α hemolytic *Streptococcus pneumoniae* (Gram positive cocci)

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S. pneumoniae

S. pneumoniae

- **General characteristics**
- **leading cause of pneumonia**
  - **particularly young and old. Colonization highest in children**
  - **member normal flora, nasopharynx**
  - **Most common in cold months**
  - **replication and spread after damage to upper respiratory tract (e.g. after the flu)**

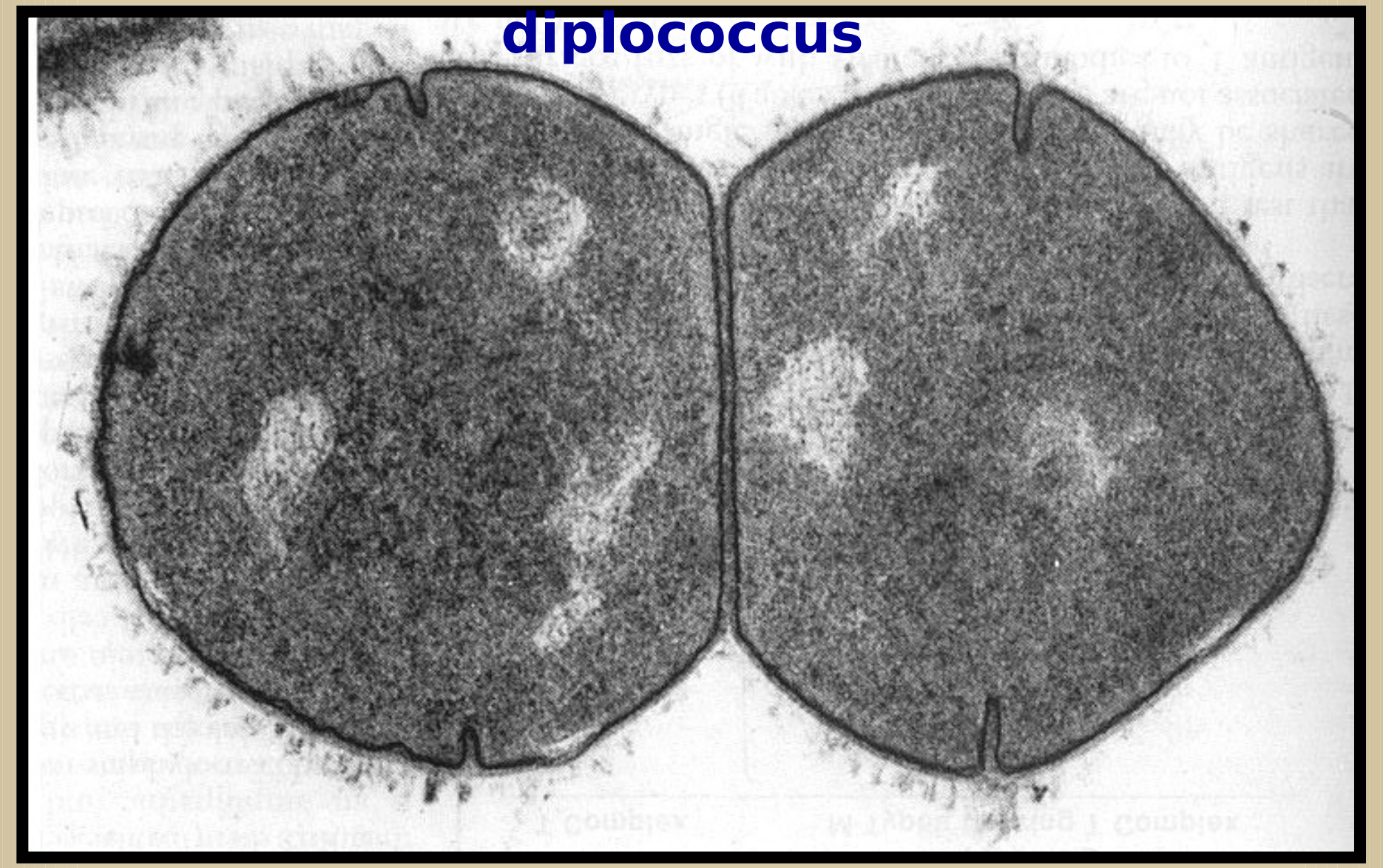
S. pneumoniae

- **α hemolytic**
- **pneumolysin**
  - **degrades red blood cells under aerobic conditions**
- **grows well on sheep blood agar**
- **no group antigen**
- **Polyvalent vaccine available (newly available for children)**

