



# **Microbiology**

**Subject :**

**Lec no :** 19

**Done By :** Tabark Aldaboubi

وَقُلْ رَبِّ زِدْنِي عِلْمًا

# Parasitology

By prof. Hala Tabl



*Trichostrongylus axei*



*Trichostrongylus axei*



*Giardia lamblia*



*Entamoeba histolytica*



# Important Terms Used in Parasitology

**Parasite:** An organism entirely dependent on another larger organism

الكائن الاخر

(Host) in order to have shelter and /or nutrition.

يعتمد على كائن حي اخر للحصول على غذائه

**Parasitology:** A science that deals with parasite.

**Medical Parasitology:** The study of parasites of medical importance

that is capable of causing disease in man.

بدرس الParasites التي يتسبب اعراض

# Host Parasite Relationship

العلاقة بين الـ Host and Parasites

**Symbiosis:** a close and prolonged association between two organisms of different species. It may be one of three relationships:



# Parasite

## Permanent parasite

(e.g. head louse)



قمل  
الشعر

بكون ملزقة فيه ما بصير شريكه لو تركه  
بموت

## Temporary parasite

(e.g. bed bugs)



ثقل  
بته  
النراش

العلاقة بتكون مؤقتة

تقسیمہ اخری:

# Parasite

## Ectoparasite

(e.g. head louse)

عیش علی السطح الخارجي

## Endoparasite

(e.g. *Entamoeba histolytica*)

عیش جوال Host با internal organ

# Life cycle

**Host:** That harbours the parasite. *البيستضيف ال parasite*

*human, fish, stool, dog and cat : ال host بالقصة تحت كانوا*

• **Definitive host:** a host which harbours the adult stage, the most highly developed form of the parasite or sexually mature stage of a parasite. *Human*

• **Intermediate host:** a host which harbours sexually immature or larval stage of a parasite.

*snail*

*Fish*



*بالقصة تحت فيه 2intermediat*

• **Reservoir host:** The animal that holds the same species of parasites as man, and constitutes a source of infection to man and ensures continuity of parasite life

*ال parasite ما بتسببها مرض وهي تعتبر ناقل للأمراض للإنسان مسؤولة عن استمرار دورة حياة ال parasite*  
cycle.

• **Habitat:** The tissue or organ in which the adult stage of parasite exists in the definitive host. ← <sup>بال</sup> هو العضو الذي يتعيش فيه parasite

• **Infective Stage:** The stage of parasite that capable of causing infection (entering the host and continue development within it).

هي التي بتدخل وبتسبب مرض Metacercaria

• **Diagnostic Stage:** it is the stage of a parasite that can be detected in stool, blood, urine, sputum, CSF,... and used in diagnosis. <sup>بالقصة تحت هي egg</sup>

Stage of the parasite that exit from the body and found in discharged

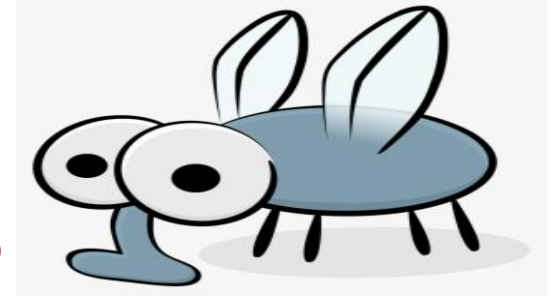


# أهم النماذج



في شخص غلبان ( لأنو عنده دوده ببطنه ) الدودة بتكون adult ممكن تكون male or female عايشة بالكبد بتوكل وبتتكاثر وبتطلع بيض الي رح يطلع عن طريق ال stool هالشخص عنده بعض العادات الخاطئة ( بعمل defecation بماء التربة يكون ال stool فيه البيض بتروح تدور ع snail قوقعة بتضل فيها لحد ما تفقس ويطلع منها parasite صغار بتيجي سمكه وبتوكلهم وينمو جواتها metacercaria بييجي كلب او بسة مثلا يوكلوا هاي السمكه بتتحرر منها ال metacercaria وبروحوا ع الكبد وبتكبر ولترجع تتعاد ال cycle

# Vector



وسيلة انتقال ال parasite من ال infected to non infected دائماً تكون حشرة

Any arthropod which transports a parasite from an infected to non-infected host.

**Biological vectors:** Vectors that are necessary to complete the life cycle of a parasite. بدون هذا ال vector ما بتكمل دورة حياة ال parasite

**Mechanical Vectors:** It is a passive carrier of parasites, not essential in the life cycle. ما الها دور اساسي بدورة حياة parasite

