

MICROBIOLOGY PRACTICAL CLASS

YEAR ONE, FOUNDATION BLOCK

*M*icrobiology



YOU ARE GOING TO LEARN ABOUT



1. Bacteria






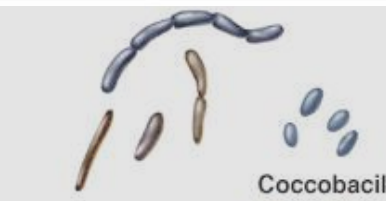










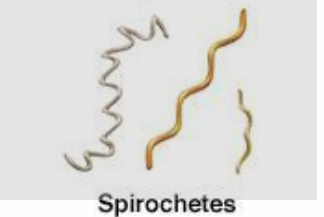
Important to know

What do you need to describe after seeing the slide?

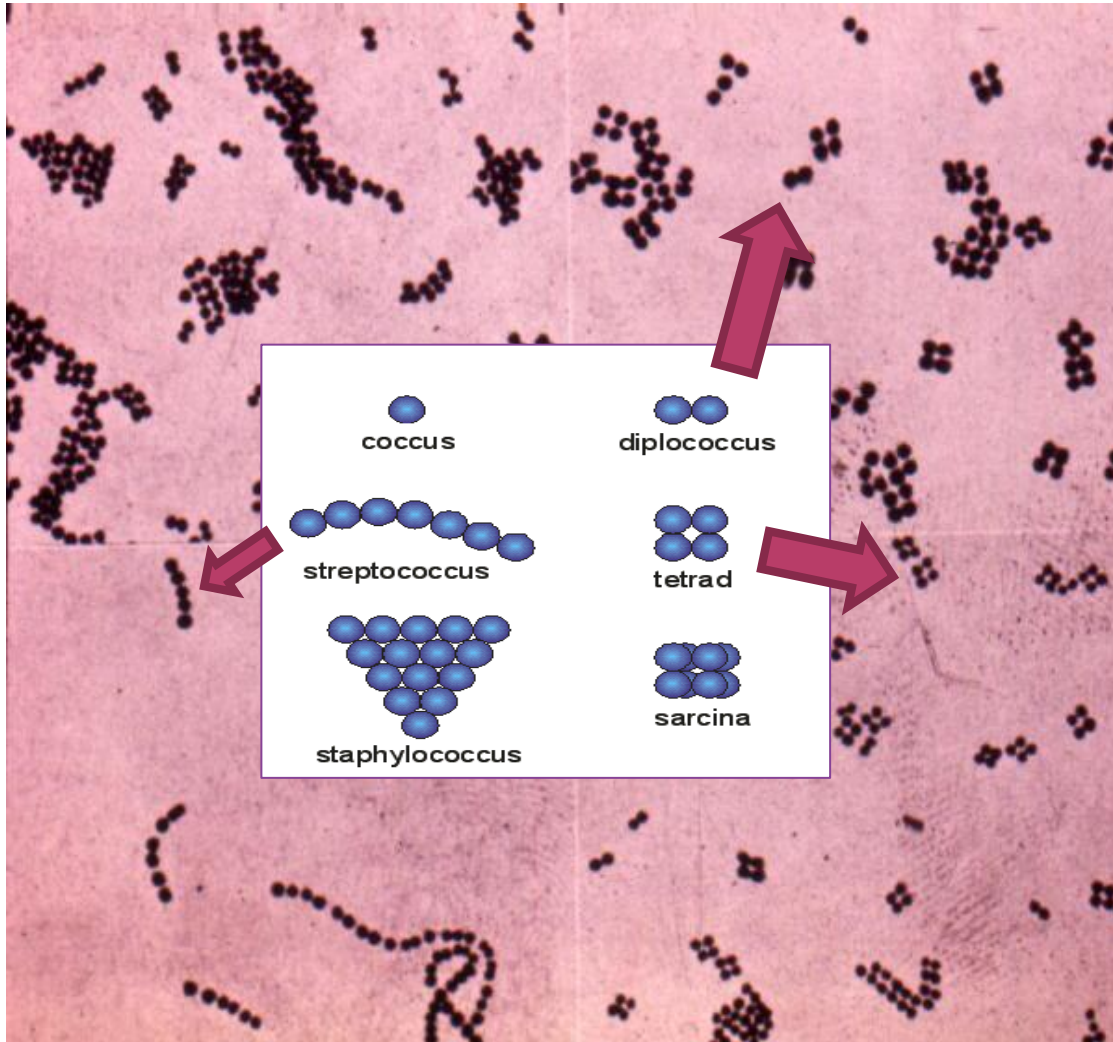
- Gram reaction (positive if purple or dark, negative if pink or light).
- Shape + arrangement
- The most likely organism.

Kathleen Park Talaro and Arthur Talaro, *Foundations in Microbiology*, 3e Copyright © 1999 The McGraw-Hill Companies, Inc. All rights reserved.

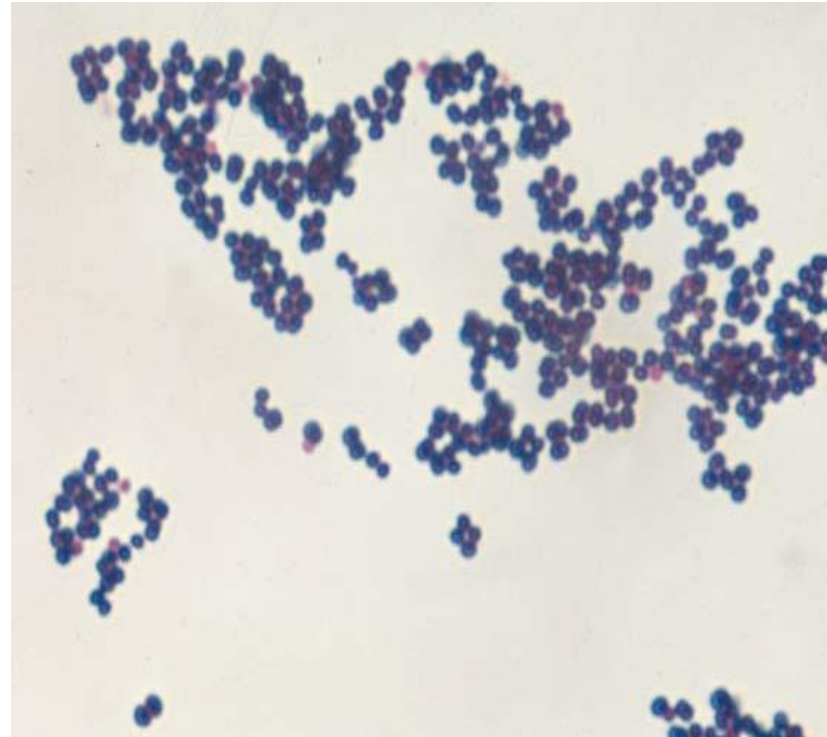
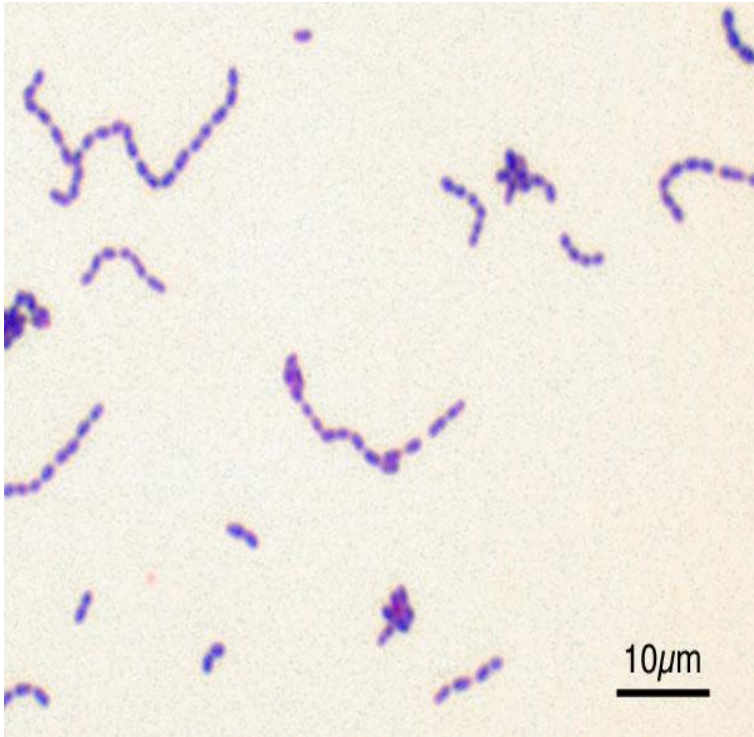
Bacterial shapes and arrangements