- **Virulence factors:**
  - ✔ Polysaccharide capsule

- **Clinical infections:**
  - ✔ pneumonia
  - ✔ meningitis
  - ✔ bacteremia
  - ✔ sinusitis/otitis media

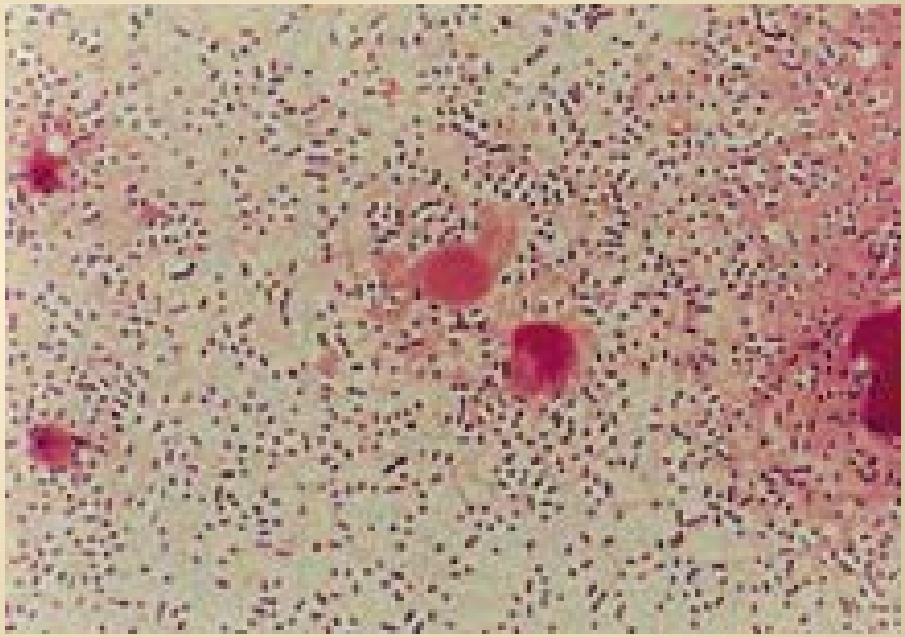
S. pneumoniae: lancet-shaped diplococcus

