Natural Farming Under the Microscope

online naturalfarminghawaii.net

What equipment do I need?

- 400x power microscope to see beneficial fungus
- 100x for nematodes
- $350 - 400 on http://www.soilfoodweb.com/Microscopes.html
- Microscope lab at Ulu'ae Garden

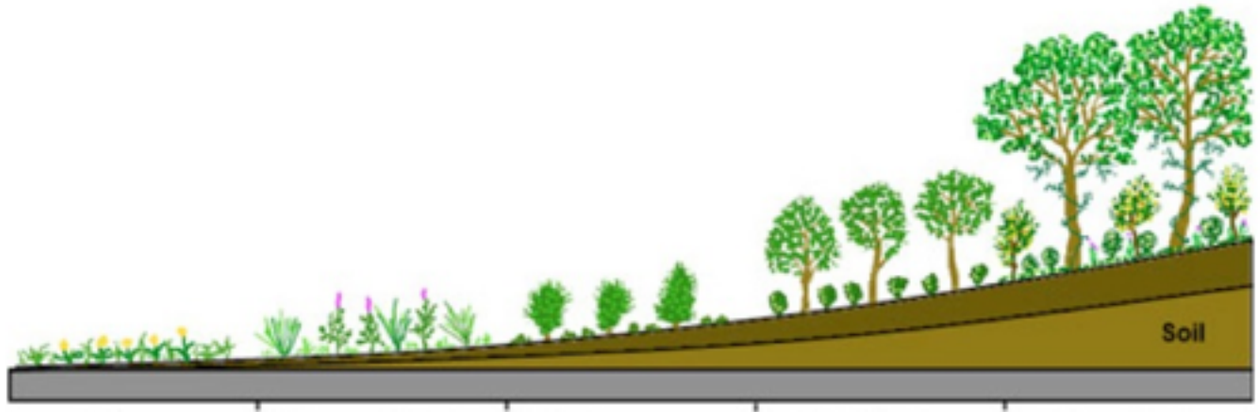
Preparing a Slide

- Glass is preferred; clean with shirt or cloth
- Add 4ml of water to beaker
- Add sample til water level reaches 5 ml
- Will now be **diluted 1:5**
- Shake in consistent manner for 30 seconds
- Place one drop on slide
- Spread and place cover slip over drop

Biology in 600:600 soil sample

- 1 nematode per slide
  - not root feeders
- 100 flagellates per slide
- few to no ciliates
- **1 beneficial fungus per view**
- some active bacteria

