

Introduction to Parasitology and Protozoan parasites

Paper: 3

Unit:1

Lecture-2,3,4

Dr. Rupali Vaity

Assistant Professor

Department of Zoology

SIES College of Arts, Science and Commerce

PROTOZOAN PARASITES

Protozoan Parasites

```
graph TD; A[Protozoan Parasites] --> B["❖ Entameoba histolytica<br/>❖ Plasmodium vivax<br/>❖ Trypanosoma gambiense<br/>❖ Leishmania donovani"]; A --> C["❖ Morphology<br/>❖ Life cycle<br/>❖ Mode of infection<br/>❖ Pathogenecity<br/>❖ Treatment<br/>❖ Prophylaxis"];
```

- ❖ *Entameoba histolytica*
- ❖ *Plasmodium vivax*
- ❖ *Trypanosoma gambiense*
- ❖ *Leishmania donovani*

- ❖ Morphology
- ❖ Life cycle
- ❖ Mode of infection
- ❖ Pathogenecity
- ❖ Treatment
- ❖ Prophylaxis

Entamoeba histolytica

Classification

Phylum: Protozoa

Class: Rhizopodea

Genus: *Entamoeba*

Species: *histolytica*

Entameoba histolytica

Distribution

Cosmopolitan (world wide)

Tropical and Subtropical regions

Mexico, South America, Thailand , China, Philippines, India

High incidence rate in rural area and densely populated urban areas with poor sanitary conditions

Entameoba histolytica

Habit and Habitat

Microscopic

Endoparasite--- Upper part of large intestine colon

Mucosa and submucosa

Ulcers and abscesses

Chronic cases: Liver, Lung, Brain and other organs

Other mammals

Entameoba histolytica

Morphology

```
graph TD; Morphology --> Trophic_stage; Morphology --> Precystic_stage; Trophic_stage --> Trophozoite_stage; Trophic_stage --> Magna; Precystic_stage --> Minuta;
```

