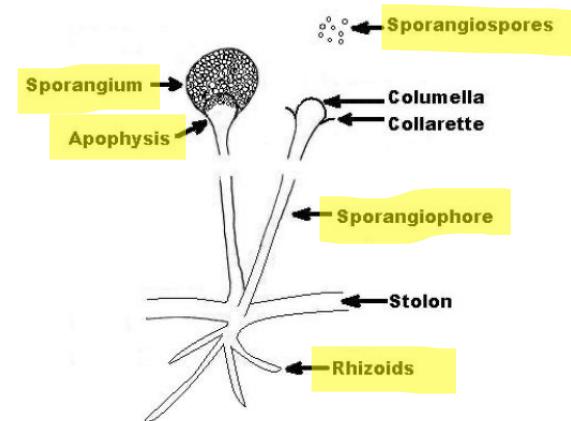
- This presentation was meant to provide students with both didactic and laboratory skills as they apply to clinical mycology. It is meant for educational purposes only and does not represent Cleveland Clinic views or practices.
- The presentation contains images and other references copyrighted by another entity or person and credits shall be given to the rightful owners of the materials and I claim no copyright to the said content.
- Most of the information was adopted from the Textbook of Diagnostic Microbiology by Mahon & Lehman (see citation) but condensed for bite sized learning.

# Clinically Significant Agents of Opportunistic Mycoses: Overview

Group	Mold	Hyphae
Mucorales	<i>Rhizopus</i> species	Sparsely septate
	<i>Lichtheimia</i> species	
	<i>Mucor</i> species	
	<i>Cunninghamella</i> species	
	<i>Syncephalastrum</i> species	
Aspergilli	<i>Aspergillus fumigatus</i>	Septate
	<i>Aspergillus niger</i>	
	<i>Aspergillus terreus</i>	
	<i>Aspergillus flavus</i>	
Brush-like phialides	<i>Purpureocillium lilacinum</i>	Septate
	<i>Paecilomyces</i> species	
	<i>Pencillium</i> species	
	<i>Gliocladium</i> species	
Others	<i>Scopulariopsis</i> species	Septate
	<i>Fusarium</i> species	
	<i>Acremonium</i> species	
	<i>Sepedonium</i> species	
	<i>Chrysoporium</i> species	

Saprobe: free-living fungi found in the environment, but don't typically cause disease

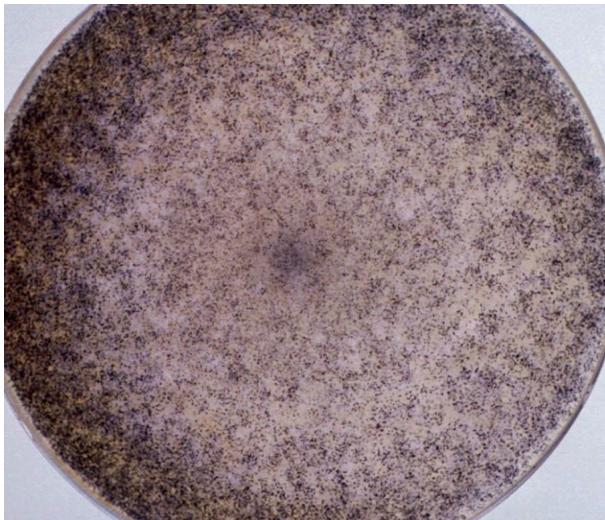
# Clinically Significant Agents of Opportunistic Mycoses: Mucorales Overview



Mucorales	Rhizoids
<i>Rhizopus</i> species	Present
<i>Lichtheimia</i> species	Present
<i>Mucor</i> species	Absent
<i>Cunninghamella</i> species	Absent
<i>Syncephalastrum</i> species	Absent

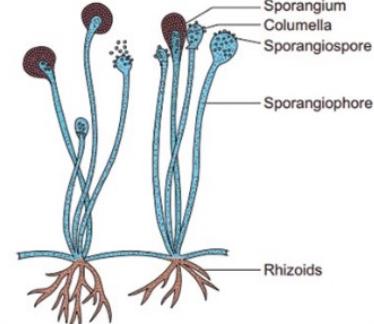
# Clinically Significant Agents of Opportunistic Mycoses: *Rhizopus* species

