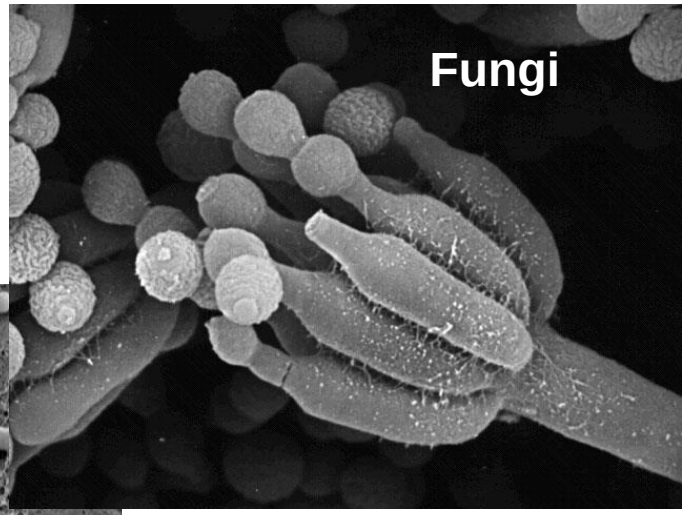
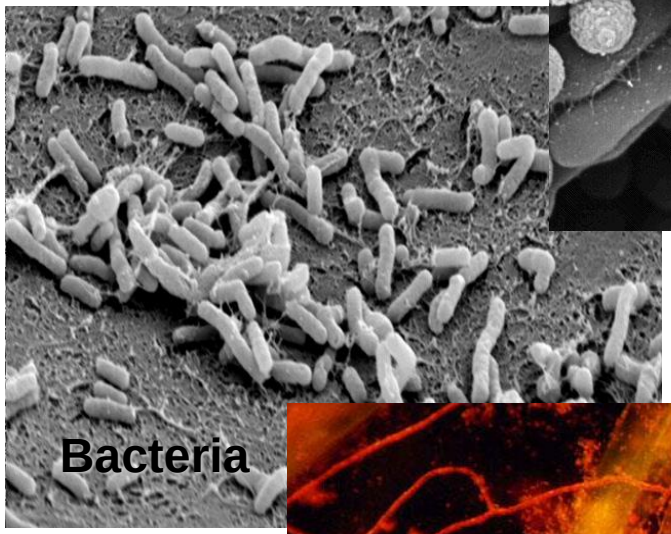
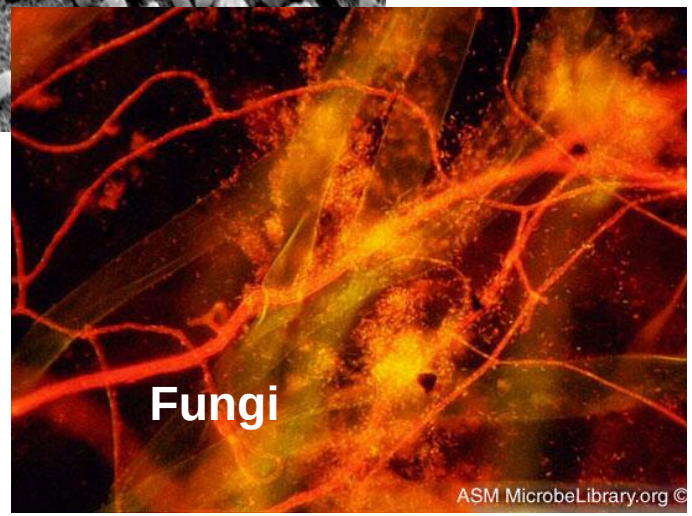
Soil microfauna







Microfauna is the most abundant in the soil and mainly responsible for the decay of organic matter, nutrient transformations and cycles, ‘’carbon sequestration’’ and disease suppression as well . Therefore it is regarded as living part of soil organic matter.

Microfauna

Soil microfauna consists of small unvisible organisims such as bacteria, fungi, protozoa, nematodes and rotifers. Soil microfauna plays an indirect but important role in the decomposition of organics residues on the surface.

