

3	Spotters – (Two marks each x 10), questions preferably clinical case based	20
	Bacteriology-1 nos	
	Mycology-3 nos	
	Parasitology -4 nos	
	Immunology-1 nos	
	Vaccines-1 no	

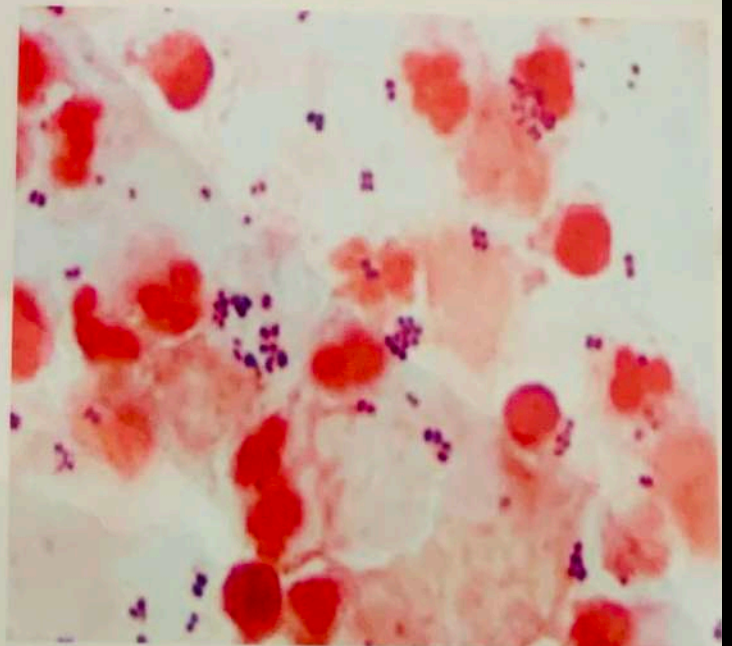
Bacteriology

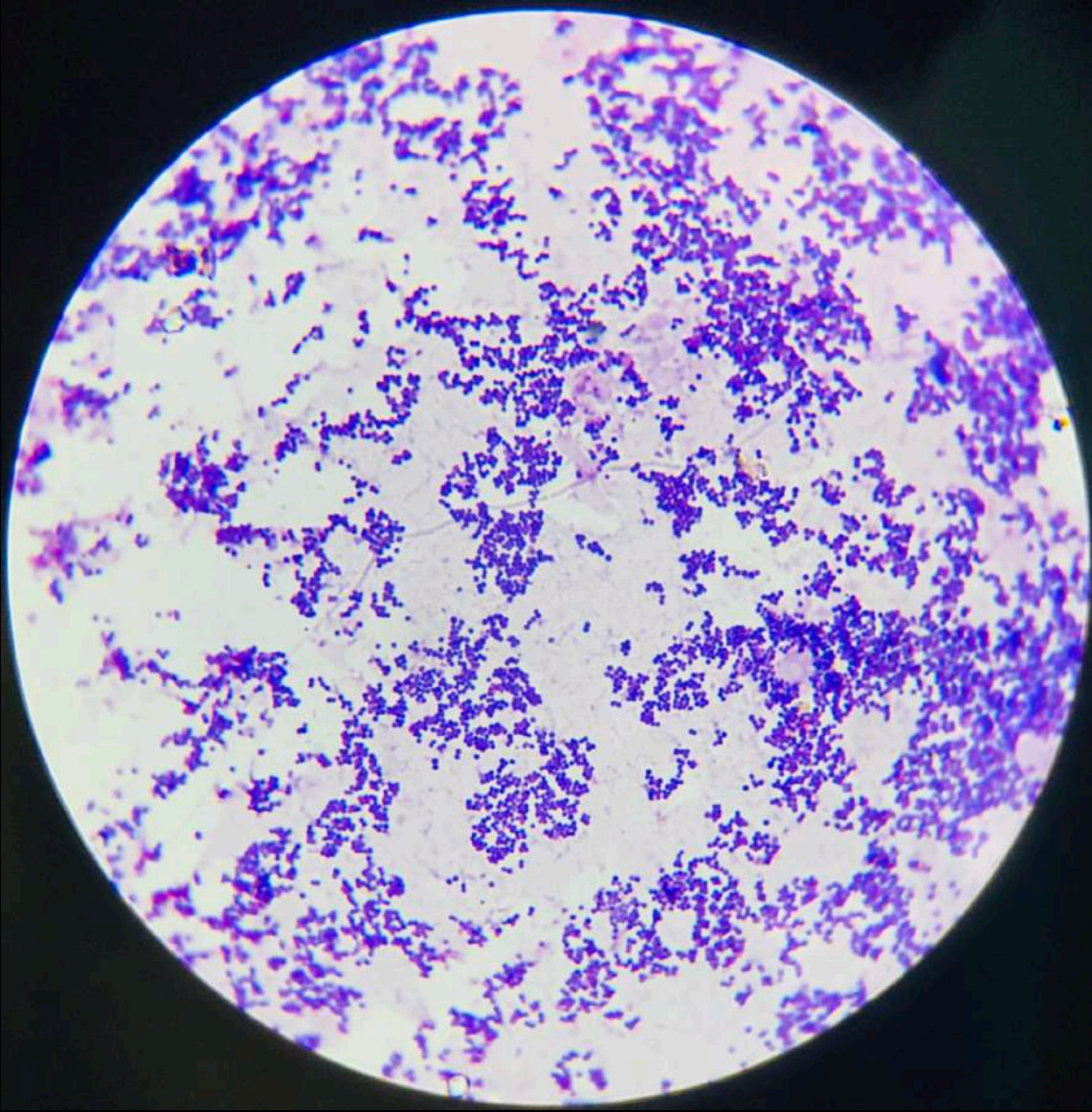
1. Staphylococci
2. Streptococci
3. Neisseria gonorrhoea(gonococci)
4. Clostridium tetani
5. Corynebacterium diphtheriae



A 30-year-old lady presented with abscess in left breast. Pus aspirated, stained, and focused.

- a. Identify the smear and describe the morphology 1
- b. Which test is used to identify the pathogenic species? $\frac{1}{2}$
- c. Mention 2 systemic infections produced by this organism. $\frac{1}{2}$





a) Staphylococcus

Morphology: gram positive cocci arranged in clusters

b) coagulase test

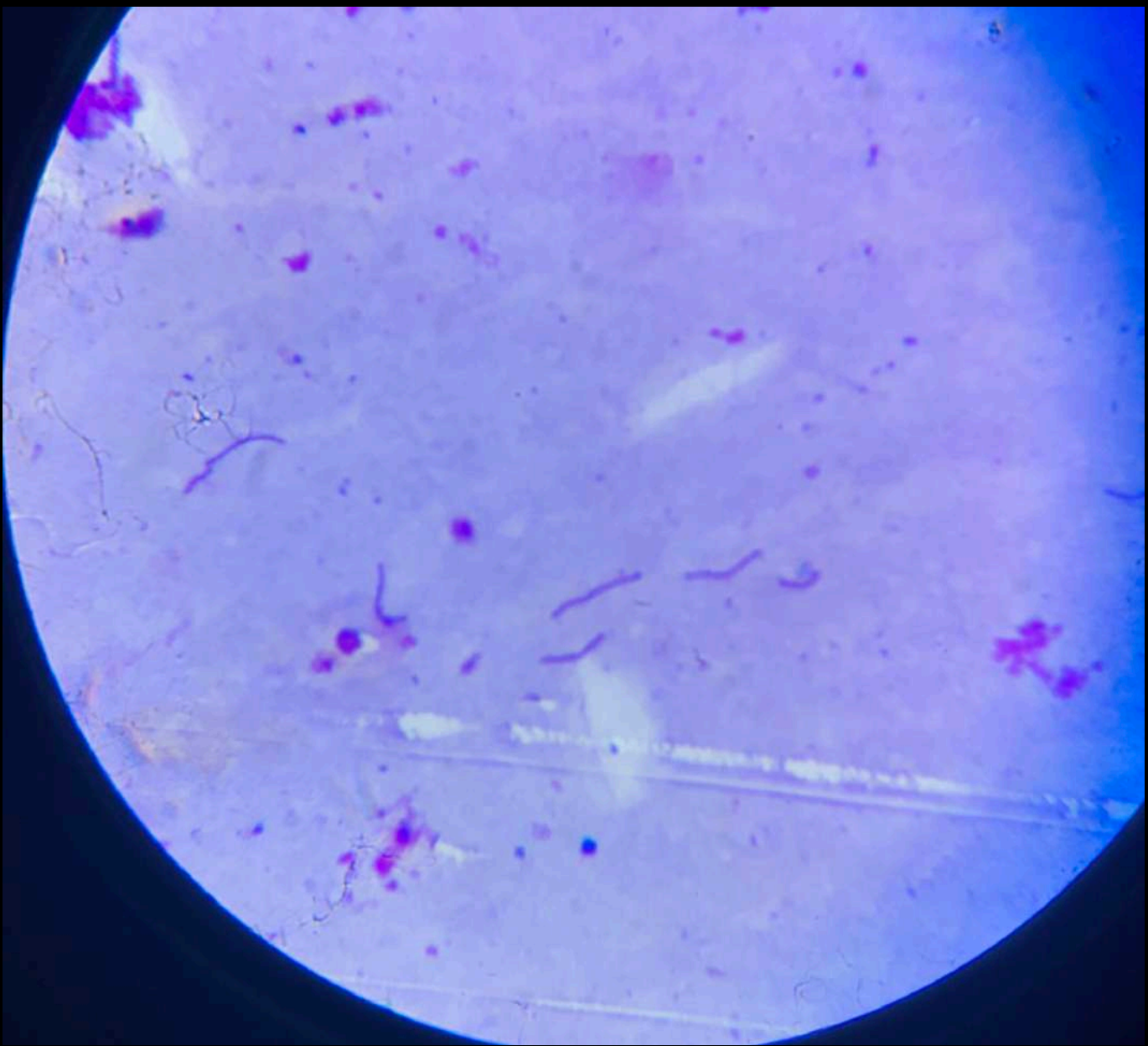
c) osteomyelitis, infective endocarditis



2

This is an organism isolated from the throat swab of a patient with acute tonsillitis

- a. Identify the organism describing the morphological feature $\frac{1}{2}$
- b. Name Two toxic manifestations caused by this organism $\frac{1}{2}$
- c. Name Two non-suppurative complications following infection in man $\frac{1}{2}$
- d. Name the test by which the infection is retrospectively diagnosed $\frac{1}{4}$
- e. What is the drug of choice for this infection? $\frac{1}{4}$



a)streptococci

Morphology: Gram positive cocci arranged in chains

b)pharyngitis, impetigo

c) Acute glomerulonephritis

Acute rheumatic fever

d)ASO antibody detection by latex agglutination test

e)penicillin

A 32-year-old male with history of frequent sexual contact with a commercial sex worker presented with urethral discharge. Gram staining of the discharge is focused.