Macroscopic

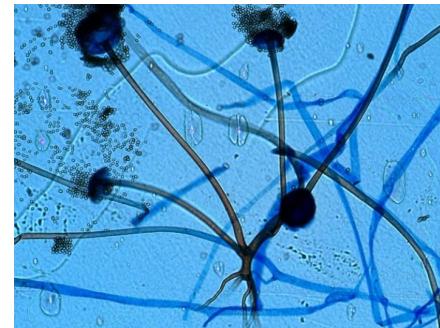


1. 4 days
2. White with black specks
3. Light

Microscopic



*Rhizopus* Morphology



1. Hyaline
2. Sparsely septate
3. Unbranched sporangiophores that terminate in a sporangium containing sporangiospores. Rhizoids are found directly beneath the sporangiophores.

Most common cause of  
mucormycoses

# Clinically Significant Agents of Opportunistic Mycoses: *Lichtheimia* species

Macroscopic



1. 4 days
2. Gray
3. Light

Microscopic

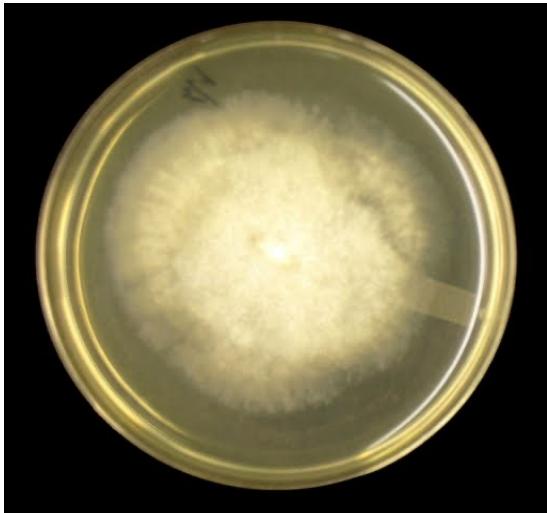


1. Hyaline
2. Sparsely Septate
3. Branched sporangiophores that widen at the top (martini glass shaped apophysis) terminating into a sporangium containing sporangiospores. Rhizoids are seen in-between sporangiophores.



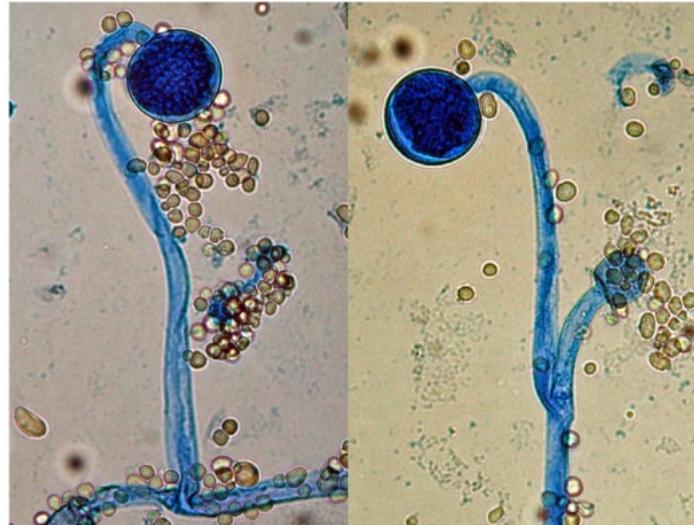
# Clinically Significant Agents of Opportunistic Mycoses: *Mucor* species

