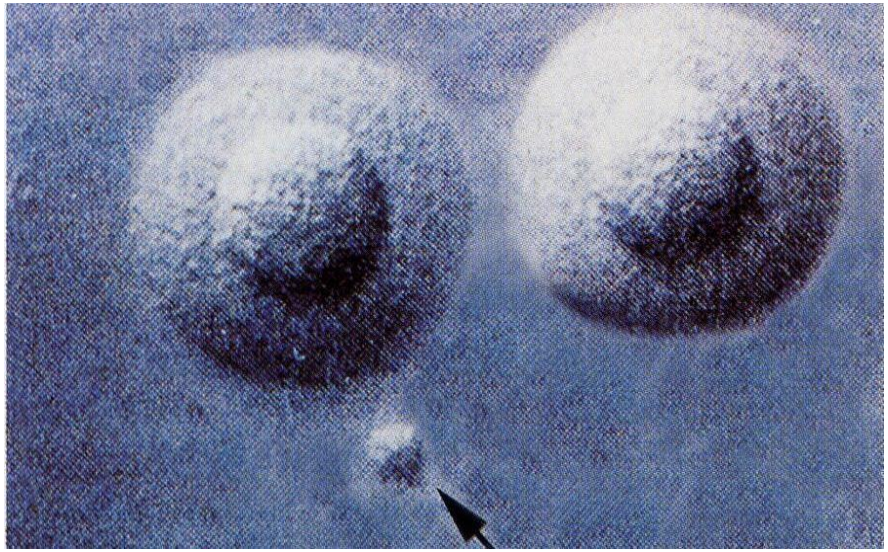
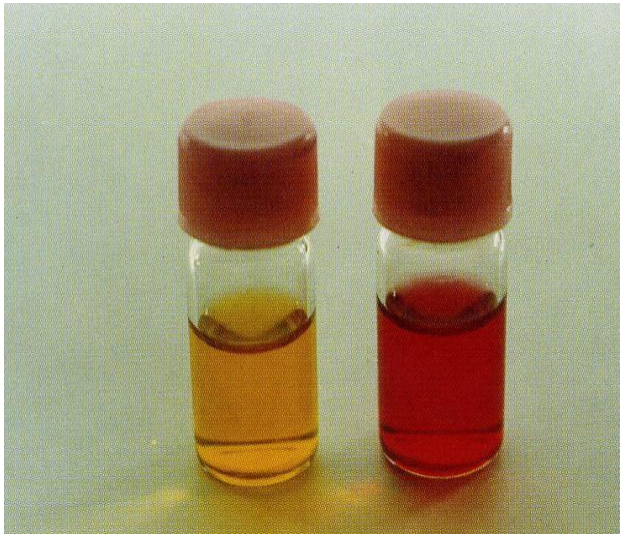
# Mycoplasma





# Important Human Mycoplasma

- *Mycoplasmataceae* – requiring cholesterol or other sterols as an essential grwoth factor.

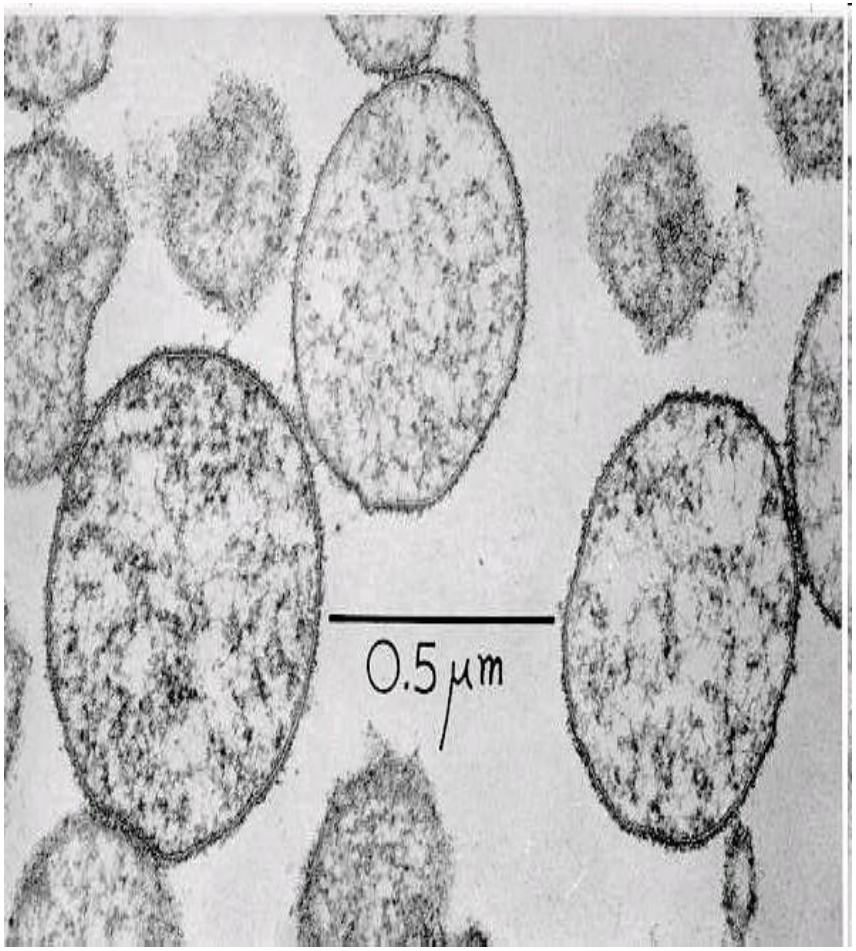
  a. Genus *Mycoplasma* which utilize glucose or arginine but donot split urea.

