Medically Significant Fungi

Clinically Significant Agents of Superficial, Cutaneous, and Subcutaneous Mycoses

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Disclaimer

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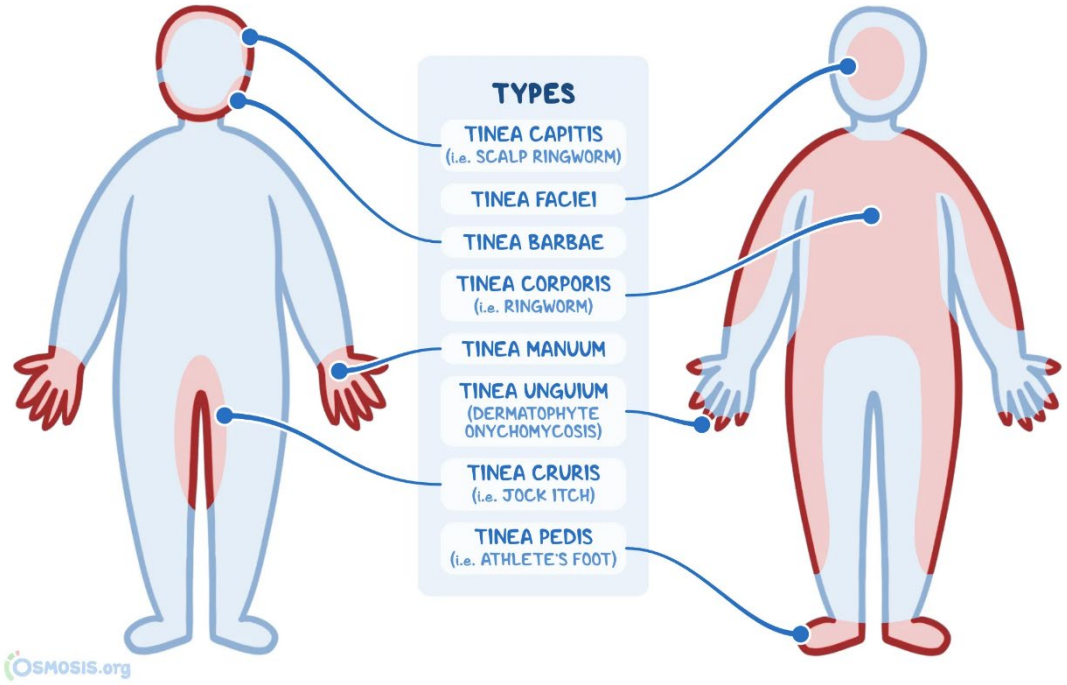
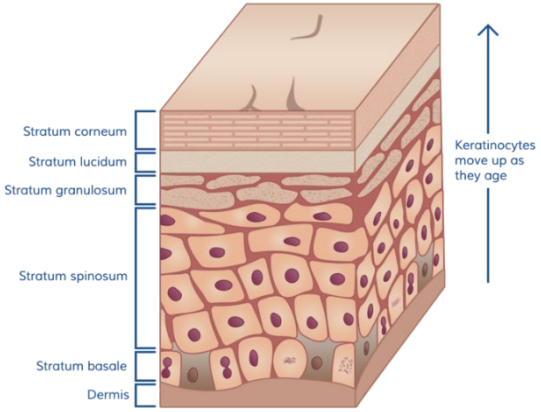
- Most of the information was adopted from the Textbook of Diagnostic Microbiology by Mahon & Lehman (see citation) but condensed for bite sized learning.

Clinically Significant Agents of Superficial and Cutaneous Mycoses



Clinically Significant Agents of Superficial Mycoses: Overview

Polymorphic fungus	Disease(s)
***Malassezia furfur* complex**	*Tinea versicolor [A] *Dandruff *Disseminated disease
Piedraia hortae	*Black Piedra [B]
***Trichosporon* species**	*White Piedra [C] *Disseminated disease
Hortaea werneckii	*Tinea nigra [D]



[A]

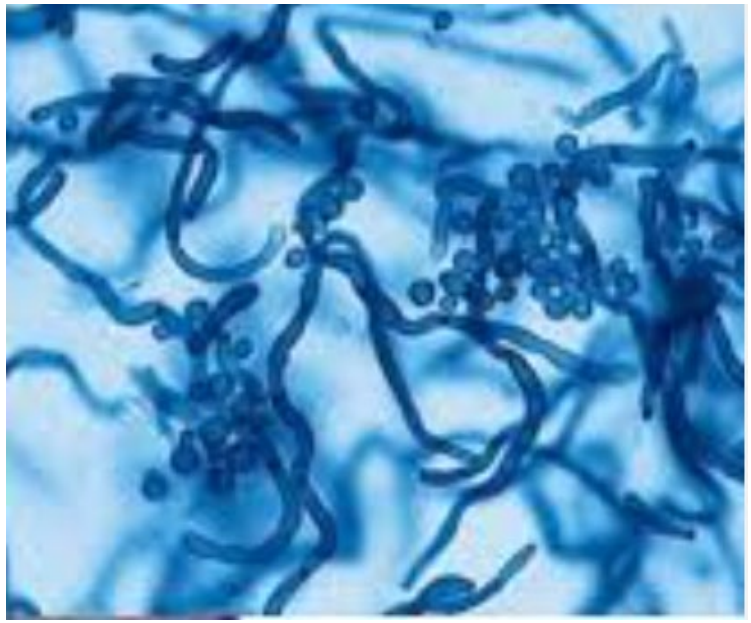
[B]

[C]

[D]

Clinically Significant Agents of Superficial Mycoses: *Malassezia furfur* Complex

Smooth, cream-colored yeastlike colonies



Hyaline septate hyphae with blastoconidia

Malassezia furfur complex is lipophilic and will not grow on fungal media without a lipid source. Fungal media can be overlaid with olive oil when *Malassezia furfur* complex is expected to satisfy this need.