 <p>Coccus</p>	 <p>Rod, or Bacillus</p>	 <p>Curved forms: Spirillum/Spirochete</p>		
 <p>Diplococci (cocci in pairs)</p>	 <p>Neisseriae (coffee-bean shape in pairs)</p>	 <p>Coccobacilli</p>	 <p>Vibrios (curved rods)</p>	
 <p>Tetrads (cocci in packets of 4)</p>	 <p>Sarcinae (cocci in packets of 8, 16, 32 cells)</p>	 <p>Mycobacteria</p>	 <p>Corynebacteria (palisades arrangement)</p>	 <p>Spirilla</p>
 <p>Streptococci (cocci in chains)</p>	 <p>Micrococci and staphylococci (large cocci in irregular clusters)</p>	 <p>Spore-forming rods</p>	 <p>Streptomycetes (moldlike, filamentous bacteria)</p>	 <p>Spirochetes</p>

Bacterial shapes and arrangement under the microscope: Cucci



microscopic slides examples



Gram reaction

Shape

Gram positive cocci in chain

Streptococci

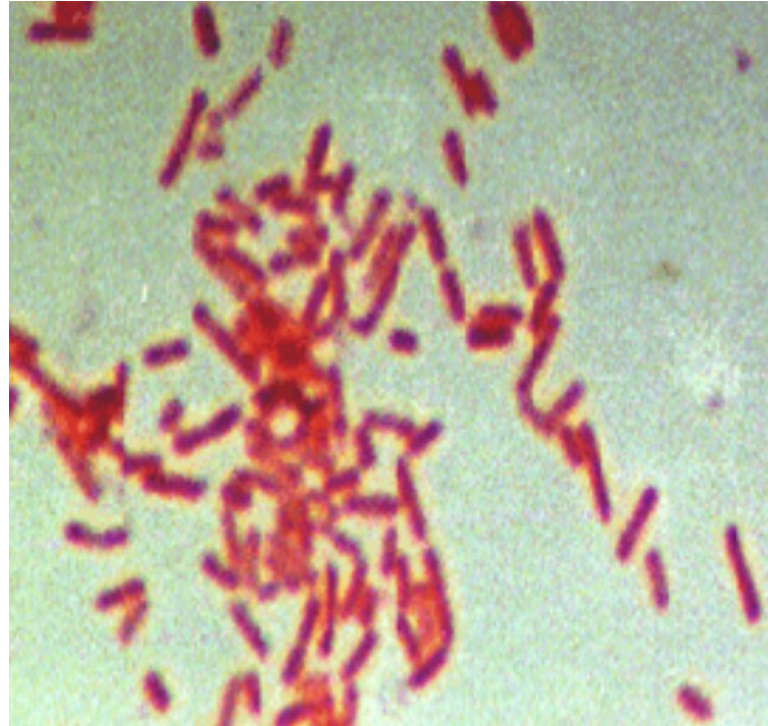
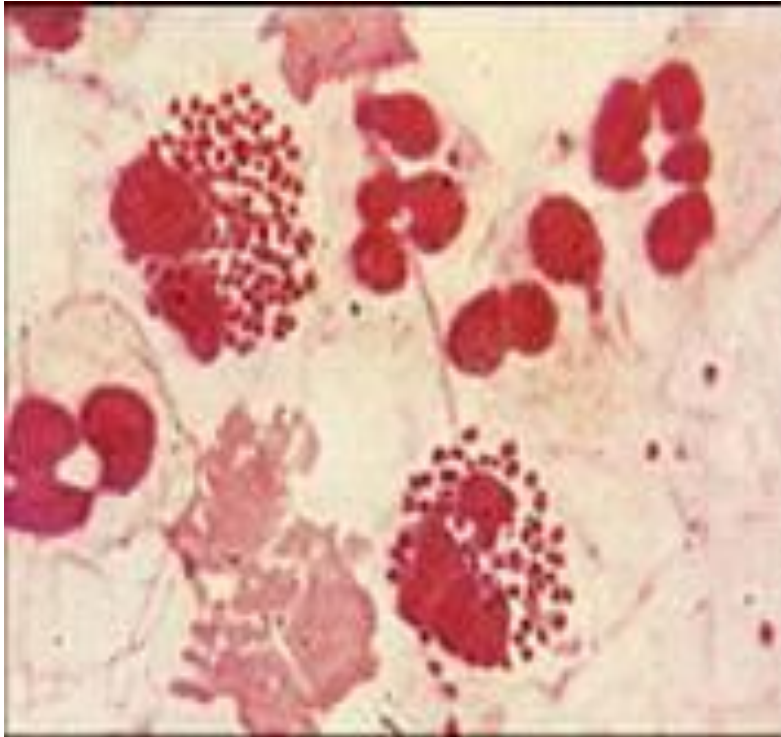
arrangement

