

Staphylococcus aureus

# General Features

- Gram positive cocci in grape-like clusters
- Catalase positive

# Clinical Manifestations

- Skin & Soft tissue infections
  - Folliculitis, Furuncle
  - Carbuncle, Impetigo
  - Mastitis and breast abscess
  - Surgical site wound infections
  - Cellulitis →
  - Hidradenitis suppurativa
  - Botryomycosis

- Musculoskeletal
- Infections
- Septic arthritis
- Osteomyelitis
- Pyomyositis in HIV
- Psoas abscess
- Epidural abscess

- Ventilator associated
- pneumonia in adults
- Respiratory Tract
- Septic pulmonary emboli
- Post viral pneumonia
- Empyema and Pneumothorax
- Pneumatocele in neonates

# **Bacteremia and its Complications**

- Sepsis, septic shock
- Central line associated blood stream infection
- Metastasis - kidney, joints, bone and lung
- Native-valve endocarditis
- Prosthetic-valve endocarditis
- Intravenous drug use associated endocarditis

- **UTI**(Urinary tract infection)- secondary to bacteremia

- **Toxin-Mediated Illnesses**

- Toxic shock syndrome
- Food poisoning
- Staphylococcal scalded-skin syndrome


- **Infections Associated with CA-MRSA**

- Necrotizing pneumonia
- Purpura fulminans
- Necrotizing fasciitis

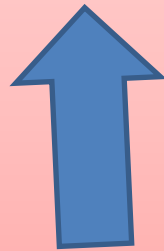
# LABORATORY DIAGNOSIS..

Infection	Specimen
Suppurative lesion	Pus, wound swab
Respiratory Infections	Sputum
Urinary tract infection	Mid stream urine
PUO, Bacteremia	Blood
Food poisoning	Feces, vomitus, food
Carriers	Nasal & perianal swab

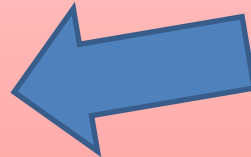
# Laboratory diagnosis

- The specimens to be collected depend on the type of the lesion.
- Direct microscopy  Culture on basal media

Antibiotic sensitivity



Coagulase  
test

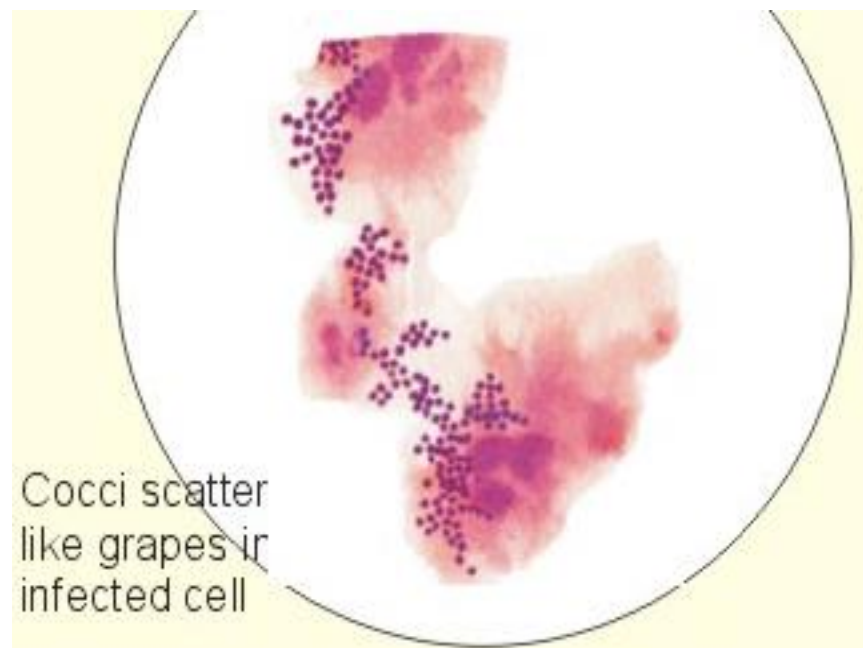
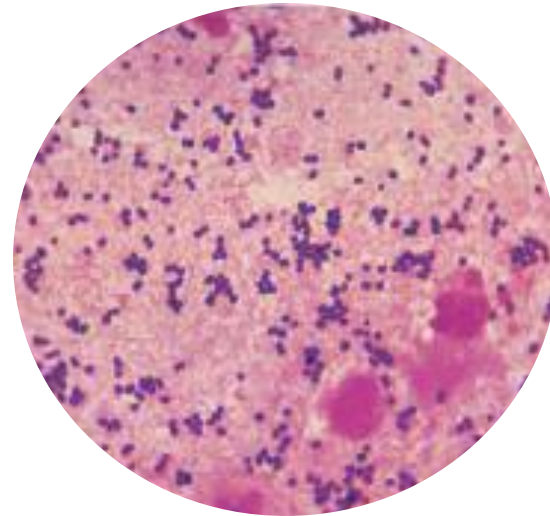