- a. Identify with characteristic features 1
- a. Name one selective media used for this organism? $\frac{1}{2}$
- a. What is the drug of choice? $\frac{1}{2}$

3



a) *Neisseria gonorrhoea*

~gram negative intracellular diplococci
(within neutrophil)

b) Thayer Martin medium

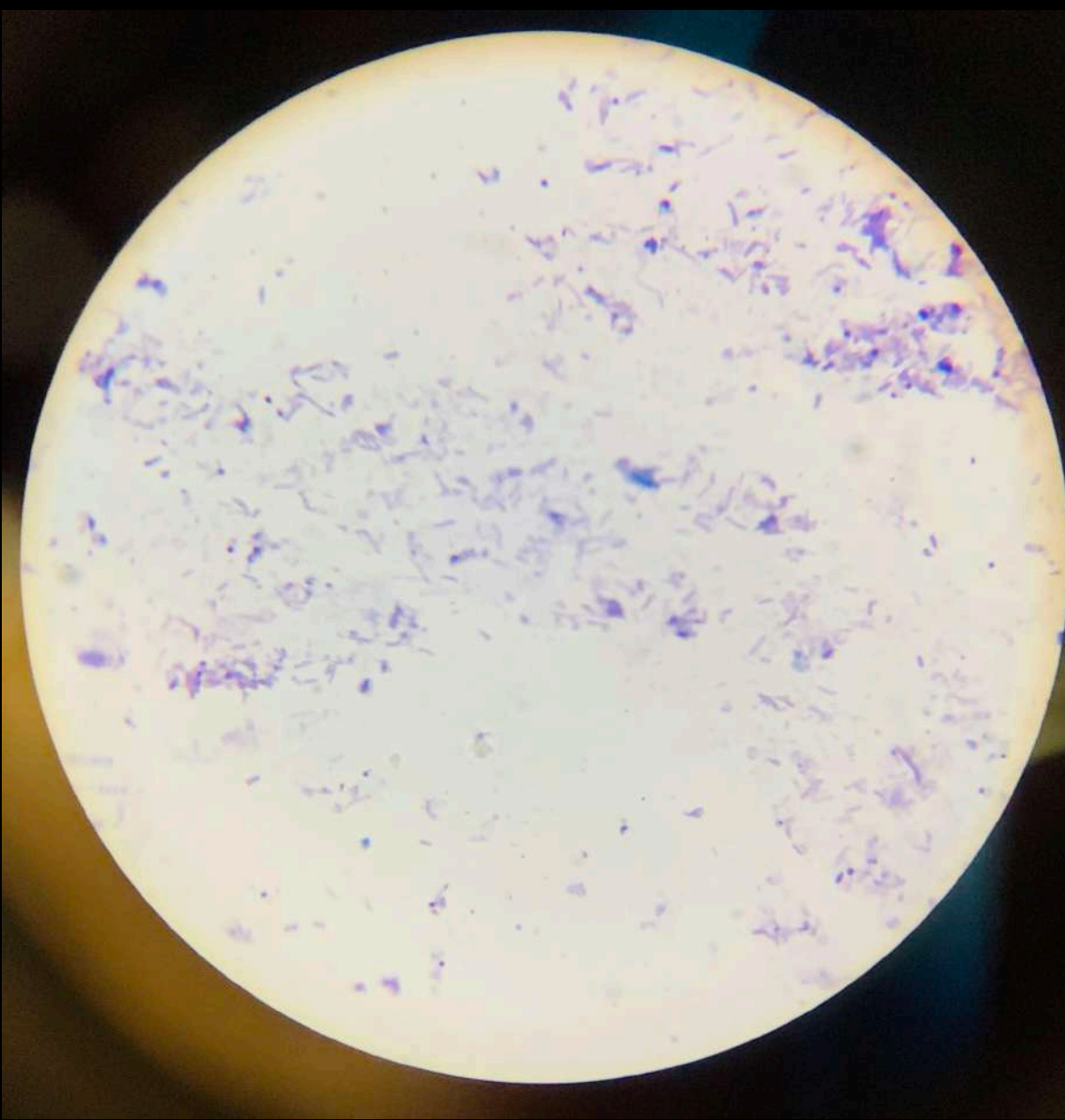
c) ceftriaxone/cefixime

4



A 32 year old male had a bike accident with lacerated deep wound of thigh. He developed spastic muscle contraction of jaw muscles. Culture of wound tissue yielded this organism

- a) Identify the organism giving characteristic diagnostic features $\frac{1}{2}$
- b) Mention the media and method used for culture of such specimens to yield this organism 1
- c) What is the change observed in the media on growth of this organism ? $\frac{1}{2}$



a. **Clostridium tetani**

~ gram positive bacilli with terminal & spherical bulging spores (drum stick appearance)

b. Robertson cooked meat broth (anaerobic culture method)

c. Meat particle turn black due to proteolysis & produce foul odour.



PTA with black colonies



Culture plate of pathogen isolated from throat swab of a 5-year-old unimmunized child is kept

a. Identify the medium with growth

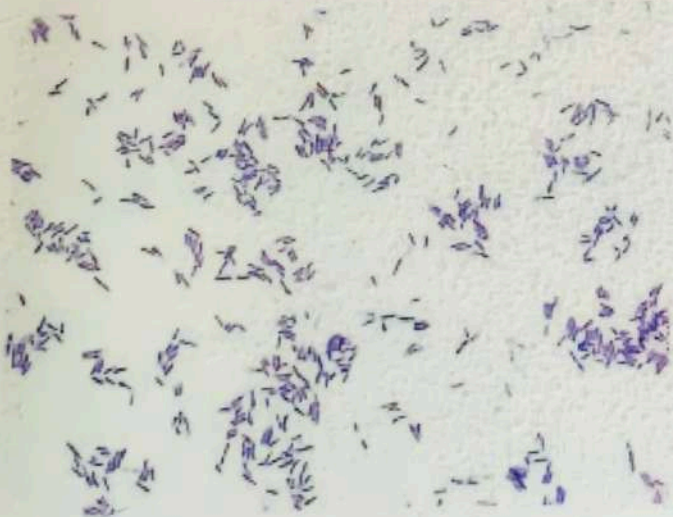
$\frac{1}{2}$

b. Name the in vitro test done for the confirmation of its pathogenicity

$\frac{1}{2}$

c. Name **TWO** complications of this disease

1



- a) potassium tellurite agar
~with black round colonies of *C. diphtheria*
- b) Elek's gel precipitation test
- c) polyneuropathy
Myocarditis

Mycology

1. Penicillium spp
2. Rhizopus
3. Aspergillus
4. Candida
5. Cryptococcus



The culture media used for isolation of fungus from clinical samples is kept here

- a. Name the medium and mention the pH of this medium 1
- b. Give two clinical diseases where use of this media is indicated 1

**a. Sabouraud's dextrose agar
(SDA)**

pH :5.4

b. Aspergillosis , mucormycosis

The culture media used for fungal isolation from clinical samples is kept here

- a) Name the medium ½
- b) What is the pH of this medium ½
- c) Name the culture method for studying the morphology of the organism grown undisturbed ½
- d) Name one stain for microscopic examination of fungus ½

c. Slide culture

d. Lactophenol cotton blue (LPCB)

SABAURAUD'S DEXTROSE AGAR

Type of Media: Fungal culture media

Use of media: To grow fungus

Yeast – produce creamy colonies

Eg: Candida spp.

Mycelial fungi – produce filamentous colonies, and produce conidia (fungal spores)

Eg: Aspergillus, Mucor

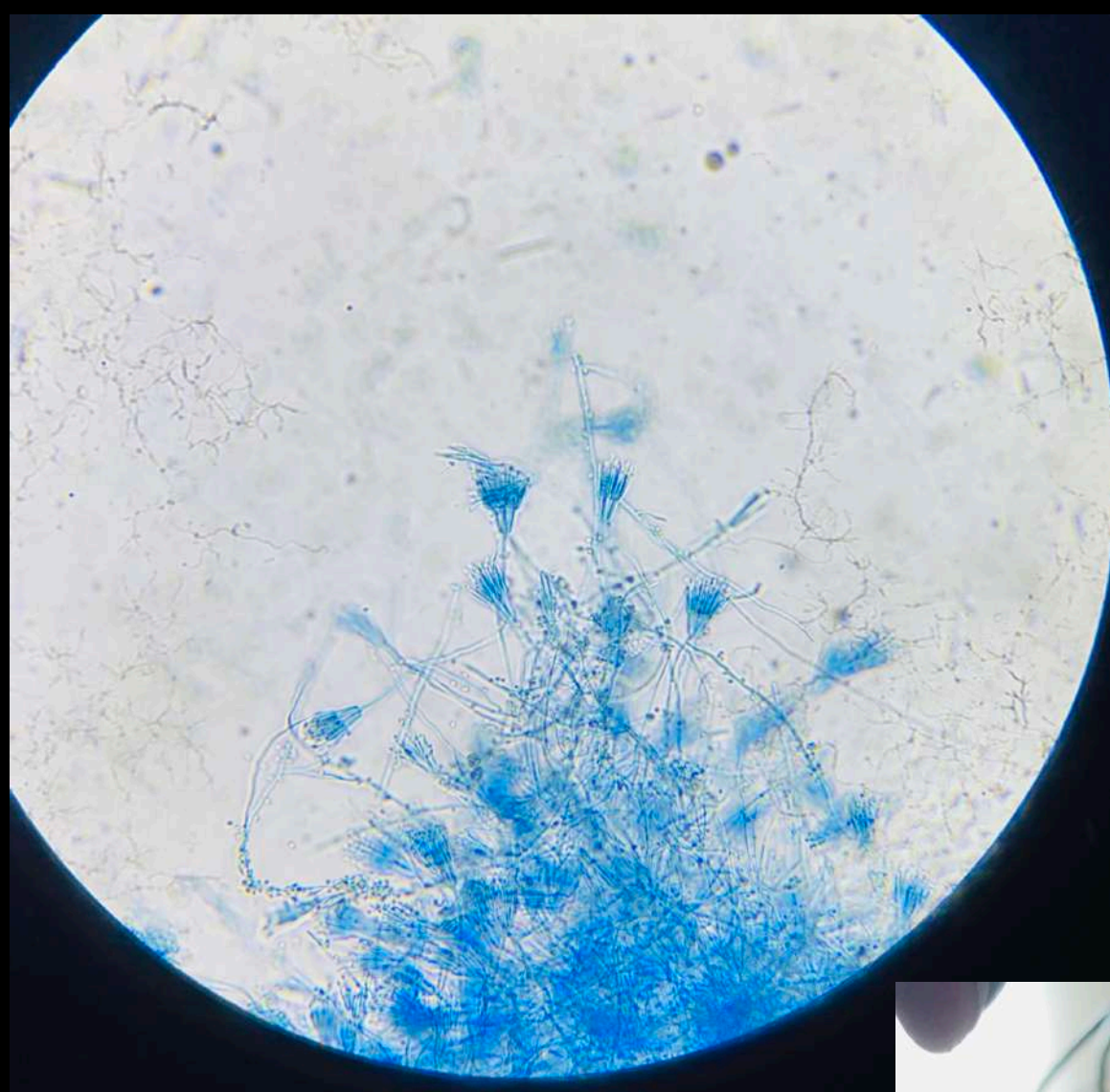
pH of the medium- 5.4

②



Corneal scraping of a 23 year old female yielded this fungus.

