

Meden School Curriculum Planning							
Subject	Biology (Triple)	Year Group	10	Sequence No.	3	Topic	B3: Infection & Response

Retrieval	Core Knowledge	Student Thinking
What do teachers need retrieve from students before they start teaching new content ?	What specific ambitious knowledge do teachers need teach students in this sequence of learning?	What real life examples can be applied to this sequence of learning to development of our students thinking, encouraging them to see the inequalities around them and 'do something about them!'
<p>Year 8 Microbes L1: Understanding that microbes are bacteria, viruses and fungi. Examining the differences between bacteria and viruses and knowing how each affect the body and how they both reproduce rapidly.</p> <p>Year 8 Microbes L2: Knowing that pathogens are disease causing microorganisms such as bacteria, virus, fungi and protists. What is the bodies first line of defence and how do they work?</p> <p>Year 8 Microbes L3: What happens if a pathogen gets inside your body? Understanding white blood cells work through antibodies, antitoxins and phagocytosis.</p> <p>Year 8 Microbes L4: Understanding immunity and how memory cells develop and work. Resulting in a rapid response of antibody production any secondary exposure to the same pathogen.</p>	<p>L1: Communicable Diseases. Students should be able to explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants. Students should be able to explain how the spread of diseases can be reduced or prevented. Pathogens are microorganisms that cause infectious disease. Pathogens may be viruses, bacteria, protists or fungi. They may infect plants or animals and can be spread by direct contact, by water or by air. Bacteria and viruses may reproduce rapidly inside the body. Bacteria may produce poisons (toxins) that damage tissues and make us feel ill. Viruses live and reproduce inside cells, causing cell damage.</p> <p>L2: Bacterial Diseases. Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions. In the UK, poultry are vaccinated against salmonella to control the spread. Fever, abdominal cramps, vomiting and diarrhoea are caused by the bacteria and the toxins they secrete. Gonorrhoea is a sexually transmitted disease (STD) with symptoms of a thick yellow or green discharge from the vagina or penis and pain on urinating. It is caused by a bacterium and was easily treated with the antibiotic penicillin until many resistant strains appeared. Gonorrhoea is spread by sexual contact. The spread can be controlled by treatment with antibiotics or the use of a barrier method of contraception such as a condom.</p> <p>L3: Viral Diseases. Measles is a viral disease showing symptoms of fever and a red skin rash. Measles is a serious illness that can be fatal if complications arise. For this reason, most young children are vaccinated against measles. The measles virus is spread by inhalation of droplets from sneezes and coughs. HIV initially causes a flu-like illness. Unless successfully controlled with antiretroviral drugs the virus attacks the body's immune cells. Late stage HIV infection, or AIDS, occurs when the body's immune system becomes so badly damaged it can no longer deal with other infections or cancers. HIV is spread by sexual contact or exchange of body fluids such as</p>	<p>L1: How diseases are spread, controlled, or reduced? Linking into COVID experiences.</p> <p>L2: How does food preparation and food hygiene relate to causing food poisoning and how this affects food businesses? What are real life dangers of unprotective sex?</p> <p>L3: How does the Measles virus affect the body? How does HIV affect the body? How are these diseases controlled, prevented or cured? How are plants affected by viruses? How can this be applied to real life scenarios?</p>