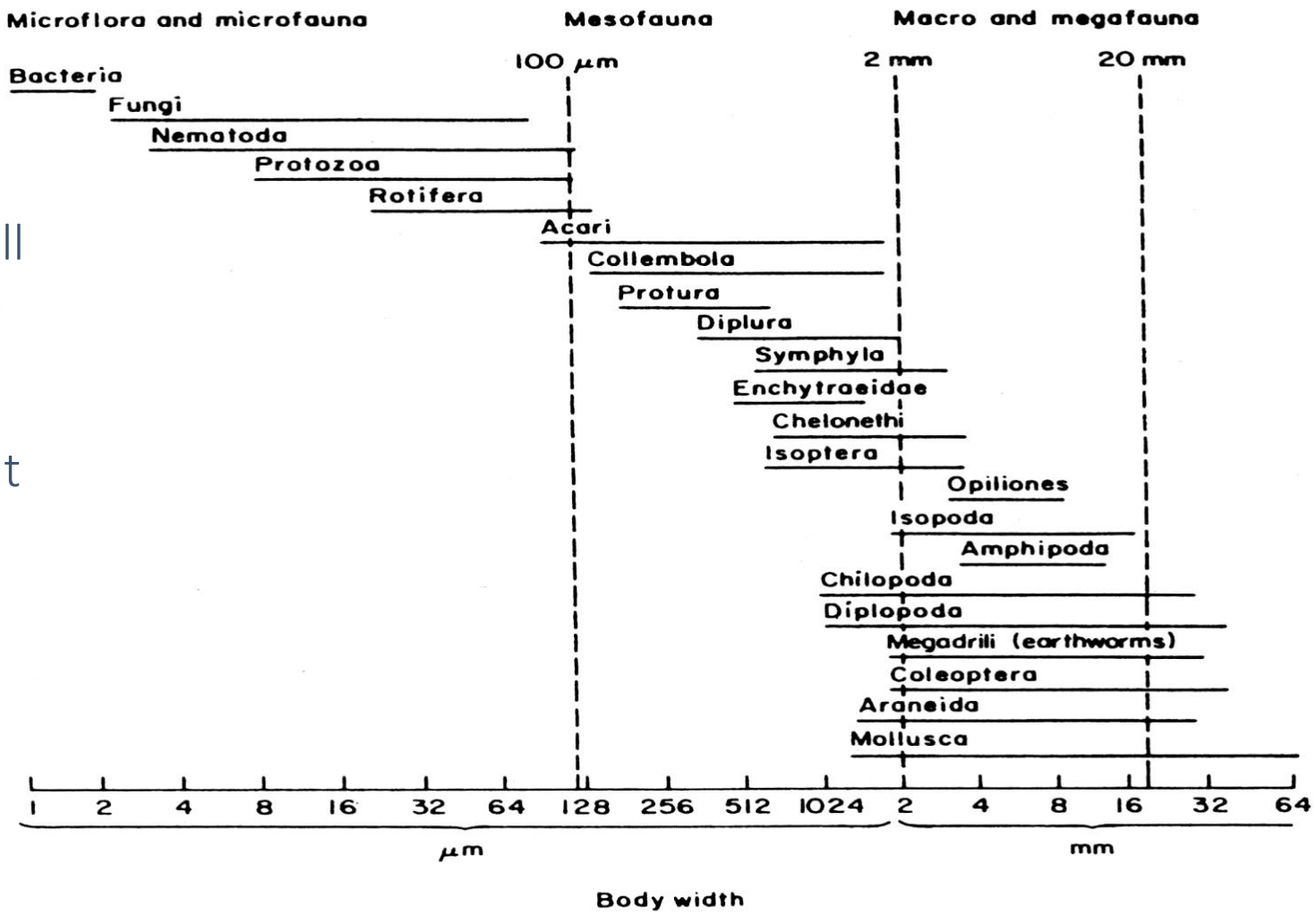
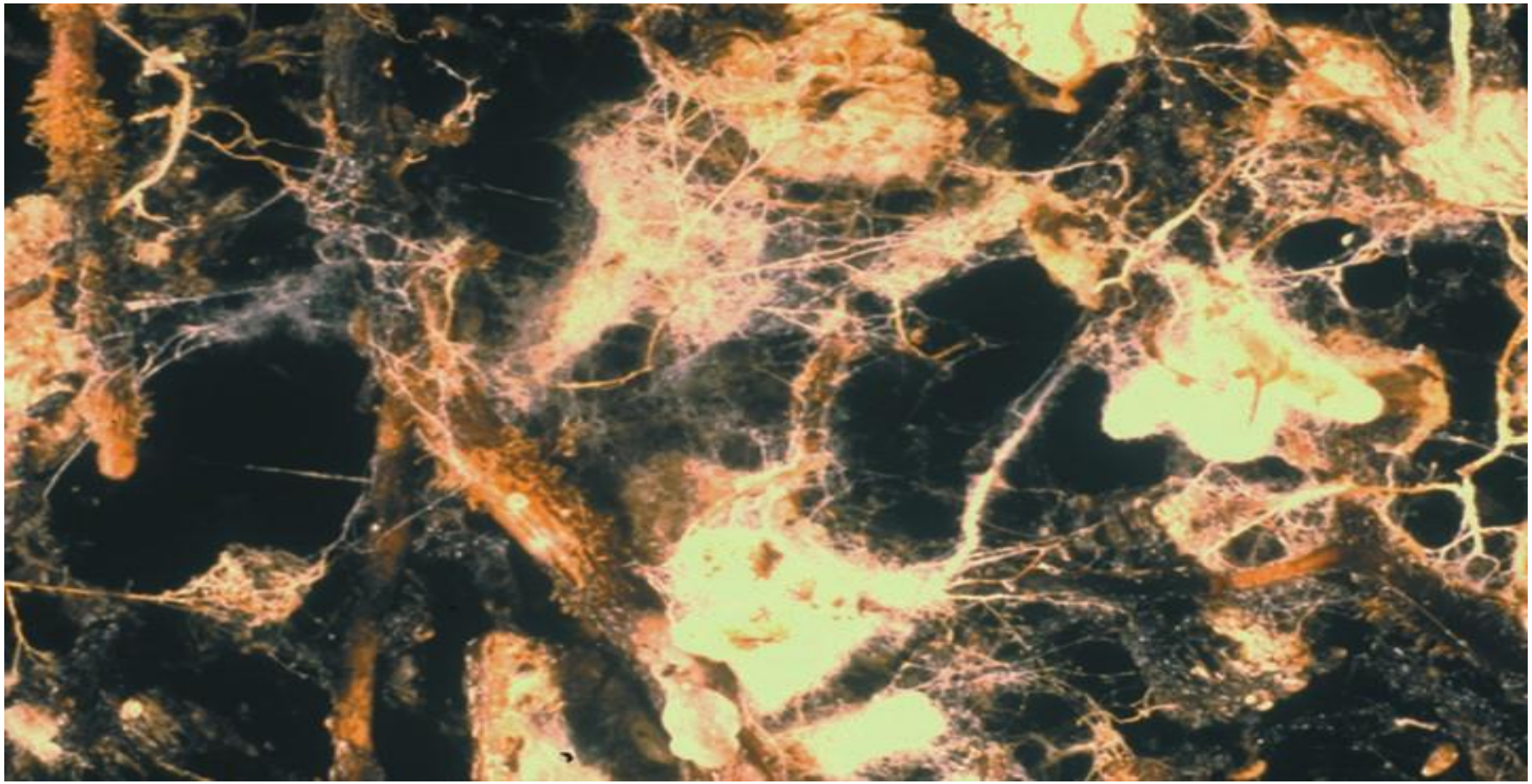
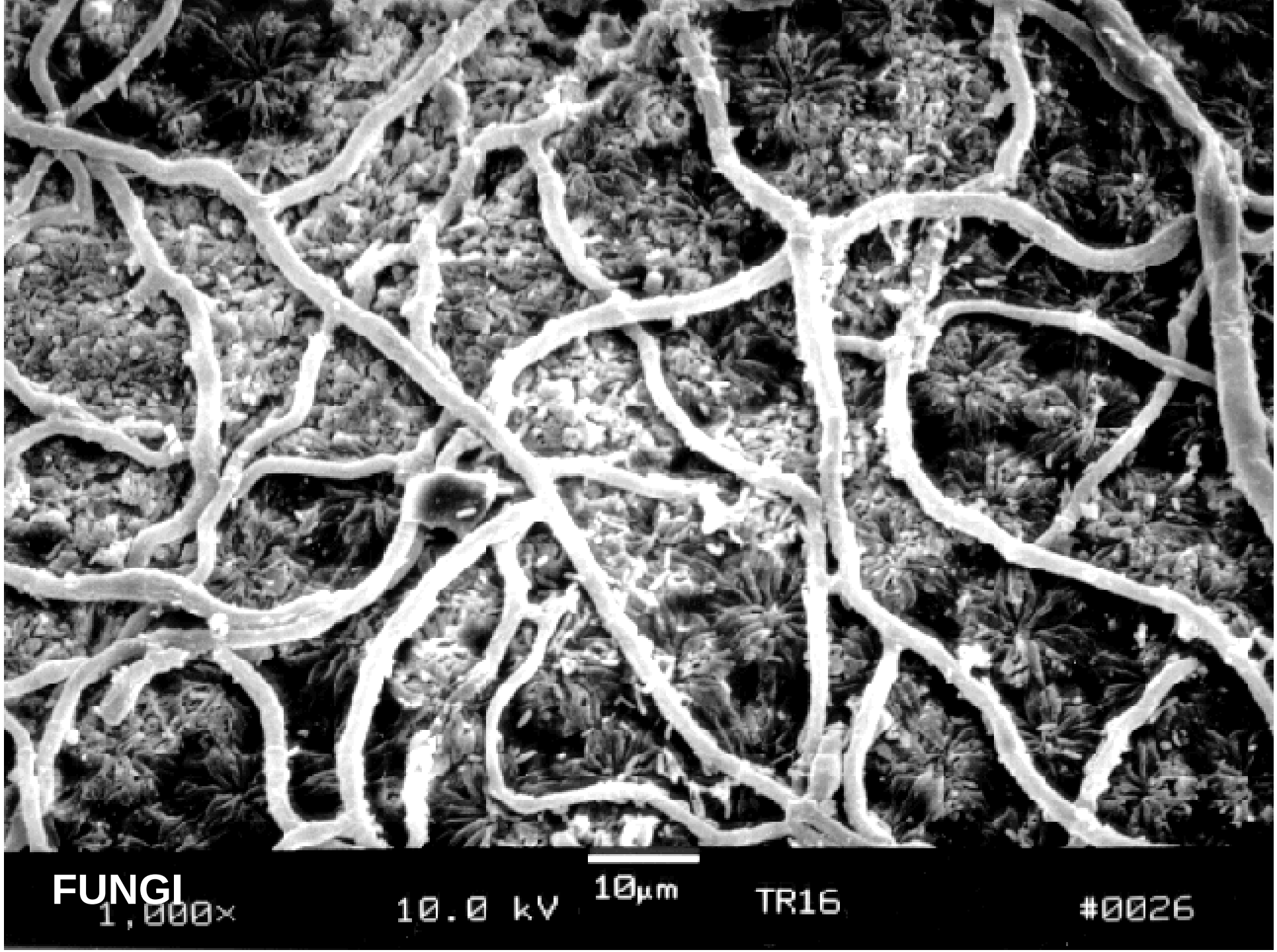


