

Soil Organisms

1 tablespoon of
SOIL has **MORE**
ORGANISMS
in it than
PEOPLE
ON EARTH!

Fact Source: soils.org

Copyright Erin Ehnle/Keeping it Real: Through the Lens of a Farm Girl



Learning Objectives

- Section 1 – Soil Ecology
 - Survey soil organism types
 - Understand classification systems
 - Define soil ecosystem and link diversity to soil quality
- Section 2 – Rhizosphere
 - Define rhizosphere and describe the environment at the root-soil interface
 - Compare and contrast the two main groups of mycorrhizal fungi
 - Describe the symbiosis and mechanism of biological N fixation
- Section 3 – Soil Engineers and Management
 - Explain why some organisms called soil engineers and describe an example
 - Discuss the benefits of managing soil to encourage a healthy, diverse soil community

How many soil organisms per gram of soil?

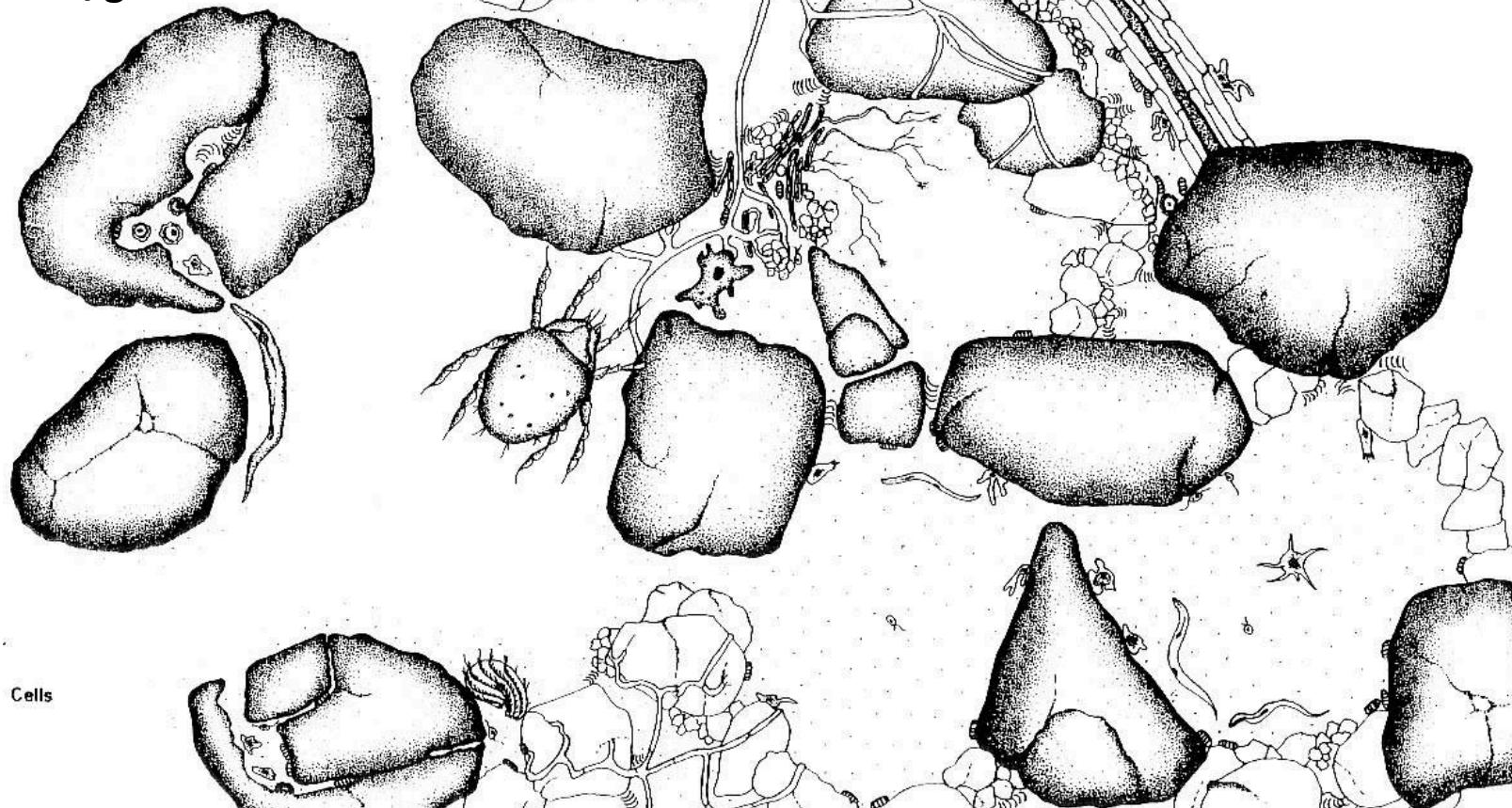
Bacteria – 1 billion/g

Actinomycetes - 200 million/g

Fungi – 10-20 million/g

Protozoa – 1 million/g

Nematodes – 50/g



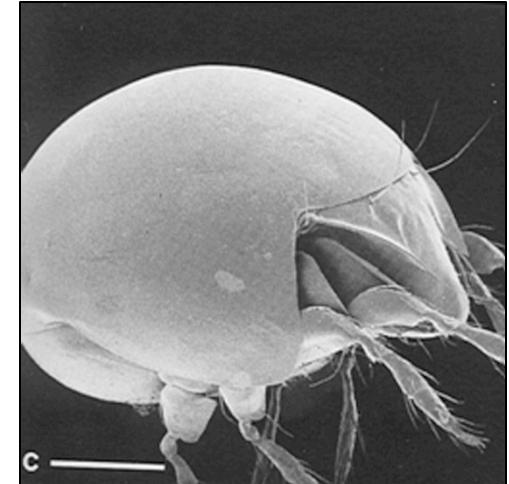
Cells

What are the organisms in the soil?

