Dermathophytes
Week 10

1. **Cutan Mycosis**

- Trichophyton Genus
- Microsporium Genus
- Epidermophyton Genus

2. Dermatophilosis

- Dermathophytes are close related fungi that uses keratin to reproduce
- They make infections on superficial regions like, stratum corneum, nails, hairs of both animals and humans
- Classical lesions are circular lesions called «Ringworm»
- Conventionally dermathophytes are classified as «Fungi Imperfecti», nevertheless some of them are classified as Ascomycetes because of their known sexual reproduction
- There are more than 38 dermathophyte species
- The ones that effect animals are classified in the genus Microsporum and Trichophyton

Frequent Dermathophyte Infections

1. *Tinea capitis*
2. *Tinea pedis*
3. *Tinea corporis*
4. *Tinea cruris*
5. *Tinea barbea*
6. *Tinea ungium*

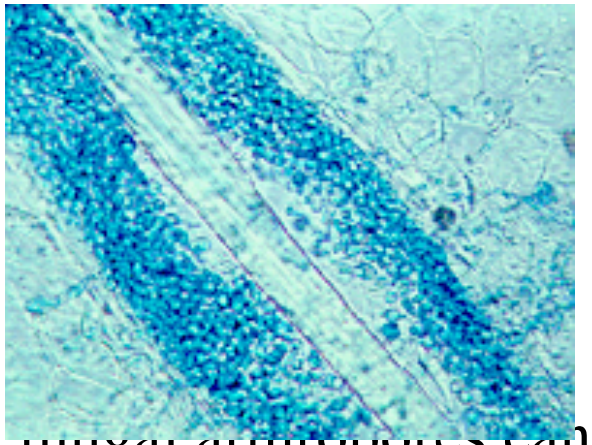
Trichophyton Genus

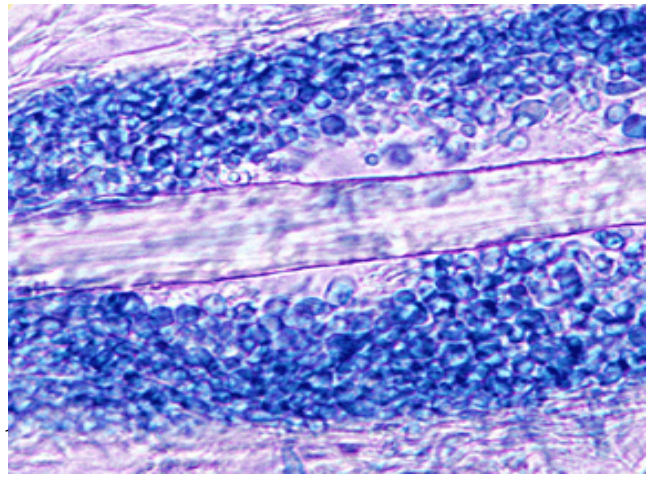
- In animals, trichophytones lead to dermathomycoses particularly observed on skin, hair and nails
- Some of them are zoonotic
- On solid agars the coloies can be cotton, granular, puffy, mucoid shaped and in different colour
- The macroconidiums are oval, lemon, cigar or cylindirical and contains 2-12 cells. They are rarely observed as a group
- The microconidiums are one cell, spherical or oval shaped. They can be found on hyphae one by one or as clusters
- They do not give flourescence under the wood lamb light!!!!

Trichophytones can be classied in two types according to the hair invasion

1) Ectothrix: The fungal arthropores can be found out of the hairs not inside

- *T. mentagrophytes*
- *T. equinum*
- *T. verrucosum*
- *T. rubrum*





2) Endothrix: The fungal arthropores can hair in parallel or irregularly

- *T. tonsurans*
- *T. violaceum*

Epidemiology

- These kind of infections can be found all over the earth
- Trichophytosis can be spread directly by contact or indirectly between animals
- The infection is more contogious in especially in winter and in the the crowded, dirty and moist barns
- Mostly the young animals are effected

