

Discovered by Jannowsky
in 1962.

MYCOPLASMA PPLO

VIRUS - 0.02 - 0.3 μ m
PPLO - 0.1 μ m
Bact. - 1 - 2 μ m
Ty. Bact. - 10 - 20 μ m dia.

- (1) - Smallest mass among living organisms. May be called smaller
- They are unicellular, prokaryotic organisms having Plasmid and
DNA, RNA and a metabolic machinery. They are capable of
autonomous growth (in the absence of other cell). They appear to
contain the basic minimum of structural organization required for viability.
- (2A) Shape - They can be cultured in vitro forming Pleomorphic
(Ge., floor-mat; morpho-form) colonies such as -
spheroid, thin, branching filaments, stellate, asteroid, etc.
It depends upon the type of culture medium.

Difference between

(2A)

Size:
0.25 - 0.1 μ m
dia.
(1000 Å dia)

Mycoplasma

1. Mycoplasma are filterable through the bacterial filter (Iwanowsky - 1892)
2. They do not contain cell wall and mesosome
3. They are resistant to ^{antibiotics} penicillin like viruses & animal cell
4. Their growth is inhibited by tetracyclines and similar antibiotics that act on metabolic pathway -

Bacteria.

1. Not filterable.
2. Both present.
3. Antibiotics kills bacteria (by interrupting synthesis).
- 4.

3) Nutrition

- Mycoplasmas are mostly free living, saprophytic or parasitic.
Example - *M. laidlawii* (0.14 μ m dia.) is saprophyte reported from
sewage, compost, soil etc.

- *M. gallisepticum* (0.25 μ m dia.) is parasitic and pathogenic. It is parasitic on cells and cell exudates of respiratory organs of warm blooded animal causing them various chronic respiratory diseases.

3) Discovery

- Discovered by E. Nocard and E.R. Roux (1898) from cattle suffering from "Pleuropneumonia" (= Pleural and lung inflammation).
- Similar organisms were later isolated from other warm blooded animals like sheep, goats, dogs, rats, human beings and were named as "pleuropneumonia-like organisms (PPLO)".

(3) B Taxonomic position:-

- Nowak (1929) included PPLo under the genus Mycoplasma.
- W.V. Johnson (1969) has placed PPLo in the group mycoplasma-tacae of bacteria.
- Sheeler and Bianchi (1987) prefer to place PPLo in between the viruses and bacteria.
- Alberts et al., (1989) considered mycoplasma as the simplest bacteria.

(4) Structure:- They are smaller than some of the larger viruses. Size varies from 0.25 to 0.1 μ m in dia (= 100 viruses) 1000 times smaller than the average bacterium and a million times smaller than a eucaryote.

They resemble the L-forms of bacteria.

- Shape - Spherical
- Cell wall is lacking but mycoplasma is bounded by 75% thick plasma membrane which is made up of lipoproteins.
- Inside the plasma membrane - DNA (dsDNA) as the linear or ^{single} circular molecule, remain surrounded by numerous (50-100) 70S type ribosomes (either free or in form of poly some). vacuoles & granules are also present but their functions are not known.
- Cell contains various types of enzymes which are required for DNA replication, transcription & R.N.A.s, protein synthesis, biosynthesis of ATP, etc.
- At the one side of the cell occurs 'bleb' (localized collection of fluid) whose function is not clear. As in other prokaryote, there is no internal membrane.

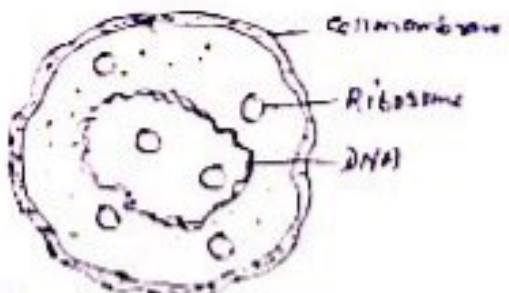


Fig. Structure of Mycoplasma. (Sheeler & Bianchi)

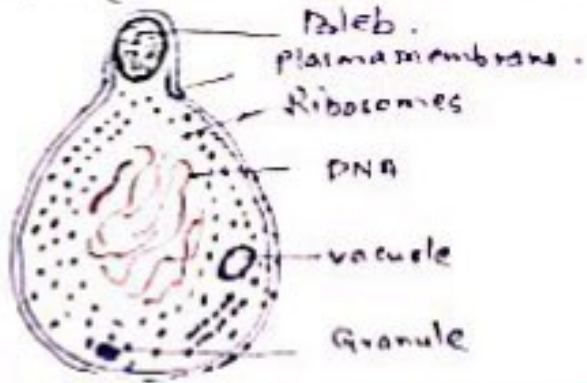


Fig - A schematic diagram of typical PPLo cell.

(6) Reproduction:-

PPLo reproduce by - binary fission, budding, formation of small spore like bodies and by growth of large branched filaments that ultimately fragment.

RICKETTSIA

1.

Rickettsia are bacteria which are obligate, intracellular parasites. They are characterized as a separate group of bacteria because they have the common feature of being spread by arthropod vectors (lice, fleas, mites, etc.).

* Structure:-

- Shape - cells are rod shaped, coccoid and often pleomorphic.

- Size - They are extremely small in size i.e. 0.25 μ m in diameter.

- * Structure - They are Gram⁻ and without flagella. They have typical bacterial cell wall which consists three major layers -

- a) an innermost cytoplasmic membrane

- b) a thin, dense, rigid cell wall

- c) an outer layer which resembles with typical membranes in its chemical composition and its trilaminar appearance.

- The cell wall is ~~similar~~ chemically similar to that of Gram⁻ bacteria in that it contains diaminopimelic acid and lacks teichoic acid.

- Intra cytoplasmic invaginations of the plasmamembrane (mesosomes) and ribosomes are also seen. There are no discrete nuclear structure.

- The basis for the obligate parasitism of these cells is that they require rich cytoplasm to stabilize an unusually permeable membrane.

→ P.T.O.

(2)

Rickettsia contd..... * Growth & multiplication:

Rickettsiae normally multiply by transverse binary fission. It occurs only inside the host cells. They occur in singly, in pair or in strands. Most species are found only in the cytoplasm of host cells, but those which cause spotted fevers multiply in nuclei as well as in cytoplasm. In laboratory, they may be cultivated in living tissues such as embryonated chicken eggs or vertebrate cell cultures.

Under poor nutritional conditions, Rickettsiae cease division and grow in long filamentous forms, which subsequently undergo rapid and multiple division into the typical short rod form. When fresh nutrition is added immediately after division, the Rickettsiae starts extensive movements through the cytoplasm of the cell.

* Pathogenicity:

They are transmitted to man, via arthropods saliva, through a bite. In their mammalian host, they are found principally in the endothelium of the small blood vessels particularly in those of the brain, skin and heart.

- Rickettsia akashi causes rickettsial pox, a mild disease. Symptoms include black, crusty scabs. Many of the symptoms include - fever, weakness and aches of muscles.

- They also cause Rocky Mountain spotted fever, Trench fever, scrub typhus & Q fever.