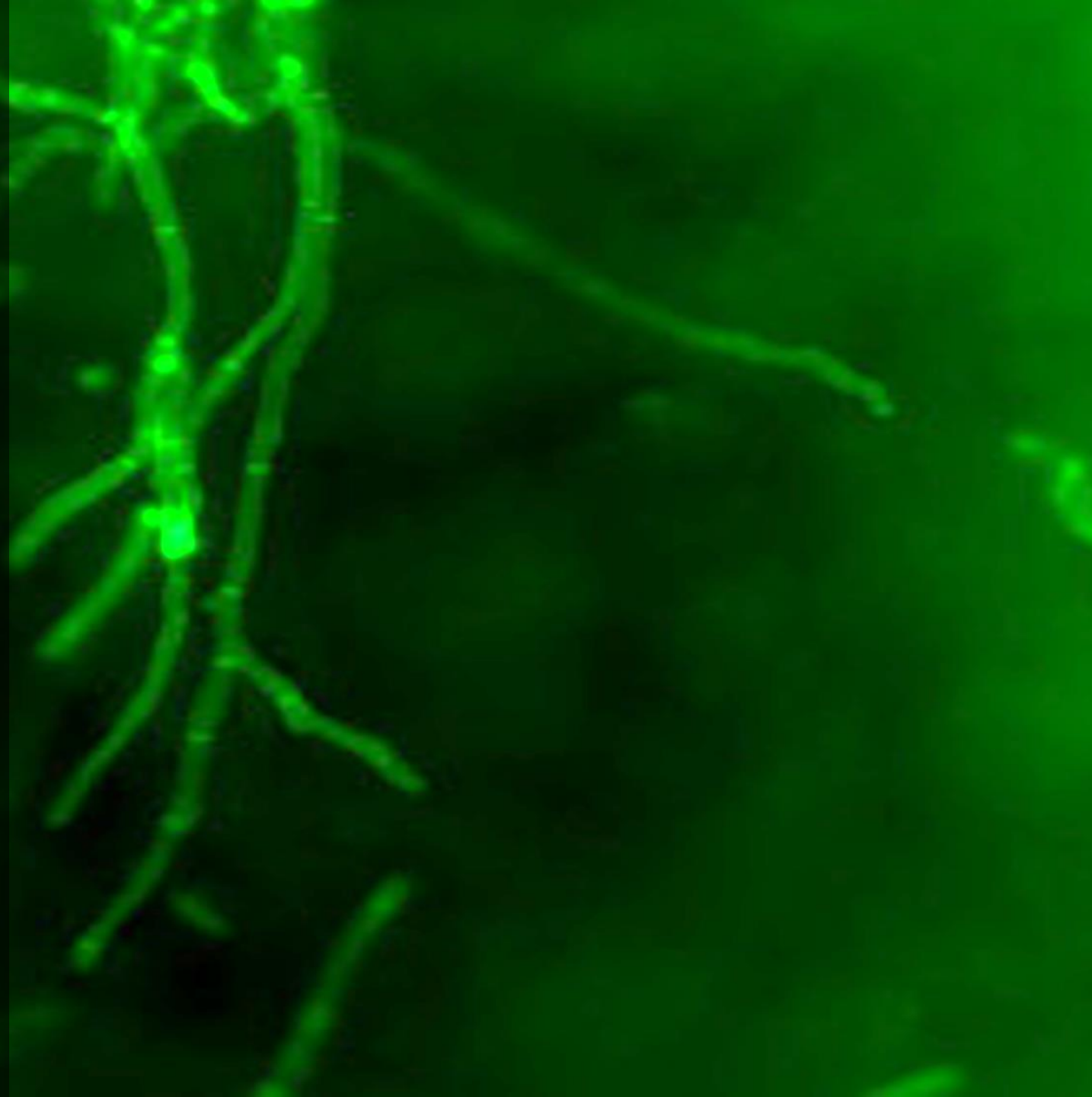




2nd Professional
Year (Veterinary
Microbiology)

Dermatophytes

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Dermatophytes

“A unique group of fungi that infect keratinous tissue and are able to invade the hair, skin, and nails of a living host.”