Trophic stage

Trophozoite
stage

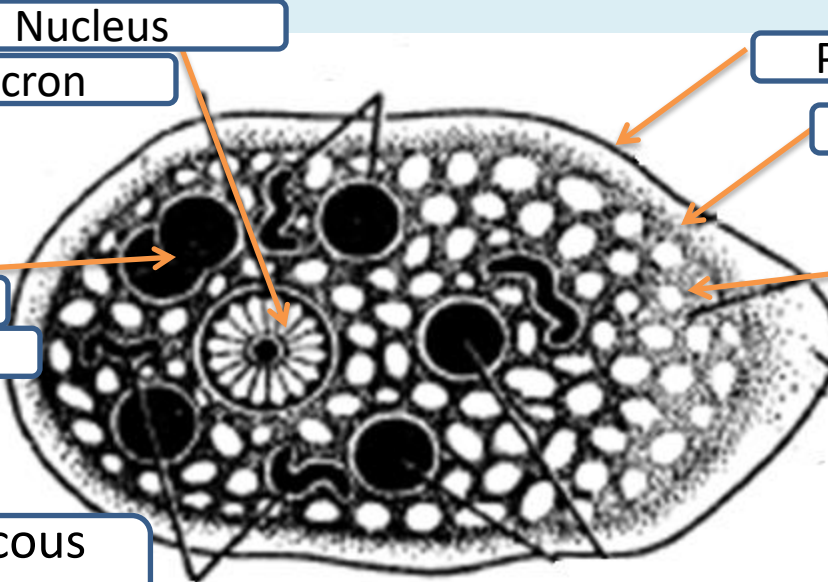
Magna

Precystic stage

Minuta

Entameoba histolytica

Trophic form



Nucleus

4-6 micron

Plasma membrane

Ectoplasm

Endplasm

Food vacuole

Ingested RBCs

Pseudopodia

Penetrates mucous lining of intestine

Active form

40 microns

Entameoba histolytica

Minuta form

Non-feeding stage

Non-pathogenic to man

7-15micron

Undergoes encystment

Infection of new host

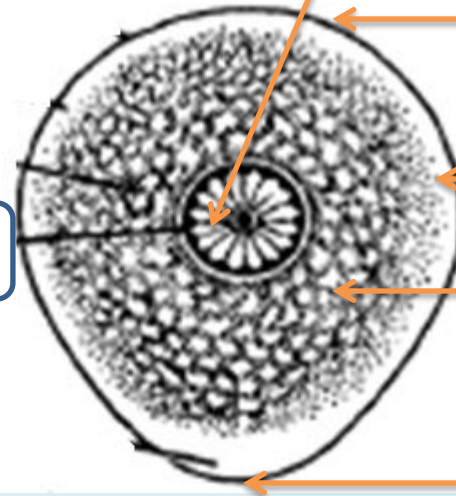
Nucleus

Plasmalemma

Ectoplasm

Endoplasm

Pseudopodia



Entamoeba histolytica

Life cycle

Monogenetic

Life cycle is completed in **single species**
of host --Man

Carrier Host

New Host

Entameoba histolytica

Life cycle

Carrier Host

Trophic form

Binary fission

2 daughter cells

Number, Penetration
in mucous lining

Binary fission

Feed on RBCs and
other tissues

Abscesses and
Bleeding ulcers

Minuta

Entameoba histolytica

Life cycle

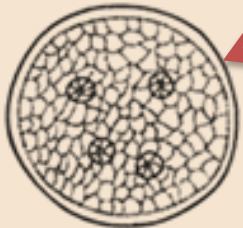
Carrier Host

Minuta

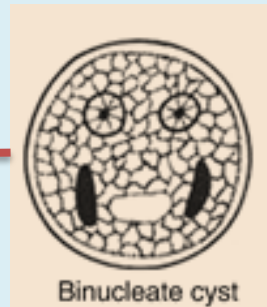
Encystation
Lumen of intestine

Thin, Flexible,
Colourless,
Transparent,
Resistant cyst wall

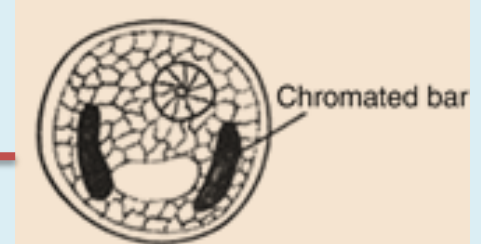
Infective stage



Quadrinucleate cyst



Binucleate cyst



Uninucleate cyst

Escapes outside the carrier
host along faeces

Entamoeba histolytica

Life cycle

New Host

Tetranucleate cyst

Digestive tube of new host

Stomach

Cyst wall dissolves

Small intestine

Resistant to gastric juice

Excystment

Liberation of Tetranucleate cyst

Excystic form Metacyst

Entameoba histolytica

Life cycle

New Host

Metacyst

Nuclear &
Cytoplasmic changes

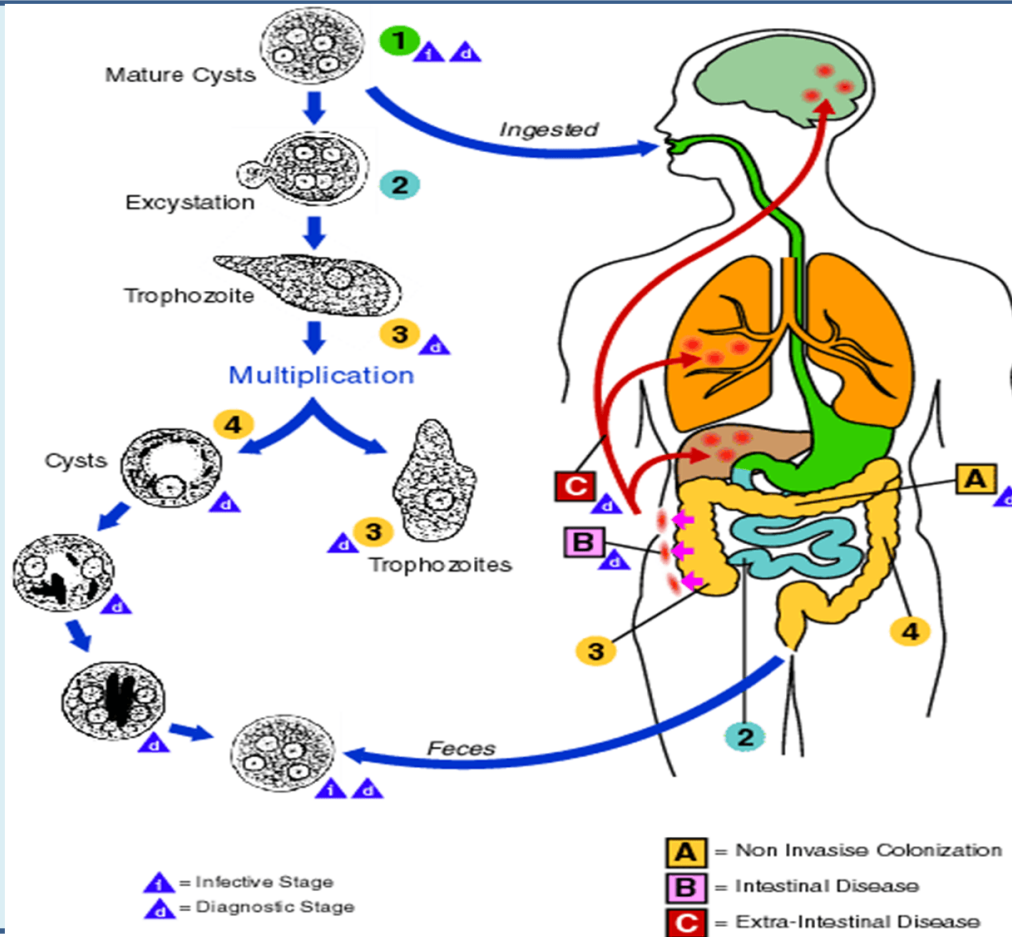
8 small
uninucleate
amoeboid
young
Trophozoites