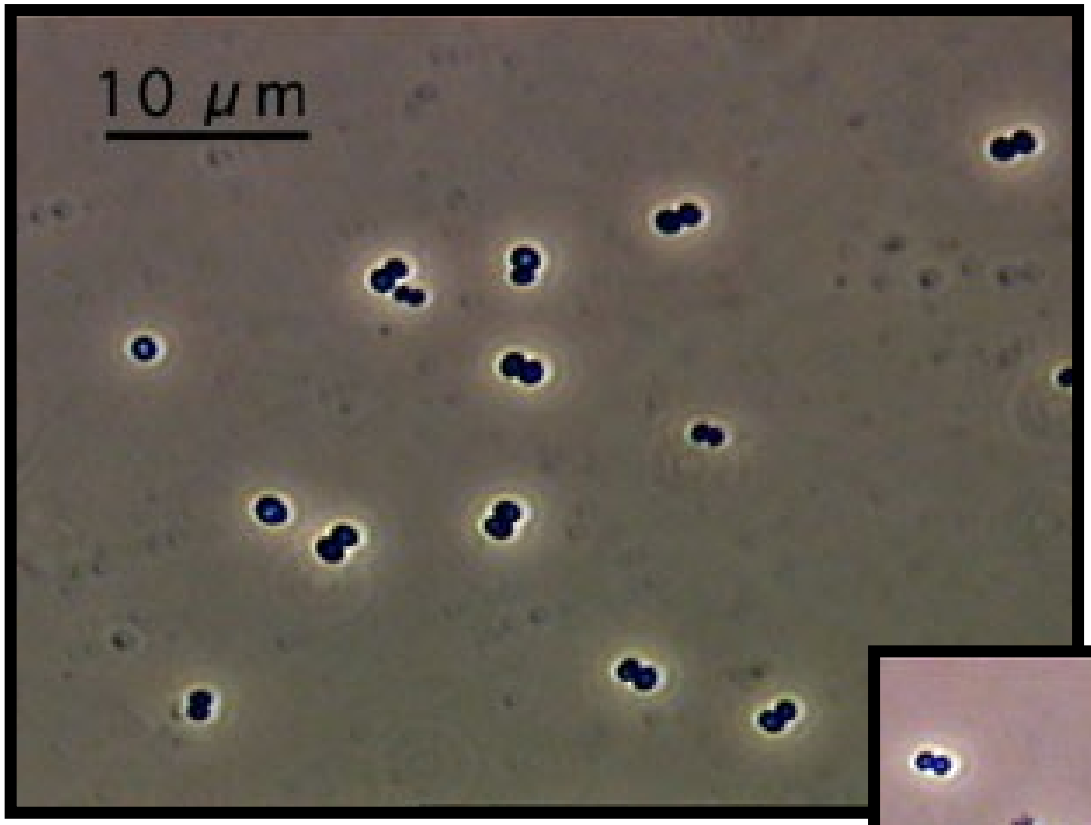


Laboratory Diagnosis: *Streptococcus pneumoniae*

1- **Microscopic morphology**

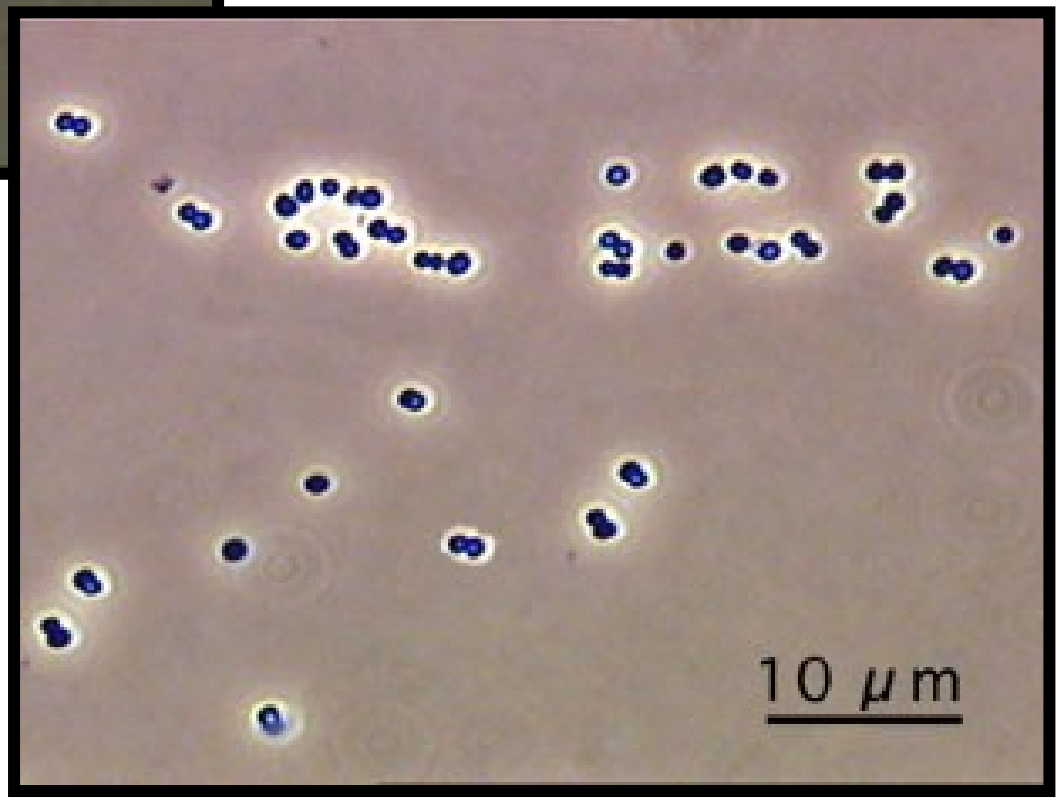
- **Gram-positive cocci in pairs; lancet-shaped**





