

Difference Between Mycoplasma and Mycobacterium

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Key Difference - Mycoplasma vs Mycobacterium

Bacteria are single cell **prokaryotic** organisms. They can live on soil, water, air and even on and inside the other organisms. Bacteria possess a simple unicellular structure with free floating, single **chromosome genome**. Some bacteria contain extra-chromosomal DNA called **plasmids**. Bacteria contain a **cell wall** which protects them from environmental influences. Mycobacterium and mycoplasma are two clinically important bacterial groups. The key difference between mycoplasma and mycobacterium is the presence of a cell wall. **Mycobacterium is a genus of bacteria where all species possess a thick, protective and waxy cell wall. Mycoplasma is another unique bacterial genus in which all species do not contain a cell wall around their cell membrane.**

What is Mycoplasma?

Mycoplasma is a genus of bacteria, which includes species that lack cell walls around their cell membranes. The cell wall determines the shape of the bacterium. Since mycoplasma does not contain a cell wall, they do not possess a definite shape. They are highly pleomorphic. The genus mycoplasma includes **gram-negative, aerobic** or facultative aerobic bacteria. They can be parasitic or saprotrophic. There are about 200 different species in mycoplasma genus. A few species among them cause diseases in human. Four species have been recognized as human **pathogens** which cause significant clinical infections. They are *Mycoplasma pneumoniae*, *Mycoplasma hominis*, *Mycoplasma genitalium*, and *Ureaplasma* species. Mycoplasma is the smallest bacteria discovered yet with the smallest genomes and a minimum number of highly essential organelles.

Mycoplasma species cannot be easily destroyed or controlled by common **antibiotics** such as penicillin or beta-lactum antibiotics which target the cell wall synthesis. Their infections are persistent and hard to diagnose and cure. Mycoplasma also contaminates cell cultures, causing serious problems in research laboratories and industrial settings.



Figure 01: *Mycoplasma haemofelis*

What is Mycobacterium?

Mycobacterium is a genus of actinobacteria which includes gram-positive acid fast bacterial species. These bacteria possess a thick and waxy cell wall. Cell wall contains a thick peptidoglycan layer and a high content of mycolic acid. Mycobacteria belong to the family mycobacteriaceae and it includes pathogenic bacteria which cause serious diseases in mammals, including humans. The two diseases [tuberculosis](#) and leprosy are caused by two common mycobacteria *Mycobacterium tuberculosis* and *M. leprae* respectively. When mycobacteria are grown in plates and liquids, they show typical growth fashion of moulds. Hence the name 'myco', meaning fungus, has given to these bacteria.

Mycobacteria can be divided into three main groups named Mycobacterium tuberculosis complex, Nontuberculous mycobacteria and *Mycobacterium leprae*. *M. tuberculosis*, *M. bovis*, vaccine strain *M. bovis BCG*, *M. africanum*, *M. canettii*, *M. microti* and *M. pinnipedii* belong to mycobacterium tuberculosis complex. However *M. tuberculosis* is considered as the main causative agent of human tuberculosis. *M. avium* and *M. intracellulare* are two common nontuberculosis mycobacteria.

Mycobacteria resist most of the strongest antibiotics like penicillin due to the hardness of their cell walls. Although several mycobacterial diseases are treated with antibiotics such as rifampin, ethambutol, isoniazid, etc.

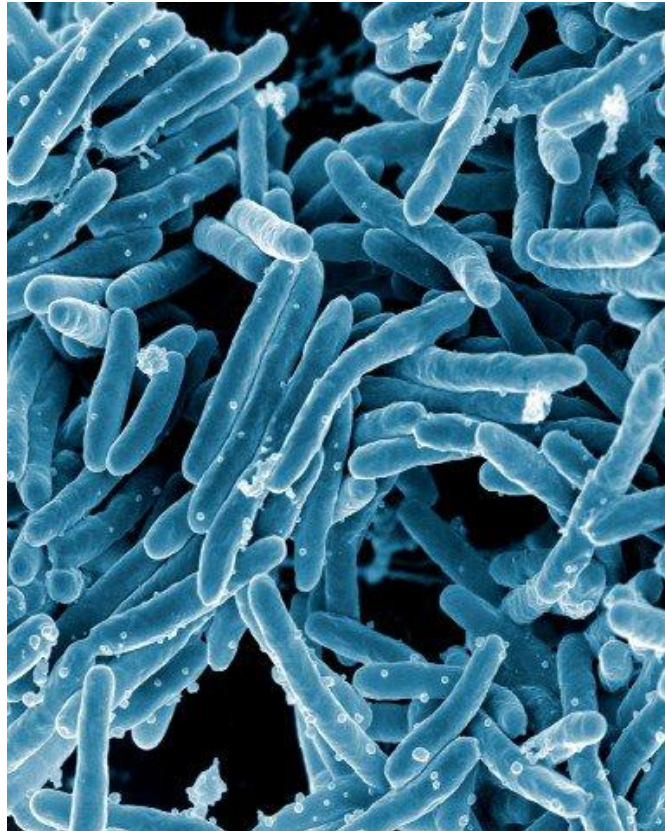


Figure 02: *Mycobacterium tuberculosis*

What is the difference between Mycoplasma and Mycobacterium?

Mycoplasma vs Mycobacterium	
Mycoplasma is a genus of bacteria that lacks a cell wall around the cell membranes.	Mycobacterium is a genus of bacteria that possess a thick, waxy cell wall around the cell membranes.
Skilled Occupation List	
Mycoplasma is a genus of family Mycoplasmataceae.	Mycobacterium is a genus of family Mycobacteriaceae.
Diseases	
Mycoplasma causes primary	Mycobacterium causes tuberculosis,

atypical pneumonia, disorders of the hematopoietic, cardiovascular, central nervous, musculoskeletal, cutaneous and gastrointestinal systems, etc.	leprosy, Mycobacteria ulcer and Mycobacterium para tuberculosis.
Shape	
Mycoplasma is pleomorphic. Hence, do not have a definite shape.	Mycobacterium species are slightly curved or straight rods.
Grams Reaction	
Mycoplasma does not contain a cell wall. Hence, they cannot be stained by grams stain.	Mycobacterium is stained in red colour since they possess thick peptidoglycan layers.
Acid Fastness	
Mycoplasma does not include acid fasting bacteria.	Mycobacterium is an acid fasting bacterial genus which contains high levels of mycolic acids in the cell wall.

Summary - Mycoplasma vs Mycobacterium

Mycoplasma and mycobacterium are two bacterial groups which include bacterial strains that cause serious diseases to human. The main difference between mycoplasma and mycobacterium depend on the presence and absence of the cell wall. Mycoplasma does not possess cell walls while mycobacteria possess a prominent, thick, waxy cell walls, which resist most antibiotics. Mycoplasma are pleomorphic since they do not have a cell wall to maintain the shape. Mycobacteria are gram positive, slightly curved or straight rods. Mycobacteria respond to acid-fast staining because they contain a high amount of mycolic acids in their cell walls. Hence they are known as acid-fast bacteria as well. Acid fastness of mycobacteria can be used as distinguishing feature to differentiate mycobacteria from other bacteria.

References:

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