Key: Plant / Biology Relationship

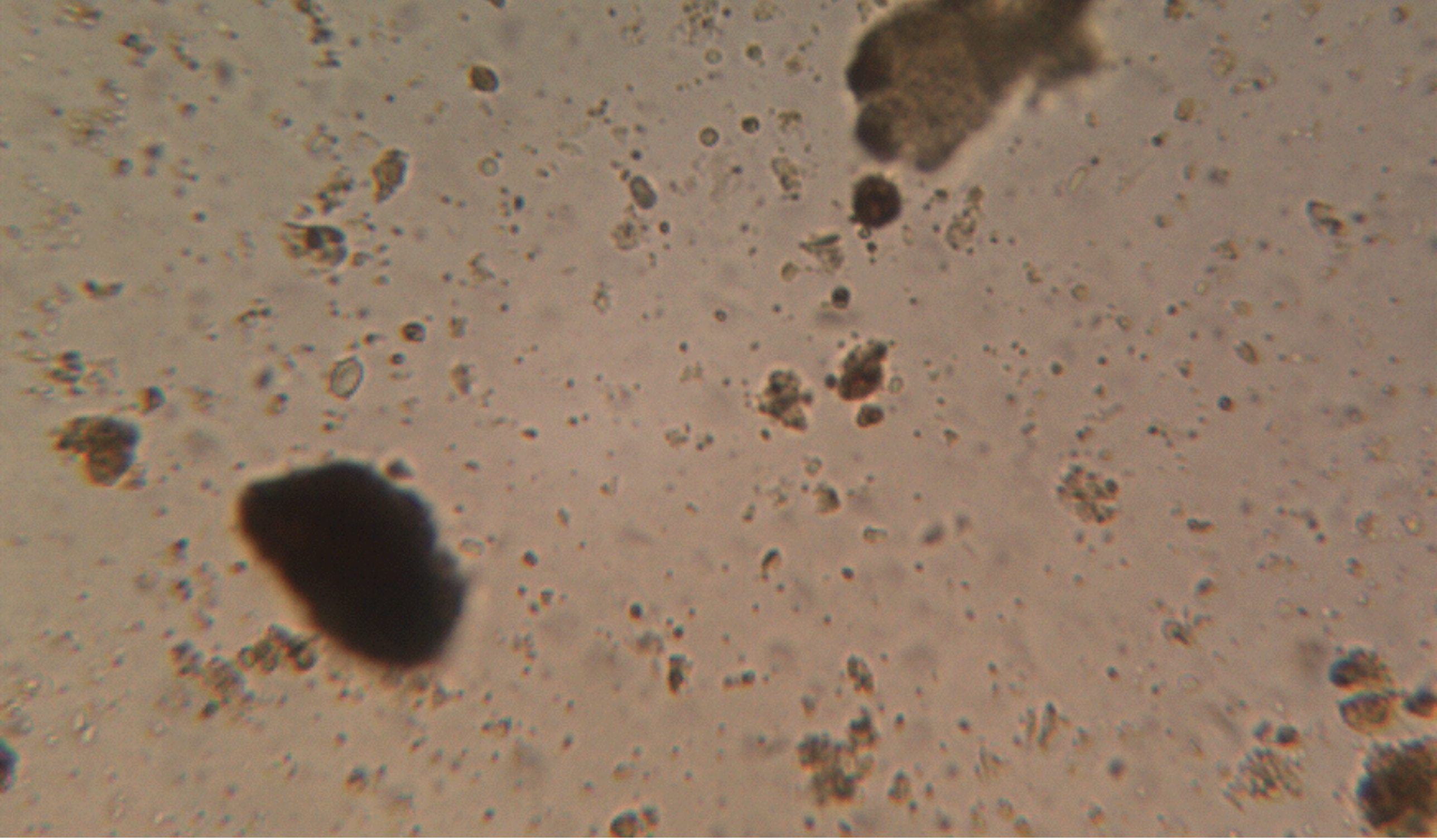


	Weeds	Pioneer Plants (Annual)	Perennial Plants and Grasses	Veggies	Short-lived Pioneer Trees (Young Forest)	Climax Forest (Mature Forest)
Bacteria	10	100	500	600	500	700
Fungus	0	10	250	600	800	7,000

This is where we want to be

Who are IMO?

- Bacteria
- Actinobacteria
- Fungus
- Beneficial Fungus
- Nematodes (5 types)
- Protozoans (2 types)
- Micro Arthropods



Bacteria
Building Material