Important Pathogenic Species

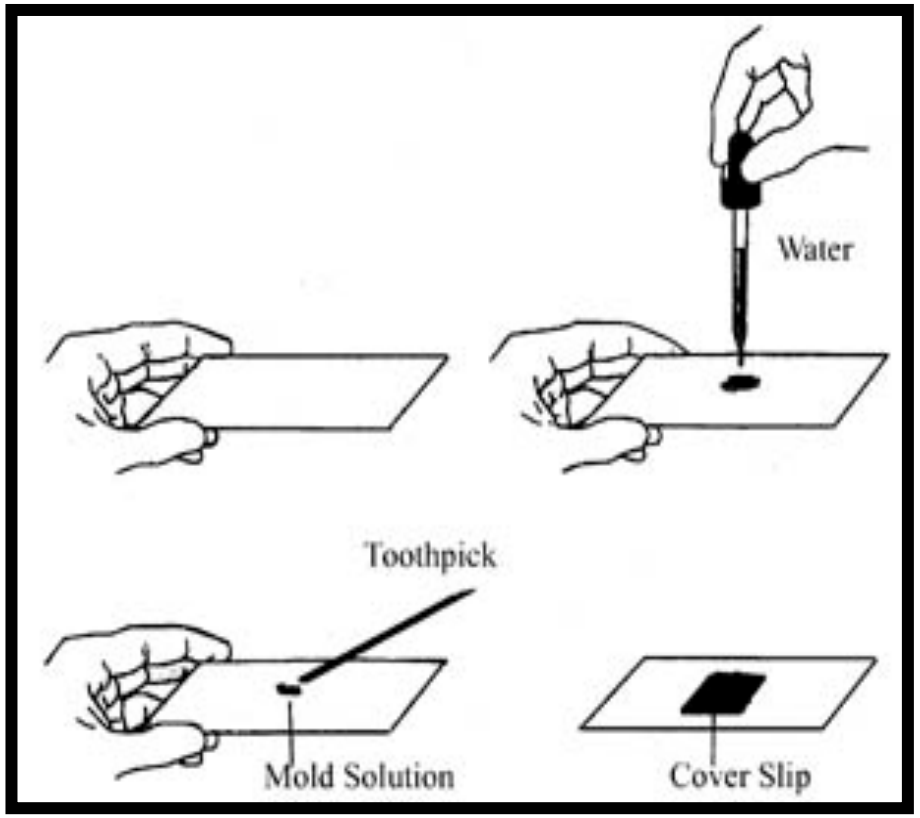
- ***Trichophyton equinum*** ***(Horse, Dog)***
- ***Trichophyton rubrum*** ***(Cow, Dog)***
- ***Trichophyton gallinae*** ***(Chicken, Turkey, Dog)***
- ***Trichophyton soudanese*** ***(Dog, Cat, Monkey)***
- ***Trichophyton megninii*** ***(Horse, Cow, Dog)***
- ***Trichophyton violaceum*** ***(Cow)***
- ***Trichophyton verrucosum*** ***(Cow, Sheep, Horse, Dog)***
- ***Trichophyton concentricum*** ***(Cow, Dog)***
- ***Trichophyton mentagrophytes*** ***(Dog, Cat, Cow, Horse)***

