Classification of Medical Parasite

Parasites of medical importance come under the Kingdom called Anemalia

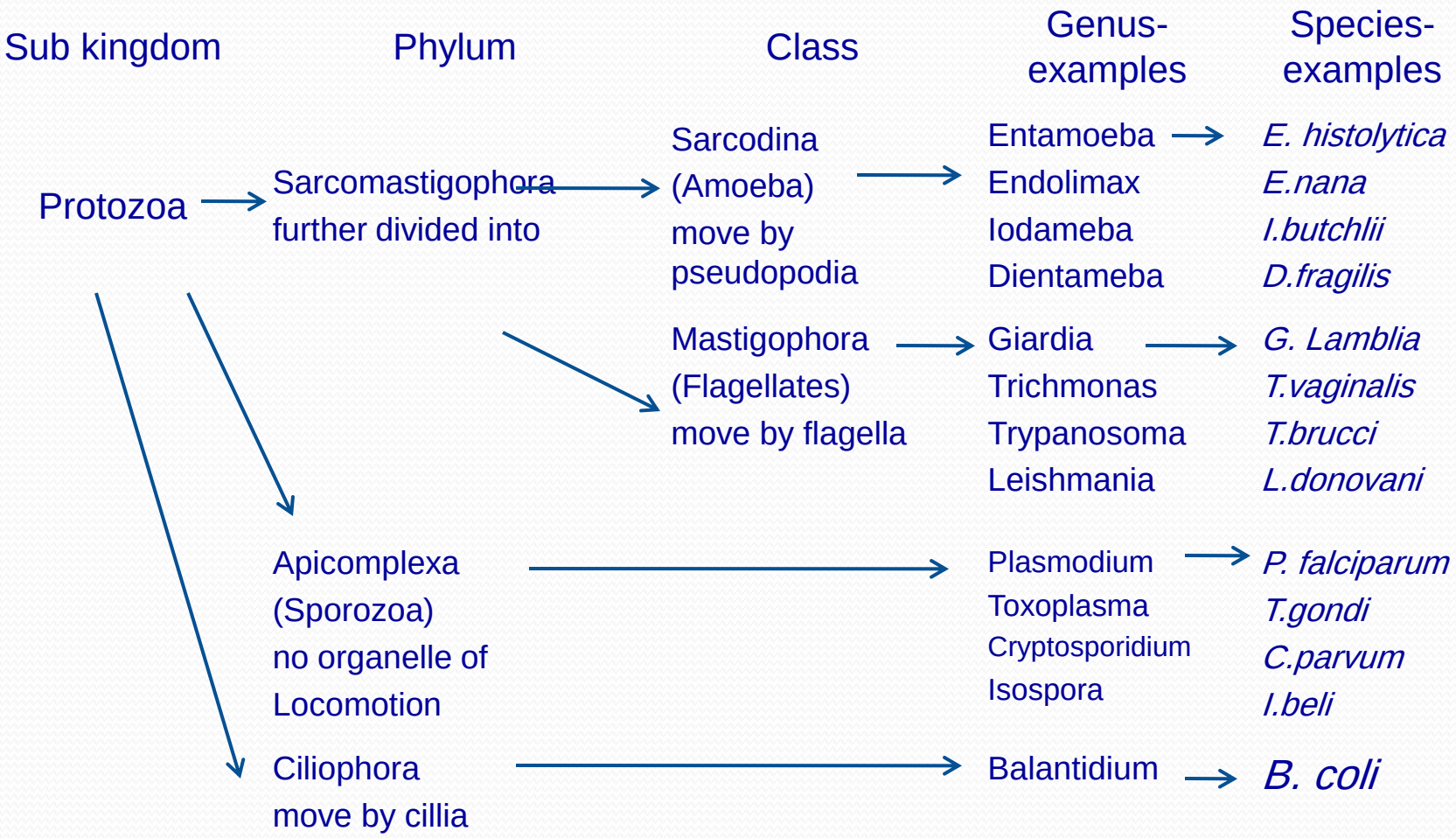
The parasite divide into three main groups

Protozoa
arasite consist of a single cell organism which is morphologically and functionally complete and can perform all function of life ,reproduction by asexual or sexual

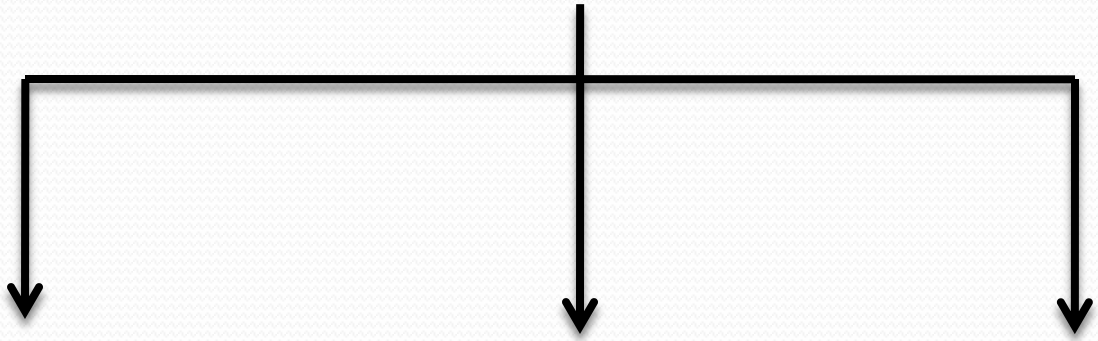
Metazoa
Parasite consist of multicellular cells, Bilaterally symmetrical, having well-differentiated tissues and complex organ

Arthropoda
(Medical Entomology) include
Insecta (Butter fly)
Arachnida (Mite)
Crustacea (Cyclops)

Taxonomic classification of Protozoa



They are three groups of Amoeba



Pathogenic :-
Entamoeba histolytica

Nonpathogenic ;-
Entamoeba coli
E.gingivalis
Endolimax nana
Iodameba butschili
Dientameba fragilis

