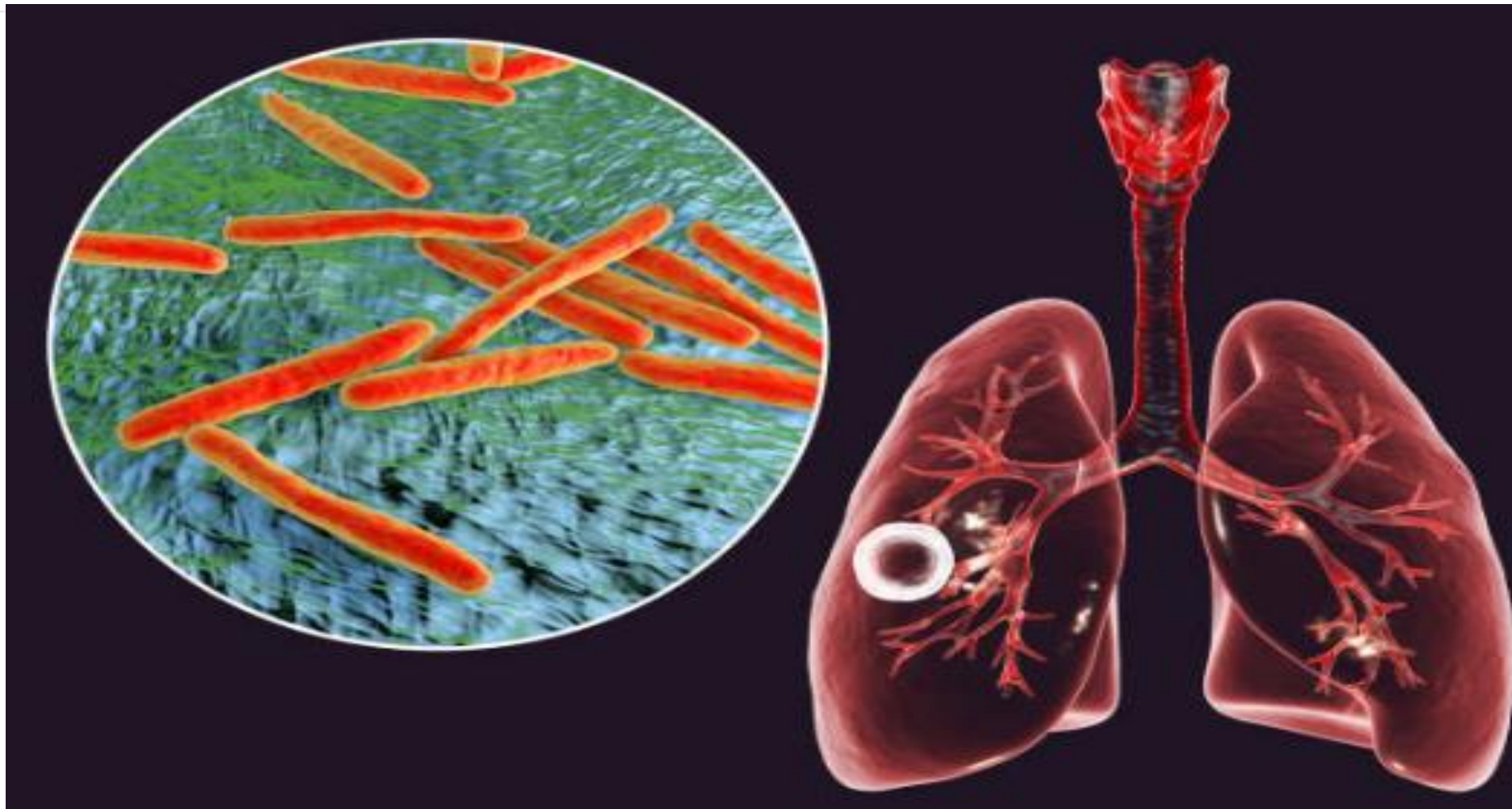
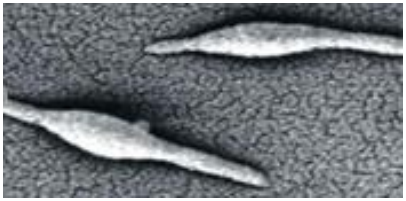