foundation of everything.
found everywhere.
the ‘glue’ that holds all together

Actinobacteria

clear; long thin strands

Beneficial Fungus

- uniform width along length
- >3.5 micrometers in width
- brown / darker in color
- 1 chunk of fungus per view at 1:5 dilution indicates equal fungus to bacteria ratios

Nematodes
Recyclers

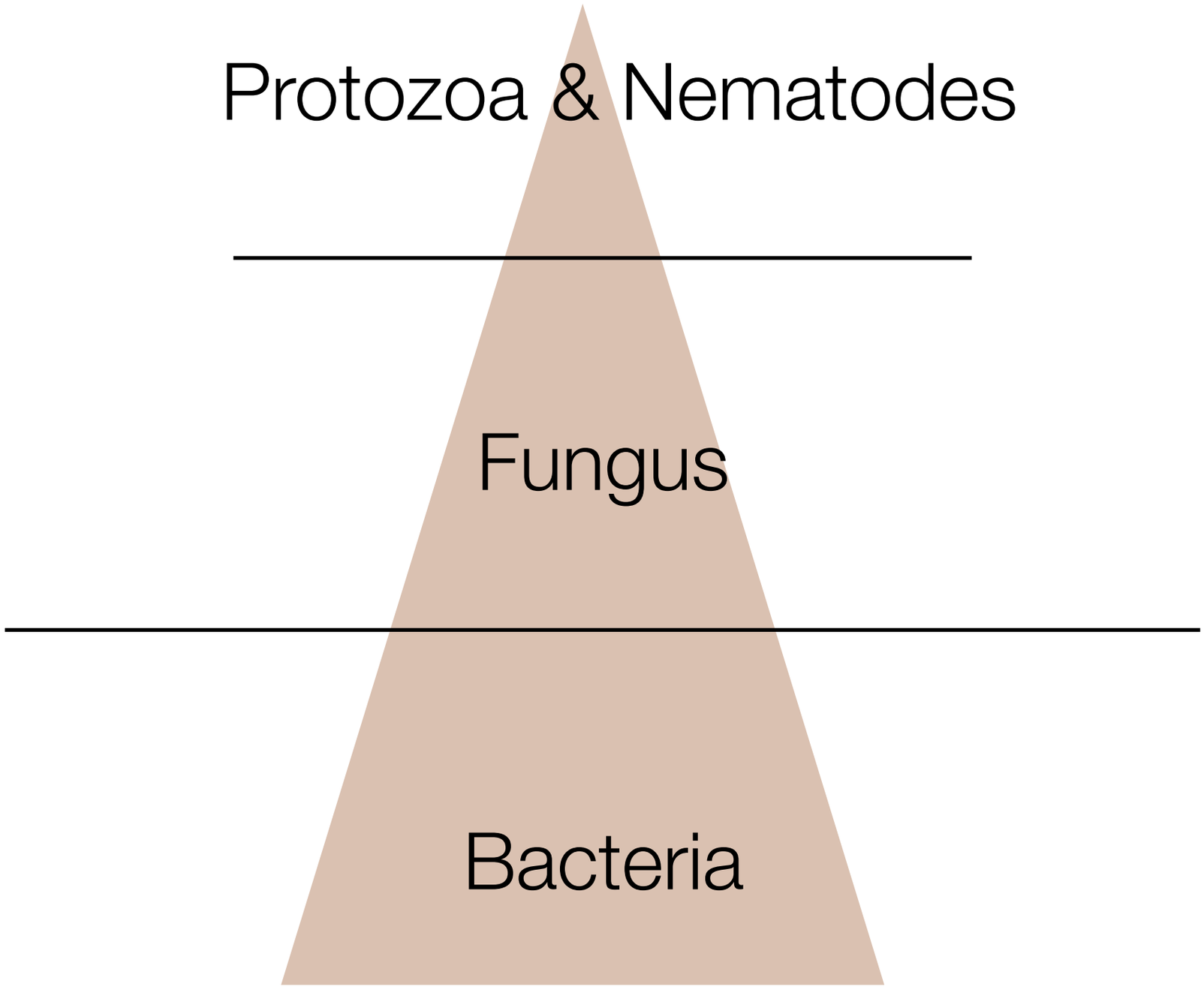
4 out of 5 multicellular animals very rich, plant available excrement left in root zone.