Free Living
Neagleria fowleria

Pathogenic Amoeba

Entamoeba histolytica

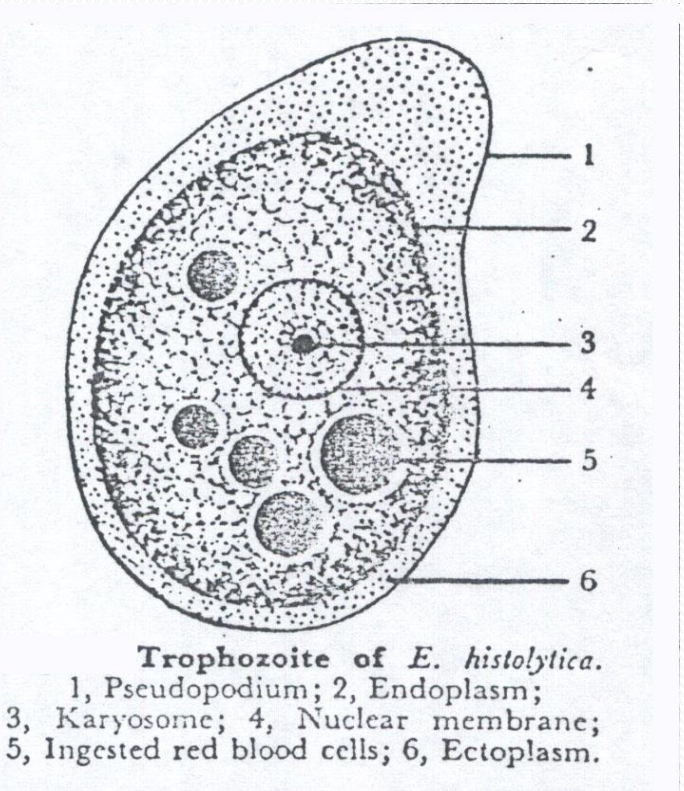
Disease : Amebiasis or amebiosis (amebic dysentery, amebic hepatitis)

Amoeba: unicellular microorganisms with simple life cycle which can be divided into two stages

- Trophozoite : known as growing, actively motile feeding stage
- Cyst : quiescent, resistance ,infective stage
- The reproduction is through binary fission
- Motility by pseudopodia .

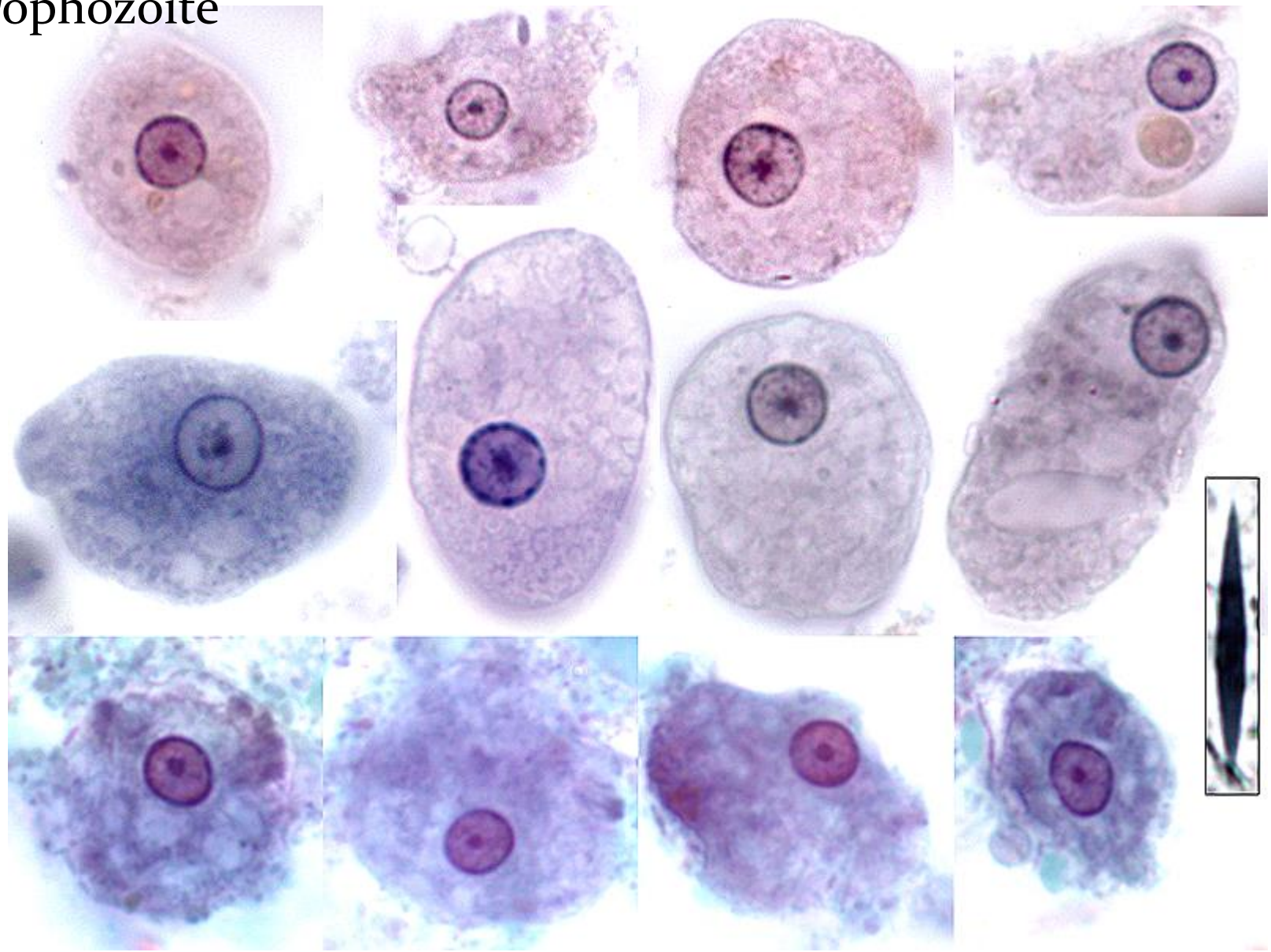
Trophozoite :-

Vary in size from 12 – 60 µm in diameter, Active movement and directional through pseudopodia (finger shape), has single nucleus with centric karyosome and chromatin arranged peripheral on the nuclear membrane, cytoplasm in clearly defined in two ectoplasm and endoplasm in case of dysentery food vacuoles contain RBCs



