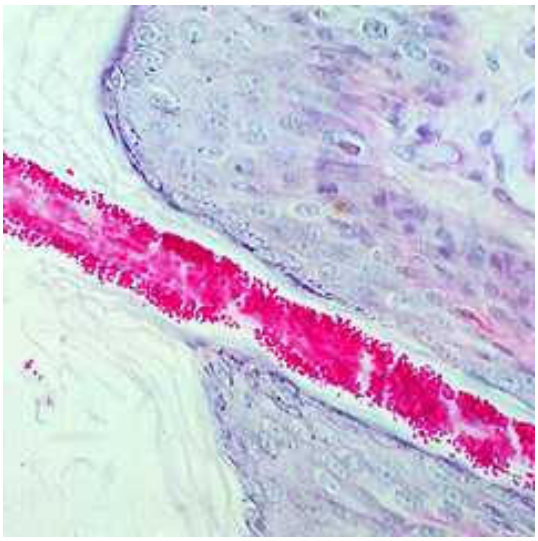
Dermatophyte Fungi

Dematophytes grow as moulds in tissue and in culture.

Microscopic Examination of Tissues

Dermatophyte, section of dog skin and hair to demonstrate ectothrix arrangement of arthroconidia; *Microsporum canis*. PAS stain		Initial diagnosis is based on examination of a wet preparation of hair samples or skin scrapings. The sample is cleared with potassium hydroxide solution to enable easier visualisation of ectothrix (a sheath of arthroconidia around the hair shaft) in the sample, particularly around the base of the hair shaft. Lactophenol cotton blue may be used as a stain.

Cultural Examination

Hair, skin scales or nail clippings are placed in the culture medium and incubated at room temperature (25°C) for 10 to 14 days. Sabouraud's dextrose agar (SDA) is the most commonly used media for general fungal culture, but more selective media with inhibitors of bacteria and saprophytic fungi can be used for isolating dermatophytes. eg. Mycosel agar (BBLR) - SDA with cycloheximide (Actidione) and chloramphenicol.

Dermatophyte test medium (DTM - FungassayR) - SDA with cycloheximide, gentamicin, chloramphenicol and phenol red. Dermatophytes growing on DTM utilise protein in the medium first, with alkaline metabolites turning the medium red. When the protein is exhausted, the dermatophytes utilise carbohydrates, giving off acid metabolites. The medium's red colour returns to yellow. Most other fungi utilise carbohydrates first, and only later, protein: they too may produce a red change in DTM, but only after a prolonged incubation (10 - 14 days or more). Therefore DTM should be examined daily for the first 10 days. Other fungi may cause an early red change in DTM, so microscopic examination of the culture is essential for an accurate diagnosis.

Identification

Identification of cultured fungi requires examination of —

1. colony characteristics (top)

- colour eg. white, yellow, cinnamon

- consistency eg. fluffy, powdery

- topography eg. flat, folded, plicate, rugose

2. colony characteristics (reverse)

- pigment production

3. microscopic morphology

- macroconidia and microconidia (size, shape, etc.)

- hyphal structures

Microscopic morphology is best examined by making a lactophenol cotton blue wet mount (sticky tape preparation). The sticky tape is gently applied to the surface of the fungal culture. A drop of alcohol is placed on the tape and it is placed on top of a drop of lactophenol cotton blue on a slide. Microsporum species are identified by the shape of their macroconidia. Trichophyton species are identified by the shape and arrangement of their microconidia.

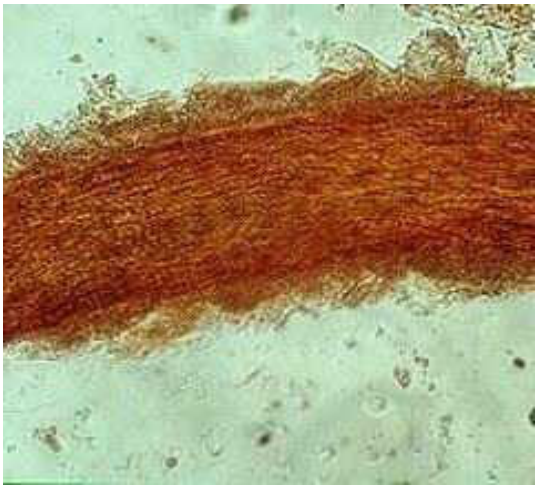
Serological Tests

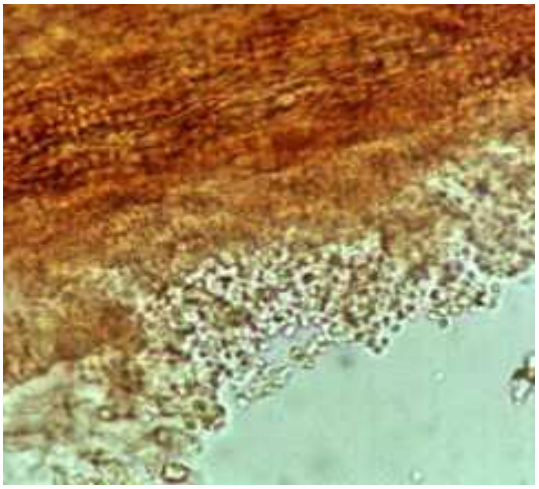
Not used diagnostically.