Clinically Significant Agents of Superficial Mycoses: *Trichosporon* species

Smooth, cream-colored yeastlike colonies

Hyaline septate hyphae with arthroconidia and blastoconidia

Clinically Significant Agents of Cutaneous Mycoses: Overview

Dermatophytes	Site of infection (Hair/Skin/Nails)	Micro:Macro
Epidermophyton floccosum	S/N	Macroconidia only
Microsporum	H/S	↓:↑
Trichophyton	H/S/N	↑:↓

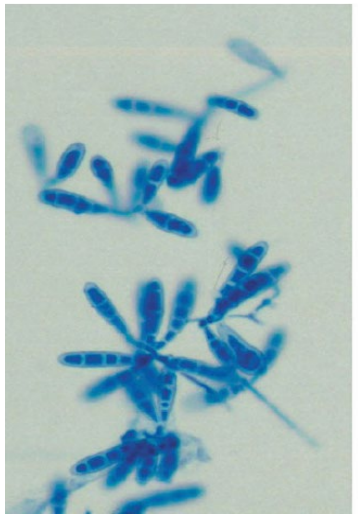
Onychomycosis is the medical term for fungal infection of the nail.

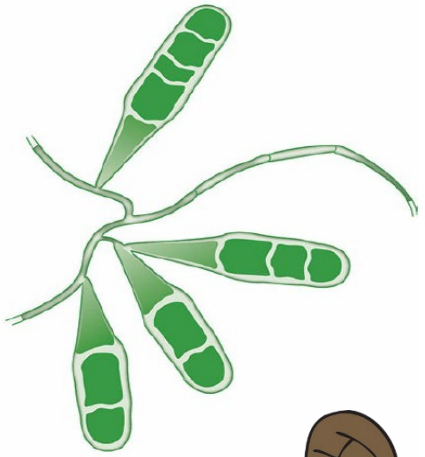
Clinically Significant Agents of Cutaneous Mycoses: *Epidermophyton floccosum*

Macroscopic

1. 10 days
2. Tan
3. Light

Microscopic





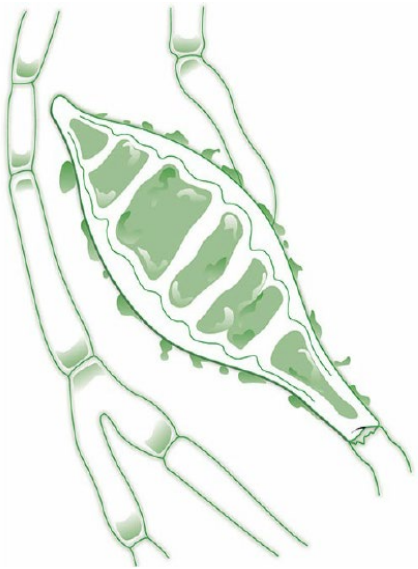
1. Hyaline
2. Septate
3. Club shaped thin-walled macroconidia with rounded ends containing 2-5 cells

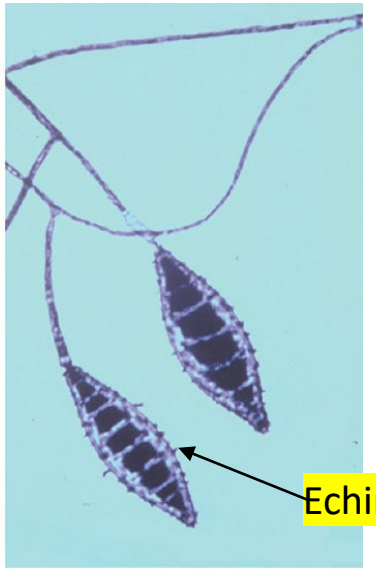
Clinically Significant Agents of Cutaneous Mycoses: *Microsporum canis*

Macroscopic

1. 4 days
2. Cream
3. Light

Microscopic





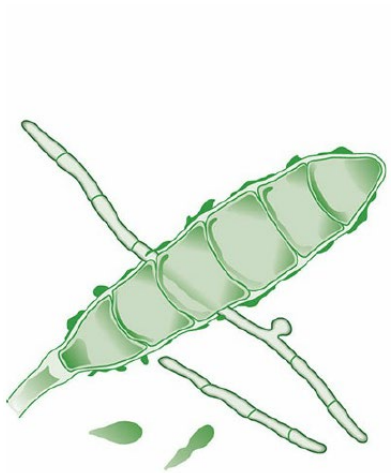
1. Hyaline
2. Septate
3. Thick-walled spindle shaped macroconidia with tapered ends containing >6 cells. Club shaped microconidia formed along the hyphae

Clinically Significant Agents of Cutaneous Mycoses: *Microsporum gypseum*

Macroscopic

1. 6 days
2. Tan
3. Light

Microscopic



1. Hyaline
2. Septate
3. Thin-walled macroconidia with rounded ends containing ≤6 cells. Club shaped microconidia formed along the hyphae

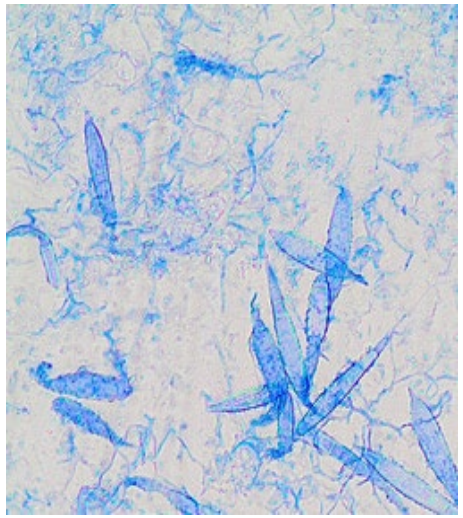
This species is geophilic: lives freely in the soil, but some human infections have been reported.