Use selective  
media





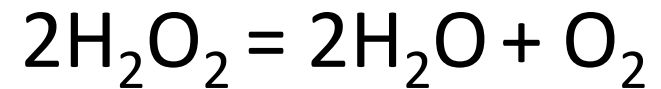
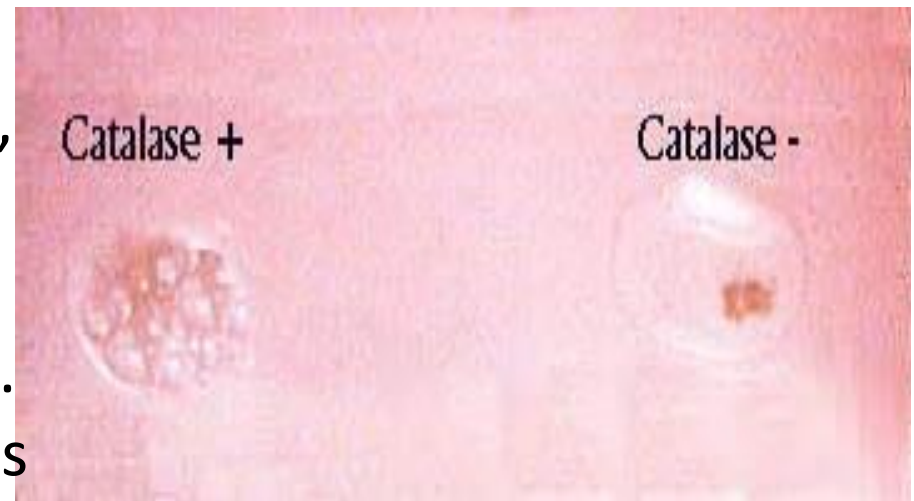
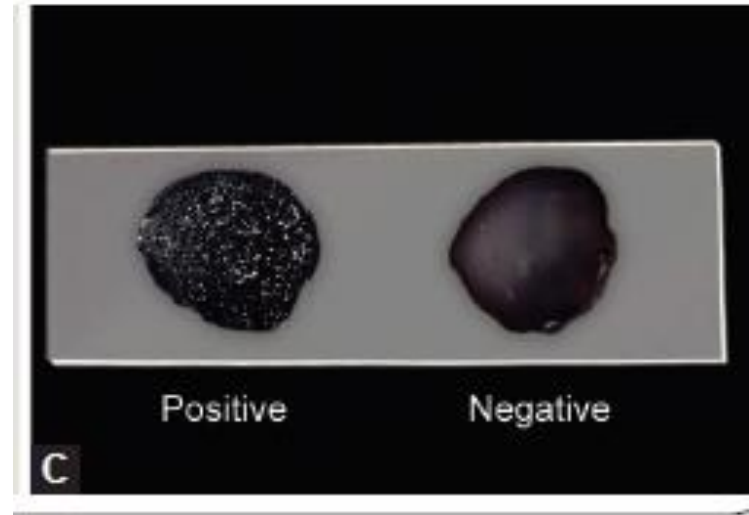
- MICROSCOPY
- Gram staining -Gram positive cocci in clusters