Survey: Macrofauna and Mesofauna



Shredders



Fungal feeder – orabatid mite

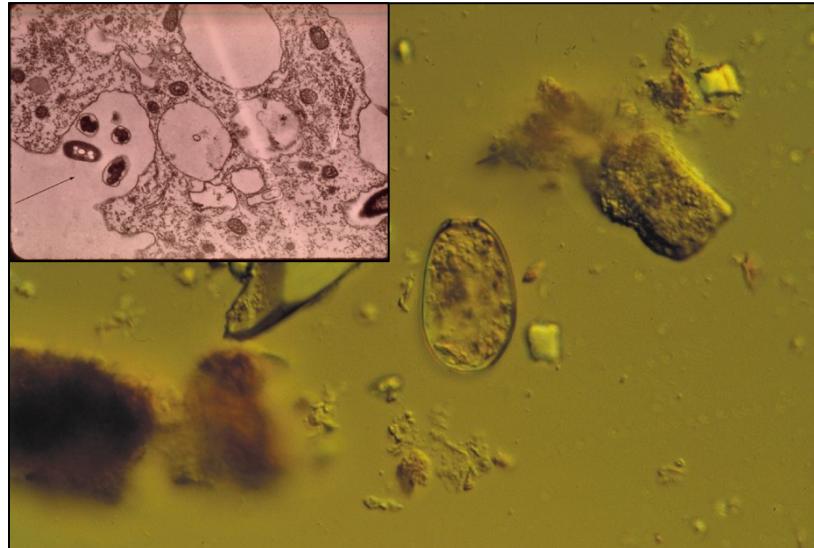


Predators

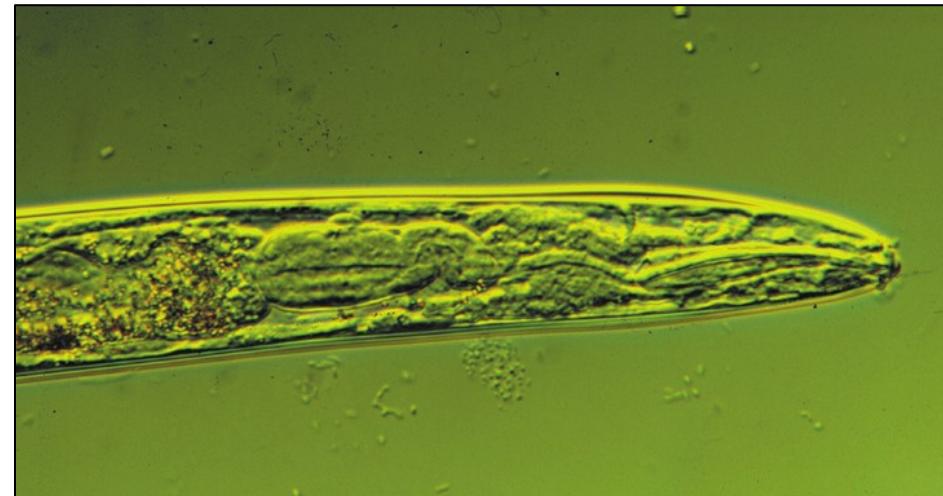


Herbivore

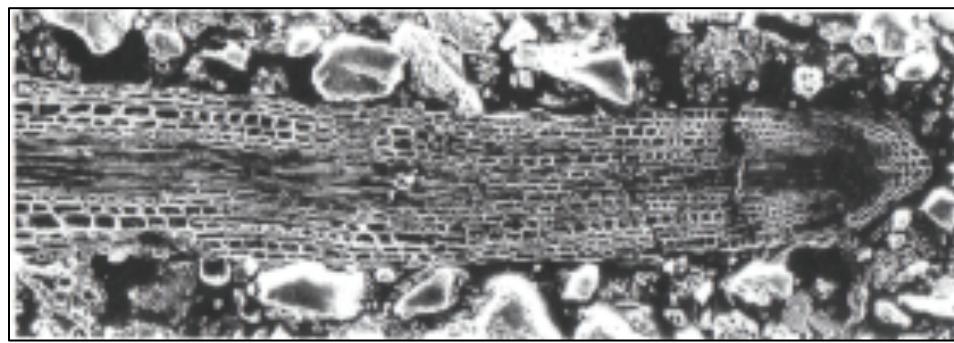
Survey: Soil Microfauna and Flora



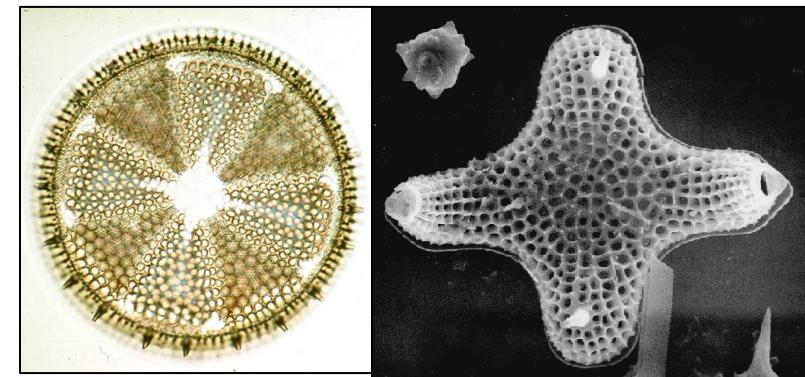
Protozoa: amoeba eating bacteria