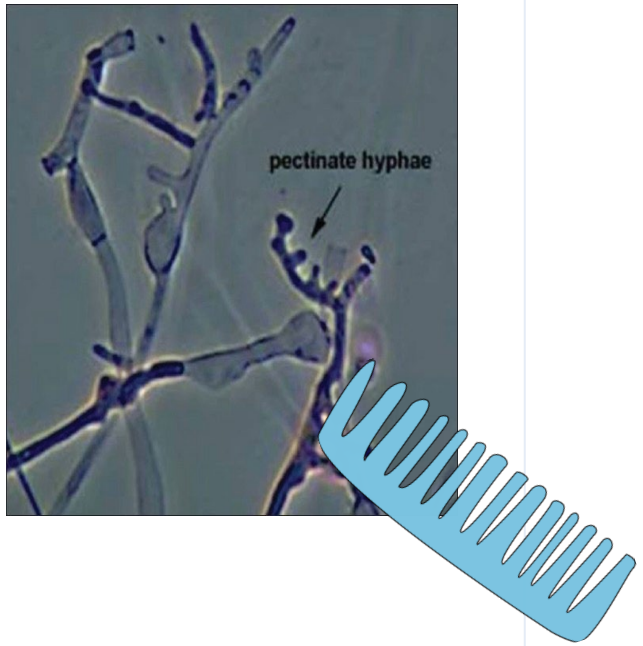
Clinically Significant Agents of Cutaneous Mycoses: *Microsporum audouinii*

Macroscopic

1. 10 days
2. White
3. Light

Microscopic

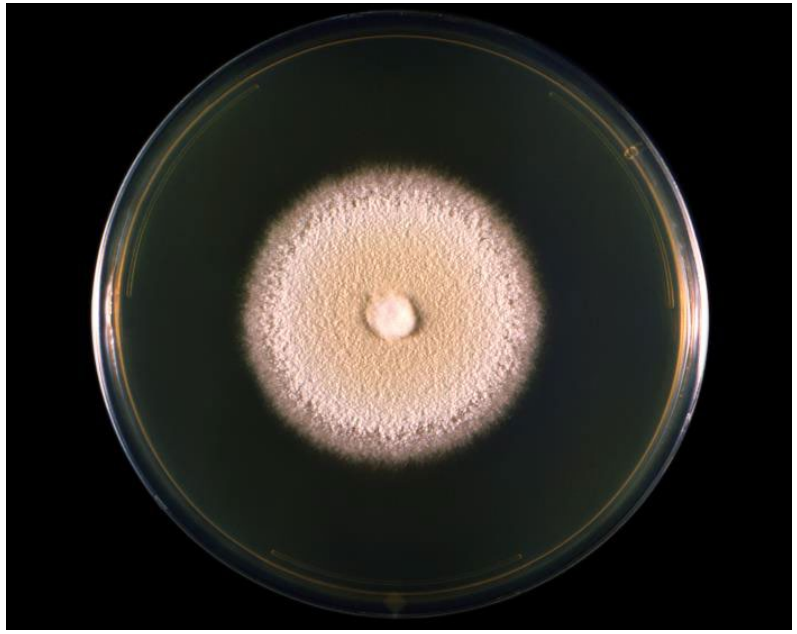




1. Hyaline
2. Septate
3. Variably shaped microconidia all along the hyphae or on short conidiophores. Irregular macroconidia.

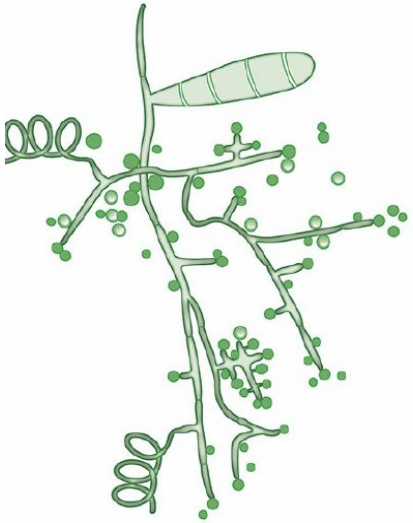
Clinically Significant Agents of Cutaneous Mycoses: *Trichophyton mentagrophytes*

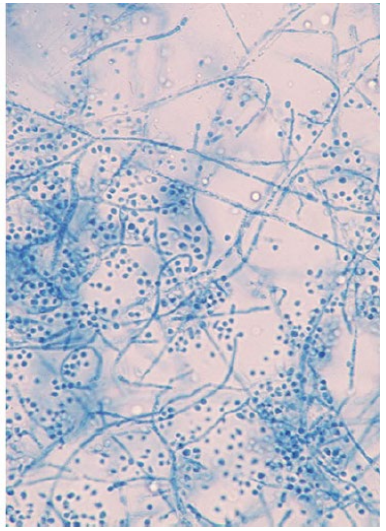
Macroscopic



1. 10 days
2. Tan
3. Light

Microscopic





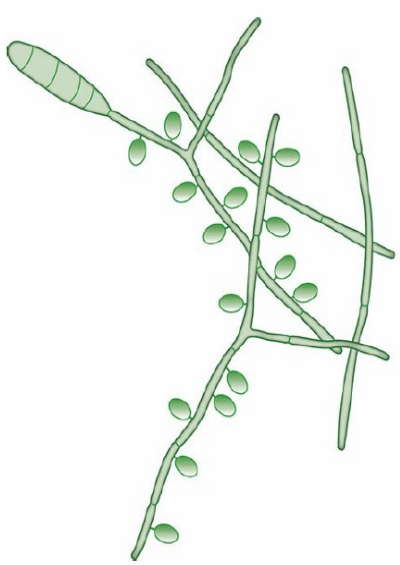
1. Hyaline
2. Septate
3. Circular microconidia clustered on branched conidiophores with thin-walled cigar shaped macroconidia contain 1-6 cells.