# Mycoplasmas



**Prof.Dr.Lamyaa Kadhim**  
**Medical bacteriology**



# Mycoplasma

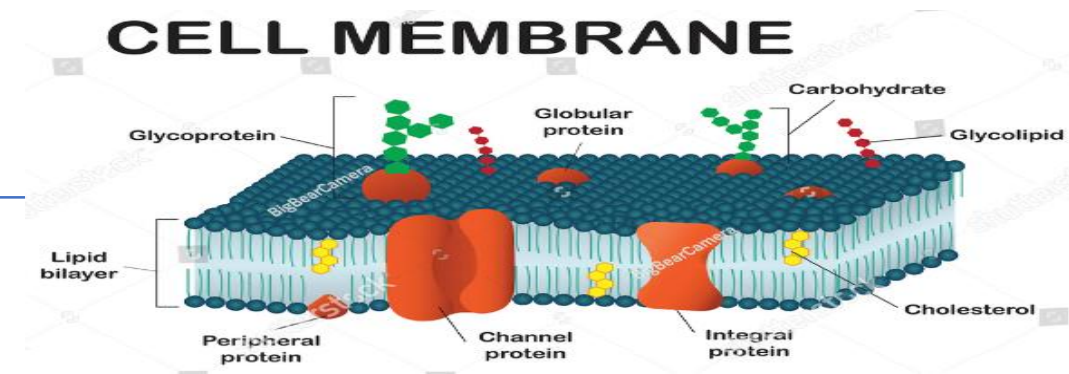
## General characteristics

**-Group of bacteria that are the smallest free living bacteria in nature and can also be grown on laboratory media.**

**-Their size are (~100 nm), mycoplasmas are undetectable by light microscopy.**

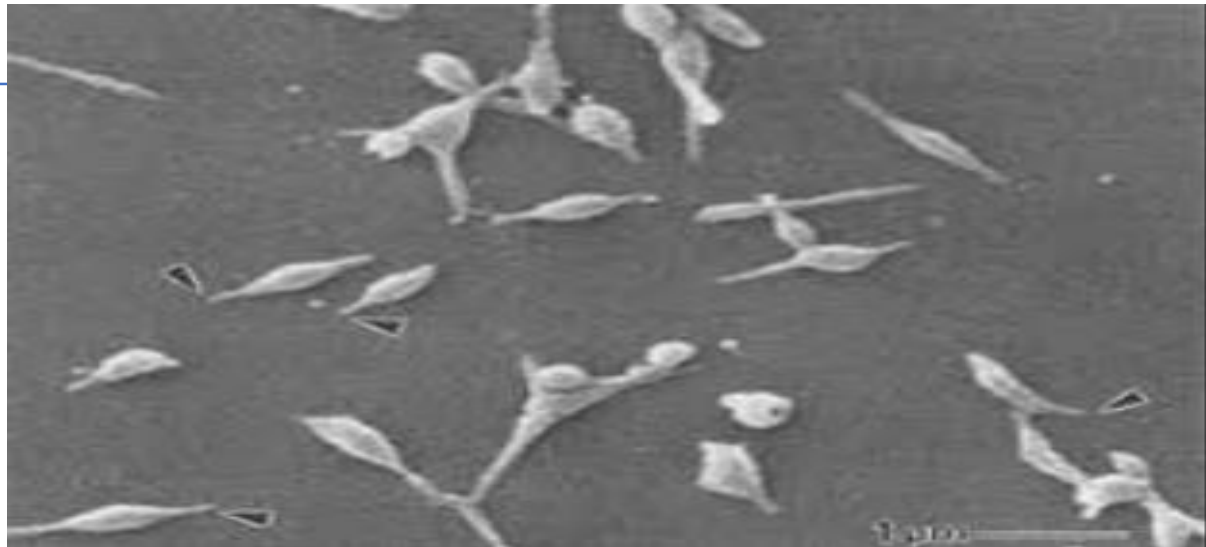
**They lack a cell wall around their cell membranes .**

**Their cell membrane (plasma membrane) is rich in cholesterol and other lipids.**



**At least 16 of these species are of human origin ; others have been isolated from animals and plants.**

**-Among mycoplasmas, *Mycoplasma Pneumoniae* and *Ureaplasma organisms* are the most important human pathogens particularly in respiratory tract and urogenital tract respectively.**



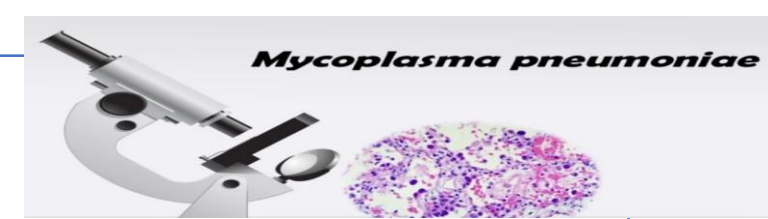
## **Because of the absence of cell walls in mycoplasma:**