Beneficial Fungus

- wider than 3.5 micro meters
- darker in color
- fungus regulate everything in soil. focusing on them will tell you a lot about the health and self sufficiency of a garden

Microscope

- 400x is sufficient
- cost about $400 w/ camera
- essential for experimentation
- quick and easy to verify beneficial fungus levels

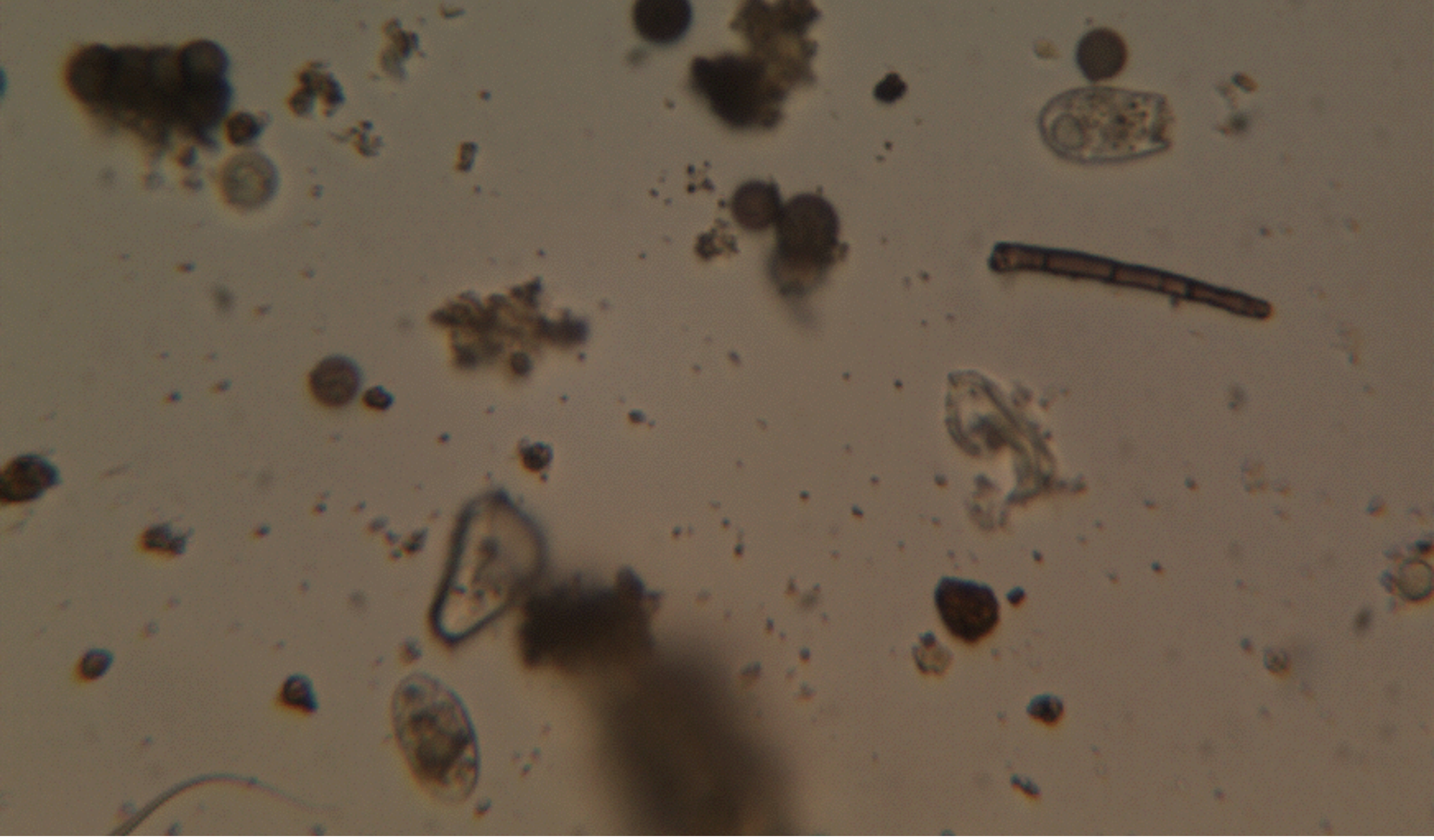


3 Tiers of the Soil Food Web

The Soil is Alive

Beneficial Fungus
Architects, Engineers

uniformly sectioned.
one per view indicates equal
parts bacteria to fungus ratio.



Beneficial Fungus

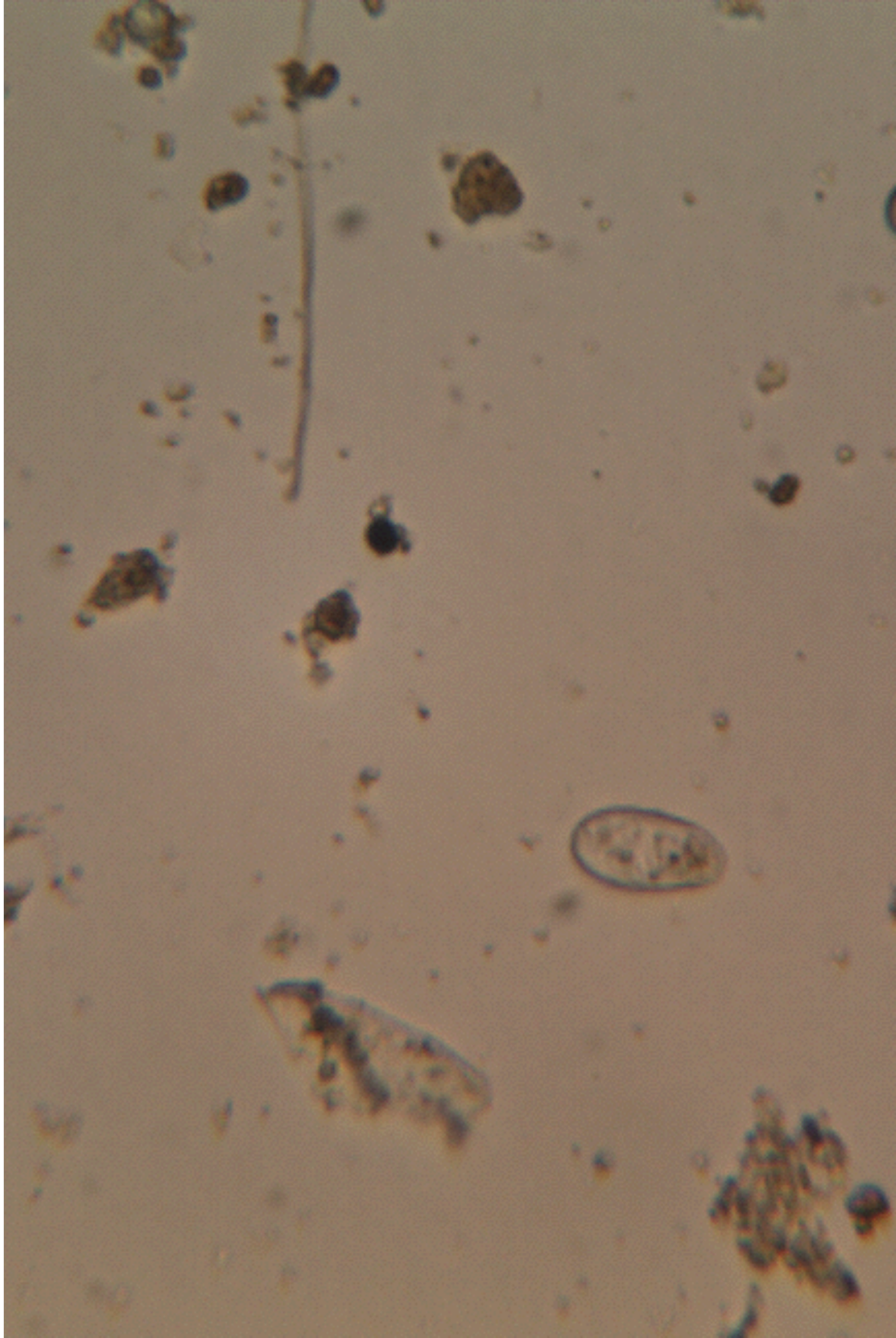
dark color
chunks are caused by slide prep