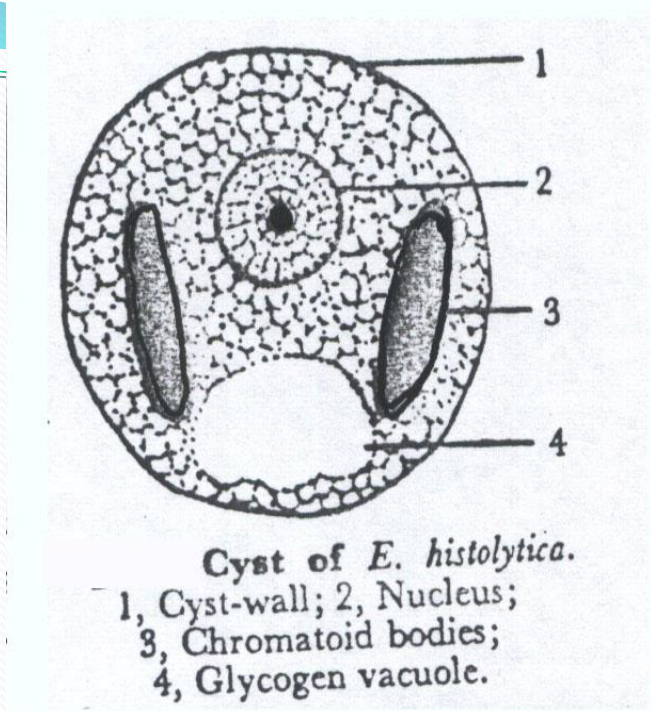
Trophozoite of *E. histolytica*.
1, Pseudopodium; 2, Endoplasm; 3, Karyosome; 4, Nuclear membrane; 5, Ingested red blood cells; 6, Ectoplasm.

Trophozoite

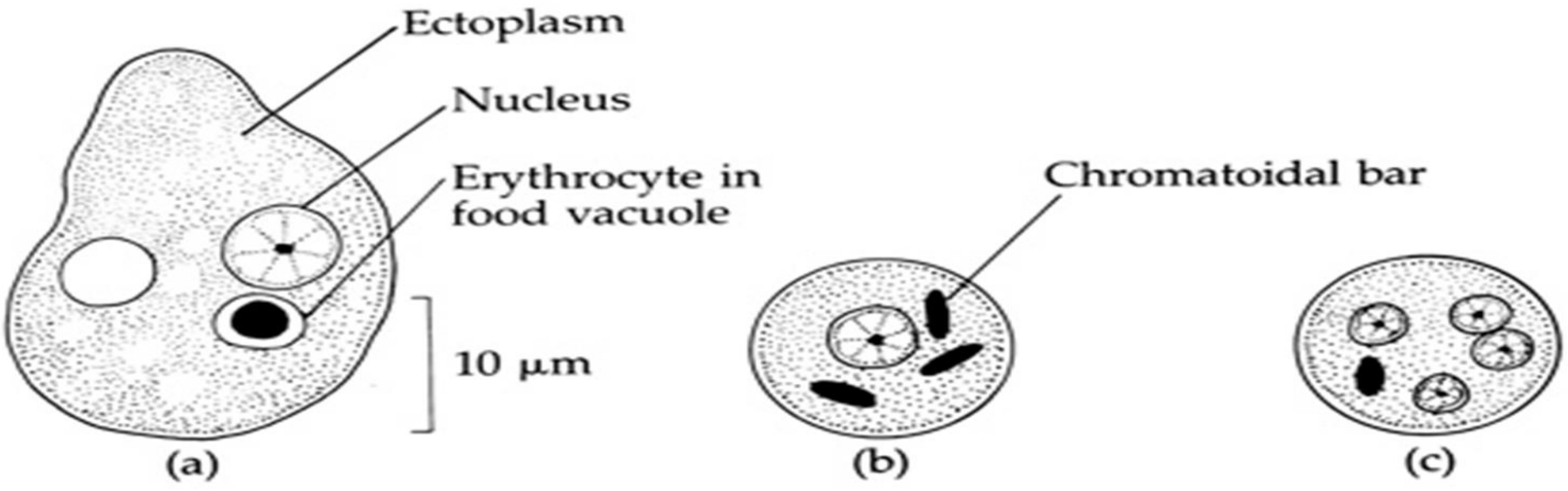


Cyst : (infective stage)