**1-They do not stain with the Gram stain although they are Gram negative bacteria (Giemsa and Dienes stains are used)**

**2-They are more pleomorphic with no fixed shape or size. The absence of a rigid cell wall and small size makes Mycoplasma able to cross filters that are otherwise permeable only to viruses.**

**3-They are resistant to antibiotics that interfere with the synthesis of cell wall (Penicillins , Cephalosporins , Vancomycin) but susceptible to tetracycline, erythromycin**

# Morphology

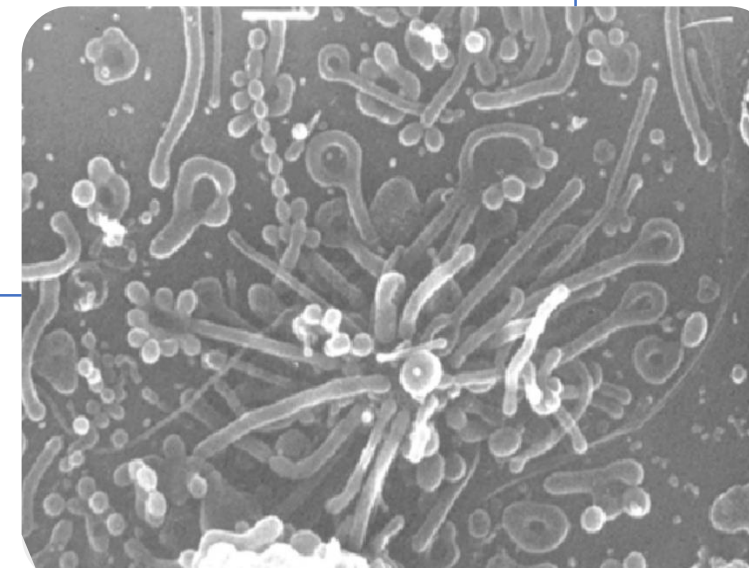


***Mycoplasma* are pleomorphic smallest living organism, also known as Pleuropneumonia like organism (PPLO).**

**Mycoplasma are Gram-negative not stained with Gram stain ,but stain well with Giemsa stain.**

**On Giemsa stain, mycoplasma appear as tiny pleomorphic cocci, short rods, short spirals , and sometimes as hollow ring forms**

**-They do not possess spores, flagella or fimbria**



# **Culture of mycoplasma**

**Mycoplasma needs special culture media rich in cholesterol such as Eaton agar**

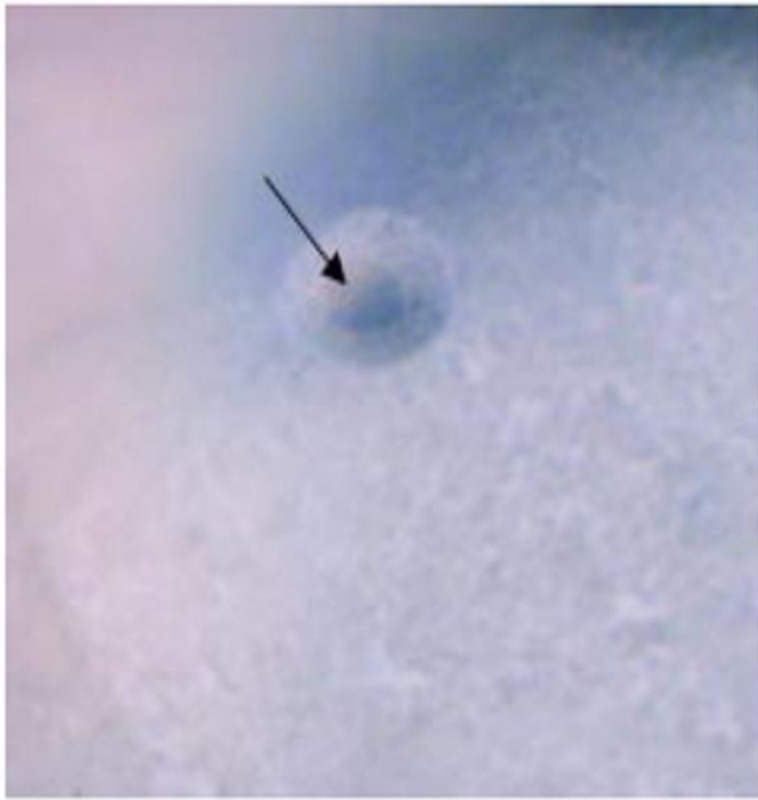


**They are aerobic or facultative anaerobic microorganisms ,but usually grow better in an aerobic condition supplemented with 5% CO<sub>2</sub>**