S. pneumoniae

- ***Diplococcus***



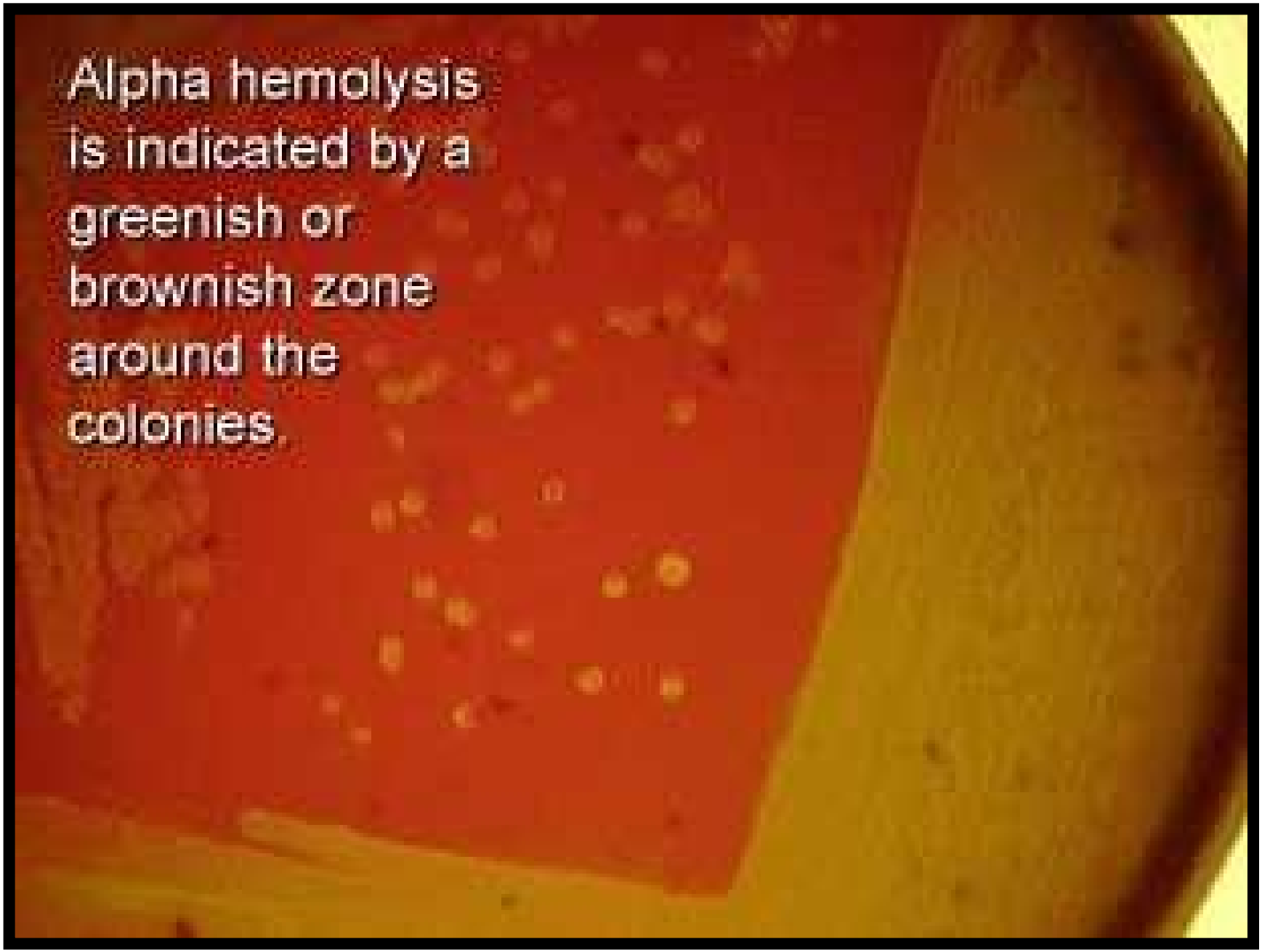
Laboratory Diagnosis: *Streptococcus pneumoniae*

2- Culture:

A- In blood agar:

- Colony morphology
  - **Smooth, glistening, wet-looking, mucoid**
  - **α-Hemolytic**
  - **CO2enhances growth**