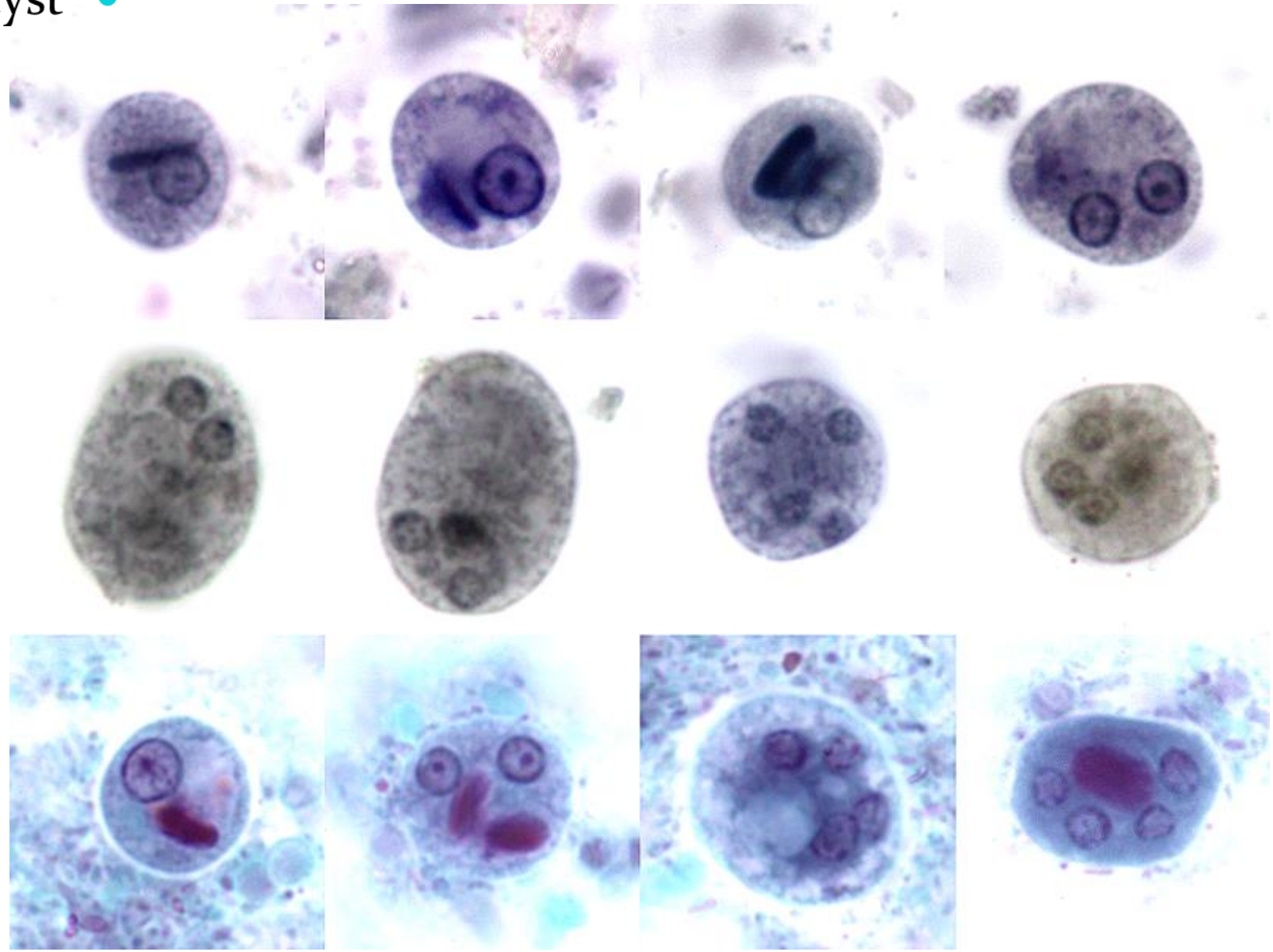
Are spherical or oval in shape ,size from 10 -20 µm ,the cytoplasm contain chromatoidal bodies and 1 to 4 nuclei with small central karyosome ,chromatoidal may be absent in the mature cyst.



Cyst of *E. histolytica*.
1, Cyst-wall; 2, Nucleus;
3, Chromatoid bodies;
4, Glycogen vacuole.