The most likely organism

Gram positive cocci in clusters

Staphylococci

microscopic slides examples

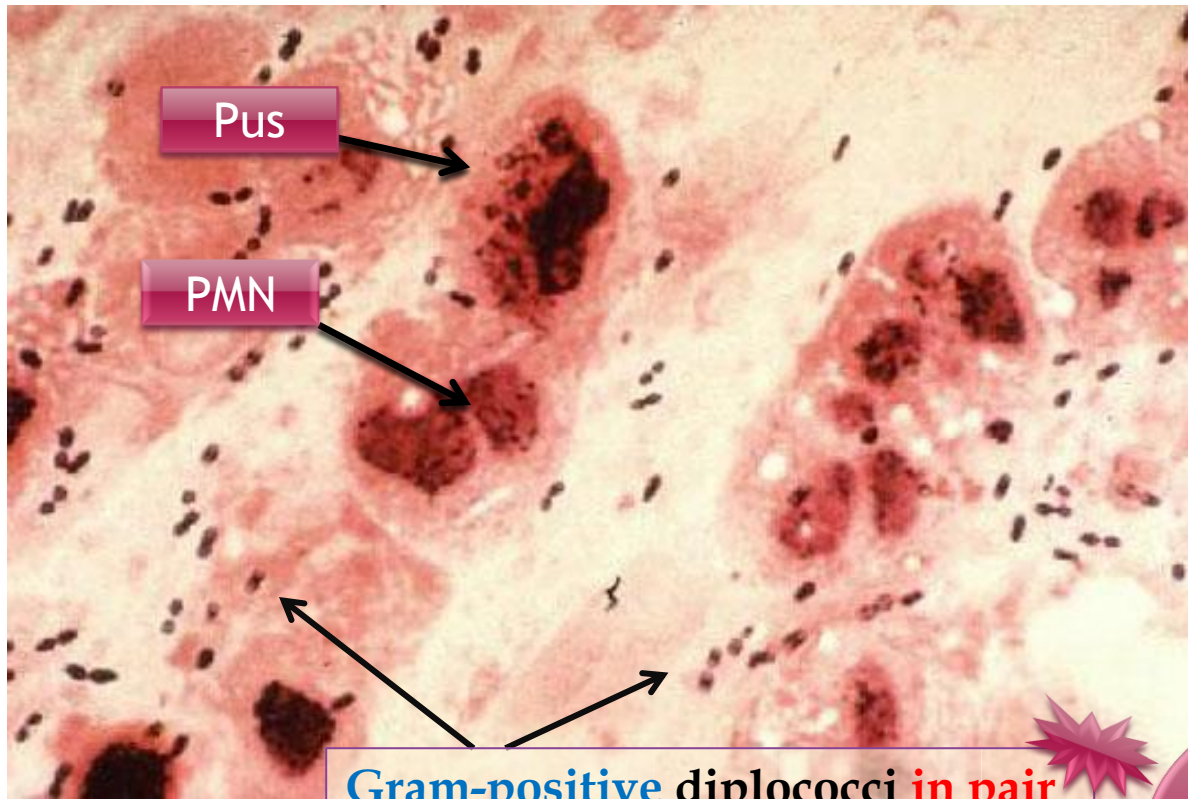


Gram negative cocci
(Diplococci)
e.g Neisseria

Gram negative bacilli
e.g E. coli
Salmonella

Case example

A gram-stained smear of a CSF sample from a **3 year old** child seen in the emergency department presenting with **fever** and **neck stiffness**.



Gram-positive diplococci **in pair**
Streptococcus pneumoniae

The disease is :
Meningitis

In the smear, we also need to mention the presence or absence of: Pus, PMN, and the bacteria

It can cause **pneumonia**, **meningitis** and other infections

Case example



This is a bacterium isolated from a child with **sore throat** and **tonsillitis** .

The most common infection is **sore throat**

A: Describe the Gram stain

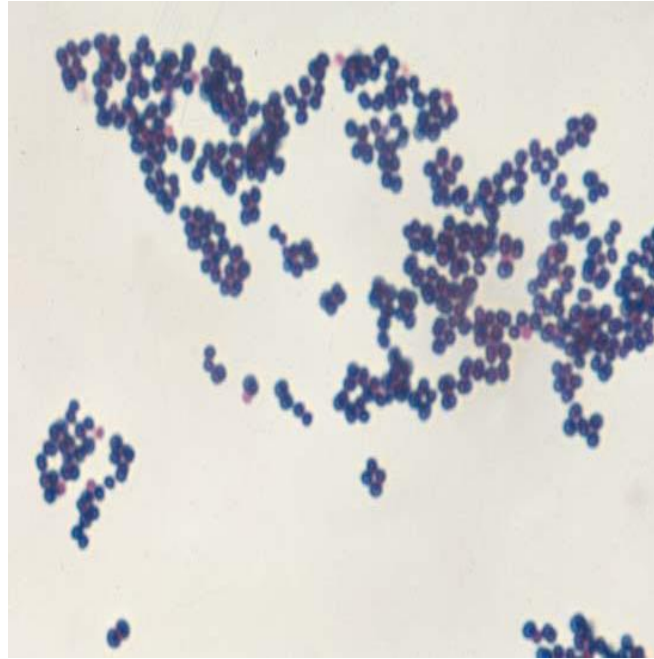
Gram positive (Streptococci)

B: Describe the shape and arrangement of the bacteria

Cocci in chains

Case example

Following is the Gram stained smear of an organism isolated from a **wound infection**.



Treatment:
Cloxacillin
If resistant
vancomycin

Describe what you see in the slide above

What is the likely organism

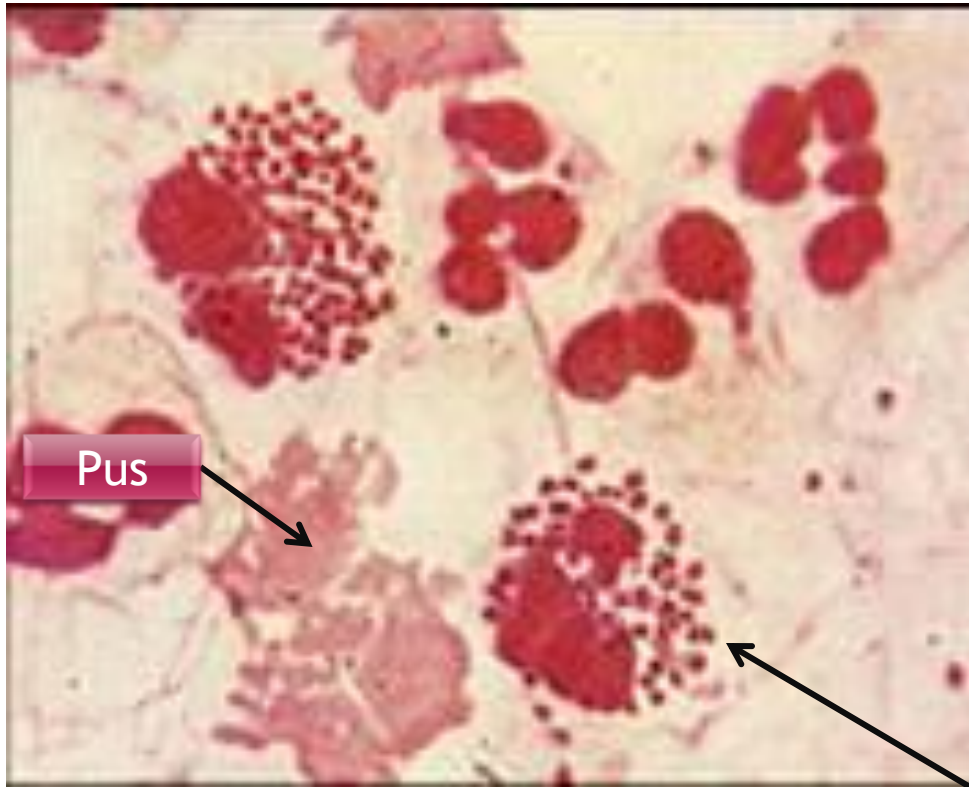
Gram-positive cocci in cluster

Staphylococcus aureus

Management: (Drainage of abscess) , because Staphylococcus usually causes abscess

Case example

Following is the Gram-stained smear of from urethra of a 25 –year old male complaining of urethral discharge



it is intra and extra cellular

Describe the Gram stain of the intracellular bacteria Gram negative

Describe the shape of the bacteria cocci (diplococci)

Bacterial culture media



blood agar

a general culture medium



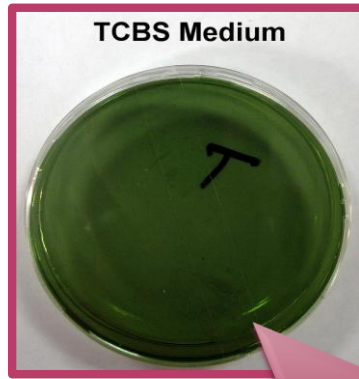
Chocolate Agar

an enriched media



MacConkey Agar

a differential media (between lactose and non-lactose fermenting colonies)



