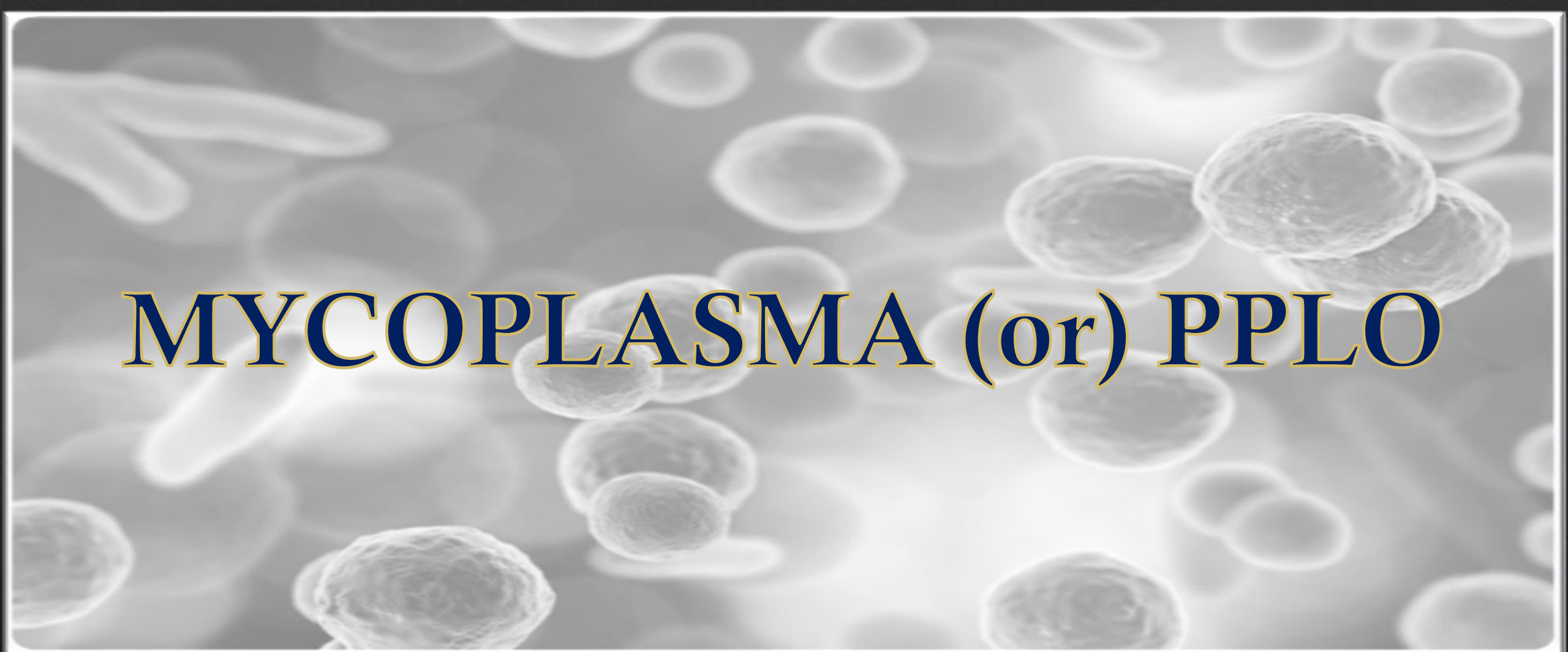




MYCOPLASMA (or) PPLO

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Why study of microbes matter

- ◈ Microbes are everywhere and affect almost all aspects of our lives.
- ◈ We cannot see them, but our world would not function without them. Bacteria, viruses, fungi, protists, archaea, algae and other microscopic life forms are on us and in us, in the air, soil and water, and in our food.
- ◈ They are in and on the surfaces of everything in our homes, workplaces and other environments.
- ◈ Most do not harm us and many are essential for the good health of humans, animals and the planet.
- ◈ Microbes help keep the planet healthy by recycling waste and supplying nutrients.
- ◈ Microbes are very diverse, they are fascinating, and modern imaging techniques show that they can be very beautiful.

MYCOPLASMA

Among living organisms that have the smallest mass, are small bacteria called mycoplasmas which produce infectious diseases in animals including humans.



MYCOPLASMAS are unicellular, prokaryotic, containing a plasma membrane, DNA, RNA and a metabolic machinery to grow and multiply in the absence of other cells (i.e., they are capable of autonomous growth).