Trophozoites

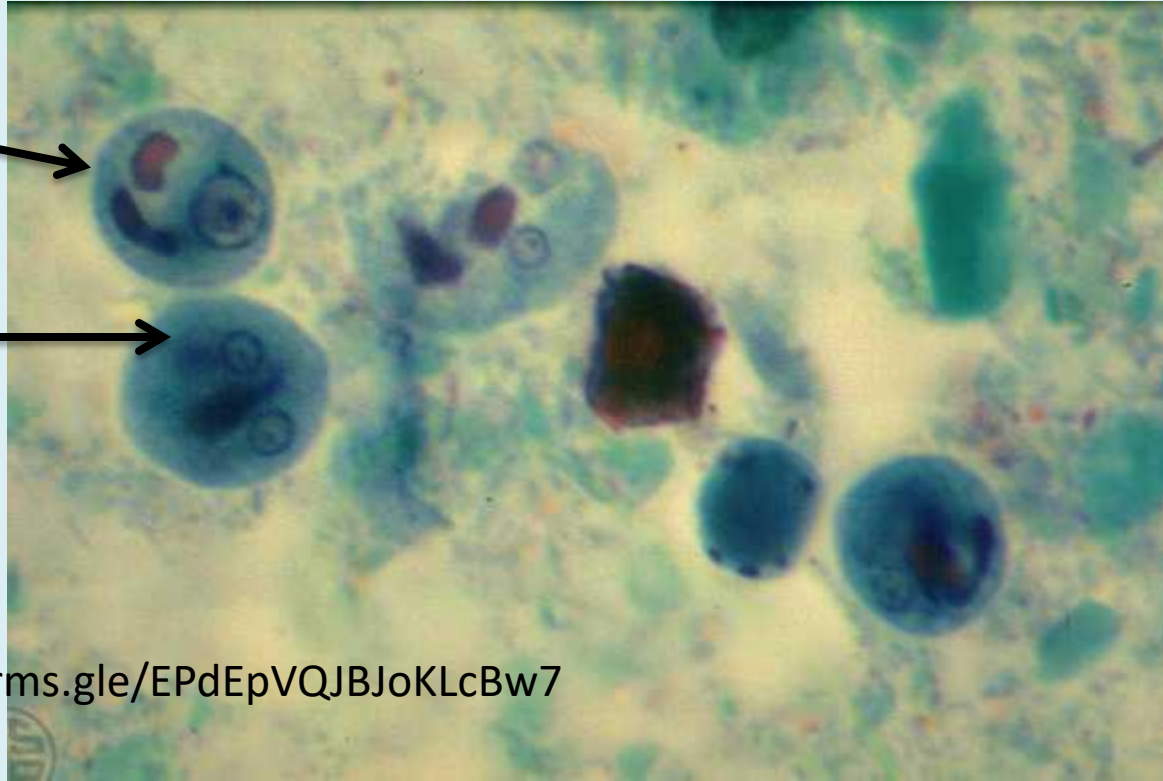
Ultimately
lodged
submucosa of
large intestine

