Lea Worthington

Unit 6 Animal Health and Disease: Assignment A – A Picture of Health 1

02/10/20

Structure and functions of each different pathogen and parasite:

Bacteria: Salmonella and Bordetella

The structure of Salmonella and Bordetella have a bacillus shape which is indicated as a rod shaped bacteria, they have a length of 1-10 µm and diameter of 0.25- 1 µm which means they are too small to been seen by the naked eye, however they are visual from using a light and electron microscopes.

In addition, both Salmonella and Bordetella are gram negative which indicates how complex their structure is for the violet stain not to dye the bacteria – this alerts us that it'll take longer to kill and treat with antibodies once inside and affecting the body.

The features of a salmonella bacterium cell have a complex outer wall which is called the capsule and this is what caused the stain not to attach – there are three outer sealants on the salmonella bacteria which are the capsule, cell wall and plasma membrane with extra little hairs called pili on the outside that help latch on to the hosts intestinal tract.

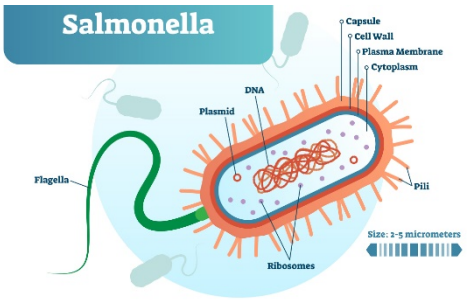

Figure 1 –Salmonella Bacteria

The capsule protects the bacterial cell from ingestion and destruction by the leukocytes (white blood cells) which is a process called phagocytosis.

The cell wall provides the shape and structure of the cell and this provides overall strength for the cell to grow, reproduce and move around the hosts intestine.

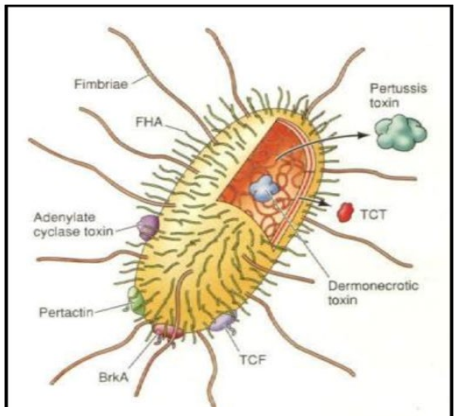

Figure 2 - Bordetella Bacteria

The plasma membrane also called cytoplasmic membrane is the barrier of defence that stops substances getting in and out of the cell.

Furthermore, the bacteria cell has four features related to its functioning to reproduce and grow – these included cytoplasm which is a gel like texture that's aids growth, metabolism and contains enzymes. Within the cytoplasm mixture contains the DNA, plasmid and ribosomes. In addition to this, the chromosomal DNA stores all of the cells specific information that includes how to move, reproduce and feed of the host. Similarly, the plasmid is in other words a small copy of the DNA as it holds molecules of DNA and carries a small number of genes that the cell uses much more regularly compared to the chromosomal DNA. Lastly, the ribosomes provide the protein synthesis which functions all of the cell and living organisms.

To add to this, bacterial cells such as salmonella and Bordet Ella spp is gram negative, this is due to their cell structure being complex enough that the stain used wasn't able to dye the cell which indicates to us that this bacterium will be harder to kill as their complex outer layers require much more treatment as they are resistant to antibiotics. If it was to turn out gram positive, then it would indicate how simple structured the cell is and its probability to accepting or treating the antibiotics.

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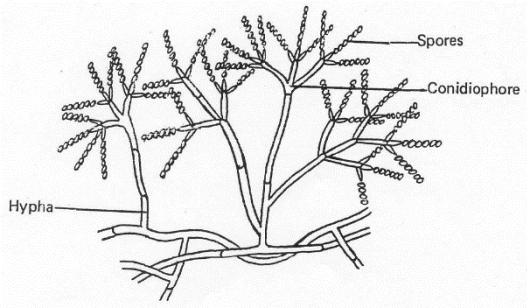
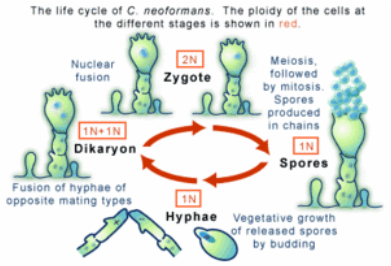
Fungi: Apergillosis and Cryptococcus

