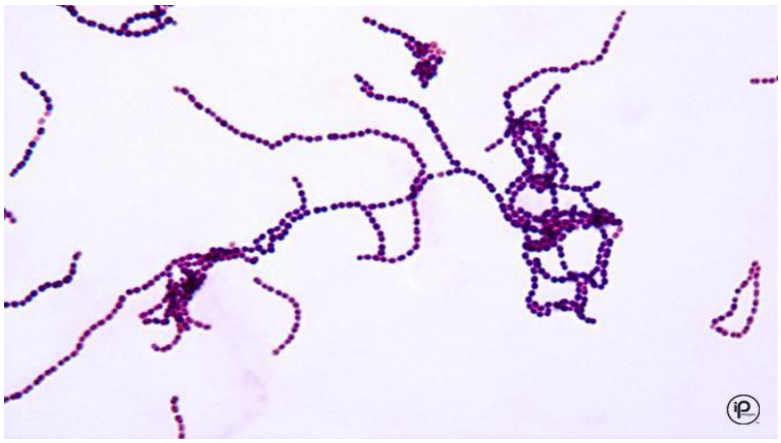
Genus *Streptococci*

Streptococcus

Genus Characteristics

- Gram positive cocci (0.5-2.0µm in diameter) - singly, in pairs, or chains
- Non Spore-forming
- Require nutritionally rich media for growth like(Brain Heart Infusion (BHI) Agar, & co2)
- Nutritionally fastidious - growth enhanced by addition of blood
- streptococci colonies are not pigmented on agar
- Associated with mouth & upper respiratory tract
- Catalase-and oxidase-negative .



Streptococci devided in to 3 groups according to their effect on the RBC in blood agar to:

- Strep.pneumoniae and Strep. viridans are Alpha- haemolysis streptococci
- Strept. pyogenes. Beta –hymolysis streptococci
  Strept. fecalis . Gama- haemolysis.

pathogenicity

The genus Streptococcus is a complex group causing a wide range of diseases such as:

- **Rheumatic fever:** an inflammatory disease that can develop as a complication of inadequately treated strep throat or scarlet fever. Strep throat and scarlet fever are caused by an infection with group A streptococcus.
- **Impetigo :** skin infection caused by. Group A strept.
- **Pharyngitis** (*S. pyogenes)*
- **Laryngitis***(S. pneumoniae or Group A Streptococcus)*
- **Toxic Shock Syndrome :** (S. pyogenes)
- **Scarlet Fever (rash) :** Group A streptococci

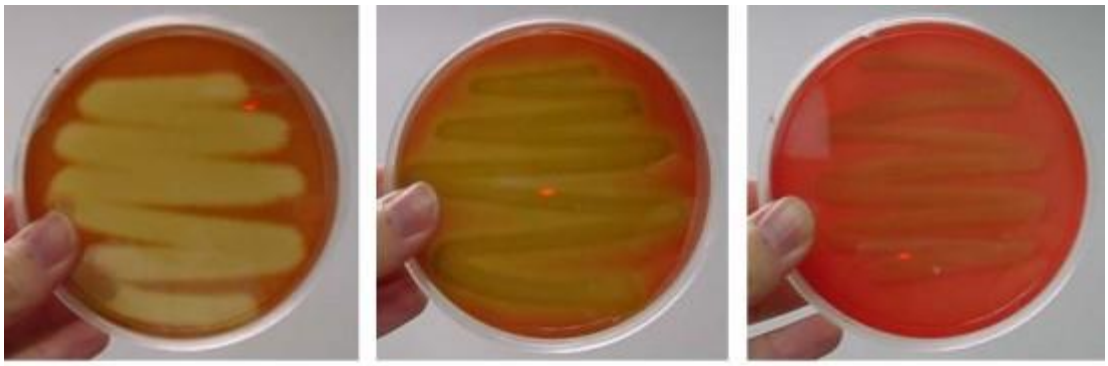
❖ **Endocarditis:** (viridans streptococci).

❖

Biochemical test

1-Hemolysis Patterns on Blood Agar

Blood agar is a **differential** medium. It is NOT a selective medium! Blood agar allows distinction among bacteria based on their ability to lyse red blood cells The three types of hemolysis are:



- **Beta hemolysis**, which is the complete lysis of red blood cells and hemoglobin. This results in complete clearing of the blood around the colonies.
- **Alpha hemolysis** refers to the partial lysis of red blood cells and hemoglobin. This results in a greenish-grey discoloration of the blood around the colonies.