• **Infection:** Invasion of the body by any pathogenic organism

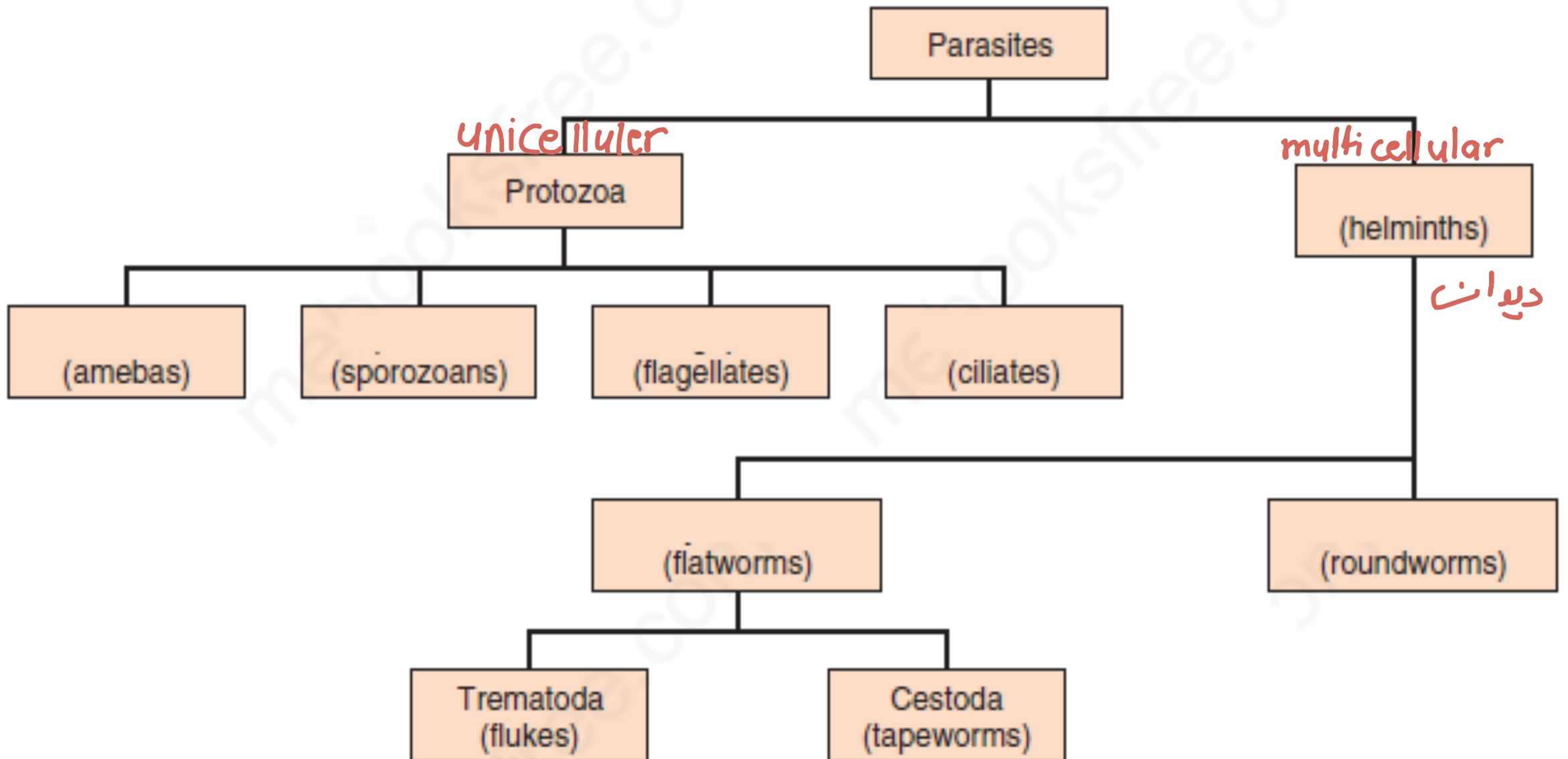
حشرات  
“except” arthropods.

• **Infestation:** The establishment of arthropods upon or within a host.  
infection by arthropods.

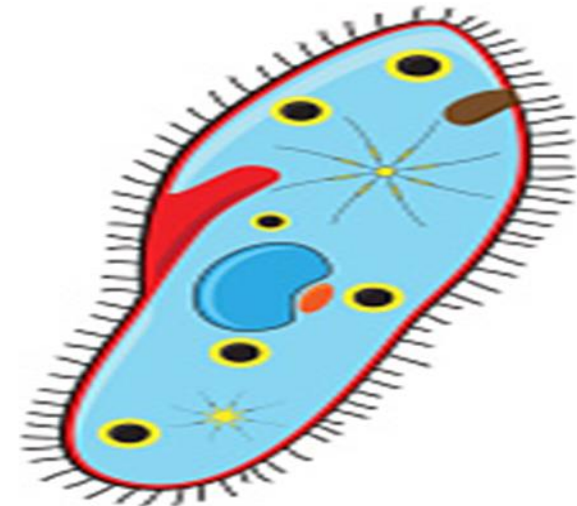
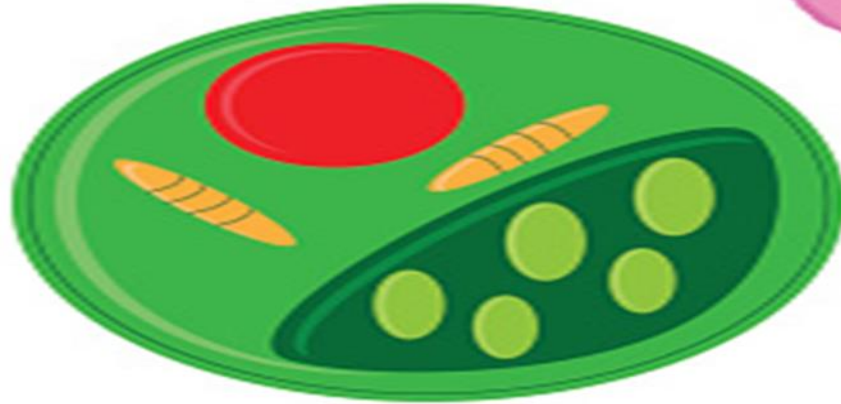
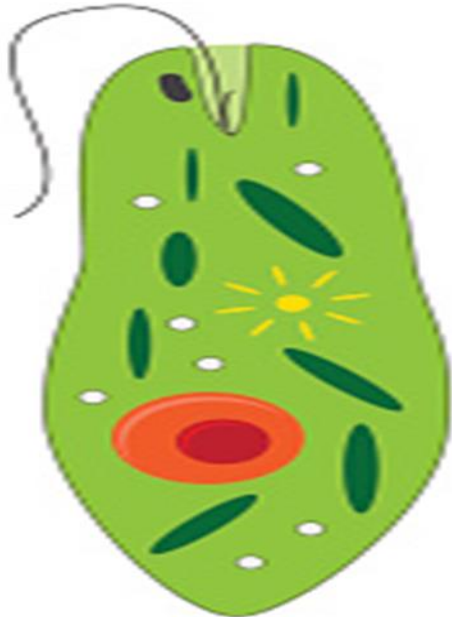
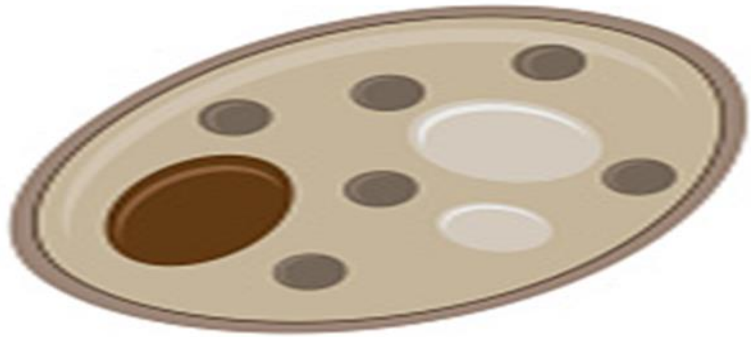
• **Autoinfection:** A situation where the infected individual acts as a source of infection to himself.