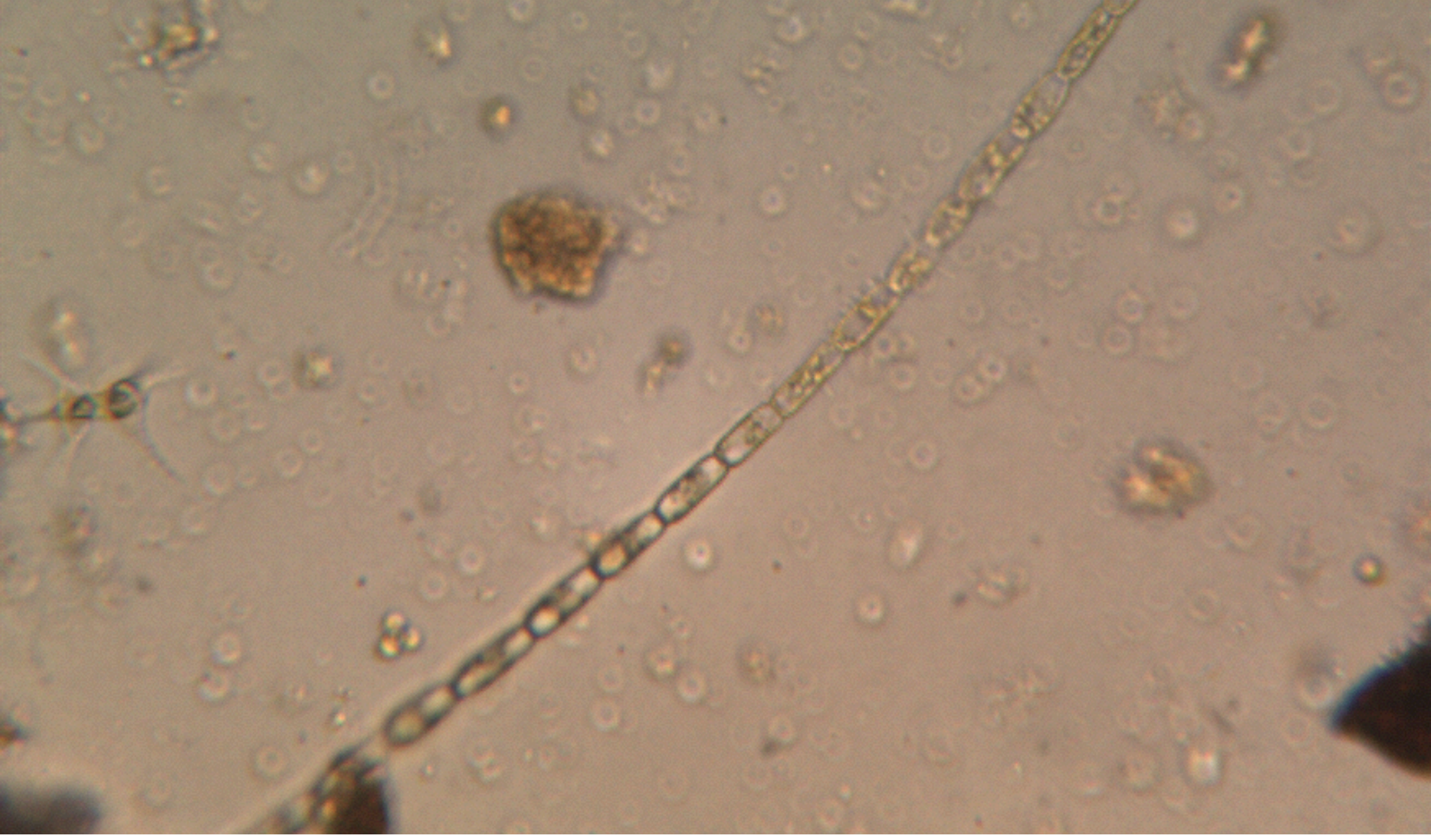
Nematodes

1 per slide is ideal
beneficial fungus will balance
nematode populations.