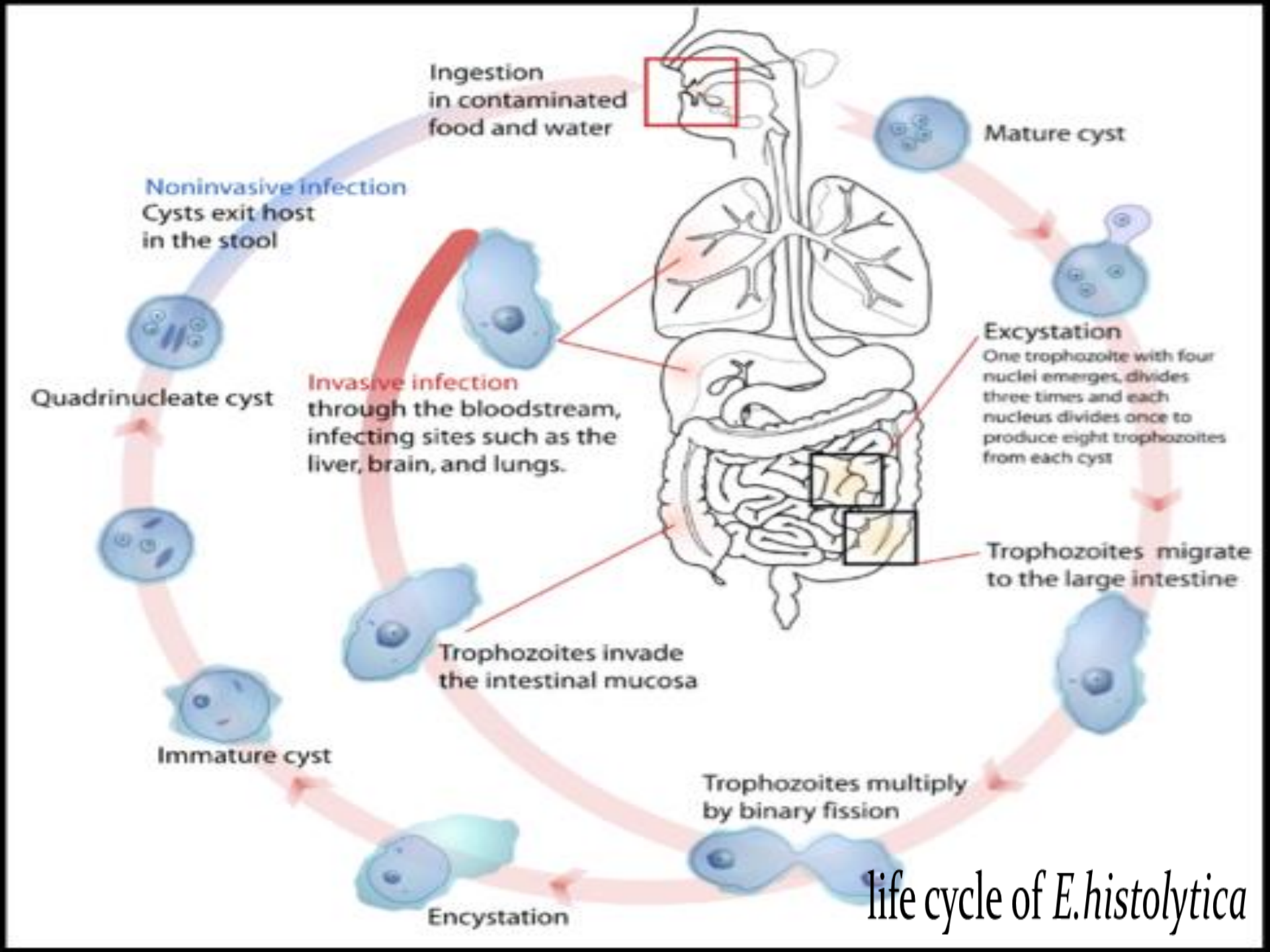


Cyst

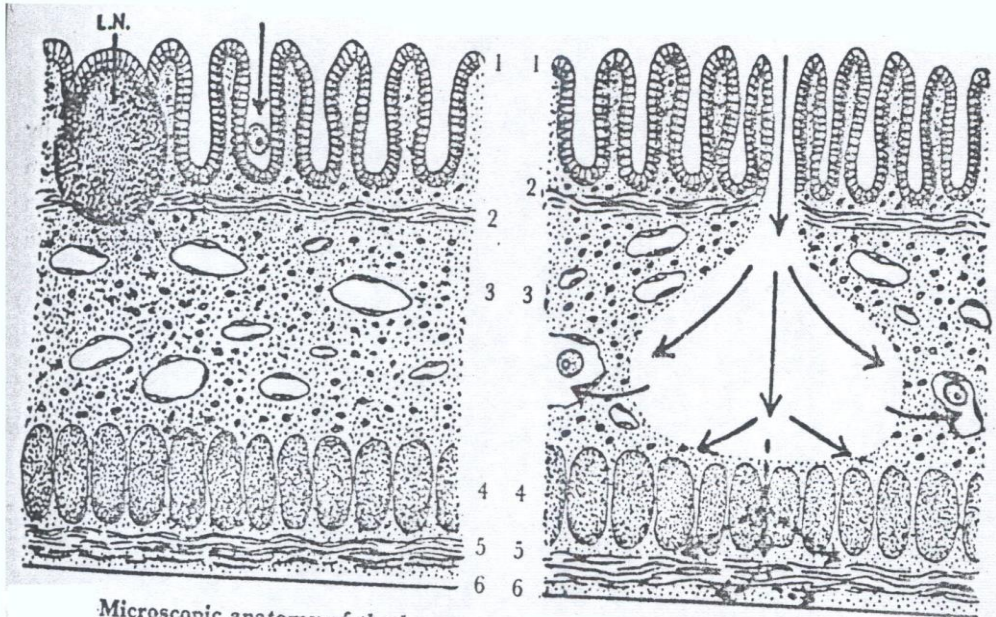


Life cycle of *E. histolytica*

Infection by *E. histolytica* occurs by ingestion of cyst in fecally contaminated food, water or hands, the cyst resistance to the gastric environment and passes to stomach and excysts in the caecum. where it excystation Trophozoite are released which migrate to large intestine, the troph. Multiply by binary fission giving rise to 8 daughter troph. and produce cyst (Mature or immature) which are passed in feces, (trophozoite can be passed in diarrheal stool, but rapidly destroyed outside the body, the troph. remain confined to the intestinal lumen , in some individuals troph. non invade the intestinal who are thus asymptomatic carriers but in other patient troph. Invade the intestinal submucosa causes intestinal disease (lesion, Ulcer, Flaske shape) or Invasion of blood vessels leads to secondary extra intestinal lesions. May be invade liver, lung and brain. the cyst can survive days to weeks in the external environment and are responsible for transmission.



life cycle of *E.histolytica*

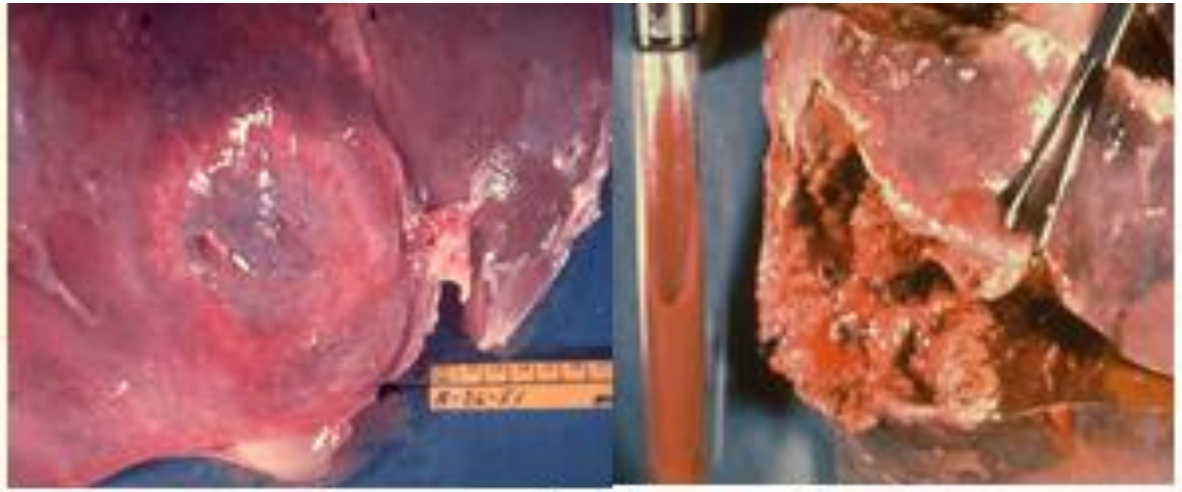


Microscopic anatomy of the large intestine.
1, crypts of Lieberkühn; 2, muscularis mucosae; 3, submucosa; 4, circular muscles; 5, longitudinal muscles; 6, peritoneum.
L.N., solitary lymph node.