• **Zoonosis:** Diseases of animals that are transmittable to man.

# Classification of the medically important parasites

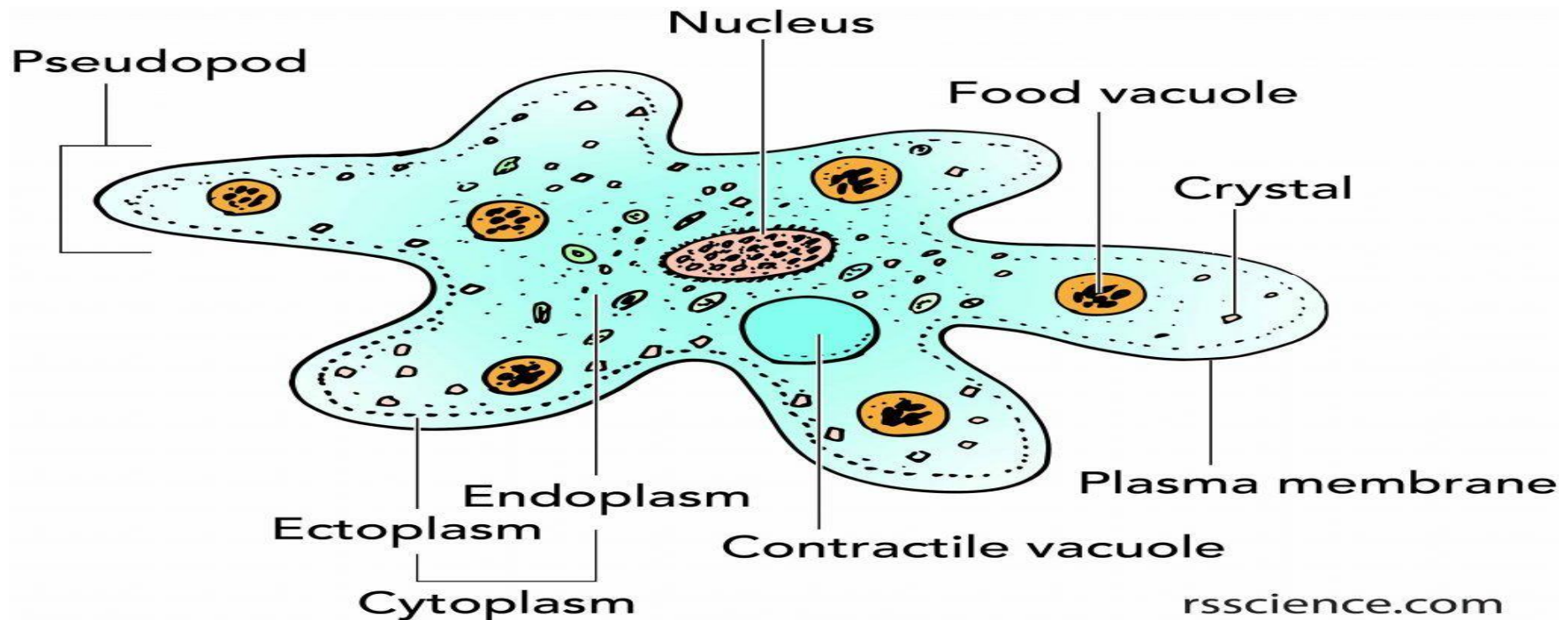


# Protozoa



➤ **Unicellular** organism.

- Eukaryotic cell: - Has true nucleus surrounded with nuclear membrane.  
- Has specialized membranous organelles (e.g. golgi apparatus, endoplasmic reticulum, ...).



# They are categorized according to their method of movements:

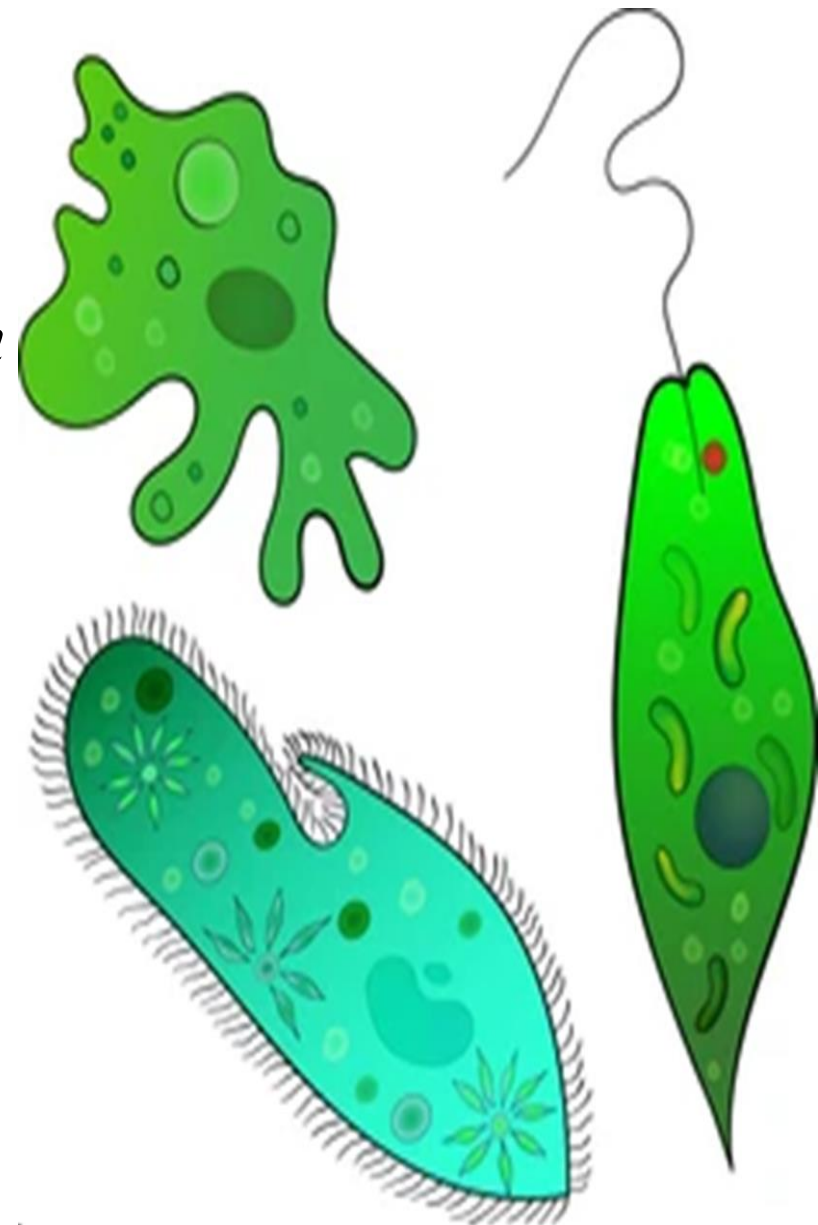
1- **Amoeba:** move by pseudopods e.g. *Entamoeba histolytica*.  
عند طريق الاقدام الكاذبة