Cocci scatter  
like grapes in  
infected cell

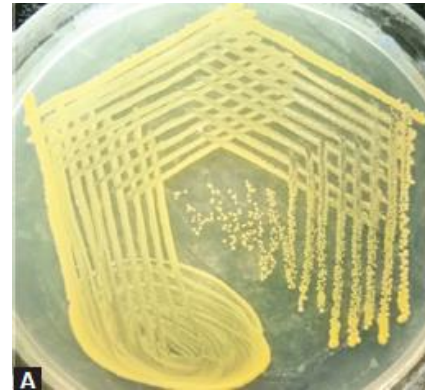
Stafylococci in pus  
Therapy: Penicillin

- The catalase test involves adding hydrogen peroxide to a culture sample or agar slant. If the bacteria in question produce catalase, they will convert the hydrogen peroxide and oxygen gas will be evolved. The evolution of gas causes bubbles to form and is indicative of a positive test.

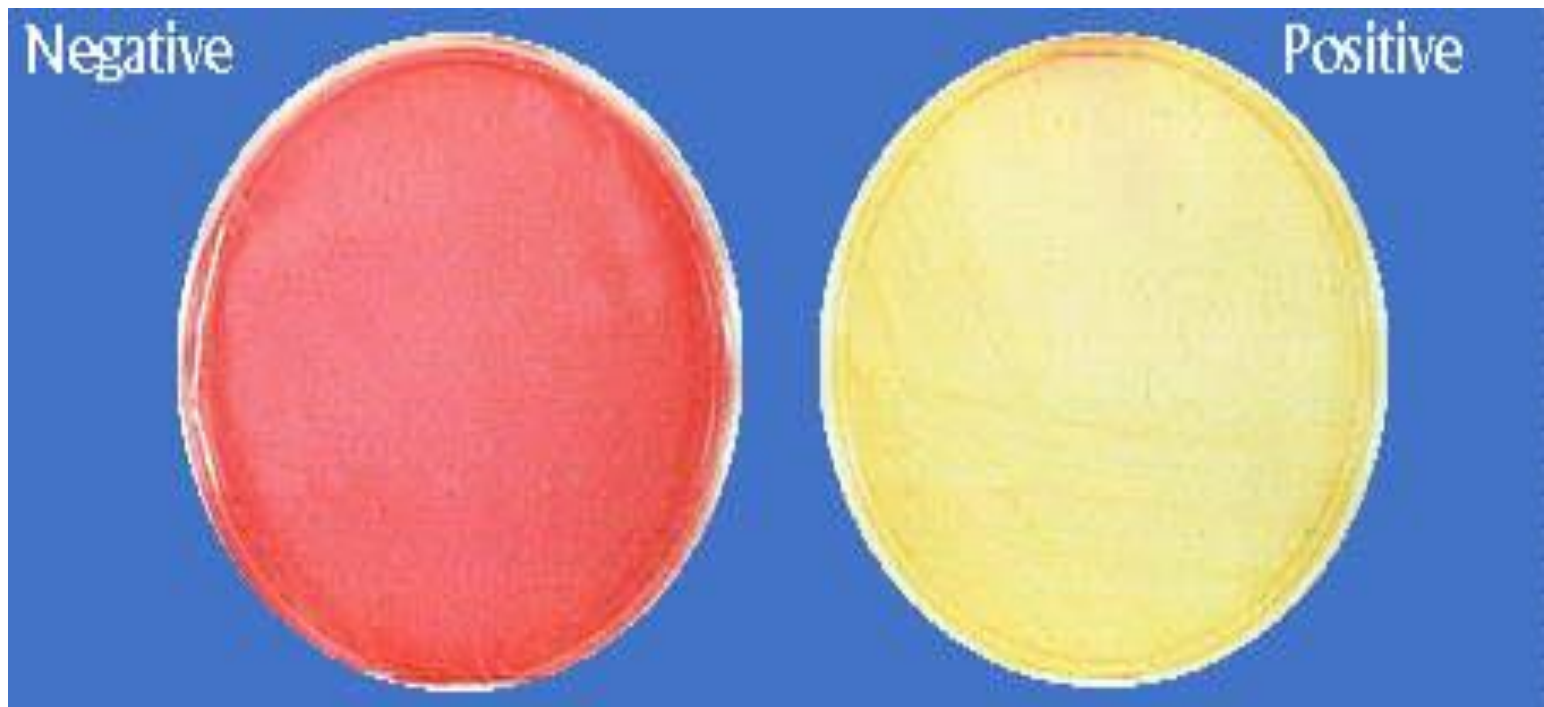


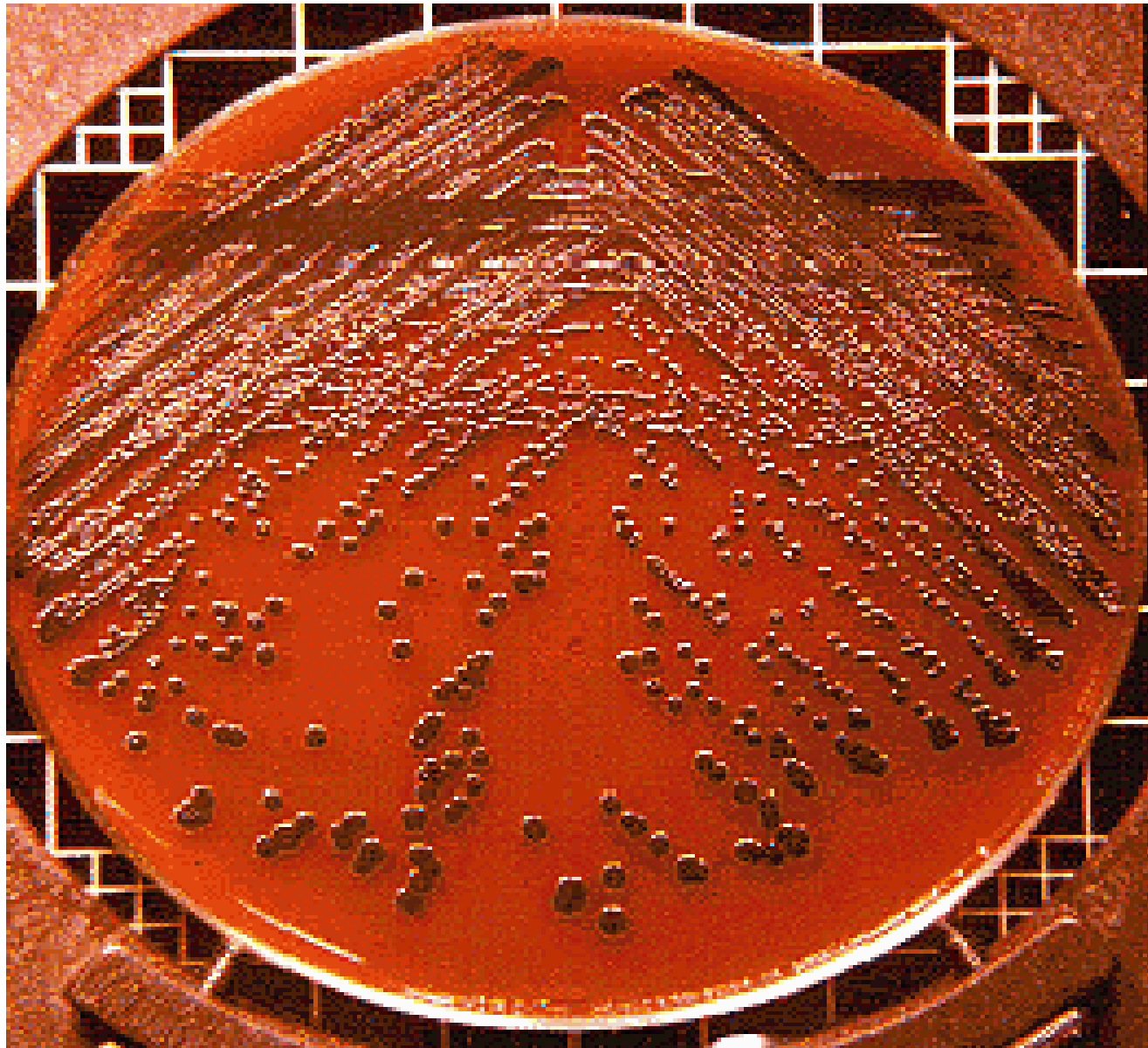
# LABORATORY DIAGNOSIS- CULTURE

- Aerobe, facultative anaerobe, Non-fastidious
- Nutrient agar – Golden yellow
- Blood agar – beta hemolytic

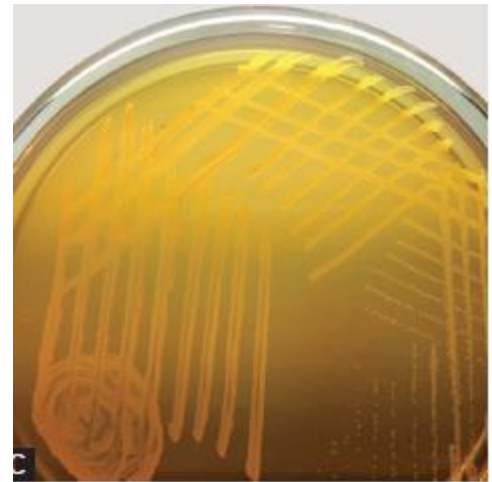


