

# **MICROBIOLOGY PRACTICAL**

TEAMWORK 437

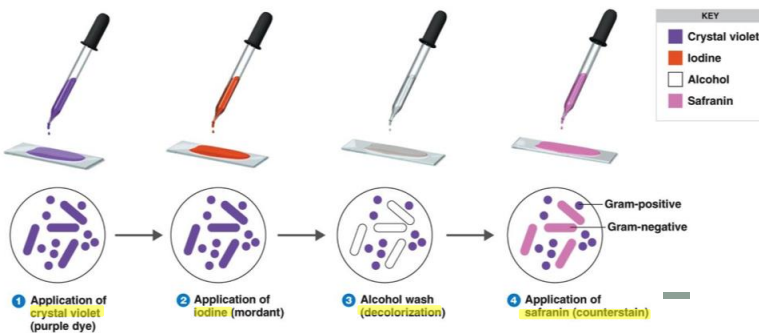
- Laboratory diagnosis of infections . ID
- Microscopic examination.
- culture.
- Serological tests (Ab).
- Detection of Ag.
- Molecular method .

## ➤ BACTERIOLOGY

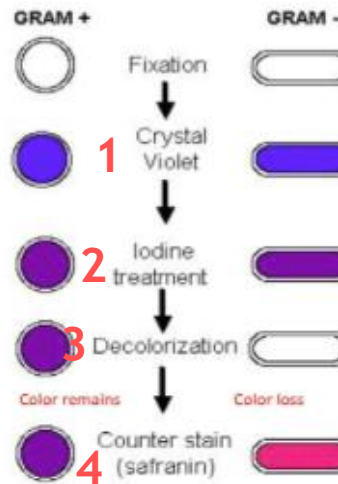
What do you need to describe after seeing the slide?

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

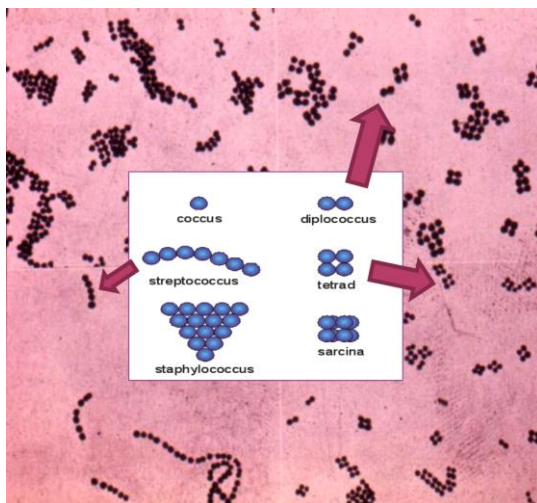
### ➤ Gram stain



“Write steps in exam”



### ➤ Shape and arrangement



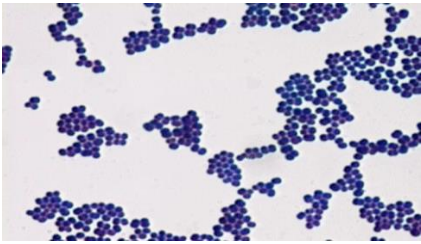
### ➤ Bacteria cell wall “ important “

Gram +	Gram -
Thick peptidoglycan	Thin peptidoglycan
Teichoic acid : anchors cell wall to cell membrane epithelial cell adhesion .	<b>Outer membrane</b> that contains : 1- specific proteins (porins) important in transport of hydrophilic molecules 2- <b>lipopolysaccharide and lipid ( endotoxin )</b>
Antigens : - polysaccharide ( lancefield ) - Protein ( Griffith )	

## ❖ MICROSCOPIC SLIDES EXAMPLES

### DESCRIBE THIS ORGANISM?

Gram positive cocci  
arrange in clusters  
staphylococcus

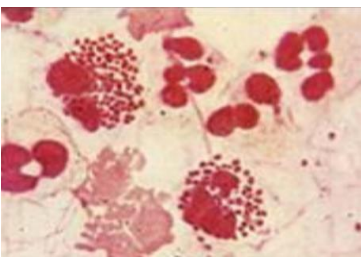


Gram positive cocci  
arrange in chain  
streptococcus

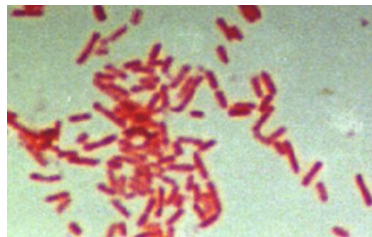


“ important picture “

Gram negative cocci  
“Diplococci”  
e.g Neisseria



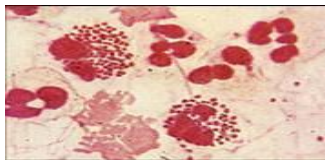
Gram negative bacilli  
“Rod”  
e.g E. coli Salmonella



## ❖ CASE EXAMPLES

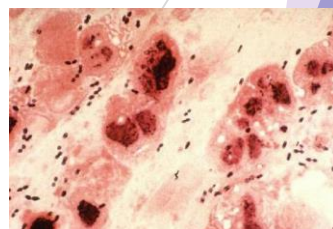
Following is the Gram-stained smear of from urethra of a 25 year old male complaining of urethral discharge.

