

Parasitology I

study of parasite

Dr. Hala Tabl



Trichuris trichiura



Trichuris lumbricoides



Giardia lamblia



Entamoeba histolytica



يَعْتَدُ عَلَى مُخَيَّرِهِ كَمَا أَنَّهُ يُوفِّرُ الْغِذَاءَ وَالْمَسْكَنَ

Parasite: An organism entirely dependent on another larger

صَوَّ الْجَسْمِ إِلَى أَنْ يَدْخُلَ عَلَيْهِ أَوْ
parasite

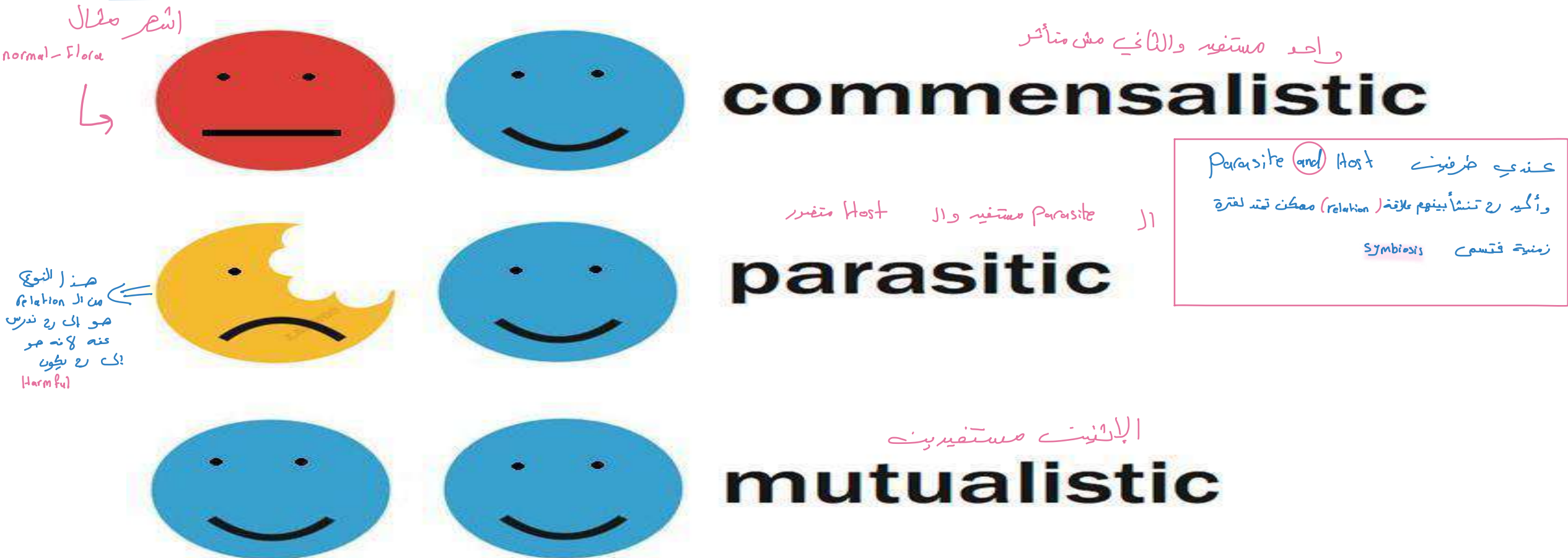
organism (Host) in order to have shelter and /or nutrition.

Parasitology: A science that deals with parasite.

Medical Parasitology: The study of parasites of medical importance that is capable of causing disease in man.

Host Parasite Relationship

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



هون مثال ال classification
ال ممكن (طبقها على ال Parasite

Parasite

Permanent
parasite
(e.g. Protozoa &
Helminths)

Temporary
parasite
(e.g. bed bugs)

العلاقة بين ال Host و ال Parasite
مش دائمة (مؤقتة) وأشهر مثال عليها ال
البقة - bed bug يكون موجود بالفراش خلال النهار
وخلال الليل يطلع عشان يدير على غنائه فيجمل suction
ال blood ويسبب حكة ناتجة
عن قرصة ال Host فإذا هو داخل ملزقة
بال Host لانه اليمع له يرجع مكانة

أشهر مثال عليها ال head louse - قمل الشعر
بغل موجود بفقر المريفية ومستحيل يروح
لحاله

Parasite

```
graph TD; Parasite --> Ectoparasite; Parasite --> Endoparasite;
```

Ectoparasite

(e.g. head louse)

او انہ یغیش کلی الا surface
لا Host زب القمل

Endoparasite

(e.g. Protozoa & Helminths)

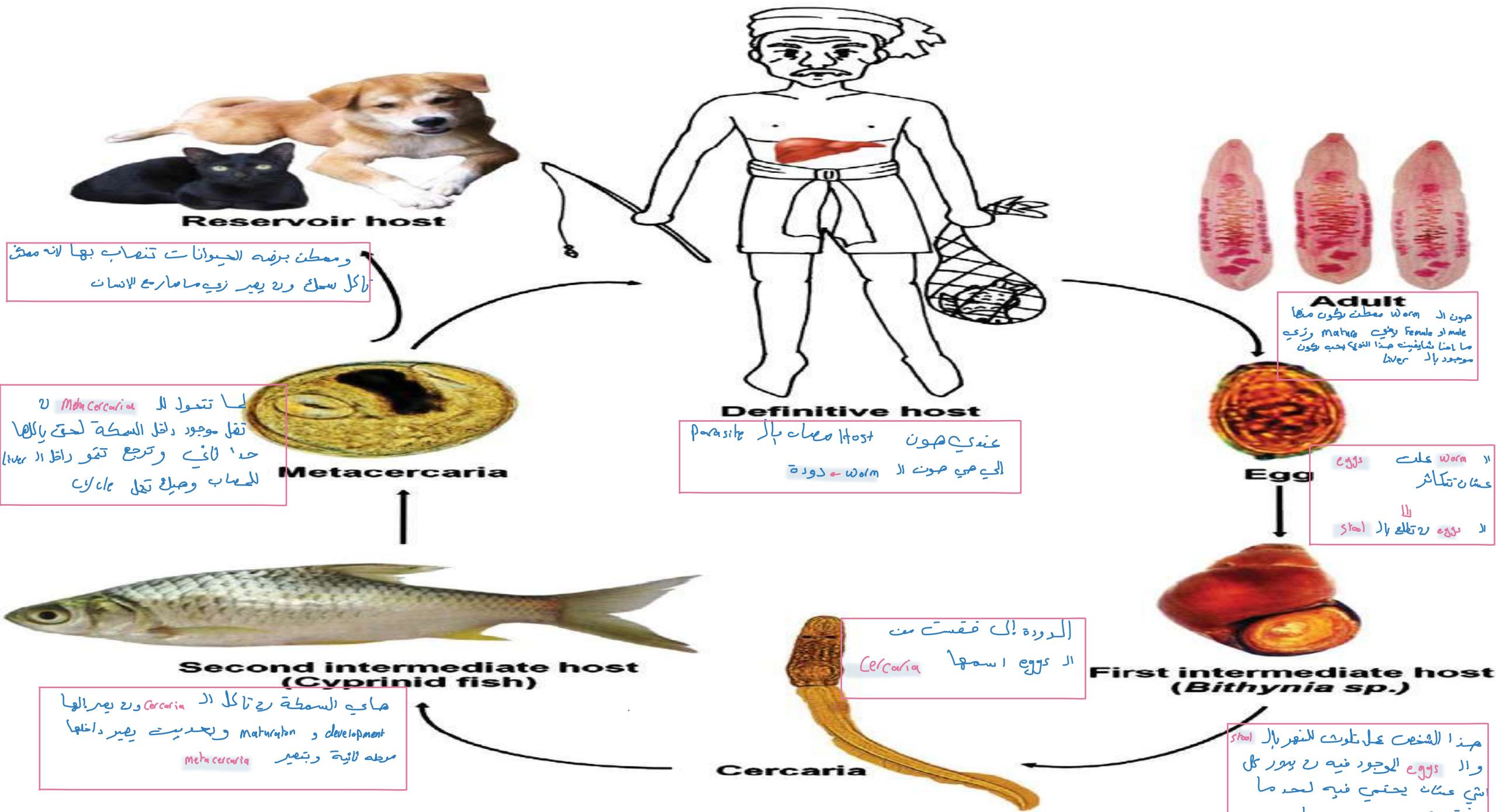
انہ در Parasite یغیش داخل
جسم ال Host یغی بال tissue of internal organ

Life cycle

Host: That harbours the parasite.

- **Definitive host:** a host which harbours the adult stage, the most highly developed form of the parasite or sexually mature stage of a parasite.
- **Intermediate host:** a host which harbours sexually immature or larval stage of a parasite.
- **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 cycle.

- **Habitat:** The tissue or organ in which the adult stage of parasite exists in the definitive host.
- **Infective Stage:** The stage of parasite that capable of causing infection (entering the host and continue development within it).
- **Diagnostic Stage:** it is the stage of a parasite that can be detected in stool, blood, urine, sputum, CSF,... and used in diagnosis.



