

Ameoboflagellates & Acanthamoebidae

- Free living, mostly in soil and water
- Cause 3 important diseases in human:

• PAM

Primary amoebic meningo-encephalitis

Occurs in healthy individuals

• GAE

Granulomatous amoebic encephalitis

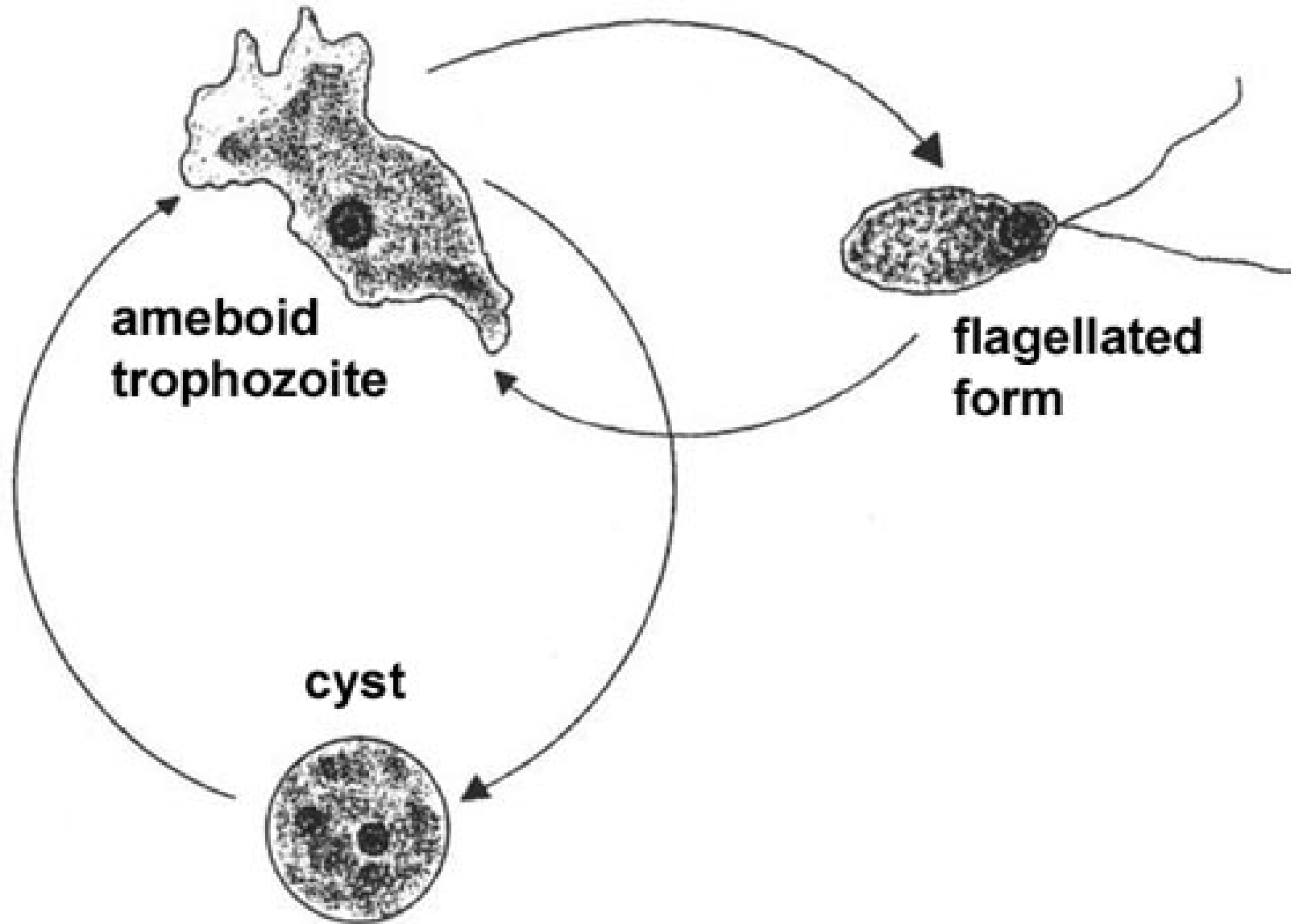
Usually associated with immunodeficient states