Macroscopic

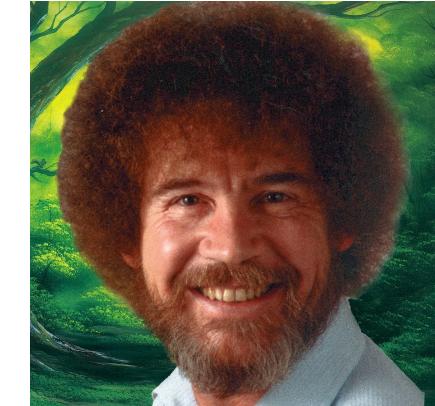


1. 4 days
2. White
3. Light

Microscopic

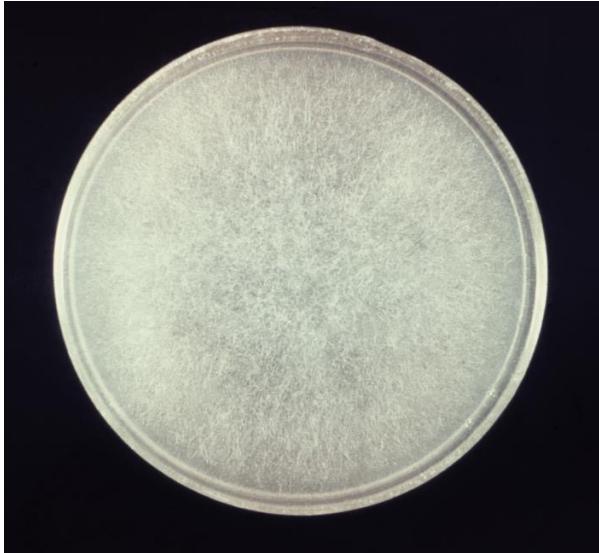


1. Hyaline
2. Septate
3. Sporangiophores are often branched and terminate in a sporangium containing sporangiospores. No rhizoids.



# Clinically Significant Agents of Opportunistic Mycoses: *Cunninghamella* species

Macroscopic



1. 4 days
2. White
3. Light

Microscopic



1. Hyaline
2. Sparsely Septate
3. Branched sporangiophores ending in swollen vesicles covered in spine like denticles that each support one sprangiospore.



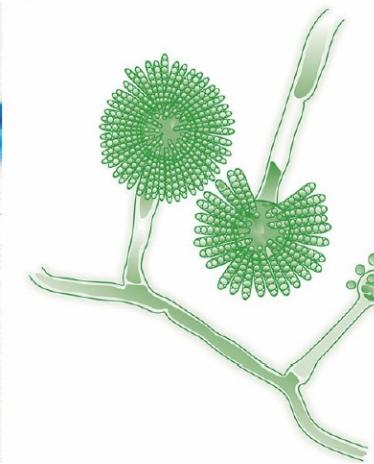
# Clinically Significant Agents of Opportunistic Mycoses: *Syncephalastrum* species

Macroscopic



1. 3 days
2. White
3. Light

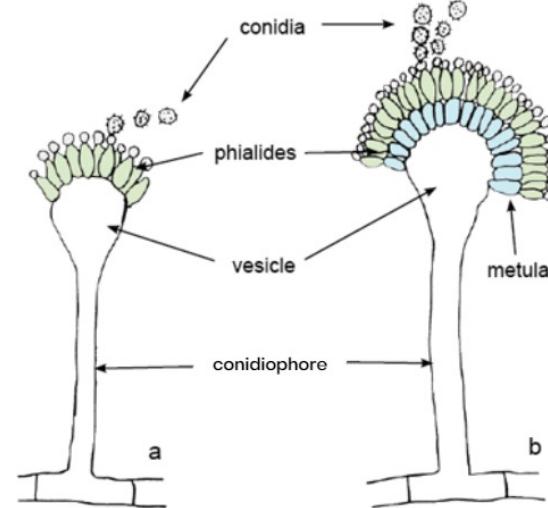
Microscopic



1. Hyaline
2. Sparsely Septate
3. Branched sporangiophores that terminate in a vesicle with fingerlike tubular sporangia containing chains of round sporangiospores



# Clinically Significant Agents of Opportunistic Mycoses: Aspergilli Overview

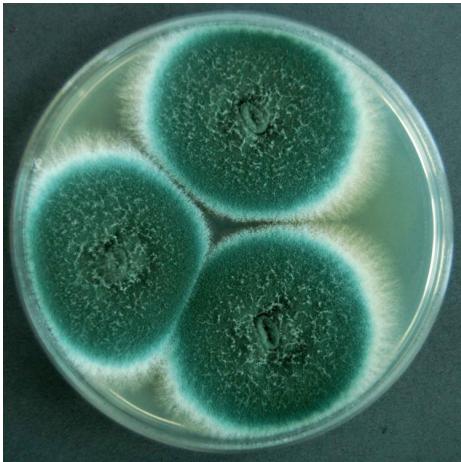


Conidial head morphology in *Aspergillus* (a) uniseriate, (b) biseriate.