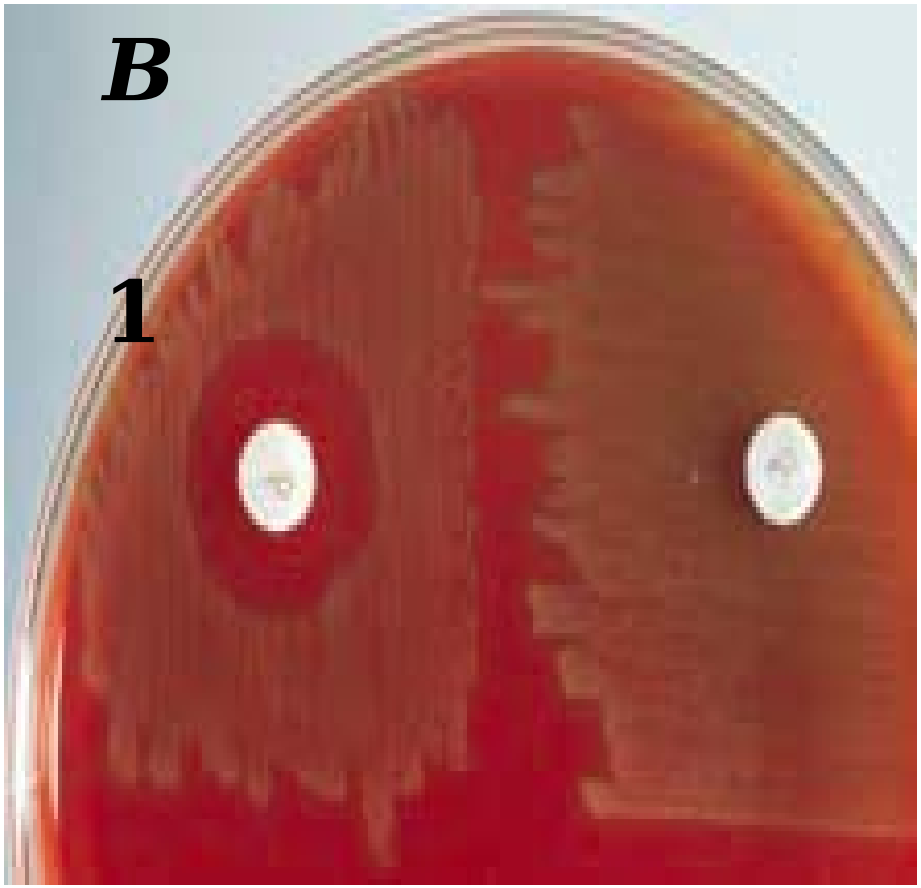



Alpha hemolysis is indicated by a greenish or brownish zone around the colonies.