مثل ال adult
للدمامات الadult
داخل الجسم من
اجته مت مرة

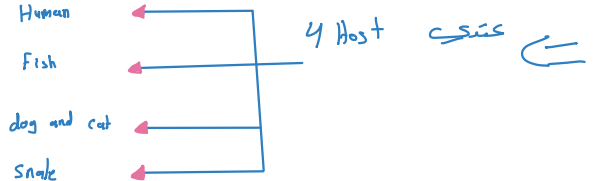
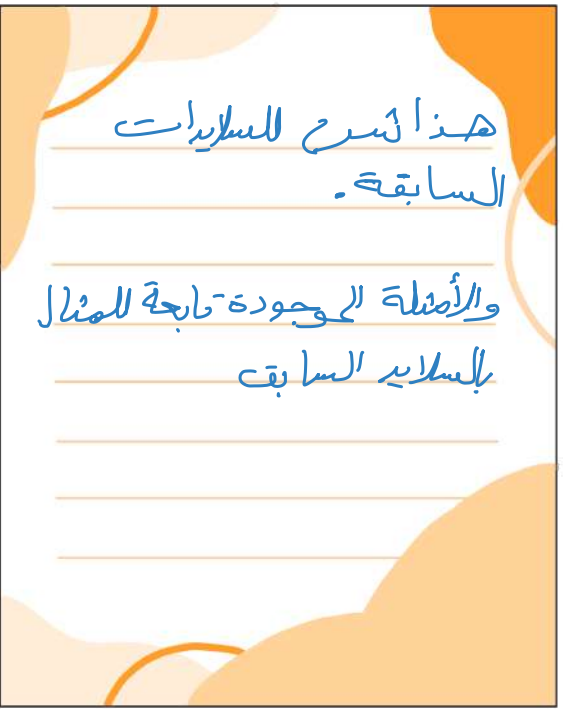
infective stage
metacercaria

فيه stage و تحت وقت infection
ال definitive Host تم infective stage

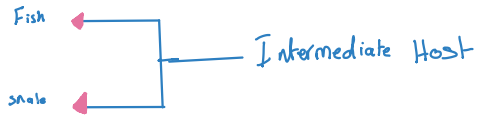
eggs
و آليها بال stool

Diagnostic stage

فيه stage لا اعل diagnosis ال parasite
من خلال ال stool مثلاً او ال urine الخ
و آليها فيه واسم ال Diagnostic stage



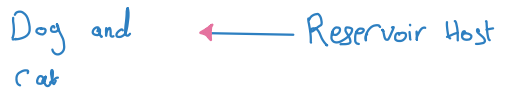
Host يستضيف ال parasite
مرحلة من مرحلة



ال Host الي و يستضيف ال parasite في
sexually immature ال
مجان يقتصر فيه ال parasite



ال Host ال يستضيف ال parasite
adult stag ال
يكون ال parasite فيه
مفطور و شغال 100%



ال parasite بحاجة انه يقبل موجود على طول
لانه ممكن امالح كل الناس منه و يلقا و يستفيد بس هو
و يقبل موجود داخل Host معطى ينقل العدوى للبشر و هذا
ال Host اسمه Reservoir host



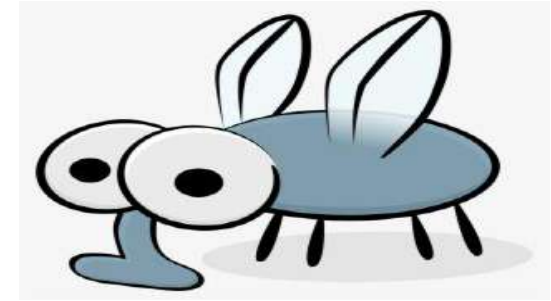
ال parasite لما يدخل على ال definitive host و يروح على
organ معين و يكون كل شغله فيه فنسمية
Habitat



وسيلة نقل ينتقل فيها الـ parasite من الـ infective host لا

non-infective host ودائماً تكون حشرة بعوضه الخيرة

Vector



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

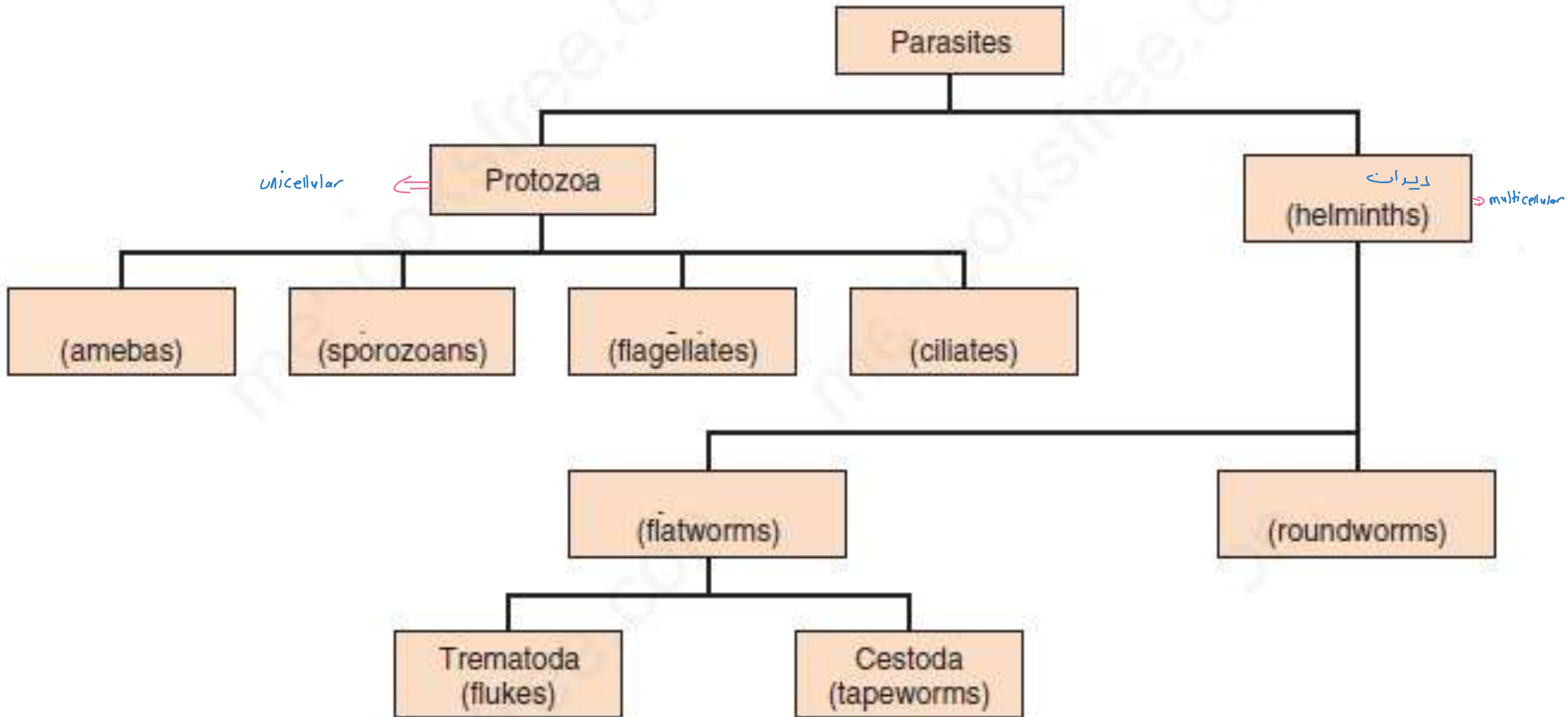
Biological vectors: Vectors that are necessary to complete the life cycle of a parasite.

يمثل جزء أساسي بحياة الـ parasite ولومش موجود الـ cycle رح توقف
كال طول

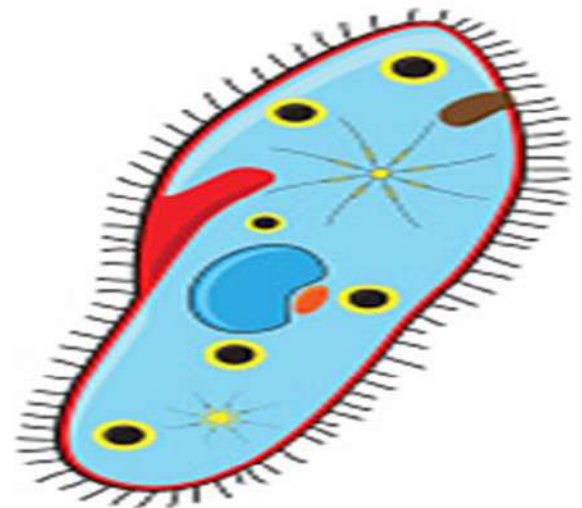
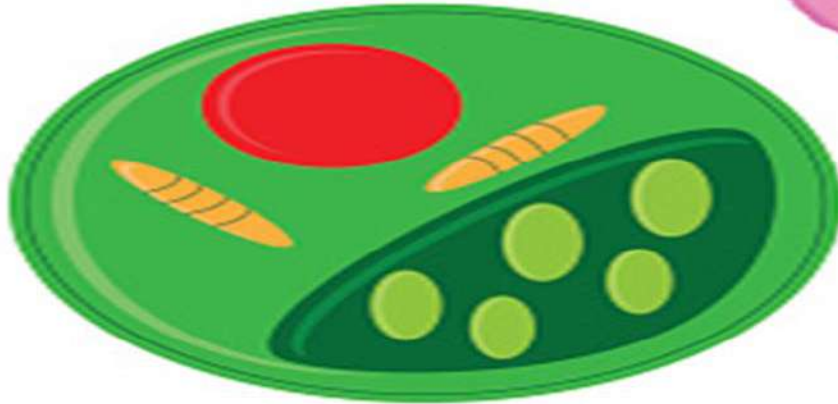
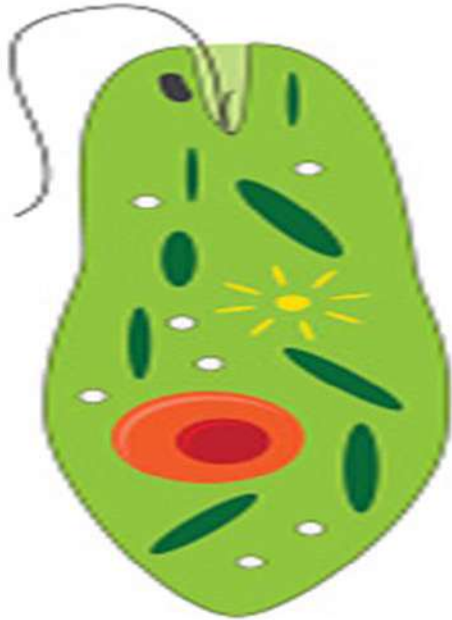
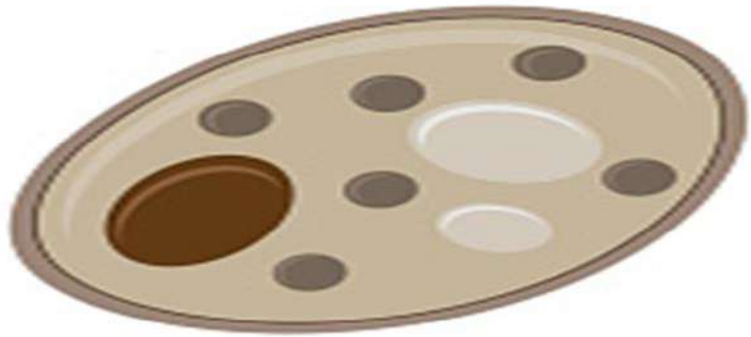
Mechanical Vectors: It is a passive carrier of parasites, not essential in the life cycle.

