



University of Basrah, Medical College – Microbiology Department

Microbiology/ 3rd Year M.B.CH.B. Students

Part II. Systematic Medical Bacteriology (22 hours)

Lecture (15)

Duration: 1 hour

Mycoplasma

Assist. Prof. Dr. Nibras Saleam Al-Ammar



References: Microbiology (Lippincott's Illustrated Review) 3rd ed. 2013, Chapter 16, Page 171



For more detailed instruction, any question, cases need help please post to the group of session.

Key definitions

Peptidoglycan: is a polymer consisting of sugars & amino acids that form a mesh-like layer outside plasma membrane of most bacteria.

Pleomorphic bacteria: have ability to alter their morphology, biological functions or reproductive modes in response to environmental conditions.

Self-replicating prokaryotic cells: can replicate although it contains the minimum set of organelles essential for growth & replication (plasma membrane, ribosomes, & genome consisting of double-stranded circular DNA.

Sterols: are subgroup of steroids with a hydroxyl group at the 3-position of A-ring. They are amphipathic lipids, the overall molecule is flat and the hydroxyl group on A ring is polar.

Vacuolization: formation of vacuoles or vacuole-like structures, within or adjacent to cells.



Fastidious organism: has complex or particular nutritional requirements for growth.

Non-purulent otitis media: inflammatory disease of the middle ear without pus.

Desquamate: become scaly

Urethritis: inflammation of the urethra (urethra: the tube that carry urine from bladder to outside the body).

Endometrium: the inner lining of the uterus

Endometritis: inflammation of the inner lining of uterus

Learning objectives (LOs)

Overview about <i>Mycoplasma</i>	LO.1
General features of Mycoplasmas	LO.2
Classification	LO.3
<i>M. Pneumoniae</i>	LO.4
Genital Mycoplasmas	LO.5

Overview about *Mycoplasma* (LO.1)

- *Mycoplasma* are small, prokaryotic organisms with no peptidoglycan in their cell wall, enclosed in a single plasma membrane.
- Many *Mycoplasma* species include several commensals commonly found in the mouth & genitourinary tracts of human.

**Reminder: Do not confuse
Mycoplasma spp. with
Mycobacterium spp.**

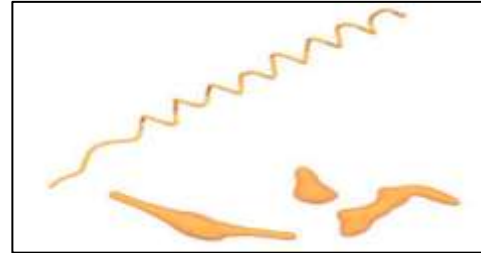


General features of Mycoplasmas (LO.2)

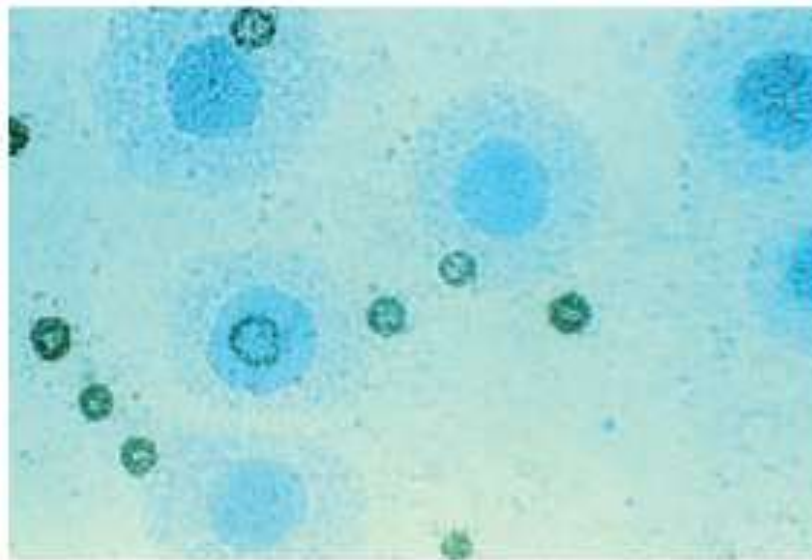
Plastic and pleomorphic organisms due to the lacking of cell wall

- Cannot classified as either cocci or rods.