Clinically Significant Agents of Cutaneous Mycoses: *Trichophyton rubrum*

Macroscopic

1. 14 days
2. White
3. Light

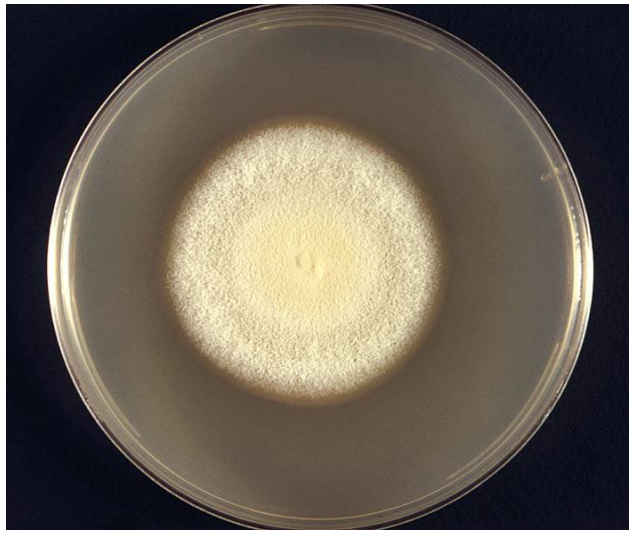
Microscopic



1. Hyaline
2. Septate
3. Tear-shaped microconidia with thin-walled macroconidia contain 3-8 cells.

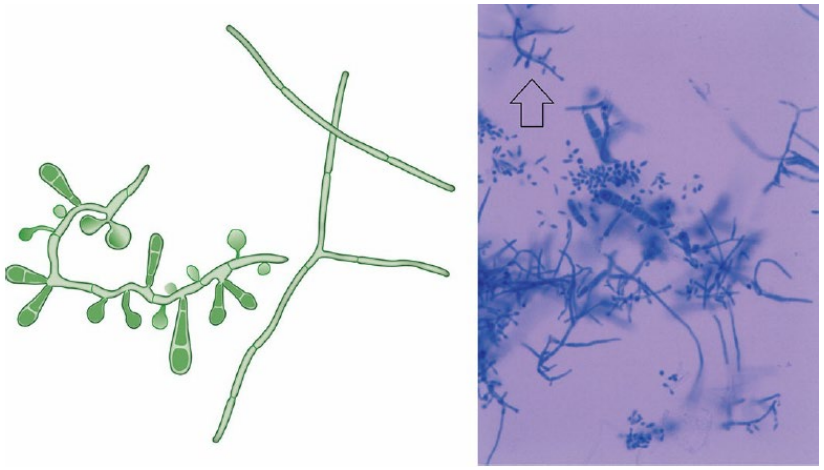
Clinically Significant Agents of Cutaneous Mycoses: *Trichophyton tonsurans*

Macroscopic



1. 12 days
2. White
3. Light

Microscopic

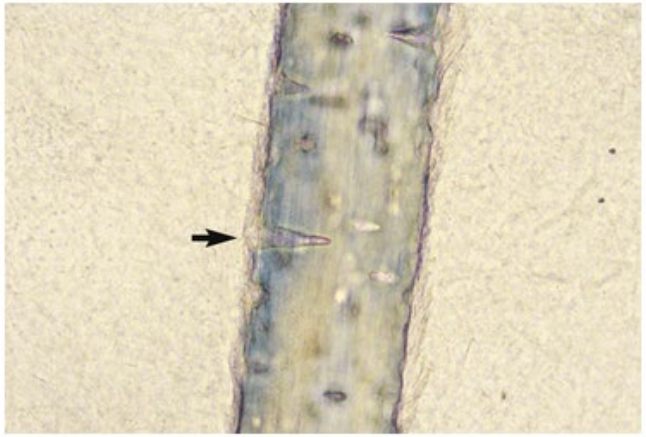


1. Hyaline
2. Septate
3. Variably shaped microconidia all along the hyphae or on short conidiophores. Irregular macroconidia.

Trichophyton tonsurans is the leading cause of tinea capitis in children.

Clinically Significant Agents of Cutaneous Mycoses: Additional Tests for Dermatophyte Identification

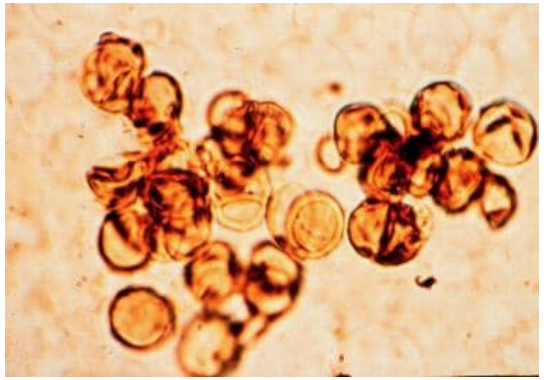
- Hair Perforation (top image)
  - Mix hair, water, and dermatophyte
  - Examine hair on LPCB weekly for up to a month
  - *Trichophyton mentagrophytes* and *Microsporum canis are positive*
- *Urease (5-day test)*
  - *Trichophyton mentagrophytes* urease positive
- Thiamine requirement
  - Some dermatophytes cannot grow on thiamine free media
- Vitamin requirements
  - *Trichophyton* agars
- Growth on rice grains (bottom image)
  - *Microsporum audouinii* does not grow and turns rice brown