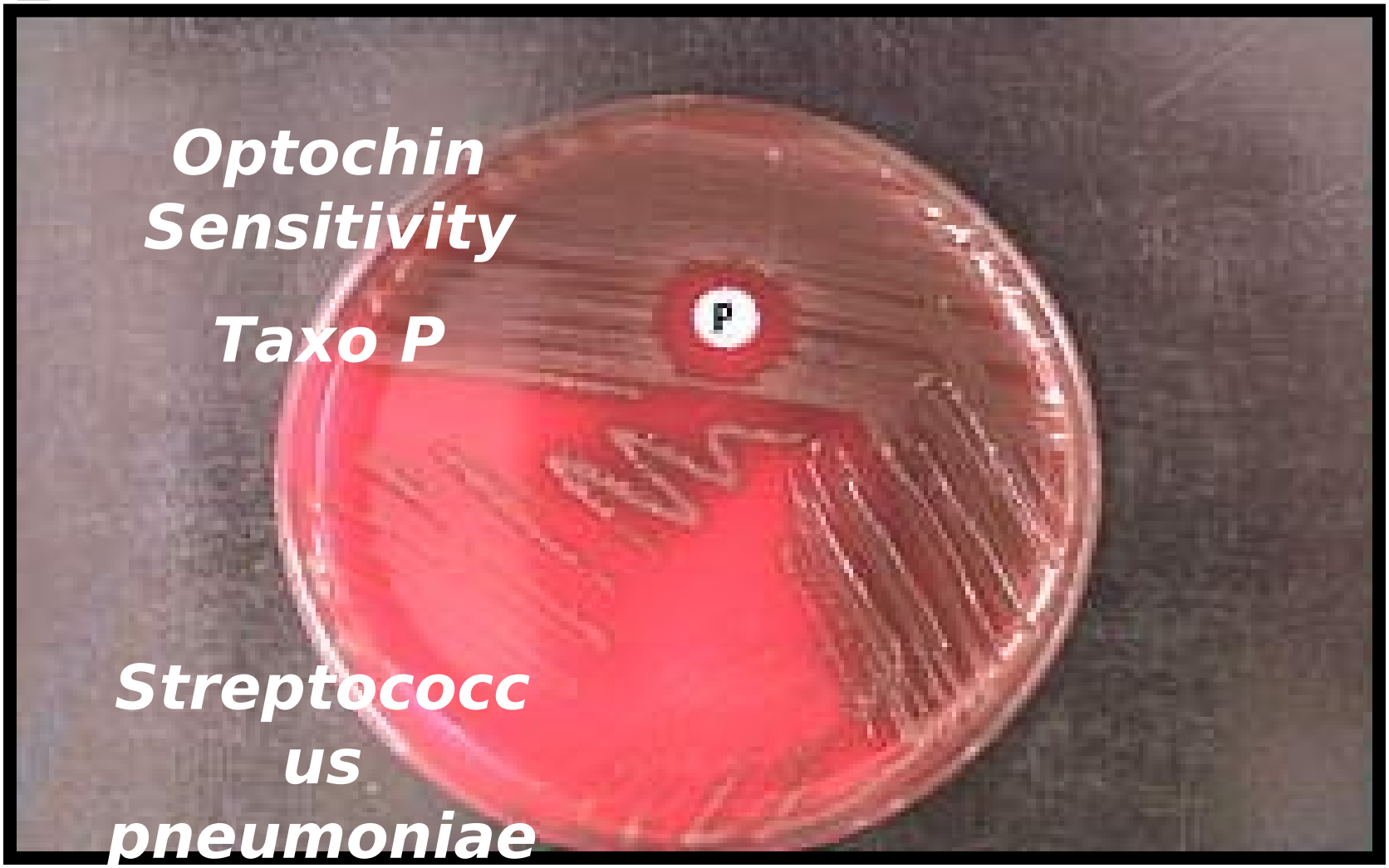
Laboratory Diagnosis: *Streptococcus pneumoniae*

3- Biochemical test:

- **Identification**
  - **A. Catalase negative**
  - **B. Optochin-susceptibility-test–susceptible(1)**
  - **C. Bile-solubility-test–positive**



