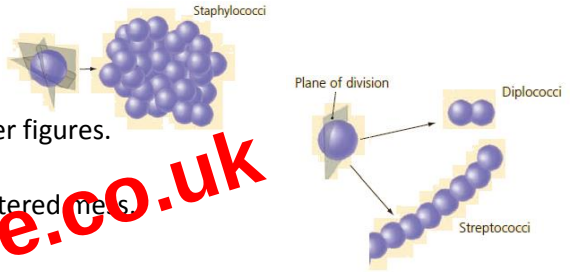
Chapter 11 – Characterizing and Classifying Prokaryotes

1. *Identify the following shapes of prokaryotic cells to the right:*

2. *Describe the formation and function of bacterial endospores.*
   - Endospores are a **defensive measure** and is found in Gram-positive bacteria like Bacillus and Clostridium.
   - The process of formation is known as **sporulation** and takes 8-10 hours. *[Process already covered earlier.]*

3. *Compare and contrast binary fission and budding.*
   - **Binary fission** involves replication of DNA, growth of the cell, invagination of cell in the middle, and then the cell wall divides into two daughter cells. Afterwards, the two cells may or may not divide.
   - **Budding** involves an outgrowth of the original cell that receives a copy of DNA. Eventually, the bud is cut off while it is still small.



4. *Know these arrangements of cocci and bacilli.*
   - Arrangements are based on the plane of replication. Consider figures.
   - Diplococci and streptococci are linear sphere chains.
   - Staphylococci are formed by a random plane, thus it's a clustered mess.
   - Likewise, diplobacilli and streptobacilli are linear rod chains.

5. *Know the common features of microbes in the domain Archaea, compared to bacteria.*
   - They lack true peptidoglycan in their cell walls.
   - Their membrane lipids have branched or ring-form hydrocarbon chains.
   - The initial amino acid in their polypeptide chains, coded by the AUG start codon, is methionine.
   - No members of Archaea have been shown to cause disease.

6. *Define a thermophile, hyperthermophile and a halophile. Where are you likely to find them?*
   - **Thermophiles** are prokaryotes that only function at temperatures at or higher than 45 °C.
     - Thermophiles that require over 80 °C are called **hyperthermophiles**.
   - Thermophiles are found in acidic hot springs, deep ocean rifts, volcanoes, and deep-sea hypothermic vents.
   - **Halophiles** are organisms that live in extremely salty habits like the Dead Sea.

7. *Discuss the lack of cell walls in mycoplasmas.*
   - Because of the lack of cell walls, mycoplasmas stain pink when Gram stained.
   - They survive in osmotically protected habitats, such as human bodies.
   - They also have sterol lipids that strengthen their membranes.

8. *Describe the difference between low and high G+C content.*
   a. G+C content refer to the amount of **guanine+cytosine base pairs in genome**.
   b. Those with G+C content below 50% are considered "low G+C bacteria," and vice versa.
   c. Gram-positive bacteria with low G+C content have similar sequences in their 16S rRNA and vice versa.
   d. Low G+C bacteria are classified under **Firmicutes phylum**.
   e. High G+C bacteria are classified under **Actinobacteria phylum**.