  b. Genus ***Ureaplasma*** – which hydrolyze urea

# Basic Characters of **Mycoplasma**

- Prokaryotic microbes
- Size of 150-250 nm
- Lack of a cell wall
- Sterol-containing cell membrane
- Fastidious growth requirements
- Fried-egg or mulberry colonies on agar

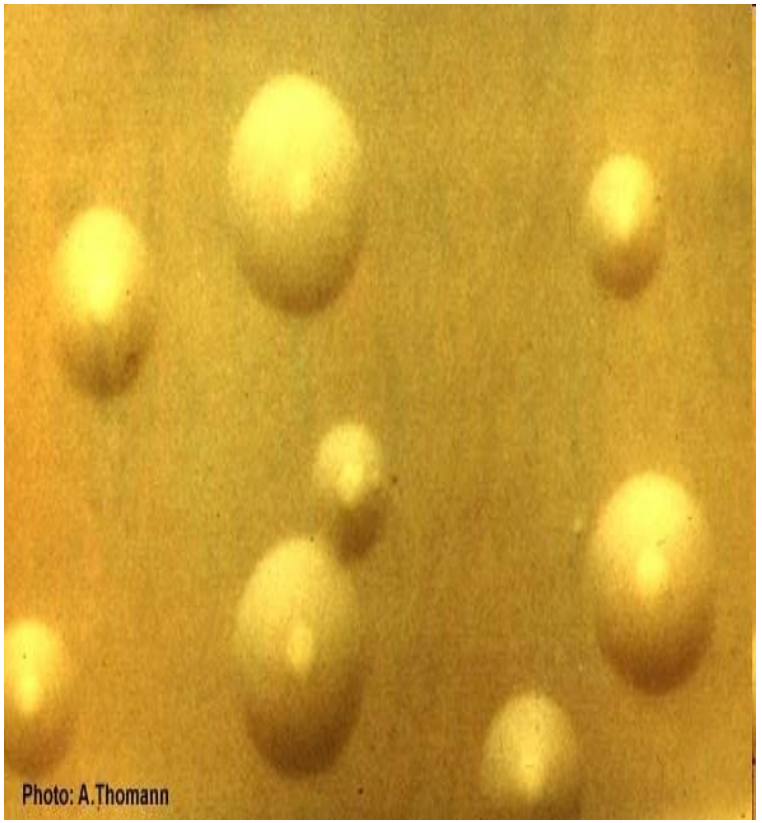
# Mycoplasma are cell wall **deficient microorganisms**




- Cross-section of **Mycoplasma** bacteria, a common cause of atypical pneumonia. This bacteria is unusual in that it lacks a cell wall

# Culturing Mycoplasma

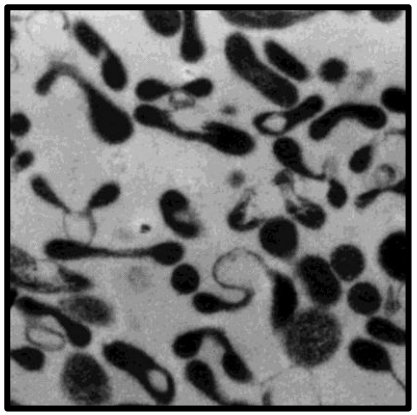
- cultured on liquid or solid medium
- Growths optimally at 35 to $37^0$c
- Medium of growth should be enriched with 20% horse or human serum.
- The colonies appears as fried egg appearance



# Diseases Caused by Mycoplasma

| Organism | Disease |
| --- | --- |
| ***M. pneumoniae*** | **Upper respiratory tract disease, tracheobronchitis, atypical pneumonia, (chronic asthma?)** |
| ***M. hominis*** | **Pyleonephritis, pelvic inflammatory disease, postpartum fever** |
| ***M. genitalium*** | **Nongonococcal urethritis** |
| ***U. urealyticum*** | **Nongonococcal urethritis, (pneumonia and chronic lung disease in premature infants?)** |