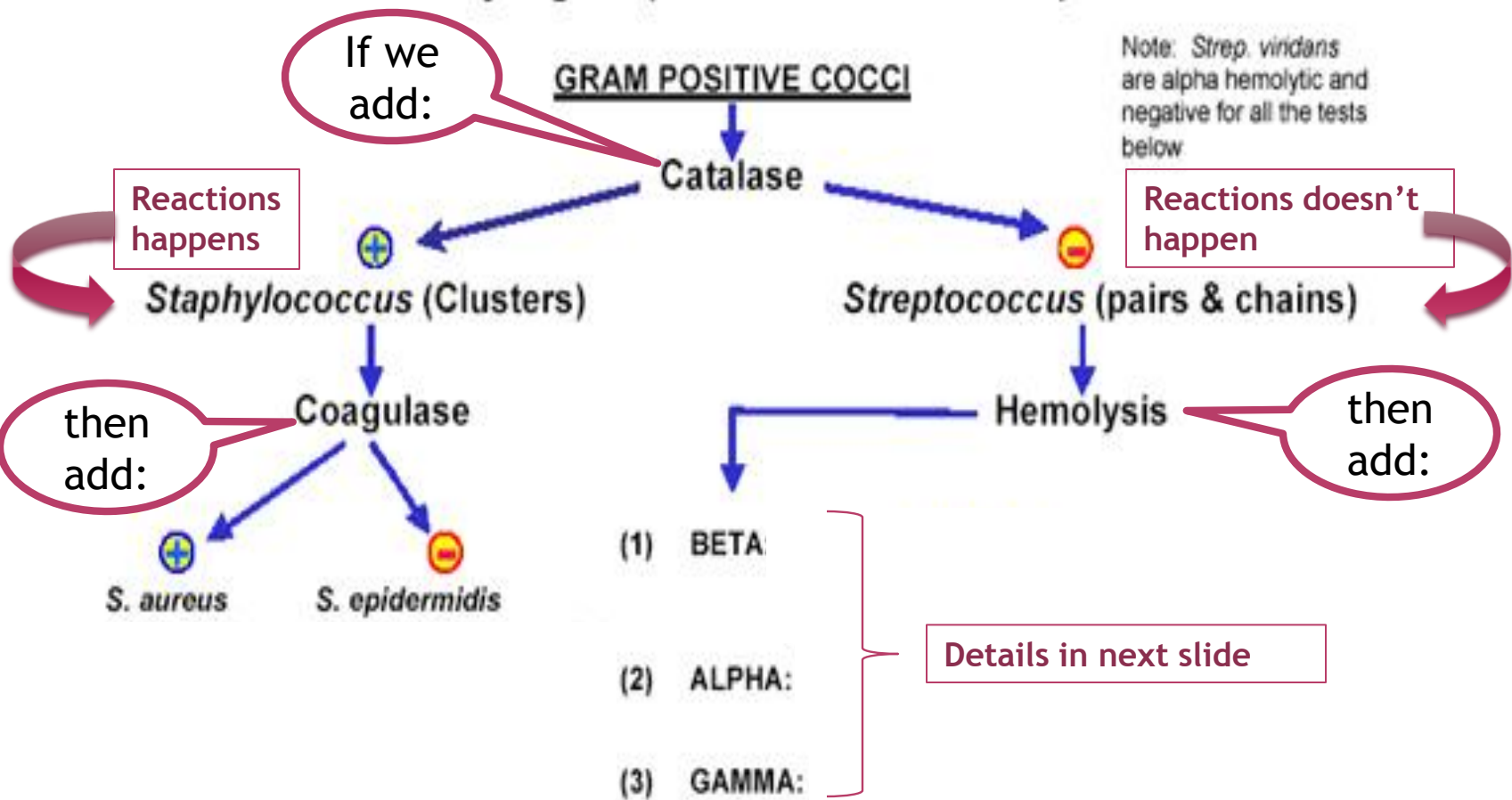
TCBS Medium

Thiosulphate citrate bile salt sucrose (TCBS) is a selective medium

Microbial growth or culture media

Type	Purpose
Chemically defined	Growth of chemoautotrophs and photoautotrophs; microbiological assays.
Complex	Growth of most chemoheterotrophic organisms.
Reducing	Growth of obligate anaerobes.
Selective	Suppression of unwanted microbes; encouraging desired microbes.
Differential	Differentiation of colonies of desired microbes from others.
Enrichment	Similar to selective media but designed to increase numbers of desired microbes to detectable levels.

How to differentiate between the various types of Gram +ve cocci



Identification of streptococci by hemolytic reaction

Gamma-hemolytic *Streptococcus* colonies

No shadows around the bacteria



Gamma

Alpha-hemolytic *Streptococcus* colonies

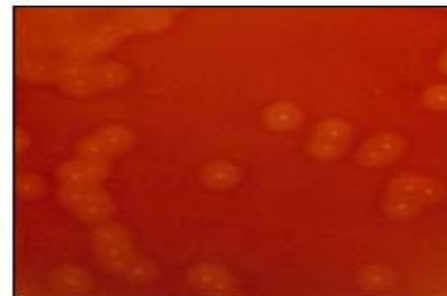
green shadows around the bacteria



Alpha

Beta-hemolytic *Streptococcus* colonies

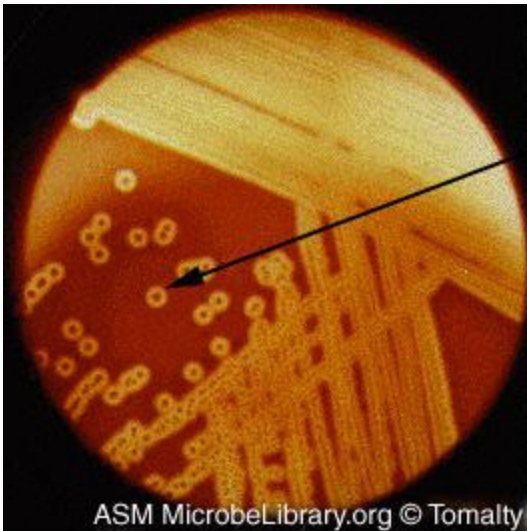
Light shadows around the bacteria



Beta

Example

- This is a blood agar growing beta hemolytic streptococci.

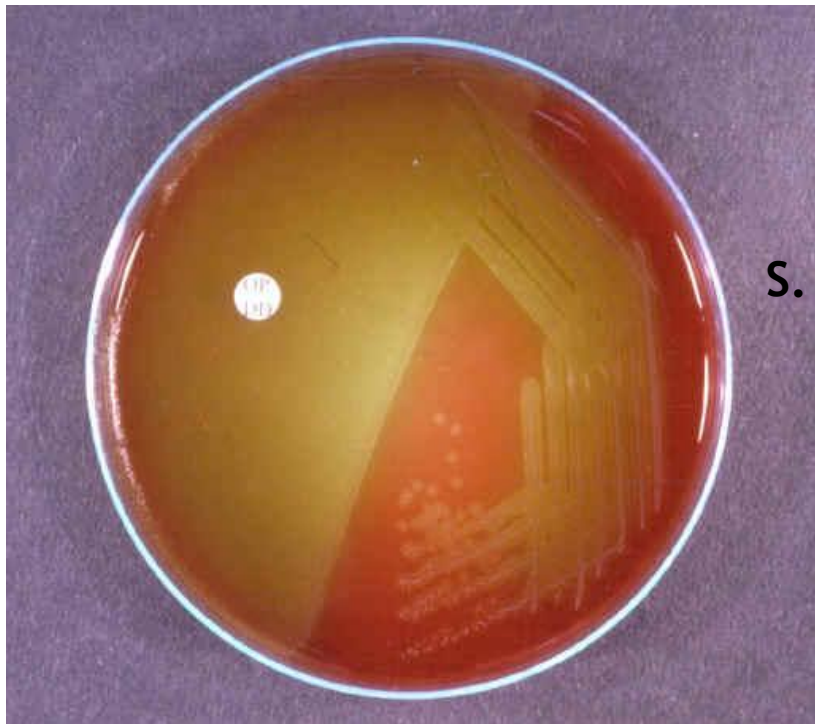


Note the clear zone of beta-hemolysis surrounding the *Streptococcus* colonies when grown on blood agar.



