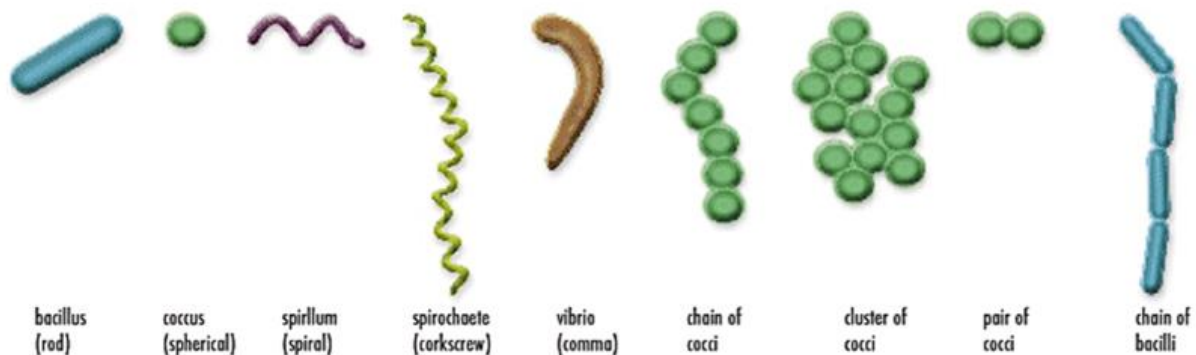


Biological Materials

Dr Murtakab Y Al-Hejjaj

Bacteria

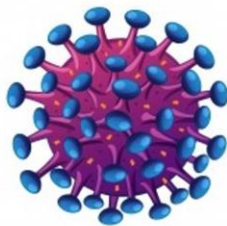
- Bacterium: a member of a large group of unicellular microorganisms which have cell walls but lack organelles and an organized nucleus.
- Bacteria are single-cell organisms that are neither plants nor animals.
- They usually measure a few micrometres in length and exist together in communities of millions.
- They are found everywhere
- Some of them can cause diseases



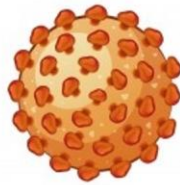
Bacillus anthracis (anthrax)

Viruses

- Virus, an infectious agent of small size and simple composition that can multiply only in living cells of animals, plants, or bacteria.
- Viruses, Smaller than bacteria.
- Viruses containing only one type of nucleic acid either DNA or RNA, but never both.
- Viruses consist of nucleic acid surrounded by a protein coat.
- Viruses lack cellular organelles, such as mitochondria and ribosomes.



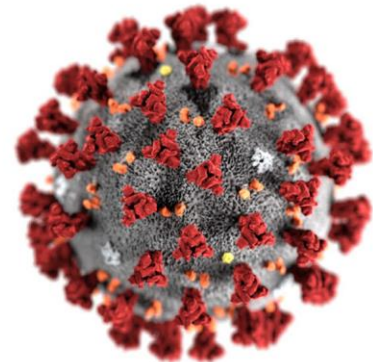
HIV



Hepatitis B



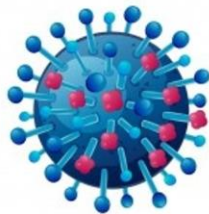
Ebola Virus



SARS-CoV-2
(Covid-19)



Adenovirus



Influenza



Bacteriophage

Fungi

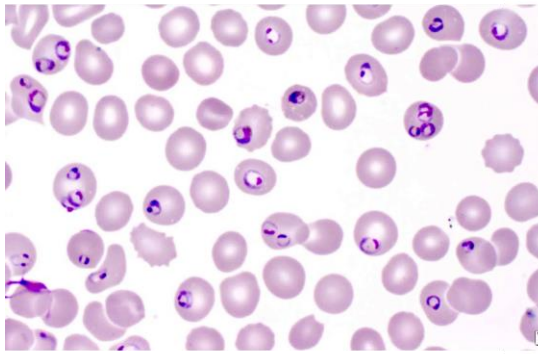
- A fungus is a eukaryotic organism.
- Examples, yeasts, moulds and mushrooms.
- The study of fungi is called mycology.
- Some fungi are microscopic organisms and some of them are huge.
- Some fungi are being used as probiotics e.g. *Saccharomyces boulardii*. Some of them are edible
- Some species of fungi are pathogenic to animals (including man) and plants. Medically important pathogenic fungi include *Candida albicans*, *Aspergillus fumigatus*



Mushroom

Parasite

- A parasite is typically an organism that lives in or on the body of another living organism (host) and harms it by feeding on its tissues or stealing nutrients.
- In the broad sense, parasites include certain bacteria, fungi, protozoans, worms, **arthropods**, and a few vertebrates.



Plasmodium



Mosquito

Zoonotic pathogens

- Zoonotic diseases are types of diseases pass from an animal or insect to a human.
- Some of them don't make the animal sick but will sicken a human.
- Zoonotic diseases range from minor short-term illness to a major life-changing illness. Certain ones can even cause death.
- The types of zoonosis include those caused by:
 - a virus
 - bacteria
 - fungus
 - parasites

Examples

- Covid-19 (Virus)
- Ebola (Virus)
- Anthrax (Bacteria)
- Bovine tuberculosis (Bacteria)
- Candidiasis (fungi)
- Cryptosporidiosis (Parasite)

How zoonotic pathogens are transmitted

- **Direct contact:** Coming into contact with the saliva, blood, faeces, or other body fluids of an infected animal. Examples touching animals.
- **Indirect contact:** Coming into contact with areas where animals live, or objects or surfaces that have been contaminated with germs. Examples pet food and water dishes.
- **Vector-borne:** Being bitten by a tick, or an insect like a mosquito.
- **Food-borne:** get sick from by eating contaminated food. Eating or drinking something unsafe, such as unpasteurized (raw) milk, undercooked meat, or raw fruits and vegetables that are contaminated with faeces from an infected animal. Contaminated food can cause illness in people and animals, including pets
- **Water-borne:** Drinking or coming in contact with water that has been contaminated with faeces from an infected animal.
- **Aerosol:** Occurs when droplets are passed through the air from an infected animal and are breathed in by a person

Toxins

- **Biological toxins** are toxic substances that can be produced by bacteria, fungi, protozoa, insects, animals, or plants and are classified separately from chemical toxins.
- They are **non-replicative, non-infectious** materials but can be **extremely hazardous**, even in tiny quantities.