Aspergilli	Colony Color	Phialides
<i>Aspergillus fumigatus</i>	Blue-green	Uniseriate
<i>Aspergillus niger</i>	Black	Biseriate
<i>Aspergillus terreus</i>	Cinnamon	Biseriate
<i>Aspergillus flavus</i>	Yellow-green	Both

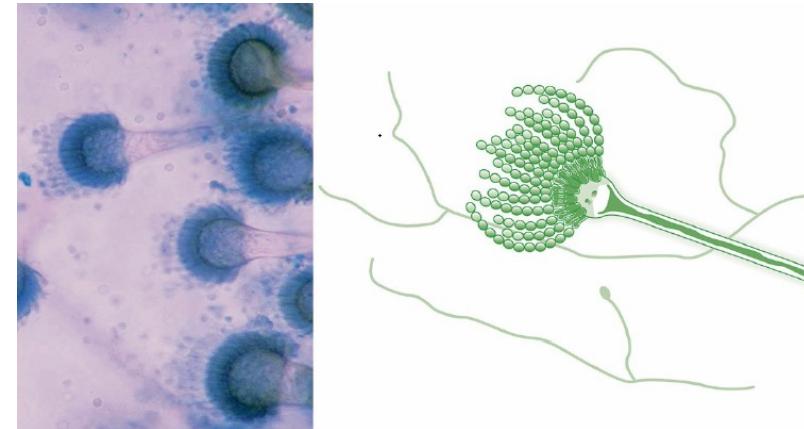
# Clinically Significant Agents of Opportunistic Mycoses: *Aspergillus fumigatus*

Macroscopic



1. 3 days
2. Blue-green
3. Light

Microscopic



1. Hyaline
2. Septate
3. Uniseriate phialides covering the upper 2/3rds of the vesicle producing chains of conidia

Most common cause of invasive aspergillosis.



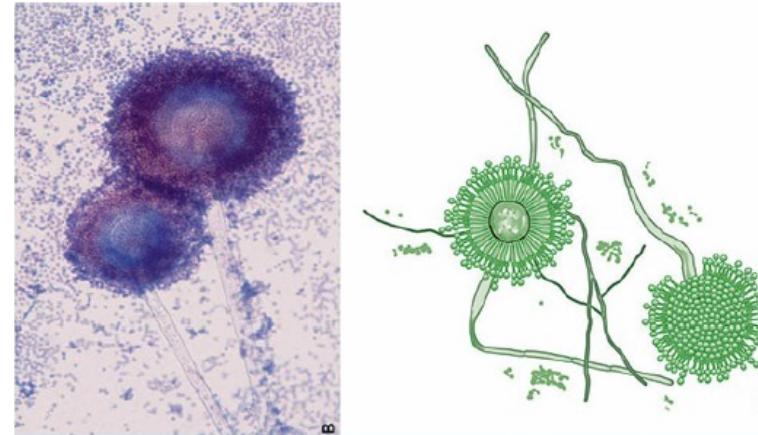
# Clinically Significant Agents of Opportunistic Mycoses: *Aspergillus niger*