- The smallest of known free-living, self-replicating prokaryotic cells.
- Have very small double-stranded DNA genome.
- Require a variety of small. Organic molecules for growth.
- Contain sterols in their cell membrane
- Rarely cultured in the lab
- Produce minute colonies on specialized agar after several days of incubation

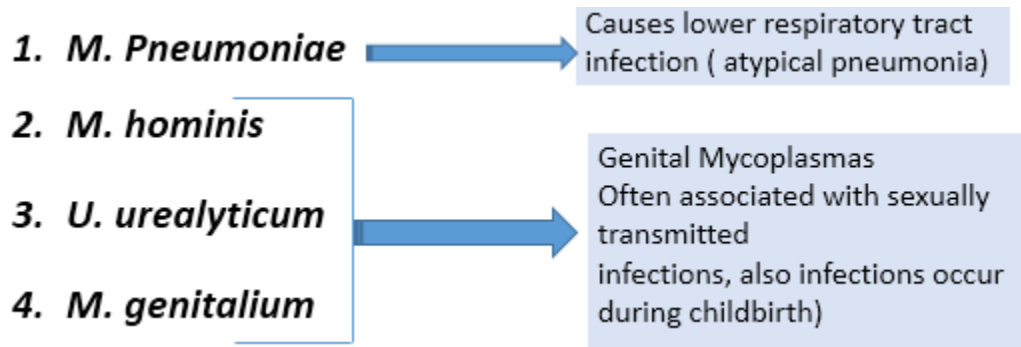


- The central portion of the colony penetrates the agar, whereas the periphery spreads over the adjacent surface (Fried egg appearance)





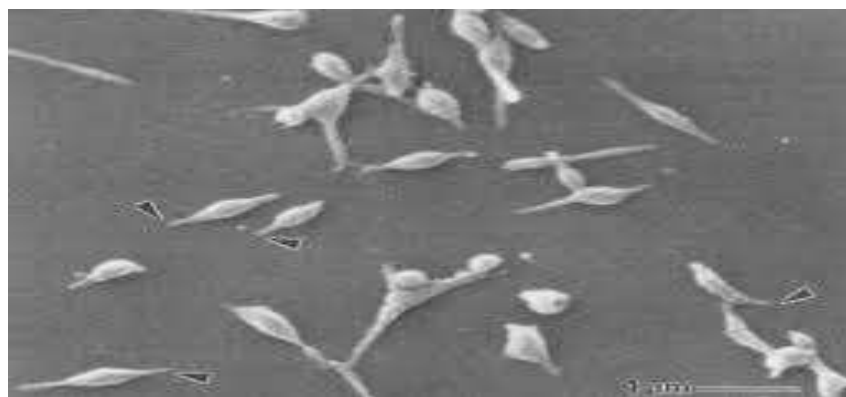
Classification (LO.3)



Pathogenesis of *M. Pneumoniae* (LO.4)

1. *M. pneumoniae* possesses a membrane- associated protein (P1) which binds sialic acid-rich glycolipids found on certain host cell membranes (ciliated bronchial epithelial cells).
2. Then it grows closely attached to the host cell luminal surface & inhibits ciliary action.
3. Patches of affected mucosa desquamate & inflammatory response develops in bronchial & adjacent tissues involving lymphocytes & other mononuclear cells.

Note: *M. pneumoniae* produces exotoxin that results in extensive vacuolization & death of host cells.





Immune responses against *M. pneumoniae* (LO.4)

- Elicit both local & systemic immune responses.
 - Serum Ab to outer membrane glycolipids & to P1 adhesion can be demonstrated.
- IgM (cold agglutinin) is produced by approximately 60 % of infected patients.