- a) Identify the LPCB mount with characteristic features 1
- b) List Two other diseases caused by this agent $\frac{1}{2}$
- c) Name the culture method to study the morphology of this undisturbed $\frac{1}{2}$



a) penicillium

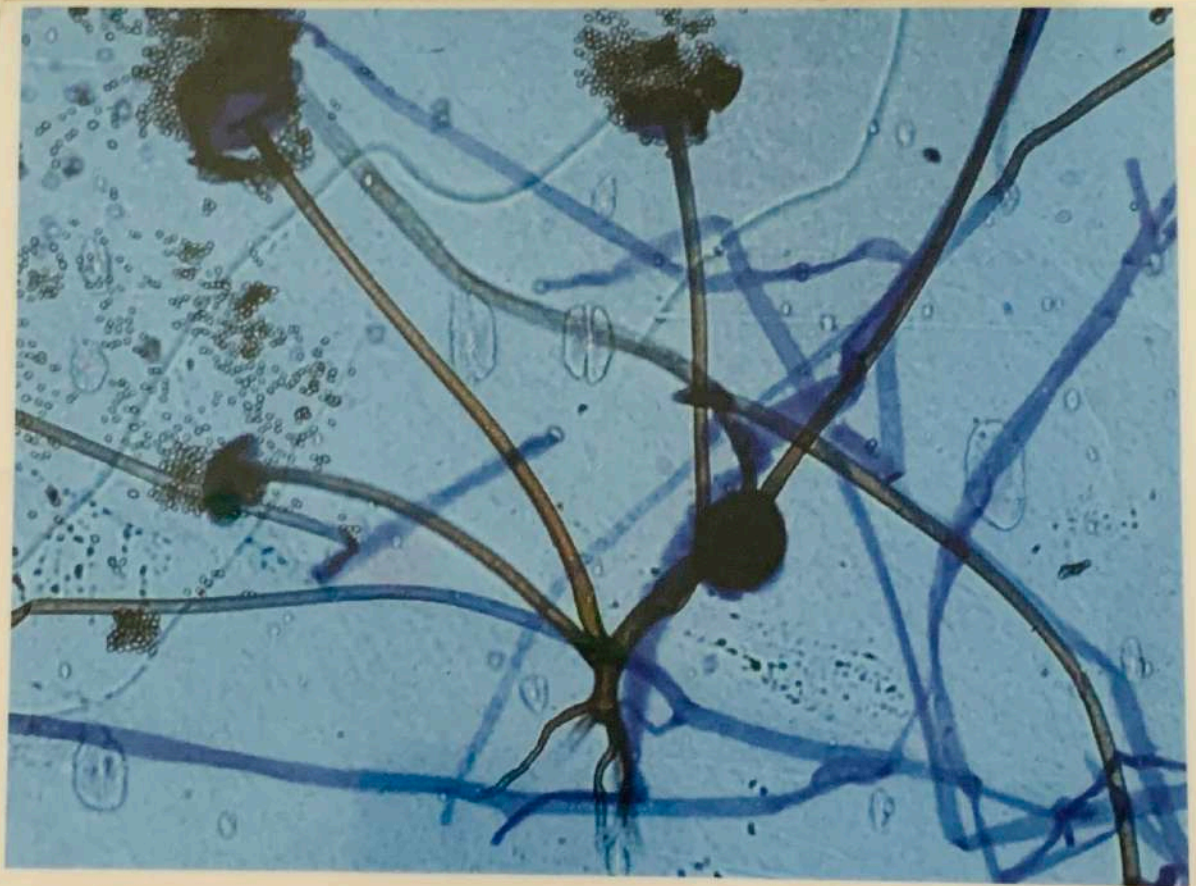
Identifying features:

- Septate hyphae
- Branched / unbranched conidiophores with Secondary branches called **METUAE**.
- Flask shaped sterigmata which bear chains of conidia.

b) Otomycosis, allergic pneumonitis

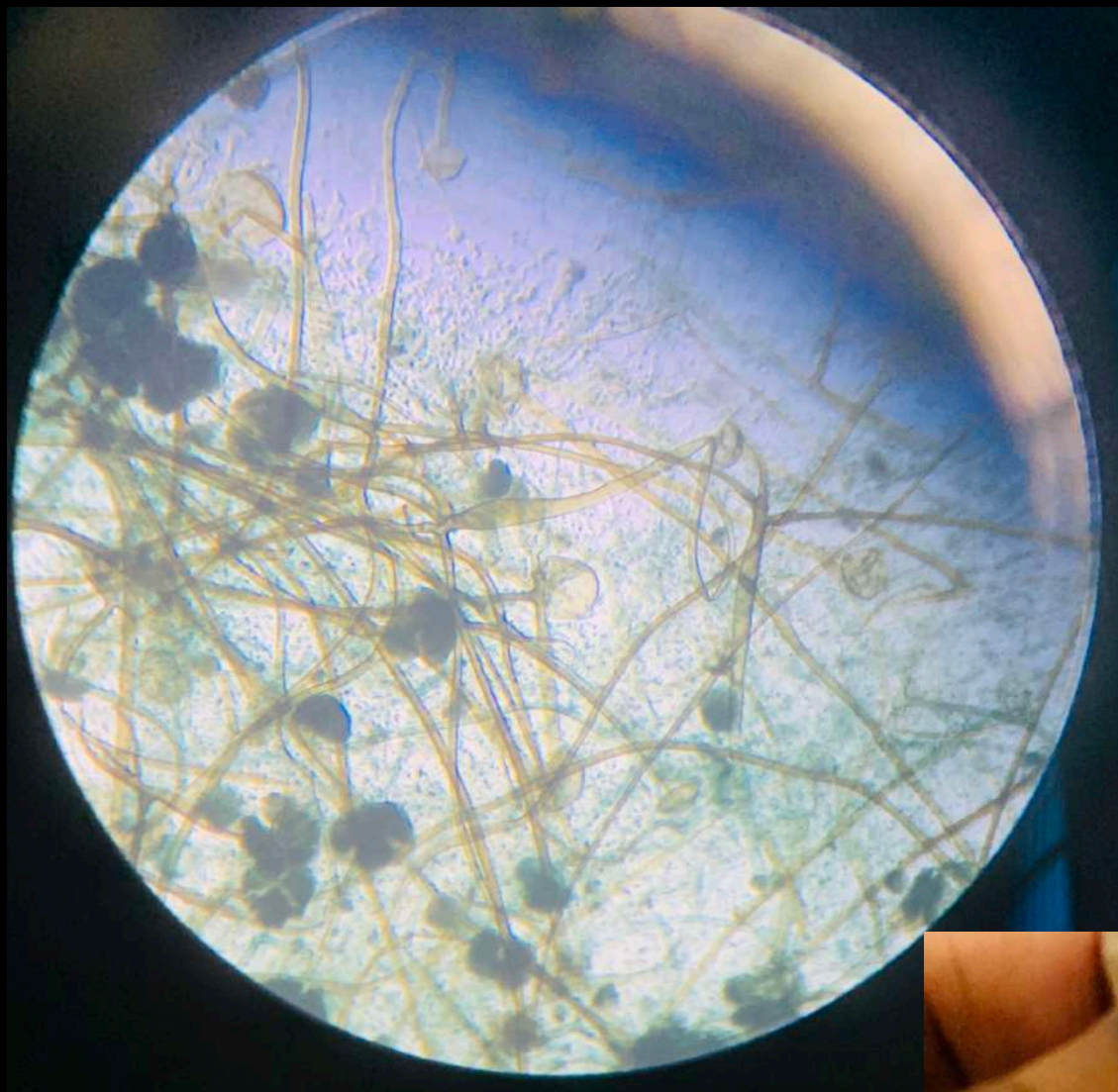
c) slide culture

3



This pathogen is obtained on culture of nasal tissue of a 56 year old woman

- a) Identify the agent with characteristic identifying features 1
- b) Name Two common predisposing conditions for infection with this organism $\frac{1}{2}$
- c) Name the stain used to study morphology of fungus $\frac{1}{4}$
- d) Name one therapeutic agent for this condition $\frac{1}{4}$



a) Rhizopus

Identifying features:

- Hyphae usually aseptate.
- Unbranched sporangiophore
- **Rhizoids**: are root like hyphae, formed opposite to sporangiophore.
- Sporangiophores terminate with dark round sporangium, containing oval, colorless / brown spores.

b) Diabetic ketoacidosis
Patient on iron therapy

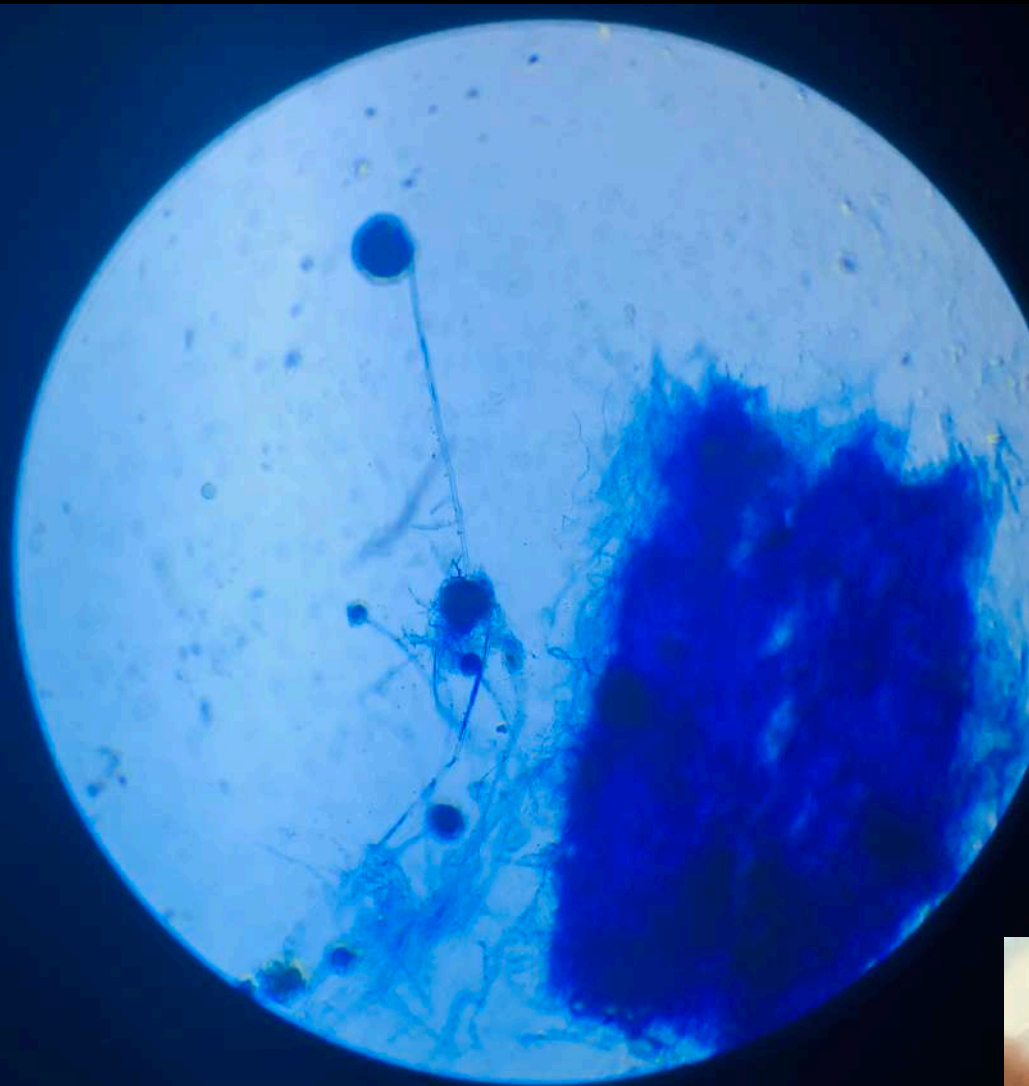
c) LPCB

d) Amphotericin B deoxycholate



This is an organism isolated from a case of otitis externa

- a) Identify the organism with characteristic diagnostic features 1
- b) Name the most common pathogenic species of this organism $\frac{1}{2}$
- c) Mention Two other common diseases caused by this $\frac{1}{2}$



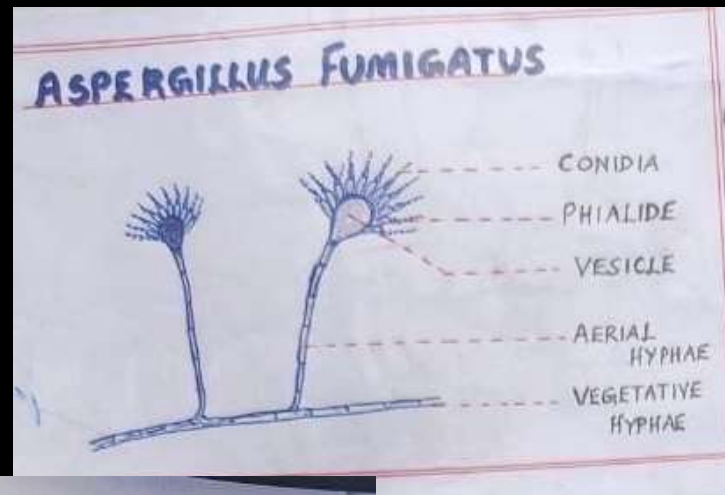
a. *Aspergillus*

- LPCB mount :

- ❖ Colonies consist of hyaline septate hyphae from which conidiophores arise, which end at vesicles. Vesicles are either tubular or globular in shape
- ❖ From the vesicle, finger-like projections of conidia producing cells arise called **phialides** or **sterigmata**. Phialides are arranged either in one or two rows, the first row is called **metulae**
- ❖ Conidia arise from the vesicles either on their entire surface or only on the upper half (Figs 69.7A to C).

b. *Aspergillus fumigatus*

c. aspergilloma ,mycotic keratitis



Diseases caused by *Aspergillus* spp.