Identificaiton

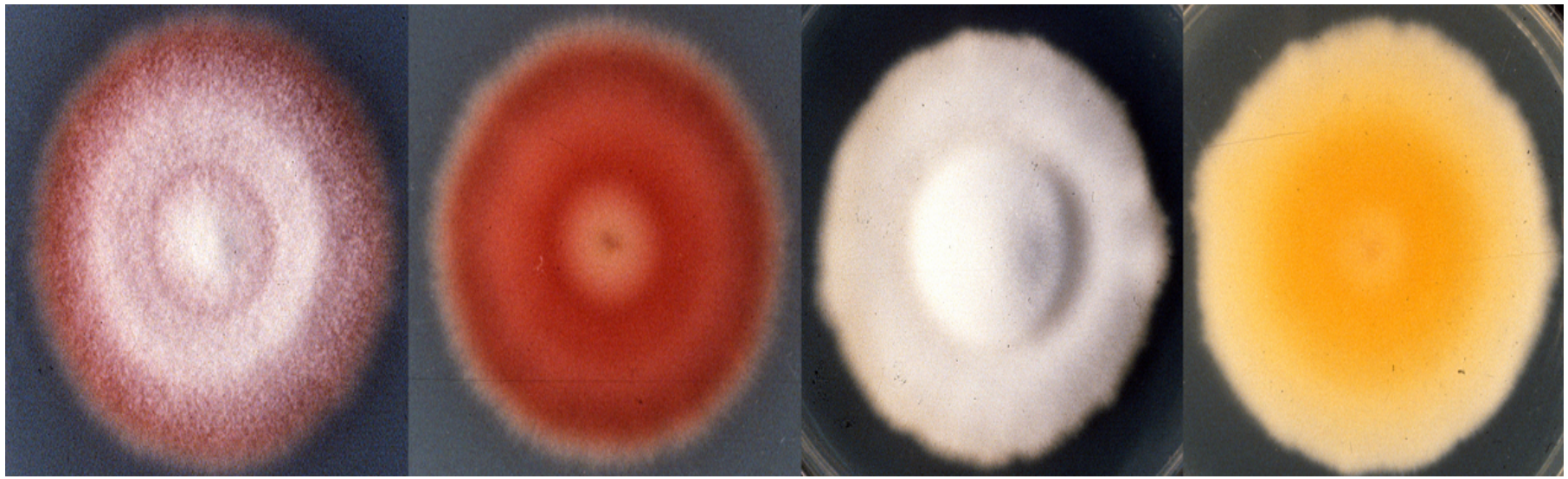
1) **Clinical Identification:** Absolute diagnosis of Trichophytosis must be done by laboratory inspection because it can be clinically misdiagnosed with other skin diseases, insect bites, bacterial infections.

2) Laboratory Inspection:

Microscopy: Skin scrapings and hair samples must be taken from the outside of the lesion. Samples must be put on a clear slide and inspected with %10 KOH on microscope. Arthrospores, hyphae with branches and septums are seeked.

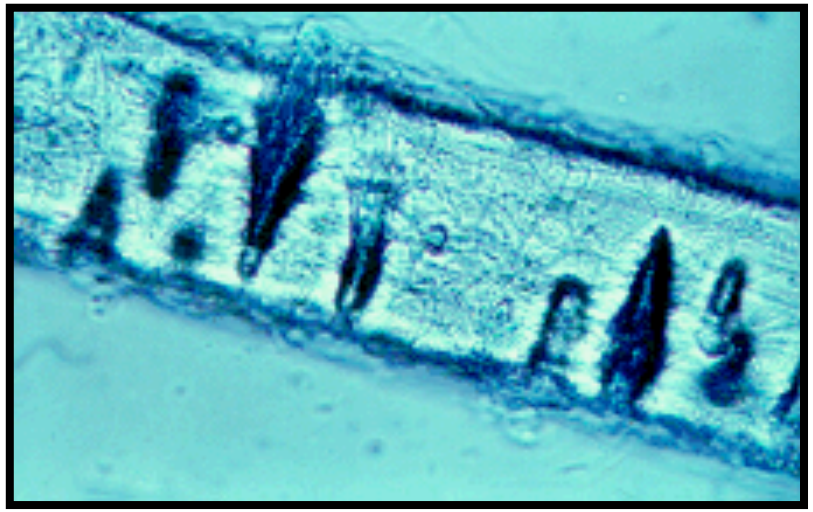


Culture: SDA is optimal. Samples are sticked into the different parts of the agar. Petri dishes are incubated for 2 weeks at 25C. The macroscopic and microscopic morphology of colonies can be inspected.