حشرة تنقل الـ parasite فقط . ما لها دور الـ life-cycle الـ parasite

Classification of the medically important parasites

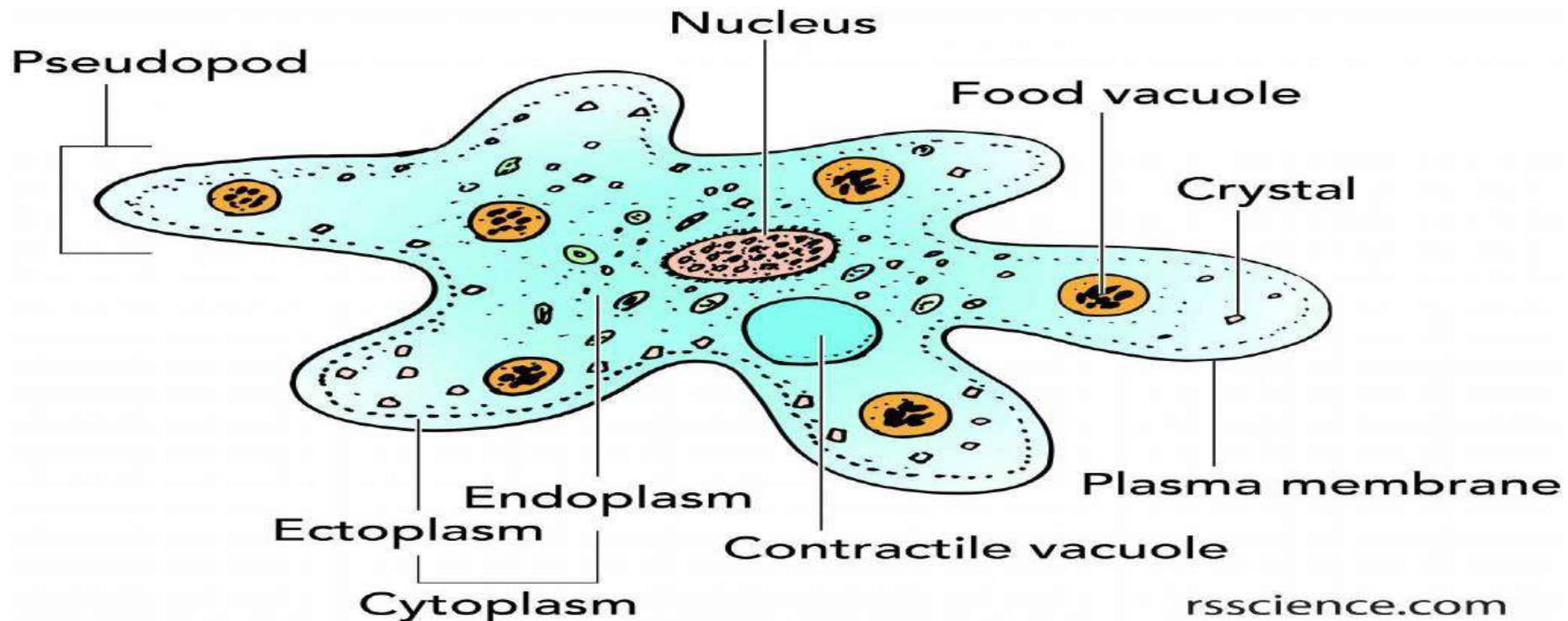


Protozoa



➤ **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*.

تتحرك من طريق الأقدام الكاذبة

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

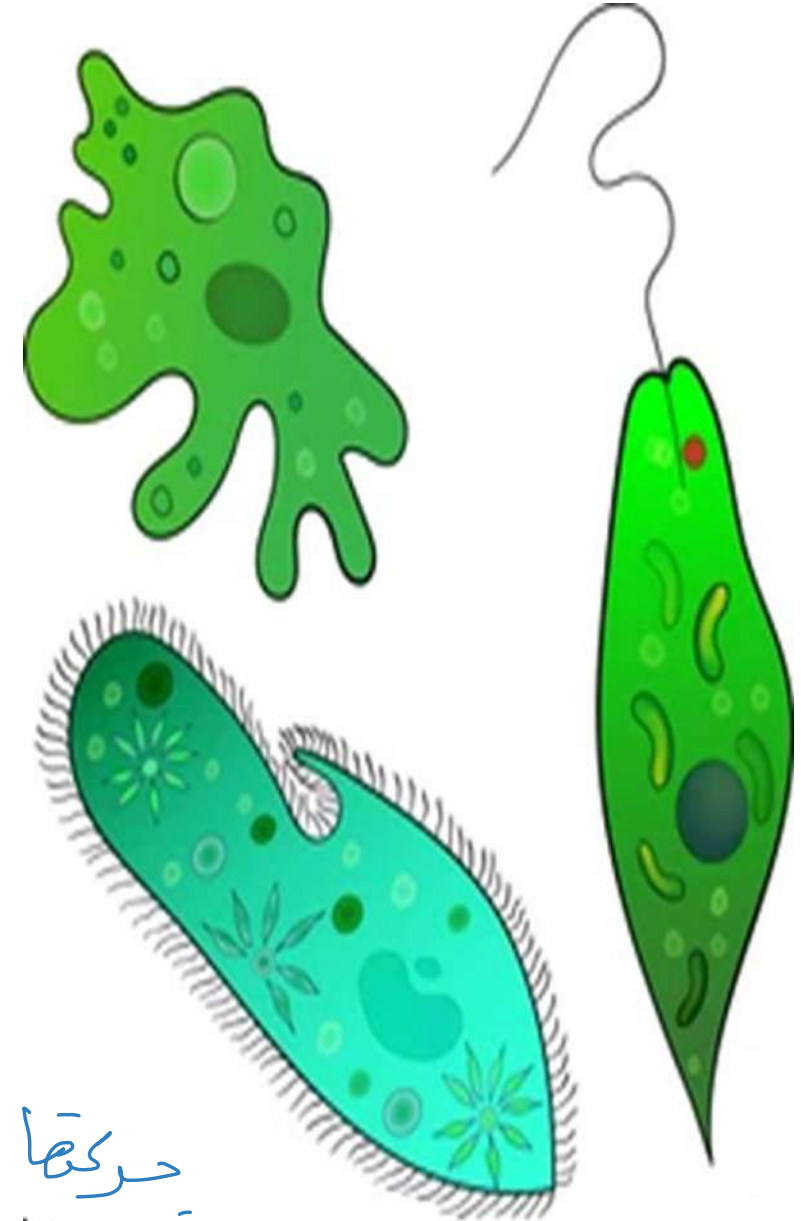
تتحرك عن طريق الأهداب

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

ماضي عندما غفر ظاهر بالحركة

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

(gliding motility). e.g. *Plasmodium*, *Toxoplasma*.



حركاتها زلي ارضا
تتجلى

Medically important protozoa

Habitate

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

Amoeba

A) Intestinal amoeba:

- Pathogenic: *Entamoeba histolytica*.
- Commensals: *Entamoeba dispar*.

B) Free living amoeba:

- Acanthamoeba, Naeglaria:

They are opportunistic pathogens causing fatal meningo-encephalitis in

immuno-compromised individuals.