1. Allergic aspergillosis:

- Hay fever, maltsters lung

(in workers of barley farm due to *Aspergillus clavatus* spores)

2. Aspergilloma:

- Solitary fungal ball in lung cavities

3. Mycotic keratitis

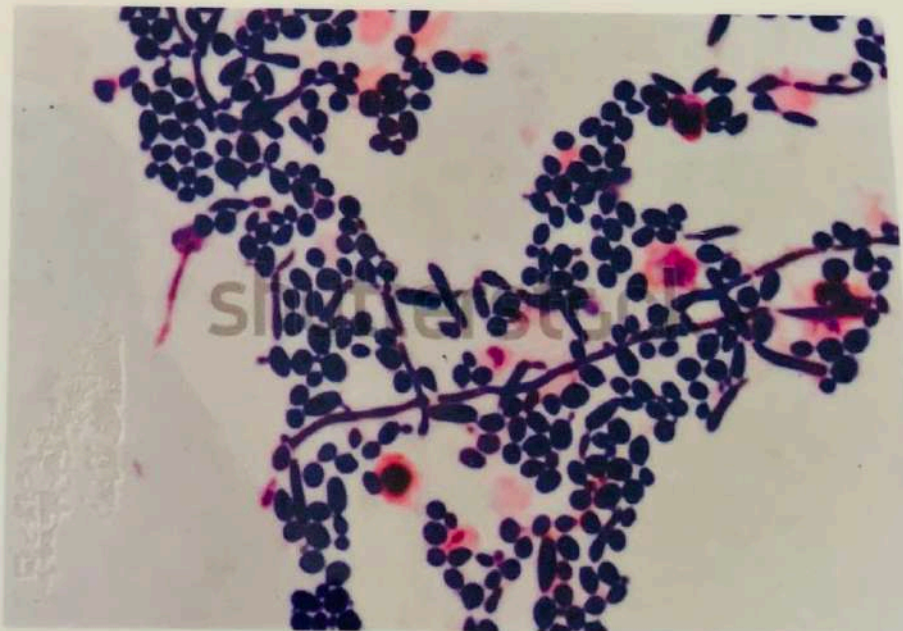
4. Invasive aspergillosis

- Occurs in severely immunocompromised patients, neutropenia, host -organ transplant

4

This is an organism isolated from vaginal swab of a woman having creamy white vaginal discharge

- e) Identify the organism with characteristic diagnostic features 1
- f) Mention Two predisposing conditions for this infection $\frac{1}{2}$
- g) Name the in vitro test done for the confirmation pathogenic species $\frac{1}{4}$
- h) Write the appropriate therapeutic agent for this disease $\frac{1}{4}$





a. Candida

~ gram positive oval budding yeast cells with pseudohyphae.

- culture on SDA: creamy white & pasty colonies.

b. extremes of age , low immunity (HIV infected people,

post- transplantation)

c. Germ tube test

d. Oral fluconazole / itraconazol

6



- a) Identify this culture method and the type of infective agents identified by this method 1
- b) Specify the advantage of performing this method. 1

a. Slide culture technique

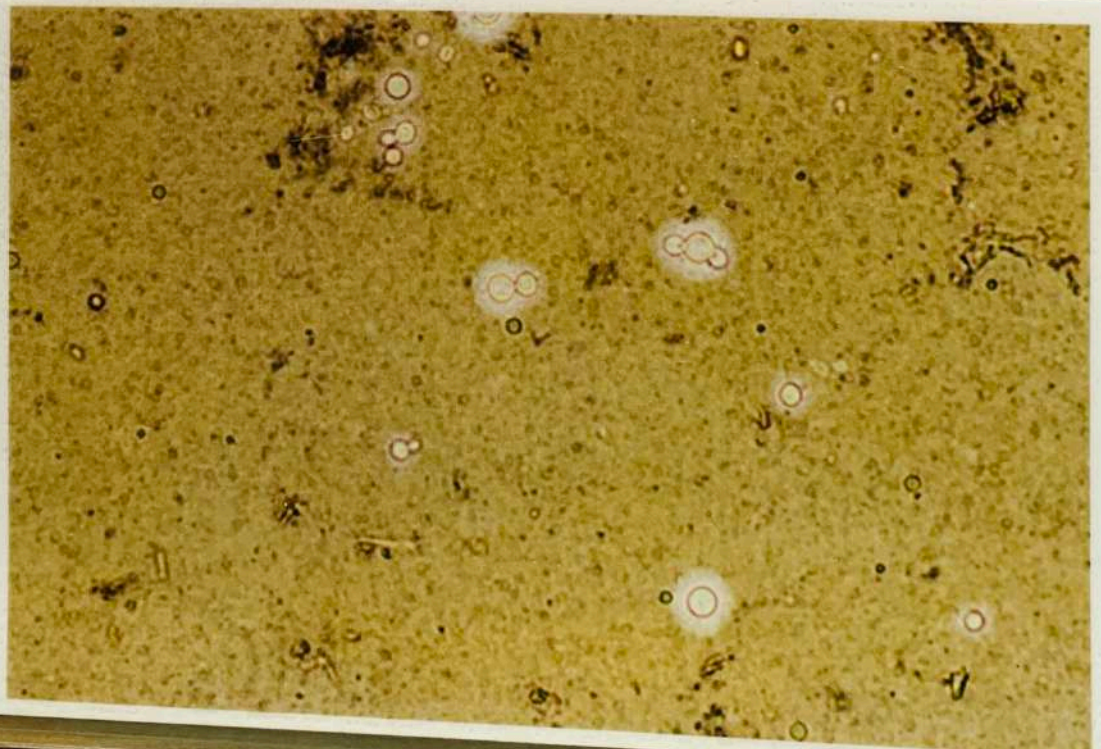
- fungus

b. Used to study the morphology of organism grown undisturbed

Microscopic picture of an organism isolated from CSF sample of an HIV positive patient is kept here

a) Identify the organism with characteristic identifying features 1

b) Identify this staining method and use of this 1



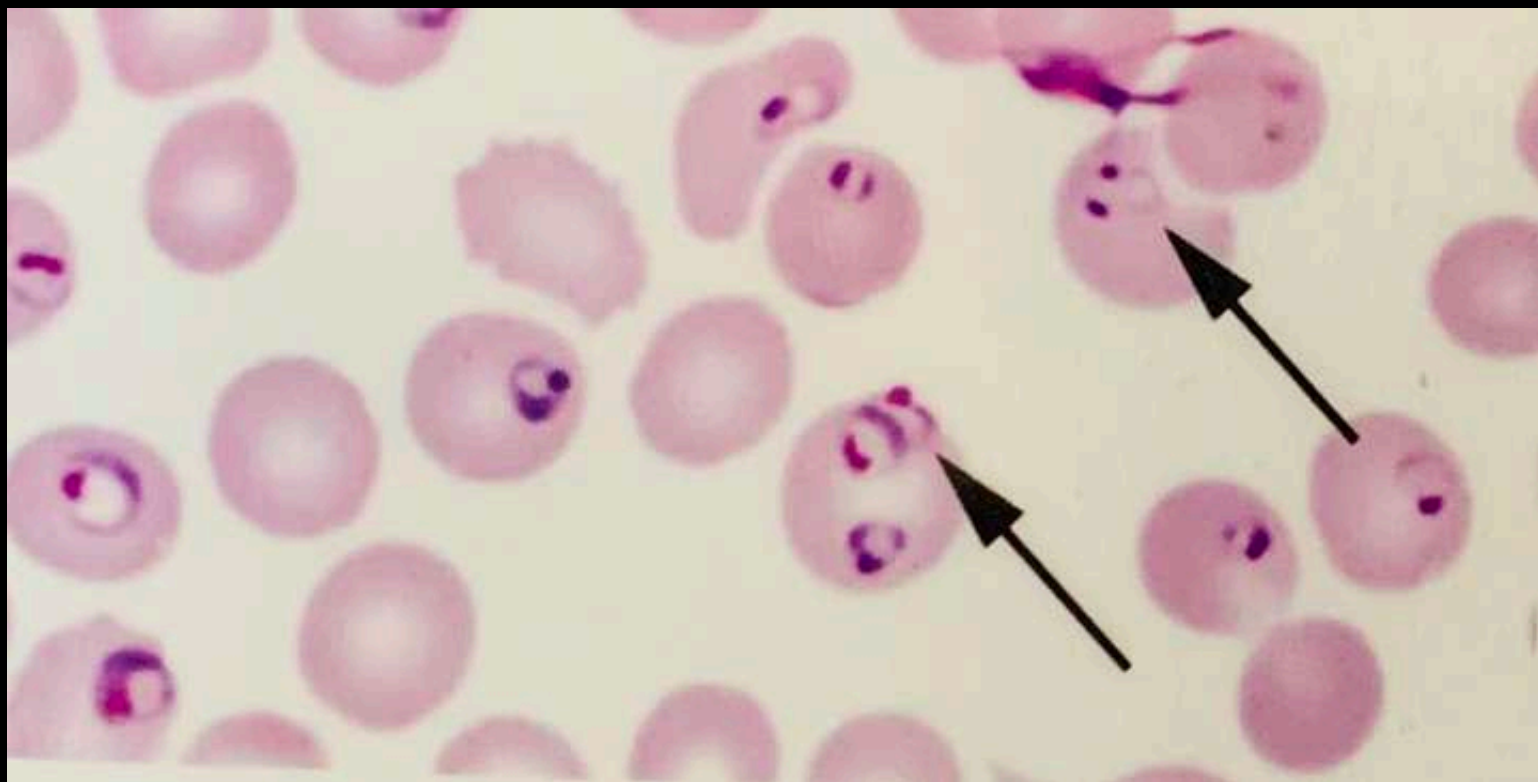
a. **Cryptococcus**

- negative staining : India ink staining shows clear refractile capsule surrounding round budding yeast cells.

b. Negative staining - demonstration of capsule

PARASITOLOGY

1. Plasmodium vivax
2. Plasmodium falciparum
3. Microfilaria
4. Coccidian parasite
5. Cyclops
6. Trichuris trichura
7. Enterobius vermicularis
8. Ancylostoma duodenale





The peripheral smear of a patient having intermittent fever for last one week is provided here

- | | |
|---|---|
| a) Identify the spotter specifying the characteristic diagnostic features | 1 |
| b) Name the definitive and intermediate hosts | ½ |
| c) Name one Rapid diagnostic test | ½ |

a. Plasmodium falciparum

- *P. falciparum*: Rings are 1.5 µm size, smaller than in *P. vivax*, occupying 1/6th of RBC. Three variants of ring forms may be seen such as (Fig. 35.5A):
 - ◆ Multiple ring forms (inside the same RBC)
 - ◆ Accole (appliqué) form: Ring form attached to RBC membrane
 - ◆ Double dot/head phone shaped ring form: Ring form with fragmented nucleus

□ **Gametocytes:** In *P. falciparum*, the gametocyte is crescentic or banana-shaped and larger than RBCs, whereas for other species, it is spherical and almost occupies the RBC (Figs 35.4D, E and 35.5B and C).

b. definitive host : female anopheles mosquito

Intermediate host : man

c. Histidine rich protein-2 detection

parasite lactate dehydrogenase (pLDH) detection

The peripheral smear of a patient having intermittent fever for last one week is kept / focused here

- | | |
|---|---|
| a) Identify the spotter specifying the characteristic diagnostic features | 1 |
| b) Name the definitive and intermediate hosts | ½ |
| c) Mention Two complications caused by this organism | ½ |

- a. *Plasmodium falciparum*
- b. Definitive host : female anopheles mosquito
Intermediate host : man
- c. Cerebral malaria , pernicious malaria

Plasmodium falciparum

Identifying feat:

- Multiple ring forms
- Sickle shaped gametocytes

Peripheral smear of a patient having fever and lymphangitis is focused here

- a) Identify with characteristic diagnostic features 1
- b) Mention the mode of transmission $\frac{1}{2}$
- c) What is the infective form? $\frac{1}{2}$

②



a. Microfilariae (w. Bancrofti)

Microfilaria (*W. bancrofti*)

Detection of microfilariae in peripheral blood is diagnostic of filariasis.