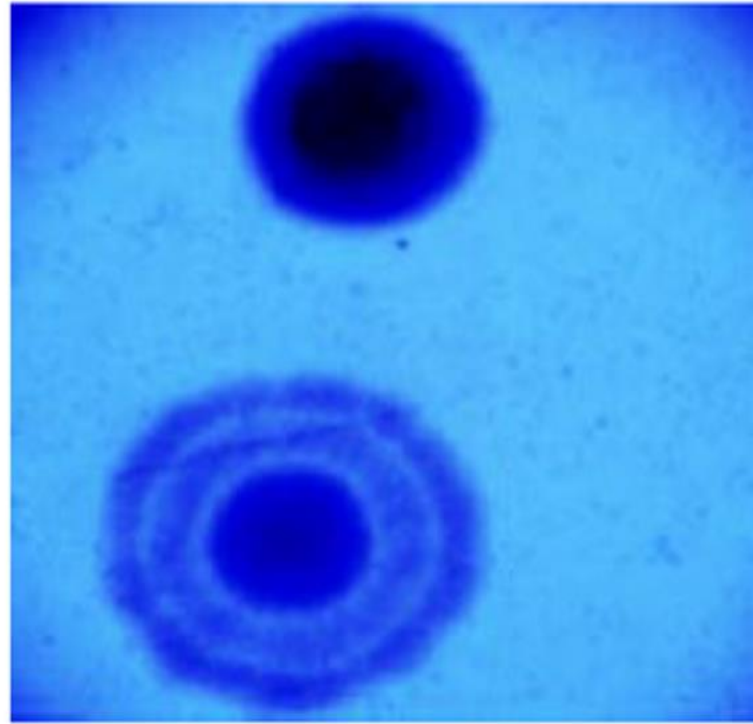
**They grow slowly on culturing (2–3 weeks incubation at 37°C), especially on first isolation.**

**Mycoplasma colonies are small and can only be observed under magnification or after Dienes staining**

**Colonies on agar have an opaque center zone of growth and a transparent outer zone on the top, giving them a fried egg look (except *Mycoplasma pneumoniae* which shows granular colonies (mulberry)).**