Root feeding nematode



Plant root, Fig 10.10

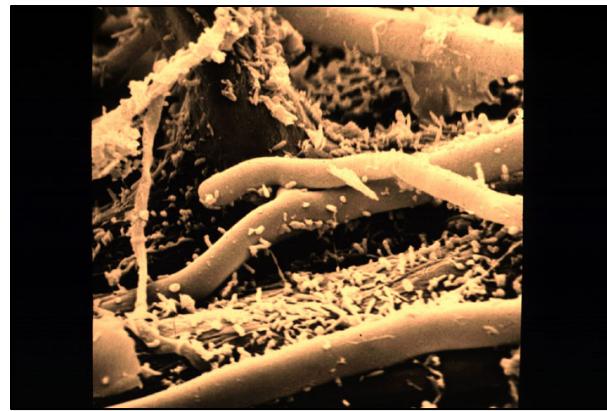


Diatoms, <http://www.ucmp.berkeley.edu/chromista/diatoms/>

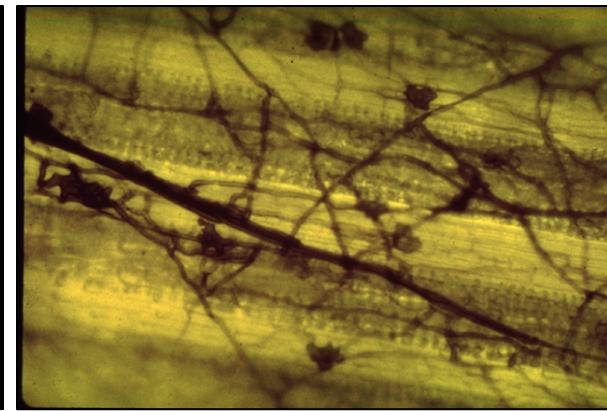
Survey: Soil Microorganisms



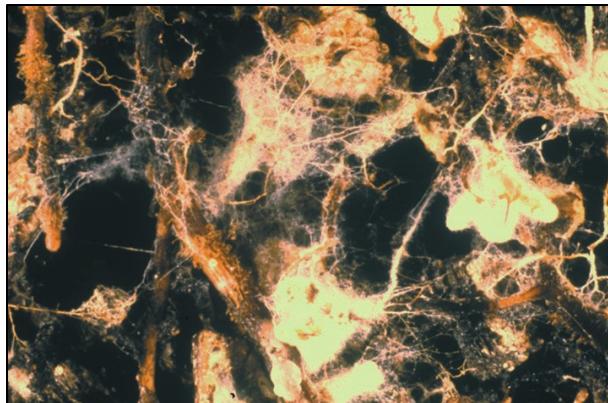
Soil bacteria



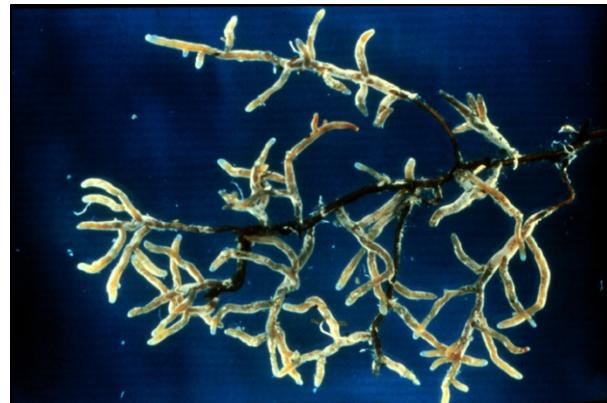
