

Week 6 – Chapter 23

Firmicutes: Phylum

The Low G + C Gram-Positive Bacteria

→ Historically grouped on the basis of phenotypical characteristics:

- | | | |
|--|---|-------------------------------|
| <ul style="list-style-type: none">• Cell shape• Arrangement of cells• Presence of endospores | ⋮ | Morphological characteristics |
| <ul style="list-style-type: none">• Oxygen requirements• Patterns of fermentation• Peptidoglycan chemistry | ⋮ | Physiological characteristics |

→ the most recent edition of *Bergey's Manual* classify the gram-positive bacteria on the basis of phylogenetic characteristics such as **16S rRNA sequence comparisons**

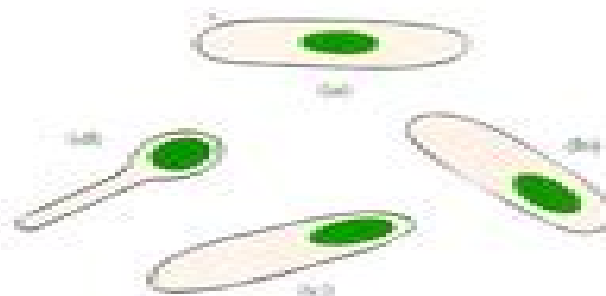
Peptidoglycan structure and endospores are still important in the taxonomy of these organisms.

- The peptidoglycan structure of different gram-positive groups differs considerably
- Peptidoglycan structure can also differ with regard to the number of cross-linkages (interpeptide bridges) between the glycan chains
- Bacilli (rod-shaped) bacteria and gram-negative bacteria have **fewer peptide bridges** than *Staphylococcus aureus* (cocci-shaped)

Endospore production

- Characteristic feature of many gram-positive bacterial species
- Spheroidal to egg-shaped intracellular survival structures
- Each consists of spore capsule, cortex and inner spore membrane that encloses the **protoplast**
- Contains **dipicolinic acid** and is very heat resistant
- Ability to remain dormant for long periods of time before germinating under favourable conditions

Examples of endospore location and size



spore-containing cell → sporangium

Clostridium tetani

→ Terminal spore with swollen sporangium

• Anaerobic genus – *Clostridium*

Figure 1.14 Examples of Endospore Location and Size.
(a) Central spore. (b) Subterminal spore. (c) Terminal spore.
(d) Terminal spore with swollen sporangium.

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