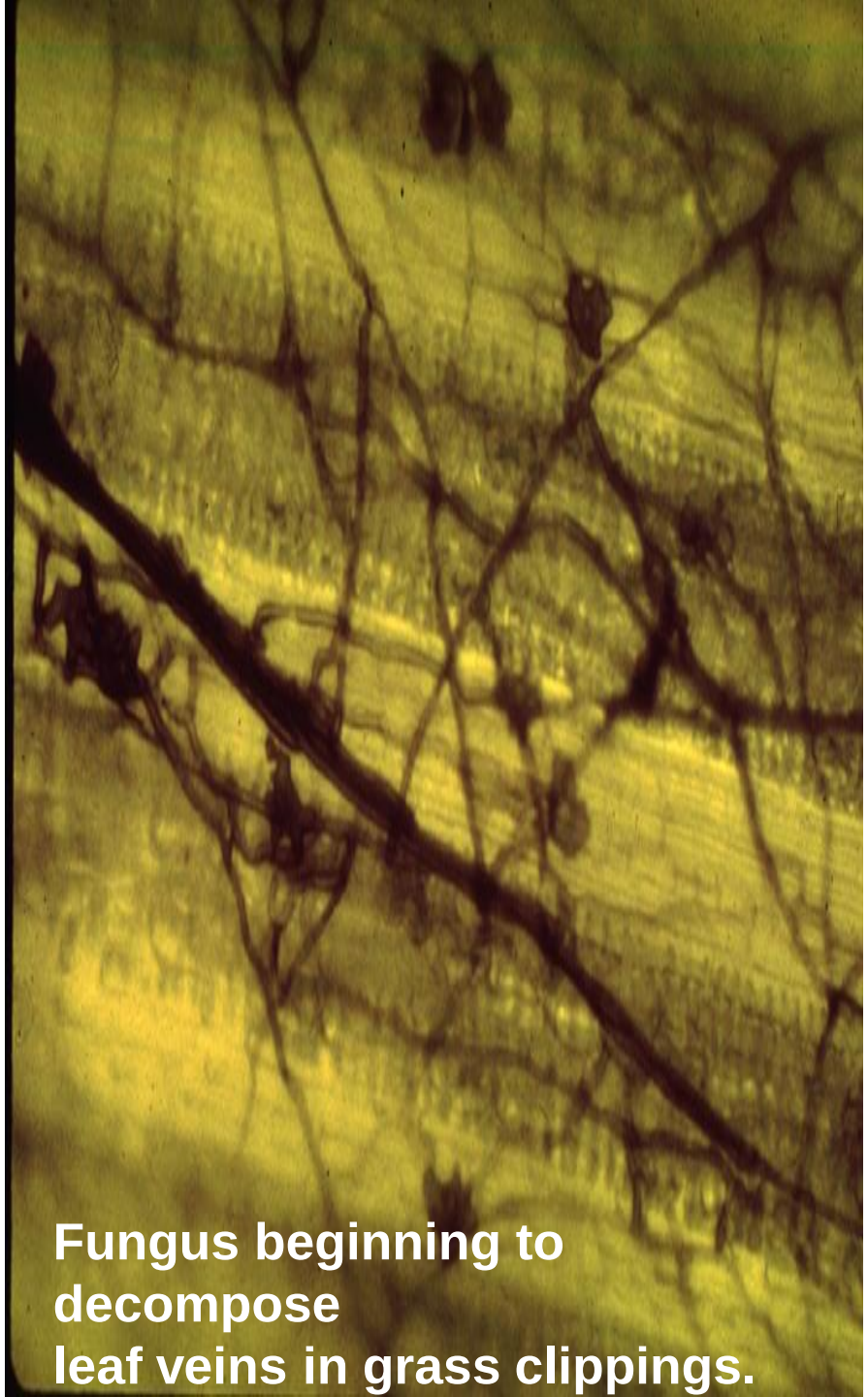
FIGURE 4.3 Size classification of organisms in decomposer food webs by body width (Swift *et al.*, 1979).