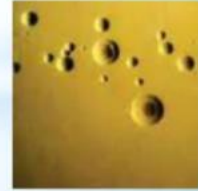
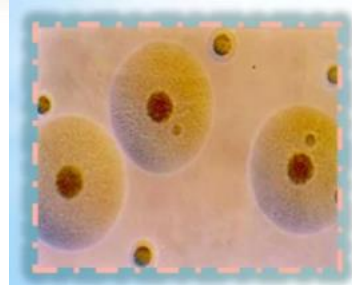
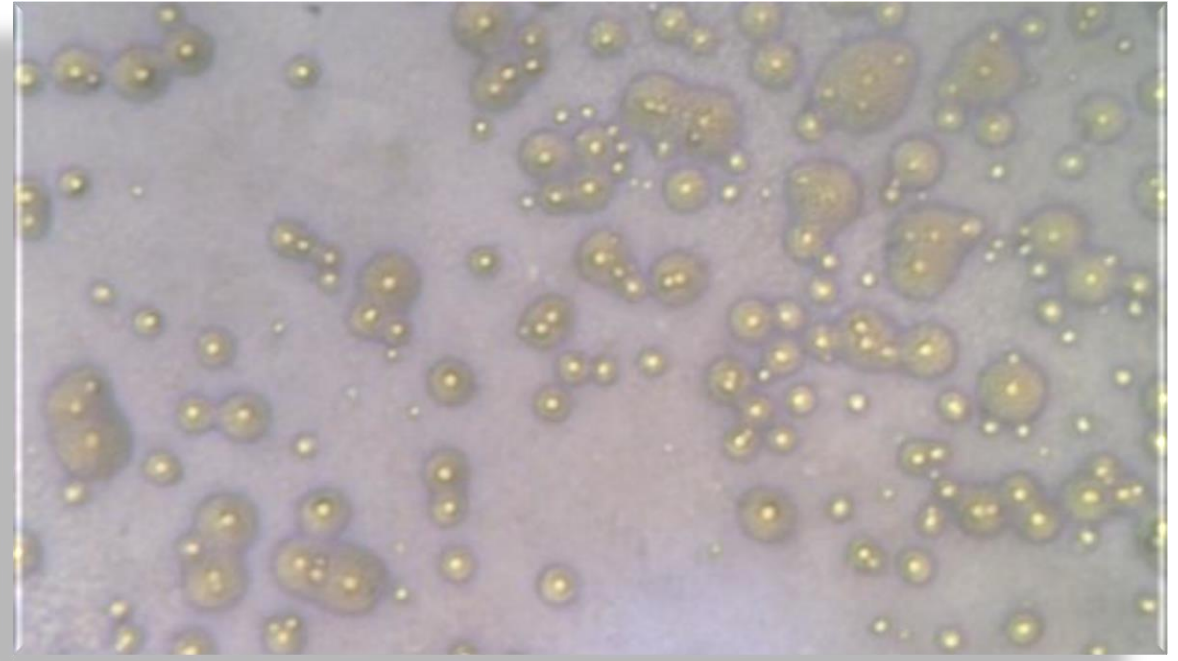
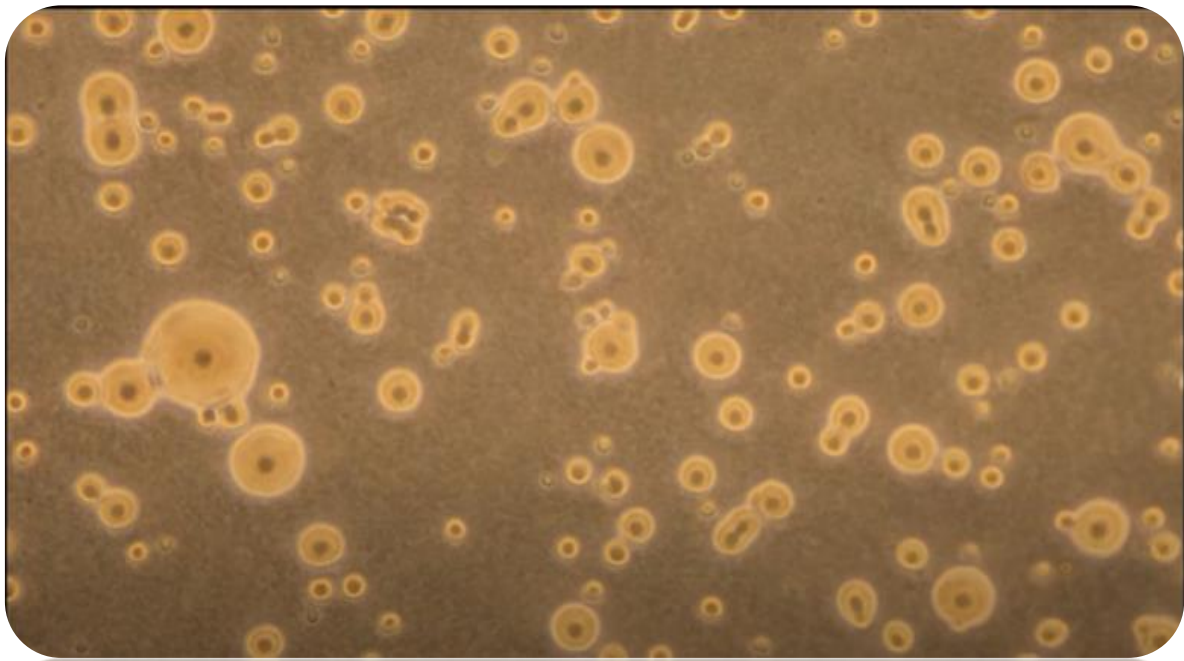