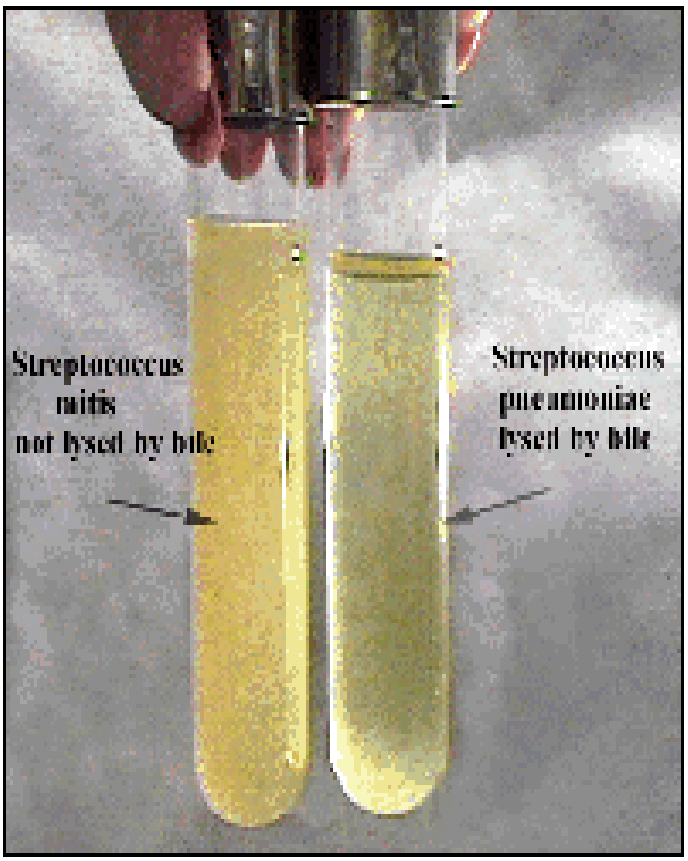
- **Gamma hemolysis** results in no change in the medium; no hemolysis.

2) Catalase test :all streptococci are negative for this test .

3) Bile solubility test :

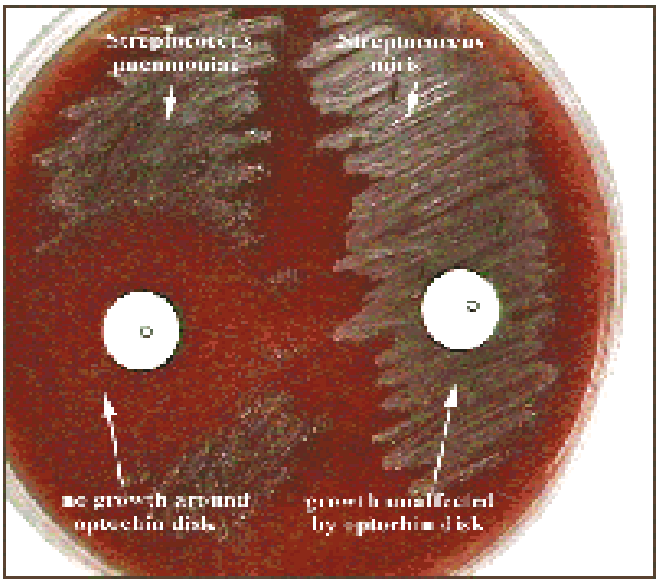
S. pneumoniae lyses in a suspension of sodium deoxycholate(bile saltes) while other ***streptococci*** do not lyse.

When a bile salt is added directly to *Streptococcus pneumoniae* growing in a broth culture the bacteria will lyse and the broth become clear. Other streptococci are resistant to (not lysed by) bile and will stay visible or turbid .



4-Bacitracin sensitivity testing

This is a differential test used to distinguish between organisms sensitive to the antibiotic bacitracin and those not. This test is commonly used to distinguish between the *streptococcus viridans* (bacitracin resistant) and *Streptococcus*



Pyrrolidonyl arylamidase /PYR-aminopeptidase : is used for the detection of pyrolidonyl arylamidase (also called pyrrolidonyl aminopeptidase) activity in Streptococcus pyogenes (group A strep), Enterococcus spp., some coagulase-negative staphylococci, and some Enterobacteriaceae. It is also known as PYR (L-pyrrolidonyl-β-naphthylamide) which serve as a substrate for the detection of pyrrolidonyl peptidase.