# Morphology and Physiology



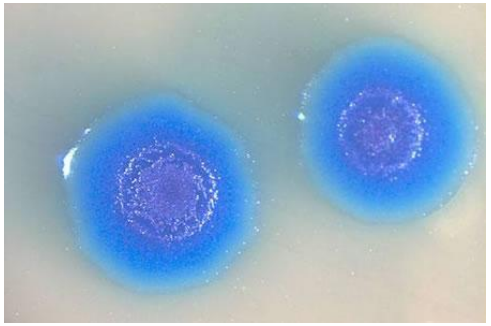
- Lack a cell wall

  Insensitive to antibiotics that inhibit cell wall synthesis

  "Fried egg" colonies on special agar after 3-4 days

- Smallest free-living bacteria (0.2 - 0.8 :m)

  Frequently pass thru bacteriologic filters



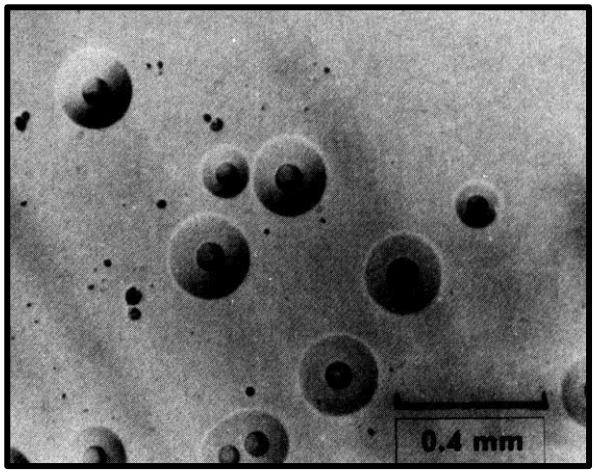
- Contain sterols in cell membranes
- Small genome size

  Require complex media and external cholesterol for growth

- Facultative anaerobes

– Except *M. pneumoniae* - strict aerobe

- Grow slowly by binary fission

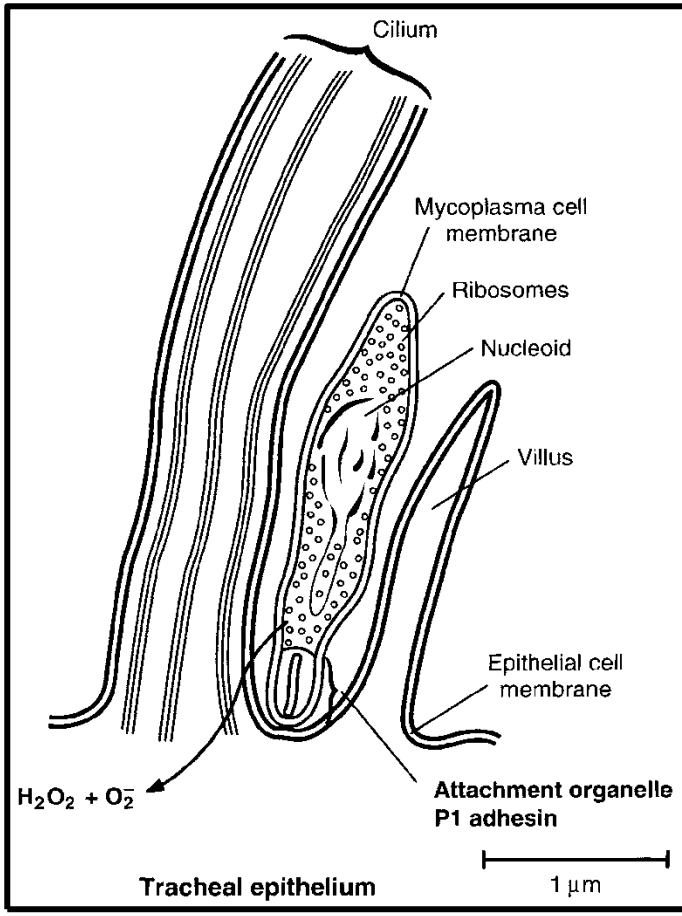


# Pathogenesis - Mycoplasma

- **Adherence**
  - P1 pili (*M. pneumoniae)*
  - movement of cilia ceases
  - clearance mechanism stops -cough
- **Toxic metabolic products**
  - peroxide and superoxide radicals

  –inhibition of catalase  host cell membrane damage
- **Immunopathogenesis**
  - activate macrophages
  - stimulate cytokine production

  **superantigen**  (*M. pneumoniae)*




*M. pneumoniae* adhesin sequences bear significant homology to mammalian structural proteins (CD4 and Major Histocompatiblity Complex type II lymphocyte proteins)