General Characteristics

- Dermatophytes are cutaneous fungi
- Infect only the keratinized tissues
- Liberates keratinase enzyme - helps them to invade into keratinized tissue (stratum corneum layer of skin, hair and nail).
- Dermatophytes are grouped Deuteromycota (Fungi Imperfecti).
- It is a group of about 40 related fungi
- Classified into three genera :
 - *Microsporum*
 - *Trichophyton*
 - *Epidermophyton*

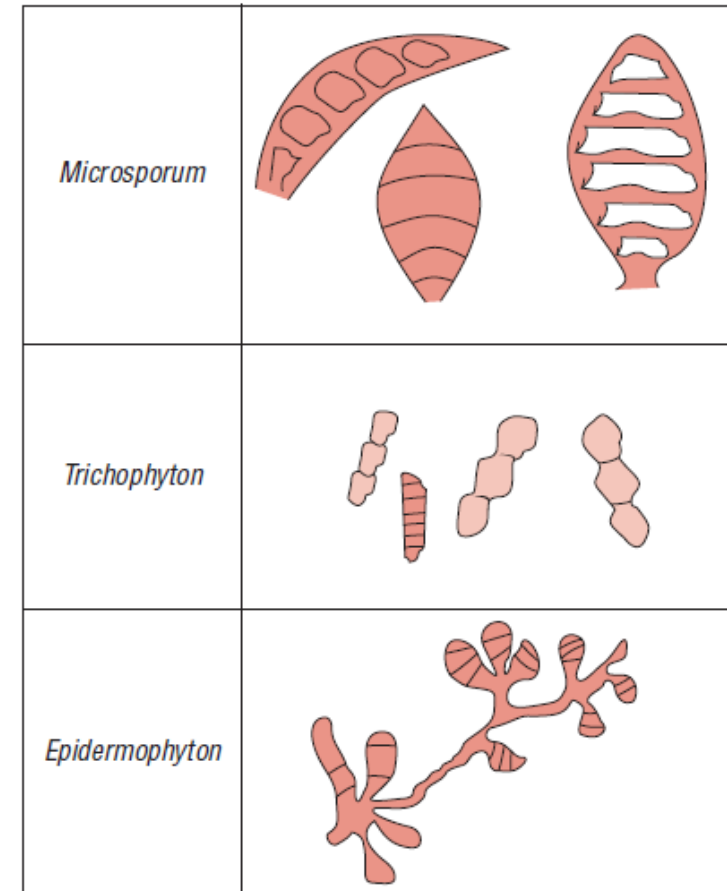
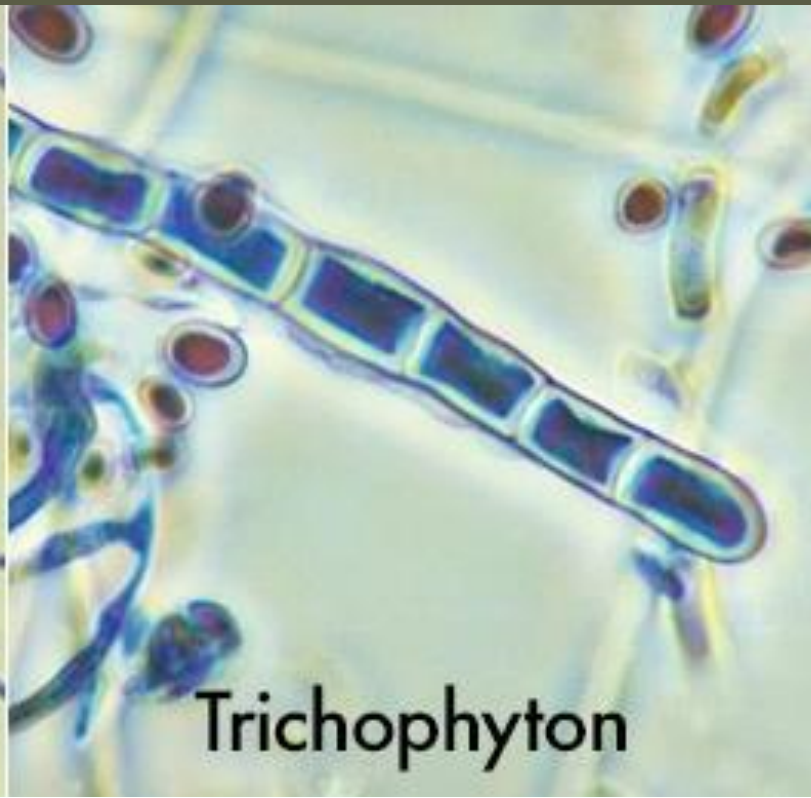


FIG. 72-3. Macroconidia in genera *Trichophyton*, *Microsporum*, and *Epidermophyton*.