- Describe the Gram stain of the intracellular bacteria? **Gram negative**
- Describe the shape of the bacteria? **cocci ( diplococci)**



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

- Describe what you see ? **Gram-positive diplococci & pus(neutrophils) cells Streptococcus pneumoniae**



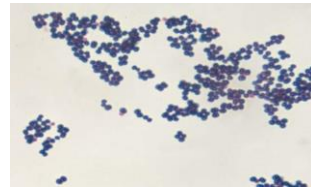
**This is a bacterium isolated from a child with sore throat and tonsillitis.**

- Describe the gram stain ? **Gram positive streptococcus**
- Describe the shape and arrangement of the bacteria ?  
**Cocci in chain**



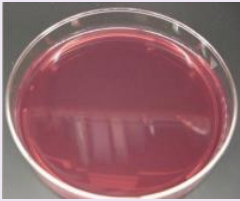



**Following is the gram stained smear of an organism isolated from a wound infection.**

- Describe what you see in this slide? **Gram positive cocci in clusters**
- What is the likely organism? **Staphylococcus aureus**



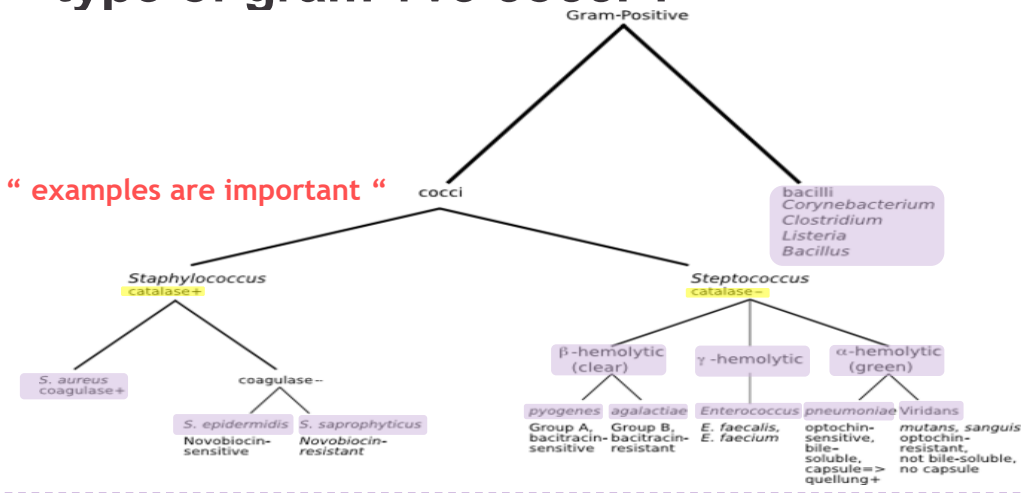
## ❖ BACTERIAL CULTURE MEDIA

<b>General culture medium ( Blood agar )</b>	<b>Enriched medium ( chocolate agar )</b>
	
<b>Differential medium ( MacConkey agar )</b>	<b>Selective medium ( Thiosulphate citrate bile salt sucrose TCBS )</b>
	

Type of media	purpose
Selective	Suppression of unwanted microbes ; encouraging desired microbes.
Differential	Differentiation of colonies of desired microbes from other.
Enriched	Similar to Selective media but designed to increase number of desired microbe to detectable levels.



# ➤ How to differentiate between various type of gram +ve cocci ?



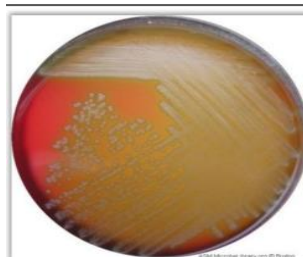
## ➤ Identification of streptococci by ( Hemolytic reaction )

Colonies are surrounded by clear zone of hemolysis complete hemolysis



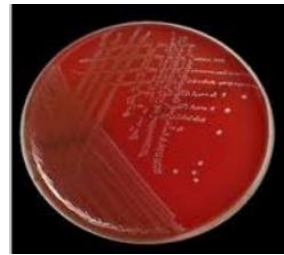
Beta-hemolytic  
Streptococcus colonies  
*St. pyogenes*