- ❑ It measures $260\text{ }\mu\text{m} \times 7.5\text{--}10\text{ }\mu\text{m}$ covered by a long hyaline sheath
- ❑ The head end is blunt while the tail end is pointed
- ❑ In cephalic space, length to width ratio is 1:1
- ❑ The nuclei are large, coarse, well-separated present throughout the body except near the tail end
- ❑ Nuclei are also absent in few places where various primordial organs are present like nerve ring, excretory pore, anal pore and genital cells
- ❑ It differs from the microfilaria of *Brugia malayi* in head and tail region (Figs 37.3 and 37.4).

b. Vector borne

c. Third stage (L3) filariform larvae

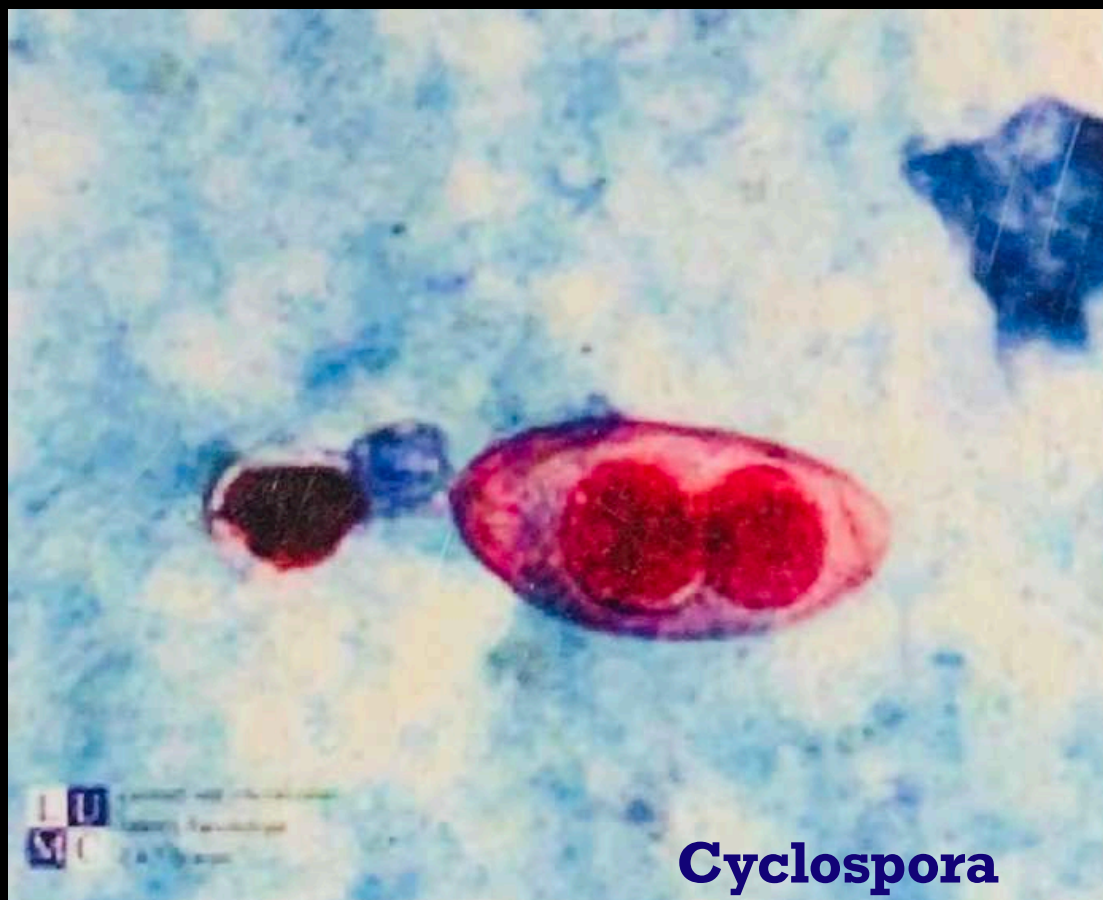
Stained smear prepared from stool sample of an AIDS patient is kept

3

a) Identify and comment on the staining 1

b) Name **TWO** opportunistic parasitic infections seen 1
in such patients





a. Answer according to picture given
(cryptosporidium/isospora/cyclospora)
-modified acid fast staining : appear as red colour
oocysts against blue background.

b.

- **Parasitic opportunistic infections:**

- *Toxoplasma* encephalitis
- Chronic intestinal cystoisosporiasis (>1 month)
- Atypical disseminated leishmaniasis

CRYPTOSPORIDIUM PARVUM

(Parasite causing diarrhea in Immunocompromised patients)

Acid fast to 1% H₂SO₄ (Modified Acid Fast staining)

|--200 μm --|



a. Identify the spotter with **TWO** characteristic features

1

b. Name **TWO** diseases in which it acts as an intermediate host

1

a. Cyclops

Features:

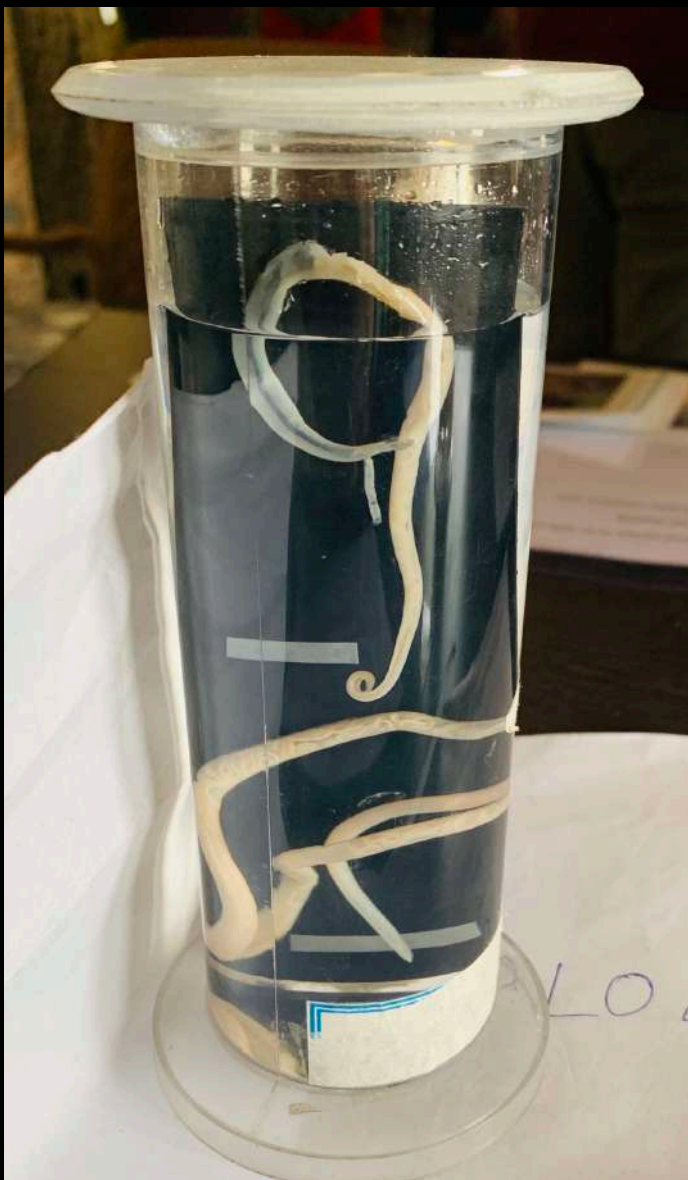
b. Dranculiasis

Diphyllobothriasis

A 10-year-old malnourished boy presented to the OPD with severe abdominal pain, nausea, and vomiting. The worm obtained from stool sample is shown here

6

- Identify the worm with **TWO** characteristic features $\frac{1}{2}$
- What is its infective form and mode of infection 1
- Name a drug to treat this infection $\frac{1}{2}$



- Ascaris lumbricoides (round worm)**
~
- egg containing rhabditiform larvae**
- ingestion embryonated egg from contaminated soil, food & water.
- Albendazole / mebendazole**



A parasitic ova obtained from the stool sample of a child having abdominal discomfort is the spotter

- Identify with characteristic features $\frac{1}{2}$
- What is its infective form and mode of infection 1
- Name a drug to treat this infection $\frac{1}{2}$

The parasitic ovum is focused from the stool of a 5-year-old child with severe abdominal pain

- Identify with **TWO** characteristic features 1
- What is the mode of transmission $\frac{1}{2}$
- Name one complication in severe infection $\frac{1}{2}$

a) *Ascaris* (round worm)

Identifying feat:	
	Fertilised
1.	Bile stained
2.	Three layers - outer mamillated albuminoid coat - thick transparent middle layer - inner lipoidal vitelline membrane
3.	Large unsegmented ovum in middle
4.	Clear crescentic space at poles

b. ~egg containing rhabditiform larvae
~ ingestion embryonated egg from contaminated soil, food & water.

c. Albendazole / mebendazole

Complications: intestinal obstruction
Intussusception .



45-year-old man presented to the OPD with pain in the right hypochondrium. USG showed a space occupying lesion in the right lobe of liver, this was surgically removed

- a. Identify the spotter $\frac{1}{2}$
- b. What is the infective form of this condition $\frac{1}{2}$
- c. Name the definitive and intermediate host 1

a) Hydatid cyst
b) egg
c) def host : dog
Int host : sheep



The stool microscopy from a 3year old boy presented with diarrhoea is focused

- a. Identify the ovum with TWO characteristic features 1
- b. Mention the habitat $\frac{1}{2}$
- c. What is the mode of transmission $\frac{1}{2}$



a. *Trichuris trichura*

Identifying features

- Bile stained
- Barrel shaped
- Triple shell
- Mucous plug at each pole.

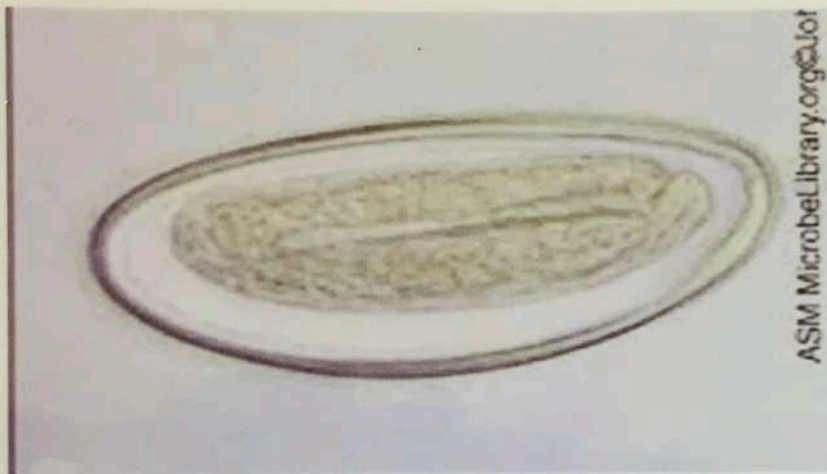
b.soil

c. Ingestion of contaminated food & water containing embryonated egg.



A 6 year old girl is brought to the OPD with history of peri anal itching during night for the last few days. This parasitic form ,obtained from clinical specimen

- a) Identify with characteristic features 1
- b) What is the mode of collection of specimen $\frac{1}{2}$
- c) Mention the usual treatment given $\frac{1}{2}$



7-year-old boy was brought to the OPD with history of recurrent episodes of nocturnal enuresis and perianal itching. The clinical specimen showed following ova.