Clinically Significant Agents of Subcutaneous Mycoses: Overview

Subcutaneous Mycosis	Definition
Chromoblastomycosis	Lesions form on the extremities and have a wart-like appearance [A]. Sclerotic bodies can be seen microscopically [B].
Mycetomas	Swelling, with characteristic exudate draining to the skin surface through sinus tracts [C].
Phaeohyphomycosis	Fungal infections caused by phaeoid fungi.

[A]



[B]

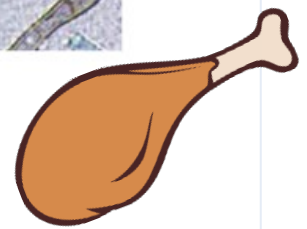
[C]

Clinically Significant Agents of Subcutaneous Mycoses: *Alternaria* species

Macroscopic

1. 5 days
2. Brown
3. Dark

Microscopic



1. Phaeoid
2. Septate
3. Zigzag (sympodial geniculate) conidophores bearing conidia with transverse and longitudinal septations (muriform) found singly or in chains.

Clinically Significant Agents of Subcutaneous Mycoses: *Bipolaris* species

Macroscopic

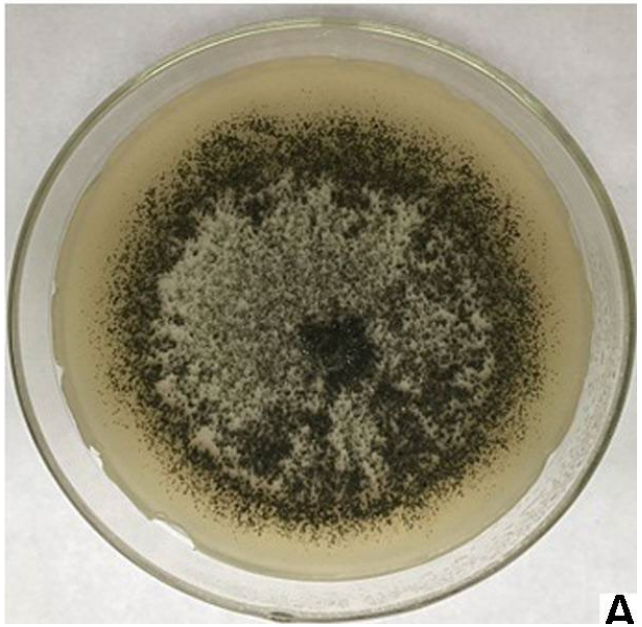
1. 5 days
2. Brown
3. Dark

Microscopic

1. Phaeoid
2. Septate
3. Sympodial geniculate conidophores bearing thick-walled conidia with 3-5 septations

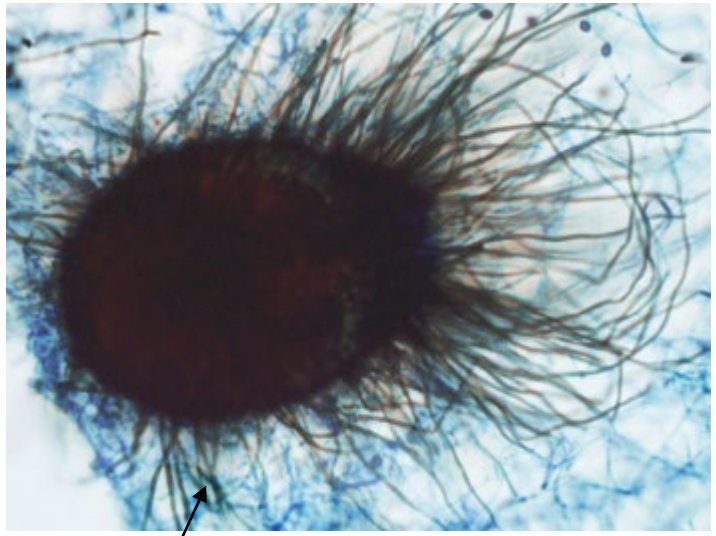
Clinically Significant Agents of Subcutaneous Mycoses: *Chaetomium* species