Soil fungi



Fungi are microscopic organisms that develop along the soil particles, plant roots and rock surfaces on their paths in the form of long thin strands called hyphae. The fungal hyphae is a few micrometers in diameter. A single hyphae with several cell lengths has a length of several hundred meters.


FUNGI
1,000×
10.0 kV
10µm
TR16
#0026



Fungus beginning to decompose
leaf veins in grass clippings.

...Functions of Soil Fungi

- nutrient cycle
- disease control
- humus formation
- soil aggregation

Fungi-1: Decomposers (**saprophytic-decaying fungi** convert dead organic matter into fungal biomass, *CO2* and organic acids)

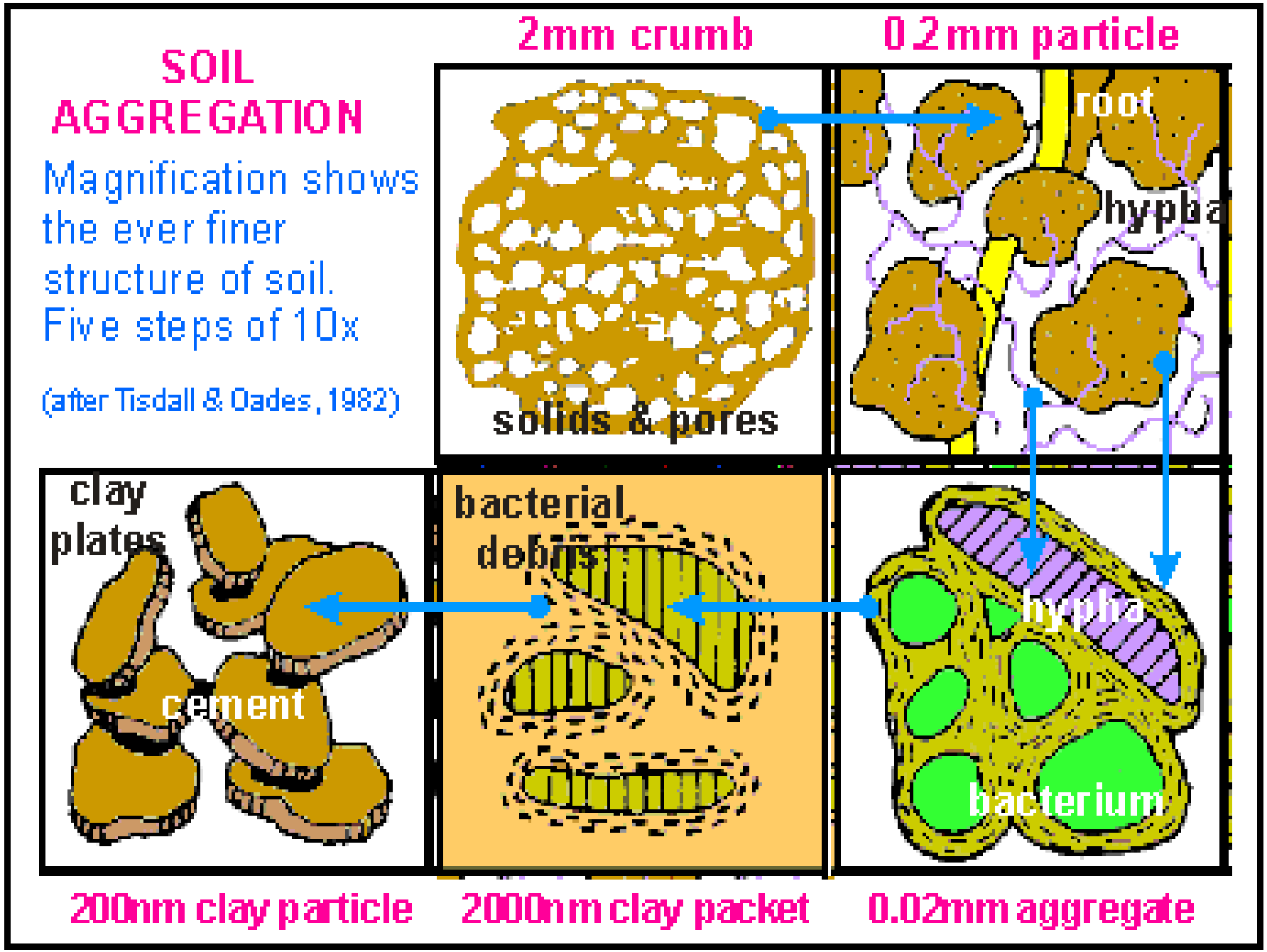
Fungi-2: Mutualists (i.e. mycorrhizal fungi colonize the plant roots and make phosphorus and other nutrients in the soil useful for the plant)

Fungi-3: Pathogens and parasites (fungi that cause proliferation and death in plants and other organisms if they multiply)