# Mannitol salt agar





- **MacConkey agar**- Small pink
- **Liquid medium** - uniform turbidity
- **Selective media**
  - Mannitol salt agar – yellow colonies -mannitol fermentation →
  - Salt milk agar
  - Ludlam's medium

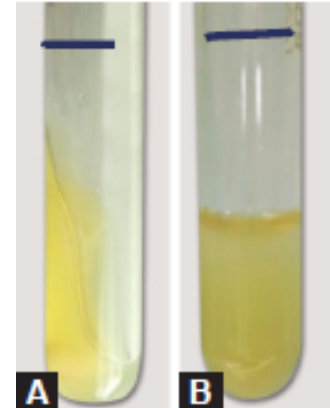


# LABORATORY DIAGNOSIS- Biochemical Tests

- **Coagulase test**
  - **Tube coagulase**
  - **Clumping factor**
- **Heat stable thermo nuclease test**
- **DNase test**
- **Phosphatase (also produced by *S.epidermidis*)**
- **Golden yellow pigmentation**
- **Hemolysis on blood agar**
- **Mannitol fermentation**
- **Black coloured colonies on potassiumtellurite agar**
- **Gelatin liquefaction**
- **Protein A detection**

- *S.aureus* positive and CoNS mostly negative

Tube coagulase	Slide coagulase
Due to coagulase enzyme	Due to clumping factor
Requires CRF in plasma	Does not require CRF in plasma
Done in tube	Done in slide
Positive if clot is formed	Positive if clumps are formed
Coagulase enzyme has eight serotypes	Clumping factor has one serotype
<i>S.lugdunensis</i> gives a negative result	<i>S.lugdunensis</i> gives a positive result
Both tube and slide coagulase positive for <i>S.aureus</i> , <i>S.hyicus</i> , and <i>S.intermedius</i>	



positive



negative



# Bacteriophage Typing

- Staphylococci may be typed, based on their susceptibility to bacteriophages.