• CAK

Chronic amoebic keratitis

Occurs in healthy individuals

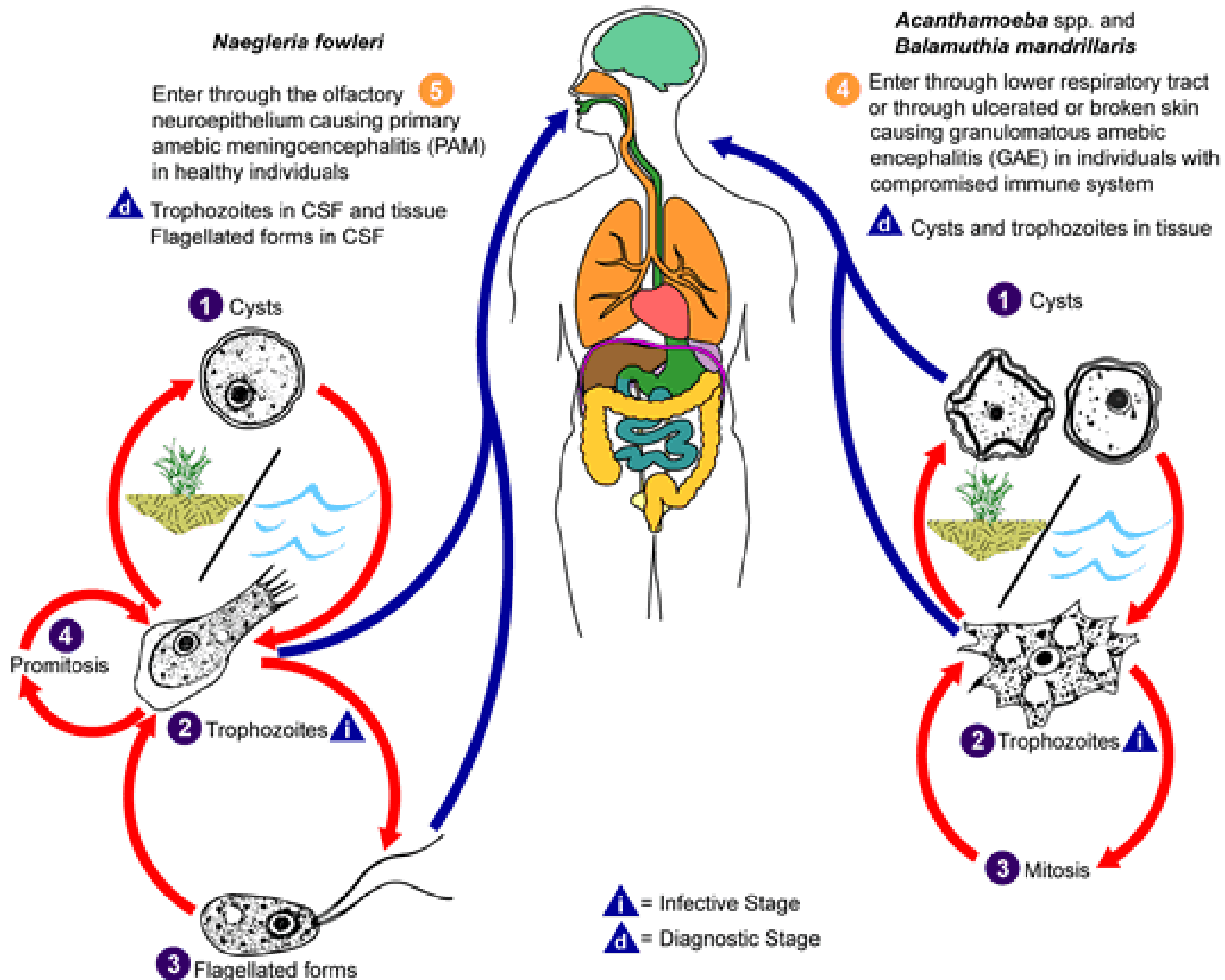
Naegleria fowleri cycle

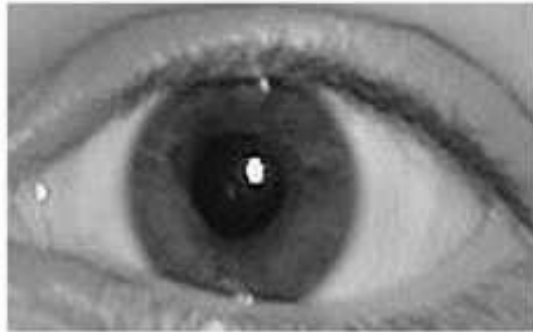


A scanning electromicrography of **Acanthamoeba** sp



N. fowleri & Acanthamoeba cycles





Normal eye



Acanthamoeba-infected eyes

Acanthamoeba-infected eyes exhibiting ulcerated epithelium and corneal opacity in acute *Acanthamoeba* keratitis.