SOIL AGGREGATION

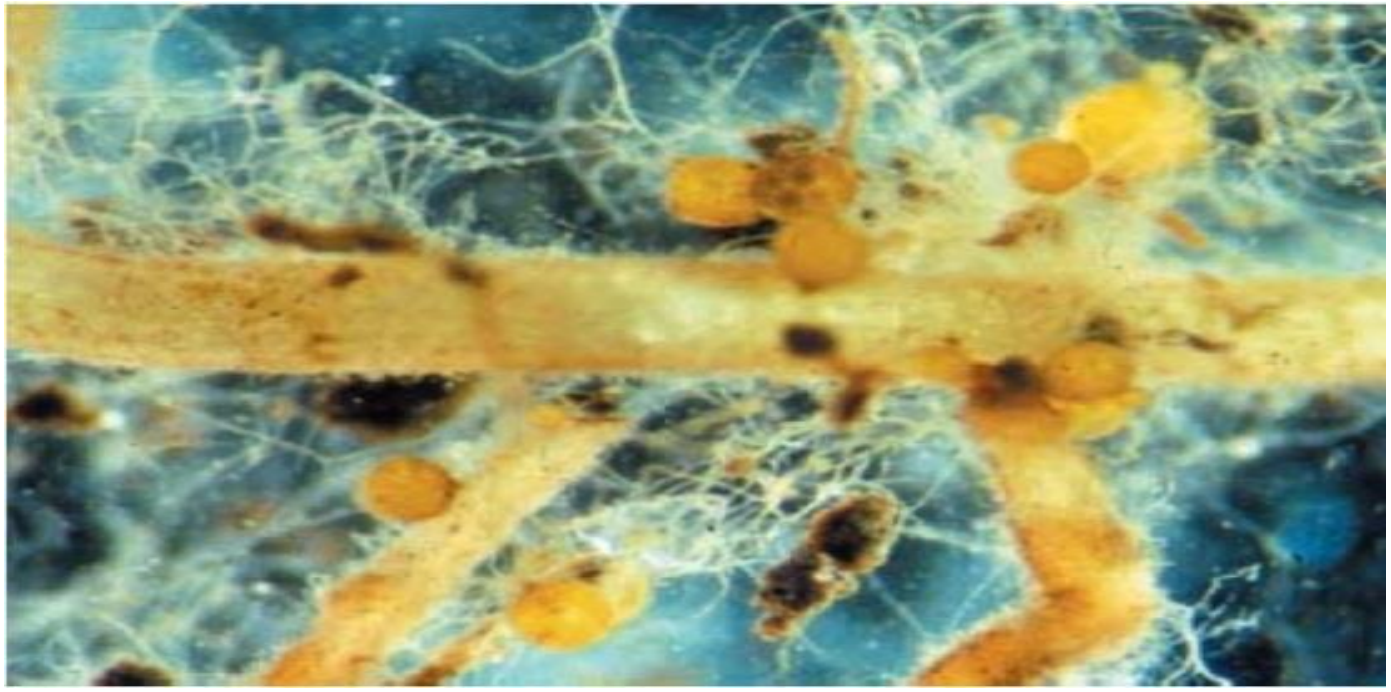
Magnification shows the ever finer structure of soil. Five steps of 10x

(after Tisdall & Oades, 1982)



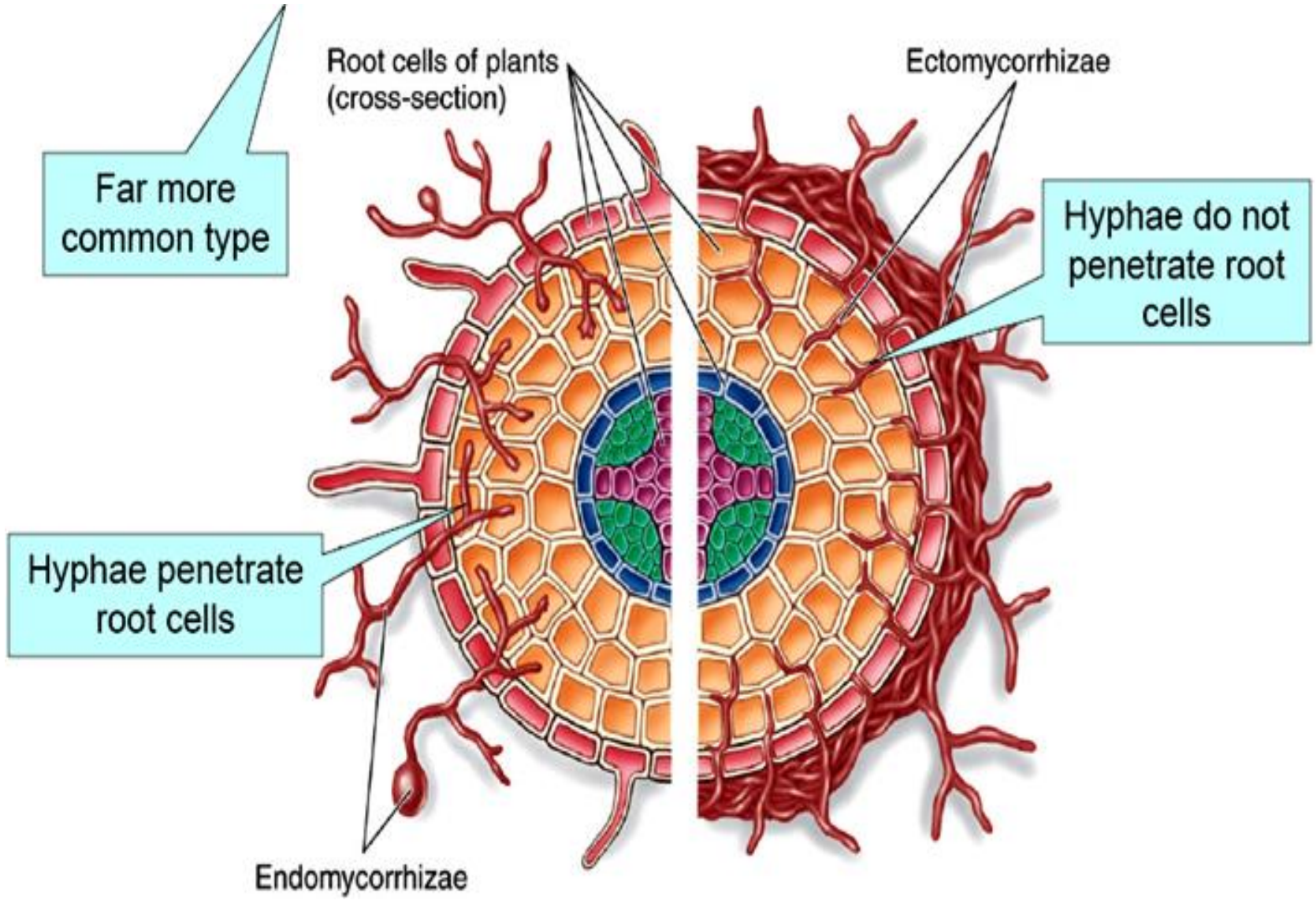
Mycorrhiza…

- In greek "mykes" (fungus) ve "rhiza" (root)
- Mutualistic symbiosis common in 80-90% of plants in the world
- Critical role in plant-soil relationships



