

**University of Zambia  
School of Medicine**

**TRICHOMONADS**

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2024**

# Classification

- **Phylum:** Metamonada
- **Class:** Parabasalia
- **Order:** Trichomonadida
- **Family:** Trichomonadidae
- **Genus:** Trichomonas

# TRICHOMONADS

## Order TRICHOMONADIDA

- a. Typically with four to six flagella (one flagellum in one genus and none in another)
- b. In typical genera, one flagella recurved. free or with proximal or entire length adherent to body surface.
- c. Undulating membrane, if present associated with adherent segment with curved flagellum

# Trichomonas hominis

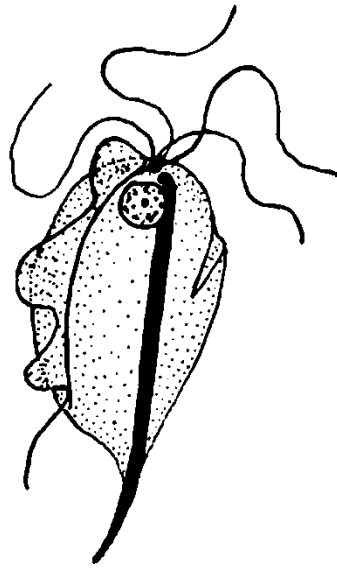
**Syn: Pentatrachomonas hominis**

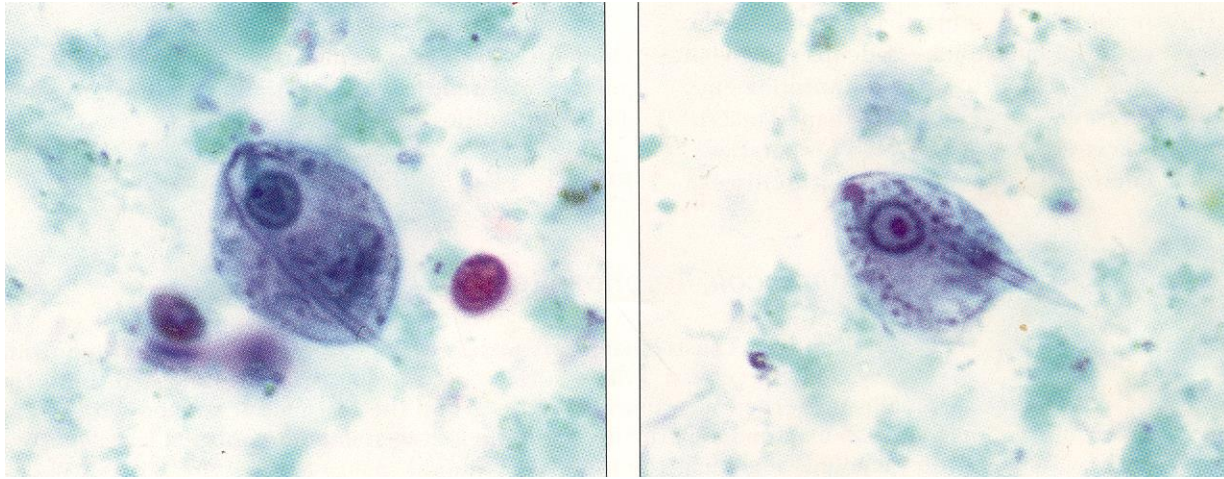
**Habitat:** Caecum, feeds on enteric bacteria

- Second commonest intestinal flagellate next to Giardia.
- feeds on enteric bacteria

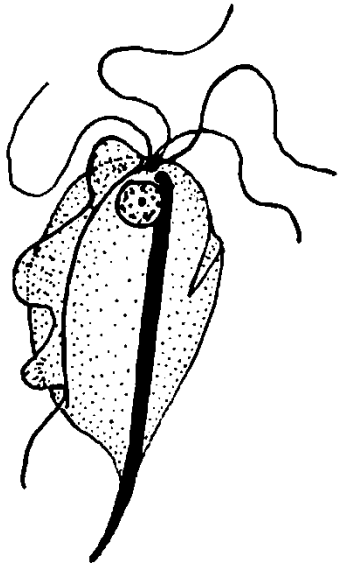
**Morphology:** only the trophic stage

1. Pyriform, semi rigid axostyle, cytosomal cleft, 5-14 microns
2. 4 anterior + 1 posterior flagella, posterior flagella free, undulating membrane