Actino Bacteria

- Warning sign!
- Long clear strands
- look like fungus
- not beneficial
- indicator that environment is running out of oxygen and becoming anaerobic





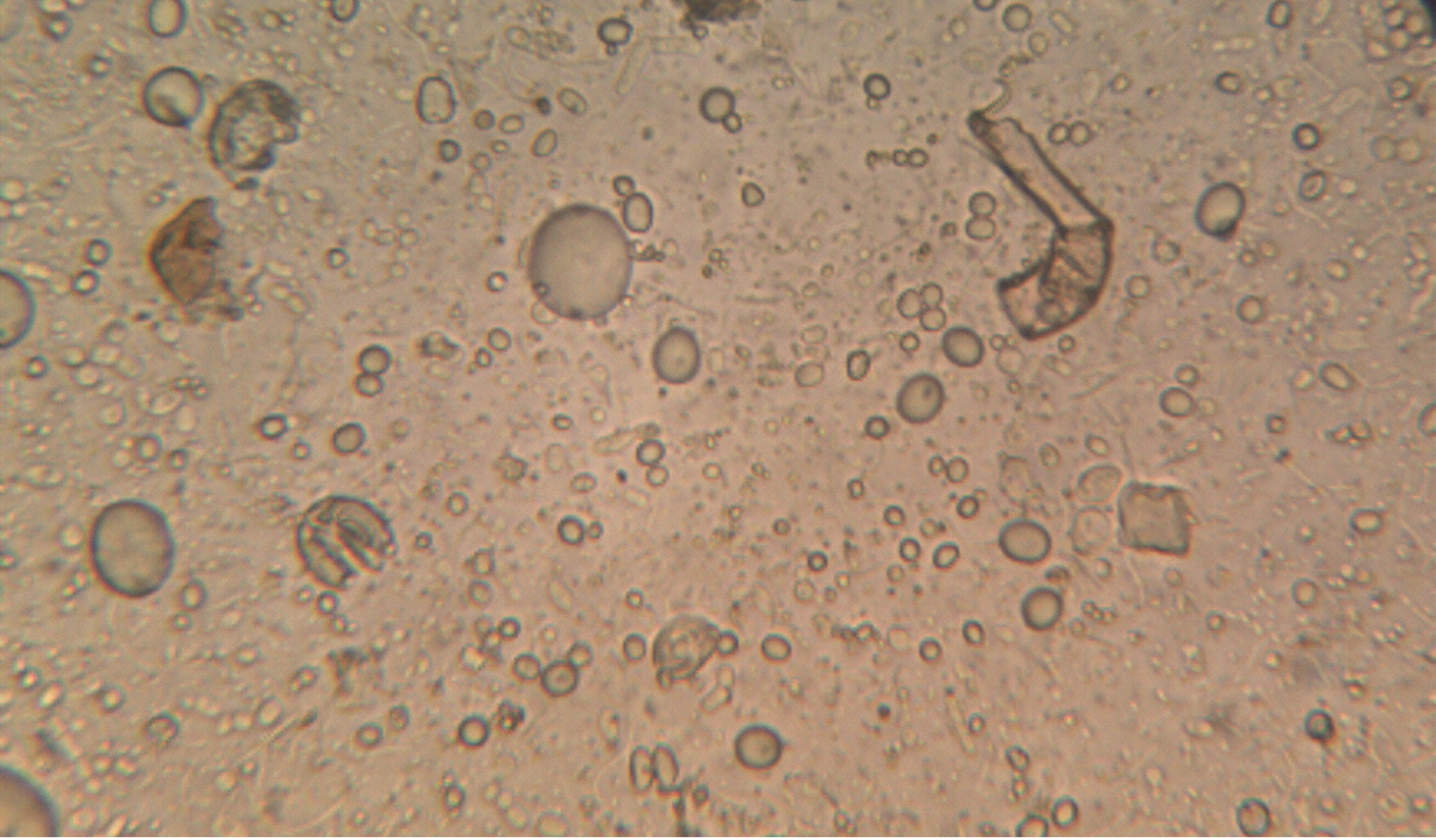
Yeasts