Invasion of *E. histolytica* through the intestinal wall.
Flask-shaped clear area represents the process of tissue necrosis. Continuous lines indicate the usual progress and dotted lines, the occasional approach.

Amoebic ulcer

Fig 24 method of collection liver fluid to detected trophozoite of E. histolytica



hepatic amoebiasis with abscess the liver tissue damaged and liquefied (from dead patient)

Laboratory diagnosis:

- Macroscobopic exam of fresh stool and observed mucous and red blood cells
- Microscopic by general stool examination for cyst or trophozoite stage.
- Concentration technique (flotation)
- Culture: polyexinic and monoxenic media
- Used scanning procedure for liver and other organs.
- Biopsy and necropsy materials
- Aspiration from abscess
- Specific serological test with stool examination

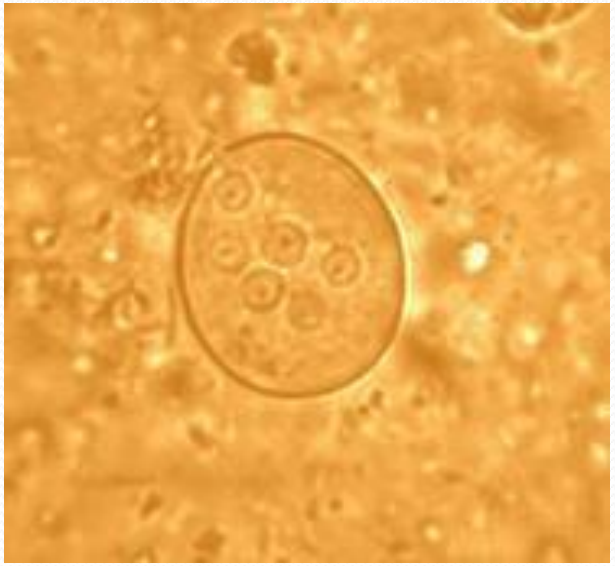
Non pathogenic Amoeba

E. coli Nonpathogenic, found in large intestine human, **Note** : as *E. coli* is more commonly found in the dysenteric stool, the morphological differences from the pathogenic species *E. histolytica* is shown in the table below

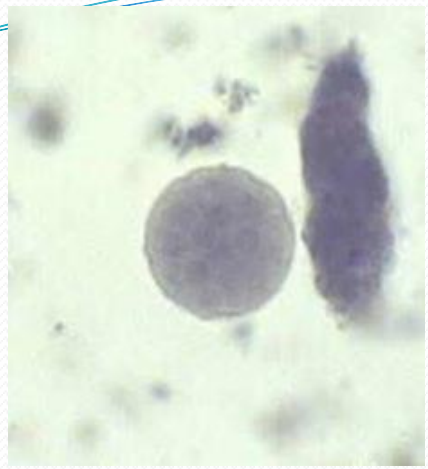
	Entamoeba histolytica	*Entamoeba coli*
Trophozoite.		
Size :	12 to 60µm.	15 to 50 µm.
Motility :	Very active	Sluggish
pseudopodia	single	multiple
Cytoplasm :	finally granular, Clearly defined into ectoplasm and endoplasm.	Coarsely granular, Not defined;
Cytoplasmic inclusions :	In food vacuoles, Red blood cells, leucocytes and tissue debris but no bacteria	Bacteria and other materials but never red blood cells .
Stained with iodine :		
Nuclear character :	Small and central karyosome; fine chromatin granules line the delicate nuclear membrane .	Large and eccentric karyosome; coarse chromatin granules line the thick nuclear membrane .

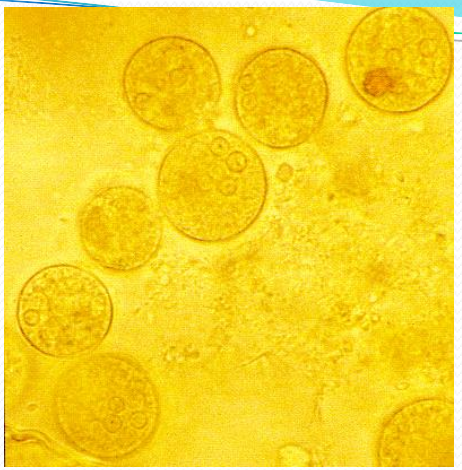
	Entamoeba histolytica	*Entamoeba coli*
cyst : Stained with iodine :		
Size :	10 to 20 µm.	10 to 35 µm.
number of nucleus	4 Or fewer	Up to 8
Glycogen mass :	Visible in uninucleate stage .	Large and visible in the binucleate stage.
Fresh preparation : Chromatoid bodies :	Rounded bars (cigar shaped) .	Filamentous, thread – like with square or pointed ends . (splinter shaped)