Invade tissues
and enter
mucous lining

Entamoeba histolytica



Entameoba histolytica



1

2

<https://forms.gle/EPdEpVQJBJoKLcBw7>

Entameoba histolytica

Modes of Transmission

From one person to another

Ingestion of Encysted stage

Ingestion of cyst along
with food and water

Infection due to
unhygienic personal habit

Consumption of
contaminated food articles

Sexual contact

Entameoba histolytica

Ingestion of cyst along with food and water

Matured Quadrinucleate cyst

Infective stage

Enter into human body

Handling of food by infected individuals

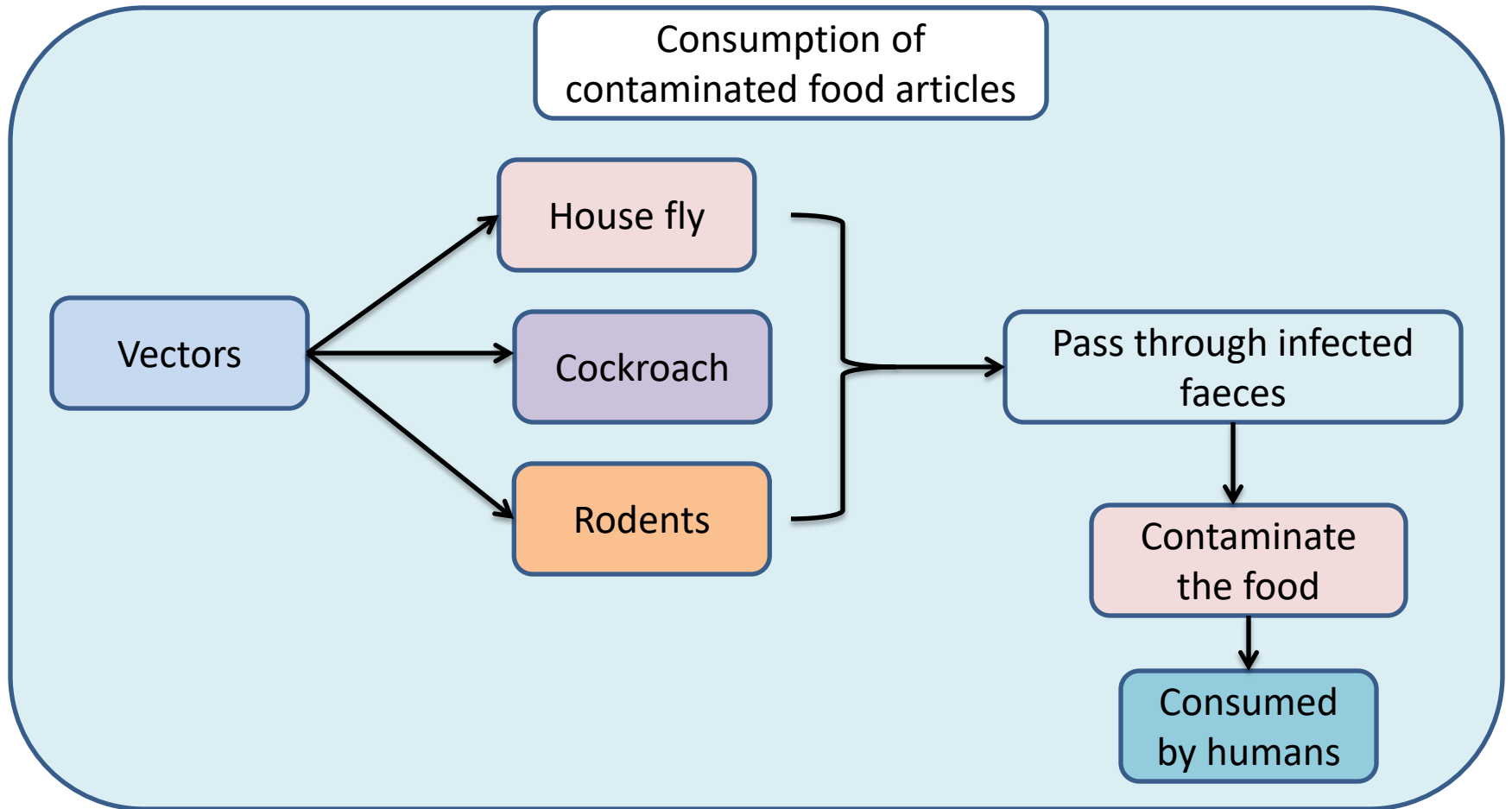
Cyst carriers / Cyst passers

Drinking of contaminated water

Consumption of raw vegetables

Consumption of fruits which are not washed

Entameoba histolytica



Entameoba histolytica

Infection due to unhygienic personal habit



Not washing hands

After visiting toilet

Before cooking food

Before eating food

Entameoba histolytica

PATHOGENICITY

Incubation period: 4-5 days

Symptoms
Clinical features

Amoebiasis

Invasion of parasites in
different organs

Amoebic dysentery

Extensive intestinal
ulceration