# Introduction to Helminthology

# The term helminths means...

- Worm
  - Multicellular
  - Bilaterally symmetrical
  - Three germ layers
  - The kingdom – Metazoa
    - Nematohelminths
      - Nematode
    - Platyhelminths
      - Cestode
      - Trematode



# General features of helminths

- Platyhelminth
  - Bodies- flattened dorsoventrally, leaf like or tape like
  - Segmented or unsegmented
  - Hermaphrodite – monoecious
  - Alimentary canal – incomplete or lacking
  - Body cavity - absent
- Nematelminths
  - Elongated & cylindrical
  - Unsegmented
  - Diecious –sexes separate
  - Alimentary canal complete with anus
  - Body cavity present

	<b>Cestode</b>	<b>Trematode</b>	<b>Nematode</b>
<b>Shape</b>	<b>Tape like segmented</b>	<b>Leaf like unsegmented</b>	<b>Cylindrical elongated</b>
<b>Head</b>	<b>Suckers +nt Hook +nt</b>	<b>Suckers + Hooks -nt</b>	<b>Suckers -nt Hooks - nt Buccal capsule</b>
<b>Sex</b>	<b>Not separate</b>		<b>Separate</b>
<b>Alimentary canal</b>	<b>Absent</b>	<b>+nt but incomplete</b>	<b>+nt &amp; complete</b>
<b>Body cavity</b>	<b>Absent</b>	<b>Absent</b>	<b>Present</b>

- **Obligate parasite**
  - This is the parasite, which cannot exist without a parasitic life in the host (e.g., *Plasmodium* spp.)
- **Facultative parasite**
  - This is the parasite, which can live a parasitic life or free-living life, when the opportunity arises. (e.g., *Acanthamoeba*).
- **Accidental parasite**
  - This is the parasite, which infects an unusual host (e.g., *Echinococcus granulosus* infect humans accidentally).
- **Aberrant parasite or Wandering parasite**
  - This is the parasite, which infects a host where it cannot live or develop further (e.g., *Toxocara canis* and *Toxocara cati* in humans).

- **Definition:** Host is defined as an organism, which harbors the parasite and provides nourishment and shelter.
- **Hosts may be of the following types:**
- **Definitive host: Sexual cycle**
  - *Anopheles species for Plasmodium*
- **Intermediate host: Asexual cycle**
  - *Man for Plasmodium*

- **Symbiosis:** It is the close association between the host and the parasite. Both are interdependent upon each other that one cannot live without the help of the other. None of them suffer any harm from each other
- **Commensalism:** It is an association in which the parasite only derives the benefit without causing any injury to the host. A commensal is capable of living an independent life
- **Parasitism:** It is an association in which the parasite derives benefit from the host and always causes some injury to the host. The host gets no benefit in return.



# Sources of Infection

- **Man-** amoebiasis, enterobiasis
- **Animal (zoonoses):** echinococcosis from dogs and toxoplasmosis from cats
- **Vectors:** *Anopheles* for Malaria , *Culex* for filariasis, Sandfly for kala-azar, reduviid bug for Chagas' disease, Tsetse fly for sleepi sicknessng
- **Contaminated soil and water:**
  - **Soil-**hookworm, *Ascaris species*, and *Trichuris*
  - **Water** contaminated with human excreta containing cysts of *E. histolytica* or *Giardia lamblia*
- **Raw or under cooked meat-** Beef containing *Cysticercus bovis* and pork containing *Cysticercus cellulosae*

# Modes of Transmission

- **Oral or feco-oral route-** cysts of *E. histolytica*, and ova of *Ascaris*, *Enterobius*, *Trichuris*
- **Penetration of the skin and mucous membranes-** *Strongyloides stercoralis*
- and hookworm, *Schistosoma*
- **Sexual contact-** *Trichomonas vaginalis*
- **Bite of vectors-** *Anopheles* for Malaria , *Culex* for filariasis
- **Vertical transmission**
- **Blood transfusion-** *Plasmodium*, *Babesia*, *Toxoplasma* , *Leishmania* and *Trypanosoma*

- **Autoinfection:** contaminated hand (external autoinfection) or by reverse peristalsis (internal autoinfection)
  - *Cryptosporidium*
  - *Hymenolepis nana*
  - *Enterobius vermicularis*
  - *Strongyloides stercoralis*
  - *Taenia solium*

# Life cycle of the parasites

- **Direct/simple life cycle:** When a parasite requires only one host to complete its development
- **Indirect/complex life cycle:** When a parasite requires
  - two hosts (one definitive host and another intermediate host)
  - three hosts (one definitive host and two intermediate hosts)