- a. Identify the ova with **TWO** characteristic features 1
- b. Mention the habitat $\frac{1}{2}$
- c. What is the mode of collection of specimen $\frac{1}{2}$

a. *Entrobium vermicularis* (pin worm)

Identifying feat:

- Non – bile stained
- Plano convex egg
- Double layered egg shell
- Egg contain 'tadpole' shaped embryo.

b.cellophane tape ,NIH swab

-perianal skin sample

c. Mebendazole / albendazole

Habitat : perianal region



The stool microscopy of a 10-year-old child with iron deficiency anaemia is focused

- a. Identify the ovum with **TWO** characteristic features 1
- b. Mention the mode of transmission $\frac{1}{2}$
- c. What is the infective form $\frac{1}{2}$

a. Hook worm

Identifying feat:

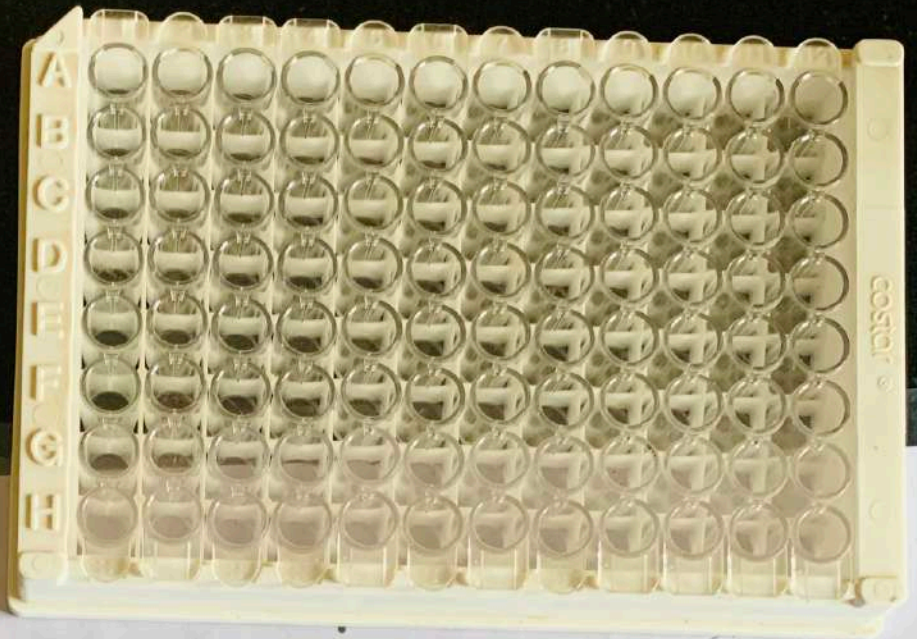
- Non – bile stained
- Oval egg
- Thin, transparent , hyaline cell wall
- Ova with 4 – 8 blastomeres
- Clear space between ovum and egg shell.

b. Penetration of skin

c.L3 Filariform larvae

IMMUNOLOGY

①



The spotter kept here is used for laboratory diagnosis of infectious diseases

- a) Identify the spotter and mention the principle of the test 1
- b) Name **TWO** diseases diagnosed by antibody detection using this method $\frac{1}{2}$
- c) Name **TWO** disease diagnosed by antigen detection using this method $\frac{1}{2}$

a) ELISA microtiter plate

Principle:

ELISA principle: Immunoassay that detects either antigen or antibodies in the specimen, by using enzyme-substrate-chromogen system for detection.

Two components-

Immunosorbent- Absorbing material used (e.g. polystyrene, polyvinyl) that specifically absorbs the antigen or antibody present in serum.

Enzyme is used to label one of the components of immunoassay (i.e. antigen or antibody). Substrate- chromogen system is added at the final step of ELISA.

Enzyme-substrate reaction in turn activates the chromogen to produce a color detected by spectrophotometry

(Ag-Ab complex)-enzyme + substrate → activates the chromogen → color change → detected by spectrophotometry

b) Hepatitis C , HIV , EBV

c) Hepatitis B , Dengue

ELISA Microtitre plate

Enzyme Linked Immunosorbent Assay

Use: Detection of Antigen /Antibody in patient's serum

Diseases commonly diagnosed using this method:

a) Bacterial (Antibody detection)

Leptospirosis

Rickettsial diseases

b) Viral (Antigen detection)

Hepatitis B

HIV P24 antigen assay –

for diagnosing early infection (Window period)

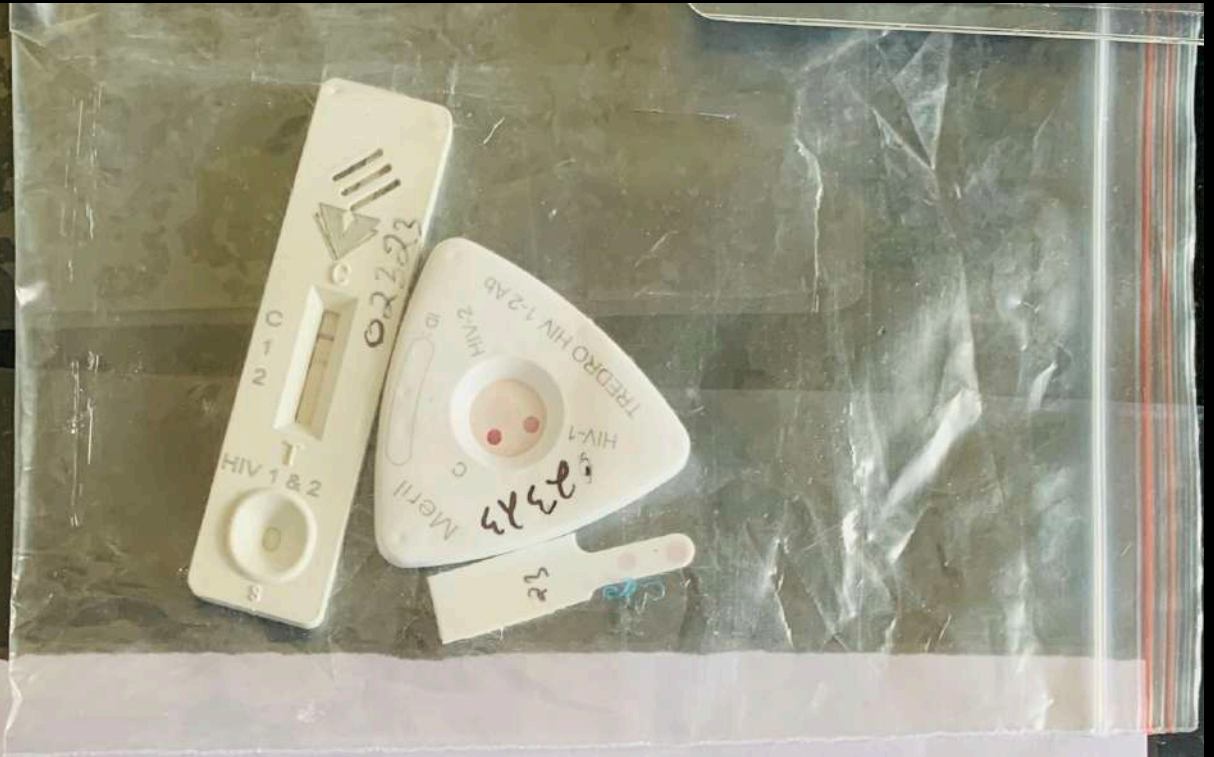
Viral Antibody detection

HIV

Dengue, Chikungunya

Hepatitis A , C, E

2

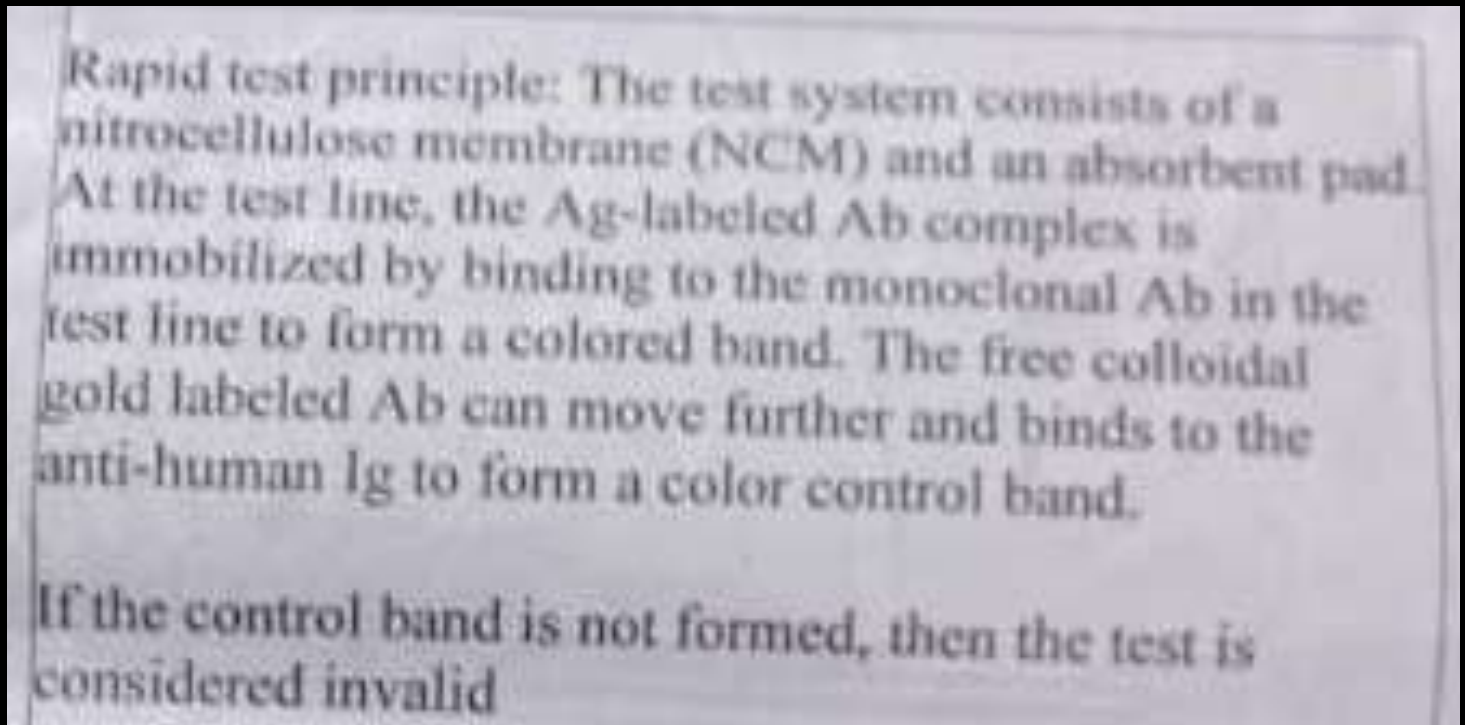


The following test was performed in a patient suffering from fever for the past 2 weeks

- Identify the type of test and its principle 1
- Name TWO advantages of using this method $\frac{1}{2}$
- Name TWO disadvantages of using this method $\frac{1}{2}$

a) Rapid test

Principle:



b) simple to perform (single step method)

Rapid (10 -20 min)

Require minimal training

Sophisticated instruments are not required

c) it is a screening test , need confirmation with another test.

Cannot be used for high sample load

3



- a. Identify the spotter and the disease diagnosed by this test. 1
- b. What type of antigen antibody reaction is this? $\frac{1}{2}$
- c. Name **TWO** specific tests used to diagnose the disease $\frac{1}{2}$

a. VDRL test slide

- syphilis

b. Precipitation reaction

c. TPA (T. Pallidum agglutination test)

TPI (T.pallidum immobilization test)

4



A serological test done for a patient with FUO is provided

- Identify the serological test $\frac{1}{2}$
- What type of antigen- antibody reaction is this? $\frac{1}{2}$
- Name the disease diagnosed by this test. $\frac{1}{2}$
- What is the significant titre? $\frac{1}{2}$

- a) Widal test
- b) Tube agglutination reaction
- c) typhoid
- d)

- H agglutinin titer more than 200 and
- O agglutinin titer more than 100.