التصاب بالدمغي

الاستجابة المناعية ⇒ Opportunistic
ضعيفة هم اي رح يمرضوا

Entamoeba histolytica

Morphology

1) **Trophozoite:** ⇒ *Pathogenic form* هو إلى ٢ يتكاثر درع يأكل وصوره
وكان صدى ٢ يتحرك

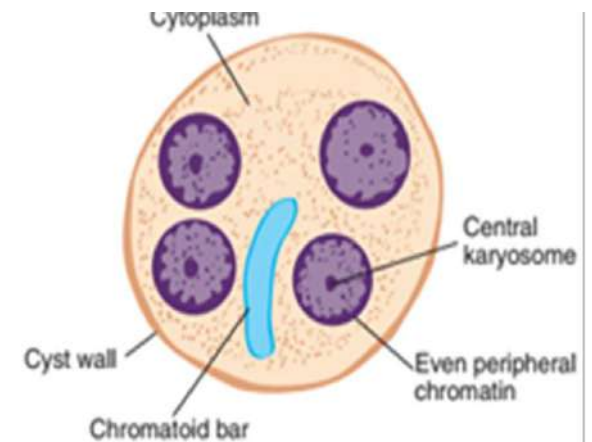
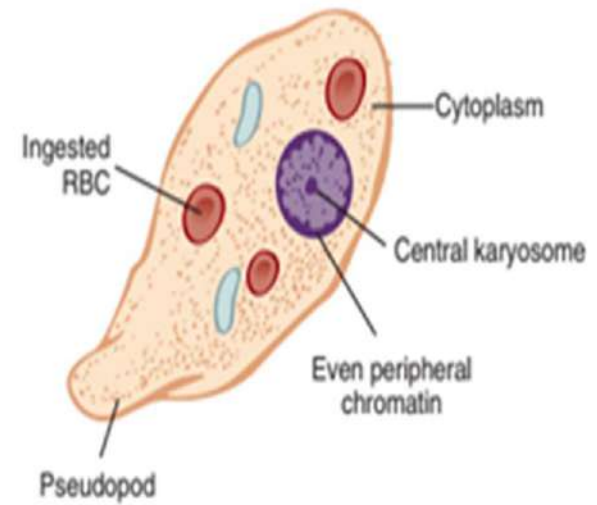
➤ It is the active motile feeding reproducing pathogenic stage.

➤ Usually encyst before leaving the gut.

2) **The cyst form:**

صايه الـ trophozoite من هذا النوع من الـ Amoeba لما يحسن انه ٢ يطاع من الـ intestine لا اكله
وهذا يعني انه ٢ يواجه بيئة غير مناسبة عشان صيكة بحيث نفسه بحدار صيكة وتنقسم الـ nucleus مرتين
والنتيجة 4 nuclei

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



Life cycle

لبعضاً تدخل الجسم على شكل الـ cyst

ورج تدخل من طريق الأكل الملوثة ولافا حاملة
حولها جدار سميل (cyst) ما رج تناثر بأجزاء البنية و
رج تدخل الأمعاء وتعتبر Free

➤ Definitive host: Man.

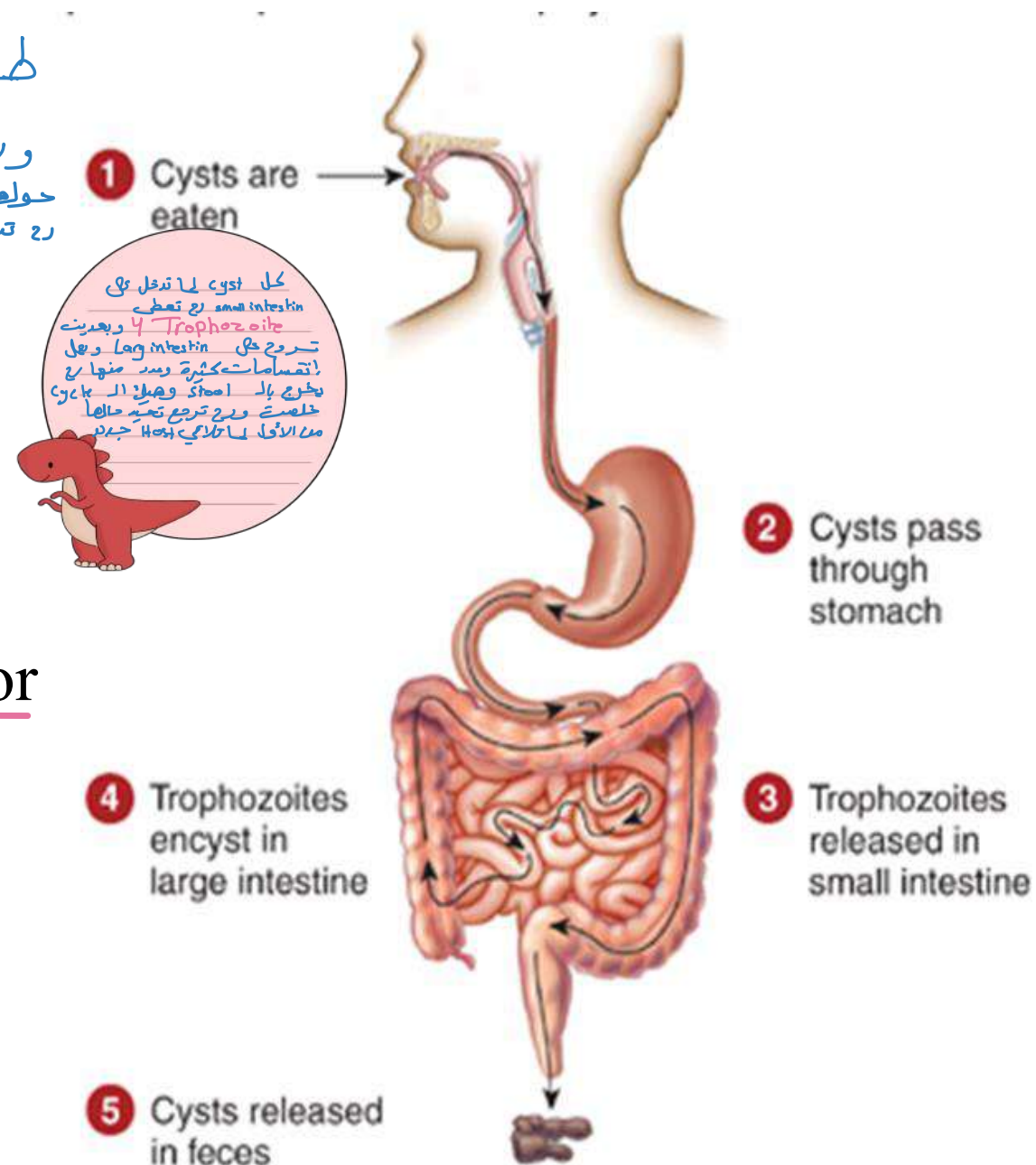
➤ Habitat: Large intestine.

➤ Infective stage: Four nucleated cyst.

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

➤ Diagnostic stage: Four nucleated cyst.

لما المريض يهل test عشان يشوف
شو نوعي الـ Parasite طما يعرفوا
انه *Entamoeba histolytica* رج يلاقوها
لار Four nucleated cyst



Amoebiasis

Tenesmus: حالة مرضية لا يستطيع المريض إخراج كمية كافية من روث المعدة ويكون اد امعاء مليان مucus و blood

1) Intestinal amoebiasis:

a) Asymptomatic (cyst passers about 75%). ⇒ organism موجود راجع ماعز لسا شغالة بس ما في امراض

b) Acute amoebiasis (Amoebic dysentery): Tenesmus & bloody diarrhea.

Trophozoites invade colonic mucosa, producing extensive ulceration.

c) Chronic amoebiasis: diarrhea is alternating with normality or constipation.

2) Extraintestinal:

مثل خمريه يكون خنده بس diarrhea (اسهال) هوات ممكن يكون Constipation (امساك)

Trophozoites may also invade the circulation causing Amoebic hepatic (the most common), pulmonary, cerebral or renal abscesses. ⇒ حراج

Flagellates

⇒ تتحرك عن طريق الأسواط

- Intestinal Flagellates: Giardia lamblia.
- Urogenital Flagellates: Trichomonas vaginalis.
- Hemoflagellates:

- Leishmania.
- Trypanosoma.



Giardia
intestinalis



Trichomonas
vaginalis



Trypanosoma
gambiense



Leishmania sp.

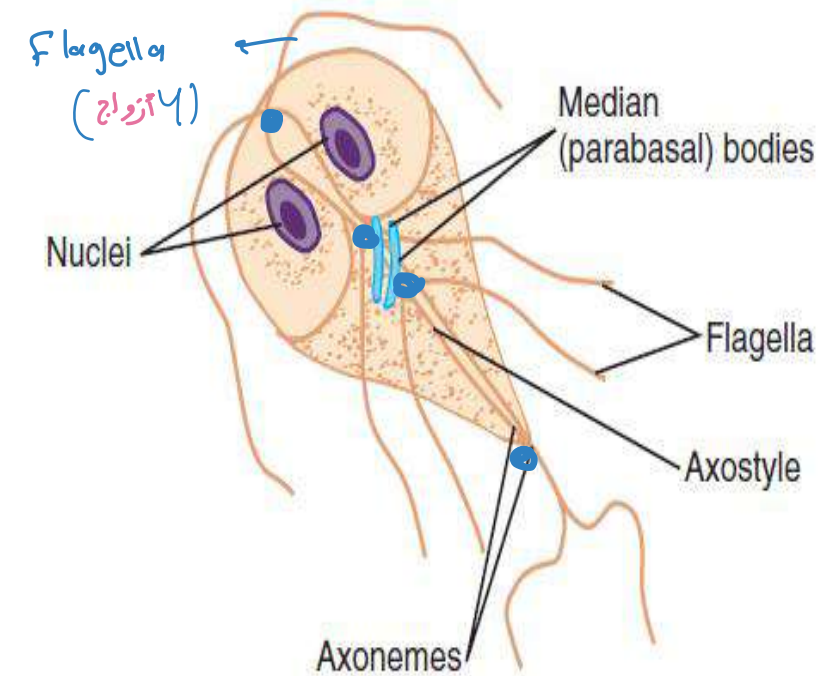
Giardia lamblia

Morphology

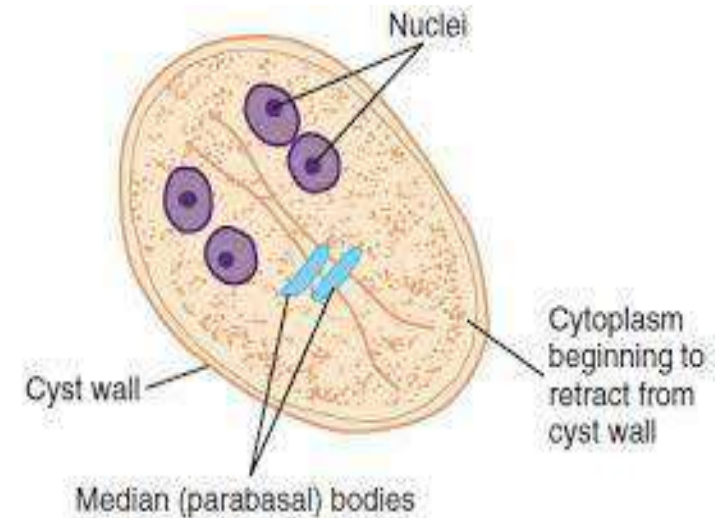
شکلہ ممیز آبی الوجہ

1) ^{Pathogenic} Trophozoite: Pear shaped, (appearance of a face)

2) Cyst: Oval, 4 nucleated .