Macroscopic



1. 3 days
2. Black with white periphery
3. Light

Microscopic



1. Hyaline
2. Septate
3. Biseriate phialides covering the entire vesicle

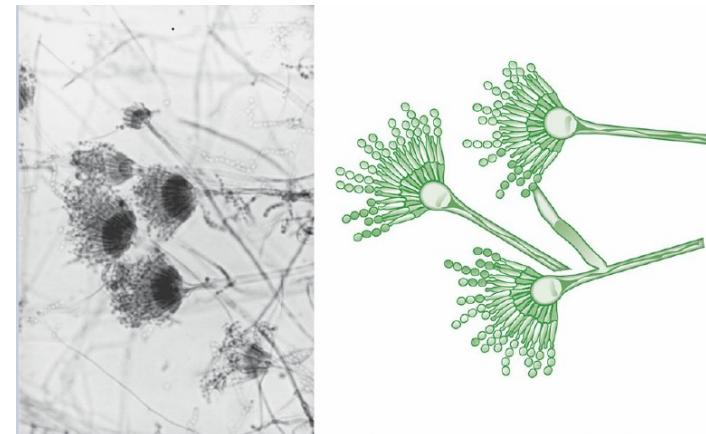
Most isolated from the external ear, causing otomycosis.

# Clinically Significant Agents of Opportunistic Mycoses: *Aspergillus terreus*

Macroscopic



Microscopic

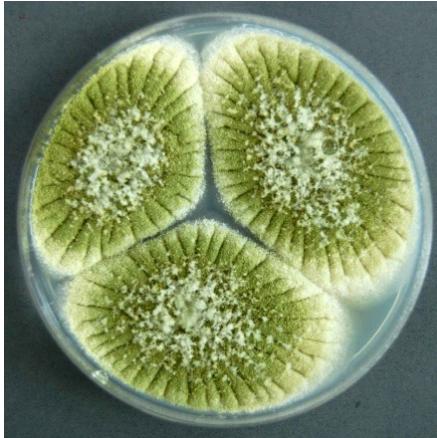


1. 3 days
2. Cinnamon
3. Light

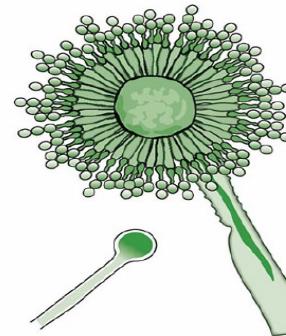
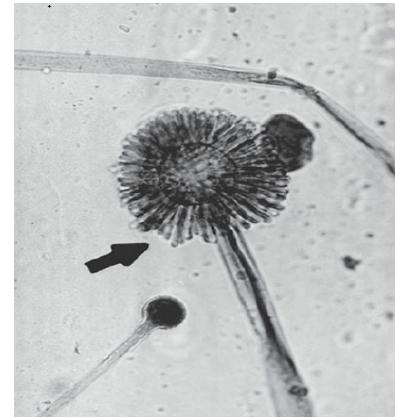
1. Hyaline
2. Septate
3. Biseriate phialides covering the upper half of the vesicle bearing conidia in chains