**Fig. 1.** Characteristic 'fried-egg' colony of mycoplasma shown by arrow mark (X 100) (unstained).



**Fig. 2.** granular colony (top)  
of Mycoplasma stained by Diene's stain (X 100).

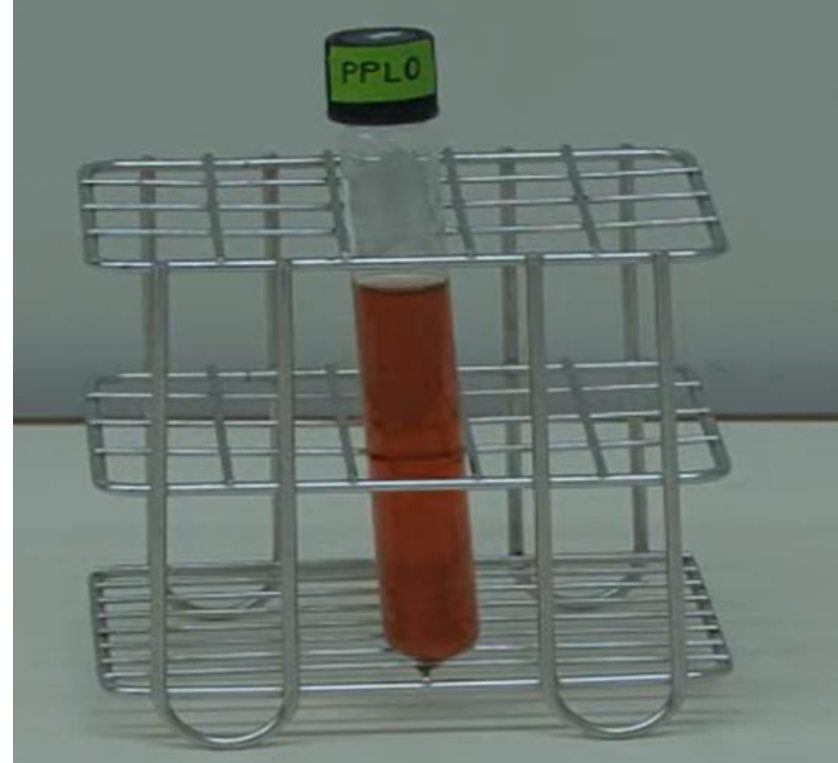








**Positive broth culture of mycoplasma**

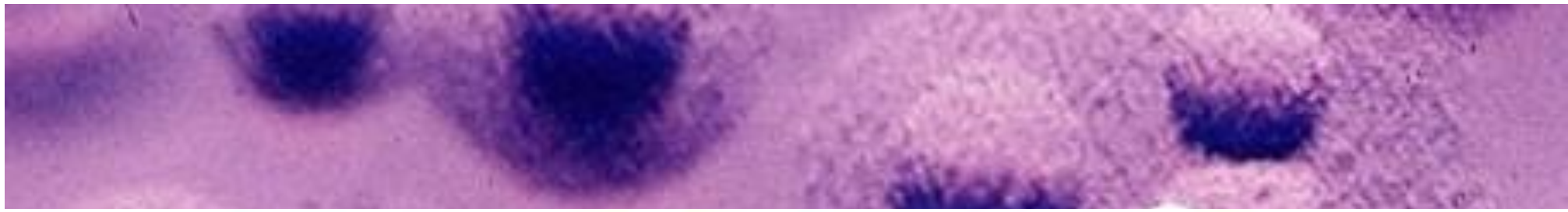


**Negative broth culture of mycoplasma**

## **Diseases caused by mycoplasma:**

**Mycoplasma pneumoniae** : causes respiratory disease ranging from tracheobronchitis to atypical pneumonia

**Ureaplasma urealyticum** : one of the causes of non-gonococcal urethritis



# MYCOPLASMA PNEUMONIAE



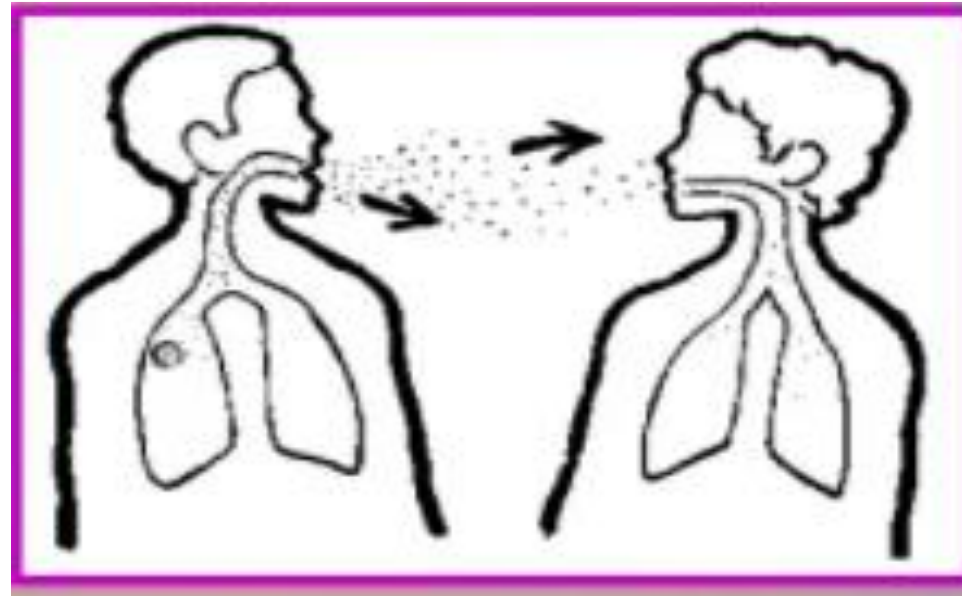
**Mycoplasma pneumoniae is the classic cause of atypical pneumonia (Walking pneumonia)**