Giardia lamblia



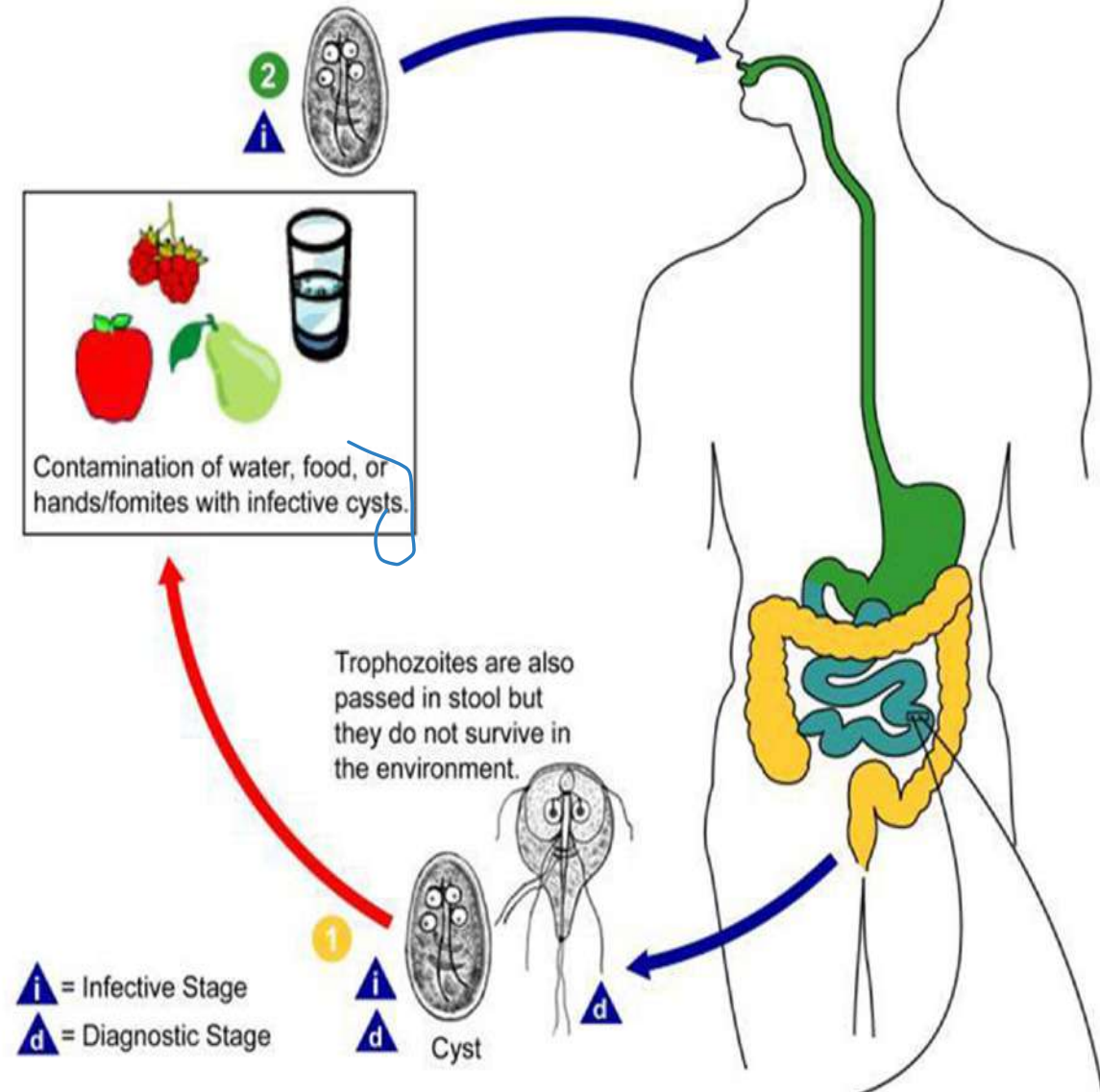
Life cycle

- **Definitive host:** Man.
- **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
or trophozoites.

Giardiasis (*Giardia intestinalis*)



Giardiasis => caused by Giardia Lamblia

- Trophozoite cause inflammation of the duodenal mucosa —> malabsorption of protein and fat.

No invasion

هي بتصلح ار wall للاعقاد
وينفصل ملزقه فيه

- Affect mainly children. Most cases are asymptomatic.

ممکن ہے کہ بچے اور اطفال میں

- Steatorrhea (fatty diarrhea, the stool is greasy), abdominal cramp,

آلم بالبطن

✓ flatulence. => غازات

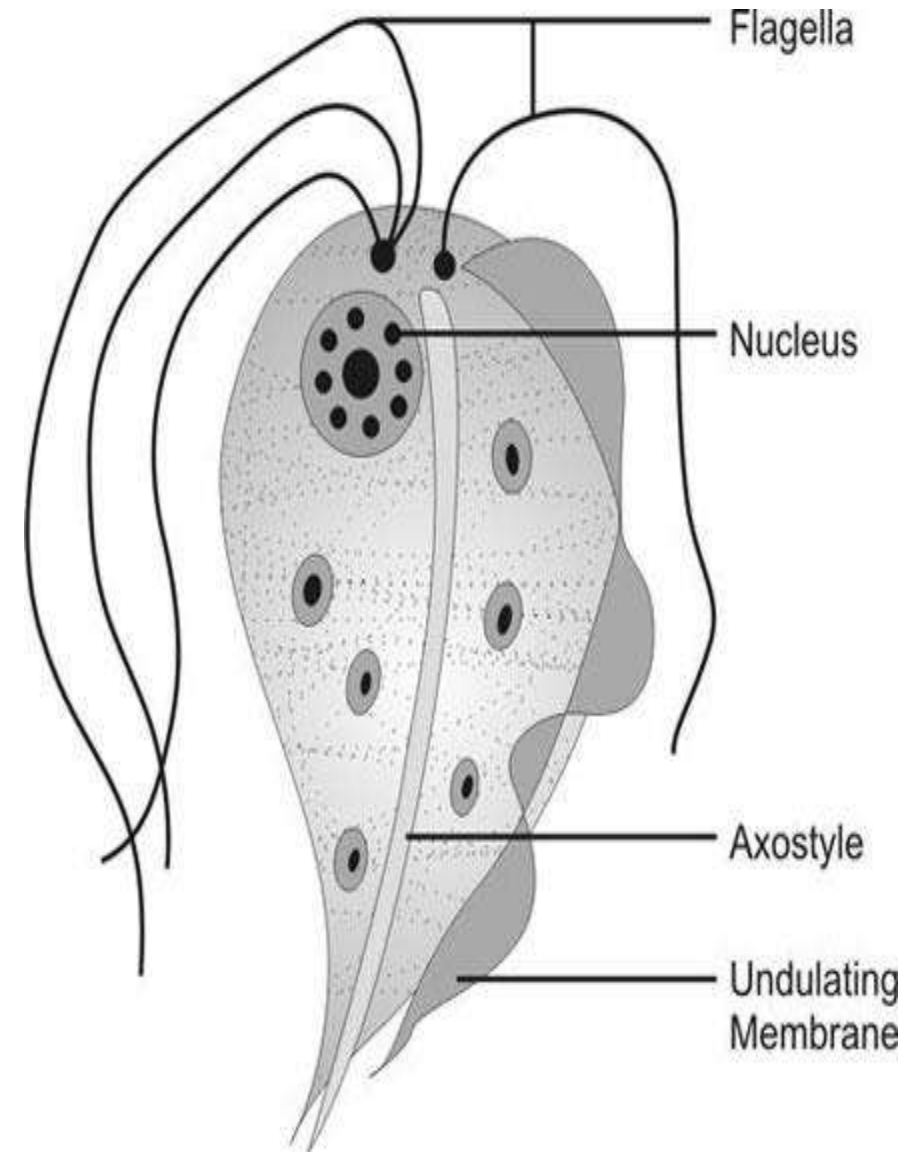
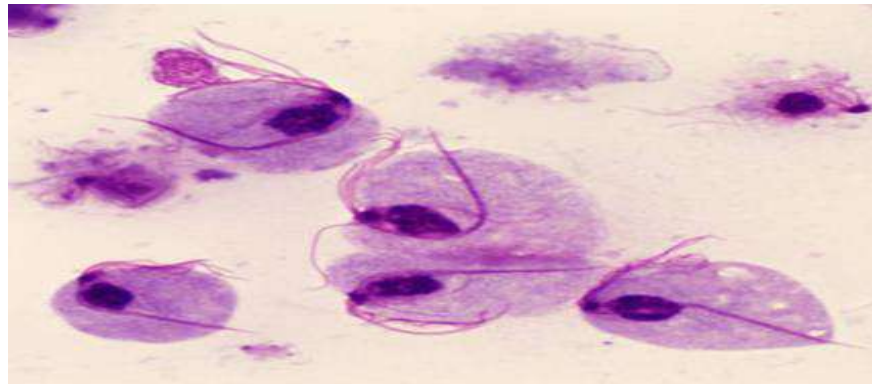
steatorrhea : بظون فی
lipid in stool
الدهون في البراز

* No blood in stool

Trichomonas vaginalis

Morphology

- 1) **Trophozoites** are pear shaped.
- 2) **No** cyst stage, so infection occurs by trophozoites.