Colonies are surrounded by partial hemolysis Greenish color



Alpha-hemolytic  
Streptococcus colonies  
*St. pneumoniae*

No hemolysis

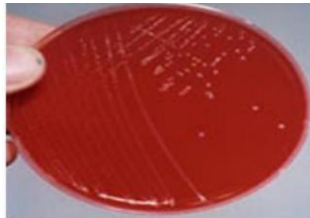


Gamma-hemolytic  
Streptococcus colonies  
*Enterococcus faecalis*

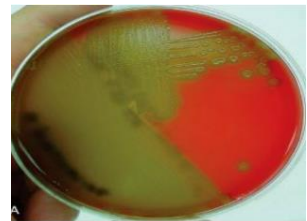
Beta-hemolytic  
Streptococcus colonies



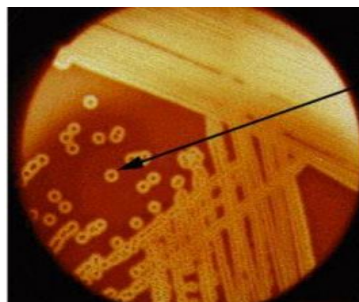
Gamma-hemolytic  
Streptococcus colonies



Alpha-hemolytic  
Streptococcus colonies



This is a blood agar growing beta hemolytic streptococci.

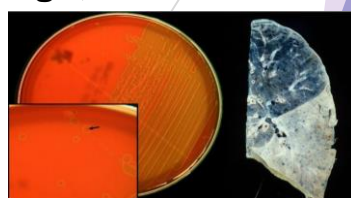


Note the clear zone of beta-hemolysis surrounding the *Streptococcus* colonies when grown on blood agar.

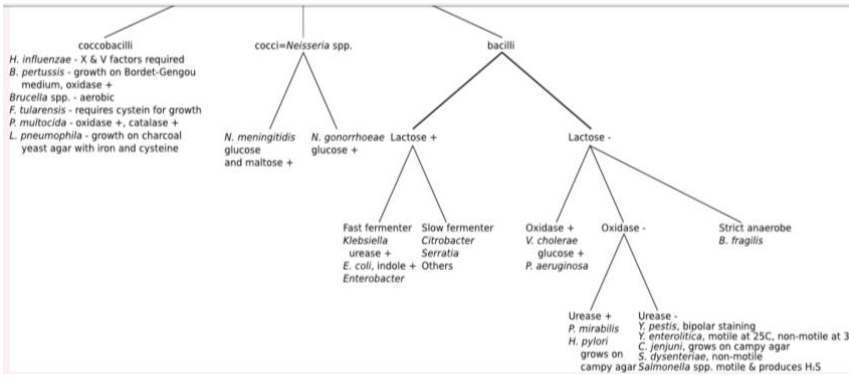
CASE

This culture was grown from a sputum specimen of a 60 year old man complaining of cough, fever and chest pain.

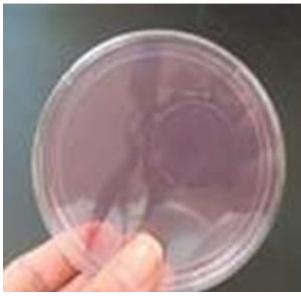
Alpha-hemolytic streptococci on blood agar



## ➤ Gram negative



## ➤ MacConKey's agar (Deferential Medium)



MacConKey's agar



Lactose fermenting colonies  
E.coli



non lactose fermenting colonies  
Salmonella

## ➤ Biochemical testing



To confirm the identify of bacteria .