Macroscopic



1. 5 days
2. Brown
3. Dark

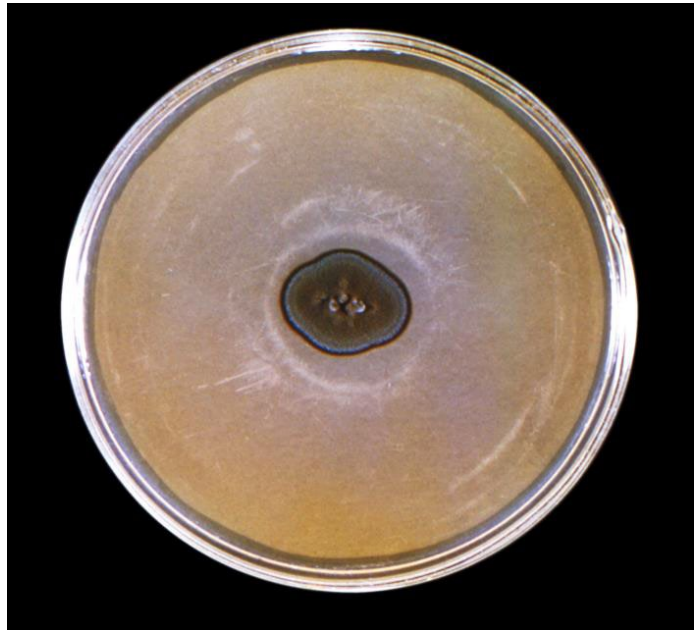
Microscopic



1. Phaeoid
2. Septate
3. Perithecium contains ascospores

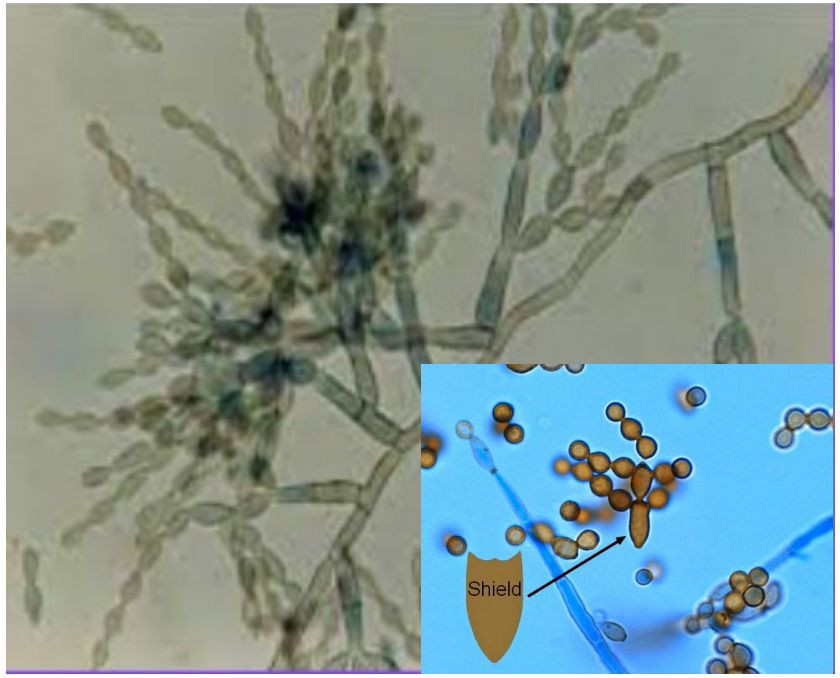
Clinically Significant Agents of Subcutaneous Mycoses: *Cladophialophora* species

Macroscopic



1. 18 days
2. Brown
3. Dark

Microscopic



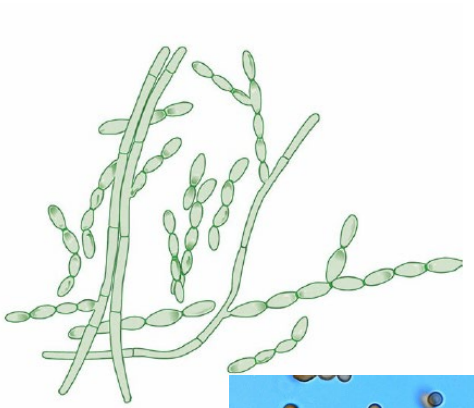
1. Phaeoid
2. Septate
3. Conidiophores produce long branching chains of rhombus shaped conidia

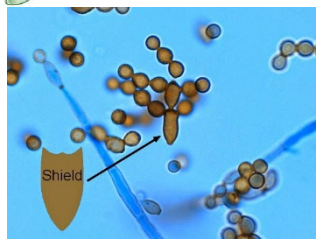
Clinically Significant Agents of Subcutaneous Mycoses: *Cladosporium* species

Macroscopic

1. 7 days
2. Brown
3. Dark

Microscopic

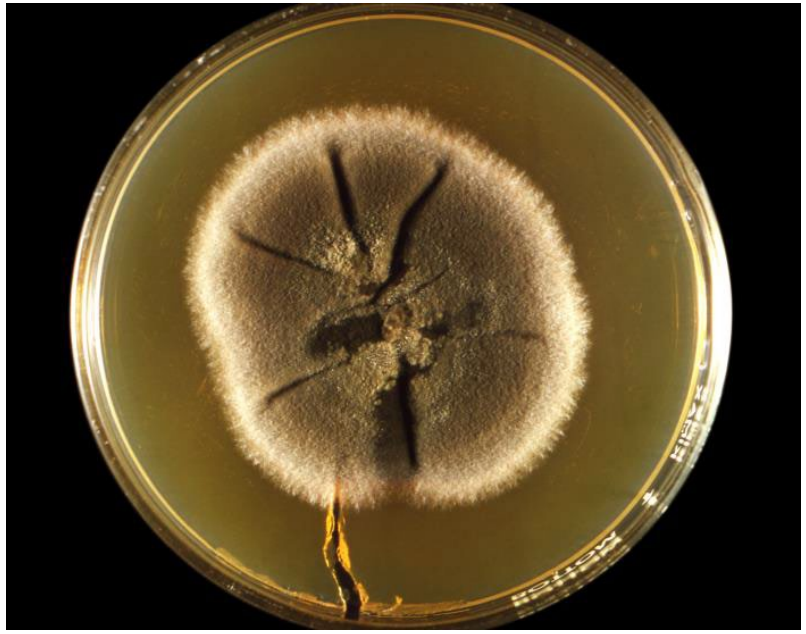




1. Phaeoid
2. Septate
3. Conidiophores produce long branching chains of rhombus shaped conidia

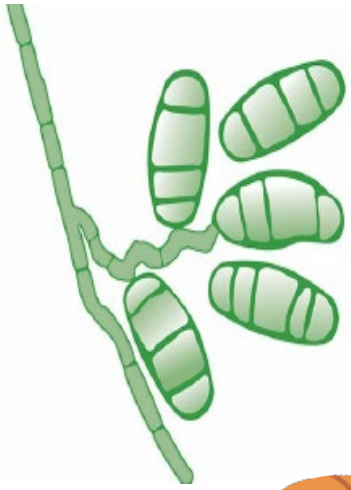
Clinically Significant Agents of Subcutaneous Mycoses: *Curvularia* species