budding in a line

Pathogens

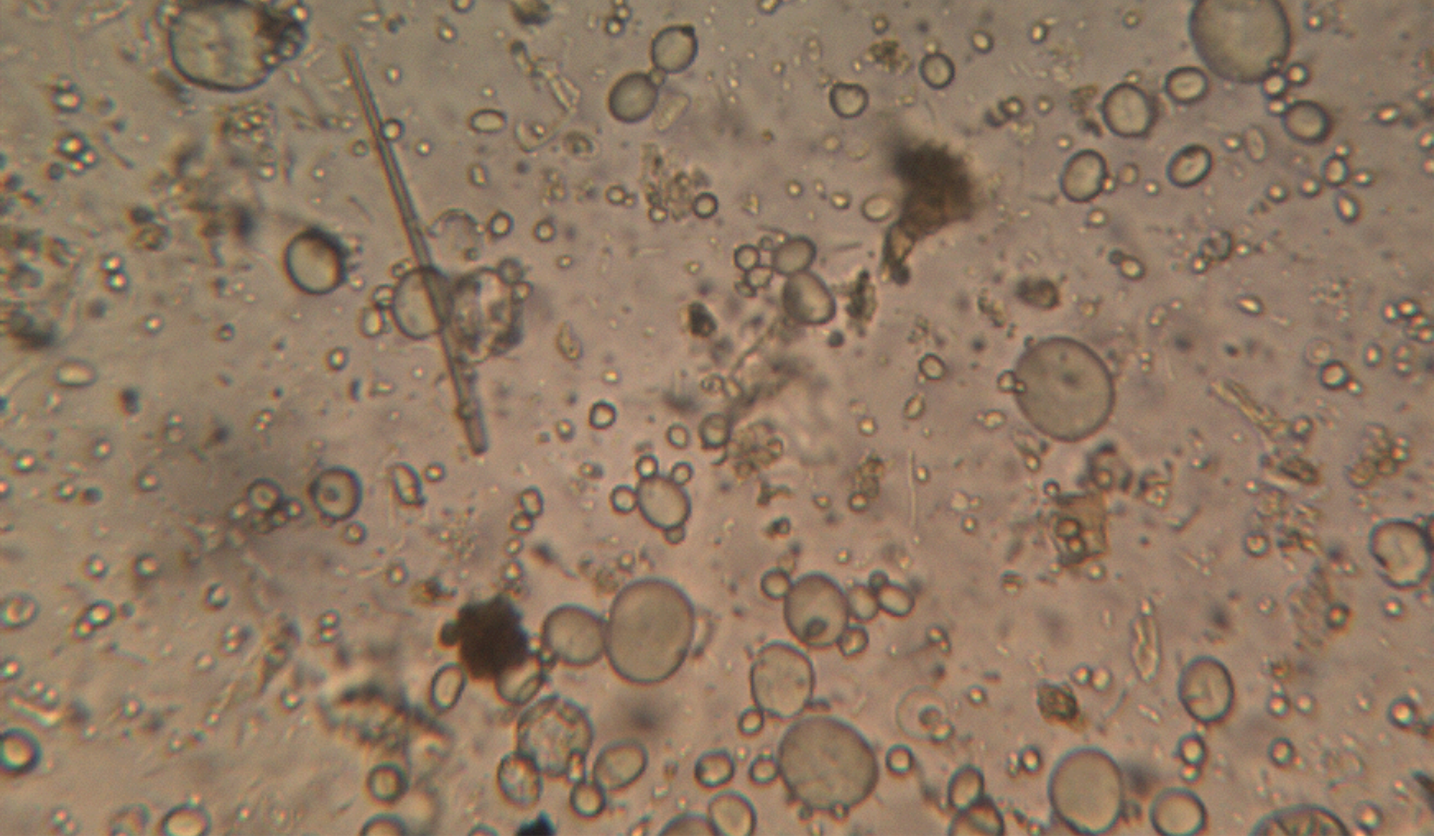
spirilla bacteria

Arthropods



IMO#4

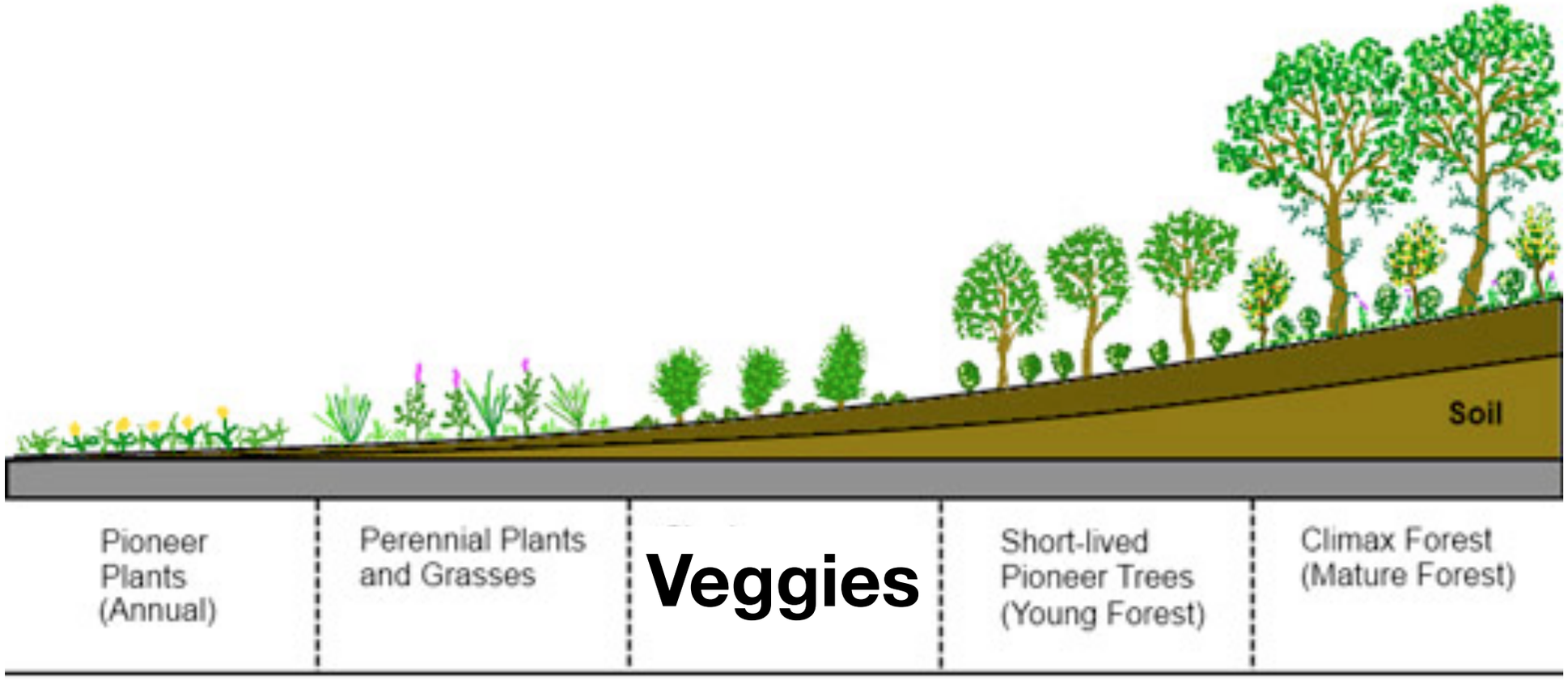
Tons of spores



IMO#4

Some active fungus

Key: Plant / Biology Relationship