# Clinically Significant Agents of Opportunistic Mycoses: *Aspergillus flavus*

Macroscopic



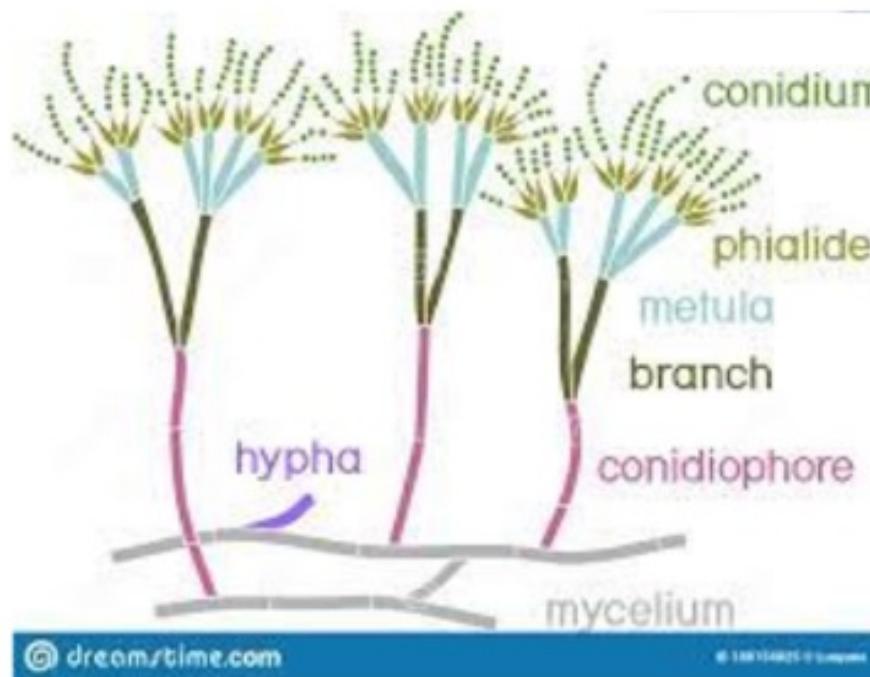
Microscopic



1. 3 days
2. Yellow-green
3. Light

1. Hyaline
2. Septate
3. Spiny conidiophores bearing either uniseriate or biseriate phialides covering the entire vesicle producing chaining conidia

# Clinically Significant Agents of Opportunistic Mycoses: Molds with Brush-like Phialides Overview



Molds with Brush-like Phialides	Colony Color
<i>Purpureocillium lilacinum</i>	Mauve
<i>Paecilomyces</i> species	Brown
<i>Penicillium</i> species	Green w/white border
<i>Gilocladium</i> species	Green w/ white border

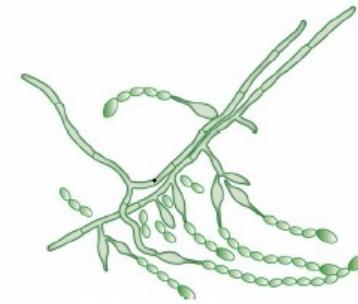
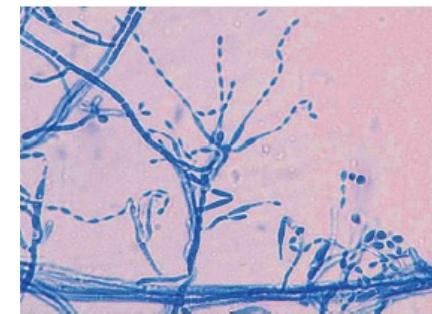
# Clinically Significant Agents of Opportunistic Mycoses: *Purpureocillium lilacinum*

Macroscopic



1. 3 days
2. Mauve
3. Light

Microscopic



1. Hyaline
2. Septate
3. Brush-like phialides with tapered ends and chaining conidia

Increasingly associated  
with sinusitis.

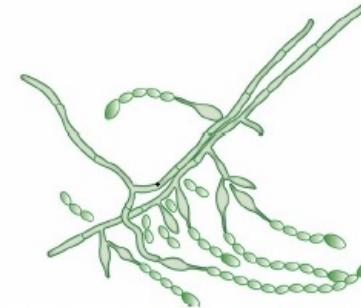
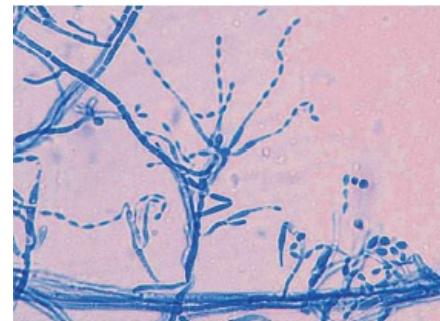
# Clinically Significant Agents of Opportunistic Mycoses: *Paecilomyces species*

Macroscopic



1. 3 days
2. Brown
3. Light

Microscopic

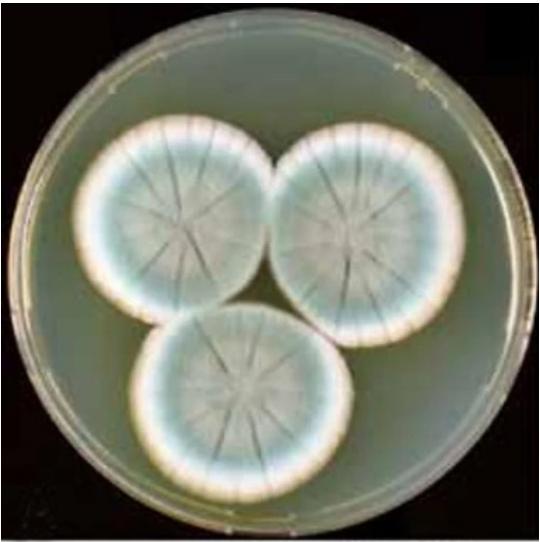


1. Hyaline
2. Septate
3. Brush-like phialides with tapered ends and chaining conidia

Increasingly associated  
with sinusitis.