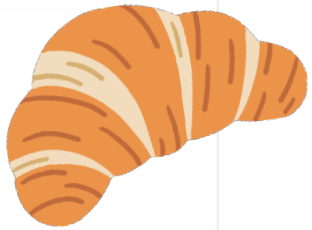
Macroscopic



1. 5 days
2. Brown
3. Dark

Microscopic





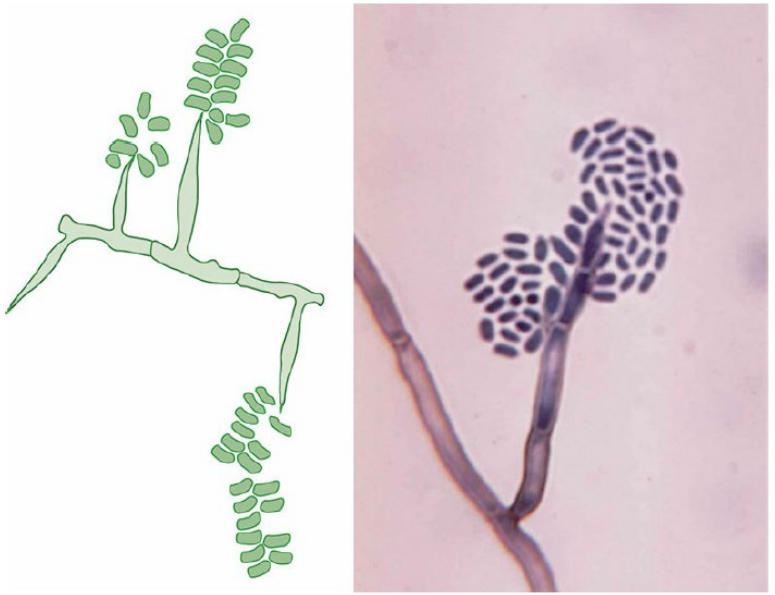
1. Phaeoid
2. Septate
3. Sympodial geniculate conidophore bearing four celled curved conidia

Clinically Significant Agents of Subcutaneous Mycoses: *Exophiala* species

Macroscopic

1. 10 days
2. Black
3. Dark

Microscopic

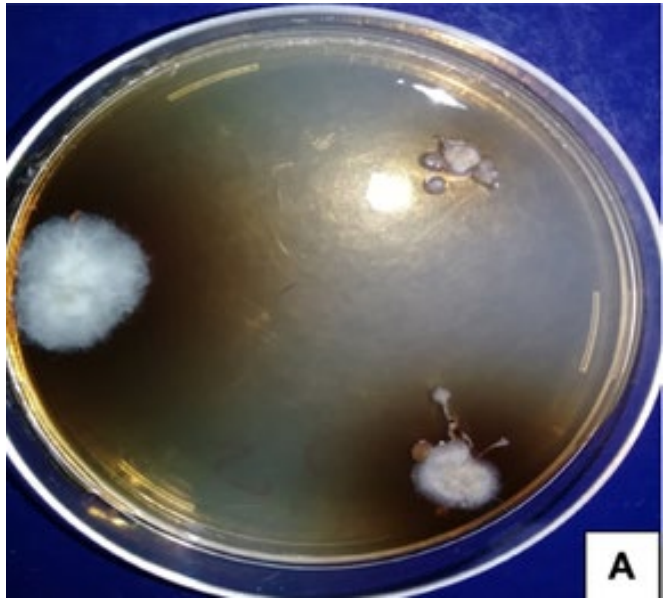


1. Phaeoid
2. Septate
3. Flask-shaped conidiogenous cells with oval conidia accumullating at the base.

Exophiala species are a common cause of phaehyphomycoses.

Clinically Significant Agents of Subcutaneous Mycoses: *Madurella*

Macroscopic



1. 12 days
2. White with brown diffusible pigment
3. Dark

Madurella species are the most common cause of eumycotic mycetomas worldwide.

Clinically Significant Agents of Subcutaneous Mycoses: *Phialophora* species

Macroscopic

1. 12 days
2. Brown
3. Dark

Microscopic

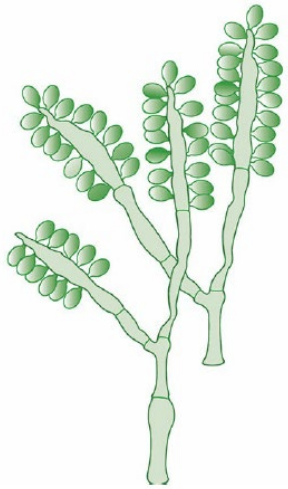
1. Phaeoid
2. Septate
3. Cuplike phialides extend directly from the hyphae and oval conidia accumulate at the apex