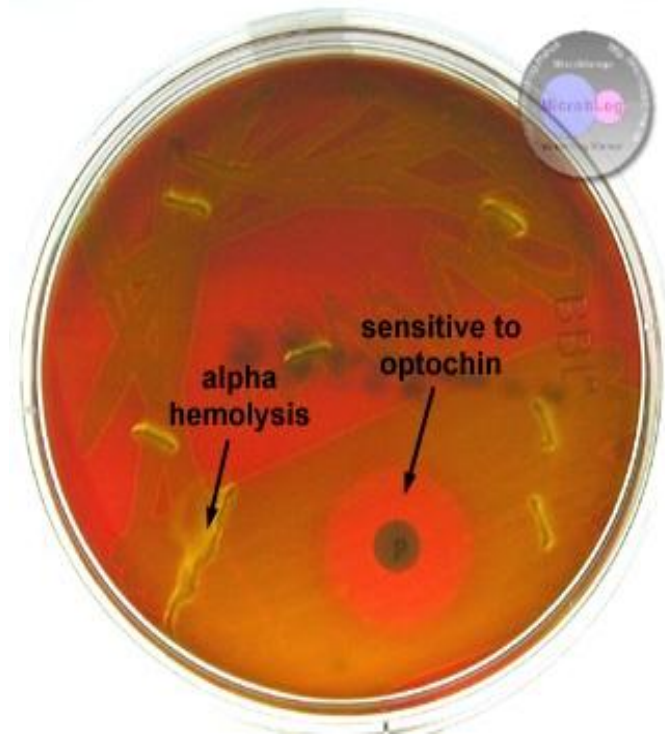
Optochin test

To differentiate between alpha hemolytic bacteria



S. e

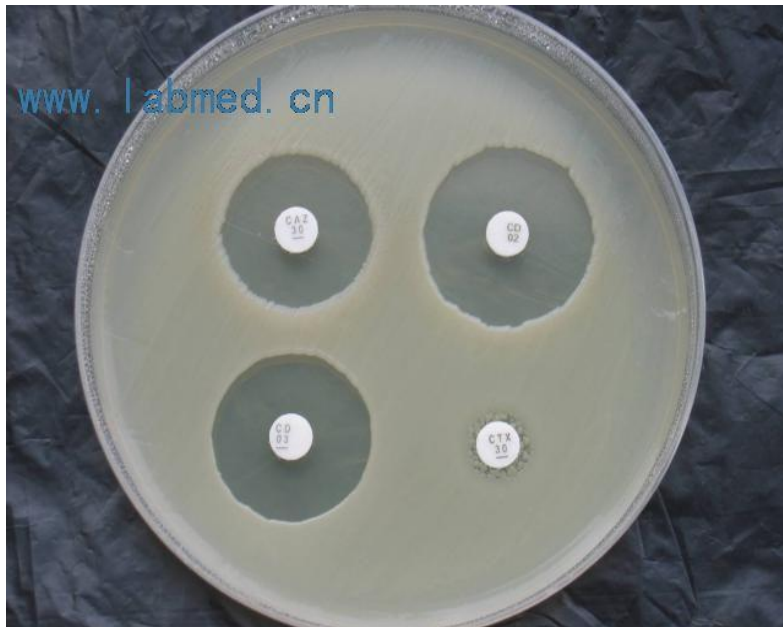
S. viridans



alpha hemolysis
sensitive to optochin

S pneumonia

Sensitivity testing



Media examples



Name the medium

Blood agar

Name its most important ingredient (constituent)

Blood

Name its main use

Culture and isolate bacteria

Media examples

MacConkey's agar



Lactose
fermenting
colonies
“pink”

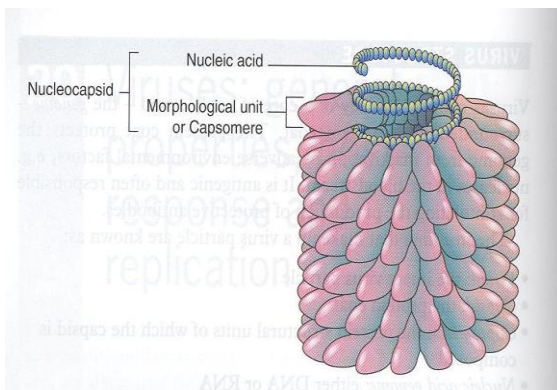


non-lactose
fermenting
“colorless”

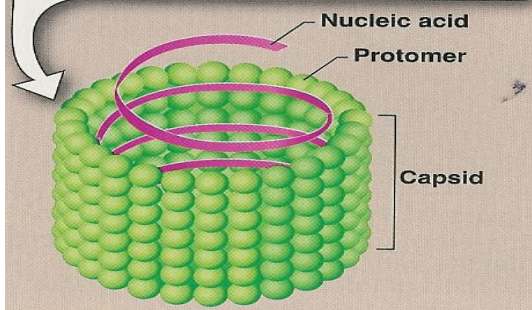
2. Viruses

Structure:

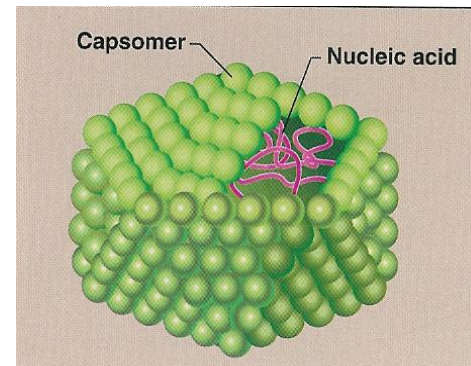
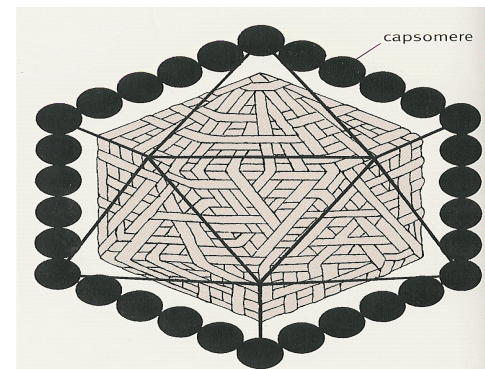
Helical Virus



Several rows of protomers have been removed to reveal nucleic acid surrounded by a hollow protein cylinder.