Bacteria on fungi



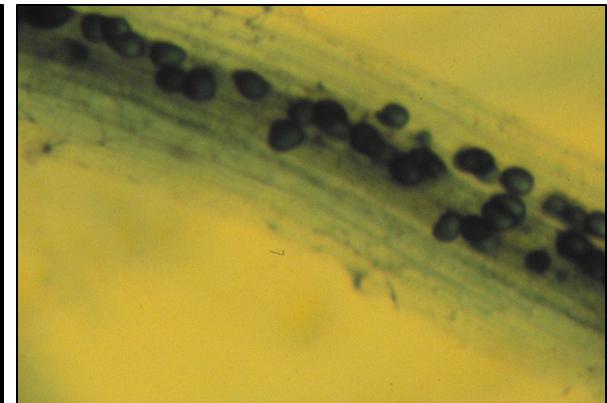
Fungi decomposing leaf tissue



Mycorrhizal bodies and hyphae



Ectomycorrhizae



Vesicles

Relative Size

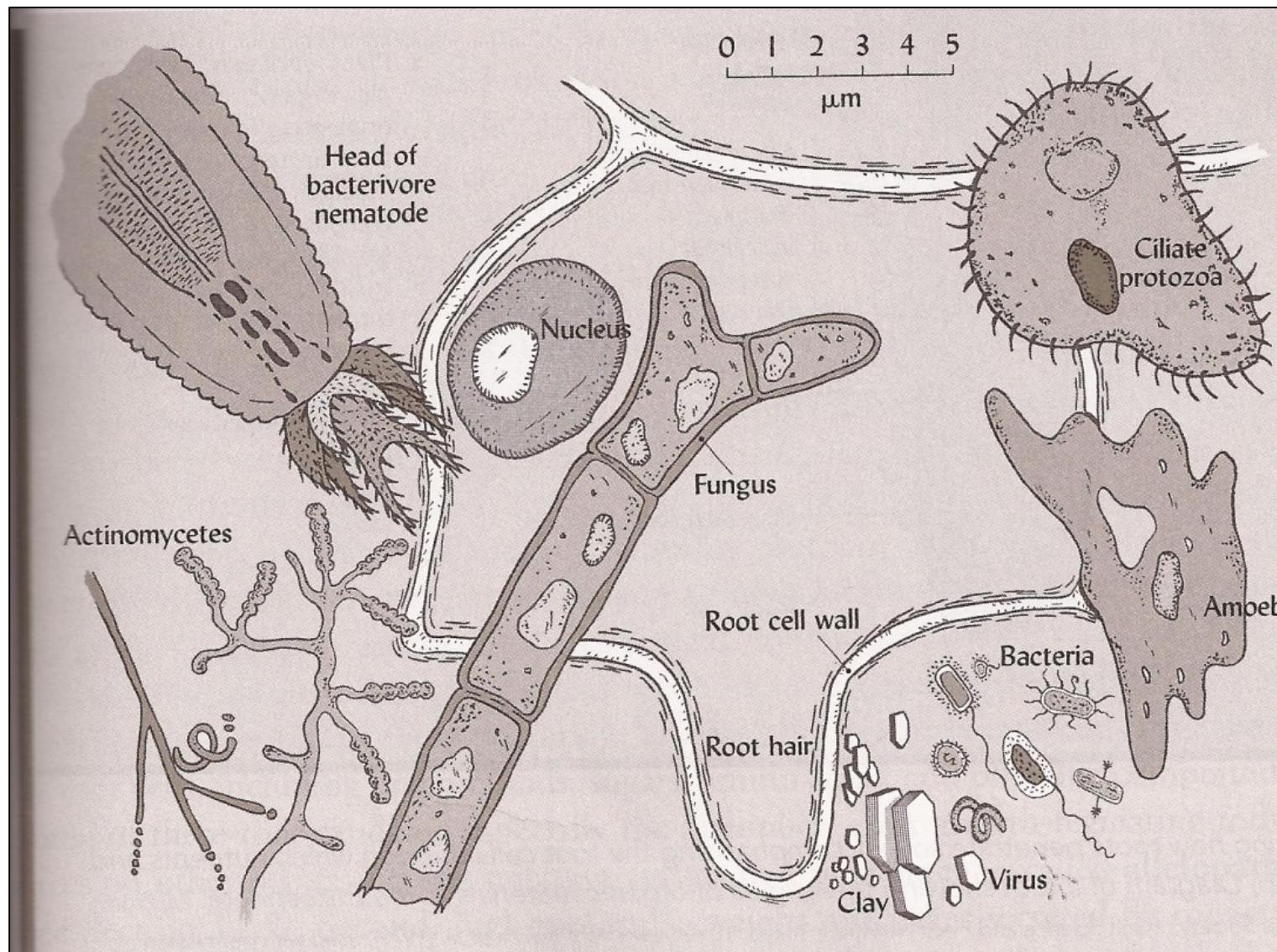


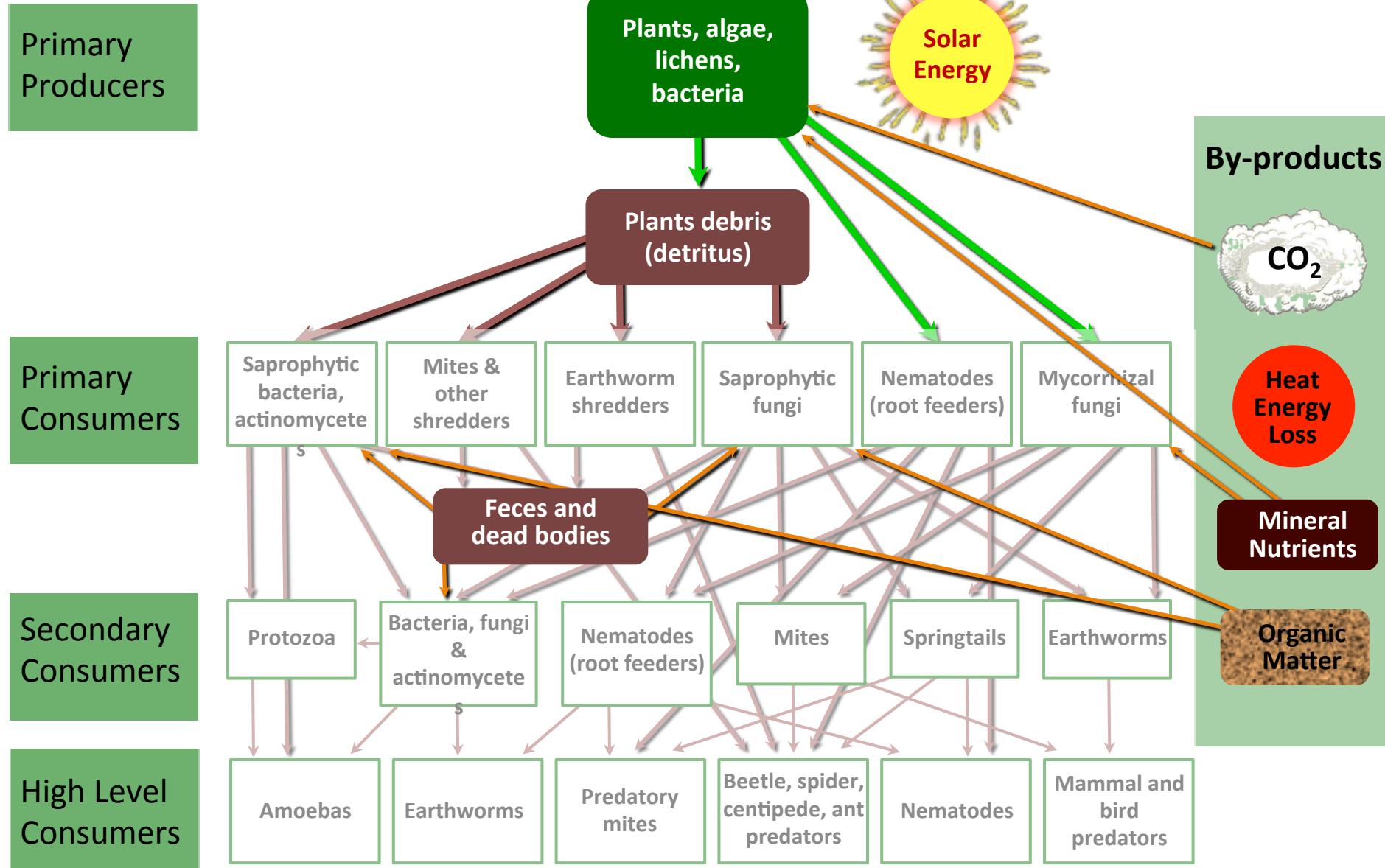
Fig 10.9

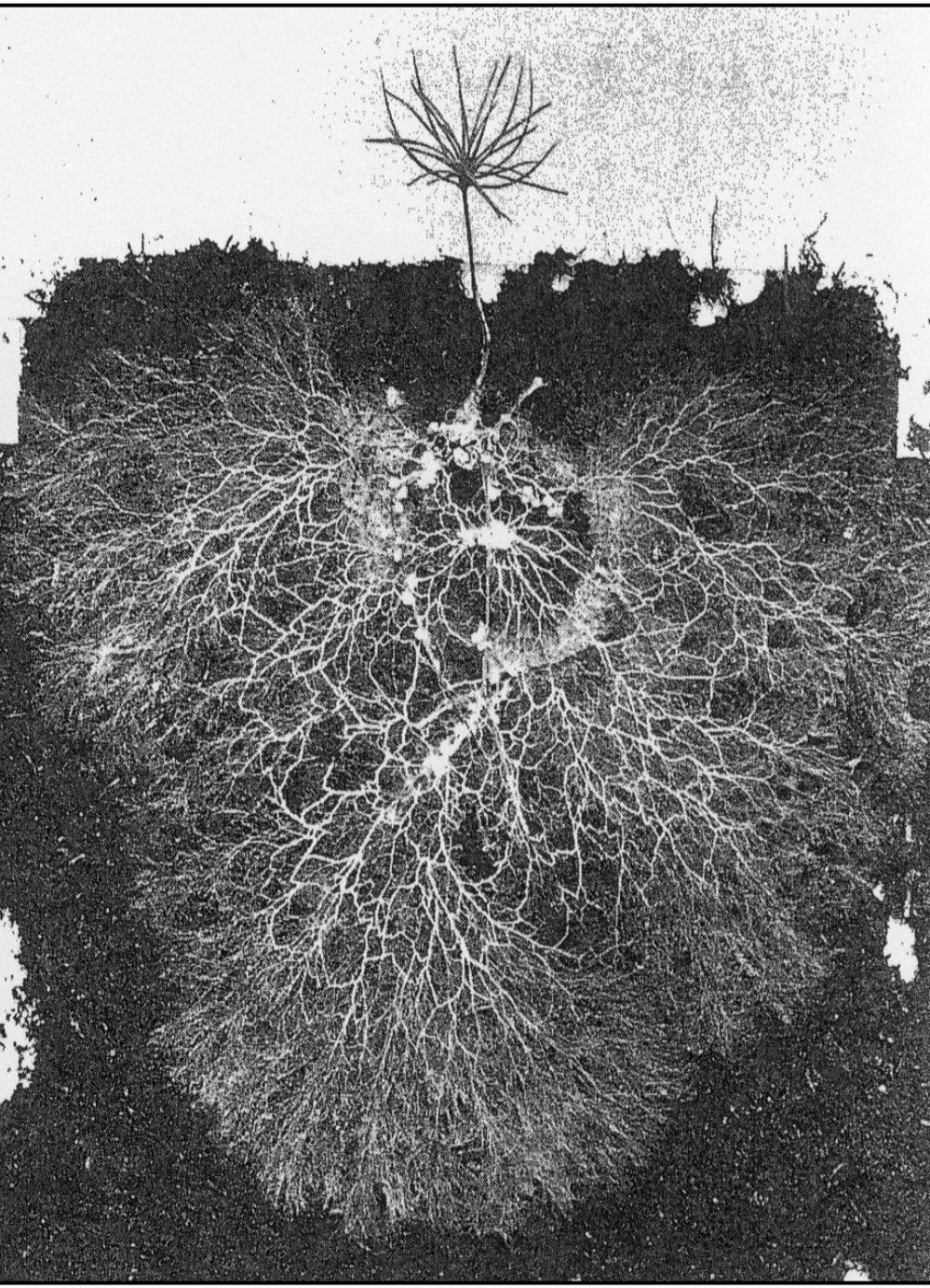
Classification of Organisms