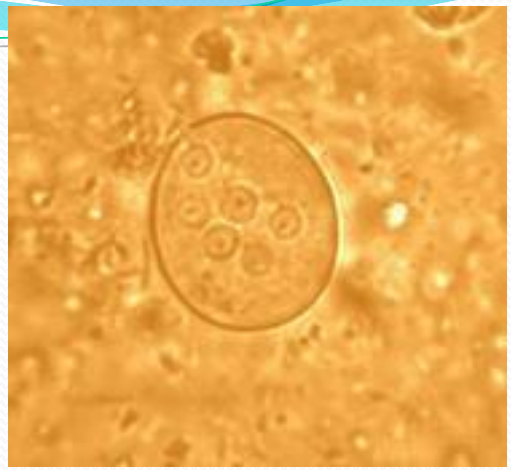
E. histolytica Cyst



E. Coli Cyst



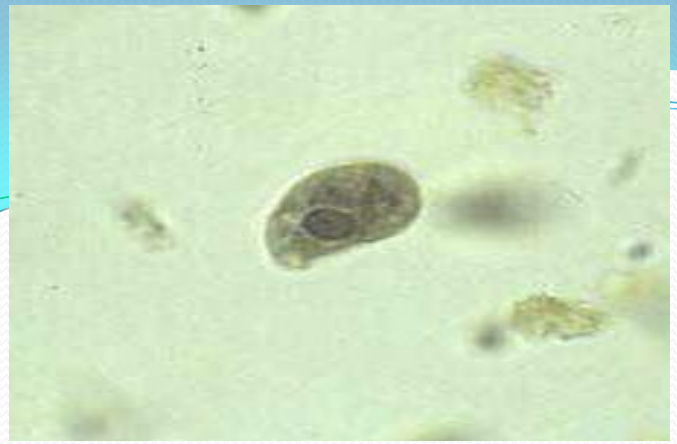


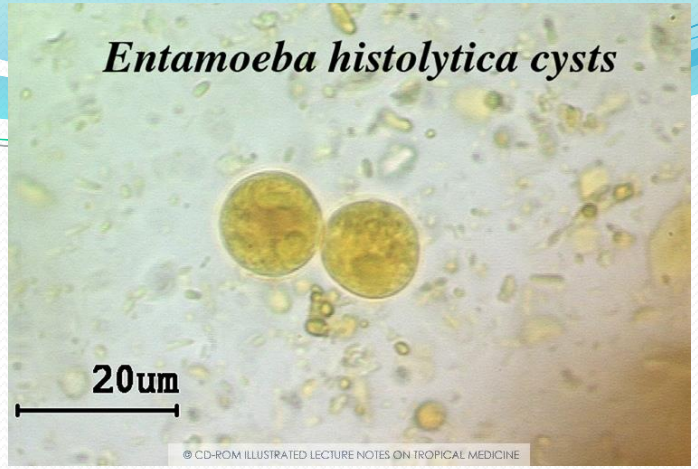


Entamoeba coli Cyst

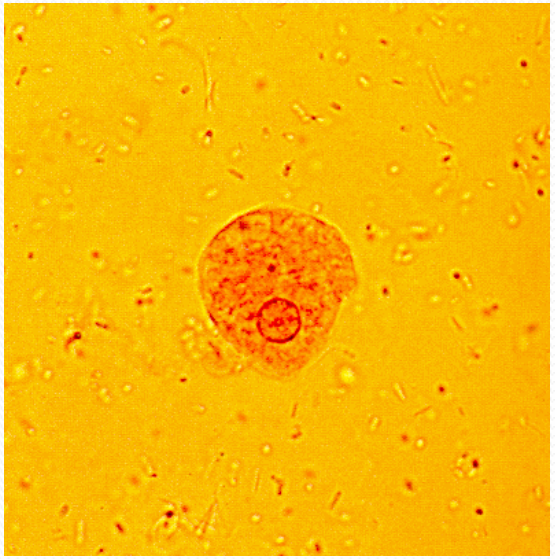
Entamoeba coli Trophozoite

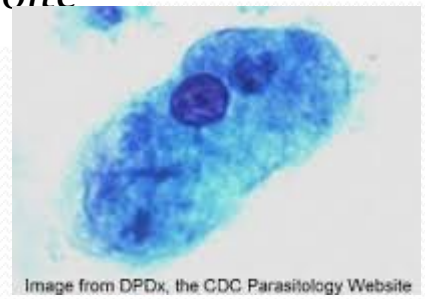
Fig *E. coli* from stool smear

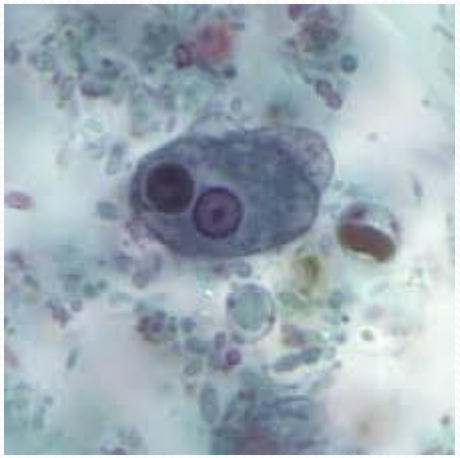




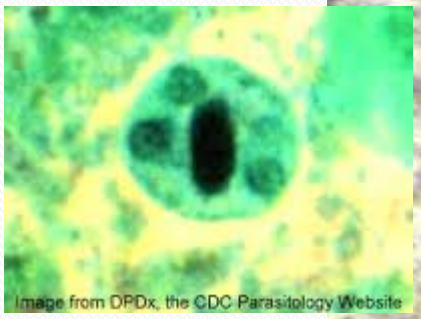
E.histolytica Trophozoite

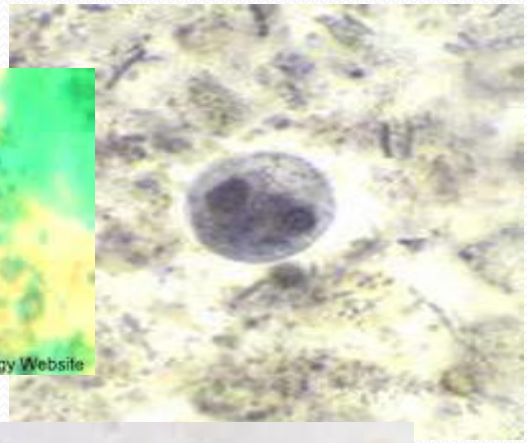






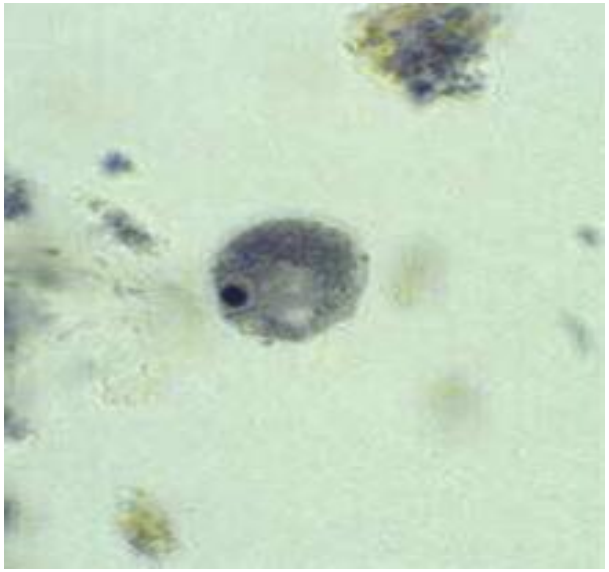
E.histolytica Cyst



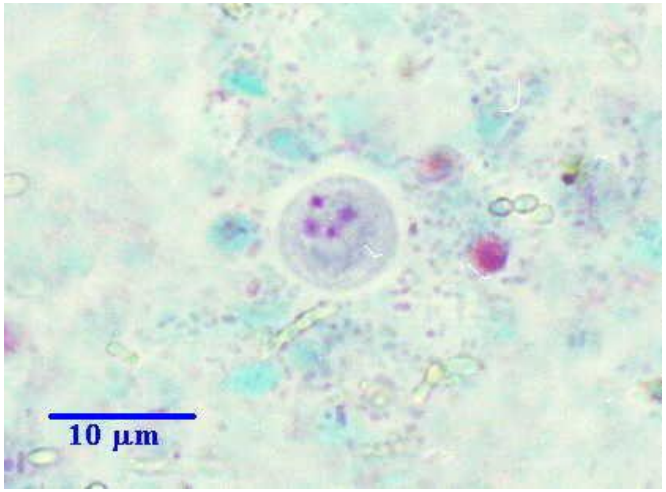


Endolimax nana

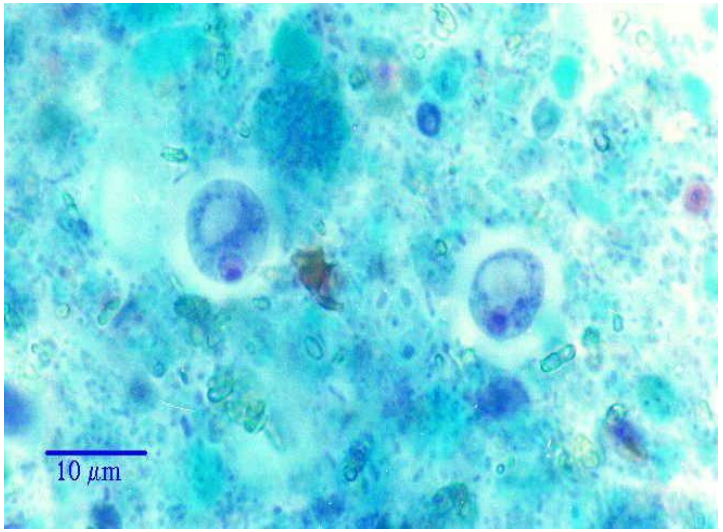
- *live in large intestine smallest amoeba (5 to 12µm)*
- *Life cycle is similar to E.histolytica*
- Trophozoite has large karyosome and no peripheral chromatin
- Feed on bacteria
- It moves sluggishly by short and blunt pseudopodia.



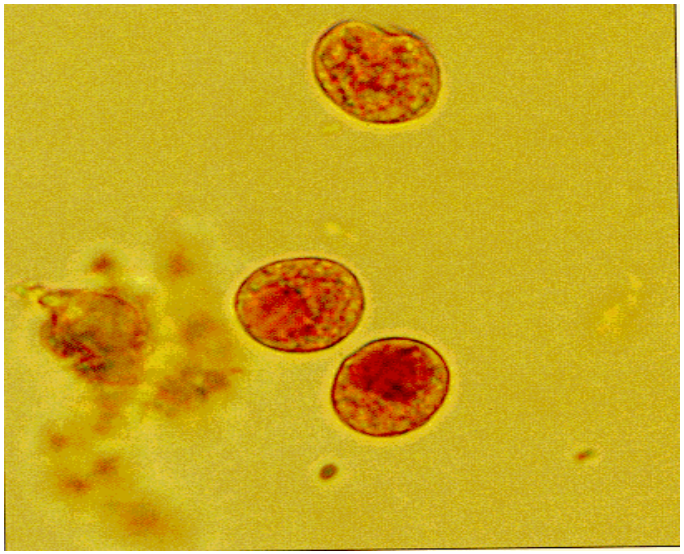
Cyst: is small in size ,oval or spherical in shape contain four nuclei with large karyosome.



Iodomoeba butschilii



The natural habitat is the lumen of the large intestine.