Hair Perforation Test

- To discriminate the *T. mentagrophytes* and *T. rubrum*
- *T. Mentagrophytes* can invade to hair tissue and make conical perforation
  - Hair sample is taken from a child
  - This hair autoclaved at 121°C for 15 min to sterilized it
  - These steril hair samples are left on the 3-5 day subculture of the tested dermathophyte and incubated at 25°C
  - On the 7th day the hair samples are stained with LCB for the inspection of perforation



Treatment:

Topical antifungals,

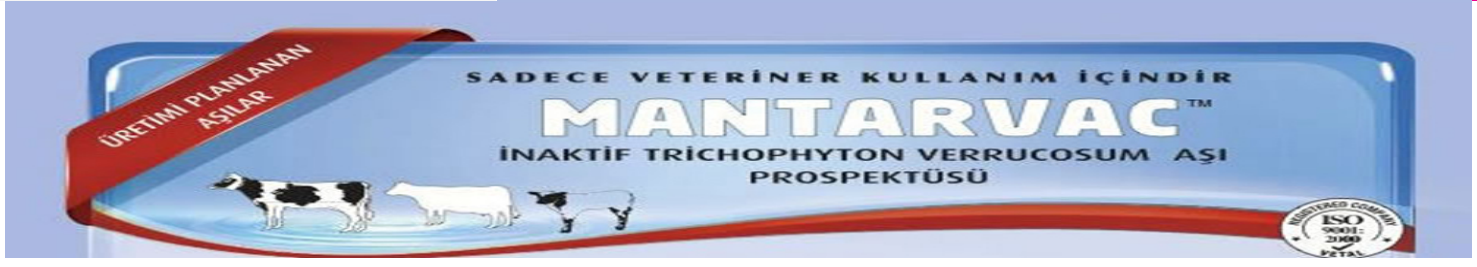
Thiabendazole, Miconazole, Ecoconazole, Ketoconazole, İtraconazole, Lime-sulphur solution, 5 % sodium hypochlorite solution can be used topically.

Systemic antifugals can be used if topical treatment doen not work. For example; ketoconazole, clotrimazole, itraconazole, terbinafine. Mostly terbinafine is the most efficient.

Nowadays, Griseofulvin isn’t used because of its acute toxicity

Prevention – Control

- T. verrucosum (LTF-130 strain)
- Live vaccine. Contains conidia and hyphal elements. Used for both prophylaxis and curation.



Microsporum Genus

- It is a dermathomycoses caused by Microsporum species in both animal and humans' hair and skin
- The arthrospores are smaller than the Trichophytone's. They can surround the hair like a package
- The morphology of colonies are thin, granullar or cotton shaped and with different colours

- In microscopy big, thin and thick walled, multi compatment (3-15 cells) and shuttle shaped macroconidiums can be inspected
- Microconidiums can be observed as spherical, oval and unicellular on the hyphae one by one
- Microsporum species give yellow-green fluoresence under the wood lamp!!!