They can be cultured *invitro like* any bacteria, forming pleomorphic colonies, i.e., depending on the type of culture medium, mycoplasmas tend to form different shaped colonies such as spheroid, thin, branching filaments, stellate, asteroid or irregular.

They differ from the bacteria in the following respects:

- ◆ Mycoplasmas are filterable through the bacterial filters (fact first demonstrated by Iwanowsky in 1892)
- ◆ They do not contain cell wall and mesosomes
- ◆ Like the viruses and animal cells, they are resistant to antibiotics such as penicillin which kills bacteria by interfering with cell wall synthesis
- ◆ Their growth is inhibited by tetracycline and antibiotics that act on metabolic pathways

DISCOVERY

Mycoplasmas were discovered by French scientist E. Nocard and E. R. Roux in 1898 while studying pleural fluids of cattle suffering from the disease pleuropneumonia which is an infectious disease of warm blooded animals producing pleural and lung inflammation.

Similar organisms were later isolated from other animals such as sheep, goats, dogs, rat, mice and human beings and were named as pleuropneumonia like organisms(PPLO).

NOMENCLATURE

PPLO were later on included under the genus *Mycoplasma* by **Nowak** (1929) and these organisms are now commonly called mycoplasmas. **W.V.Iterson** (1969) has placed PPLO in the group Mycoplasmataceae of bacteria. Currently mycoplasmas are considered as the simplest bacteria. However, some cell biologists still prefer to place PPLO in between the viruses and bacteria.

HABIT AND HABITAT

Mycoplasmas are mostly free-living, saprophytes or parasites. For example, *Mycoplasma laidlawii* (0.1µm in diameter) is saprophytic and is found in sewage, compost, soil etc. *Mycoplasma gallisepticum* (0.25µm in diameter) is parasitic and pathogenic; it is the parasite of cells and cell exudates of respiratory organs of warm –blooded animals causing in them various chronic respiratory diseases

STRUCTURE

- ❖ Mycoplasmas range in size 0.25 to 0.1 μm in diameter. Thus, they correspond in size to some of the large viruses.
- ❖ The spherical cell of a mycoplasma is bounded at its surface by a 75 $\text{\AA}$ thick plasma membrane which is composed of molecules of proteins and lipids, but there is no cell wall.