AH agglutinin titer > 200

BH agglutinin titer > 200

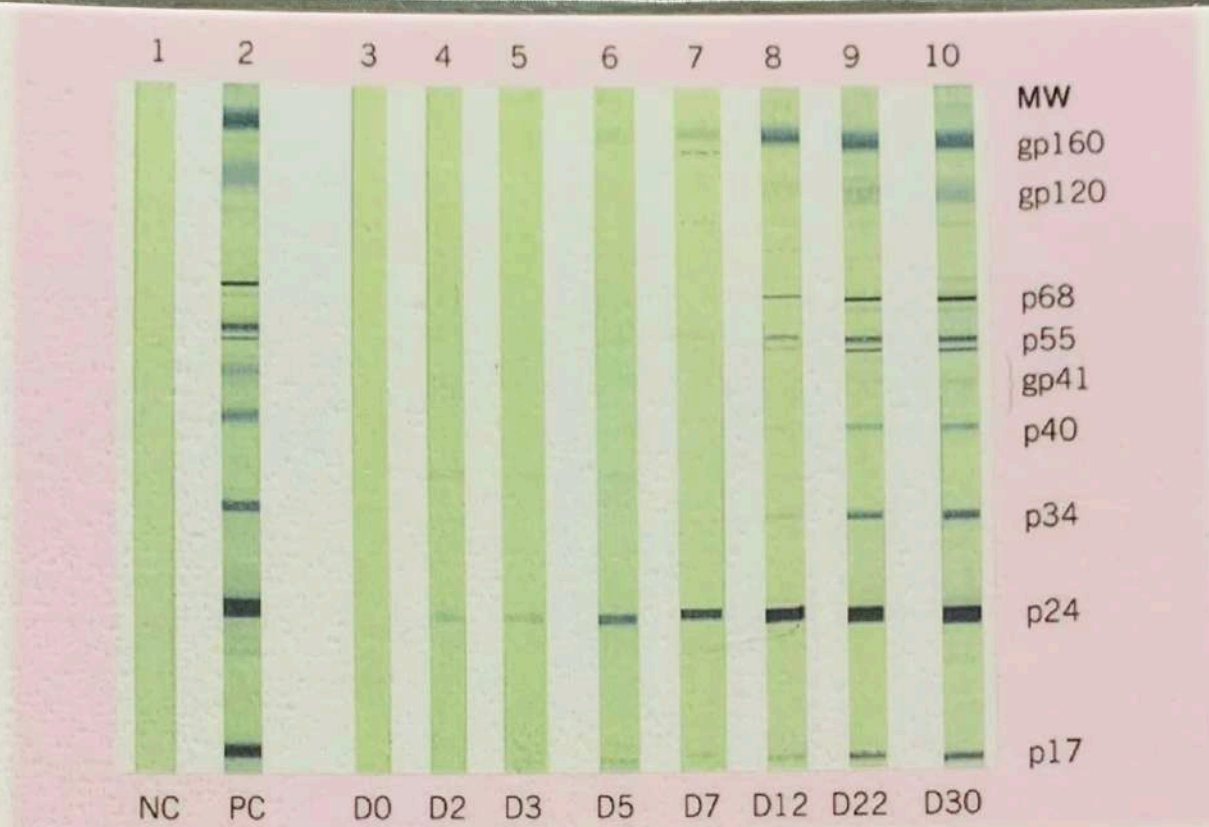
Significant titre

STO > 100

STH > 200

AH > 200

BH > 200



A commercial sex worker presented with diarrhoea for 1 month. Screening test with ELISA for HIV showed repeated inconclusive results. The following test was advised.

- Identify the test $\frac{1}{2}$
- What is the interpretive criteria (CDC/WHO) 1
- What is the gold standard in the diagnosis of HIV $\frac{1}{2}$

a) western blot

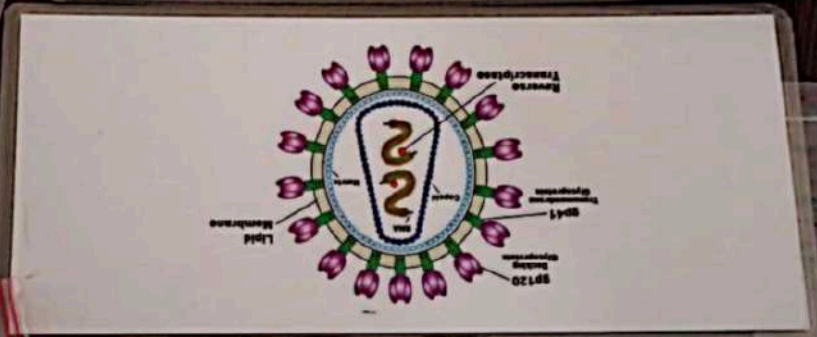
b)

WHO / CDC criteria

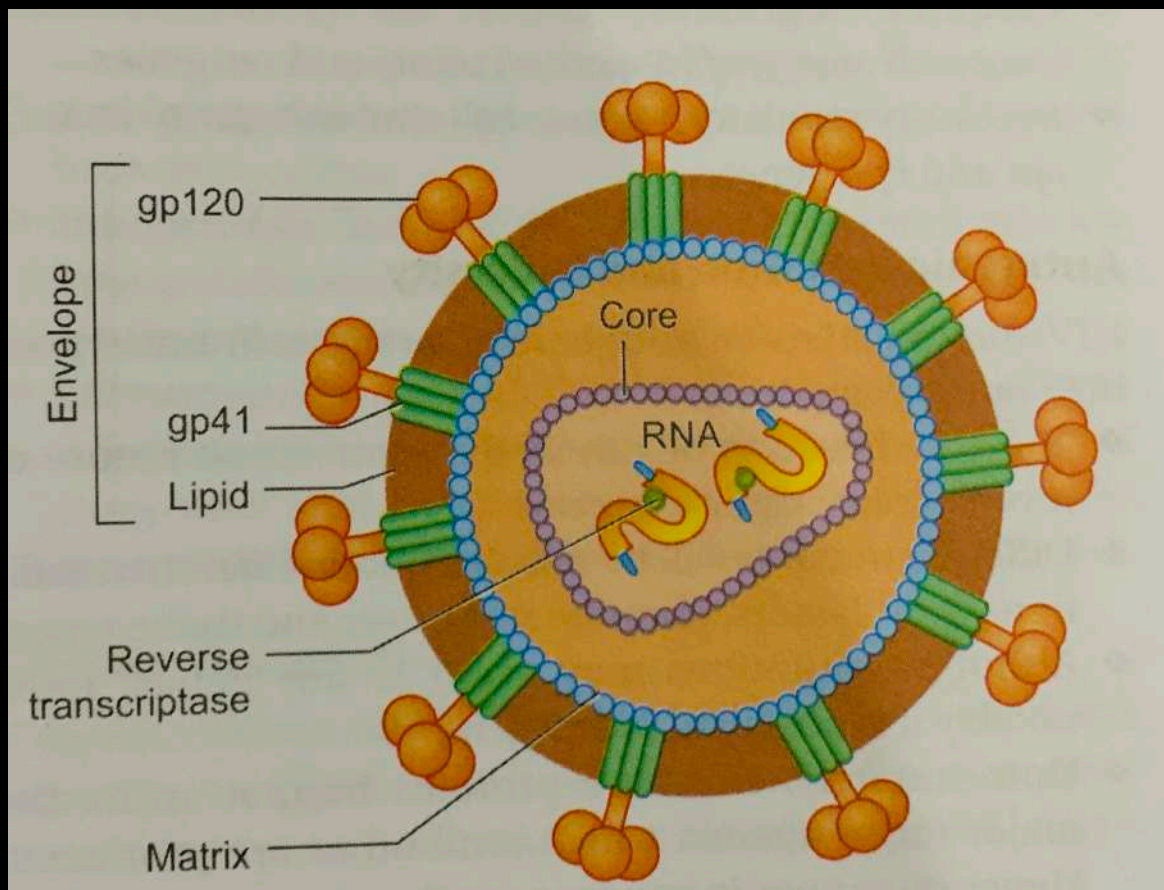
WHO - At least 2 Env. Bands with-
or without gag or pol Bands.

CDC - presence of any out of the
4 → p24, gp120, gp160, gp141

c) PCR



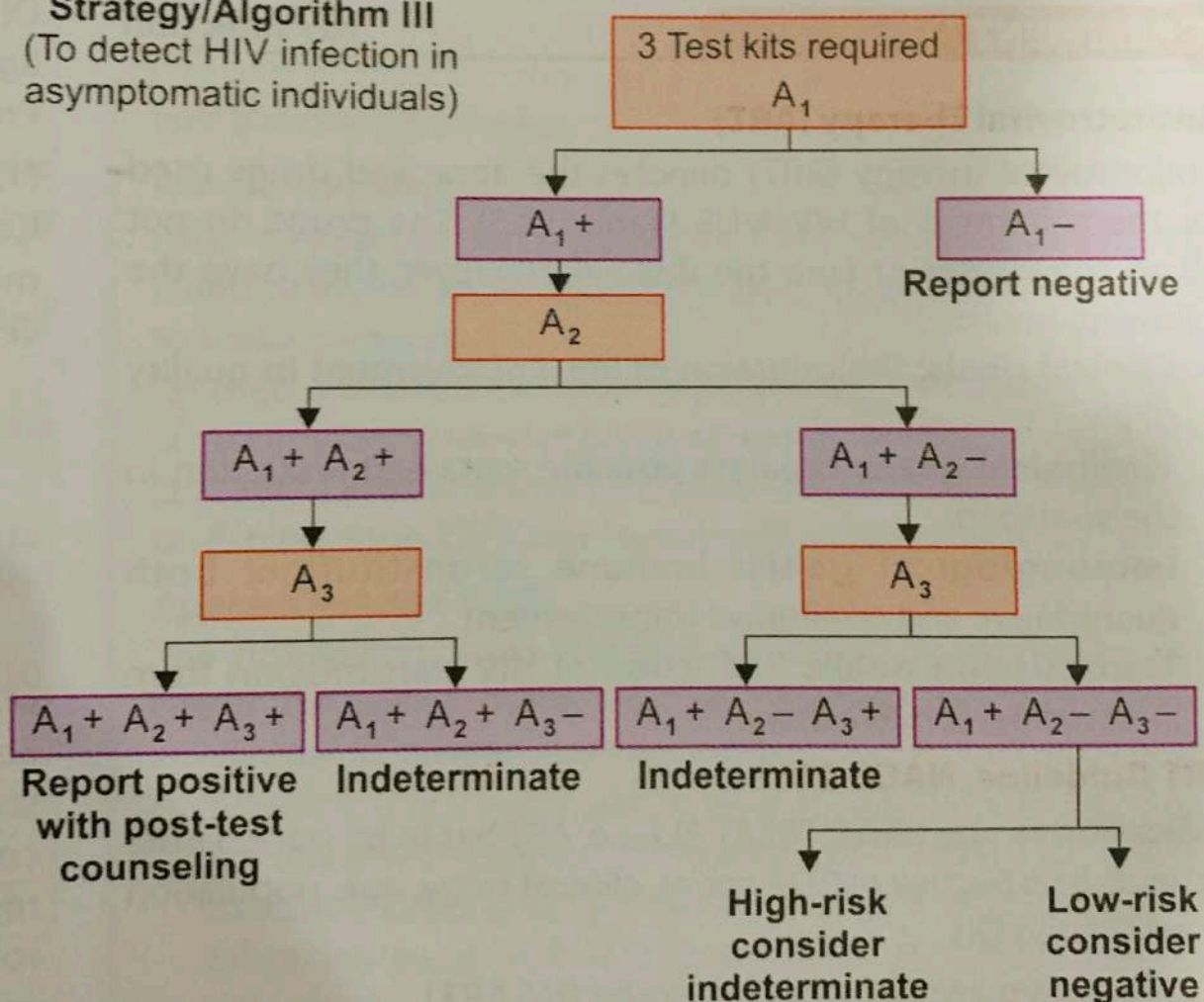
HIV - Structure and diagnostic tests
 1) What is meant by the above test strategy of disease diagnosis



4. Strategy III:

- **Purpose:** It is done for the diagnosis of asymptomatic HIV patients, antenatal screening and screening of patients awaiting surgeries
- **Three tests format:** All positive results in the first test should be confirmed by the second and third test. Positive report is sent only if all three test results are found reactive
- For indeterminate results of strategy IIB and III, (i.e. first test positive but second or third test negative), a repeat test is done after 14-28 days and the sample should be sent to the reference center for confirmation by western blot or RT-PCR.