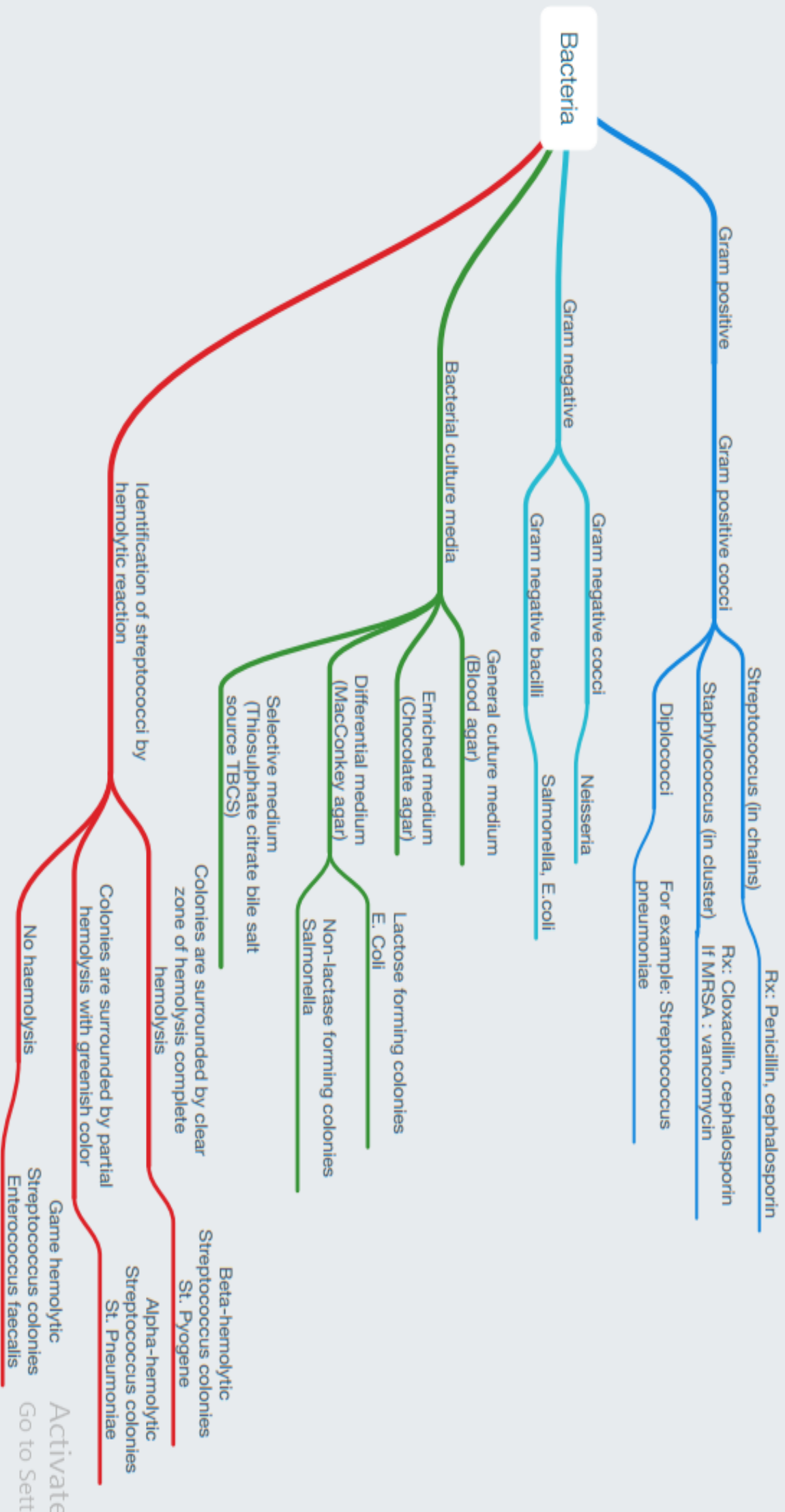
## ➤ Antibiotic susceptibility testings



## ➤ Automated instrument for identification and susceptibility testings



# ➤ Summary

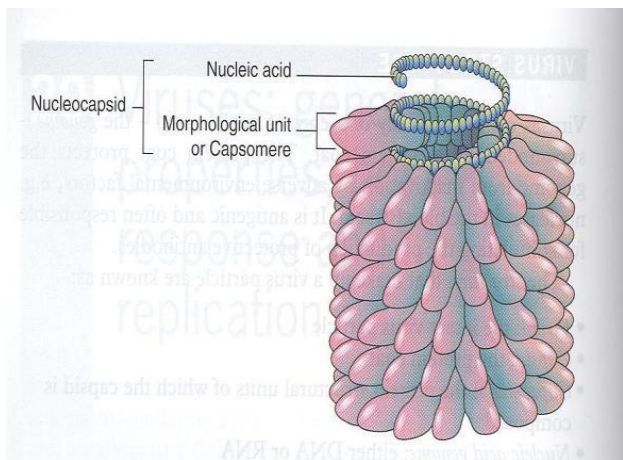




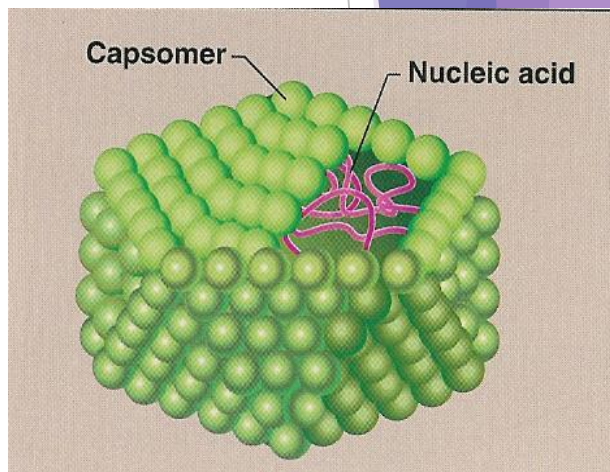
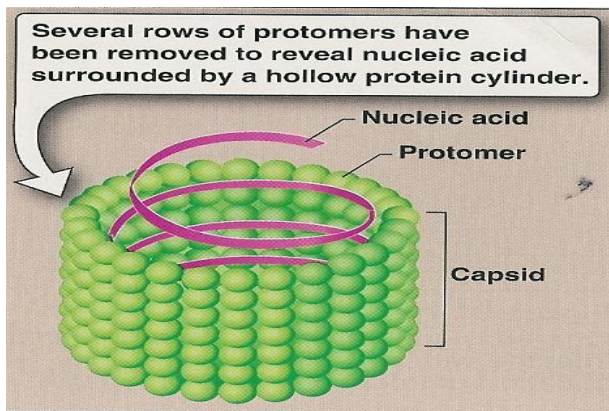
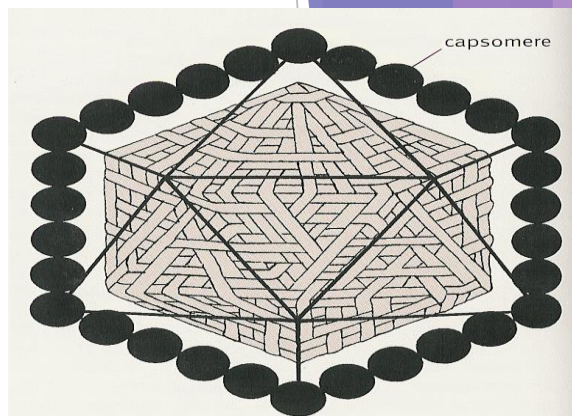
# Virology