Life cycle

-Definitive host: Man.

المسالك البولية
↗

-Habitat: Urogenital tract of both women and men.

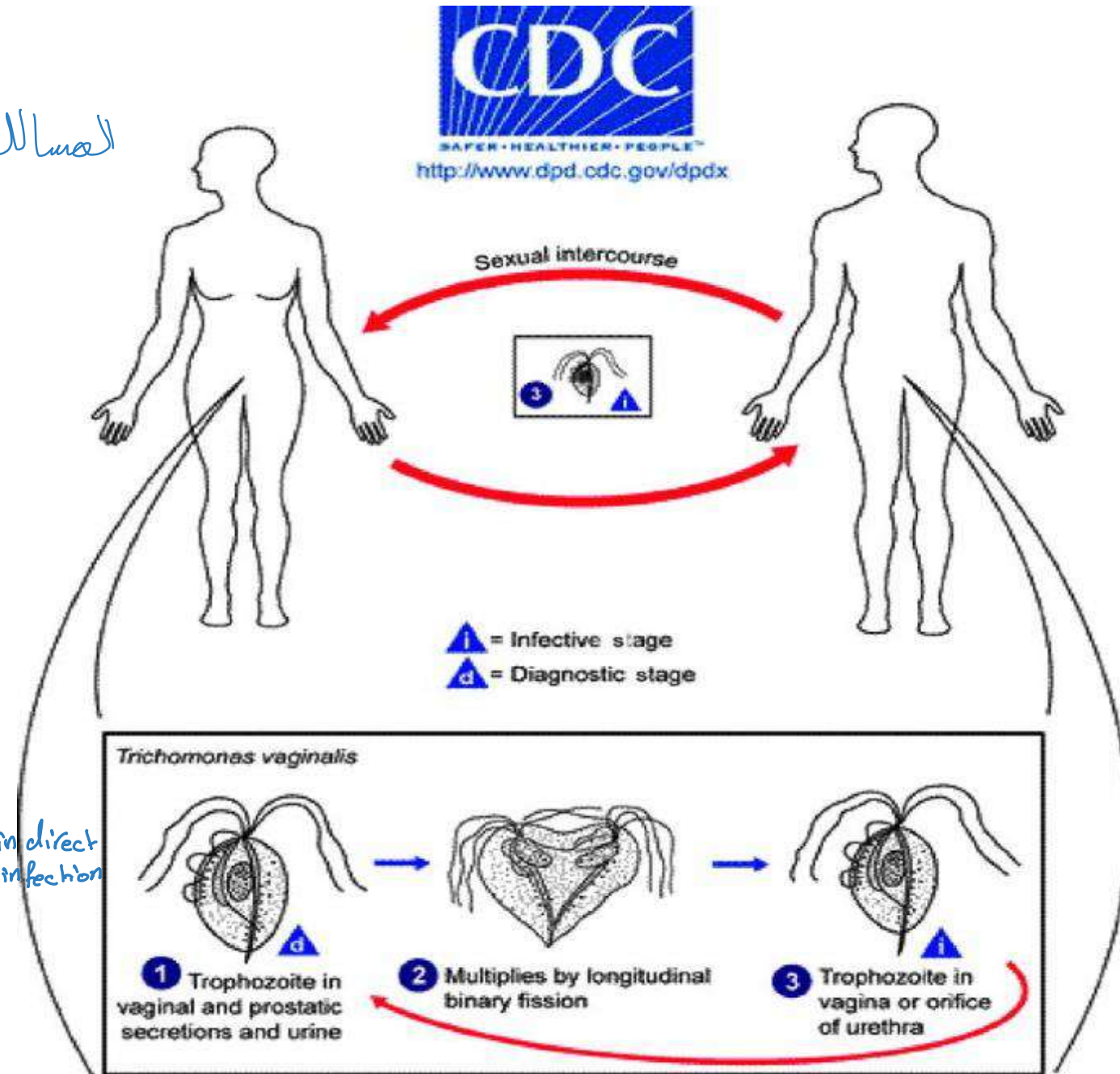
-Infective stage: Trophozoite.

-Mode of infection:

Sexual intercourse → *ملاقة* → direct infection

Contaminated toilet seats or towel. → indirect infection

-Diagnostic stage: Trophozoite.



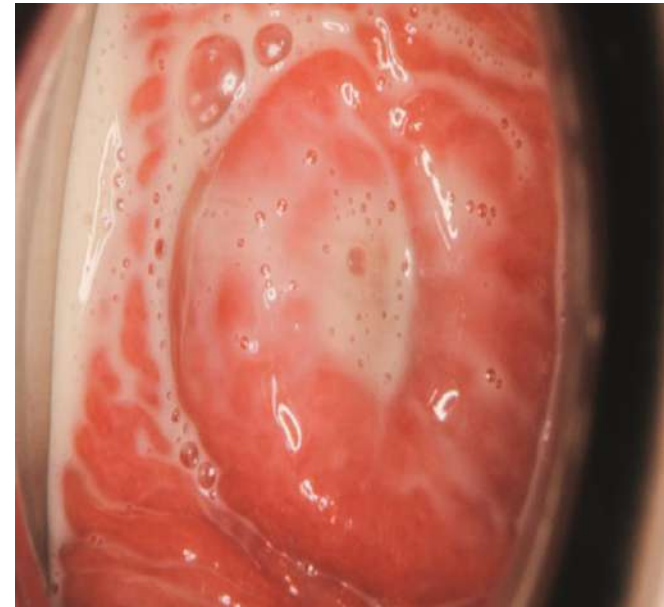
Caused by *Trichomonas vaginalis* ← **Trichomoniasis**

In women:

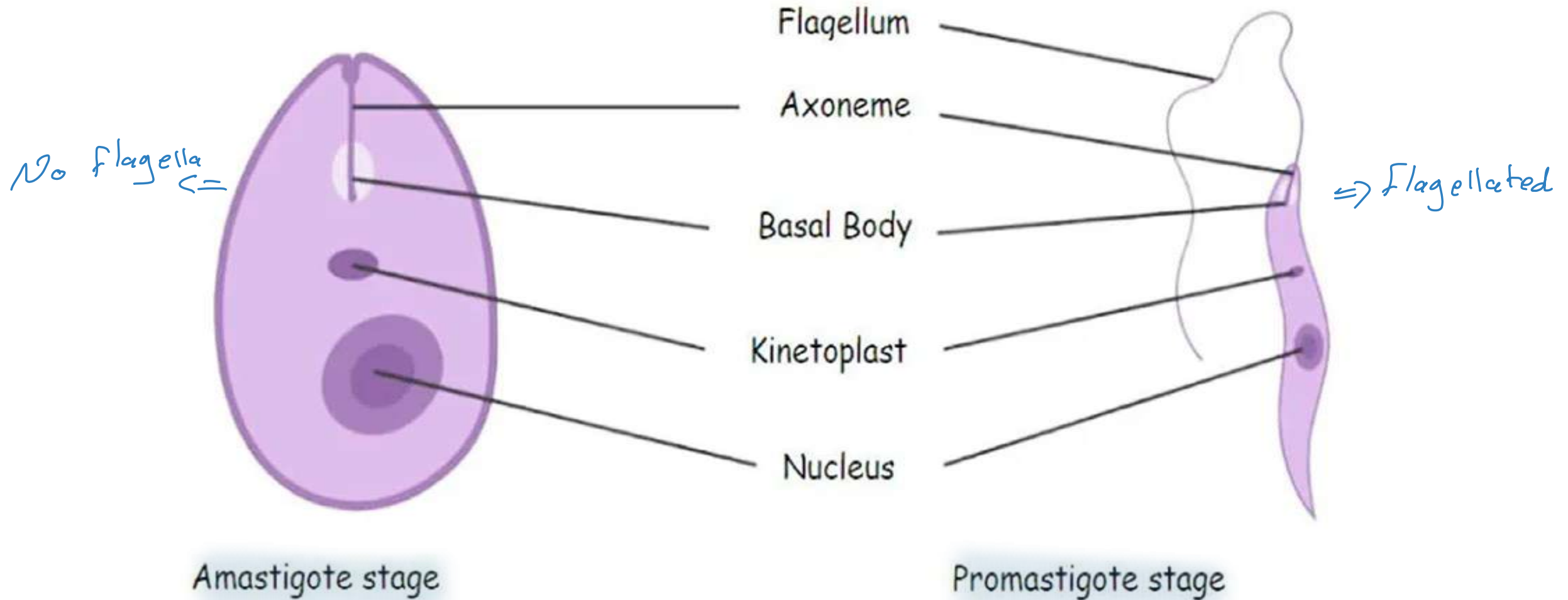
- Vaginitis in 70 % of infected women.
- Reddish vaginal mucosa & strawberry cervix. شكل عنق الرحم 2 يكون منتفخ يشبه الفراولة
- White or yellowish frothy discharge with a fishy smell.
- Vulvar pruritis. يكون راحة الإفرازات زوي راحة السمك
- Dysuria and frequency. عسر في البول

In man:

- Mostly asymptomatic.
- Sometime it causes urethritis (frequency and dysuria). كـ التهاب مجرى البول



Leishmania donovani



هذا النوع له Complex Life-cycle يعني جزء بال Human وجزء بال Vector

Life cycle

Definitive host: Man.