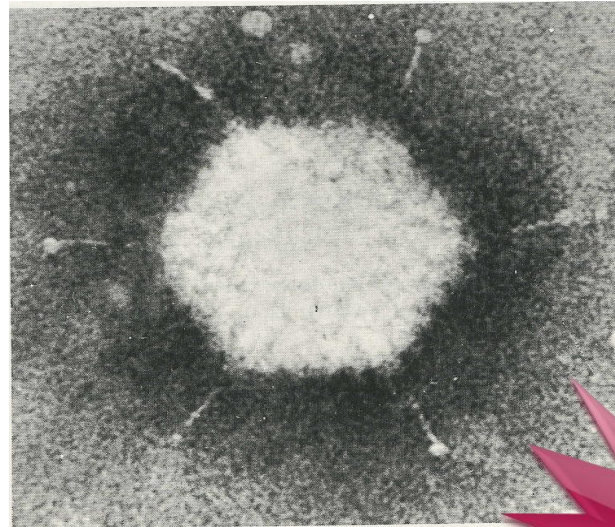
Icosahedral Virus



➤ Electron microscopy ; electron micrographs

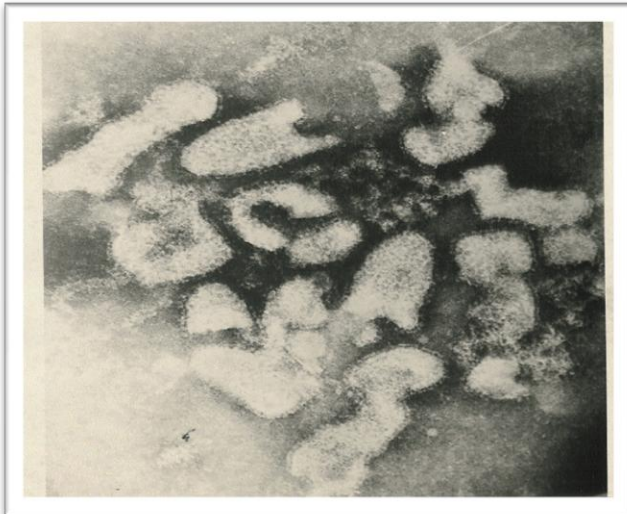


Herpes virus

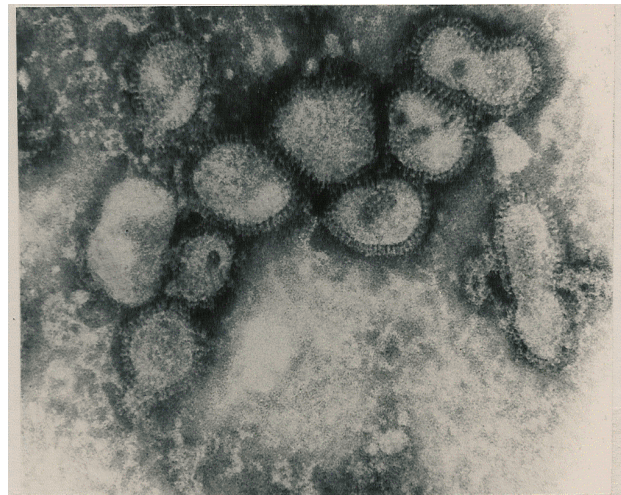


Adenovirus

Important
to know



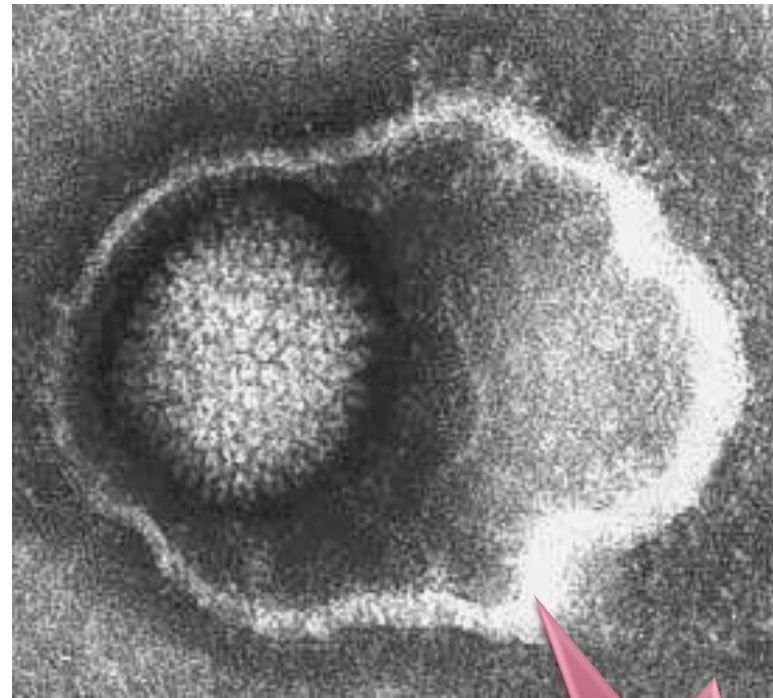
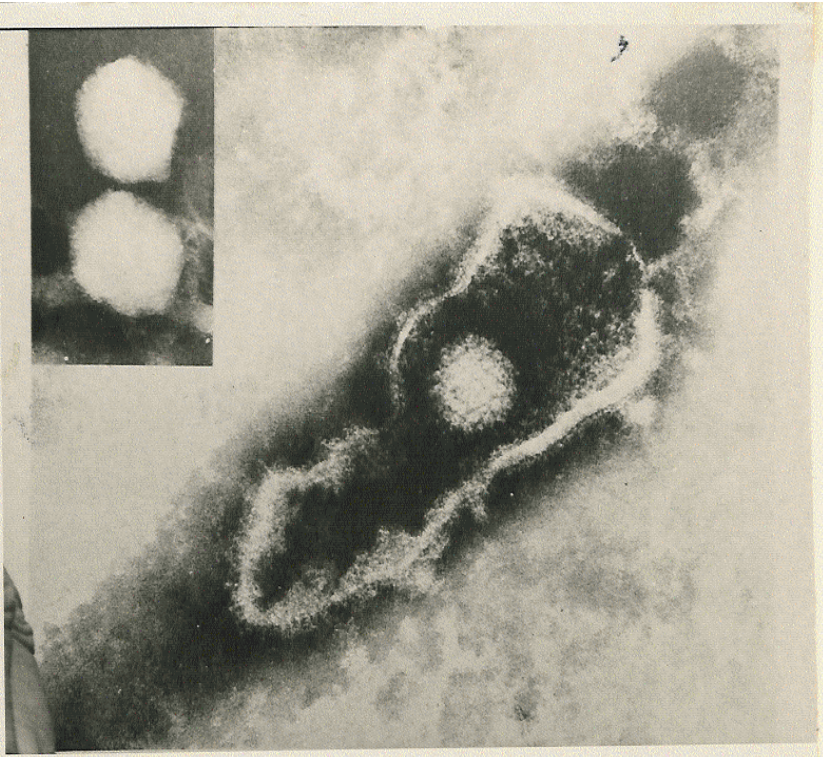
Rabies virus



Influenza Viruses

Examples

These are electron micrographs of a virus



Q1: Name this virus

Q2: Describe its structure.