trophozoite (4 to 20µm)
contain nucleus with large karyosome, which is separated from nuclear m. by amass of chromatine granules,
-feeding on bacteria
-It moves sluggishly by short and blunt pseudopodia.



Cyst : (6 to 16µm)
uninuclatyed with large karyosome and spherical with large glycogen

Dientamoeba fragilis

It is extremely resistant to conditions outside

* The size: It measures (6-10) µm.

* It has 2 nuclei with characteristically divided karyosome that are diagnostic.

* Cyst: No cyst stage is known and transmission is by trophozoites.

* A few observers believe that the organism causes a low grade of invasion of the intestinal mucosa with excess mucus production, intestinal hypermotility and loose stools.

E. gingivalis

- mouth amoeba,
- trophozoite: It measures (5 – 35 µm)
- The nucleus is smaller than that of *E. histolytica*, with little irregular or uneven chromatin distribution and large central karyosome.
- It moves actively by blunt pseudopodia,

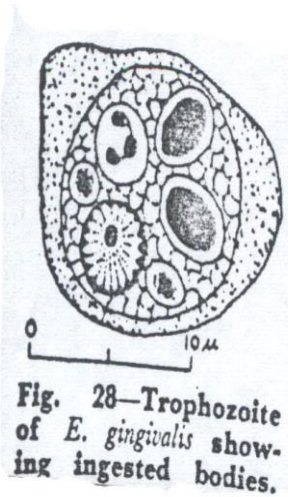


Fig. 28—Trophozoite of *E. gingivalis* showing ingested bodies.