Habitat: Reticuloendothelial cells(REC)

Vector: Female Sand fly. بمس ad Female

Infective stage: Promastigote. يكون موجود بال saliva ال Vector

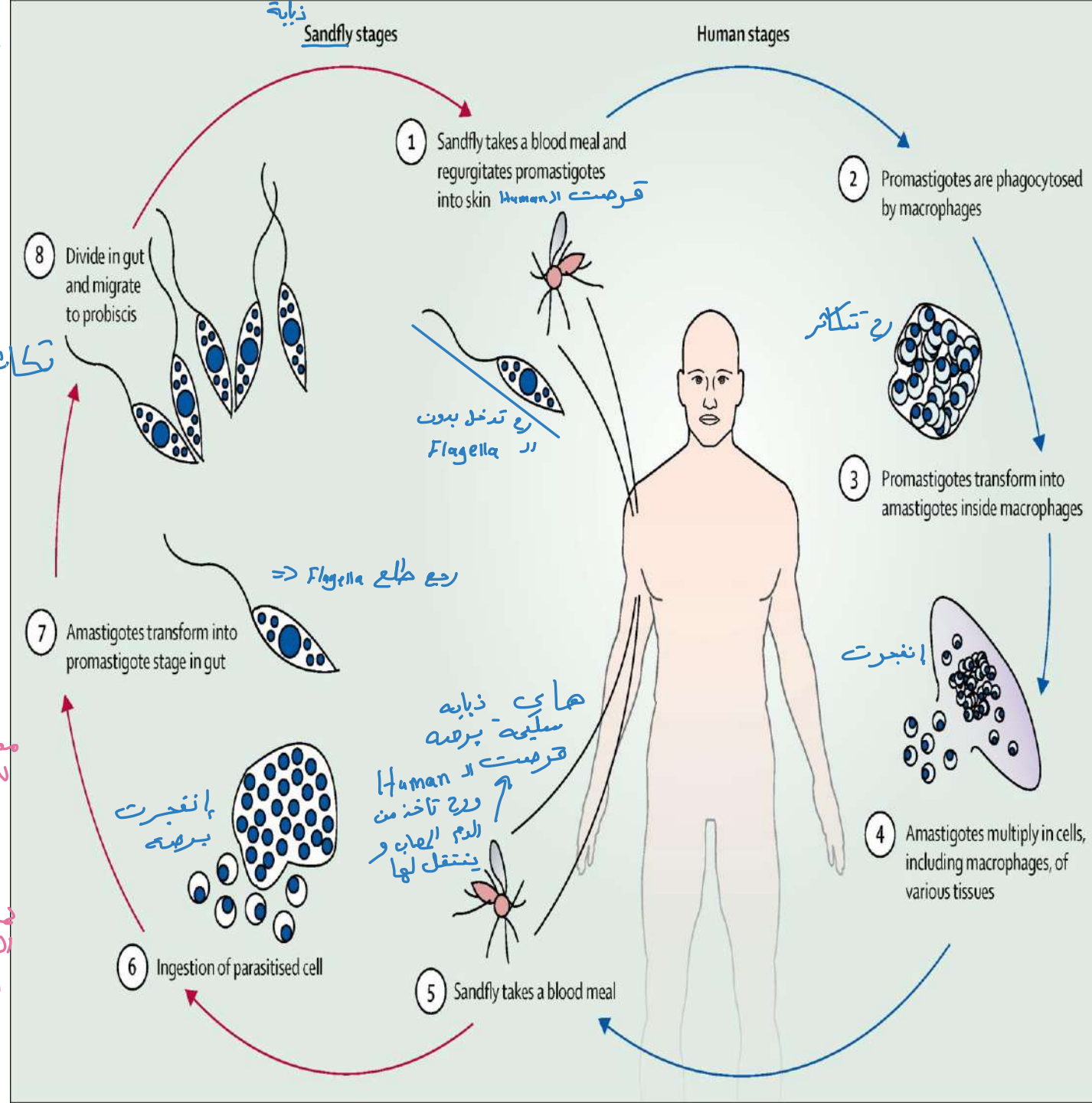
Mode of infection: قرصة

-Bite of an infected female sandfly.

-Vertically from mother to fetus. ممكث ينتقل من الأم للجنين أثناء الحمل

-Blood transfusion.

Diagnostic stage: Amastigote. ما أخذ عينة من الدم ال لآلأيا بهذا ال stage



Caused by *Leishmania donovani*

← Leishmaniasis

Results from the invasion and marked destruction of RES.

Visceral leishmaniasis (kala-azar) (black fever): ⇒ هذا النوع حسوي

يكون جسم المريض مبقع
بالوان داكنه

- Persistent fever (Azar) and hyperpigmentation of skin (Kala).

- Hepatomegaly, splenomegaly and generalized lymphadenopathy. ⇒ هاي الامراض بتتبع لانه لا RES هو المتأثر

- Pancytopenia (Anaemia, repeated infections & hemorrhage).

نتيجة إصابة ال bone-marrow يتأثر كل اشي ينتج
مثل RBC او WBC بتقل المناعة بسببه ذلك

Cutaneous leishmaniasis:

- Single or multiple papules that ulcerate. نادر جداً

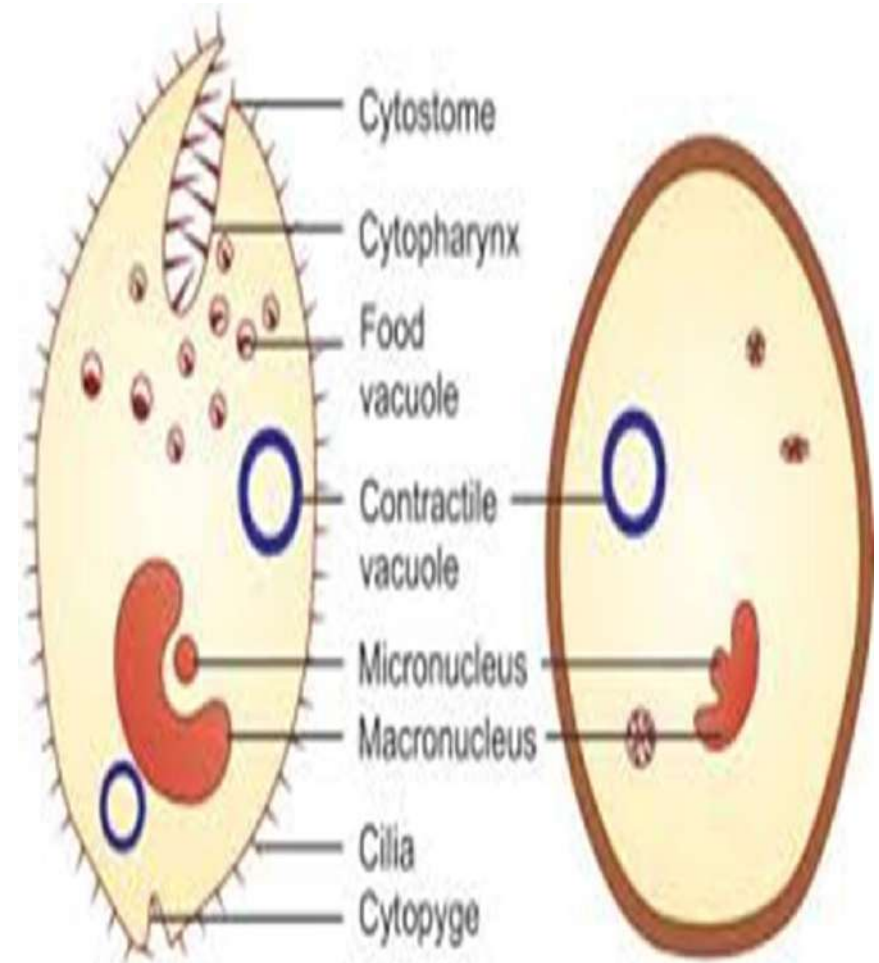


Ciliates

Balantidium coli

Morphology

- 1) Trophozoite: It is the **largest** protozoa
- 2) Cyst: It is spherical or oval.