Metabolic – Carbon and Energy

Source of Energy		
Source of Carbon	Biochemical Oxidation	Solar Radiation
Combined organic carbon	<p>Chemoheterotrophs: <i>All animals, plant roots, fungi, actinomycetes, and most other bacteria</i></p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> Earthworms Aspergillus sp. Azotobacter sp. Pseudomonas sp. 	<p>Photoheterotrophs: <i>Just a few algae</i></p>
Carbon dioxide	<p>Chemoautotrophs: <i>Many archaea and bacteria</i></p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> Ammonia oxidizers – Nitrosomonas sp. Sulfur oxidizers – Thiobacillus denitrificans 	<p>Photoautotrophs: <i>Plant shoots, algae, and cyanobacteria</i></p> <p><u>Examples:</u></p> <ul style="list-style-type: none"> Chorella sp. Nostoc sp.

Soil Food Web





Root Rhizosphere

- Define
- Environment
- Microbial hotspot

Detritusphere



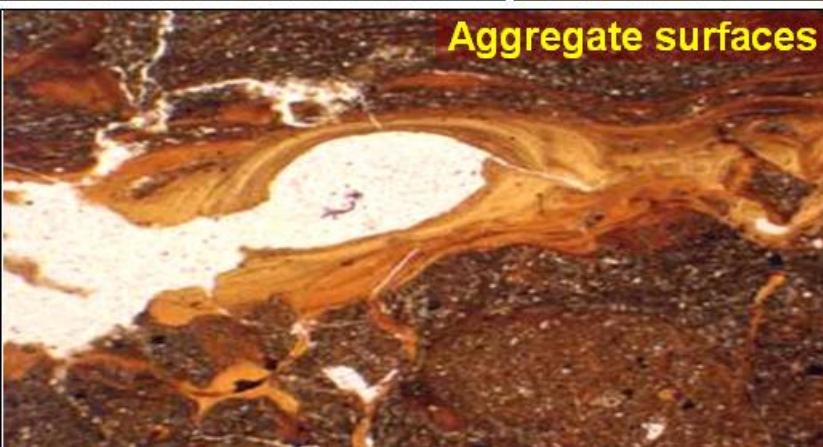
Biopores



Rhizosphere



Aggregate surfaces



Microbial Hotspots

Soil as an Ecosystem