	Weeds			**Veggies**		
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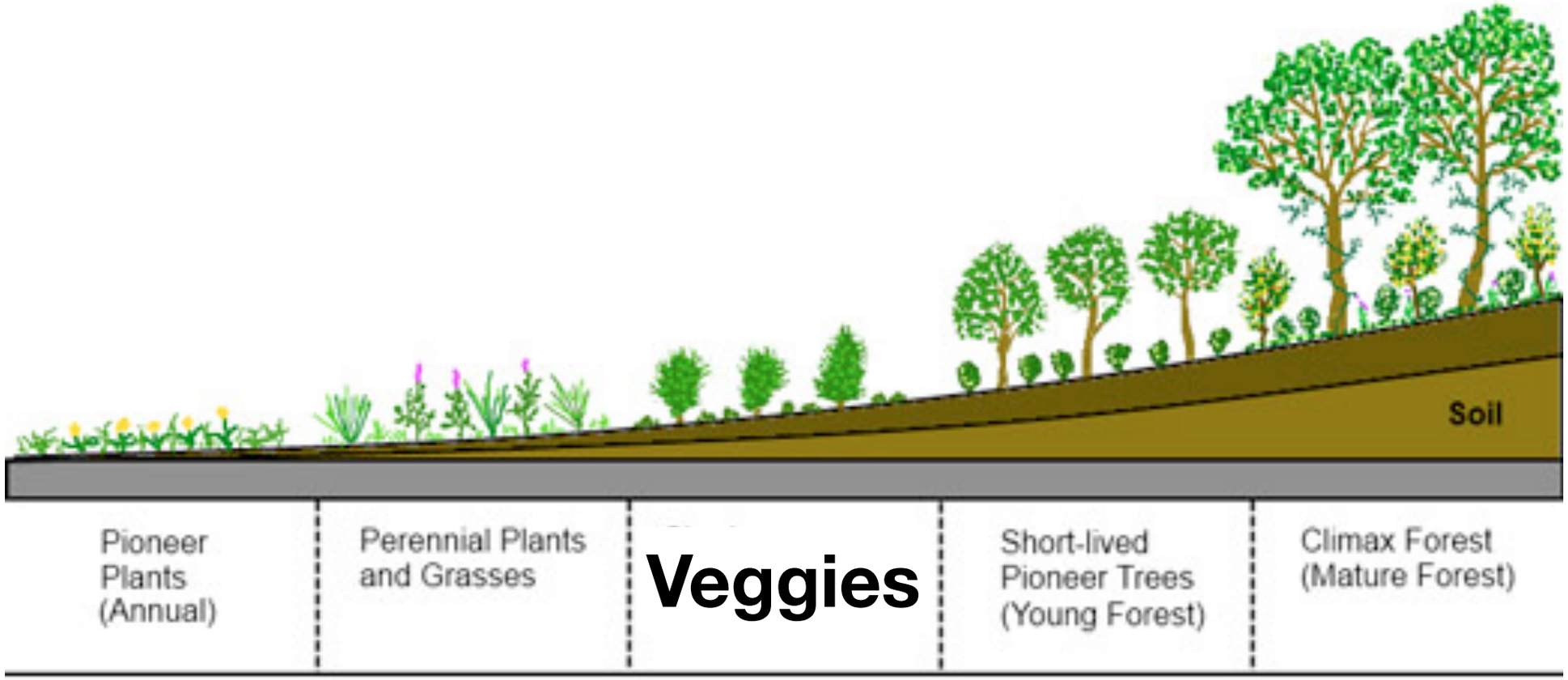

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IMO#4 beneficial fungus spore concentrate inoculation