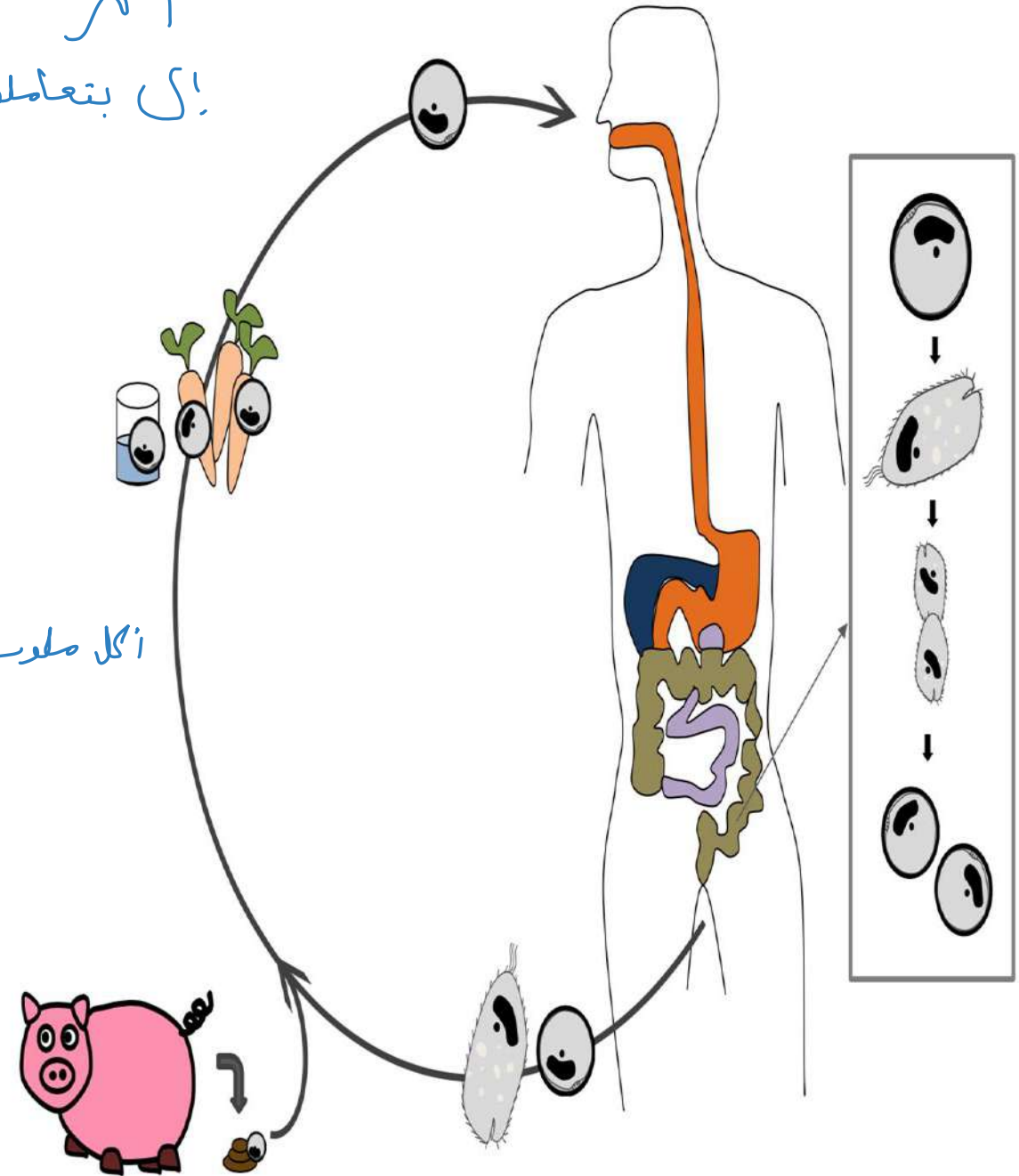


Life cycle

- Definitive host: Man.
- Reservoir host: pigs.
- Habitat: Large intestine.
- Infective stage: Mature cyst.
- Mode of infection:
 - *Ingestion of food or drink contaminated
with the mature cyst.
- Diagnostic stage: Cyst

انكر البشر الممرضه
الى بتعلموا مع براز الخنزير

انكل صلوته



Clinical manifestations

- Infection in man mostly asymptomatic.

دیر بار
اعراض

- Trophozoites may penetrate mucosa cause **balantidial dysentery**.

- No extraintestinal lesion.



ما رح یوصل عضو آخر غیر الامعاء

مكتبة ابنه ما عندها عضو للحركة

Sporozoa

➤ Intracellular.

رأى ألقى انه تكاثر (asexual و sexual)

➤ Complex life cycle (more than one host), asexual reproduction occurs in one host and sexual reproduction in another host.

➤ Medically important sporozoa:

- Intestinal sporozoa:

Cryptosporidium

Cyclospora

Isospora

- Tissue sorozoa:

Toxoplasma

Plasmodium

Plasmodium ← يسبب الماريا اي تعبر مصدره للحياة

The genus plasmodium contains 4 human species: -

- 1- Plasmodium malariae (The mildest type).
- 2- Plasmodium vivax.
- 3- Plasmodium ovale.
- 4- Plasmodium falciparum (The most dangerous type).



The causative agent of **malaria**, a life-threatening disease distributed in hot moist tropical and subtropical areas.

المناطق الحارة والبرستوائية

Life cycle

Habitat: Red Blood Cells.

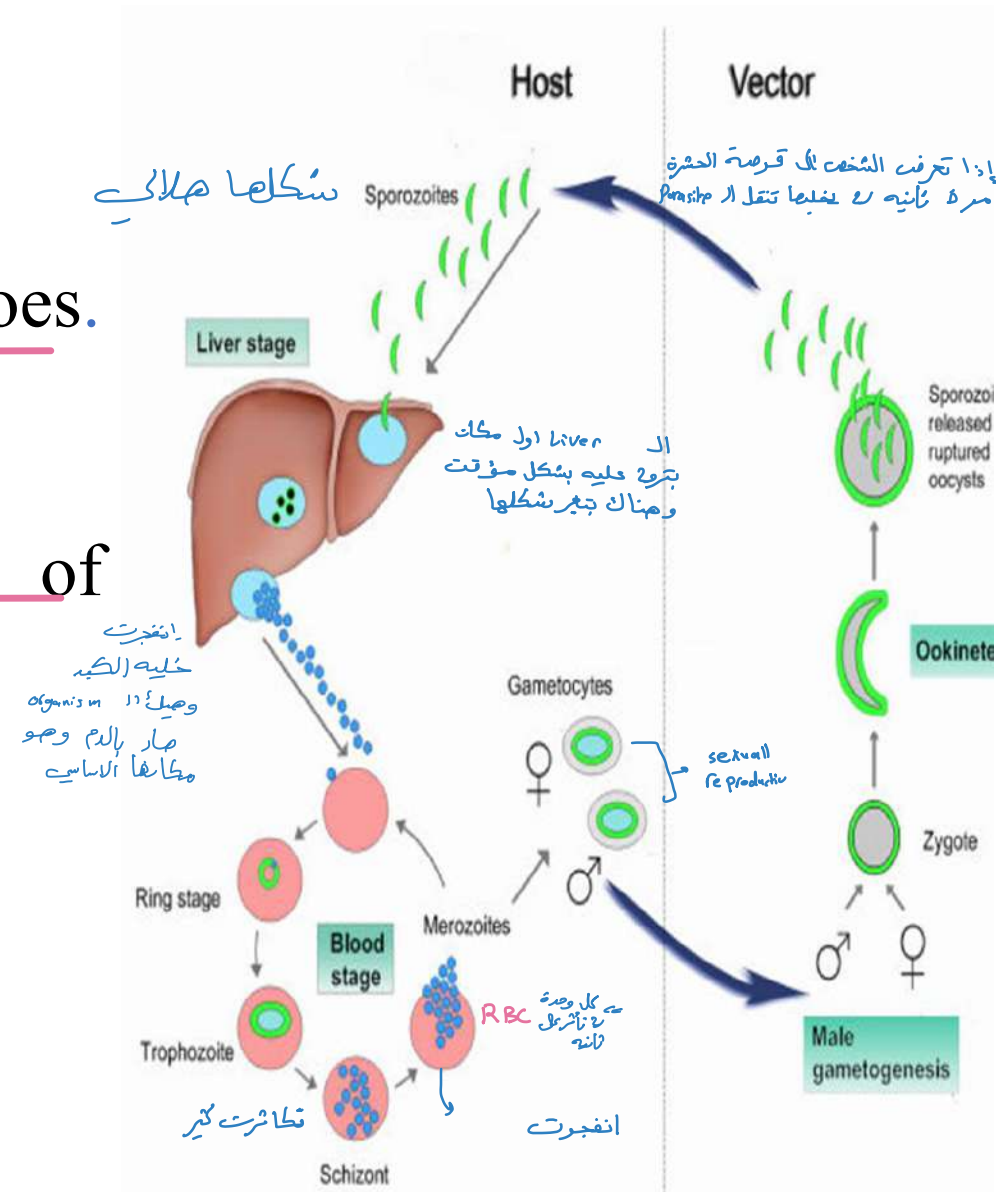
Definitive host: Females of *Anopheles* mosquitoes.

Intermediate host: Humans

Infective stage: Sporozoites in the saliva of infected female mosquitoes.

Mode of infection:

- Bite of Females of *Anopheles* mosquitoes.
- Blood transfusion.
- Transplacental transmission. من الـلام إلى الجنين



Pathogenesis & Clinical findings:

- Characterized by **regular paroxysmal febrile attacks** which consists of:

المریض ٢٠ یحس ببرودة کبیرة

Fever (الجلد ٢٠ یكون حار جہ ١)

یسبب زیادة درجہ الحرارة ٢٠ یتعرف وترجع الحرارة تنزل

Cold stage (1/2 h), Hot stage (2-4 h), Sweating stage (2-4 h).

- Malarial paroxysmal attacks recur at the following intervals:

a) *P. vivax* and *P. ovale* attack occurs every 48 h (tertian malaria).

دقیقة

b) *P. malariae* attack occurs every 72 h (quartan malaria).

دقیقة

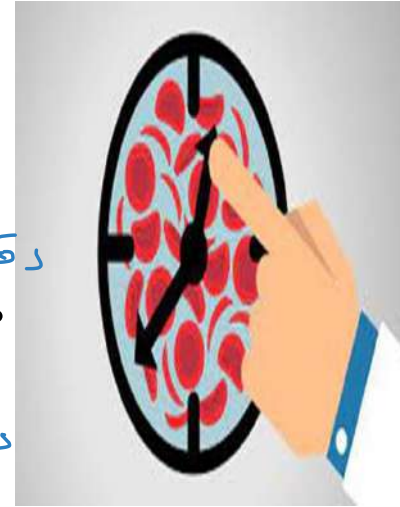
c) *P. falciparum* attack occurs 24-48 h (Subtertian or irregular malaria).

- Hemolytic anemia & jaundice (destruction of R.B.Cs)

یا مصفرار

- Hepato-splenomegaly.

- **Malignant malaria** (*P. falciparum*) is severe and fatal



معدن تدمر کلایومین
او یوم دتھا او بالیوم
نفسه مرتین یوم
صلن متطو

Thank
you



At Rachel Zoucl