Protozoa in sites other than intestinal

- **Amoeba**

Naegleria fowleri

Acanthamoeba sp

Entamoeba gingivalis

- **Flagellates**

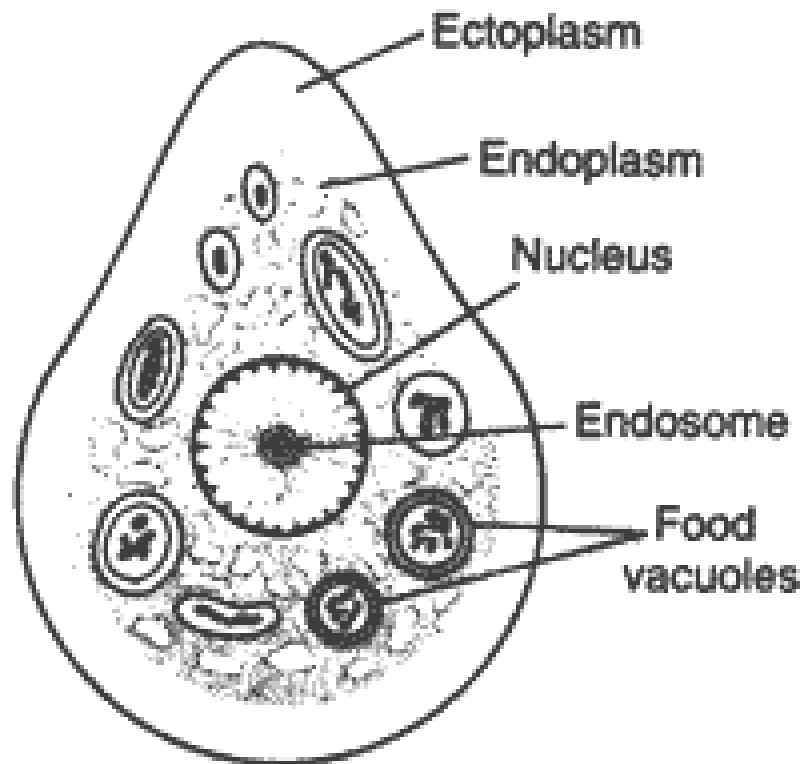
Trichomonas vaginalis

Trichomonas tenax

Entamoeba gingivalis

- **Trophozoites live in the oral cavity of humans residing in the gingival pockets near the base of the teeth.**
- **The trophozoite stage of *E. gingivalis* is morphologically similar to that of *E. histolytica***
- **Both can be coughed up in sputum specimens (for the latter, when present in pulmonary abscesses)**
- **Usually non-pathogenic**
- **Can ingest bacteria, leukocytes, erythrocytes**