Enterococci and ***S. pyogenes*** are positive; ***S. bovis*** **group and** ***S. anginosus*** group are negative.

Procedure of PYR Test:

Broth Method Inoculate PYR broth with 3-5 colonies from 18-24 hours pure culture.

- Incubate the tube aerobically at 35-37°C for 4 hours.
- Add 2-3 drop of PYR reagent and observe for color change.
- Observe for the red color development within 1-2 minutes.

Disk Method (Rapid)

- Wet the PYR test disc on the strip with 10 µl sterile distilled water or deionized water.

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. CAMP test: is used for the presumptive identification of **Group B** beta-hemolytic streptococci, ***Streptococcus agalactiae***. The hemolytic activity of the beta-hemolysin produced by most strains of ***Staphylococcus aureus*** is enhanced by extracellular protein produced by group B streptococci. Interaction of the beta-hemolysin with this factor causes "synergistic hemolysis," which is easily observed on a blood agar plate. This phenomenon is seen with both hemolytic and non-hemolytic isolates of group B streptococci.

Procedure for CAMP test: Procedure for CAMP test:

1) Down the center of a blood agar plate (trypticase soy agar +5% sheep blood) , make a single straight line streak of beta-hemolysin producing ***Staphylococcus aureus***, taking care not to intersect the staphylococcal streak, inoculate a streak of the beta-hemolytic streptococcus to be identified perpendicular to the staphylococcal streak.

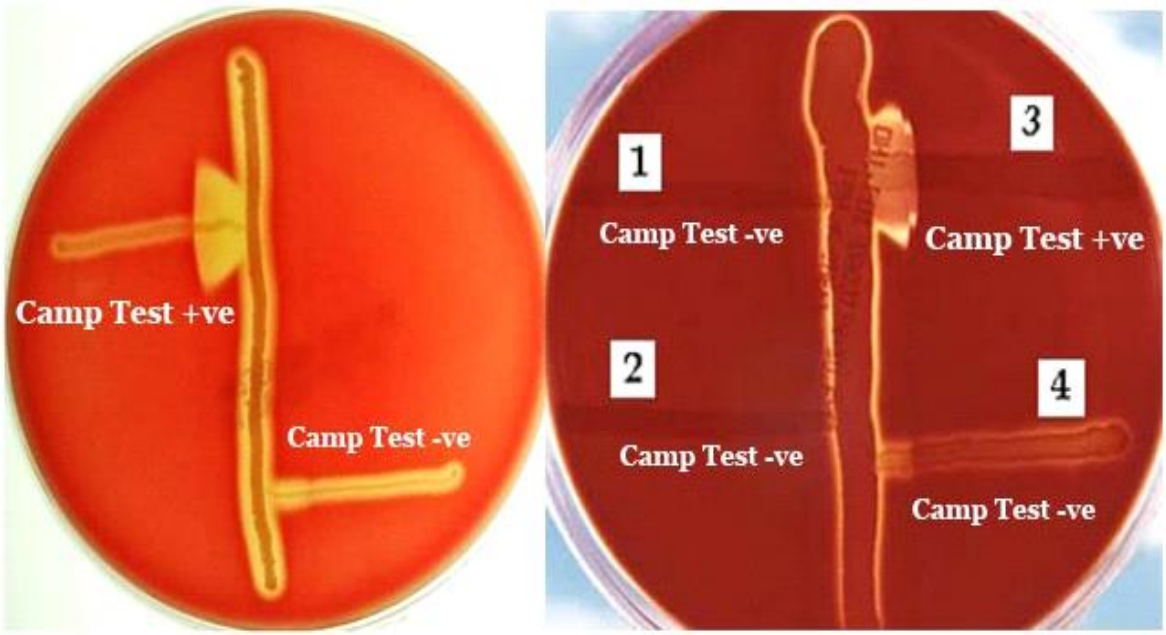
2) Make these streaks in such a way that, after incubation, the growth of the two organisms will not be touching.

3) The streptococcal streak should be 3 to 4 cm long. Known group A and B streptococcal strains should be similarly inoculated on the same plate as negative and positive controls respectively.

4) Incubate the plate at 35°C in ambient air for 18-24 hours.

Results and interpretations:

The area of increased hemolysis occurs where the beta hemolysin secreted by the staphylococcus and the CAMP factor secreted by the group B streptococcus



CAMP test


tonsillitis


pharyngitis