2- **Flagellates:** move by flagella e.g. *Giardia lamblia*.  
سوطيات

3- **Ciliates:** move by cilia e.g. *Balantidium coli*.  
هدبيات

4- **Sporozoa:** no organ of locomotion

ما عندها Organ للحركة بس هيلت عندها  
(gliding motility). e.g. Plasmodium, Toxoplasma.  
سبا عندها تنزحلت



# Medically important protozoa

<b>Amoeba:</b> Entamoeba histolytica Free living amoeba: Acanthamoeba, Naeglaria	Gastrointestinal tract  Nervous system
<b>Flagellates:</b> Giardia lamblia Trichomonas vaginalis Hemoflagellates: Leishmania Trypanosoma	Gastrointestinal tract Urogenital tract  Blood, Skin Blood, Nervous system
<b>Ciliates:</b> Balantidium coli	Gastrointestinal tract
<b>Sporozoa:</b> Cryptosporidium Cyclospora Isospora Toxoplasma Plasmodium	Gastrointestinal tract Gastrointestinal tract Gastrointestinal tract Nervous system, tissue Blood



# Amoeba

## A) Intestinal amoeba:

Intestine ال Habitatها تتكون بال

➤ Pathogenic: *Entamoeba histolytica*.

➤ Commensals: *Entamoeba dispar*.  
ما يتغذى مستأكل.

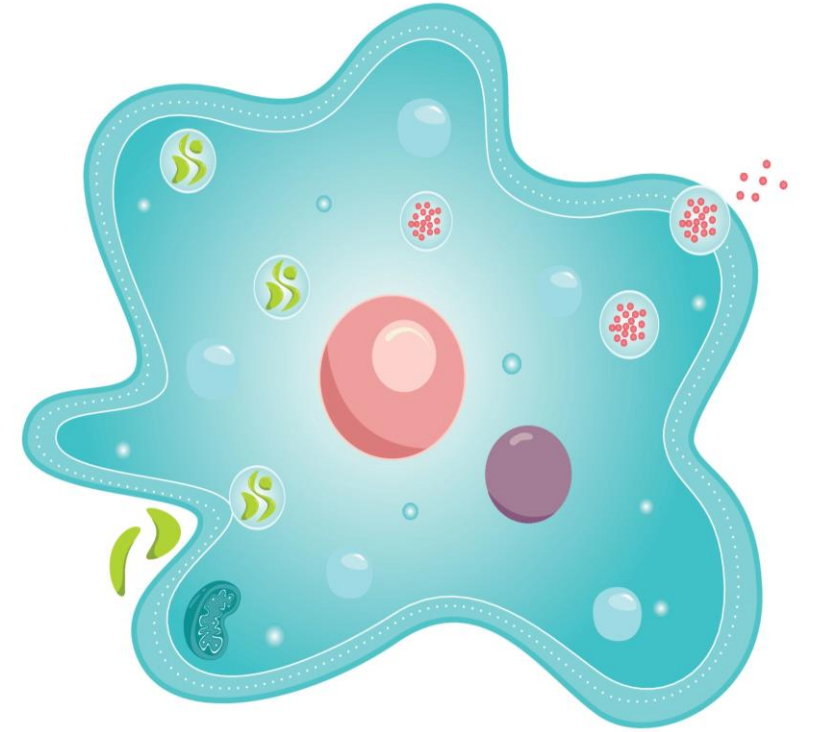
## B) Free living amoeba:

➤ Acanthamoeba, Naeglaria:

استغلالية

They are opportunistic pathogens causing fatal meningo-encephalitis in

immuno-compromised individuals.



# Entamoeba histolytica

## Morphology

### 1) Trophozoite:

هو ال Parasite لقنسة

( الي بوكل وينبو و بييضو الي بتحرك و ببل اعراضه )

- It is the active motile feeding reproducing pathogenic stage.
- Contains: Nucleus and food vacuoles.