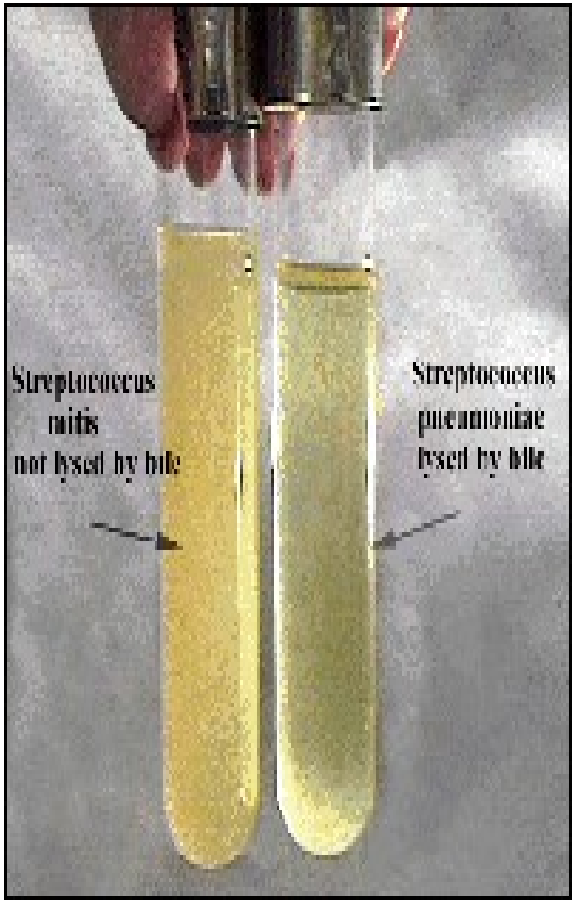
B



S. pneumoniae is positive (S) while S. viridans is negative (R)

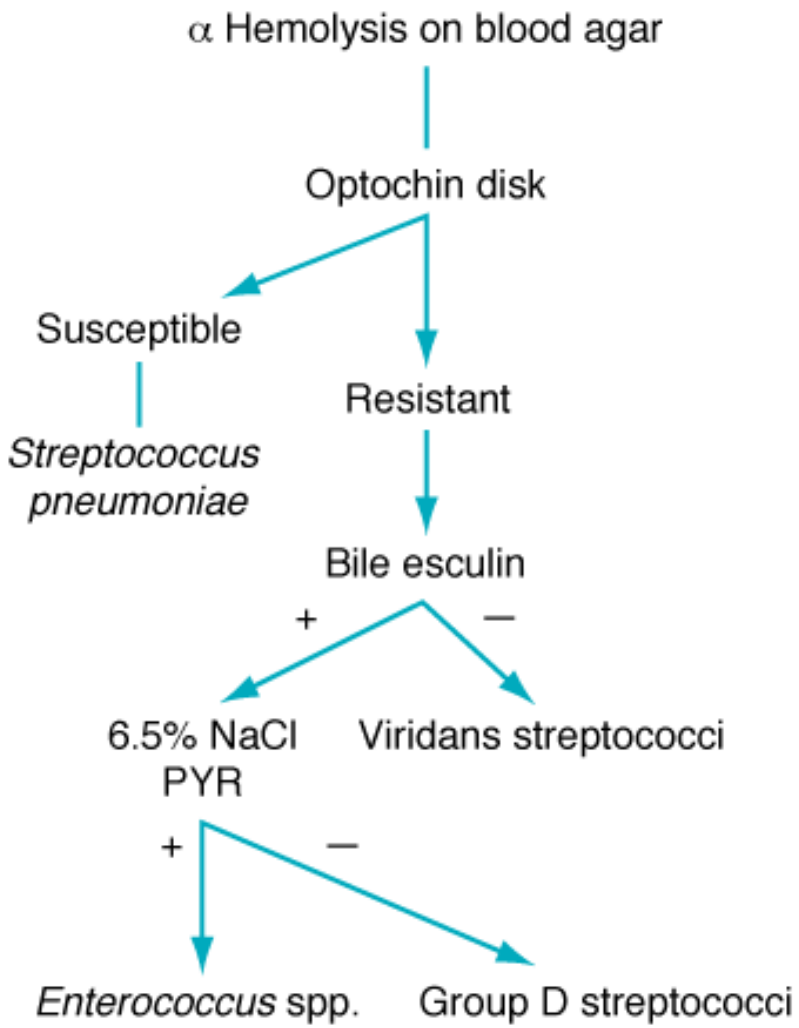
C- Bile Solubility test

- Results:
  - Positive test appears as clearing in the presence of bile while negative test appears as turbid
  - *S. pneumoniae* soluble in bile whereas *S. viridans* insoluble



Identification Schema

Schema to differentiate S. pneumoniae from other α-hemolytic streptococci



Therapy

- ***S. pneumoniae***
  - most strains susceptible to penicillin
  - resistance is common

