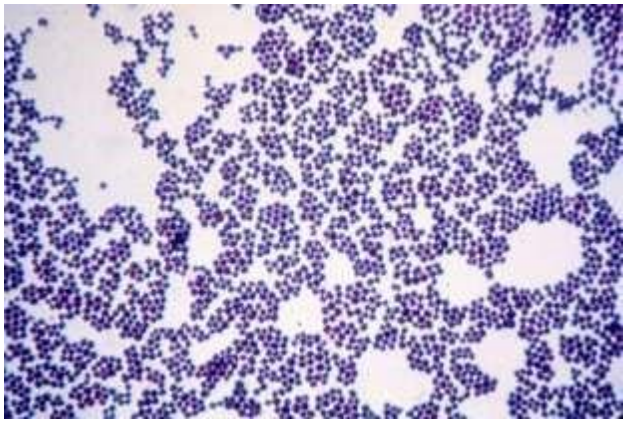
## Genus Staphylococcus

**Morphology: 1**) They are spherical cocci, approximately 1 µm in diameter,

2) arrange in **grapelike clusters**.

3) They are **non-sporing**, **non-motile** and usually non- capsulate **5**) gram-positive

This microorganism is widely distributed in our environment some of them are members of the normal flora of humans, found on the skin and mucous membrane of human beings. Others are important human pathogens like Staphylococcus aureus, Staphylococcus epidermidis , Staphylococcus saprophyticus. grow rapidly on many types of ordinary bacterial media ferment CHO and produced pigments varying from white to deep yellow.

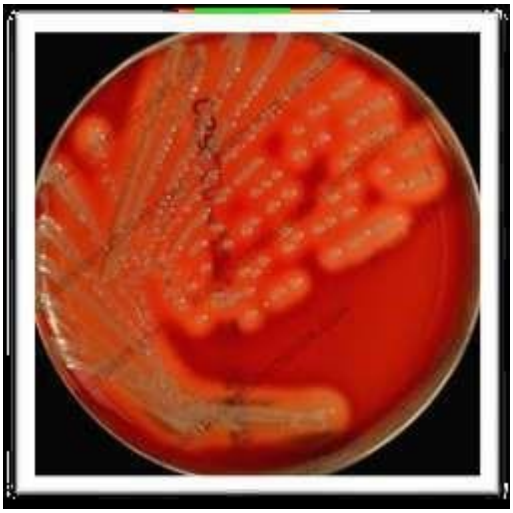


**Cultural Characteristics**

grow at 37 ºC and produce its pigments at room temperature (20-25 ºC), it shape onto solid media round smooth glistening raised and *S.aureus* colonies color vary from gray-golden yellow and its size about 3-4 mm with hemolysis area 1 cm around it; while *S.epidermidis* colonies graywhite in color and without hemolysis.

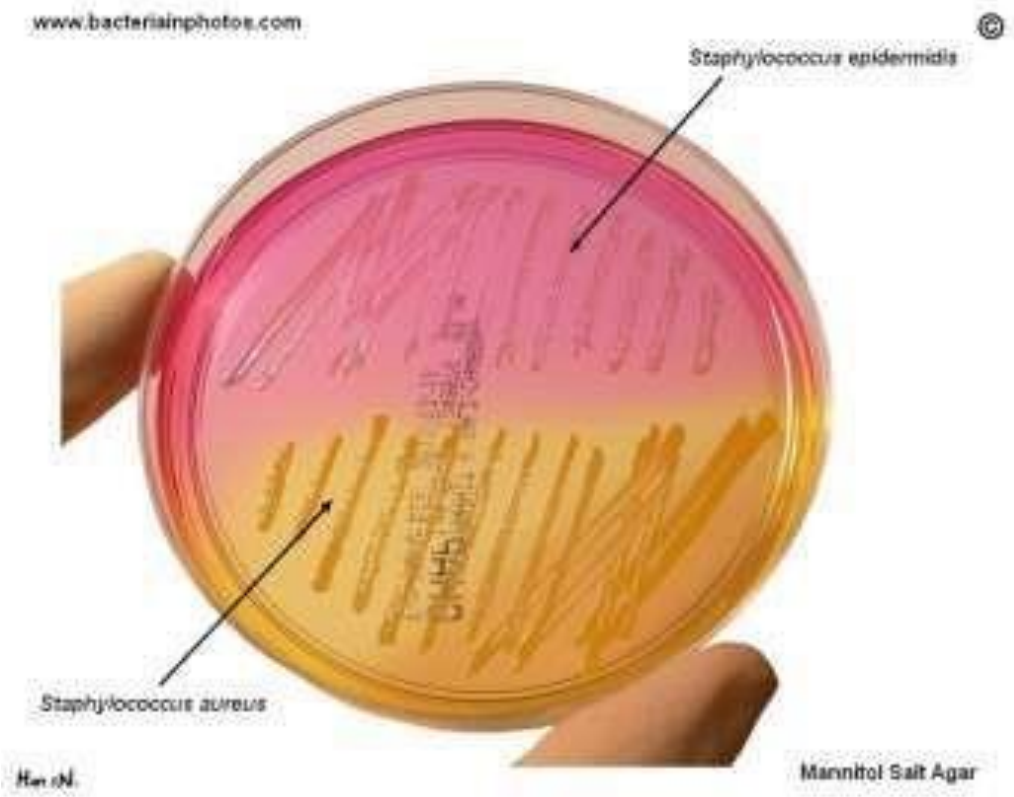
1. Blood Agar

The colonies have the same appearance as on nutrient agar, but may be surrounded by a **zone of β-hemolysis.**