### 2) The cyst form:

لما يبيلش يخرج من ال intestine و يروح لا stomach بعرفانا رح يواجها



Cyst

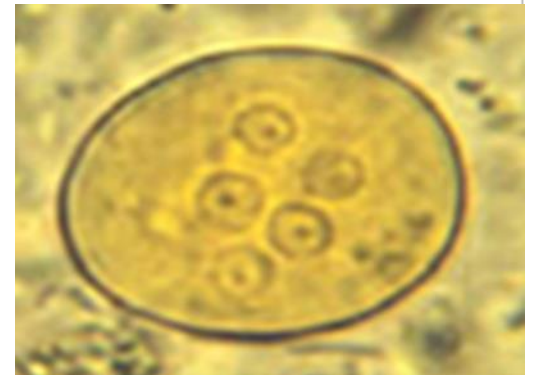
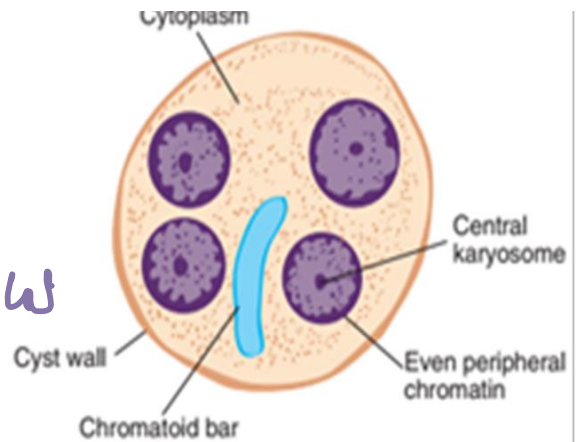
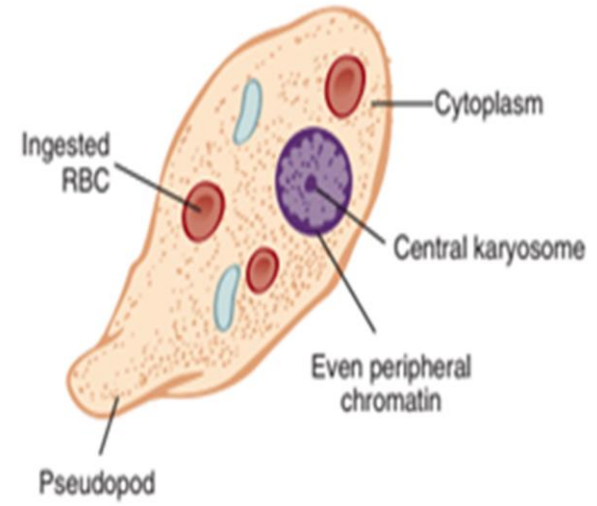
بييئة عنبر فنا سبلة فنبروح يتحول لـ

- Trophozoites usually encyst before leaving the gut.

- Mature cyst is spherical, 4 nucleated cyst (quadrinucleate).

بحوم حاله بجدار سميلت وال nuclei تاغت بتنقسم جوا ال Cyst

فرتين لتنج 4 nucleated



# Life cycle

بنتقل لل human عن طريق الاكل والشرب (يكون فيهم cyst) بتكون حامية حالها بالجدار السميك فمش رح تتأثر بأحماض المعدة وبتعدي لتوصل لل intestine وبعدها بتحرر ك trophozoites الي هو ال parasite نفسه كان عندي 4 nucleated فكل cyst بتعطيني 4 trophozoites بتترك ال small intestine وبتروح لبيتها الاساسي large بتعيش فيه وبتعمل الامراض فيه ، فيه جزء منها رح يخرج مع ال stool

➤ **Definitive host:** Man.  
human

➤ **Habitat:** Large intestine.

But may invade other tissues, reaching the circulation leading to extra-intestinal lesions.

الارتجاع infection

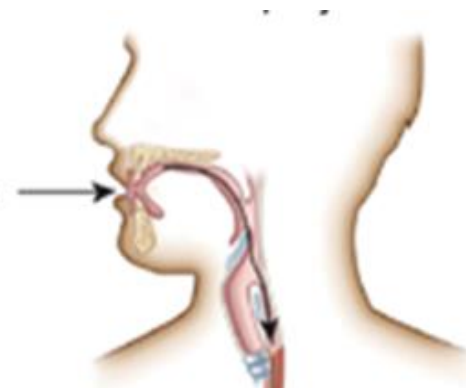
➤ **Infective stage:** Four nucleated cyst.

➤ **Mode of infection:** Ingestion of food or drink contaminated with infective stage.

➤ **Diagnostic stage:** Four nucleated cyst.

الي راحت على ال stool

1 Cysts are eaten



2 Cysts pass through stomach



3 Trophozoites released in small intestine



4 Trophozoites encyst in large intestine

5 Cysts released in feces



# Amoebiasis ← *Entamoeba histolytica* بتسبب مرضاً

القولون (بعض large intestine)

and necrosis

Trophozoites invade colonic mucosa, producing extensive ulceration. They may also invade the portal circulation and carried to the liver or, more rarely, to the lung, brain, or spleen.

## 1) Intestinal amoebiasis:

ما في أعراض

a) Asymptomatic (cyst passers about 75%).

صح فاني أعراض بس ال cycle شغالة جوا وبطلع ال cyst مع ال stool المشكلة هون انه بنقل العدوى للاخرين

b) Acute amoebiasis (Amoebic dysentery): Fever, colic, tenesmus, bloody diarrhea.

وخمن

c) Chronic amoebiasis: There is diarrhea, abdominal cramps, flatulence, anorexia. The diarrhea is alternating with normality or constipation.

بتضل اكم يوم هاي الاعراض وبس

توخذ علاج بخف العلاج ما يكون

كامل ف بعد فترة بترجع الاعراض

2) Extraintestinal: Amoebic hepatic, pulmonary, cerebral and renal abscesses.

Sever Pain

Amoebic liver abscess: right-upper-quadrant pain, fever, and a tender, enlarged liver.

# Flagellates

➤ **Intestinal Flagellates:** *Giardia lamblia*.

➤ **Urogenital Flagellates:** *Trichomonas vaginalis*.

➤ **Hemoflagellates:**

- Leishmania.

- Trypanosoma.



Giardia  
intestinalis



Trichomonas  
vaginalis



Trypanosoma  
gambiense



Leishmania sp.

➤ **Intestinal Flagellates:** <sup>مثال</sup> → *Giardia lamblia*

## Morphology

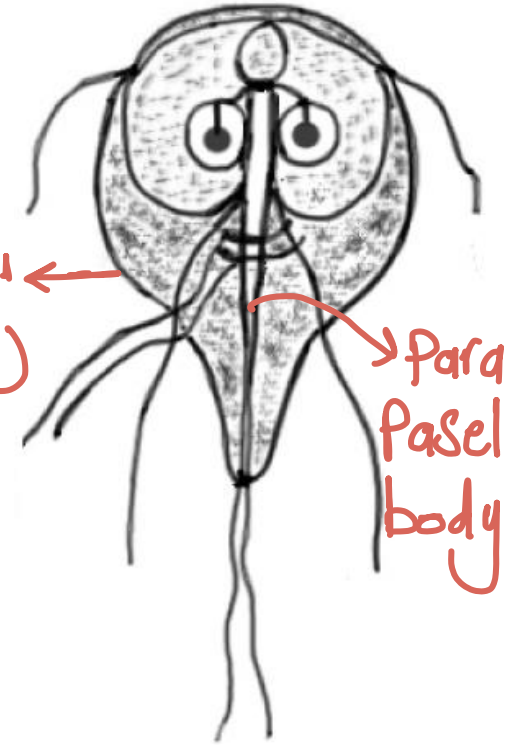
### 1) Trophozoite:

Pear shaped, has two nuclei and central parabasal bodies and four pairs of flagellae giving it the appearance of a face with two eyes, a mouth, hair and chin.