Epidemiology

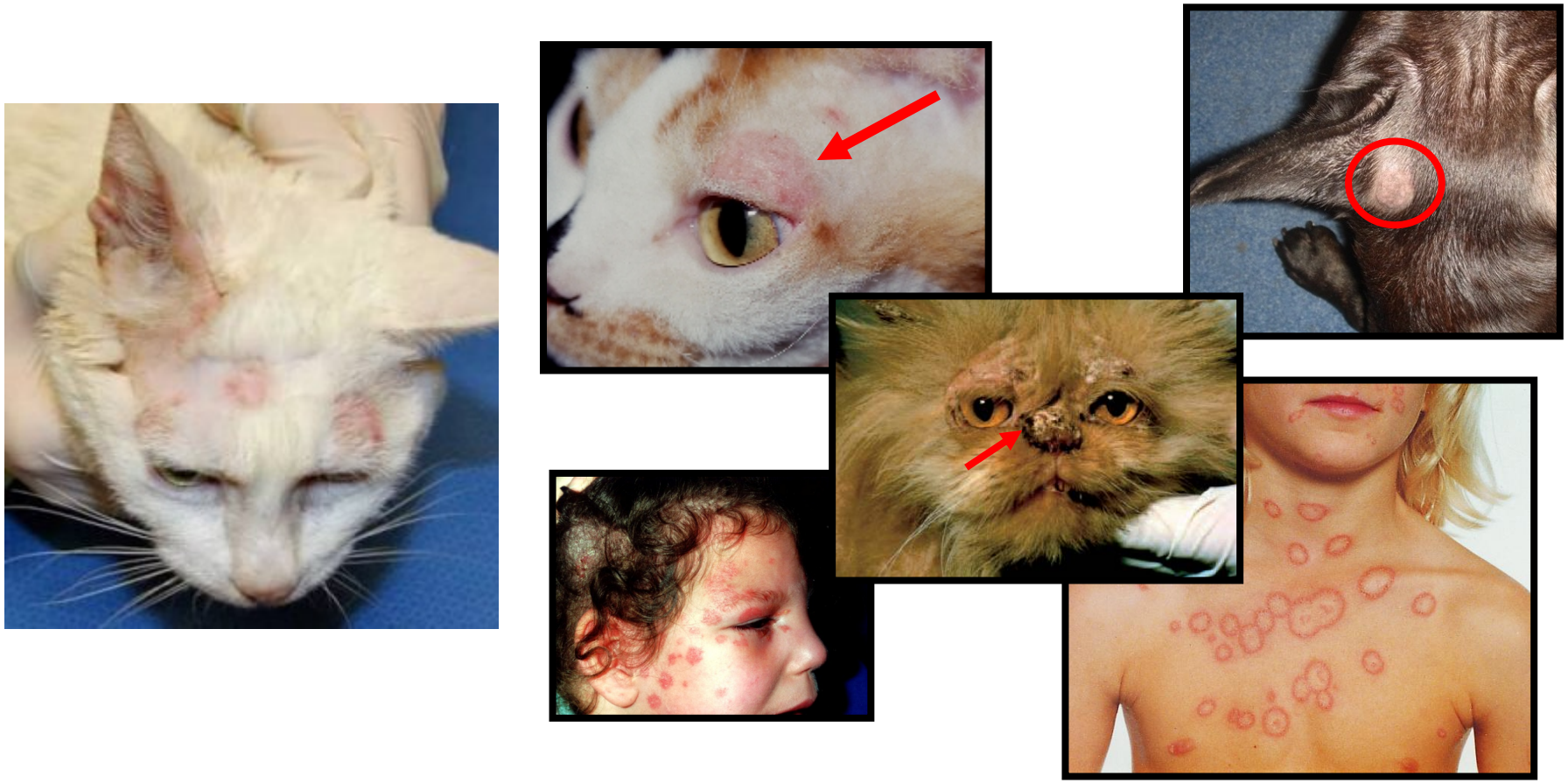
- Can be seen all over the World
- Spread by direct contact or indirectly
- The infection is more contogious in especially in winter and in the the crowded, dirty and moist barns
- Mostly the young animals are effected

Important Pathogenic Species

- ***Microsporum canis*** ***(Dog, Cat, Horse, Rabbit, Rodents)***
- ***Microsporum nanum*** ***(Dog, Pig)***
- ***Microsporum cookei*** ***(Dog, Cat, Guinea pig)***
- ***Microsporum gypseum*** ***(Dog, Cat, Horse, Rodent)***
- ***Microsporum audouinii*** ***(Dog, Monkey, Rodent)***
- ***Microsporum distordum*** ***(Dog, Monkey)***
- ***Microsporum persicolor*** ***(Human, Dog, Rat)***
- ***Microsporum ferrugineum*** ***(Human, Animal)***
- ***Microsporum vanbreuseghemii*** ***(Human, Animal)***