Mycprrhizal connections

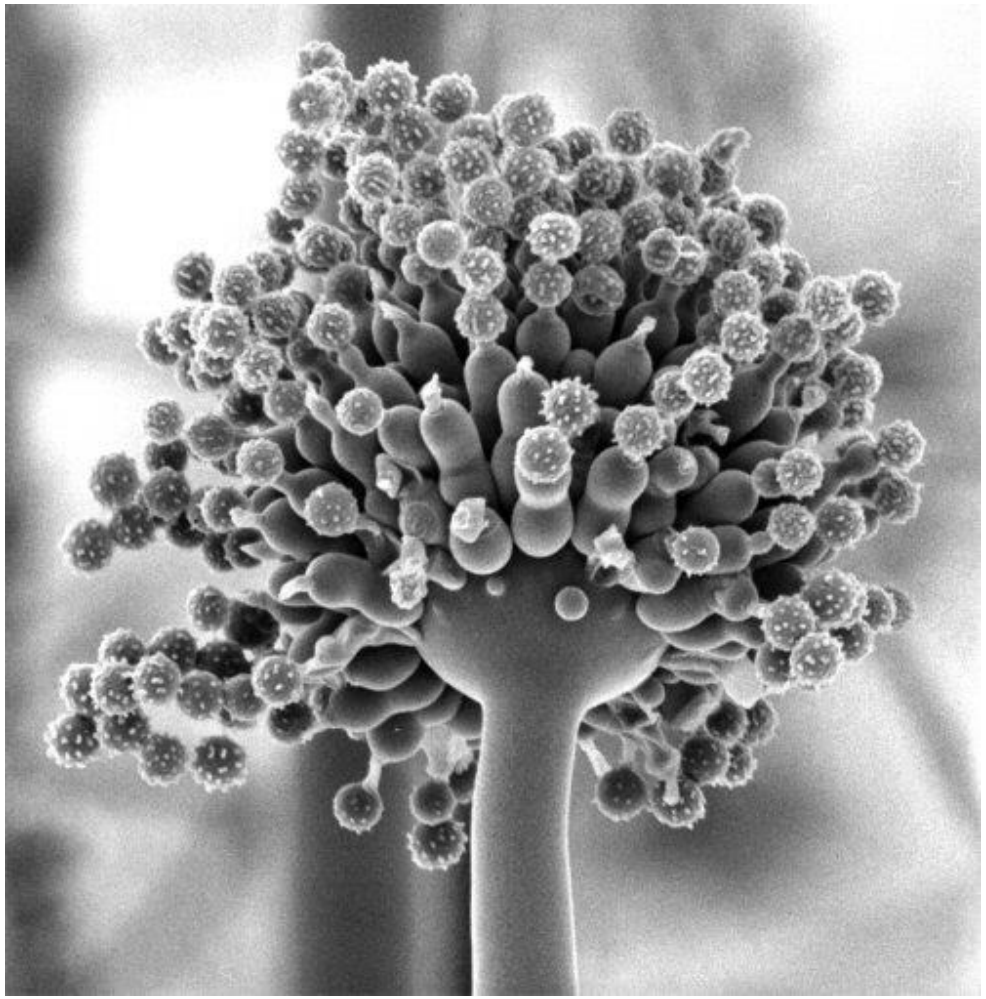
The appearance of hyphae in the soil structure of mycorrhizal infection in corn roots


Far more common type
Root cells of plants (cross-section)
Ectomycorrhizae
Hyphae do not penetrate root cells
Hyphae penetrate root cells
Endomycorrhizae

Functions of AMF

- Transfer of various nutrients (P, Zn, Cu, Mn, Fe, Ca, K ve N) to the plant
- Stimulation of plant metabolic activities
- Carbon storage (due to high lipid, aminoacid and carbohydrate contents in hyphae and spores)
- Supression of root disease
- Hyphae growth + hydrophobic sticking → soil aggregation
- Supporting plant growth under stress (drought-pollution-salinity)
- Potential biological material for soil remediation

AMF is one of the most important components of soil ecosystem due to above mentioned facts