## ► Structure

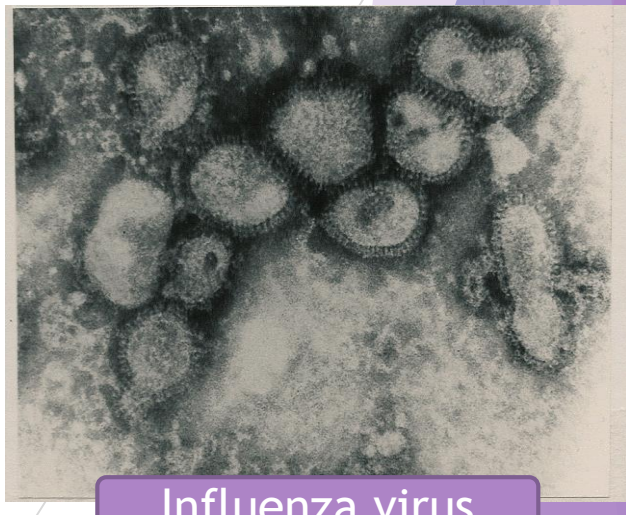
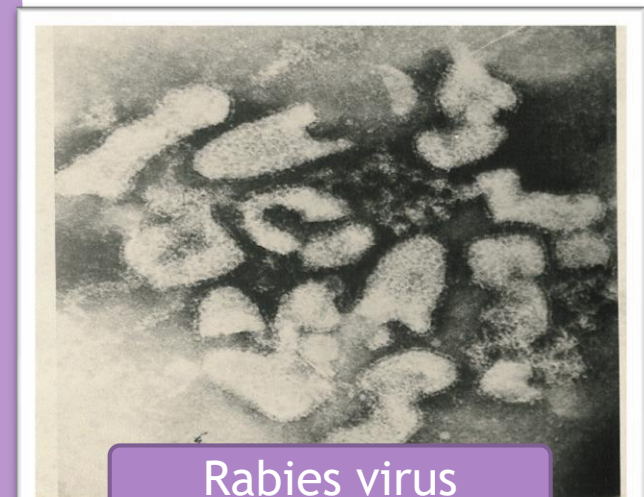
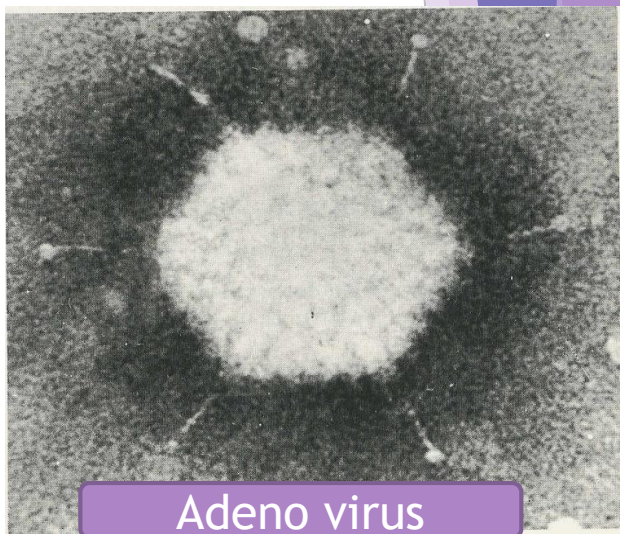
### Helical Virus:



### Icosahedral Virus:



## ► Electron microscopy: (very important)

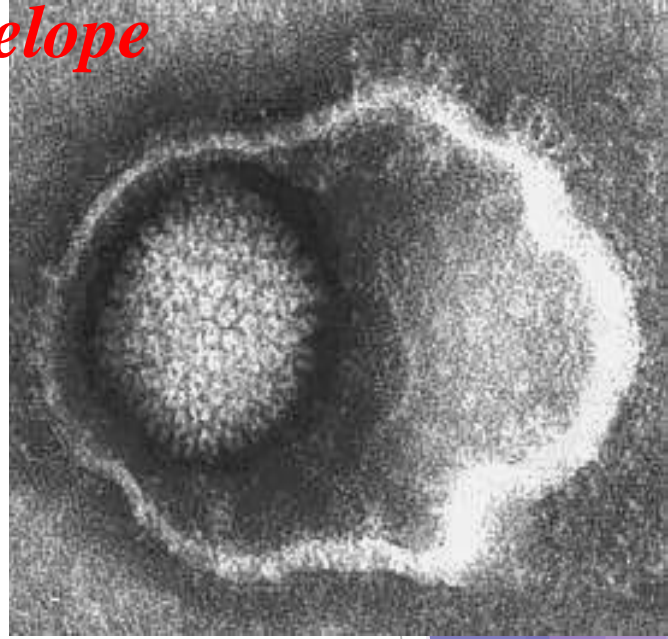
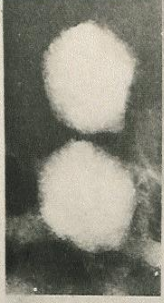




► Examples:

1- These are electron micrographs of a virus:

*Loose envelope*



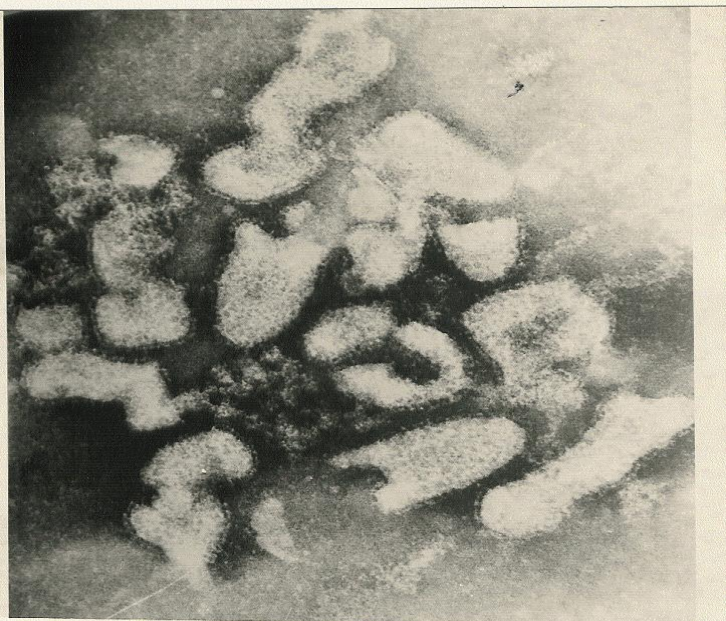
A) Name this virus

Herpes virus

B) Describe its structure.

- Enveloped virus ,
- Icosahedral capsid,
- Double stranded DNA genome

2- This is an electron micrographs of a virus:



Bullet Shaped

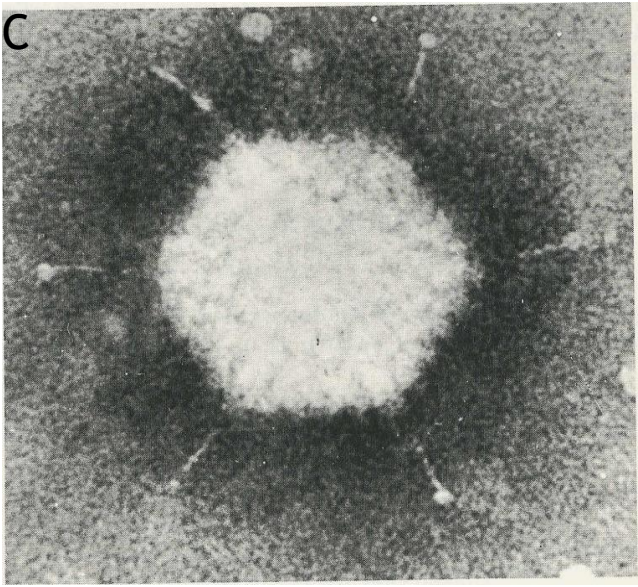
A) Name this virus

Rabies virus

B) Describe its structure.

- Enveloped virus ,
- Helical capsid,
- Single stranded RNA genome

3- This an electron micrograph of a virus:



Only virus  
with fiber

A) Name this virus

Adeno virus

B) Describe its  
structure.

- Non-Enveloped virus ,
- Icosahedral capsid,
- Double stranded DNA genome

4- This an electron micrograph of a virus:



*Pleomorphic  
shape*

A) Name this virus

Influenza virus

B) Describe its  
structure.