Identification

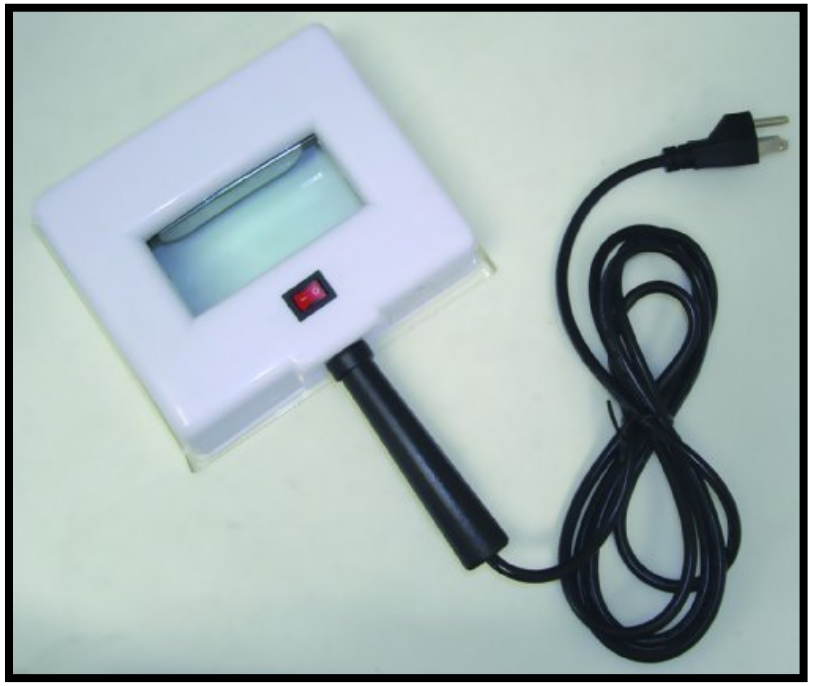
1) **Clinical Identification:** Absolute diagnosis of Microsporiosis must be done by laboratory inspection because it can be clinically misdiagnosed with other skin diseases, insect bites, bacterial infections.

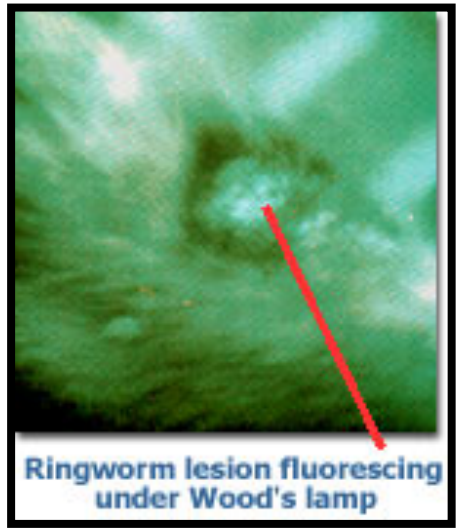


Wood's Lamb inspection:

- While growing, ***M. canis***, ***M. distortum***, ***M. audouini*** (human) and ***M. ferrugineum*** (human) can produce some metabolites which also give green fluorescence by **Wood's Lamb** UV light (366 nm)
- Suspected *M. canis* infections can be diagnosed
- The infected sites are generally face, front paws and abdominal areas
- However half of the *M. canis* infections doesn't give fluorescence, because of this future laboratory inspection must be performed
- Topical ointments lead to false positive results

Wood Lamb



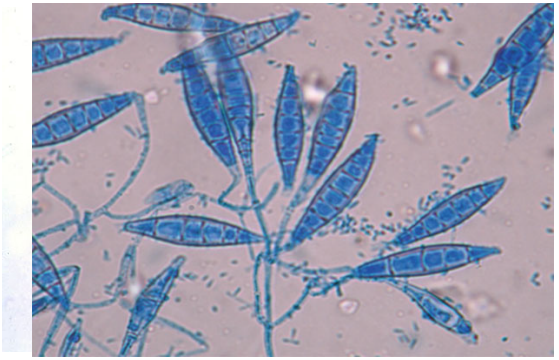


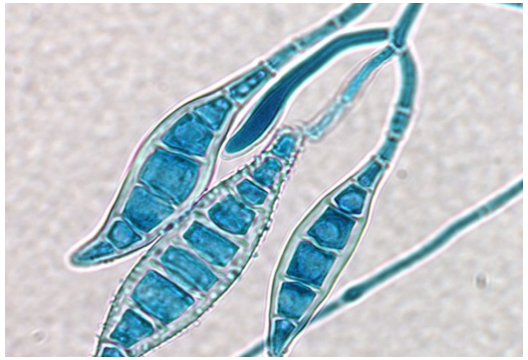
Ringworm lesion fluorescing under Wood's lamp