2. Selective Salt Media

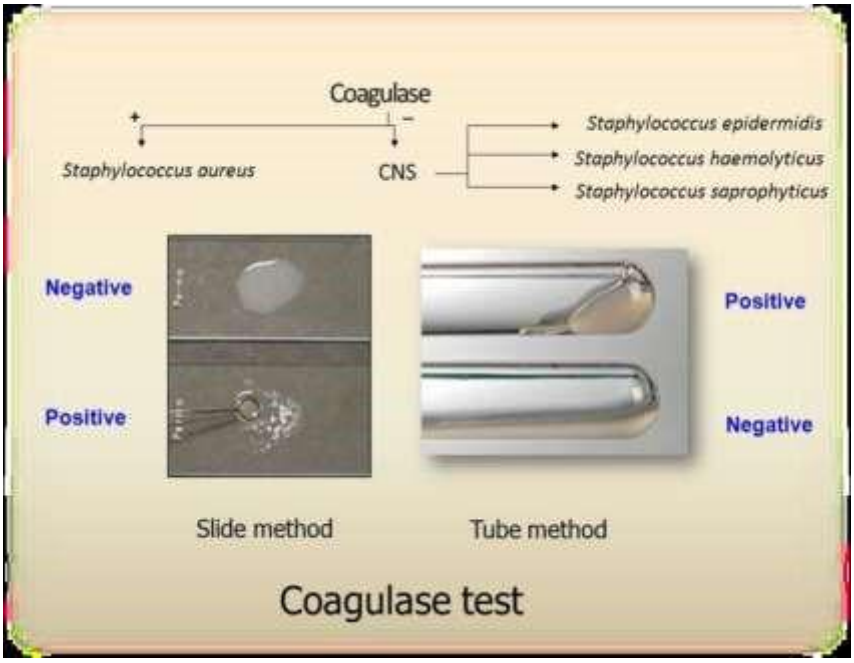
Selective medium may be useful for the isolation and enumeration of staphylococci from materials **mannitol salt agar containing 7.5 percent NaCl, and phenol red**




**Biochemical Reactions:**

1. **Sugar fermentation**: *S. aureus* ferments a range of sugars (**glucose**, **maltose**, **lactose**, **sucrose**, including **mannitol**) producing **acid** but no **gas**.
2. **Catalase test**: Catalase positive *Staphylococci* are catalase positive to be differentiated from *Streptococci*.

3-Coagulase test:
*S. aureus* produces an extracellular enzyme called coagulase which brings about clotting of human or rabbit plasma.




The Coagulase negative *Staphylococci* (CNS) e.g*S.epidermidis, and S.saprophyticus* (cause UTI in young females only). usually are normal flora in human and cause infections if introduced by intravascular catheterization or joints prostheses, especially in young or elderly immunocompromised patients.

***Staphylococcus aureus***

***Staphylococci extracellular enzymes & toxins*** The bacterial enzymes they are:

2- Coagulase & clumping factor: the clumping factor is responsible for bacteria adherence to the fibrinogen.
3- Hyalorunidase, staphylokinase that produce fibrinolysis, proteinase, lipase.
**The toxins are:**

1- α-toxins (hemolysin) act upon leucocytes cell wall
2- β-toxins act upon RBCs act upon leucocytes wall
3- Exfoliative toxins (A+B) they are epidermolytic toxins, cause skin desquamation (scalded skin),
4- Toxic shock syndrome toxin (TSST-1)
7- Enterotoxins (emetic effect) and it types are (A-E, G-J, K-R, and U, V); it preformed as Staph grow in carbohydrate or protein diets and the personnel ingest the already produced toxins not the microbe itself.

## Pathogenecity of Staphylococcus aureus:

Local infection (Cutaneous lesions, abscess, Boils, eye infection).
Staphylococci occur also directly through wound contamination (surgical or traumatic) as meningitis after skull fracture or osteomyelitis after open fracture surgery. If the bacteria transmitted by blood stream we get bacteremia, pulmonary, osteomyelitis, meningitis, arthritis, etc.
In food poisoning the incubation period is short (1-8 hours); with vomiting and diarrhea & NO fever.

**Staphylococci laboratory diagnosis**
The specimens are pus swab, blood, tracheal or abscess aspirates, urine, CSF 1-Gram stained smears
2-Culture onto 5% blood agar plate (BAP), Mannitol salt plate as S aureus ferment it to gain yellow colonies,

3-Catalase test
4-Hemolysis in BAP
5-Coagulase test