# *Mycoplasma pneumoniae*

- Tracheobronchitis 70-80% of infections
- Atypical pneumonia ~10% of infection
    - Mild disease but long duration
    - "Primary atypical pneumonia"
- Shed in saliva several days before onset of clinical disease; re-infection is common
- Spread by aerosol route (Confined populations)
- Disease of the young (5-20 years), although all ages are at risk
- No seasonal variation
- Proportionally higher in summer
- Occurs worldwide

# Transmission of Mycoplasma Infections

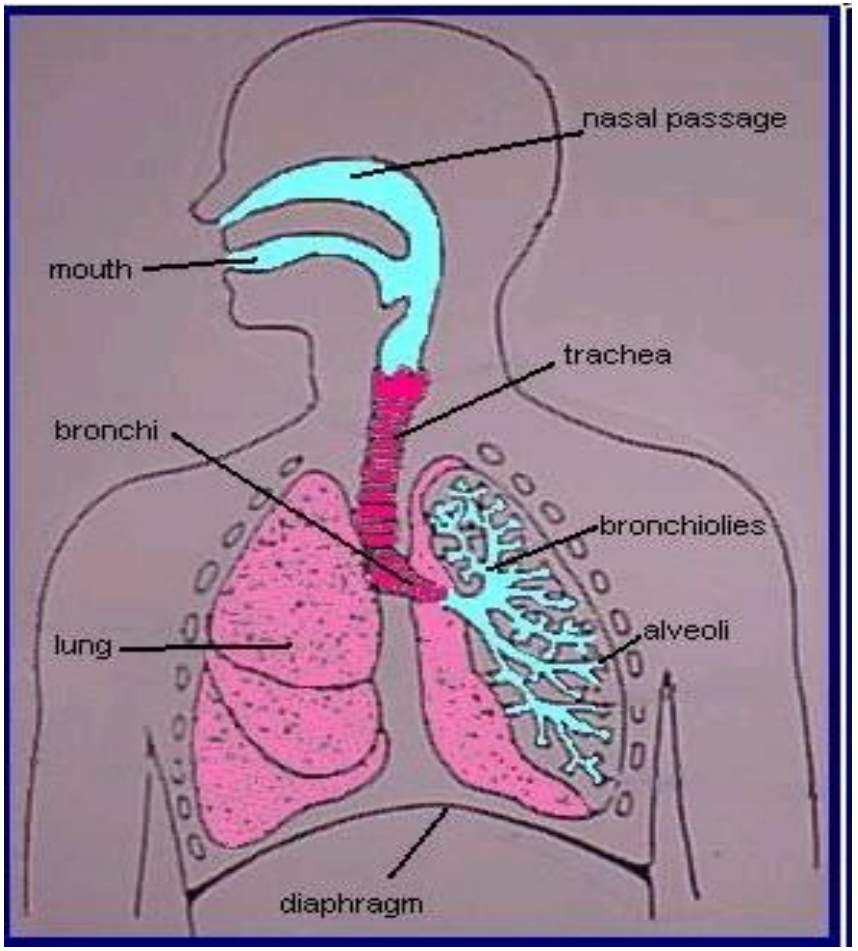
- **The disease is world wide,**
- **Transmission by drop let infection of nasopharyngeal secretions.**
- **Spread is associated with close contact of infected person**
- **Important infection in Military personal.**
- **Even the persons recovered from infection will harbor the pathogens for 2 months or more**

# Clinical Manifestations

- Generalized aches and pains
- Fever (usually  102°F)
- Cough - Usually non-productive
- Sore throat
- Headache/ myalgias
- Chills but not rigors
- Nasal congestion

# Respiratory spread

- Infection moves easily among people in close contact because it is spread primarily when infected droplets from the respiratory system circulate in the air due to coughing, spitting, or sneezing



# Pneumonia leading Manifestation in **Mycoplasma infections**

## Laboratory Diagnosis

**Microscopy** - difficult to stain

- help eliminate other organisms

**Culture** (definitive diagnosis)

- sputum (usually scant) or throat washings
- special transport medium needed
- may take 2-3 weeks

**Serology**

- Complement fixation
  - May take 4-6 weeks, fourfold rise in titer between acute & convalescent samples
- Cold agglutinins I antigen
  - 1/3 - 2/3 of patients
  - Appear first, on-specific, presumptive diagnosis

**Molecular diagnosis** -PCR-based tests

# Treatment and Prevention
## *M. pneumoniae*

- **Treatment**
  - Tetracycline or erythromycin Newer fluoroquinolones
  - Can't use cell wall synthesis antibiotics
- **Prevention**
  - Washing hands
  - Avoid close contact
  - No vaccine

# Thanks!