Entamoeba histolytica

Entamoeba histolytica infection



Lesions
Injury/Wound

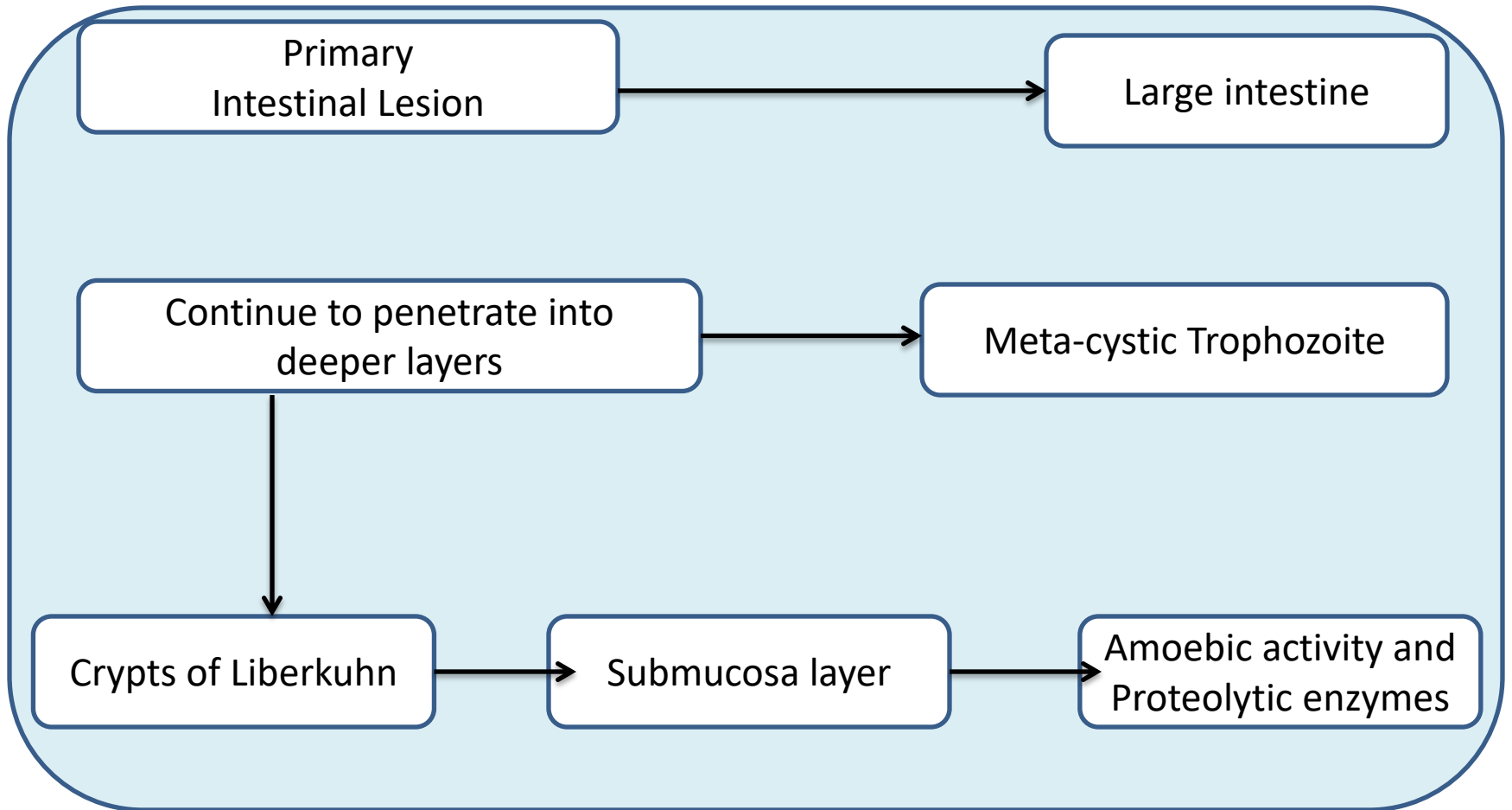


Primary
Intestinal Lesion

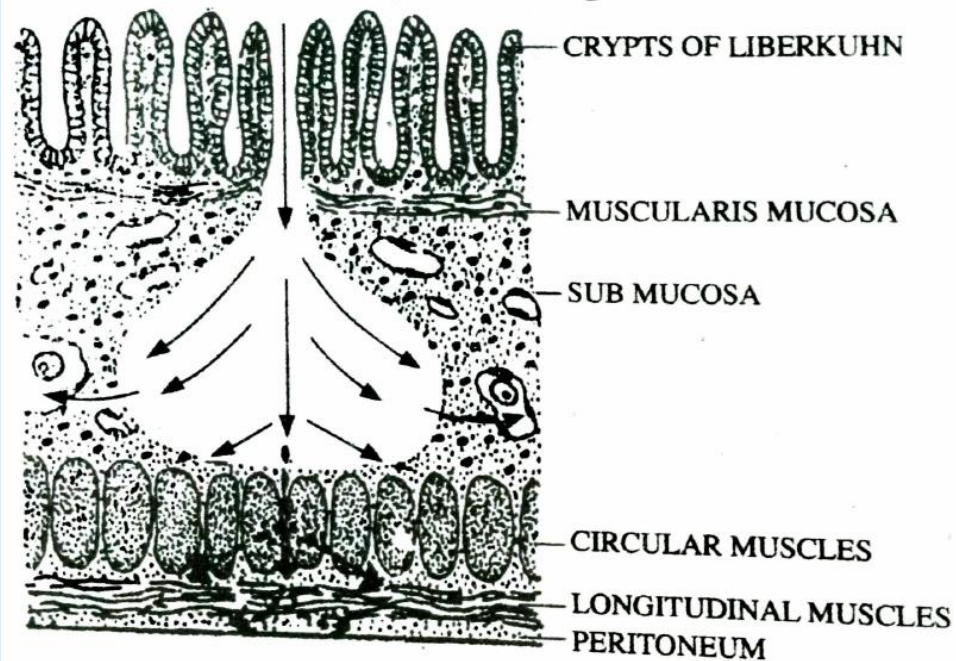


Secondary
Metastatic Lesion

Entameoba histolytica

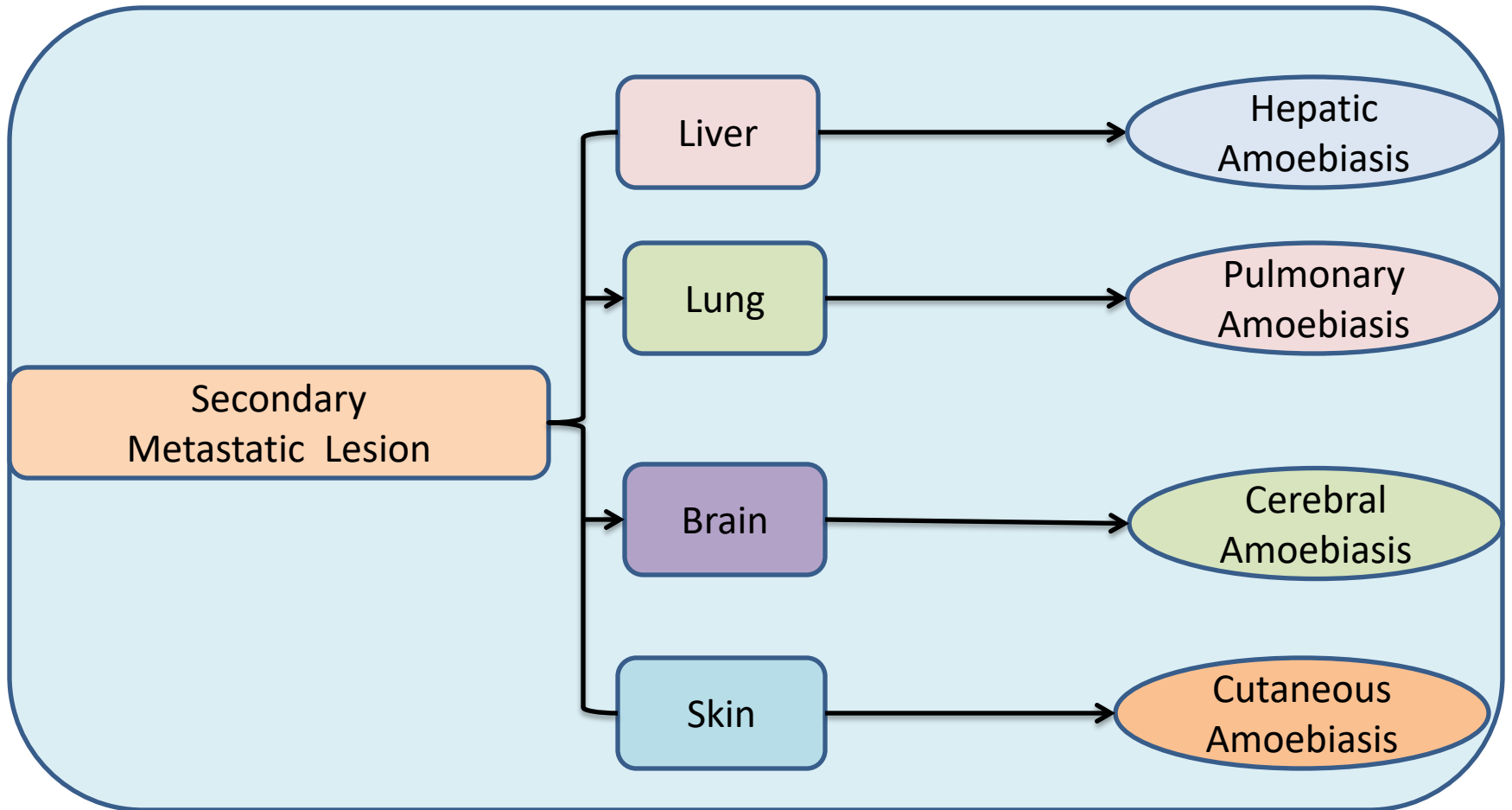


Entameoba histolytica



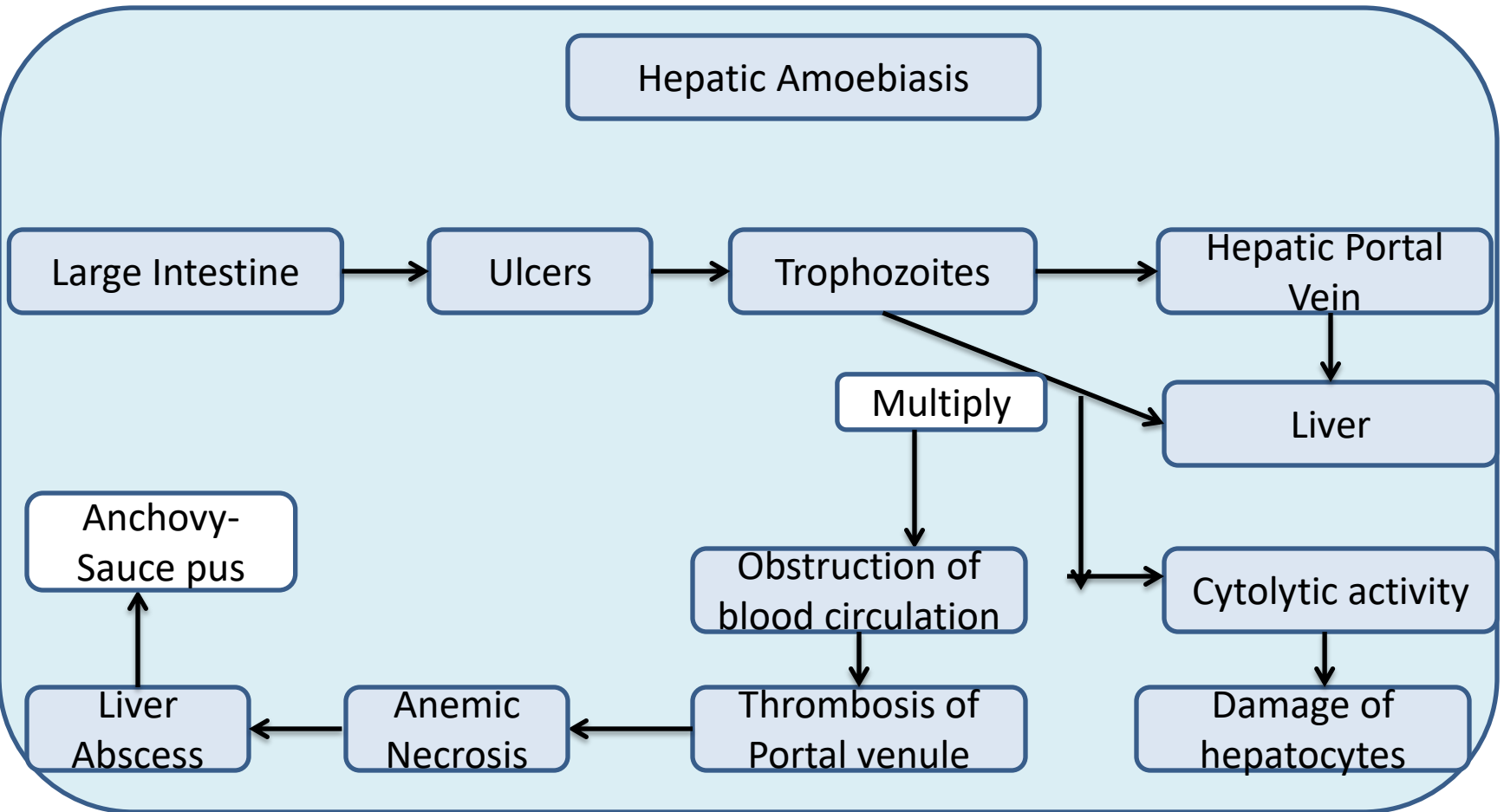
T.S of Intestine of man showing the process of tissue necrosis.
The flask shaped clear area indicates the process of tissue necrosis.
The arrows indicates the movement of parasites in different directions