Herpes virus

Enveloped virus ,
Icosahedral capsid,
d.s DNA genome

What you
need to
mention

Examples



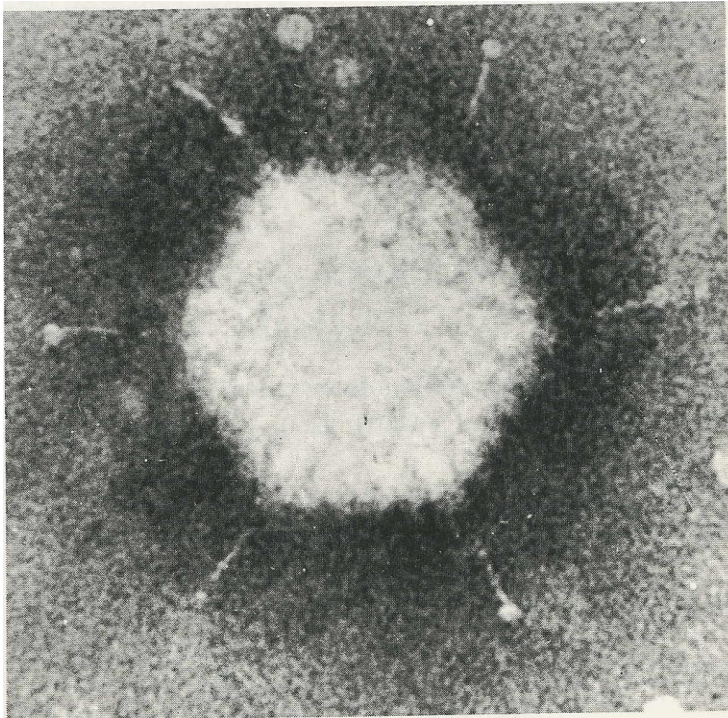
Q1: Name this virus

Rabies virus

Q2: Describe its structure.

*Enveloped virus , Helical capsid
& s.s RNA genome*

Examples



Only Virus with fiber

Important
to know

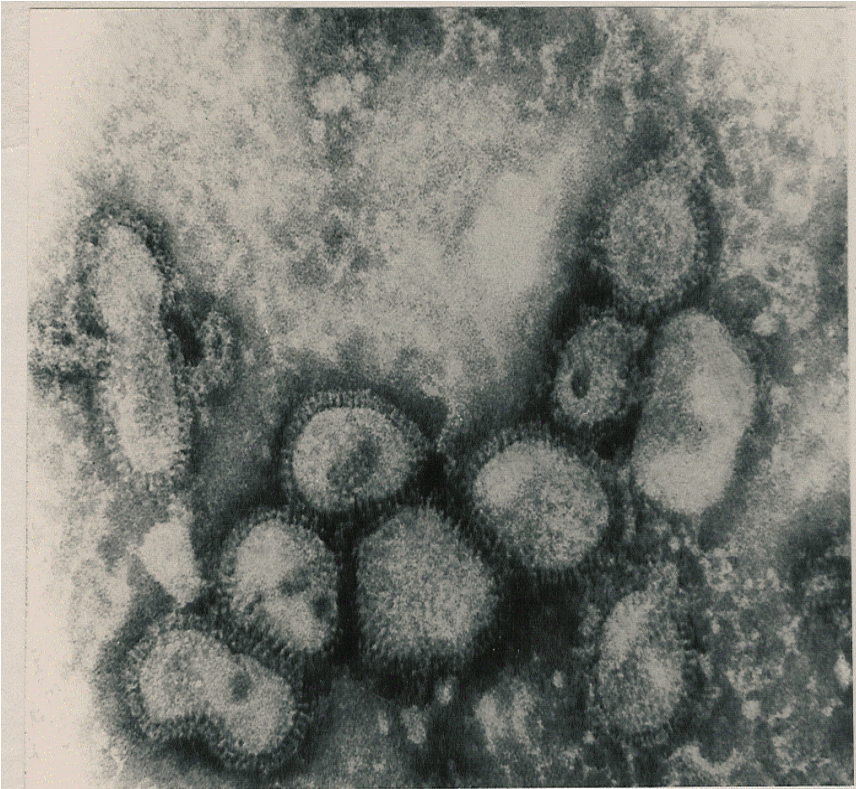
Q1: Name this virus

Adenovirus

Q2: Describe its structure.

*Nonenveloped virus,
Icosahedral capsid & d.s DNA
genome*

Examples



Q1: Name this virus

Influenza Viruses

Q2: Describe its structure

Enveloped Virus with spikes ,
Helical capsid ,Segmented s.s RNA

3. Parasites

Classification of Parasites

Protozoa	Helminths
Unicellular Single cell for all function	Mulicellular Specialized cells
Amoebae: move by psudobodia. Flagellates: move by flagella. Ciliates : move by cilia Apicomplexa (sporozoa) Tissue parasites	Round worms (Nematodes) cylindrical, unsegmented Flat worms 1-Trematodes: leaf-like, unsegmented. 2-Cestodes: tape-like, segmented

Helminthes

Flat worms

Round worms

TREMATODES

CESTODES



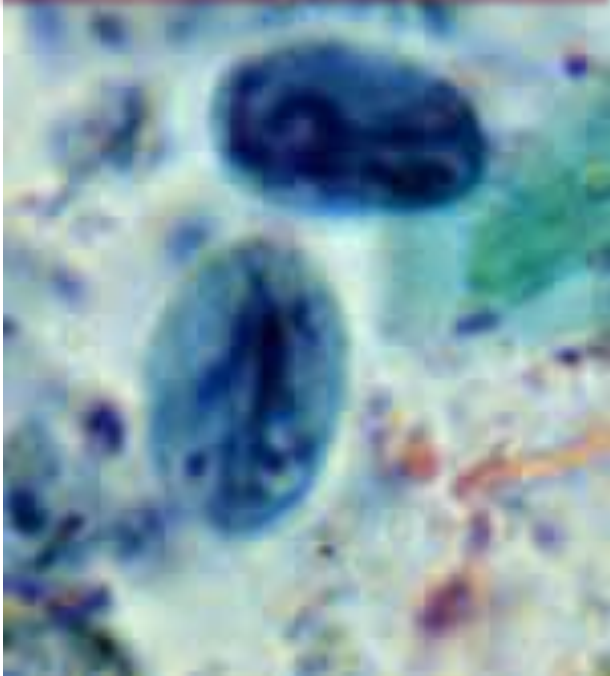
Taenia saginata



Ascaris lumbricoides

Protozoa: Giardia lamblia

Giardia
lamblia cyst



- Mature, infective cyst, containing 4 nuclei
- Note a straight axoneme running longitudinally

Giardia lamblia
trophozoite



- Two nuclei, each with central karyosome
- Four pairs of flagella

Examples

Following is the microphotograph of an organism found in the upper part of the small intestine .



Name the Organism

Giardia lamblia

What is the Stage?

Trophozoite stage

Examples

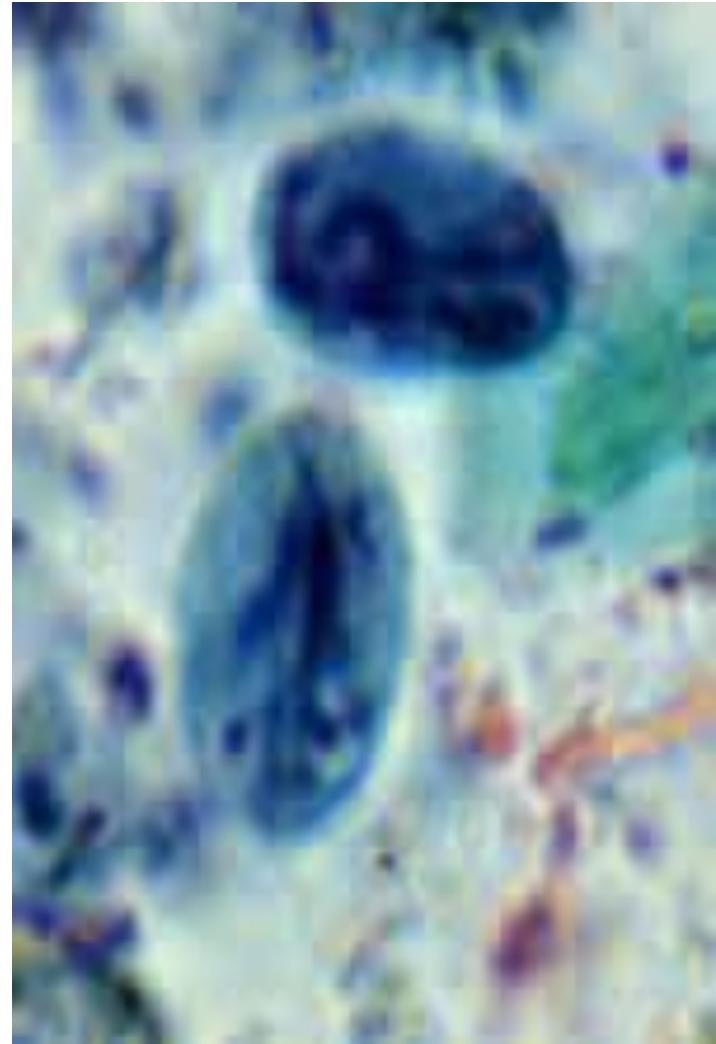
Following is the microphotograph of an organism found in stools