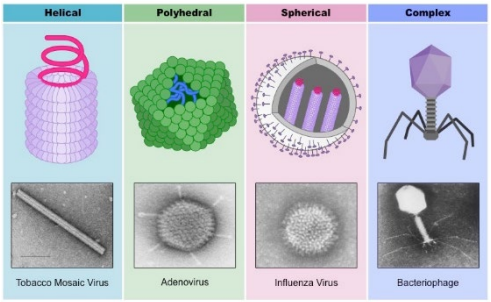


The next pathogen is Aspergillosis and Cryptococcus which are examples of fungi, firstly the aspergillus is a fungal infection which is caused by a species of mold called Aspergillus. This disease commonly affects dogs with weakened immune systems or infants that haven't got fully developed immune system to fight off ant infection or pathogen once entered. The structure of aspergillosis contains a network of long filaments and my diagram is a microscopic image of filaments. The base of the structure is named Hyphae and this is a long threadlike cylinders that are several centimetres long but have a main purpose of containing the cytoplasm or cell sap that may become nuclei because it could contain genetic material. Moving up the mould cell and branching occurs so new hyphae are able to grow and create a huge network called mycelium, further up the structure you'll find conidiophore that are branch like structure which contains spores called conidia. Lastly, the conidia are what has already been asexually reproduce in the dog's nose and sinuses but can be found in any other organs in the body to produce offspring, to carry the disease further through the animal's body.

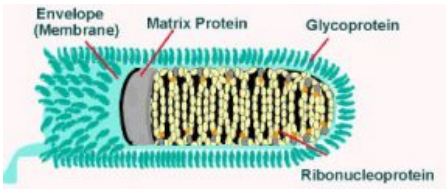


The structure and functions of Cryptococcus is similar to Aspergilliosis however the lifecycle varies slightly. For example, there is a long network of filaments which is the base of the structure called hyphae, the next stage is dikrayon which is a nuclear fusion and this leads to a stage called zygote that using meiosis followed by mitosis to produces a chain of spores (offspring).

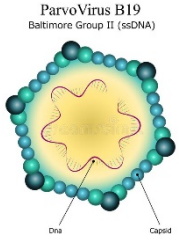
Virus: Rabies and Canine Paravirus



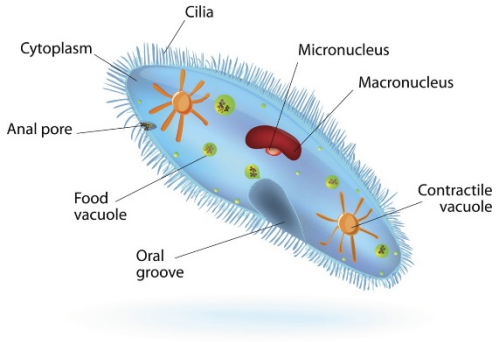
Furthermore, my next examples of viruses are rabies and canine parvovirus which are highly contagious viral disease found in mammals mostly common in dogs or foxes, these feed of the host and can be transferred from saliva or a scratch. A virus can come in the forms such as helical, polyhedral, spherical or complex shape structure - rabies has a helical shape structure that contains RNA, envelope, matric protein, glycoprotein and ribnucleoprotein. RNA is known as a single strand of DNA that stores all of the virus data or information, the envelope is the outermost later also called membrane that protects the genetic material when traveling between t host cells however not all virus has envelopes. After that, the matric protein (M protein) connects the viral membrane together and are important for the virus to grow and to reproduce. Next, the glycoprotein is what help the virus bind to their target hosts membrane by receptors and then allow the capsid and viral genome to enter and infect the host.



In addition to that, the canine parvovirus has a spherical structure containing capsid protein and is a single stranded DNA genome, this imply that it isn't complex and without an envelope the genetic material wouldn't be fully protected and secure - without an envelope it can be called a naked virus. The capsid is the protein shell that encloses the genetic material, lastly the genome is the stand of RNA and these are the instruction for reproducing a new virus.



Parasite: Tapeworm and Protozoa



To conclude, a parasite is an organism that lives in or on an organism of another species (its host) and benefits by deriving nutrients at the others expense.

With that being said, a protozoa is the first type of parasite and single-celled organisms that contain some main functions such as cilia, food vacuole, oral groove, anal pore, cytoplasm, micronucleus and also a flagellum. However only some protozoa's have a flagellum or cell membrane.