Microsporum



Trichophyton



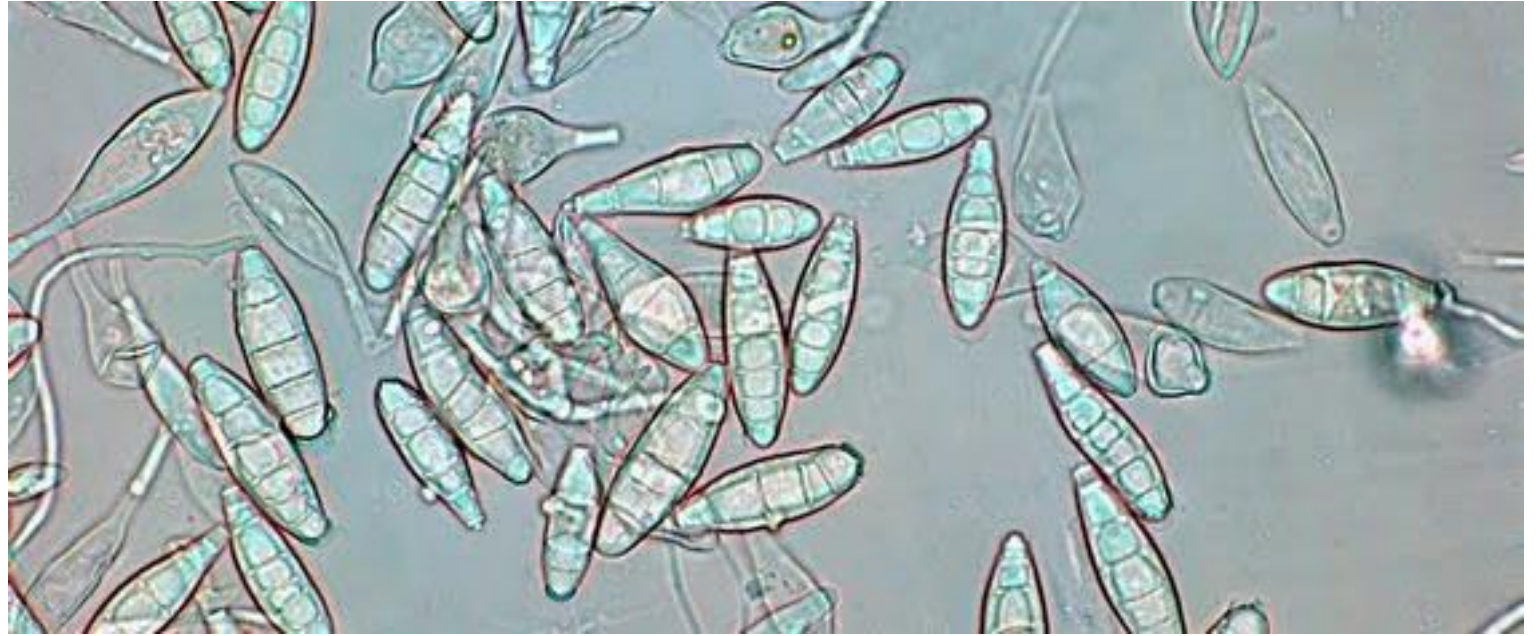
Epidermophyton

Macroconidia of different Genera of Dermatophytes



Microsporium

- Characterized by the presence of rough walls - asperulate, echinulate, or verrucose.
- Hyphae are septate with numerous spindle-shaped, rough thick-walled macroconidia (10–25 × 35–110 μm).
- Macroconidia
 - taper to spiny, bent knob-like ends
 - resemble “dog snouts.”
- Microconidia-
 - club shaped and smooth walled
 - form sparsely along the hyphae.



