

Table 1: Microbes in the Environment

Division	Phylogenetic Domain	Organism	Habitat, diameter	Characteristics	Importance
Prokaryotes		virus (plant, animal, bacterial)	Hosts; 0.25 $\mu\text{m}$ (varies)	Not cellular, RNA or DNA+capsid, can't replicate outside living cells	Genetic exchange, disease
	<i>Bacteria</i>	bacteria	Terrestrial, aquatic, aerial, plant surfaces, in other organisms; 1 $\mu\text{m}$ typ. up to 50 $\mu\text{m}$	Unicellular, most with cell wall, cytoplasmic membrane, ribosomes, inclusions, nucleoid, diverse physiological functions. <i>Bacteria</i> and <i>Archaea</i> differ in cell wall and lipid chemistry, transcriptional and protein synthesis	Biogeochemical cycling, biodegradation, disease, biotechnology, photosynthesis (cyanobacteria oxygenating the earth)
		(bacteria)	Hot springs, alkaline or acidic environs; 1 $\mu\text{m}$ typ.		
Eukaryotes	<i>Eukarya</i>	fungi (molds=filamentous, yeasts, mushrooms)	Some aquatic (marine + fresh), most terrestrial (soil or plants); > 5 $\mu\text{m}$	nonmotile, cell wall, streaming cytoplasm, vacuoles, non-differentiated, no chlorophyll, diverse morphology and sexual cycles but not phylogenetically	Decomposition, biotechnology
		slime molds	decaying plant matter; > 1 $\mu\text{m}$	Plasmodia or cellular, feed on other microbes	grazing
		protozoa	Freeliving in aquatic (marine + fresh), or soils, and in gut; 20-80 $\mu\text{m}$	Unicellular, no cell walls, motile, no fruiting body, no chlorophyll, ingest microbes or particulates	grazing, disease, hosts (cyanobacteria, algae, bacteria)
		algae	aquatic (marine + fresh), soils; > 1 $\mu\text{m}$	photosynthesize to make oxygen, uni- or multicellular	primary production (aquatic = phytoplankton)
		plant-microbe interactions a. lichen, b. mycorrhiza c. root nodules	a. plant, rock surfaces, soils b.-c. rhizosphere;	a. fungus-algae or cyanobacteria, b. fungus-root c. bacteria-root	a. mutual: phycobiont is primary producer & / or fixes $\text{N}_2$ , mycobiont protects & supplies minerals b. P, $\text{N}_2$ to plant c. $\text{N}_2$ fixing