Entameoba histolytica



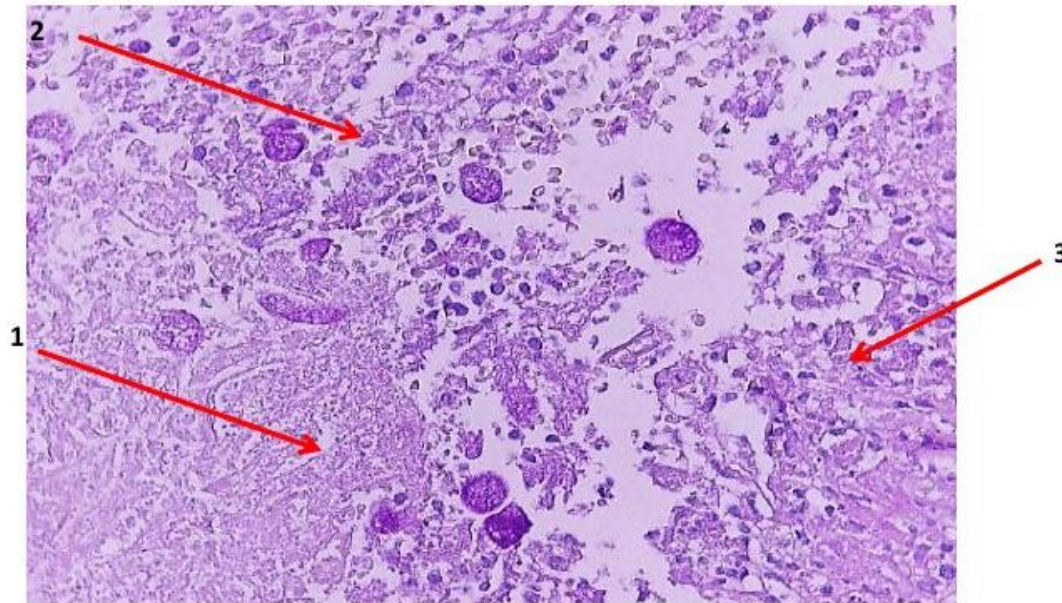
Entameoba histolytica

Hepatic Amoebiasis



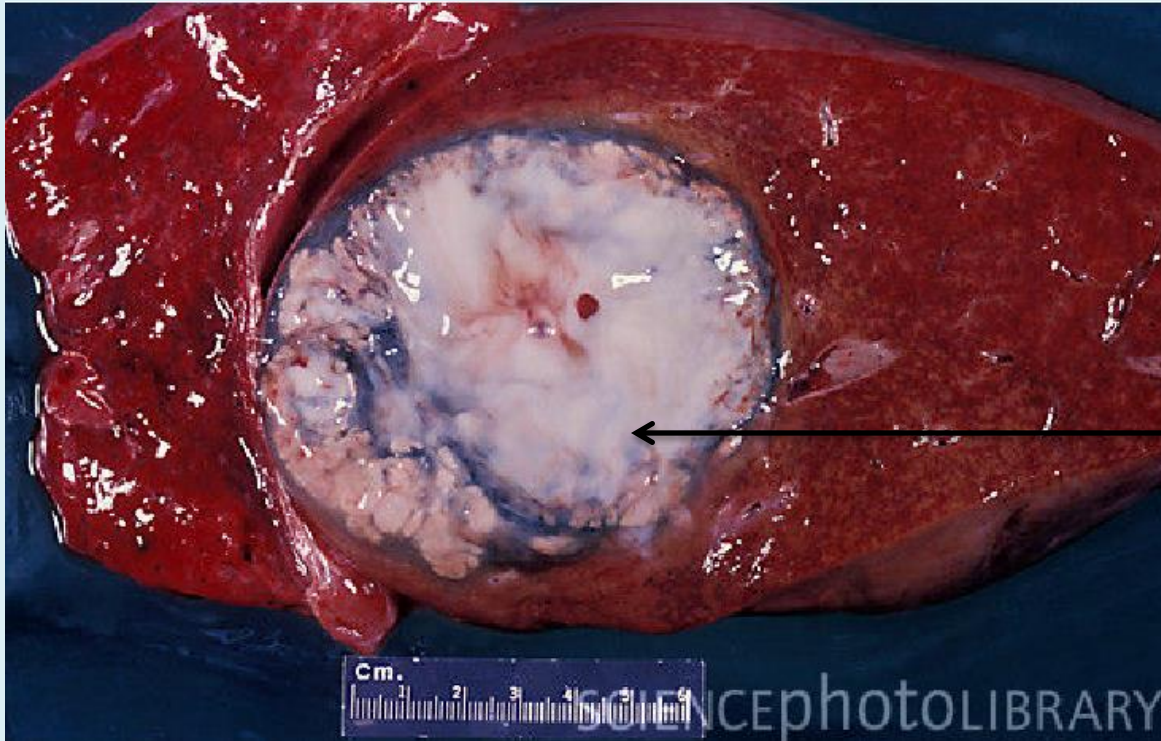
Entamoeba histolytica

Amoebic Liver Abscess



- 1) Necrotic liver cells
- 2) *Entamoeba histolytica*
- 3) Hepatocytes infiltrated with chronic inflammatory cells

Entameoba histolytica



Amoebic
Liver Abscess

Entameoba histolytica

Pulmonary Amoebiasis

Single
Abscess



Lower Lobe of Right
Lung



Direct Extension of Liver Abscess

Entry of parasite into the lungs from intestinal wall via portal circulation is a rare case

Entamoeba histolytica

Cerebral Amoebiasis

Abscess formation in brain due to the infection of *Entamoeba histolytica* is rare