E. gingivalis - trophozoite



• 10-35 μm

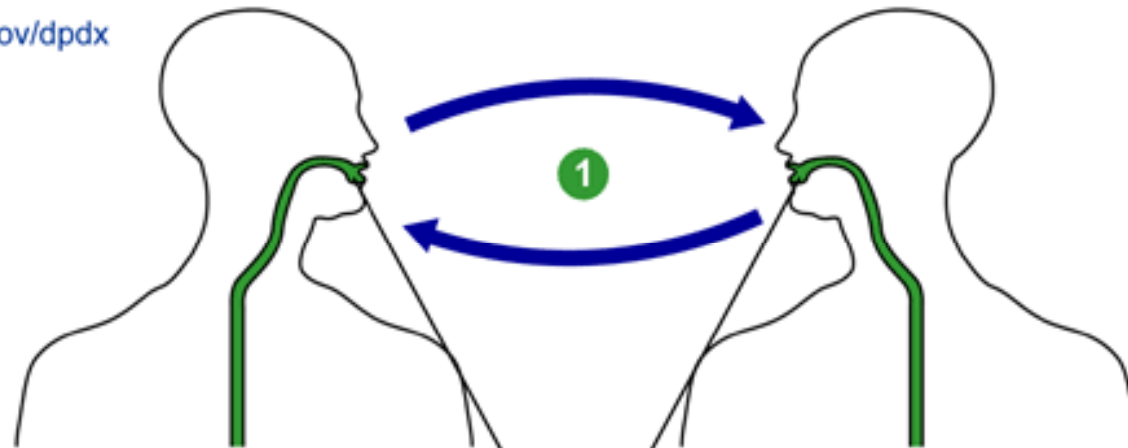
Entamoeba gingivalis

E. gingivalis - cycle



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A



Trophozoite **i** **d**

i = Infective Stage

d = Diagnostic Stage

A = Noninvasive Colonization

Epidemiology

- **Worldwide**
- **Trophozoites are transmitted person-to-person orally by kissing or fomites (such as eating utensils) but also water/food**
- **Found in about 95% of patients with gum disease and about 50% of patients with healthy gums**

Diagnosis

- Identification of *E. gingivalis* is made by the finding of trophozoites in scrapings of the gums and teeth
- They may also be found in sputum in rare occasions