Laboratory Diagnosis:

serological tests mostly used for diagnosis of atypical pneumonia

Genital Mycoplasmas (LO.4)

Mycoplasma hominis & *Ureaplasma urealyticum*

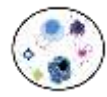
- Common inhabitants of GU tract, particularly in sexually active adults.
 - In some populations, colonization rates (50%)
 - Both can be cultured (they grow more rapidly than *M. pneumoniae*)

M. Hominis & *U. urealyticum* can be distinguished by their

carbon utilization patterns:


M. Hominis degrades arginine

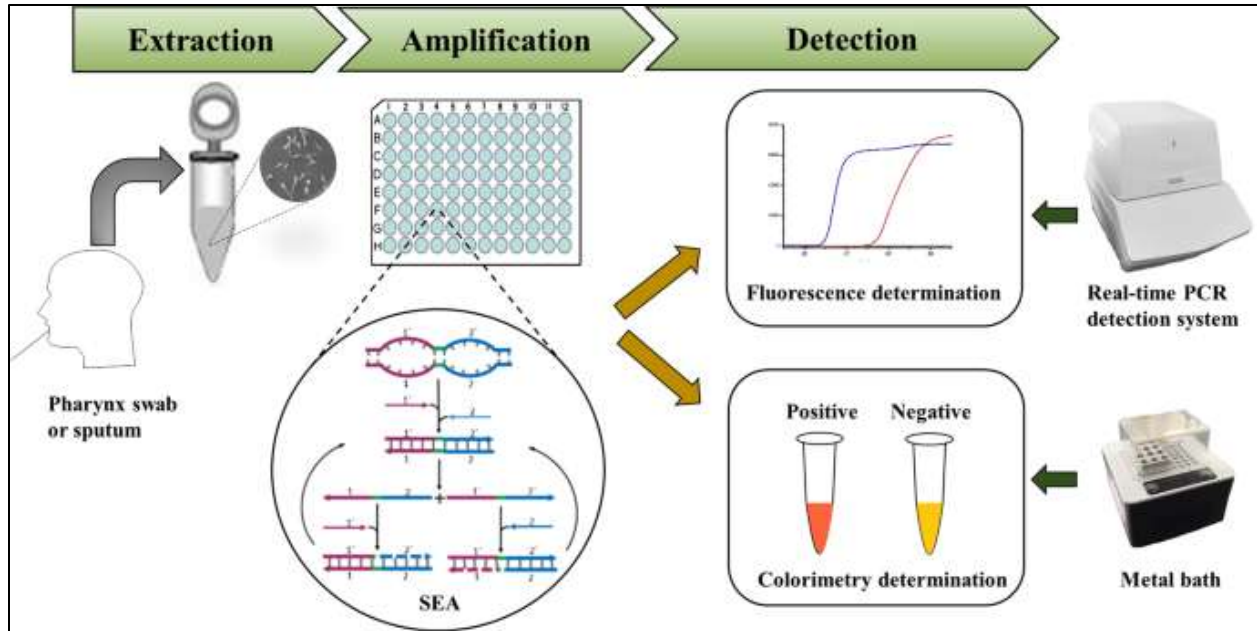
U. urealyticum hydrolyses urea



- *M. hominis* isolates are resistant to erythromycin in contrast to other mycoplasmas.
- *U. urealyticum* is a common cause of urethritis when neither gonococcus nor chlamydia can be demonstrated, particularly in men.
- In women, *U. urealyticum* has been isolated from the endometrium of patients with endometritis and from vaginal secretions of women who undergo premature labor or deliver low-birth-weight babies.
- *U. urealyticum* also isolated from the infant's lower respiratory tract & CNS both with & without evidence of inflammatory response.
- *M. genitalium* has been recognized as a sexually transmitted pathogen, resulting in a series of syndromes similar to those caused by *N. gonorrhoeae* & *Chlamydia trachomatis*.
- PCR amplification is recommended for specific diagnosis.

STUDY AID **Nongonococcal Urethritis.** Once upon a time, *Neisseria gonorrhoeae* was the major cause of urethritis. Cases of urethritis that were not caused by *N. gonorrhoeae* were referred to as nongonococcal urethritis (NGU). Today the major cause of NGU is *Chlamydia trachomatis*, but other organisms (e.g., *Mycoplasma genitalium* and *Ureaplasma urealyticum*) also cause NGU.





Thank You