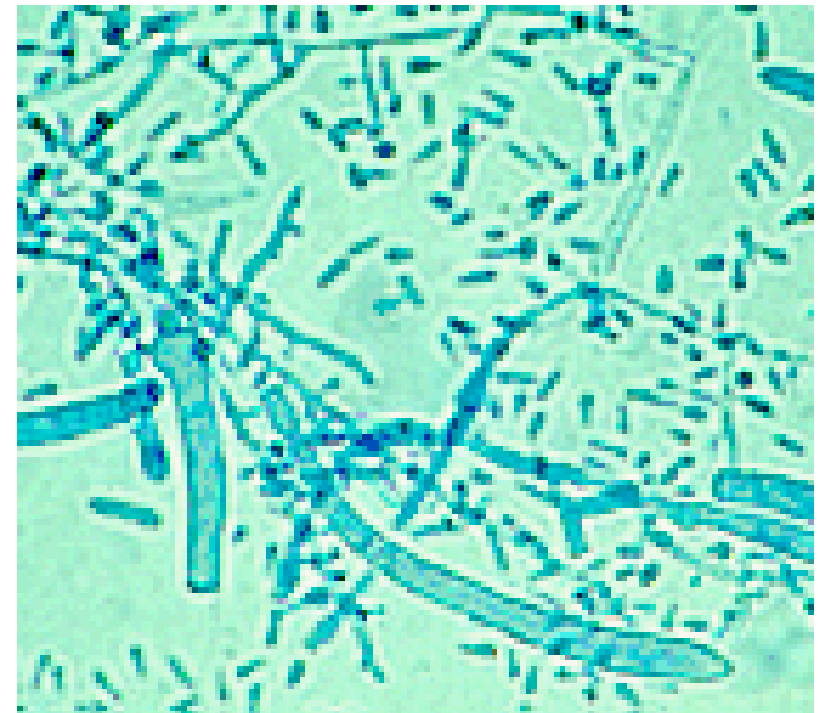
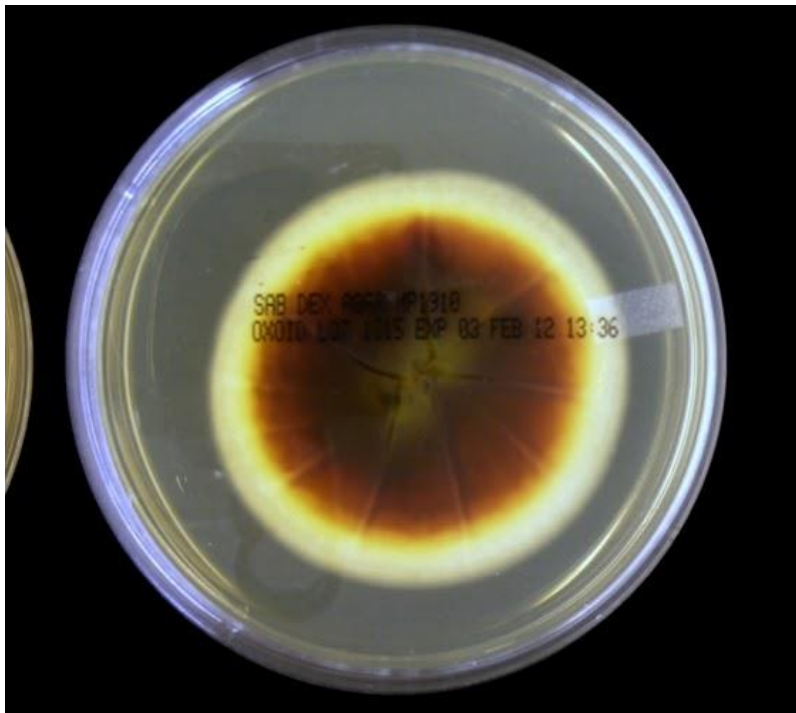
Microsporium

Trichophyton

- Hyphae are septate, with many conidia
 - formed along the hyphae or on short perpendicular conidiophores.
- Microconidia are teardrop or club shaped may enlarge to form “balloon” forms.
- Intercalary and terminal chlamydoconidia are common.
- Macroconidia are rare, irregularly shaped and slightly thick-walled. , elongate and pencil shaped, clavate, fusiform, or cylindrical.