Microsporum canis

Ectothrix formation with abundant, small arthroconidia. 50% of infections will fluoresce under the Wood's (ultraviolet) lamp.

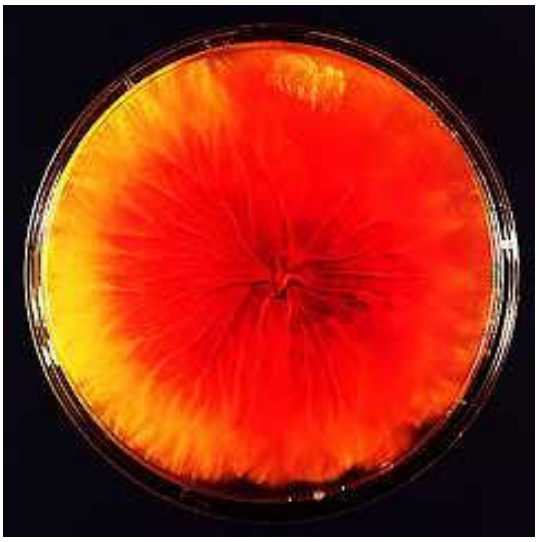
Microsporum canis showing ectothrix formation with abundant, small arthroconidia. Left 100x; right 400x.



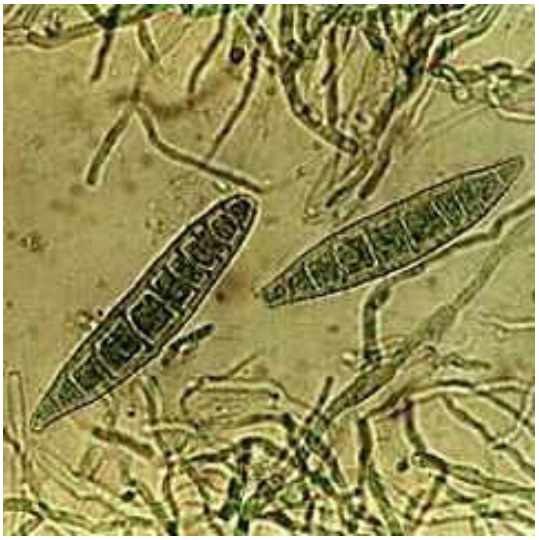


Colony appearance - Fluffy, white to yellowish flat colony with radiating edges. The reverse surface exhibits a non-diffusing lemon to deep chrome yellow pigment.

Microsporum canis culture grown on Sabouraud dextrose agar for 20 days at 28°C. Left, upper surface view; right, reverse view.



Microsporum canis. Wet preparation of culture stained with lactophenol cotton blue and showing macroconidia. 400x.



Microscopic features - many large macroconidia which are thick walled, spindle shaped, six or more compartments, echinulate (spiny surface), asymmetrical terminal knob.

Microconidia are slender, clavate to pyriform, and are not diagnostic.

Microsporum gypseum

Ectothrix formation with sparse arthroconidia, arranged in chains.

Colony appearance - Rapid spreading flat thallus with texture of chamois, rich cinnamon-buff colour. Powdery surface due to presence of multitudes of macroconidia. Reverse surface may or may not be pigmented.

Microsporum canis culture grown on Sabouraud dextrose agar for 14 days at 28°C. Left, upper surface view; right, reverse view.

Microscopic features - large numbers of macroconidia, which are symmetrical, ellipsoid, echinulate, thin walled, up to six compartments. Clavate microconidia may be present but are not diagnostic.

Microsporum nanum

Ectothrix with large arthrospores in chains.

Cultural characteristics - white to buff, red reverse.

Microscopic features - ovoid to ellipsoidal ovate macroconidia. Clavate microconidia.

Microsporum distortum

Very irregularly shaped macroconidia

Trichophyton gallinae

Ectothrix with large arthrospores in chains.

Cultural characteristics - white to pale rose with radial folds. Reverse surface red.

Microscopic features - infrequent club-shaped and clavate macroconidia. Microconidia occur singly on hyphae and are pyriform to clavate.

Trichophyton mentagrophytes

Ectothrix with large arthrospores in chains.

Cultural characteristics - granular, light buff to tan with reverse side variable (red, yellow, tan-brown).

Microscopic features - variable numbers of spindle-shaped or clavate macroconidia with 5-6 septa. Microconidia are abundant, sessile and pyriform to clavate.

Culture of hairs from mycoses infections in mice, caused by *Trichophyton mentagrophytes*. Upper view, left; reverse view, right.

Trichophyton verrucosum

Ectothrix with large arthrospores in chains.

Cultural characteristics - grows slowly and requires thiamine and inositol for growth. Deeply folded, white to brilliant yellow colonies.

Microscopic features - rare, long, thin walled macroconidia. Microconidia are abundant, ovoid, pyriform or clavate.

Trichophyton equinum

Ectothrix with large arthrospores in chains

Cultural characteristics - white, cottony colonies with a yellow edge. Older colonies are velvety to cream-tan. Reverse is yellow to red-brown

Microscopic features - rare, clavate macroconidia. Microconidia are abundant, and spherical to pyriform.

Trichophyton equinum culture on Sabouraud dextrose agar. Taken from a dermatophyte infection from a horse. Incubated at 28°C for 14 days