It arises as a complication of either hepatic or pulmonary abscess or both

The abscess is small, usually single and it is found in one cerebral hemisphere

Entamoeba histolytica

Cutaneous Amoebiasis

Rare reported complication

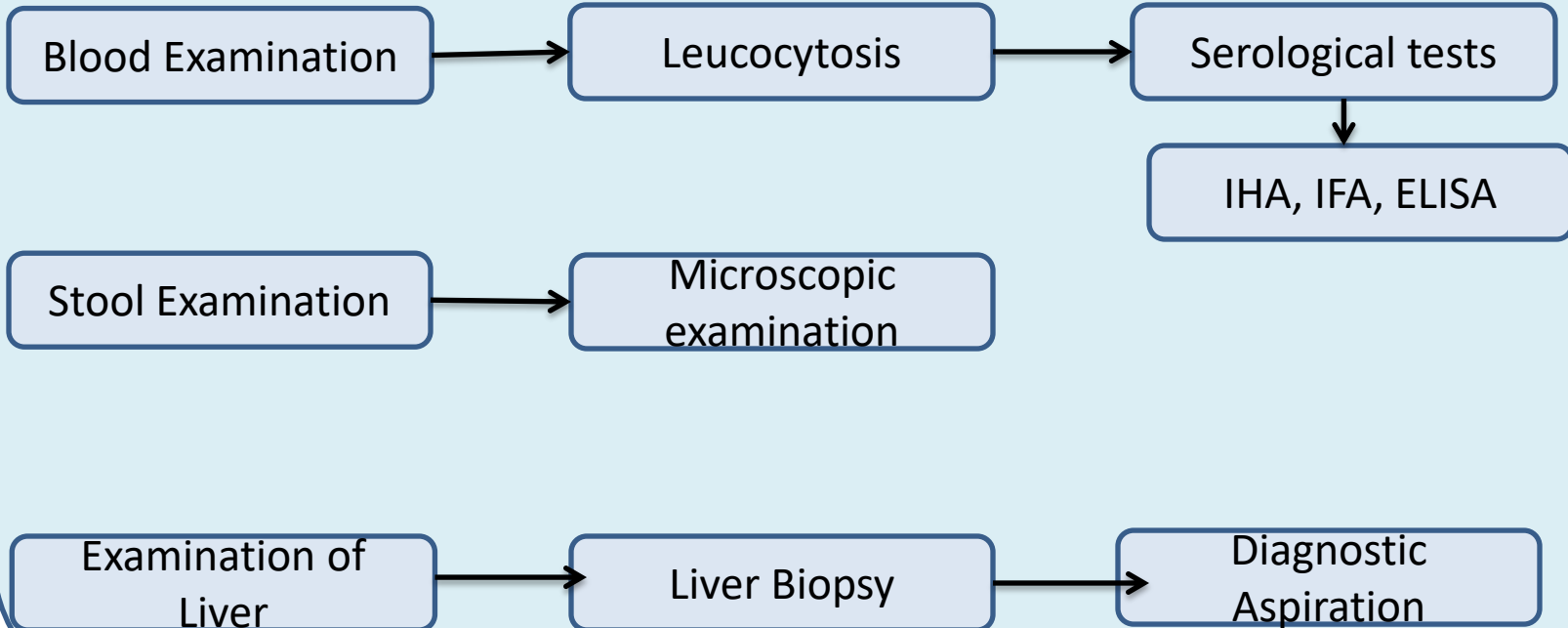
Occurs in areas adjoining visceral lesion



Patient with amoebiasis liver abscess, with perforation of abscess through abdominal skin.

Entamoeba histolytica

Diagnosis of *Entamoeba histolytica* infection



Entameoba histolytica

Treatment

Vary according to type of infection and the pathogenicity

Anti-amoebic
Amoebicidal drugs

Luminal Amoebocides

Tissue Amoebocides

Both Luminal and Tissue
Amoebocides

Entameoba histolytica

Luminal Amoebocides

Act on trophozoites and cysts present in the lumen of intestine

Direct Acting Luminal
Amoebocides

Contact Amoebocides

Dichloroacetamide
groups

Halogenated
Hydroxyquinoline

Pentavalent Arsenicals

Paromomycin

Entameoba histolytica

Tissue Amoebocides

Act on trophozoites of *E. histolytica* in the intestinal wall, liver, lungs and other metastatic areas



Carapichea ipecacuanha

Emetine

Synthetic Emetine



Less Toxic than natural
Emetine

Chloroquine Phosphate

Highly toxic

Nausea, Vomiting, Diarrhoea, Muscle pain, Weakness, Dyspnoea

Entameoba histolytica

Both Luminal and Tissue amoebocides

These drugs act on parasites occurring both in the lumen of alimentary canal and in various organs



Relatively Non- toxic
Nausea, Vomiting

Niridazole

Highly Toxic
Nausea, Vomiting,
Headache, Abdominal
pain, Neurophysiological
problems

Entamoeba histolytica

Prophylaxis

Measure taken to prevent a disease---- Preventive measures

Personal Prophylaxis

Community Prophylaxis

Entameoba histolytica

Boiling of water



Personal Prophylaxis



Washing of fruits and Vegetables

General Cleanliness



Avoid food contamination by vectors



Entameoba histolytica

Community Prophylaxis

Quick and proper disposal of human faeces should be managed.
Underground sewage system should be developed.

Irrigation of land for growing vegetables with
contaminated water should be avoided

Cysts may be killed by 50% alcohol, 1% formaldehyde, Phenol, Chlorine,
Mercuric Chloride Caustic soda, HCl, Potassium Permanganate