Laboratory Inspection

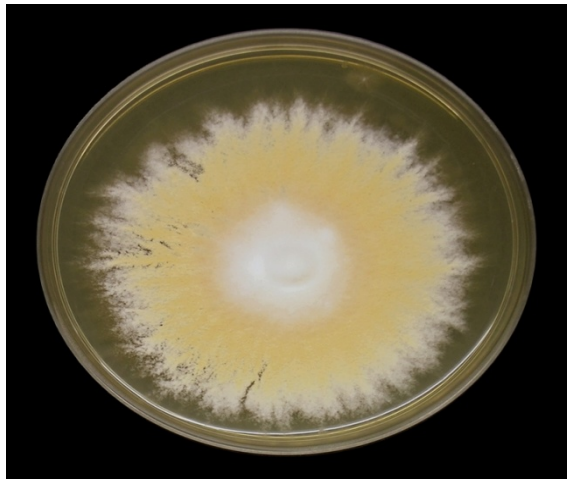
Skin scrapings and hair samples must be taken from the outside of the lesion.

1) **Microscopy: Arthrospores, hyphae with branches and septums can be onserved.**





2) **<u>Culture:</u> SDA is optimal. Samples are sticked into the different parts of the agar. Petri dishes are incubated for 2 weeks at 25C. The macroscopic and microscopic morphology of colonies can be inspected.**




Treatment:

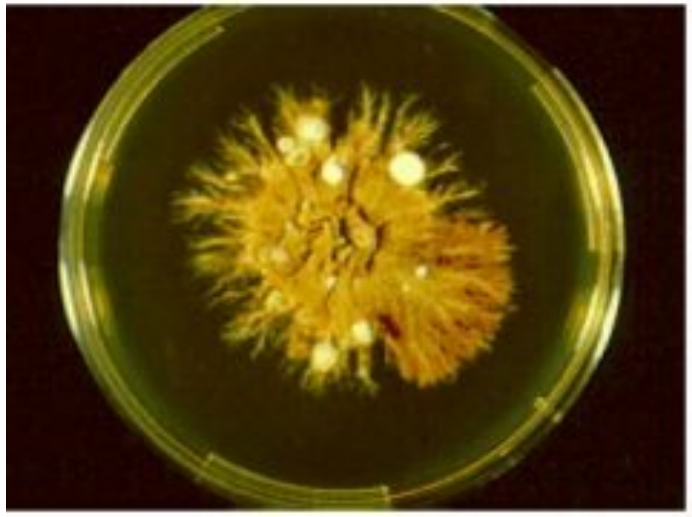
Topical and systemic treatment is performed for 10 days with antifungal agents.

- Itraconazole (Anorexia risk is low in cats)
- Terbinafine
- Ketoconazole
- Thiabendazole
- Miconazole
- Griseofulvin (Isn’t used because of its acute toxicity) (In Siamese, Himalayan, Abyssinian cats **myelosupression** can be observed)

Prevention – Control

Epidermophyton Genus

- First article of Epidermophyton was published in 1870 by Harz, about a Tinea cruris case
- In the beginning it was called *Acrothecium floccosum;* then in 1923 Ota and Langeron named it as *Epidermophyton floccosum*
- In Epidermophyton genus there are 2 species described
  - *Epidermophyton floccosum (Mostly in gogs)*
  - *Epidermophyton stockdaleae (Non pathogen)*



- Usually isolated from the cases of tinea corporis, tinea pedis, tinea cruris and tinea ungium
- There is no need for spesific medium for the isolation of agent. SDA and 25C is optimal.
- In solid media they develop expanded hyphae like other dermathophytes. Macroconidias are long and thin shaped with 1-9 septums. They do not include microcodias
- The most important virulence factor is its proteinase enzyme that it produces at 37C

Treatment:

Topical and systemic antifungals,

Thiabendazole, Miconazole, Ecoconazole, Ketoconazole, İtraconazole, Clotrimazole, Terbinafine

- The most effective one is Terbinafine which can be used both topically and systematically

