Module 3: Global Health

Lecture 19 - Microbiology and the 'One Health' concept

Learning outcomes:

- *Define the five major types of microbes (viruses, bacteria, fungi, protists, algae)*
- *Describe key inventions and ideas in microbiology:*
  - *Microscopy*
  - *Agar plates*
  - *Spontaneous generation*
  - *Germ theory*
  - *Koch's postulates*
  - *Penicillin*
- *Discuss difference between normal flora, transients, & pathogens*
- *Explain the concept of 'One Health'*
- *Describe one major problematic infectious disease*

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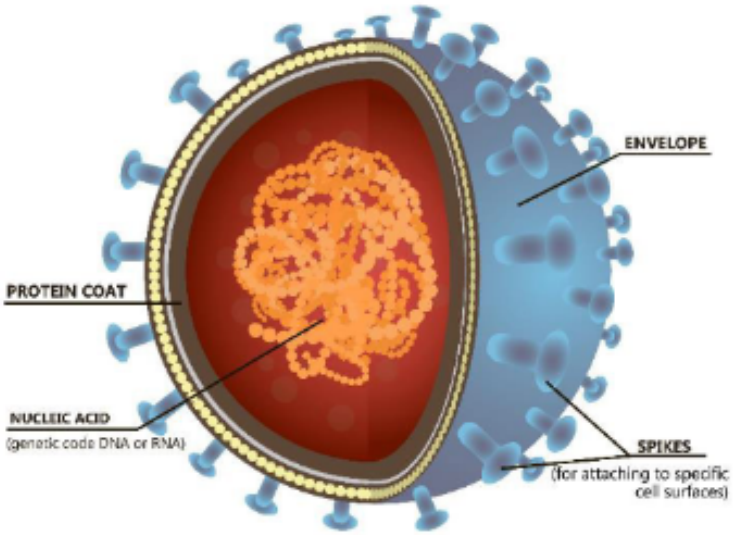
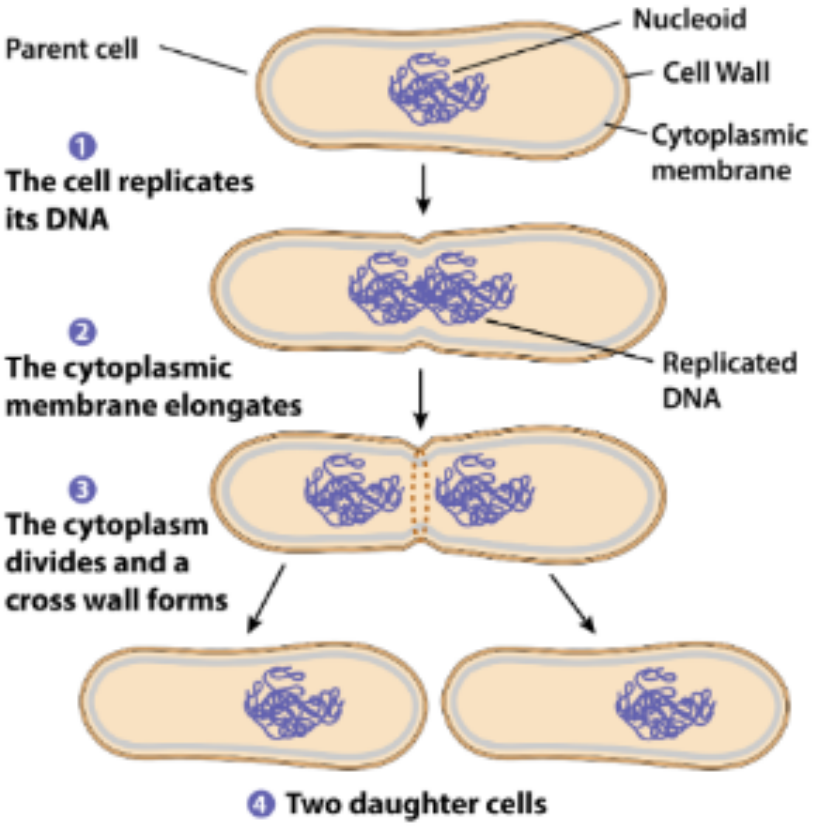
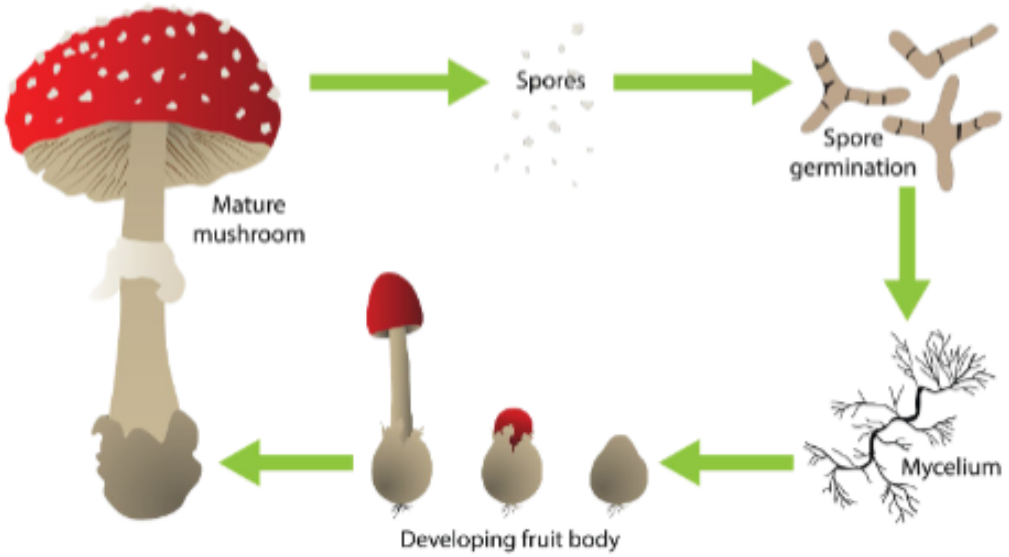
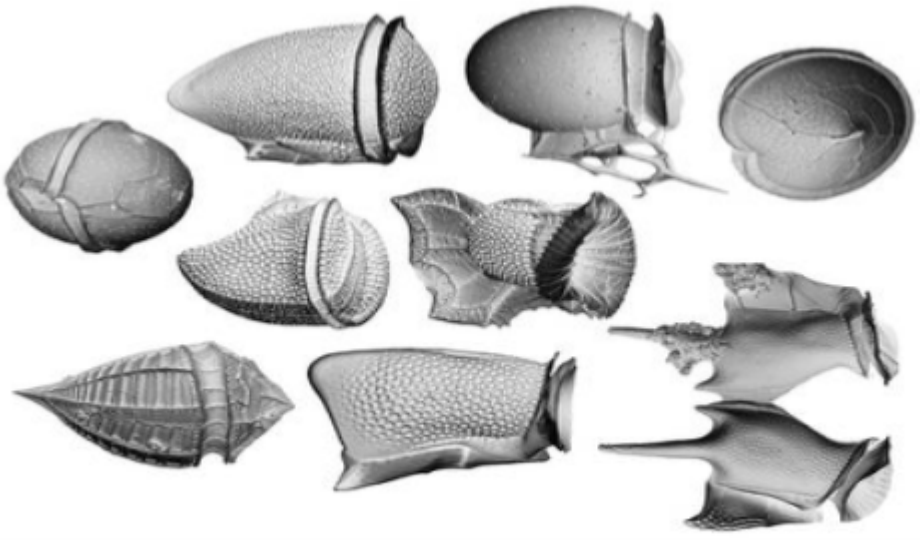
10 trillion human cells 30 trillion non-human cells on and within the human body

