

# INTRODUCTION to MICROBIOLOGY and HUMAN PATHOGENS

**What is a Microorganism?** A living thing that is too small to see with the naked eye.

**What is a pathogen?** “disease causer” – these typically are either bacteria, protists, fungi, parasitic worms, or viruses.

	BACTERIA	PROTISTS	FUNGI	ANIMALS	PLANTS	VIRUSES
PROKARYOTE OR EUKARYOTE	PROKARYOTE	EUKARYOTE	EUKARYOTE	EUKARYOTE	EUKARYOTE	NEITHER – THEY ARE “ACELLULAR” (NOT A CELL)
UNICELLULAR	YES	YES	FUNGAL PATHOGENS, SUCH AS YEAST, ARE UNICELLULAR	NO	NO – plants are not pathogens	NOPE – THEY ARE ACELLULAR
MULTICELLULAR	NO	NO	MUSHROOMS	YES	YES	NOPE – THEY ARE ACELLULAR
CELL MEMBRANE	YES	YES	YES	YES	YES	NOT ON THEIR OWN, BUT SOMETIMES THEY ‘STEAL’ MEMBRANE FROM HOST
CELL WALL	YES	NO	YES	NO	YES	NOPE – THEY ARE ACELLULAR

Examples of **BACTERIA** associated with human disease (either causing or inhibiting disease):

- Gram positive cocci: *Staphylococcus aureus*, *Streptococcus pyogenes*
- Gram positive rods: *Lactobacillus acidophilus*, *Listeria monocytogenes*
- Gram positive rods—also the only two genera that can form endospores: *Clostridium tetani*, *Clostridium difficile*, *Clostridium botulinum*, *Bacillus anthracis*, *Bacillus cereus*
- Gram negative cocci: *Neisseria gonorrhoea*, *Neisseria meningitidis*
- Gram negative rods: *Escherichia coli*, *Enterobacter aerogenes*, *Klebsiella pneumoniae*, *Shigella dysentery*, *Vibrio cholera*, *Campylobacter*

Examples of **PROTISTS** associated with humans disease:

- *Giardia*—causes diarrhea
- *Plasmodium*—causes malaria
- *Entamoeba*—causes diarrhea
- *Trichomonas*—causes a type of vaginosis
- *Toxoplasma*—usually only causes problems if occurring during fetal development
- *Trypanosoma*—causes Sleeping Sickness in tropical countries

Examples of **FUNGI** associated with humans:

- *Candida*—can cause yeast infections in mucous membranes (sinus, lungs, GI, vagina)
- *Microsporium*, *Epidermophyton* and *Trichophyton* are a three primary types of dermatophyte yeasts that cause skin/hair/nail fungal infections—toenail fungus, ringworm, jock itch, athlete’s foot, etc.

Examples of **ANIMALS** associated with human disease:

- Blood-suckers can be disease VECTORS (fleas, ticks, leeches, mosquitos)—often transmit other diseases such as *Yersinia pestis* (bacteria that causes black plague); bacteria that causes Lyme disease; or the Plasmodium (protist that causes malaria)
- Helminths (worms that live inside our guts, bloodstreams, muscles or other organs) – these are studied by microbiologists because they often are diagnosed by microscopic examination of feces or blood.

Examples of **VIRUSES** associated with human disease:

- Rhinoviruses (type of coronavirus)—cause common cold
- Enteroviruses—cause diarrhea
- HIV—causes immune system failure
- Influenza—causes respiratory illness
- Herpes—causes cold sores, genital lesions, chickenpox (depending on which virus and location)