Treatment – Protection

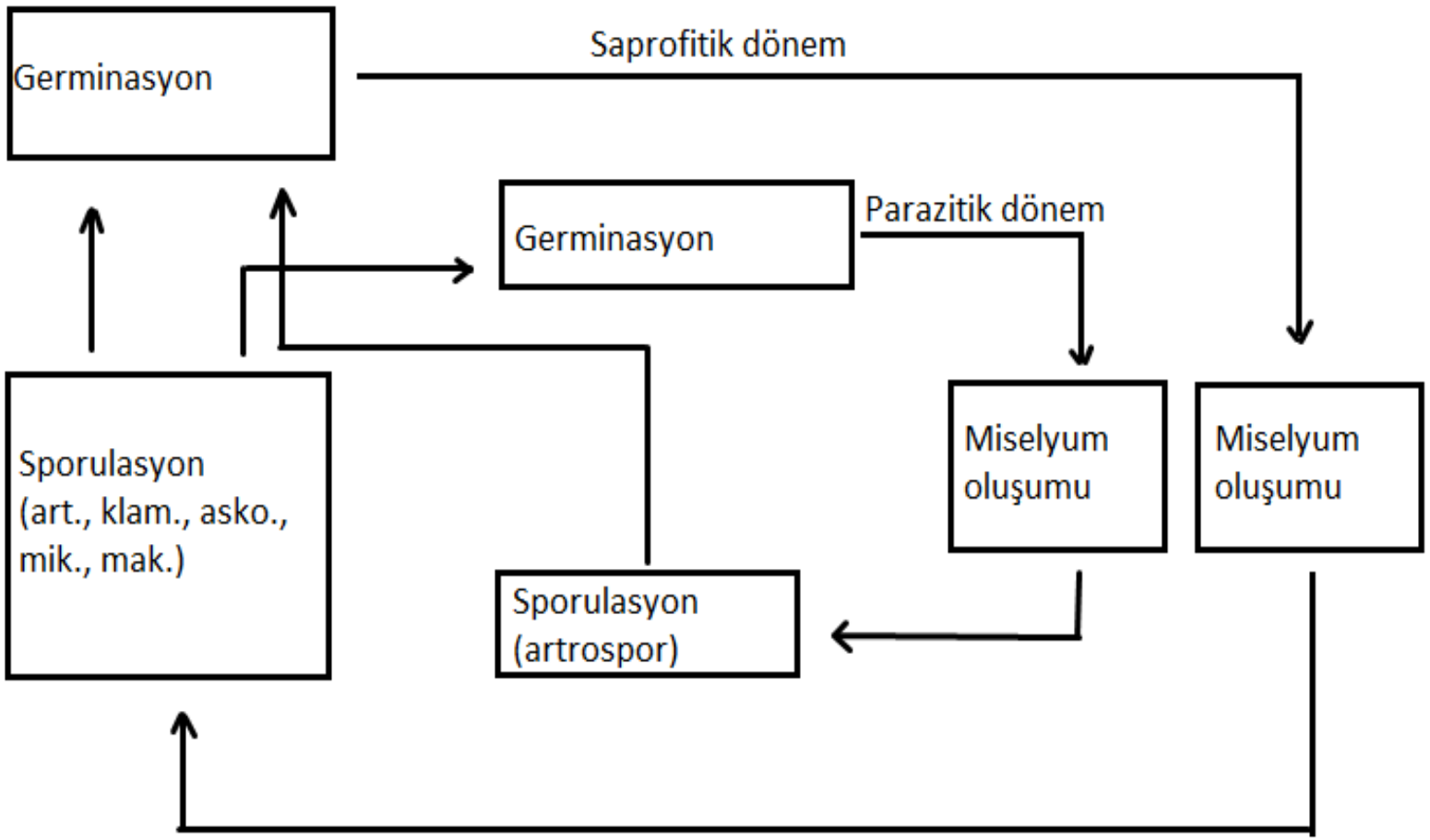
- The treatment of new infection is easy and sometimes animal can recover spontaneously. However treatment of the chronic infections are very difficult

- Pomat iodure, iodophorm ointment, %5 salicylic acid and topical antifungal agents can be used

- If necessary Penisilin-Streptomisin can be used

- For the foot lesions zinc sulphate or copper sulphate can be used

- Maintaining the skin of animals dry is the most important prevention strategy. Insect and arthropode control must be performed



Dermatofitlerin genel yaşam dönemleri