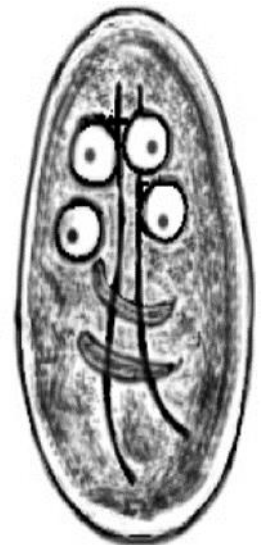
2) **Cyst:** Oval, 4 nucleated, develop in the colon.

لها نفس الي قبل 2 stages

الله شكل عيين (وجاه)  
(زي الكشرك).



Para  
basal  
body

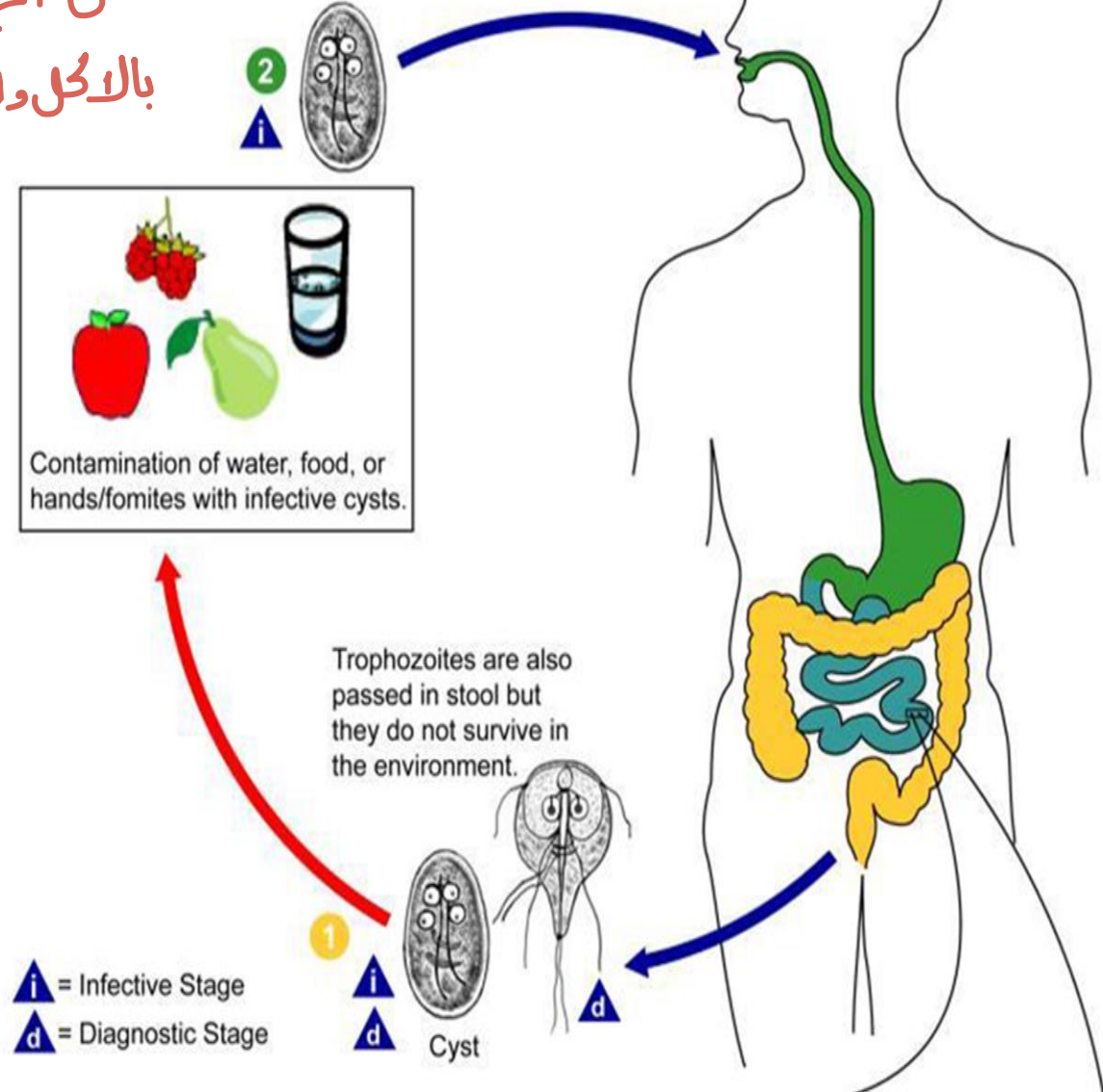


# Life cycle

- **Definitive host:** Man. (*human*)
- **Habitat:** Small intestine.
- **Infective stage:** Four nucleated cyst.
- **Mode of infection:**  
Ingestion of food or drinks contaminated with infective stage.
- **Diagnostic stage:** Four nucleated cyst.

نفس الحي قبل بدتقل  
بالاكل والشرب

## Giardiasis (*Giardia intestinalis*)



# Giardiasis ← *Giardia lamblia* يتجلى مرض

- Trophozoite attaches to the gut wall (not invade the mucosa /bloodstream)  
duodenal mucosa في Superficial inflammation يتجلى
- > inflammation of the duodenal mucosa —> malabsorption of protein and fat.  
and diarrhea
- Most cases are asymptomatic.  
بتصيب الاطفال اكثر
- Symptoms range from mild diarrhea, flatulence, cramp-like abdominal pains  
غازات  
وخض شديد  
to steatorrhea (fatty diarrhea). →  
فاتي blood
- The stool is foul smelling, greasy in appearance and devoid of blood.

