**Pathogens & Disease Notes**

**Definitions**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: Any change that impairs the normal function of an individual in some way.
* **Parasite**: An organism that lives on or in another organism and feeds from it, usually without killing it.
* **Host**: The organism or cell that a particular \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lives in or on.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: An organism that is able to cause disease in a host
* **Vectors**: An insect or other animal that carries a pathogenic organism from one host to another
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**: Diseases caused by an agent that can be passed from one organism to another.
* **Contagious**: Diseases easily passed through the population.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** An organism capable of synthesizing its own food from inorganic substances using light or chemical energy.
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_:** An organism that cannot manufacture its own food and instead obtains its food and energy by taking in organic substances, usually plant or animal matter.

**Pathogens**

**Types of pathogen can be split into two groups:**

* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are organisms that cause disease and include bacteria, protozoans, oomycetes, fungi, worms and arthropods (parasites).
* **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** are not actually organisms but can cause disease and include viruses, viroids and prions.

**Bacteria**

* Bacteria are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ cells that are found almost everywhere.
* Some are autotrophs but most are heterotrophs.
* They can \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ very quickly.
* Can be pathogens of both plants and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* Some people can be infected by bacteria and not show symptoms, these people are known as **\_\_\_\_\_\_\_\_\_\_\_\_\_\_**.

**Bacteria can be transmitted by:**

* Direct contact with an infected \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Contact with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that have been contaminated
* Inhalation of dust or water droplets that have come into contact with, or produced by an infected host
* Contact with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carrying the bacterium.

**How do bacteria cause disease?**

* Some cause disease purely because their large numbers change normal functioning of their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ tissue.
* Others directly attack and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ host tissues.
* In other cases, the bacteria produce poisons (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) which may kill or seriously affect normal functioning of the hosts cells.

**Common diseases caused by bacteria include:**

* *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*, *Bubonic plague*, *Salmonella poisoning*, *Gonorrhoea*, *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*, *Leprosy*, *Syphilis*

**Controlling bacteria**

* Bacteria can be controlled with a combination of:
* Antiseptics, Disinfectants, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Antimicrobial agents.

**Protozoa**

* Protozoa are animal-like \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* This means they are single-celled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ organisms
* The three classes of protozoa are classified according to their structure:
  + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, sporozoans, sarcodinians

**The most common protozoa that cause disease**

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ – this is the organism responsible for malaria. It is classified as a sporozoan. It relies on a certain species of mosquito for its spread. It therefore has two hosts in its life cycle. The primary (adult) host is the human and the secondary (larval) host is the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**The most common protozoa that cause disease**

* Trypnasoma – this protozoan is a flagellate and is the cause of African \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It relies on the tsetse fly for its transmission between hosts.
* Entamaoeba histolytica – this protozoan is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and is capable of causing a severe form of dysentery. It is spread through contamination of food or water. The disease called is known as amoebic dysentry.

**Fungi**

* Fungi are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and obtain their nutrients from decomposition of dead matter. Like bacteria, many species of fungi are important decomposers in biological systems. When fungi attack living plant or animal tissue, they can then be regarded as disease causing organisms.

**Fungi Treatment**

* Fungal infections can be treated with fungicides and antifungal treatments
* Many of these treatments have been found by accident.

**Parasitic Worms**

Parasitic worms can be classified as either:

* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Platyhelmithes) such as tapeworms, hookworms and blood flukes.
* Roundworms (Nematodes) such as dog heartworm, Ascaris and filarial nematodes (which cause elephtiasis). In plants round worms infect roots and are major pests of orchards and crops.

**Parasitic Arthropods**

* Insects are major \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of disease in plants and animals.
* Ticks and mites are examples of arthropods that infect humans.
* Lerp insects are examples or arthropods that infect plants to produce galls.

**Viruses**

* Viruses are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and can infect all types of organisms.
* They are obligate intracellular parasites, meaning they cannot replicate outside of cells.
* A single virus particle (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) is composed of genetic material either DNA or RNA, enclosed in a protein coat known as a capsid
* Viruses do not have cytoplasm, membranes or any organelles
* Viruses produce new virions by taking over the metabolic pathways of the host cell.

**Classifying viruses**

Different features are used to classify viruses. These include:

* The kind of cell they use for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* The kind of nucleic acid they contain
* The different structures that make up the protein coat

**Bacteriophage**

The type of virus that infects a bacterial cell.

**Human viruses**

* Details about the way in which mammalian cells are infected with viruses are not fully known. Some inject their nucleic acid in much the same way as bacteriophages. In other cases, the complete virus may be surrounded by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and enclosed by part of the plasma membrane of a cell.

**Life cycle of a virus**

* In some viral infections, the complete virus enters the infected cell. New viruses are assembled and then they leave the cell by budding from the cell within a portion of the hot cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This process does not necessarily kill the host cell and results in a persistent infection of cells as in the case of the herpes virus.

**Common Human Viruses**

* Herpes complex, \_\_\_\_\_\_\_\_\_\_\_\_, Chicken pox, Influenza, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, Rabies, Warts

**Treatment**

* Treating viral infections is more difficult that treating bacterial infections because it is difficult to attack a virus without \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ host cells as well.
* There has been some success with developing antiviral therapies that interfere with the un-coating of coated viruses, preventing nucleic acid synthesis and preventing the assembly and release of viral particles.

**Prions**

* Prions are infectious \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ that have only recently been recognised as being responsible for several degenerative brain diseases like mad-cow disease and the human disease Cruetzfeldt Jakob disease, which causes ‘holes’ to form in the brain tissue and leads to aggressive behaviour.
* Prions can be transferred by consumption of infected tissues, as occurred with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ epidemic in England were cow where fed a food supplement which contained sheep carcasses that were infected with scrapie.
* Human to human infection can also occur through body fluids