

Mycoplasma/PPLO's

Mycoplasma, earlier known as 'Pleuro Pneumonia Like Organisms' (PPLO's) were discovered to be associated with the disease **bovine pleuro pneumonia** and were described in one of the orders mycoplasmatales under Eubacteria.

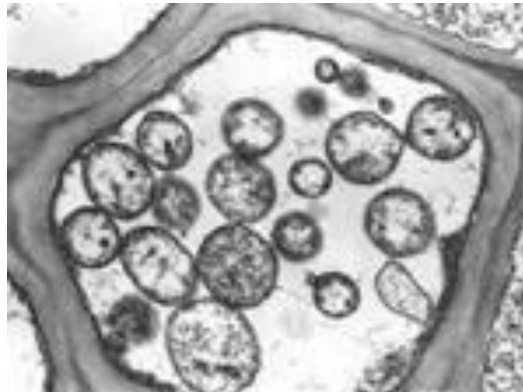
- Mycoplasma represent a group of organisms that lack cell wall and contain a very small genome.
- Phylogenetically, they are closely related to clostridia, the gram positive bacteria.
- As per the requirement for their growth, they can be divided into those which require sterol (mycoplasma and spiroplasma); and those which do not require sterols (acholeplasma and thermoplasma).
- The mycoplasma cells are small, pleomorphic (of different shapes) and divide by budding. The colonies of mycoplasma on agar exhibit a characteristic 'fried egg' appearance because of the formation of dense central core surrounded by lighter circular spreading area.
- The growth of mycoplasma is not inhibited by penicillin or other antibiotics that inhibit cell wall synthesis. But they are sensitive to tetracycline.
- The *Spiroplasma* genus is important plant pathogenically and has cork screw shaped cells. They are motile and exhibit undulating or rotating movement. *Spiroplasma citri* has been associated with citrus plants, where it causes citrus stubborn disease and corn plants which causes corn stunt.

Phytoplasma

They were earlier called MLO's and were found to be associated with several yellows and witches' broom diseases after their discovery by Doi *et al.* in 1967.

- They are different from mycoplasma in the sense that they can not be cultured on synthetic media.
- The change in terminology from MLO's to phytoplasma occurred since the studies of DNA homology in the highly conserved genes encoding ribosomal RNA and ribosomal protein.
- It showed that the phytoplasma comprise a coherent group distinct from other prokaryotes. Their closest relatives are in the genus *Acholeplasma*.
- As they have not been cultured on artificial medium *in vitro* and characterized apart from their host, they are referred to *Candidatus* status.

- They are associated with about 200 plant diseases including aster yellows, apple proliferation, peanut witches' broom, peach-x-disease, rice yellow dwarf and elm yellows.
- They are phloem inhabiting organisms and are graft transmissible in nature, and can also be transmitted by leaf hoppers.



Phytoplasmas in plant cell

Bacteria as Plant Pathogens

- Bacteria are known to grow in a wide range of habitat.
- All the plant pathogenic bacteria are mesophilic (they can grow at a temperature of 20-35°C); and remain in the host plants as plant parasites and only partly in plant residues or as saprophytes in soil.
- They enter the plants either through natural openings such as stomata, lenticels or hydathodes or through wounds.
- The presence of free water is essential for bacterial infection. Once inside the plant tissues, they multiply only if there is water or at very high humidity.
- They multiply in the intercellular spaces and produce pectolytic and other cell wall degrading enzymes, thereby creating more space to move inside the host tissue.
- They kill the host cells by the action of extracellularly released enzymes and toxins and subsequently invade the dead cells. Most of the bacterial pathogens are necrotrophs.
- Some are apparently biotrophs.
- Some species colonize the xylem vessels and because of their physical presence or the slime ultimately cause the plugging of the water conducting tissues and cause wilt symptoms.

- Plant pathogenic bacteria produce various types of symptoms in plants as are caused by fungal pathogens. They cause soft rot of vegetables and fruits, wilts, cankers, scabs and also over-growths.