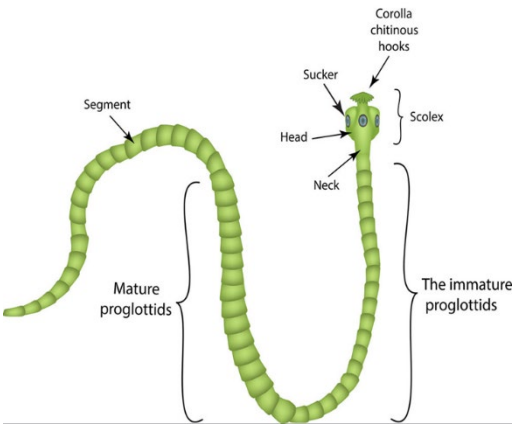
As stated, the protozoa have some similarities as a bacteria cell such as cytoplasm that provides a save environment for the nutrients to perform correctly and flagellum that assists the parasite to travel around in moist aquatic environments such as fresh water, marine environments or soil.

Moreover, the cilia are tiny hair like structures that are located on the outside of the cell, these are allocated to move any substances affecting the protozoa's ability to function correctly, the cilia also help gather passing food and consume it through the oral groove and food vacuole.

The food vacuole and anal pore work together to absorb and consume the food of its nutrients to grow, reproduce and uses its energy to hunt more food. The food vacuole is allocated to ingest pats of the cytoplasm containing the energy and nutrients whilst the cell anal pore releases the waste material or substances into their environment. However, in order for food to enter the food vacuoles system, the oral groove is the main purpose of food entering the protozoa system in the first place. The oral groove finds aquatic invertebrates and passed them through as food to the food vacuole.

Lastly, the micronucleus is where the parasites DNA is stored and keeps securely by the hard outer cell membrane. The micronucleus is like a computer for the protozoa to remember how to reproduce, move and most of all live inside another organism – without the nucleus the cell would die or function incorrectly.

The structure of the pork tapeworm



Additionally, another form of parasite is the tapeworm which is a type of endoparasitic worm – meaning the parasite lives inside the hosts body e.g. intestines or tissues. A tape worm is a long tape like worm with a body that is divided into sections and each section once its matures (breaks off) it contains egg droplets.

The head of the structure is called the scolex and the tape worm using it to attach itself to the intestinal lining off its host. Within the head structure, it contains the corolla chitinous hooks which is at the tip of the head and suckers either side of their head – these as previously mentioned are there to sustain a firm grip on the host intestinal wall. Also, there is the head and neck of the tapeworm and this is to allow stability and to keep upright position.

Also, the body consists of segments which contain unfertilised eggs inside them, these break off and release inside the hosts of a dog or cat's intestine to produce hundreds of tapeworms. The mature and immature proglottids are a large section of segments together however, some contain eggs (closer to the end of the tapeworm) and some haven't formed or matured any yet – these would be at the neck of the tapeworm as these are newer or younger segments.

Routes of transmission of each different pathogen and parasite:

Bacteria: Salmonella and Bordetella

Salmonella can grow on certain fresh foods If they are not refrigerated properly, meaning the bacteria in raw food can enter the animals body causing them to start vomiting, having diarrhoea and paralysis (loss of movement from illness). Even though, salmonella can be caused and passed by uncooked food, once contaminated it can be passed on to other animals by their faeces, bodily fluids, direct contacts such as liking or hugging one another -it can also be surrounded in by their fomites e.g. bedding, clothes and outside areas.

Fungi: Apergillosis and Cryptococcus

The aspergillosis fungal infection can develop form individuals inhaling aspergillus spores meaning it is air bourn – this is what's let out to reproduce. With this, it isn't contagious meaning it cannot be transmitted from one animals to the other by direct contact, bodily fluids or fomites. This fungal infection can be very aggressive with animals such as dogs that have a weak immune system – and so they cannot fight of the infection as quickly and effectively as healthier or stronger immune systems.

Cyrptococcus is most commonlly found in the soil, it Is known from inhaling the fungus (dust with contaminated bird faeces) and with that effecting the lungs or immune system of the animal. However, there have been many cases of infection spread through direct contact with pigeon faeces or unwashed raw fruit.

Virus: Rabies and Canine Parvovirus

Rabies virus can be transmitted monst commonly through direct contact such as a bite and saliva seeping into broken skin