

Microbiology | Notes

Bacteria

- Kingdom Monera
- Prokaryote (their genetic material is not bound with a membrane)
- Classified according to shape
 - Spherical (cocci)
 - Spiral
 - Rod Shaped
 - TWO TYPES: Heterotrophic (organism that relies on food made by others) &

Autotrophic (can make their own food)

The Three Types of Important Heterotrophic Bacteria

Decomposers

- Break down dead and decaying organic matter
- Important in the carbon and nitrogen cycles
- In the production of silage, lactobacillus bacteria break down sugars in the grass into lactic acid

Symbiotic bacteria

- Clover + the bacteria rhizobium = symbiotic relationship
- Bacteria fix atmospheric nitrogen into nitrates for clover
- Bacteria gets sugars from the clover
- Bacteria in ruminant animals - produce enzymes - break down cellulose in grass

Pathogenic bacteria

- Cause disease eg tb, mastitis
- Classified as parasites - cause harm to host animals
- Some are zoonoses

Key Definitions

Pathogen

- A microorganism that causes a disease

Zoonose

- A disease that can pass from animals to humans

Parasite

- When two organisms live in close association with each other and only one organism (the parasite) benefits and causes the other organism (the host) harm

Symbiotic relationship

- When two organisms of different species live in a close relationship that benefits both organisms

Bacterial Cell Structure and Function

Flagellum

- Helps bacteria to move; locomotion

Capsule

- Enhances bacteria's ability to cause disease
- Prevents white blood cells in an animal's body from engulfing the bacterial cell (phagocytosis)
- Helps the cell from drying out

Cell wall

- Provides shape
- Stops bursting when water moves in by osmosis

Cell membrane

- Controls what enters and exits the cell

DNA

- Controls the cell activities
- Replicated when bacteria reproduce

Ribosomes

- Responsible for protein synthesis

Plasmid

- Circular pieces of DNA

Respiration In Bacteria

Some bacteria carry out aerobic respiration

- Eg Mycobacterium bovis which is responsible for bovine TB)
- Release energy from sugars in the presence of oxygen

Lactobacillus species carry out anaerobic respiration (fermentation)

- Release energy from sugars in absence of oxygen

Production of silage

- Lactobacillus in anaerobic conditions
- Convert sugars in grass to lactic acid
- Decrease the pH of grass
- Thus preserves it as silage

Reproduction In Bacteria

- Need favourable conditions
- Reproduce asexually by binary fission

If environmental conditions become unfavourable;

- Some can survive by producing an endospore
- Highly resistant structure
- Can survive heat, freezing, drying and chemicals

Fungi

- Kingdom fungi
- Can be microscopic eg yeasts
- Can be very large eg mushrooms
- Lack chlorophyll so cannot carry out photosynthesis

- Either saprophytic decomposers (break down dead organic matter) or parasitic
- Important decomposers in carbon and nitrogen cycles
- Parasitic fungi cause ringworm in cattle and blight in potatoes

Fungi Structure And Function

Hyphae

- Long filaments

Mycelium

- Entire mass of hyphae

Rhizoids

- Anchor fungi to substrate
- Absorb nutrients from substrate

Stolon

- Horizontally growing hyphae

Sporangiophore

- Hyphae that grows upwards
- Has a sporangium on top

Sporangium

- Produces spores

Reproduction In Fungi

- Reproduce asexually by producing spores
- Reproduce sexually by producing a zygospore

Potato Blight

- Caused by airborne fungus called phytophthora infestans
- Parasitic fungus

Zoospore = a mobile spore. Each spore has two flagella that help it move.

- Potato blight reproduces by producing zoospores

- Blight zoospores germinate to produce hyphae
- They invade the cells of potato leaves
- The hyphae exit through the stomata of the leaves
- They develop into sporangia
- In warm humid weather the zoospores develop inside sporangia
- Zoospores infect other leaves, stems and tubers of the plant
- Blight appears as brown spots on the leaves
- Infected tubers have black patches
- Treated/prevented by spraying fungicide
- Meteorological service issues blight warnings

Viruses

- Extremely small (0.01-0.03mm)
- All are obligate parasites;
- Viruses can only replicate themselves inside other living organisms
- Very simple structure
- Lack cellular structure therefore antibiotics are ineffective
- Some diseases can be vaccinated against
- Responsible for BVD in cattle, leaf roll in potatoes

BVD

- Bovine Viral Diarrhoea
- Symptoms include infertility, miscarriages, ill-thriving calves
- Virus suppresses immune system of calf making them more prone to respiratory diseases
- Calves born with it at PI (persistently infected)
- They shed large amounts of BVD over their lifetime
- National eradication programme was introduced in 2012 as voluntary and became compulsory in 2013

Notifiable Diseases

- A disease which must be immediately reported to the district veterinary office
- Cause significant economic loss
- Decrease productivity
- Affected and unaffected animals are destroyed to prevent spread
- Some are zoonoses
- Eg avian flu
- BSE
- Foot and mouth disease
- Newcastle disease