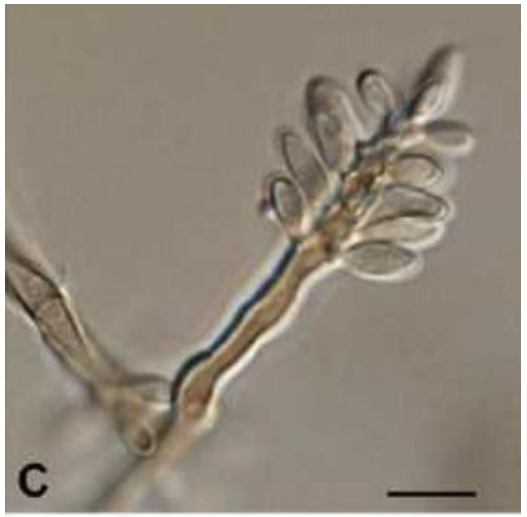
Clinically Significant Agents of Subcutaneous Mycoses: *Rhinocladiella* species

Macroscopic

1. Varies
2. Brown
3. Dark

Microscopic

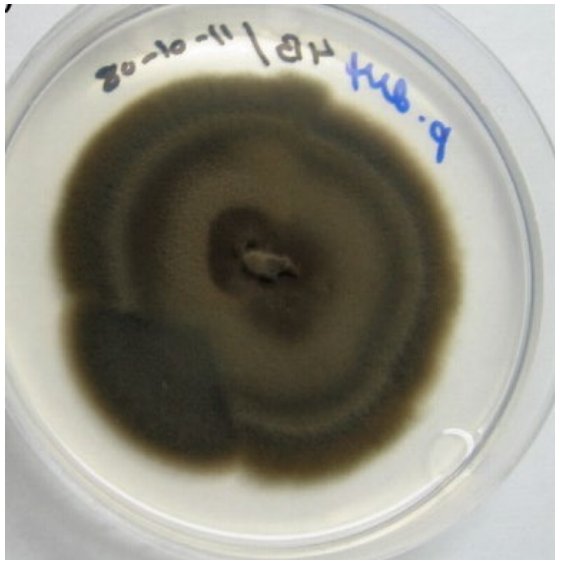




1. Phaeoid
2. Septate
3. Conidia form on the top and upper sides of the conidiophore

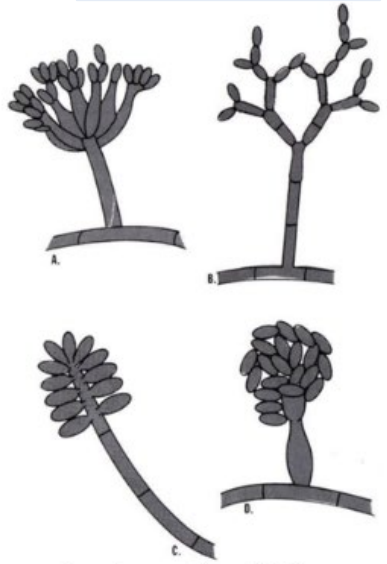
Clinically Significant Agents of Subcutaneous Mycoses: *Fonsecaea* species

Macroscopic



1. 14 days
2. Brown
3. Dark

Microscopic



Four types of conidiation

1. Phaeoid
2. Septate
3. Four types of conidiation

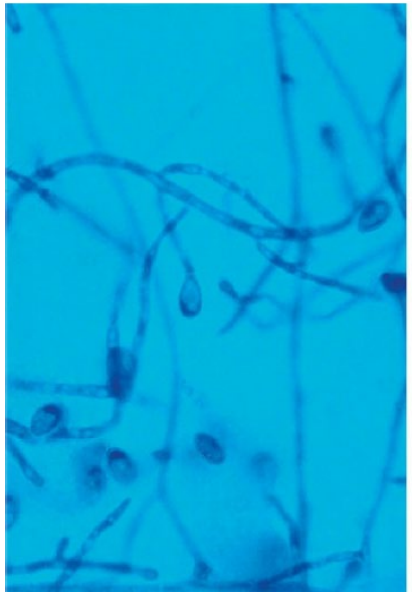
Fonsecaea pedrosoi is the most common cause of chromoblastomycoses.

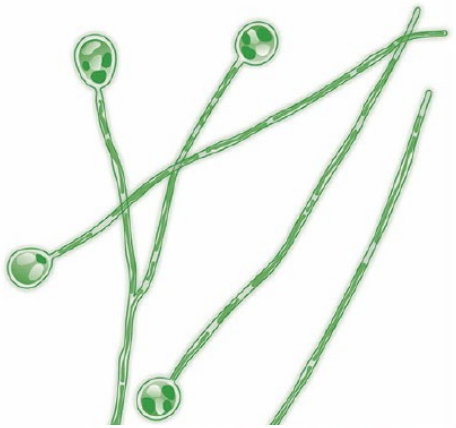
Clinically Significant Agents of Subcutaneous Mycoses: *Scedosporium boydii/Pseudallescheria boydii*

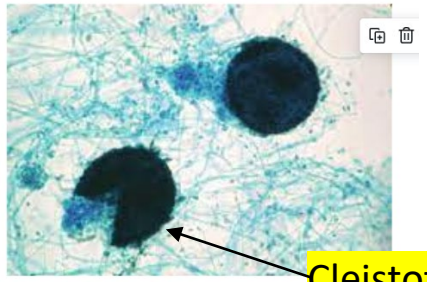
Macroscopic

1. 7 days
2. Gray
3. Opinions differ

Microscopic







1. Opinions differ
2. Septate
3. Short conidiophores bearing oval shaped conidia that are truncate and darken as they age

Scedosporium boydii/Pseudallescheria boydii is the most common cause of eumycotic mycetomas in the USA.

Clinically Significant Agents of Subcutaneous Mycoses: *Ulocladium* species

Macroscopic

1. 5 days
2. Brown
3. Dark

Microscopic

1. Phaeoid
2. Septate
3. Sympodial geniculate conidophores bearing round muriform conidia.

Citations

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