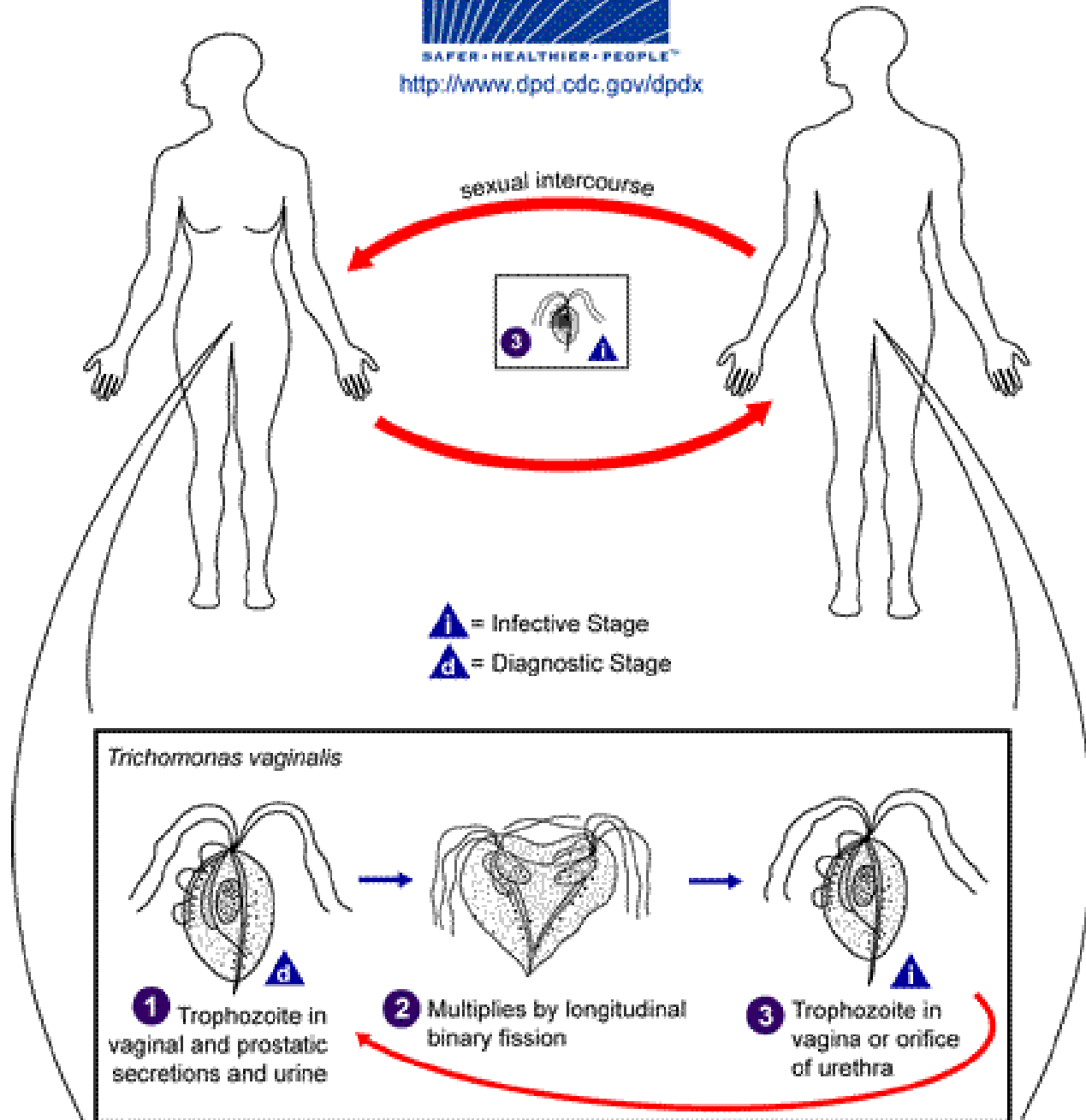
OTHER BODY SITES PATHOGENIC FLAGELLATE

- *Trichomonas vaginalis*
- *Trichomonas tenax*

Trichomonas vaginalis

- **Pathogenic protozoan**
- **Site-specific : on the mucosal surfaces of the urogenital tracts of humans, predominantly the female lower genito-urinary tract**
- **Infection may or may not be symptomatic**
- **Can be sexually transmitted**
- **Ovoid/pyriform organism, 10-20 μm wide**
- **Twitching motility by 4 anterior flagella and 1 recurrent flagellum (with undulating membrane)**
- **Actively phagocytic**