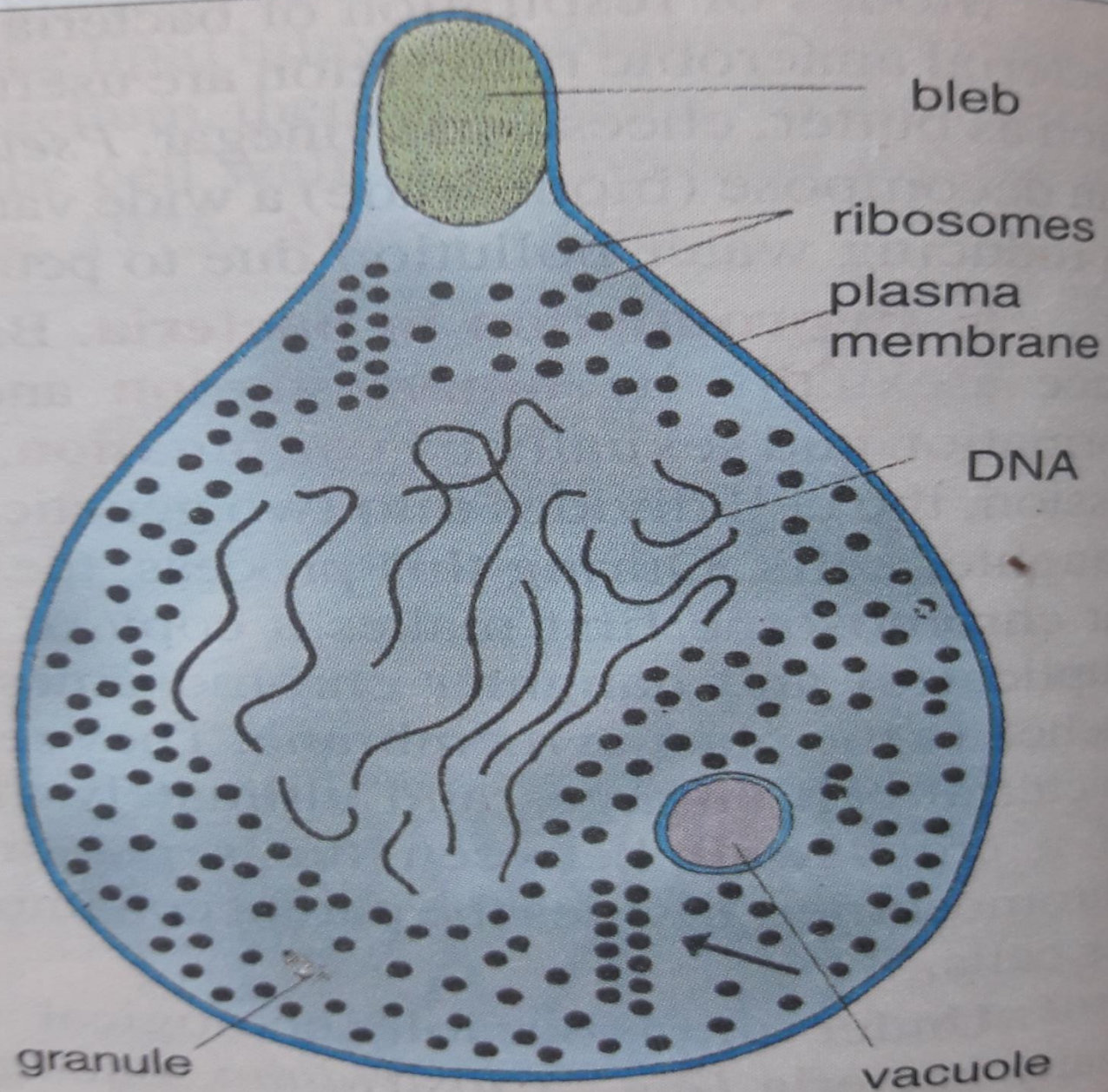


Fig 3.13. A schematic diagram of typical PPLO cell.

INTERNAL STRUCTURE

- Internally the cells composition is more or less diffuse.
- The only microscopically discernible features within the cell are its genetic component, the DNA and the ribosomes.
- The DNA molecule is contained in a membrane less and clear nucleus-like region and it is a double helix which may exist either as the linear strands or a single circular molecule.
- The nuclear region is surrounded by numerous 70S type ribosomes existing either freely or in the polysomes.
- A variety of other cytoplasmic inclusions, such as vacuoles and granules, have also being detected, but their functions are not known.
- At one side of the cell occurs bleb of ill understood function. As in other prokaryotes, there is no intracellular membranous structure.

- The PPLO cells contain many enzymes which may be required for DNA replication, the transcription of different kinds of RNA molecules and translation involved in protein synthesis, and also in the biosynthesis of ATP by anaerobic breakdown of sugars.
- Unlike viruses, they are free living and do not require host cells for their duplication.

REPRODUCTION

PPLO reproduce by

- binary fission
- budding
- formation of small spore-like bodies
- growth of large branched filaments that ultimately fragment.

Epidemiology

Mycoplasmas are frequently present as commensals in the oropharynx or in the genital tract of healthy subjects. Of the 18 species found in humans, only a few are clearly pathogenic.

Mycoplasma pneumoniae and the closely related *Mycoplasma genitalium*, which is currently an emerging hot topic in the sexual health community.

Mycoplasma pneumonia

The *Mycoplasma pneumonia* bacterium is one of the most recognized of all human pathogens.

There are over 200 different known species.

Most people with respiratory infections caused by *Mycoplasma pneumoniae* don't develop pneumonia.

Once inside the body, the bacterium can attach itself to your lung tissue and multiply until a full infection develops.

Most cases of mycoplasma pneumonia are mild.

Mycoplasma genitalium

- ❖ *Mycoplasma genitalium* commonly known as **Mgen**, is a sexually transmitted, small and pathogenic bacterium that lives on the skin cells of the urinary and genital tracts in humans.
- ❖ Medical reports published in 2007 and 2015 state Mgen is becoming increasingly common.
- ❖ The bacteria was first isolated from urogenital tract of humans in 1981 and was eventually identified as a new species of *Mycoplasma* in 1983.
- ❖ It can cause negative health effects in men and women. It also increases the risk factor for HIV spread



THANK YOU