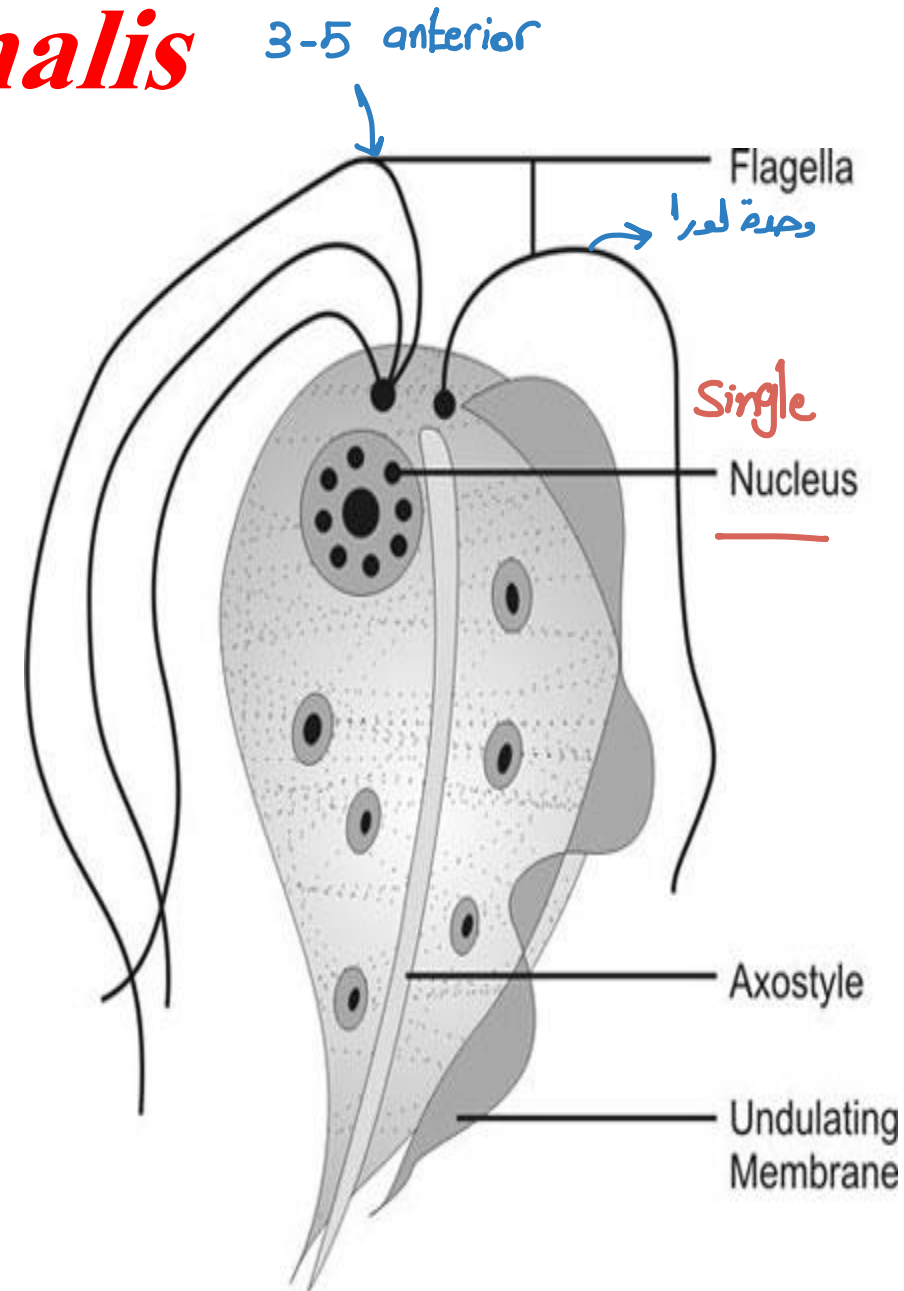
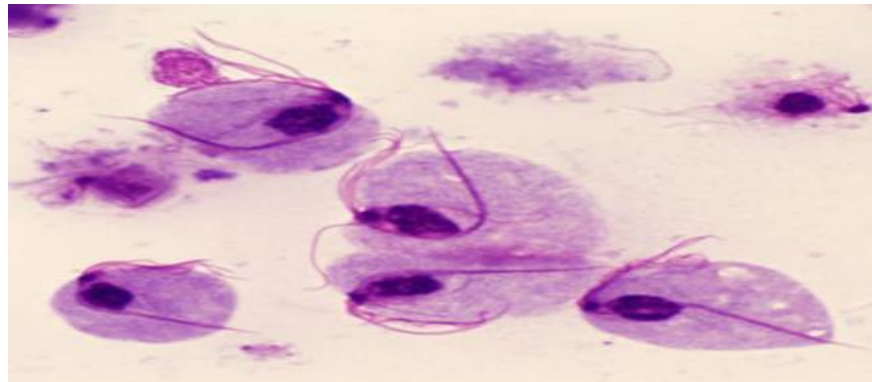


Urogenital Flagellates: <sup>مثلاً</sup> → *Trichomonas vaginalis*

## Morphology

1) Trophozoites <sup>بشكلها</sup> are pear shaped, and have single nucleus, 3-5 anterior flagella, and undulating membrane bordered by flagellum.

2) No cyst stage <sup>مهمته</sup>, so infection occurs by trophozoites.



# Life cycle

-**Definitive host:** Man.

-**Habitat:** Urogenital tract of both women and men.