Strategy/Algorithm III
(To detect HIV infection in asymptomatic individuals)



Vaccines



①

Hepatitis B vaccine is kept here

- a) Mention the type of vaccine ½
- b) Write the route & schedule of this vaccine for adults 1
- c) What is the protective titre of antibody ½

a. Recombinant Sub unit vaccine

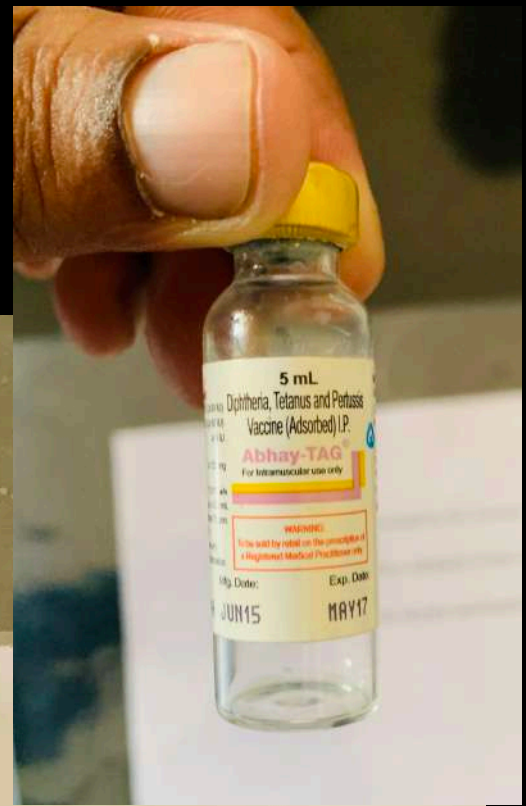
b. IM

- adults: 0,1,6 months (3 doses)

- children (NIS) : 6,10,14 weeks

C. Anti- HBs Ag antibody >10mIU/mL

②



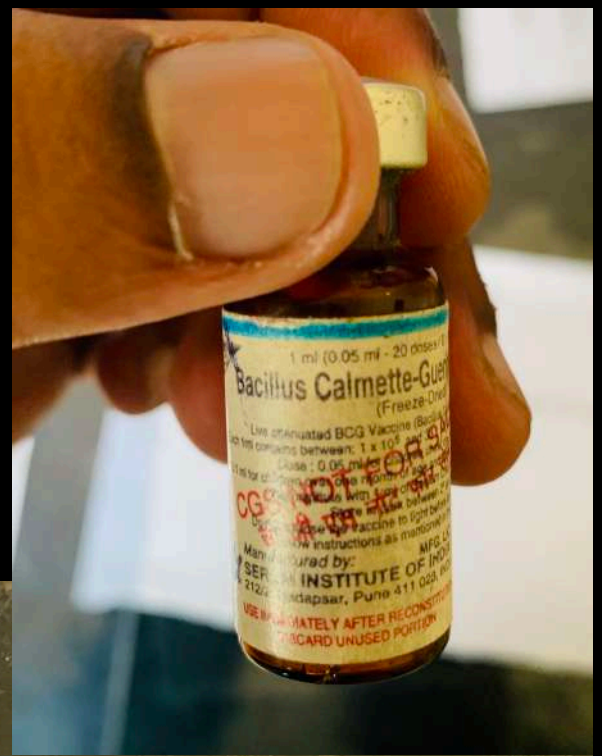
DPT vaccine is kept

- a) List the diseases prevented by this vaccine $\frac{1}{2}$
- b) Universal immunization schedule of this vaccine 1
- c) Name one method of vaccine sterilization $\frac{1}{2}$

a. Diphtheria, pertussis, tetanus

b. 2 booster doses of DPT : 16-24 months & 5 year

c. Autoclavation

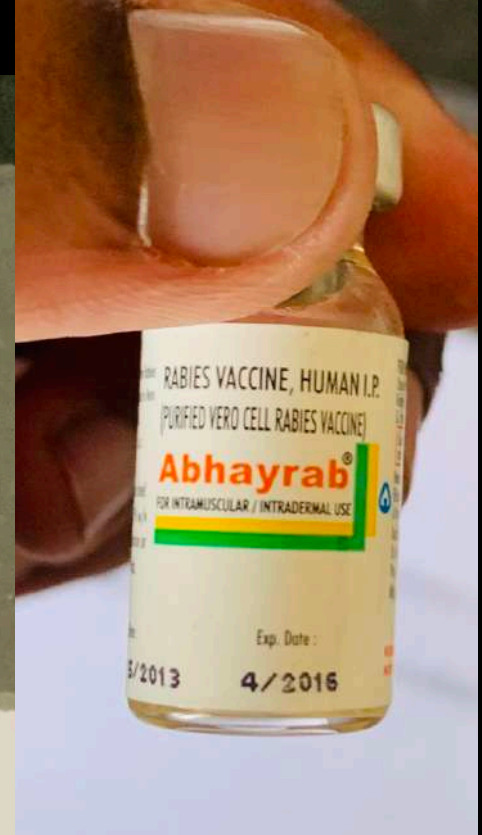


Answer the following about BCG vaccine

- a) What type of vaccine is this? $\frac{1}{2}$
- b) Write the route and time of administration of this vaccine 1
- c) Which disease is prevented by this vaccine? $\frac{1}{2}$

- a. Live attenuated vaccine
- b. Intradermal
-at birth (max upto 2 yr)
- c. Tuberculosis

4



Rabies vaccine is kept

- a. Intradermal schedule of this vaccine 1
- b. Dose and site of administration 1

a) *ID PEP regimen (2-2-2):* 2-site ID vaccine is given on days 0, 3 and 7

- b) ❖ **Site:** The preferred site of administration is in the deltoid area of the arm for adults and the anterolateral area of the thigh for children (aged < 2 years); never administered in gluteal region
- ❖ **Dose:** One ID dose is 0.1 mL of vaccine and one IM dose is considered as an entire vial of vaccine, irrespective of the vial size



5

Oral polio vaccine is kept

a. Type of vaccine

$\frac{1}{2}$

b. Dose and schedule of administration in National Immunisation schedule

1

c. Mention TWO advantages of oral vaccine

$\frac{1}{2}$

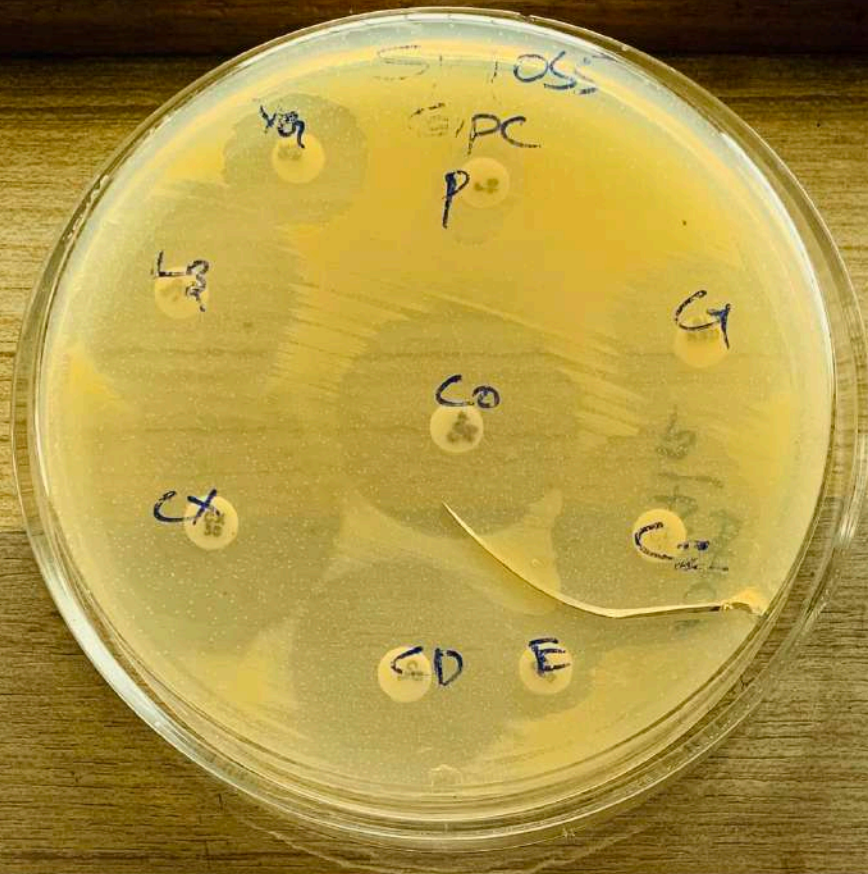
a) live attenuated vaccine

b)

Total five doses (2 drops/dose, oral) of bivalent OPV (serotype 1 and 3):

- Zero dose—given at birth
- 1st, 2nd and 3rd dose —given at 6th, 10th, 14th week of age; booster given at 16–24 months

c) it provide herd immunity , local immunity
Cheaper & easy to administer



~~Day 2~~

Antibiotic sensitivity test of a culture isolate is given

- Identify the method of testing $\frac{1}{2}$
- What is the media used $\frac{1}{2}$
- What is MIC? $\frac{1}{2}$
- Name one method by which MIC can be detected $\frac{1}{2}$

- a. Kirby -Bauer disk diffusion method
- b. Mueller Hinton agar (MHA)
- c. Minimum inhibitory concentration : lowest concentration of an antimicrobial agent that will inhibit visible growth of a micro organism after overnight incubation.
- d. Epsilometer / E -test



This method is used for blood culture of a patient with PUO.

- a. Identify the spotter 1
- a. What is the advantage of this method? $\frac{1}{2}$
- b. Name two diseases for which this method is best used $\frac{1}{2}$



CASTANEDA METHOD OF CULTURE

Use:

To do blood culture for *Salmonella* species and *Brucella*

Advantage:

Prolonged incubation and repeated sub cultures are possible without causing contamination



This method is used for blood culture of a patient with PUO.

- a. Identify the spotter 1
- a. What is the advantage of this method? $\frac{1}{2}$
- b. Name two diseases for which this method is best used $\frac{1}{2}$

a) Brain heart infusion broth

b) recovery of microorganisms in blood which is in less quantity & fastidious.

c) infective endocarditis , enteric fever.

Advantage:

Prolonged incubation
sub cultures
causing contamination

BRAIN HEART INFUSION BROTH

Type of Media:

Enriched (liquid) media

Use of media:

For doing blood culture

Indications for doing blood culture:

Enteric fever, Bacterial endocarditis,
Septicemia

- McIntosh Fildes's Anaerobic Jar
- catalyst - Aluminium pellets coated with palladium
- Indicator - Methylene Blue
- organisms - *Clostridium* Sp
- *Bacteroides fragilis*



a. Identify the spotter

$\frac{1}{2}$

b. What is its use

$\frac{1}{2}$

c. Name the catalyst and indicator used

1

d. Name one organism grown by this method.

$\frac{1}{2}$

b) used to create anaerobiosis (for anaerobic culture methods.)