Trichophyton



Epidermophyton

- Macroconidia
 - broadly clavate with typically smooth, thin to moderately thick walls
 - one to nine septa.
 - usually abundant and borne singly or in clusters.
- Microconidia are absent.
- Two known species to date- only *E. floccosum* is pathogenic.

Contd...

- They are restricted to non-viable skin
 - Most are unable to grow at 37°C or in the presence of serum .
- Many species have particular keratinase, elastase and other enzymes
 - considered as virulence factors.
- Many of them capable of sexual reproduction – produce ascospore.
 - Thus belongs to genus *Arthroderma* in phylum *Ascomycota*

Life cycle of dermatophytes

- Dermatophytes may exhibit two phases in their life cycle:
 - Anamorph state (imperfect or asexual phase)
 - Teleomorph state (perfect or sexual phase).

Epidermophyton



Natural habitat

- Broadly classified into three groups on the basis of their natural habitats.
 - **Geophilic species** - (soil-inhabiting saprophytes)
 - Occasionally pathogenic for man or animals
 - **Zoophilic species** - normal host is animals
 - May also infect man.
 - Ability to hydrolyze keratinous debris (“keratinophilic fungi”) - parasitized animal hosts.
 - **Anthropophilic species** - confined to man as a host

Geographic distribution

- variability with respect to geographical distribution of individual species
- Some species are found worldwide, while others are localized
- Disease occurrence dependent on factors including:
 - population migration patterns
 - husbandry practices
 - primary host range
 - secondary host susceptibility
 - climatic preference of fungi

Transmission

- occurs through contact with hyphal fragments and arthroconidia
- associated with skin scales or hair fragments –
 - deposited on fomites such as brushes combs, clothings, etc.
- Arthroconidia are airborne –
 - propagules can easily disseminate from one host to another.
- Arthroconidia are more infective for transmission than macro- and microconidia.
- Arthroconidia can remain viable for several years on skin scales or hair shed into the environment.

Pathogenicity

- Fungus colonizes the stratum corneum → grows in a radial manner without penetrating viable tissue.
- Invasion of hair → example of colonization.
- Colonization or infection → disease manifestation (structural or functional harm.)

Clinical manifestations

- Traditionally, infections caused by **dermatophytes (ringworm)** have been named according to the anatomic locations involved by appending the Latin term designating the body site after the word tinea, e.g., tinea capitis for ringworm of the scalp.
- Clinically
 - damaged or destroyed hair and nails
 - hyperhidrosis
 - Pruritus
 - Inflammation
 - alopecia.
- Geophilic and Zoophilic dermatophytes
 - typically cause more severe, self-limiting lesions.

A laboratory setting with a blue background. In the foreground, a glass petri dish is partially visible, containing a white substance. A pipette is positioned above it, with a small amount of liquid being dispensed. In the background, another petri dish is visible, containing a yellowish substance. The overall scene is brightly lit, with some bokeh light effects in the background.

DIAGNOSIS

DERMATOPHYTES

Laboratory diagnosis

- **DIRECT MICROSCOPY**
 - Potassium hydroxide (KOH) treatment for visualization under microscope .
- **FLUORESCENCE MICROSCOPY**
 - Calcofluor white technique
 - Congo red technique
- **FUNGAL CULTURE**
 - Clinical sample - plated onto SELECTIVE and NON-SELECTIVE fungal media.
- **MOLECULAR IDENTIFICATION AND DETECTION**

Media for culture

- **Selective Media :**
- Mycosel and Mycobiotic agar
 - (contain cycloheximide for the inhibition of saprophytic moulds, e.g., *Penicillium* & *Aspergillus*.)
- **Non-selective media :**
- Potato dextrose agar (PDA) & Sabouraud dextrose agar (SDA)
 - antibiotics added to inhibit bacterial contamination.

Identification

- Dermatophyte isolates - identified to genus/species by
 - colonial appearance
 - microscopic examinations by Scotch tape preparation
 - biochemical tests

Thanks