- Enveloped virus with spikes ,
- Helical capsid,
- Segmented Single stranded RNA genome



# ➤ Parasitology

## Classification of Parasites

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

## Helminthes

Flat worms

Round worms

TREMATODES



CESTODES



*Ascaris lumbricoides*



*Taenia saginata*

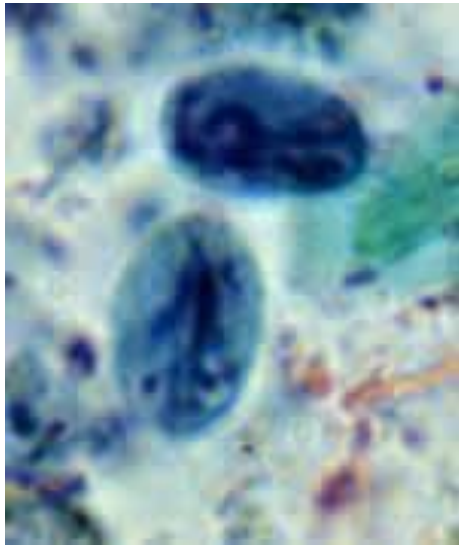
*fasciola hepatica*





# 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

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



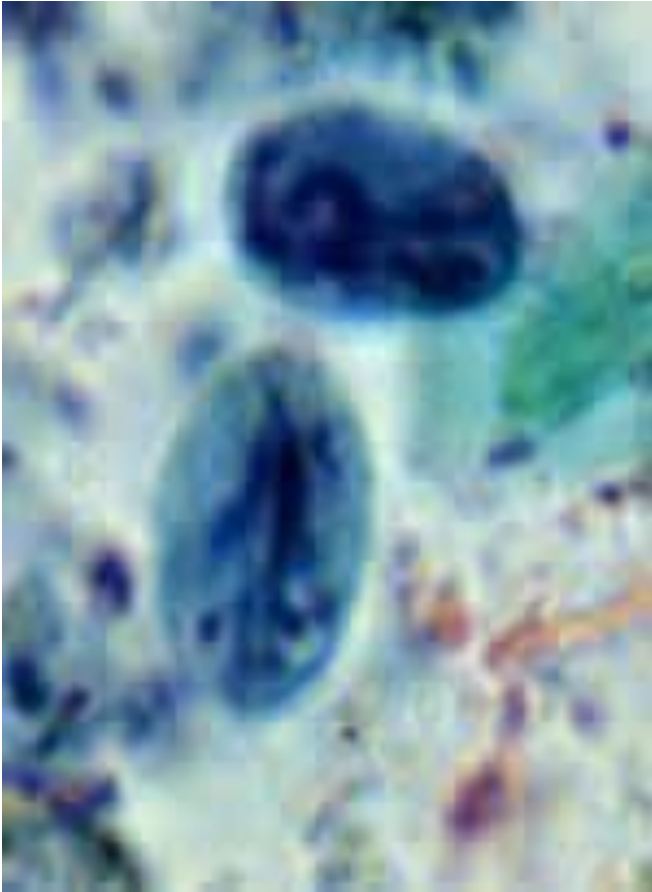
A) Name the Organism

Giardia lamblia

B) What is the Stage?

Trophozoite stage

2- Following is the microphotograph of an organism found in stools



A) Name the Organism

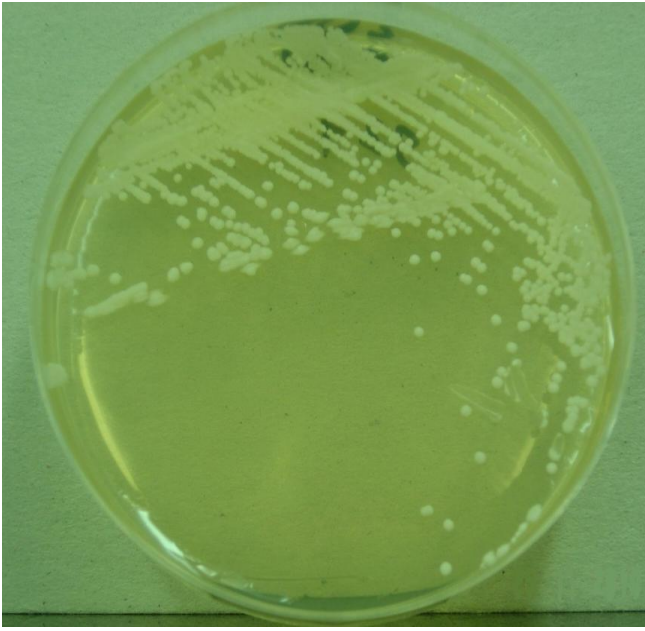
Giardia lamblia

B) What is the Stage?