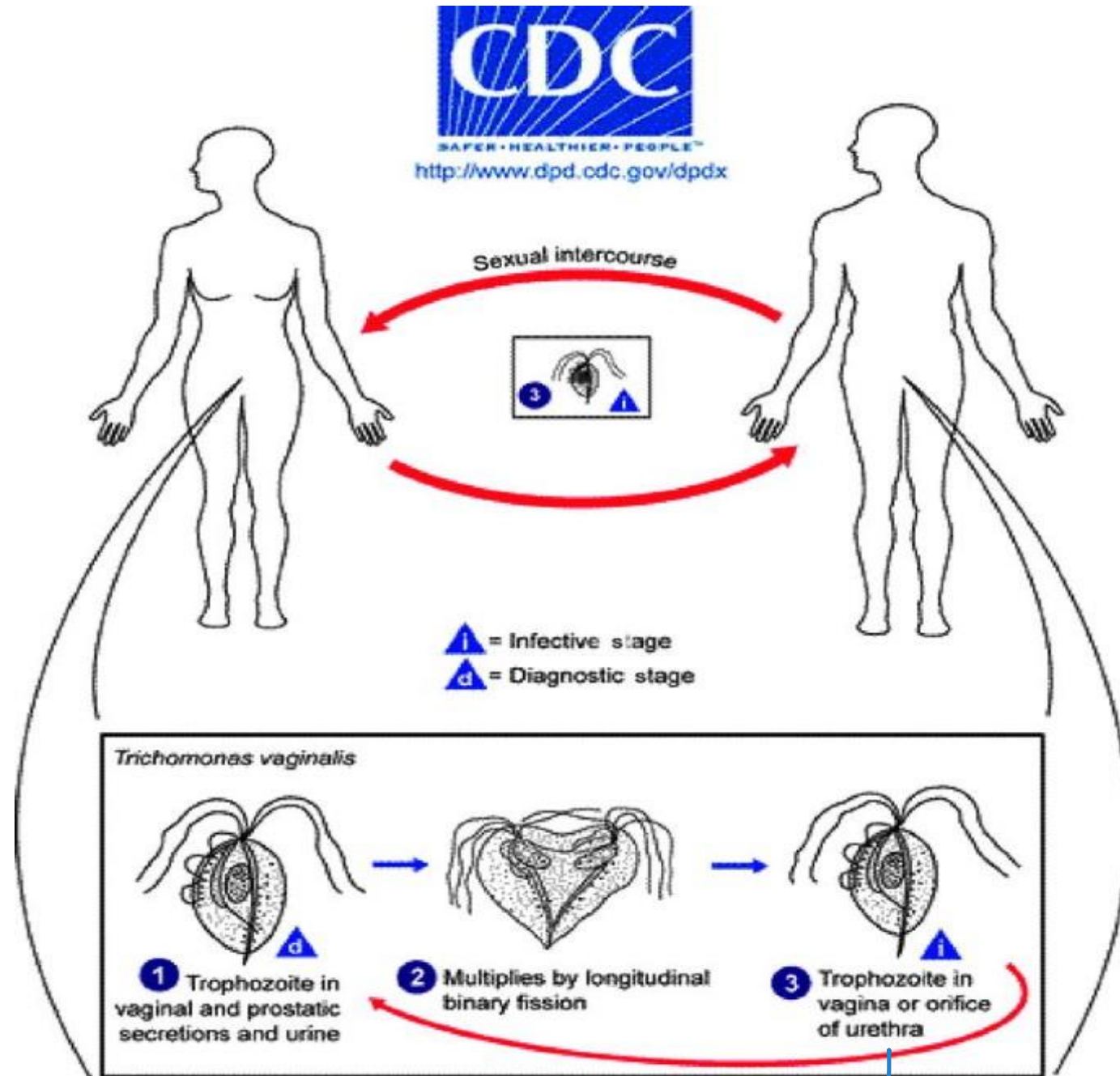
-**Infective stage:** Trophozoite.

-**Mode of infection:**

Sexual intercourse

less common through contaminated toilet seats or towel. ← *indirect*

-**Diagnostic stage:** Trophozoite.



↓ انتقال pathogenesis معین وبتکثیر فجزء منها بخرج بال secretion

# Trichomoniasis

تتبع  
مرض

*Trichomonas vaginalis*

## In women:

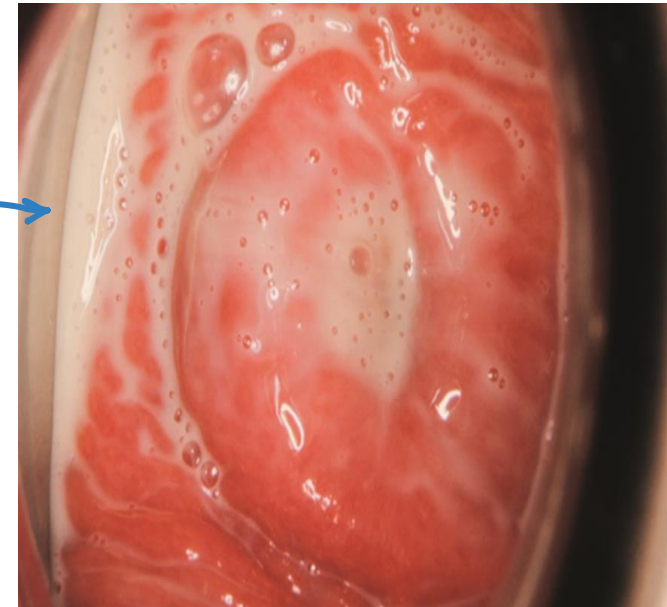
- Vaginitis in 70 % of infected women. *Vagina* التهاب بال  
وجفت الرحم.
- Reddish vaginal mucosa & strawberry cervix. *مخضرها*
- White or yellowish frothy discharge with a fishy smell.
- Vulvar pruritis.
- Dysuria and frequency.



## In man:

- Mostly asymptomatic.
- Sometime it causes urethritis (frequency and dysuria).

Frothy →



الاجابات :

1) C

2) C

3) A



**Regarding amoebiasis, which of the following statements is TRUE?**

- A) The lesion is confined only to the intestine.
- B) The normal habitat of the parasite is the small intestine.
- C) The infection occurs by ingestion of food or drink contaminated with four nucleated cyst.
- D) The infection occurs by penetration of the skin by trophozoite.
- E) Trophozoites is the infective stage.

**A 7-year-old child presented with diarrhea, flatulence and cramp-like abdominal pain. The child's stool appears fatty, greasy and foul smelling. An examination of his stool revealed pear-shaped, motile organisms. Of the following, which one is the most likely cause of this infection?**

A) *Cryptosporidium hominis*

B) *Entamoeba histolytica*.

C) *Giardia lamblia*.

D) *Trichomonas vaginalis*.

E) *Balantidium coli*.

**Which of the following statements concerning *Trichomonas vaginalis* is CORRECT?**

- a) It is transmitted sexually.
- b) It can be diagnosed by visualizing the cyst stage in vaginal discharge.
- c) It causes bloody diarrhea.
- d) It causes vaginal thrush.
- e) It is symptomatic in 70% of males.

Thank  
you





إياك أن تياس  
فكل الصابرين  
قد جبروا



@HNDROZ