

## Endospores (spores)

These are a dormant form of a bacterial cell produced by certain bacteria when starved; the actively growing form of the cell is referred to as vegetative. The spore is resistant to adverse conditions (including high temperatures and organic solvents). The spore cytoplasm is dehydrated and contains calcium dipicolinate (dipicolinic acid) which is involved in the heat resistance of the spore. Spores are commonly found in the genera *Bacillus* and *Clostridium*. **Wirtz-Conklin method is used to stain endospores.**

These modified Gram positive bacterial cells have an unusual cell envelope that contains a cell membrane and an outer membrane. The peptidoglycan layer is less cross-linked than in most bacterial cells and contains a dehydrated form of muramic acid. The spore peptidoglycan is referred to as a cortex and is found between the two membranes. A coat consisting of highly cross-linked keratin is found around the outside of the cell. The bacterial spore is highly resistant to chemical agents because of this coat.

Normally in bacterial replication, as cells divide, a septum forms dividing the mother cell into two roughly equally sized daughters. When sporulation occurs, cell division is unequal and the larger so-called "mother cell" envelops the daughter cell. The cell membrane of the daughter cell constitutes the inner membrane of the spore and the cell membrane of the mother forms the outer membrane

## Capsules and slime layers

**Burri's India ink method** is used to stain capsules. Capsules are structures surrounding the outside of the cell envelope. When more defined, they are referred to as a capsule when less defined as a slime layer or glycocalyx. They usually consist of polysaccharide; however, in certain bacilli they are composed of a polypeptide (polyglutamic acid). They are not essential to cell viability and some strains within a species will produce a capsule, whilst others do not. Capsules of pathogenic bacteria inhibit ingestion and killing by phagocytes. Capsules are often lost during *in vitro* culture.

## Metachromatic granules

**Albert Staining is used to stain the Volutin or Metachromatic granules** present in *Corynebacterium Diphtheriae*. The granules are more numerous if cultured on a protein rich media, like Dorset egg or Loeffler serum. Metachromatic granules also can be found in other *Corynebacterium* species and occasionally in some *Bacillus* species. Granules are present in bacteria- composed of polymetaphosphate. Its function is storage. As with Loeffler's methylene blue staining, it takes bluish-purple colors, it is called Metachromatic granules. They are also called 'Volutin' or 'Babes-Ernst granules'.

SOURCE:

Microbiology and Immunology online

[http://www.microbiologybook.org/fox/cell\\_envelope.htm](http://www.microbiologybook.org/fox/cell_envelope.htm)

<http://www.microbiologybook.org/fox/prototype.htm>

abhelpline.com/2019/09/14/albert-staining-to-identify-c-diphtheriae/