Virus	The smallest and simplest biological entities - Acellular (nonliving) - Are comprised of a DNA or RNA in a protein shell - Don't last long without a host, and need a host cell for replication and metabolism - Viruses utilise hot cell machinery and steal nutrients and energy in order to multiply.  Viruses will either cause cells to: - Lyse (burst and spread to infect other cells) - Or hide in our genome

	Viruses are very small and have a tiny genome.. But they have a huge impact on organisms and ecosystems
Bacteria	- Unicellular structure, many are prokaryotes - Bacteria are the smallest cellular organisms. Can be “true living” - Undergo their own metabolism and energy production Bacteria can self replicate through binary fission.  Bacteria also have their own metabolism and processes which are not seen in higher order organisms Bacteria act as primary producers and decomposers in the ecosystem. **Cocci** – spherical bacteria **Bacilli** – rod-shaped bacteria **Filaments** – long, thread-like bacteria (often chains of cells)

Fungi	Large and complex cells
	- Eukaryotes:
	  - Membrane bound nucleus
	  - Complex organelles (eg, mitochondria, golgi apparatus etc..)
	
	Fungi can be unicellular and multicellular
	- Yeasts (unicellulars)
	- Moulds and mushrooms (multicellular)

	Fungi can be microscopic and macroscopic and these can also be in differing stages of the fungus development Fungi reproduce via spores and fruiting bodies 

Protist	Large complex cells
	- Eukaryotes:
	  - Membrane bound nucleus
	  - Complex organelles (eg, mitochondria, golgi apparatus etc..)
	
	There is a massive diversity of protists, many differ in their:
	- Morphology
	- Lifestyle
	- Evolution
	
	 
	
	There are two types of protists:

	1. Photosynthetic (produce their own energy) 2. Predatory, also called protozoa (feed on other organisms)
Algae	- Eukaryotic or prokaryotic - Are photosynthetic → the largest players in global photosynthesis - Have complex cellular structures.