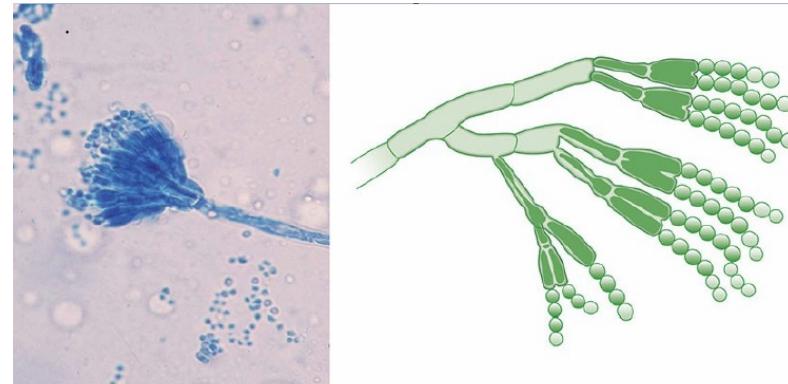
# Clinically Significant Agents of Opportunistic Mycoses: *Penicillium* species

Macroscopic



1. 4 days
2. Green with light periphery
3. Light

Microscopic



1. Hyaline
2. Septate
3. Brush-like phialides with flask-shaped ends and chaining conidia

Almost always a contaminant.

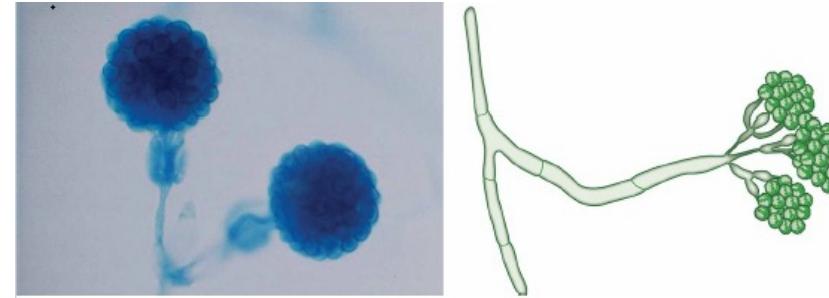
# Clinically Significant Agents of Opportunistic Mycoses: *Gilocladium* species

Macroscopic



1. 4 days
2. Green center
3. Light

Microscopic



1. Hyaline
2. Septate
3. Brush-like phialides with flask-shaped ends and clustering conidia

# Clinically Significant Agents of Opportunistic Mycoses: The Outcasts

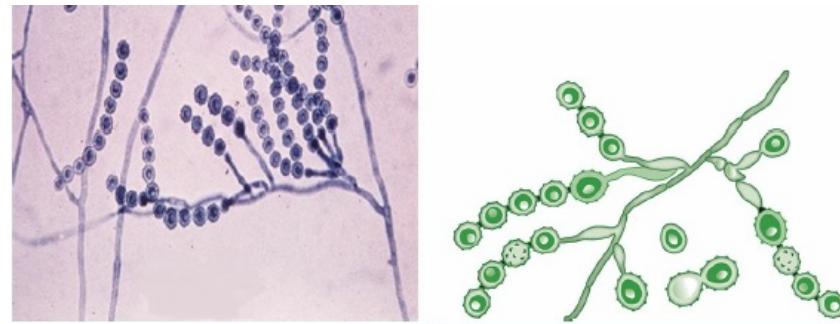
# Clinically Significant Agents of Opportunistic Mycoses: *Scopulariopsis* species

Macroscopic



1. 5 days
2. Light brown
3. Light

Microscopic



1. Hyaline
2. Septate
3. Branched conidiophores bearing annellides that produce spiny conidia in chains



Known to cause  
onychomycosis.

