**Micrococcus**

**Morphology:**

- Gram +ve cocci
- Arrangement : Tetrades
- Non motile, non capsulated, non sporulated

**Habitat:**

May be normal present in upper respiratory tract

**Species :**

1- *M.variants*
2- *M. luteus*
3- *M.roseus*

**Culture:**

- Strictly aerobic at 37°C incubation (24 hr)
- Grow on ordinary media Nutrient agar   - Blood agar and

<table>
<thead>
<tr>
<th>on the Blood agar</th>
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<tr>
<td><em>M.variants</em> (yellow)</td>
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- On mannitol salt agar grow given rise to rose or pink colonies except *M. roseus*.

**Biochemical**

1- Catalase (+ve)
2- Coagulase (-ve)
3- Oxidative fermentation of glucose: (oxidative)

4- To differential between *Micrococcus* and *Staphylococcus* by Furazolidone test

*Micrococcus* → resistance.

*Staphylococcus* → sensitive.

**Disease:**

Acute endocarditic

Urinary tract infection

Mastitis

Chest infect

**Resistance:**

Resistance to many antibiotics
Streptococcus

General characteristics:

1- Morphology:
   - Gram (+ve) cocci
   - Arrangement: chain
   - Non motile, non sporulated, may be capsulated or not

2- Culture characteristics:
   - Facultative anaerobic
   - On fluid media → Sediment
   - Grow very poor on ordinary media as dew drops like colonies, but growth enhanced with blood or serum and glucose

Classification

1- Brown`s classification → depend up on degree of hemolysis

* β- hemolytic (clear zone of hemolysis) or (complete) e.g. S. pyogens [most pathogenic group]

* α – hemolytic (incomplete hemolysis) greenish colour in the blood agar e.g. (S. viridans _ S. pneumonia) [mild pathogenic group]

*γ-haemolysis (non hemolytic group)

  e.g. S. lactis

Mainly saprophytic.
2- Sherman's classification → depend up on the ability of microorganism to grow at 10°C and 45°C

* pyogenic group

e.g S. pyogenic

- Not grow at 10, 45°C but grow at 37°C
- Pathogenic
- β- hemolytic

* Enterococci group

↓

S. fecalis (E. fecalis)

- grow at 10& 45°C
- Less pathogenic (present in the intestine)
- Highly resistance to alkaline, bile salts.
  & saline NaCl & resistance to Antibiotic

* Lactic group:

↓

e.g S. lactis

- Grow at 10°C but not at 45°C
- Non pathogenic
- γ- hemolytic
*Viridans or oral Streptococcus*

\[ S. \text{viridans}\]

- grow at 45 °C & not 10°C
- α – hemolytic

3- lancefield classification → depend on carbohydrate Antigen in the cell wall

Group A, B, C, D, G, N, K, untenable group

**Group A:**

*S. pyogens* affect the human causing scarlet fever acute tonsillitis – abscess – sore throat – otitis media- puerperal sepsis and pyogenic infection

Also cause post streptococcus disease as:

- Rheumatic fever.
- Rheumatic kidney.
- Bovine mastitis in cattle.

**Group B:**

*S. agalactia* → mainly affect the bovine causing mastitis.
Normal present in female vagina causing meningitis in the infant & sepsis.

**Group C:**

*S. dysgalactia* → mastitis in cattle.

**Group D:**

*S. faecalis (E. Faecalis)* → endocarditic

Urinary tract infection

**Group G, N, K:** → animal strain

Affect the animal

+ *S. lactis, S. salivaris* → in saliva.

**Untypable group**

*S. pneumonia* → pneumonia in man.

*S. uberis* → mastitis in cattle.

**S. pyogens**

From group A&B hemolytic

**Morphology:** As general characters

**Culture character:** As general character+ β.hemolysis

**Biochemical test:** As general character

**Antibiotic sensitivity:** Bacitracin sensitive
Serological test:

* C-reactive protein (CRP):

it is test used for diagnosis of post-streptococcal disease

* Anti-streptolysin O (ASO):

Strept. pyogene → produce. streptolysin O

. streptolysin S

. Erythrogenic toxin produce skin rash

. streptokinase (Fibrinolysin)

streptolysin O → stimulated produce of specific antibody in the serum after 3-4 weeks from infection, this test used to measure the ASO titer.

What is rheumatic fever?

It is autoimmune disease due to similarity between Ag on the heart muscle and on strep., so the Ab-formed against strept. will attack the heart → Carditis
Streptococcus pneumoniae

Its role in pathogenesis is of minor importance.

Lancifield group → ungroupable.

Isolated from different species of animals.

Infection always occurs in the immuno-suppressed individual.

**Morphology:**

* Elongated diplococci.

* Capsulated by polysaccharide capsule gives the virulent character of the m.o. as it is highly resistant.

* Typical powerful - haemolytic.

* Optichin sensitive.
  [N.B. Oral Streptococci is optichin resistant].

* Bile soluble:

* Inuline fermenter.

* According to capsular Ag → 80 serovars or more.

**Quelling test:**

* Also called precipitin capsule test.

* It is a diagnostic test for Streptococcus pneumoniae.

  • Film of sputum + Anti pneumococcal serum

    + 3 drops M.B.

    ↓

    Swelling of the capsule

* Used for serovar determination.