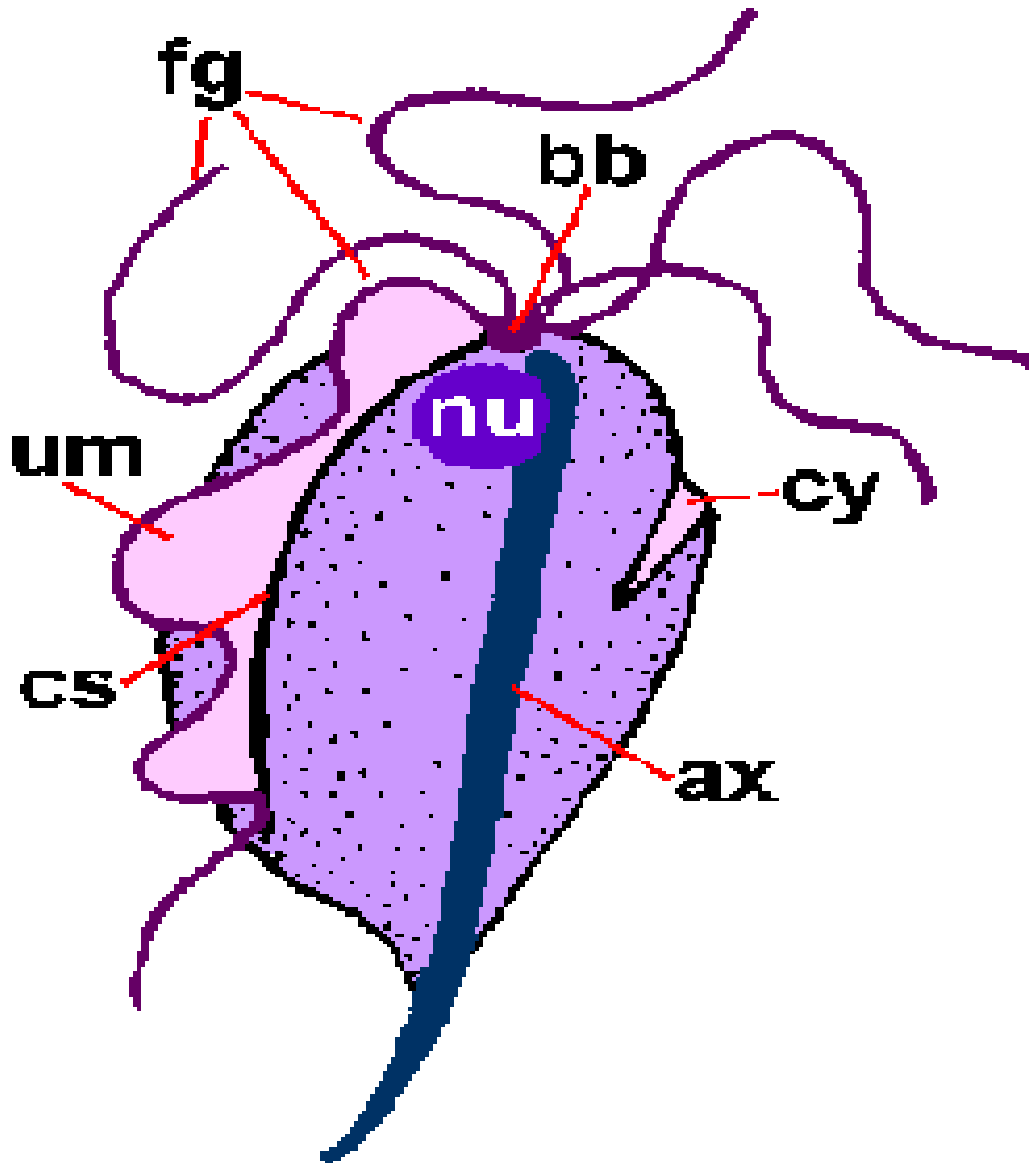
Trichomonas vaginalis



Trichomonas vaginalis

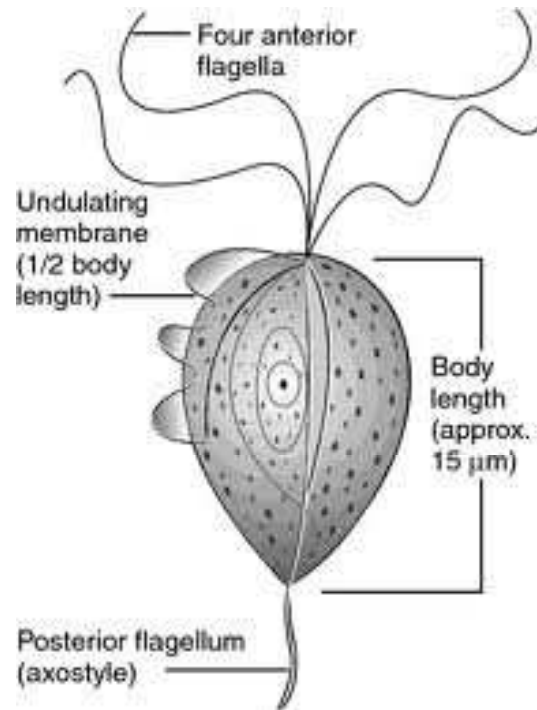
- **Optimal growth under moderate anaerobic conditions**
- **Unique energy-producing organelles : the hydrogenosomes**
- **Reproduction by binary fission**
- **NO CYST form**
- **Different strains with variation in virulence**
- **Related organisms but pathogenicity not proven**
 - ***Trichomonas tenax* : in gums**
 - ***Pentatrichomonas hominis*: in colon**

Morphology



- fg flagella
- ax axostyle
- bb basal bodies
- cy cytostome
- cs costa
- um undulating membrane
- nu nucleus

Trichomonas vaginalis



Epidemiology

- **Worldwide. Can survive in moist environment**
- **Annual incidence estimated at 180 million cases**
- **Humans are the only host.**
- **Sexual transmission. Screening for other STDs is important**
- **In STD clinics, 7-32% prevalence recorded**
- **High prevalence in female prostitutes (80%)**
- **Risk factor for HIV infection (3x)**
- **Usually asymptomatic, self-limiting and low prevalence in males**
- **Often co-existent with candidiasis, gonorrhoea, syphilis or HIV infection**
- **Perinatal infection may occur**

Symptoms

WOMEN	MEN
<p><u>Vaginal discharge</u></p> <p>Vaginal <u>itching</u></p> <p>Smelly, itchy, and typically frothy or foamy <u>discharge</u> (50-75%)</p> <p>Yellow or gray-green discharge</p> <p><u>Pain</u> with urination possible</p> <p>Up to one-third of infected women have no symptoms</p>	<p>The majority of infected men have no symptoms</p> <p>Urethral discharge</p> <p>Pain with urination</p> <p>Pain and swelling in the <u>scrotum</u> (from <u>epididymitis</u>)</p>

Pathogenesis/pathology

- Involves squamous epithelium. Rarely in endocervix but urethra involved in 90% of cases
- Rarely in epididymis and prostate
- Occasionally causes urethritis
- The infection is accompanied by a large number of polymorphonuclear neutrophils and a consequent vaginal discharge
- Not invasive, either free in the vagina or adherent to epithelium, but adhesion of *T. vaginalis* facilitates efficient cytotoxicity toward mammalian cells
- Micro-haemorrhage in 50% of cases
- Local IgA can be detected but low concentration