**Atypical** :means the disease dose not resemble the regular pneumococcal pneumonia or the causative bacteria cannot be isolated on routine culture media

**Walking pneumonia:** nonmedical term means that the disease is not severe enough to require bed rest or hospitalization

**Transmission from person to person through respiratory droplets**

**The disease occurs frequently in young adults, and in crowded environments such as military recruits, prisons and colleges**



- The ONSET of SYMPTOMS is **GRADUAL**, TYPICALLY BEGINS with **NON-PRODUCTIVE COUGH** and **SORE THROAT**



**DRY COUGH**



**SORE THROAT**



**FEVER**



**HEADACHE**

# Laboratory Diagnosis of *Mycoplasma pneumoniae*

**-Culture**

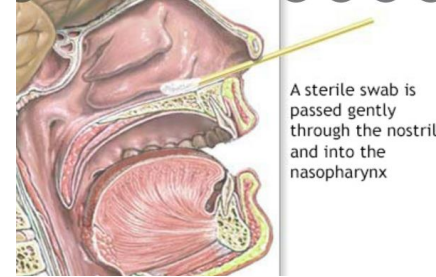
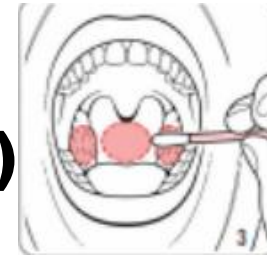
**-Serology**

**-Molecular detection**

# Culture:

**Specimen:** ideal specimens are throat swabs and nasopharyngeal aspirates

**Microscopy:** is not very helpful (lack of a cell wall )

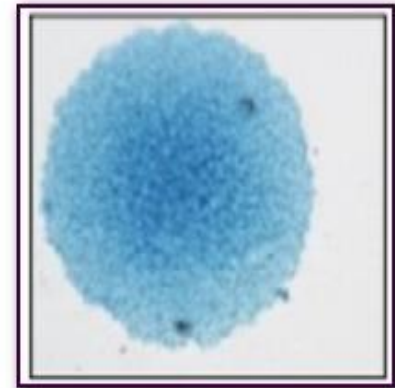


**-Culture** Primary isolation of *Mycoplasma* requires complex media (both solid or liquid media).

They are very slow under both aerobic and anaerobic conditions.

**-Colonies of *M. pneumoniae*** are small and have a homogeneous granular appearance (Mulberry shaped)

**-Colonies can be examined by hand lens or Dienes` staining**



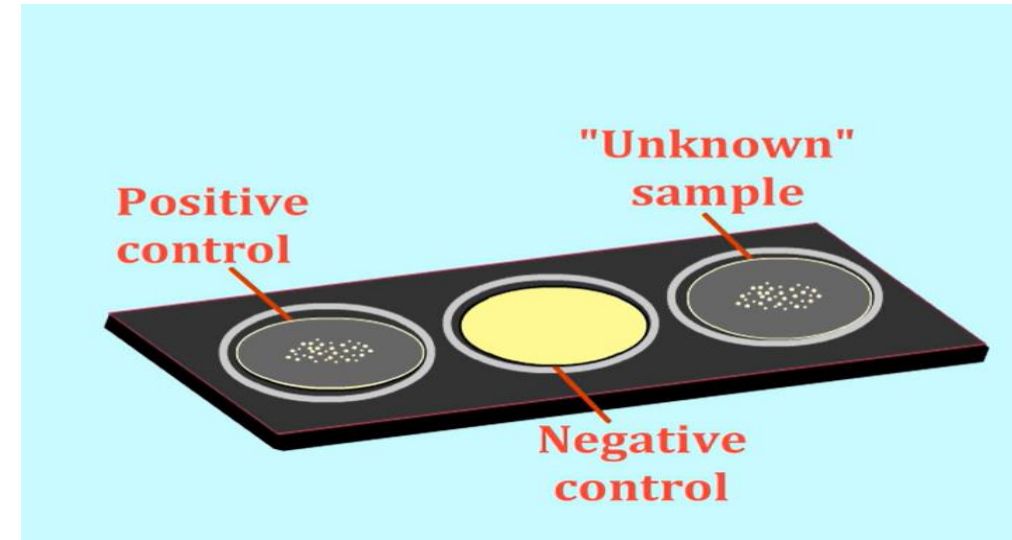
**-Further biochemical tests** are used to identify the microorganism