Name the Organism

Giardia lamblia

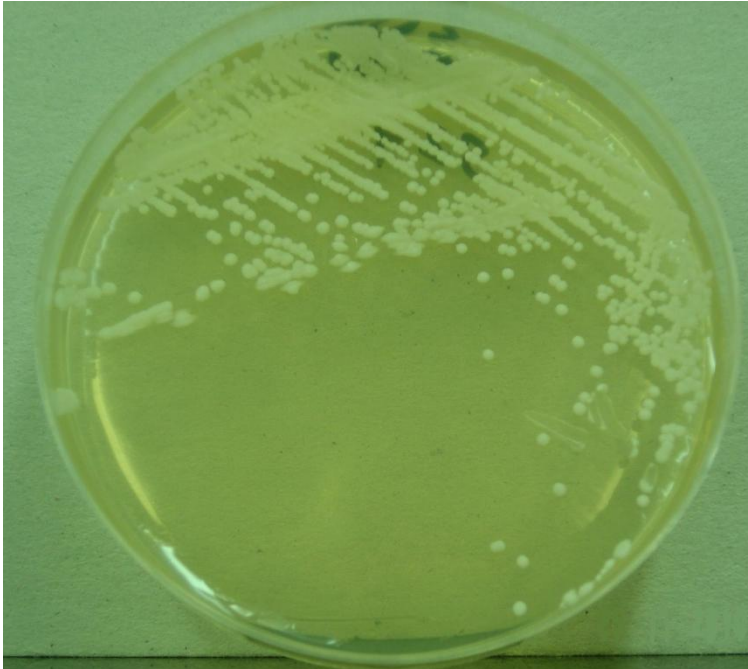
What is the Stage?

Cyst stage

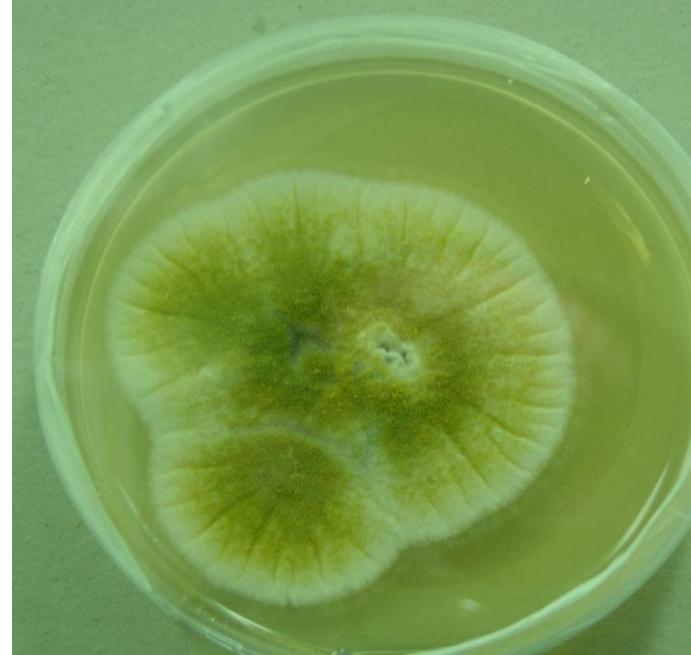


4. Fungi

Fungi can be divided to two types based on morphology



A



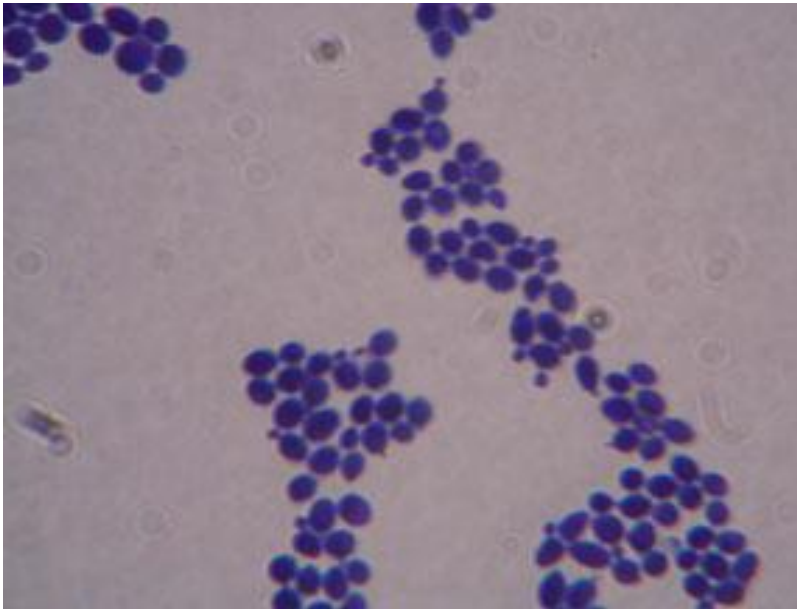
B

Based on morphology, name the two fungal structures in A and B?

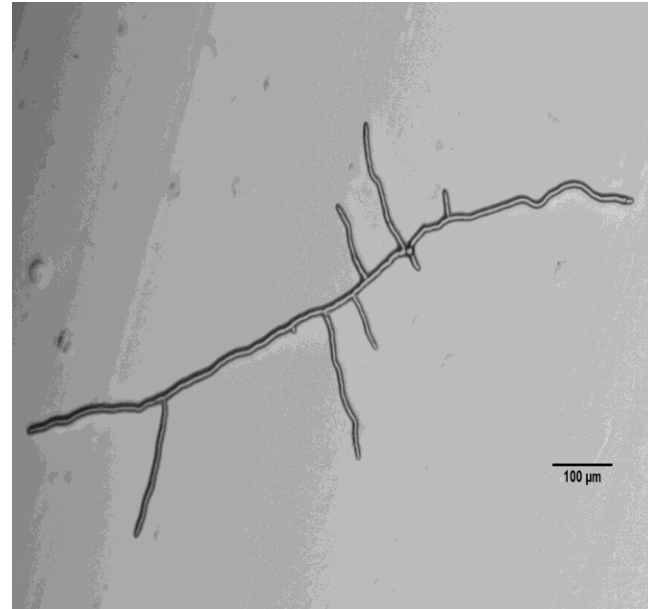
A: Yeast
e.g. *Candida*

B: Mould fungi
e.g. *Aspergillus*

Microscopic appearance of yeast and mould fungi



A



B

Name the two fungal structures in A and B?

A: Budding yeast cells
e.g. *Candida*

B: Branching Fungal hyphae
e.g. *Aspergillus*

*M*icrobiology

TEAM 432



Done by:

**Hamad Albraid
Latifah Alfahad**