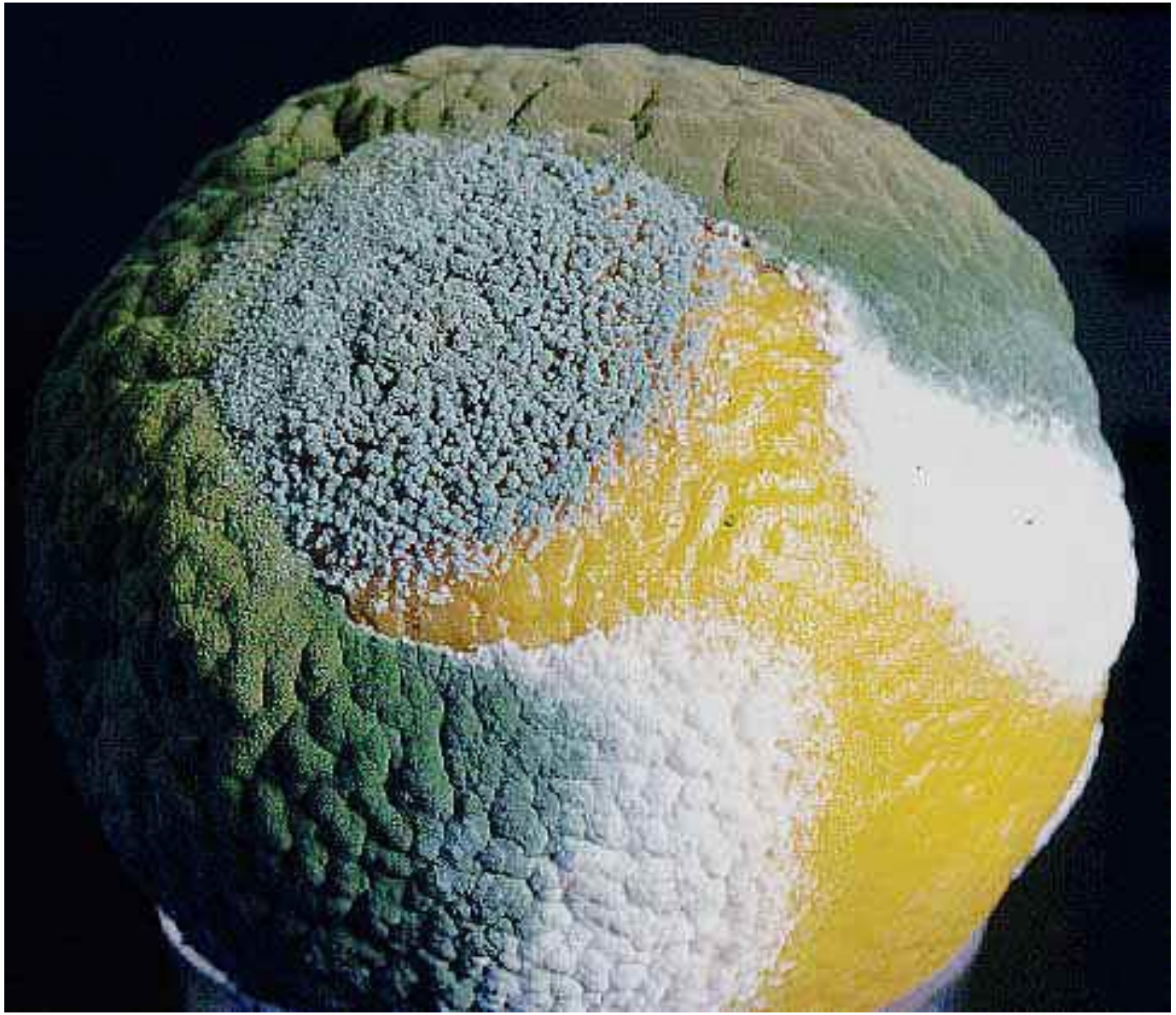
ASPERGILLUS NIGER-

ASPERGILLUS FLAVUS

Aspergillus niger

Siyah Çürüklük (Küf Hastalığı)

soğan, sarımsak, incir ve turunçgil meyvelerinde



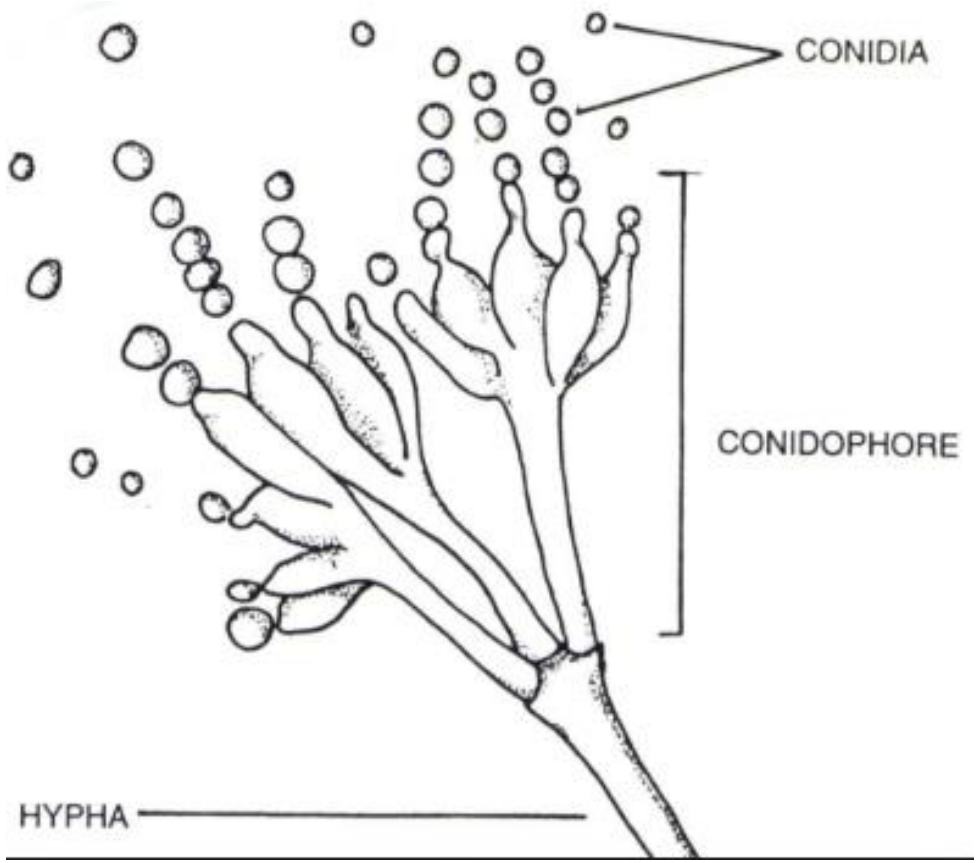
PENICILLIUM DIGITATUM

Penicillium roquefortii.

Actinomycetes

- Heterotrophic, prokaryotic, Gr^{+}, bacteria showing same characteristics with fungi.
- Having bacterial cell structure and mycelium development in soil (like fungi).
- Most actinomycetes form asexual spores known as conidia over their hyphae.
- Some others makes sporangium (special structure of spores)
- Core of decomposition (responsible for plant biomass degradation i.e chitin, lignocellulose and organic pollutants such as phenol, PAH, paraffin and other POPs)
- Microbial antagonism (supression of soil pathogens)
- Common species are Streptomyces, Nocardia and Micromonospora