<p>Year 8 Microbes L6: What are different types of STIs such as gonorrhoea and HIV. Researching numerous STIs on how they are contracted, prevented and treated.</p> <p>Year 8 Microbes L7: What does communicable and non-communicable mean and provide examples of such diseases.</p> <p>Year 8 Microbes L8: How do antibiotics work and addressing the misconception that they can be taken to cure viral diseases. How antibiotics were discovered by Alexander Fleming and how this discovery has saved millions of lives. Understanding that painkillers only treat the symptoms of a disease and not the disease itself. Discovery of antibiotic resistance and the impact of this upon modern medicine.</p> <p>Year 8 Microbes L9: Understanding vaccinations, what is in them, how the body responds to a vaccine and how it provides protection against disease. Researching how Edward Jenner discovered the first vaccine and what are the pros and cons of vaccines. How does mass vaccination and herd immunity work?</p>	<p>blood which occurs when drug users share needles. Tobacco mosaic virus (TMV) is a widespread plant pathogen affecting many species of plants including tomatoes. It gives a distinctive 'mosaic pattern of discolouration on the leaves which affects the growth of the plant due to lack of photosynthesis.</p> <p>L4: Fungal & Protist Diseases. Rose black spot is a fungal disease where purple or black spots develop on leaves, which often turn yellow and drop early. It affects the growth of the plant as photosynthesis is reduced. It is spread in the environment by water or wind. Rose black spot can be treated by using fungicides and/or removing and destroying the affected leaves.</p> <p>The pathogens that cause malaria are protists. The malarial protist has a life cycle that includes the mosquito. Malaria causes recurrent episodes of fever and can be fatal. The spread of malaria is controlled by preventing the vectors, mosquitos, from breeding and by using mosquito nets to avoid being bitten.</p> <p>L5: Body Defenses: Students should be able to describe the non-specific defence systems of the human body against pathogens, including the:</p> <ul style="list-style-type: none"> • skin • nose • trachea and bronchi • stomach. <p>L6: Immune System: Students should be able to explain the role of the immune system in the defence against disease. If a pathogen enters the body the immune system tries to destroy the pathogen.</p> <p>White blood cells help to defend against pathogens by:</p> <ul style="list-style-type: none"> • phagocytosis • antibody production • antitoxin production. <p>L7 & L8: Vaccines: Students should be able to explain how vaccination will prevent illness in an individual, and how the spread of pathogens can be reduced by immunising a large proportion of the population. Vaccination involves introducing small quantities of dead or inactive forms of a</p>	<p>L4: How do fungal diseases affect plants? How can fungal diseases be prevented or controlled? What is Malaria? What is the impact of Malaria on developing countries? How can we prevent or control Malaria?</p> <p>L5: How does the body defend itself? What is the bodies first line of defence? What is the immune system? How does the immune system defend us from diseases?</p> <p>L6: How does a vaccine work? What are examples of vaccines that we may have had? How has the vaccination programme affected the spread of covid? What are the pros and cons of vaccines?</p>
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	<p>pathogen into the body to stimulate the white blood cells to produce antibodies. If the same pathogen re-enters the body the white blood cells respond quickly to produce the correct antibodies, preventing infection. Students do not need to know details of vaccination schedules and side effects associated with specific vaccines.</p> <p>L9: Antibiotics & Painkillers. Students should be able to explain the use of antibiotics and other medicines in treating disease. Antibiotics, such as penicillin, are medicines that help to cure bacterial disease by killing infective bacteria inside the body. It is important that specific bacteria should be treated by specific antibiotics. The use of antibiotics has greatly reduced deaths from infectious bacterial diseases. However, the emergence of strains resistant to antibiotics is of great concern. Antibiotics cannot kill viral pathogens.</p> <p>Painkillers and other medicines are used to treat the symptoms of disease but do not kill pathogens. It is difficult to develop drugs that kill viruses without also damaging the body's tissues.</p> <p>L10 & L11: Development of Drugs Students should be able to describe the process of discovery and development of potential new medicines, including preclinical and clinical testing.</p> <p>Traditionally drugs were extracted from plants and microorganisms.</p> <ul style="list-style-type: none"> • The heart drug digitalis originates from foxgloves. • The painkiller aspirin originates from willow. • Penicillin was discovered by Alexander Fleming from the Penicillium mould. <p>Most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant.</p> <p>L12 & L13: Monoclonal Antibodies</p> <p>Monoclonal antibodies are produced from a single clone of cells. The antibodies are specific to one binding site on one protein antigen and so are able to target a specific chemical or specific cells in the body.</p> <p>They are produced by stimulating mouse lymphocytes to make a particular antibody. The lymphocytes are combined with a particular kind of tumour cell to make a cell called a hybridoma cell. The hybridoma cell can both divide and make the antibody. Single hybridoma cells are cloned to produce many identical cells that all produce the same antibody. A large amount of the antibody can be collected and purified.</p>	<p>Should there be mass vaccination programmes?</p> <p>L7: Should antibiotics be given to cure all diseases? Should antibiotics be given to animals breed for food?</p> <p>L8: How does the destruction of the Amazon rainforest affect the development of new drugs? Who was Alexander Fleming and how did he develop Penicillin? Why do plants contain chemicals that be used to synthesise new drugs?</p>
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L14: Uses of Monoclonal Antibodies

Monoclonal antibodies can be used in the following

- for **diagnosis** such as in **pregnancy tests**
- in laboratories to measure **the levels of hormones** and other chemicals in blood, or to detect pathogens
- in research to locate or identify specific molecules in a cell or tissue by binding to them with a **fluorescent dye**
- to treat some diseases: for cancer the monoclonal antibody can be bound to a radioactive substance, a toxic drug or a chemical which stops cells growing and dividing. It delivers the substance to the cancer cells without harming other cells in the body.

Monoclonal antibodies create more side effects than expected. They are not yet as widely used as everyone hoped when they were first developed.

L15: Plant Disease

(HT only) Plant diseases can be detected by:

- stunted growth
- spots on leaves
- areas of decay (rot)
- growths
- malformed stems or leaves
- discolouration
- the presence of pests.

(HT only) Identification can be made by:

- reference to a gardening manual or website
- taking infected plants to a laboratory to identify the pathogen
- using testing kits that contain monoclonal antibodies.

Plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects. Knowledge of plant diseases is restricted to tobacco mosaic virus as a viral disease, black spot as a fungal disease and aphids as insects.

Plants can be damaged by a range of ion **deficiency** conditions:

- stunted growth caused by **nitrate deficiency**
- **chlorosis** caused by **magnesium deficiency**.

Knowledge of ions is limited to nitrate ions needed for **protein synthesis** and therefore growth, and magnesium ions needed to make chlorophyll.

	<p>L16: Plant Defences Physical defence responses to resist invasion of microorganisms.</p> <ul style="list-style-type: none">• Cellulose cell walls.• Tough waxy cuticle on leaves.• Layers of dead cells around stems (bark on trees) which fall off. <p>Chemical plant defence responses.</p> <ul style="list-style-type: none">• Antibacterial chemicals.• Poisons to deter herbivores. <p>Mechanical adaptations.</p> <ul style="list-style-type: none">• Thorns and hairs deter animals.• Leaves which droop or curl when touched.• Mimicry to trick animals. <p>L17: Revision</p> <p>L18: EoTT</p> <p>L19: GPA</p>	
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