# Clinically Significant Agents of Opportunistic Mycoses: *Fusarium* species

Macroscopic



1. 4 days
2. Violet with a light periphery
3. Light

Microscopic



1. Hyaline
2. Septate
3. Conidiophores produce large canoe-shaped macroconidia containing 3 – 5 septa

Frequent agents of mycotic eye infections.

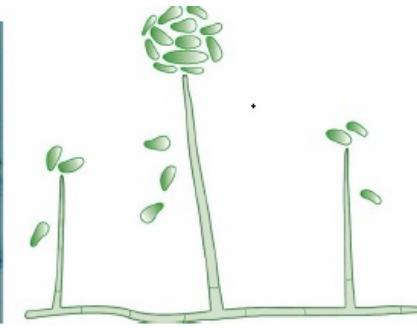
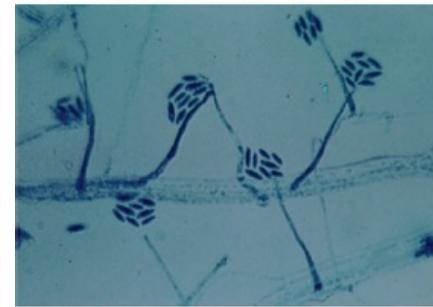
# Clinically Significant Agents of Opportunistic Mycoses: *Acremonium* species

Macroscopic



1. 7 days
2. Light gray
3. Light

Microscopic



1. Hyaline
2. Septate
3. Long phialides with a septum at the base and a cluster of one or two celled conidia



# Clinically Significant Agents of Opportunistic Mycoses: *Sepedonium species*

Macroscopic



Microscopic



1. 7 days
2. Yellow
3. Light

1. Hyaline
2. Septate
3. Conidiophores produce tuberculate conidia

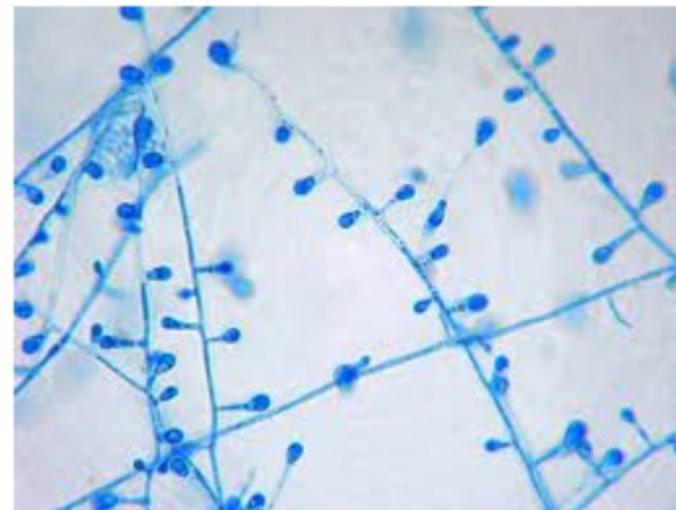
Look-a-like alert:  
*Sepedonium species*  
microscopically look like  
*Histoplasma capsulatum*.

# Clinically Significant Agents of Opportunistic Mycoses: *Chrysoporum species*

Macroscopic



Microscopic



- 1. 6 days
  - 2. White
  - 3. Light
- 1. Hyaline
  - 2. Septate
  - 3. Conidiophores produce one condium with a flattened base

Look-a-like alert:  
*Chrysoporum species*  
microscopically look like  
*Blastomyces dermatitidis*

# Citations

- Mahon, C. R., & Lehman, D. C. (2023). *Textbook of Diagnostic Microbiology* (7<sup>th</sup> ed.). Elsevier.
- Procop, G. W., & Koneman, E. W. (2017). *Koneman's Color Atlas and Textbook of Diagnostic Microbiology* (7<sup>th</sup> ed.). Wolters Kluwer Health/Lippincott Williams & Wilkins.