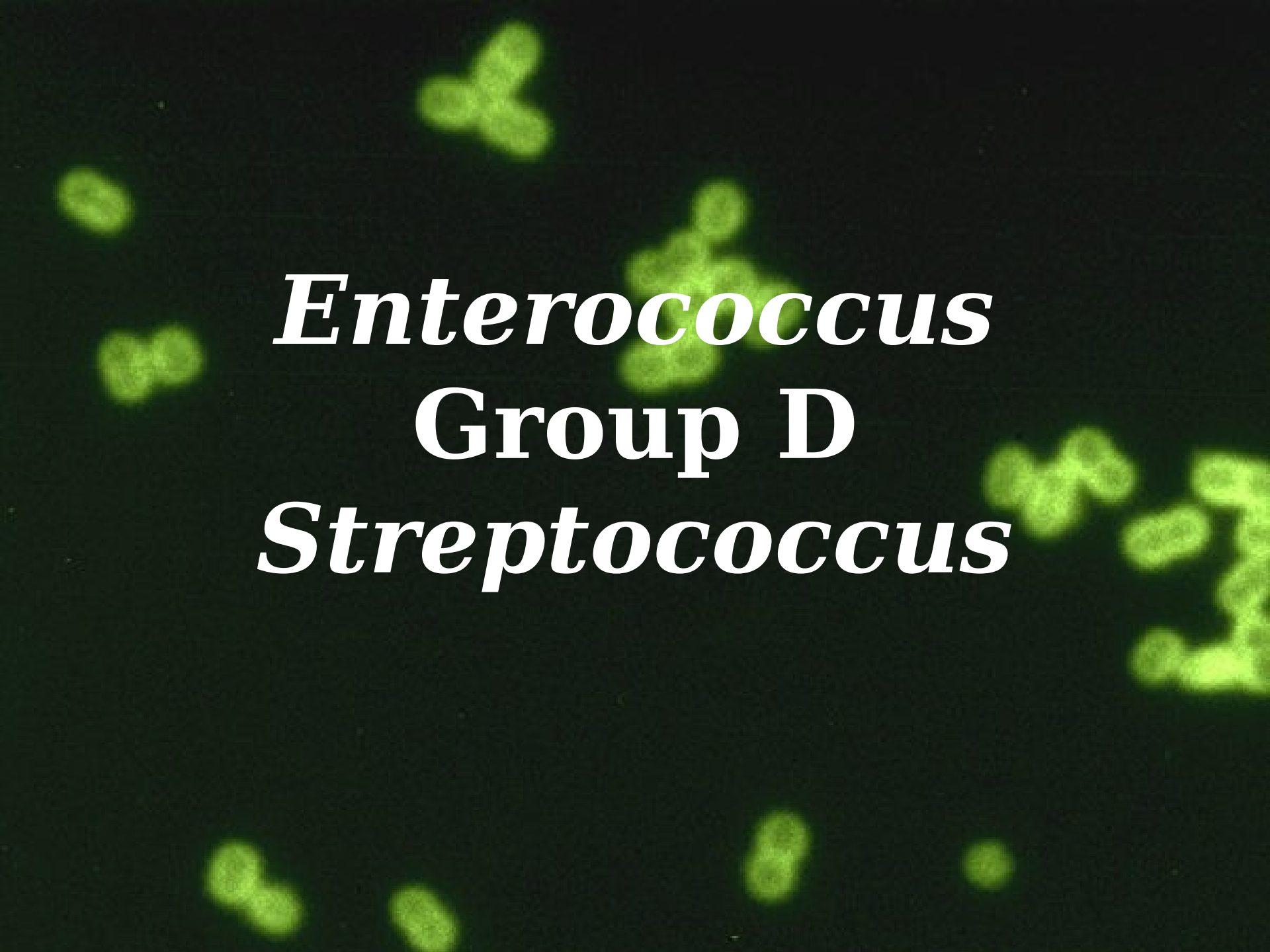
Capsular vaccine

- **Immunity**
  - serotype specific
  - to eradicate the organism in normal flora
- **Vaccine**
  - a few major serotypes (polyvalent)
- **Vaccination or the susceptible population**
  - young children
  - elderly
- **Immunization**
  - major serotypes susceptible to change
  - population monitoring essential


S. Viridans
α hemolytic

Other Streptococcal Species(α hemolytic)

- **Viridans group**
  - **Members of the normal oral and nasopharyngeal flora**
  - **Includes those that lack the Lancefield group antigen**
  - **Most are α hemolytic but also includes nonhemolytic species**
  - **The most common cause of subacute bacterial endocarditis(SBE)**


Enterococcus
Group D
Streptococcus

Enterococcal Infections

- **Group D cell wall antigen**
- **Enterococcus faecalis; Enterococcus faecium**
- **GI tract of humans and animals**
- **UTI most common; wound infections; bacteremia; endocarditis**
- **Most infections from endogenous source**
- **Prolonged hospitalization and broad-spectrum antibiotics increase risk**
- **Antibiotic resistance**

Enterococcus

Diagnostic Laboratory Tests

- ***Resistant to bile***
- ***Esculin hydrolysis***


Bile Esculin
Agar
NEG


Enterococcus
Group D
Streptococcus
Bile Esculin
Agar

Summary Figure (Identification Scheme)