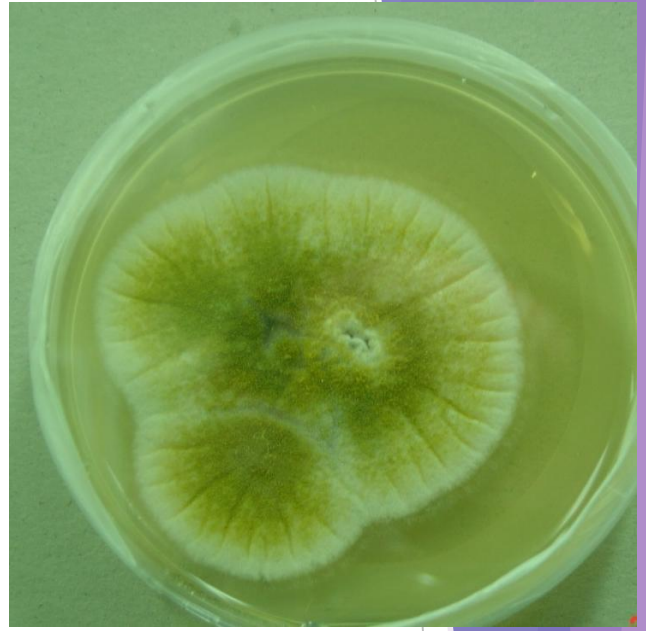
Cyst stage

# Mycology

- ▶ Fungi can be divided to two types based on morphology



A



B

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

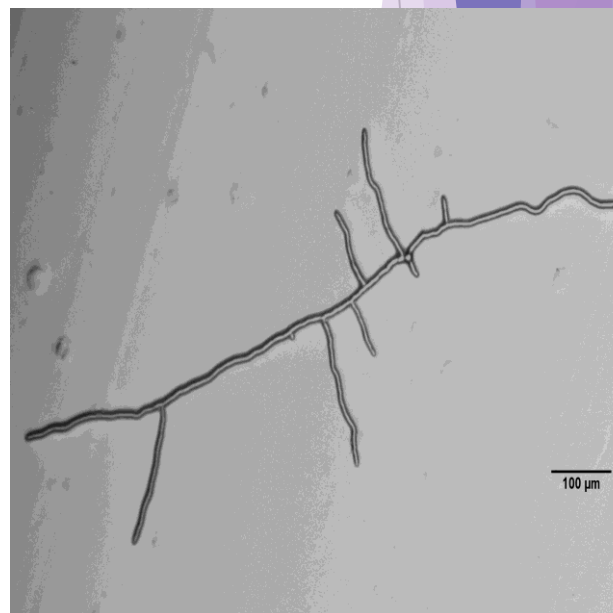
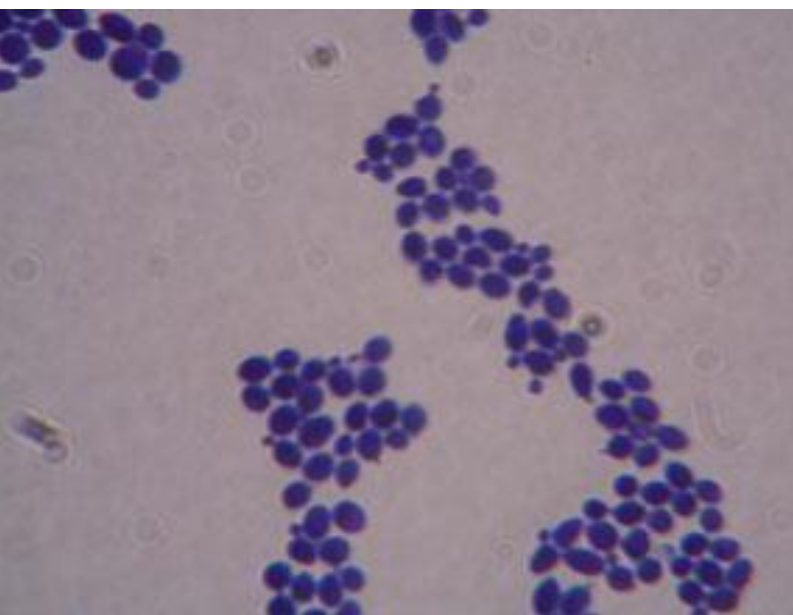
A: Yeast  
e.g. *Candida*

B: Mould fungi  
e.g. *Aspergillus*

- ▶ Microscopic appearance of 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*



# Done by:

➤ **Team leader :**  
عبير العبدالجبار

➤ **Team leader :**  
علي شحادة

➤ **Team members**

ميعاد النفيعي  
إبتسام المطيري  
رناد الفرهم  
شهد الطياش  
لمى الهدلق  
نورة الضبيب  
روان الرحيلي  
مها النهدي  
آلاء الصويغ  
عهد القرين  
رهم الشمري