Clinical aspects (a)

- **Usually vulvo-vaginitis (incubation 3-28d)**
- **50-90% of female infected are symptomatic but this could also be due to other organisms**
- **Vulval irritation may occur as well as lower abdominal discomfort but rare**

Clinical aspects (b)

- **In men, urethritis may occur but mostly the infection is asymptomatic**
- **Small infants may be infected (perinatal) but in older children it may indicate abuse**
- **In long-term, the infection is benign. There is no indication that this predisposes to cervical carcinoma BUT the associated papillomavirus may be implicated in carcinoma**

Immunology

- **Partially protective immunity, as re-infection up to 30%**
- **Evidence of circulating antibodies in the serum and proliferation of peripheral mononuclear cells**
- **Antiadhesin antibodies that block the adhesion of *T. vaginalis* to various human cell lines but more than antibody is needed for elimination of infection**
- **Lack of an adequate experimental-animal model for vaginal infection studies**
- **Presence of specific IgG and IgA but exact effects of antibodies on the parasites is unknown**

Complications (a)

- ***T. vaginalis* was significantly associated with low birth weight, premature rupture of membranes, and preterm delivery**

Cotch, M. F., J. G. Pastorek, R. P. Nugent, S. L. Hillier, R. S. Gibbs, D. H. Martin, D. A. Eschenbach, R. Edelman, J. C. Carey, J. A. Reegan, M. A. Krohn, M. A. Klebanoff, A. V. Rao, and G. G. Rhoads. 1997. *Trichomonas vaginalis* associated with low birth weight and preterm delivery. *Sex. Transm. Dis.* **24**:361-36

- **Lower genital tract infections, including trichomoniasis, have been linked to elevated levels of enzymes and cytokines within the vaginal fluid and the presence of cytokines within the amniotic fluid has been linked to chorioamnionitis and premature delivery.**

Complications (b)

- **Transmission of HIV is enhanced by coinfection with *T. vaginalis***
- **The associations between HIV and trichomoniasis, as well as other STDs, may relate to**
 - (i) increased shedding of HIV as a result of the local inflammation produced by the STD,**
 - (ii) increased susceptibility to HIV as a result of the breaks in mucosal barriers caused by the STD,**
 - (iii) a higher prevalence of STDs among HIV-infected individuals as a result of common risk factors for both infections, and/or**
 - (iv) an increased susceptibility to STDs as a result of the immunosuppression associated with HIV infection.**

Complications (c)

- Given the higher prevalence and incidence of trichomoniasis than most other treatable STDs in most studies to date, the attributable fraction of HIV acquisitions due to trichomoniasis may eclipse the relative contribution of other STD

Sorvillo, F., and P. Kerndt. 1998. *Trichomonas vaginalis* and amplification of HIV-1 transmission. *Lancet* **351**:213-214

Diagnosis

- Vaginal swab, then microscope (wet mount with Giemsa or acridine-orange stain) or/and **culture**
- Use of 10-20% potassium hydroxide added to vaginal discharge gives a pungent, fishy odour in most of those infected
- Fluorescent antibody technique shows a high sensitivity (80-90%)
- PCR-based tests are currently under development
- Important to determine the presence of other STDs
- *Trichomonas* is rarely seen during urine testing

Management

- Sensitive to 5- nitroimidazole compounds
- Most widely used is metronidazole
- BUT recent resistance to metronidazole has been shown
- Intravaginal gel has limited efficacy
- Paromomycin has shown effect in metronidazole-resistant infection
- Use of condoms is effective

Prevention

- **Early diagnosis & treatment**
- **Trace spouse/partner**
- **Condoms**

RELATED HUMAN AND NON-HUMAN SPECIES

- ***Trichomonas tenax***: found in oral gingival and tracheobronchial sites
- ***Pentatrichomonas hominis***: isolated from the intestinal tract,
- Both are considered nonpathogenic and occur infrequently in humans. Each human species has specific tropism for its site of infection.
- ***Tritrichomonas foetus***: non human, causes the disease bovine trichomoniasis (invasive to foetus and abortion)