# Serology :

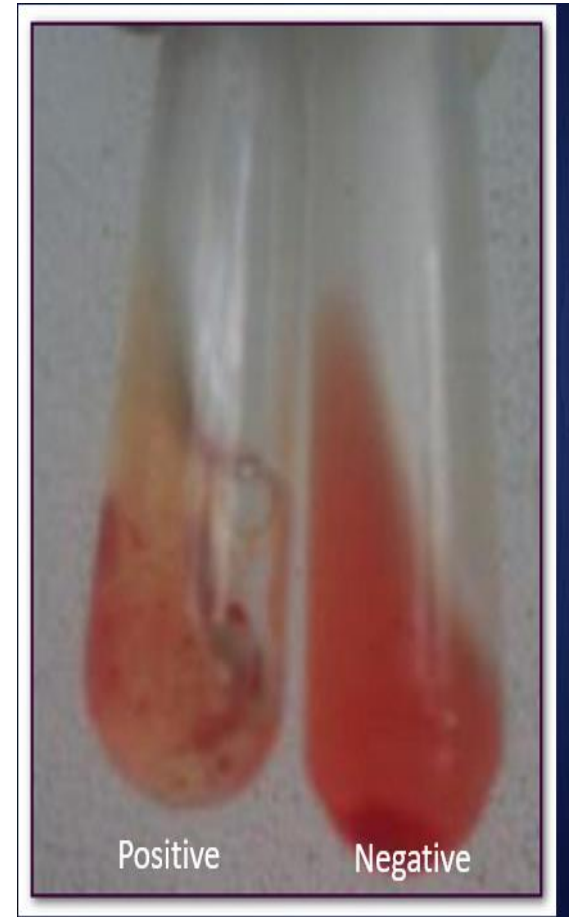
**-Complement Fixation Test  
For antibodies to *M.pneumoniae***

**-ELISA and Immunofluorescence**



## **Cold agglutination test :**

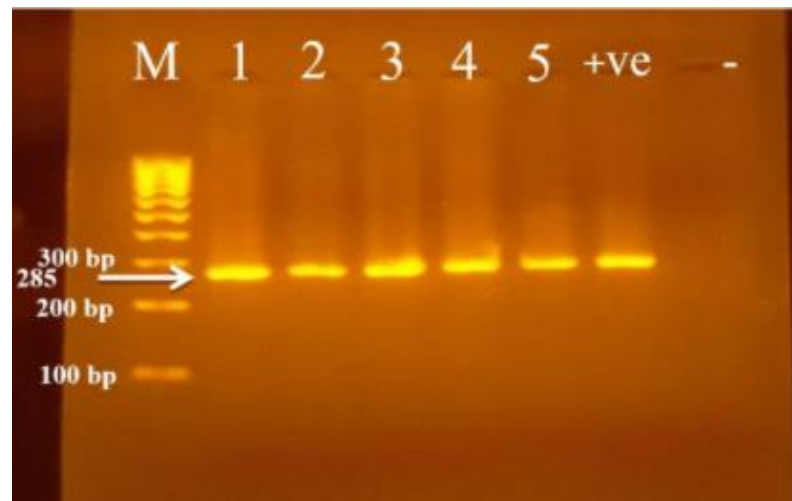
**Non-specific test previously used to diagnose mycoplasma infection based on the production of IgM autoantibody by the infection that agglutinates erythrocytes at 4° C but not at 37° C.**



# -Molecular Technique

**-Polymerase chain reaction is the best choice to diagnose *M. pneumoniae* infection**

**PCR assay can detect the presence of *M. pneumoniae* DNA in single specimen and will be positive earlier than serological test**



# Radiographic findings:

**The X-ray often looks worse than the clinical pictures**



# Treatment

-Suggested to treat for 7-10 days

-Antimicrobial against *M. pneumoniae* are bacteriostatic not bactericidal

-**Erythromycin**-will also be effective against other community acquired infections such as pneumococcal pneumonia.

-**Clarithromycine and Azithromycin**

-**Tetracycline** in patients more than 10 years old.

-**Levofloxacin**

## **In Summary**

**-Mycoplasma pneumoniae is among the smallest of free-living organisms.**

**-In humans, it is usually found in the throat and lungs**

**-Is susceptible to antimicrobial agents that inhibit protein synthesis.**

**- The spread of mycoplasmal infections depends on close and prolonged contact between people, as it is transmitted by means of droplet nuclei from the respiratory tract.**

**-Mycoplasmal infection may be asymptomatic or may produce upper respiratory tract disease or atypical pneumonia.**

**-The pneumonia is difficult to differentiate from viral diseases by clinical means alone .Laboratory tests such as isolation, Complement Fixation serology, and ELISA serology and preferably PCR are helpful as an aid in the diagnosis.**

# THANK YOU

For Your Listening