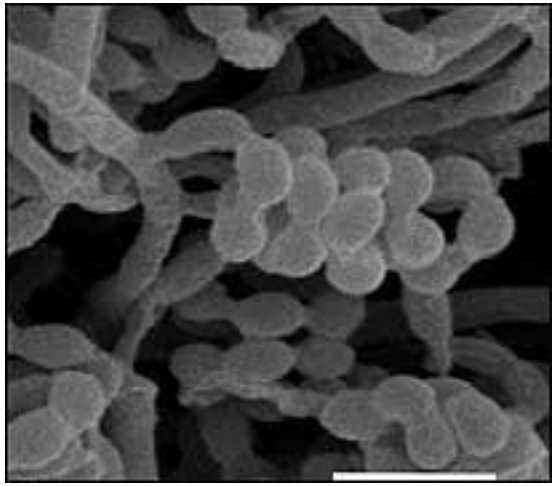
Conidia, a Greek word for "fine dust

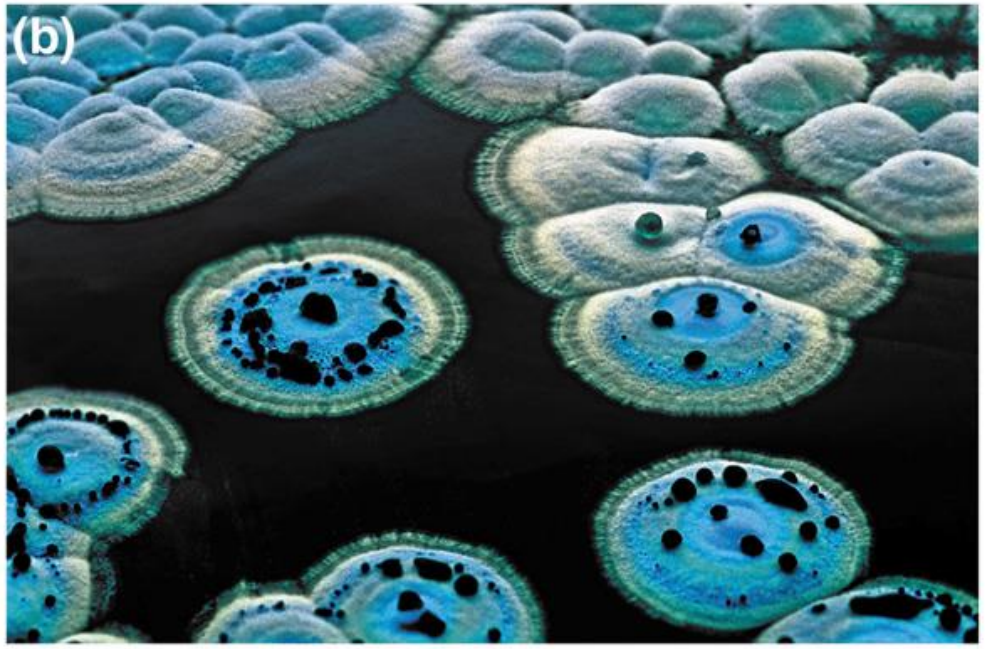


Streptomycetaceae

- 500'ün üzerinde Streptomyces türü tanımlanmaktadır.
- Büyüme, ipliklerin uç noktalarında gerçekleşir ve buna genellikle dallanma eşlik eder.
- Sonuçta oluşan koloninin aldığı şekle mycelium denir.
- Streptomyces sporlarına konidya (**conidia**) adı verilir.
- Streptomyces türleri esas olarak toprakta yaşar. Hatta "**toprak kokusu**" dediğimiz kokunun sebebi bu canlıların **geosmin** adı verilen metabolik ürünleridir.

Streptomyces spp.





•Streptomyces cinsine ait türler zorunlu aeroblardır

•En önemli dikkat çekici özellik
• antibiyotik üretme

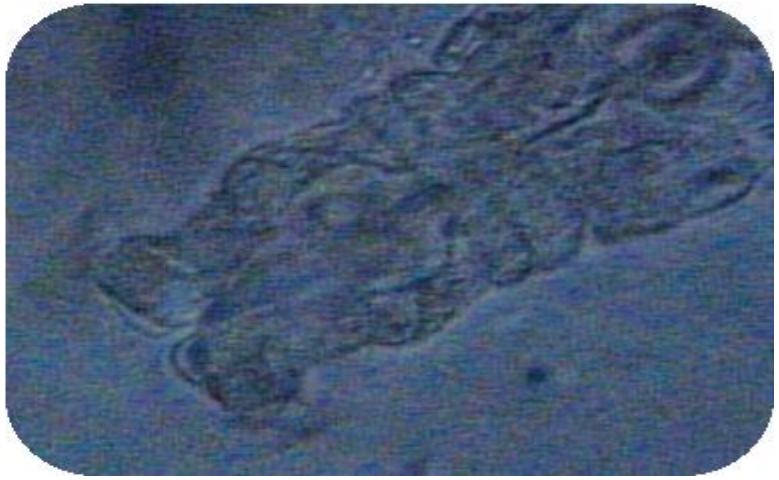
•KİTİN'i ayrıştırırlar

Streptomycetes

5 farklı Streptomycetes. Bu bakterilerin hepsi normalde toprakta yaşar ve antibiyotik üretirler. Bazıları örneğin *Streptomyces azureus*, plate de görüldüğü gibi renkli pigmentler verirler.

Protozoa

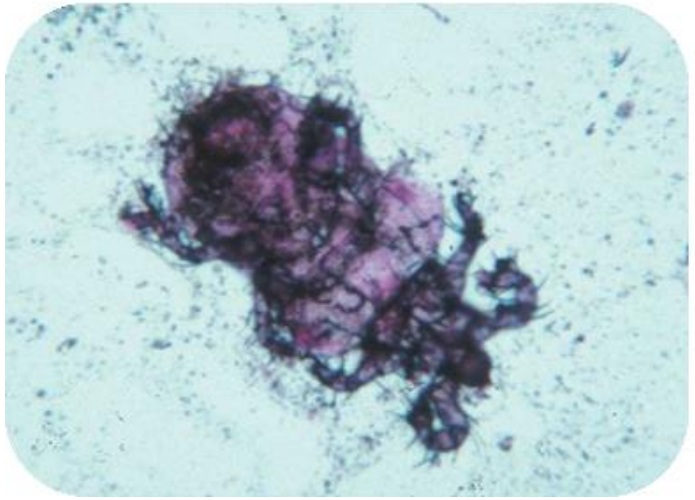
Rotifers



Protozoa are single-celled organisms that feed mainly on bacteria and organic debris. Protozoa swim through water films in the soil to collect their food. Notice the fine hairs around this organism that allow it to swim. The organism in this photograph is magnified 1000 times.

A little larger than the protozoa are the rotifers. By whirling hair-like cilia on their head, they move water into their mouths where the bacteria and other food particles can be digested. This is a fascinating group to watch under a microscope.

Mites



Spintails

Mites chew plant debris into small pieces, which makes the debris available to smaller organisms. Some also feed on other mites, living fungi, or other soil organisms. Mites have eight legs and are related to spiders.

These little organisms are springtails, which get their name because they have a mechanism under their abdomen that allows them to ‘spring’ away from predators. They eat organic materials and often graze on fungal tissue.