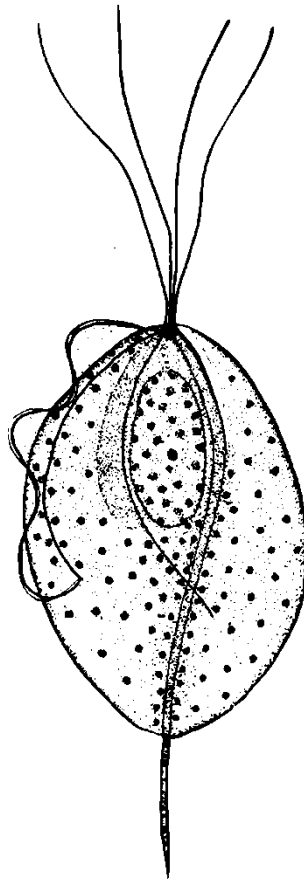




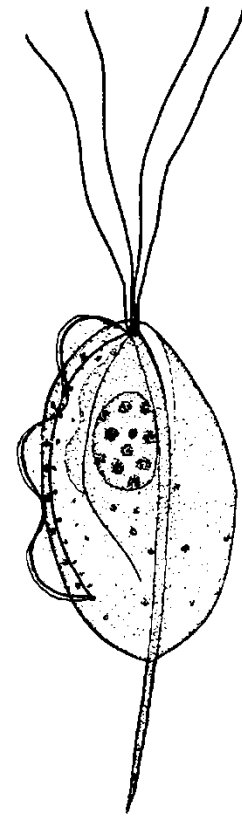
*P. hominis* trophozoites in trichrome-stained fecal smears. One can see the spherical nucleus situated near the anterior end in Figures 3 and 4 as well as the prominent axostyle that protrudes a short distance beyond the posterior end. The 3-5 anteriorly directed flagella are not usually seen with this stain. It is not always possible to see the single, posteriorly directed flagellum that usually extends beyond the posterior end of the body. A longitudinal series of prominent granules (hydrogenosomes) are frequently visible adjacent to the axostyle and the undulating membrane. The presence of these granules is often helpful in identifying the parasite. In Figure 5, the trophozoite is rounded and ameba-like in appearance. However, careful study of the organism reveals the presence of the axostyle and the hydrogenosomes.



**Trichomonas  
hominis**



**Trichomonas vaginalis**



**Trichomonas tenax**

## **Life cycle:**

- longitudinal binary fission
- Oral-fecal route, trophic stage transmitted via diet of gruel and milk by filth flies

**Pathogenesis:** none

**Diagnosis:** fecal smear

**Treatment:** not indicated

## **Epidemiology:**

1. low incidence, 1 – 12%, warm climates,
2. Under 10 olds, diet of fresh vegetables and fruit

# Trichomonas vaginalis

= causes sexually transmitted infection  
known as **trichomoniasis**

**Habitat:** vagina, urethra,

**Prostate gland, preputial glands**

Feeds on mucosal bacterial

# Trichomonas vaginalis

- It lives in the reproductive and urinary system
- Obligate parasite-cannot live without close association with vagina, urethral or prostatic tissues
- Infects squamous epithelium but not columnar epithelium
- High incidence of symptomatic infection is seen in women
- Zinc & other inhibitory substances probably inhibit their growth in men

# Trichomonas vaginalis

- Natural flora (bacteria) keep the pH of the vagina at 4-4.5 and ordinarily this discourages infection
- *T. vaginalis* can survive at a low pH
- Once established it causes a shift toward alkalinity (pH 5-6) which further encourages its growth

# *Trichomonas vaginalis*

- Facultative anaerobic parasite
- It produces energy by fermentation of sugars in a structure called **hydrogenosome**
- A modified mitochondria in which enzyme of oxidative phosphorylation is replaced by enzyme of anaerobic fermentation

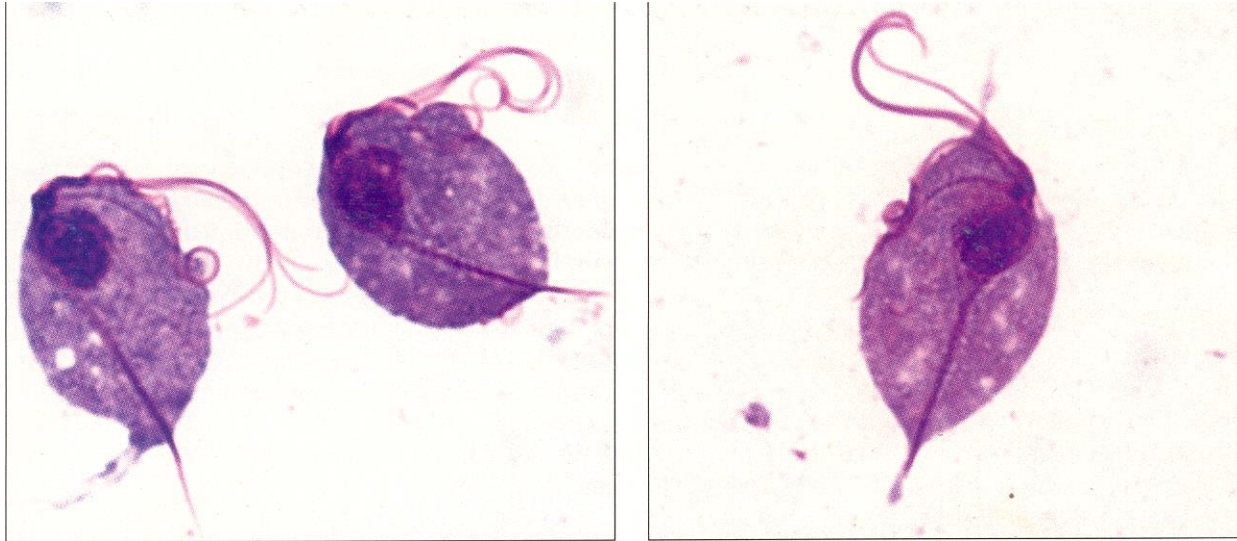
# *Trichomonas vaginalis* infection

## Significance

- Sexually transmitted disease of worldwide importance
- Cosmopolitan in distribution, however prevalence is not uniform because of sanitary and hygiene habits
- 7.4 million cases reported every year
- 180 million people infected worldwide
- 50% asymptomatic carriers, 20-40% in women & 15% in men

## **Morphology: only trophozoites**

1. Pyriform flagellate
2. 4 anterior flagella + 1 on body margin  
undulating membrane
3. posterior flagella does not extend beyond  
posterior of body
4. thick curved axostyle
5. cytostome small and inconspicuous  
costa ( chromatin basal body)
6. Chromatin granules present in cytoplasm



Giemsa-stained trophozoites of *T. vaginalis* from culture demonstrate the characteristic morphology of trichomonads. In these specimens one can see the large anteriorly situated nucleus, the prominent, stiff axostyle that extends beyond the posterior end of the body, and the four anteriorly directed flagella. Also the single posteriorly directed flagellum that courses along the margin of an undulating membrane ending slightly posterior to the middle of the body.

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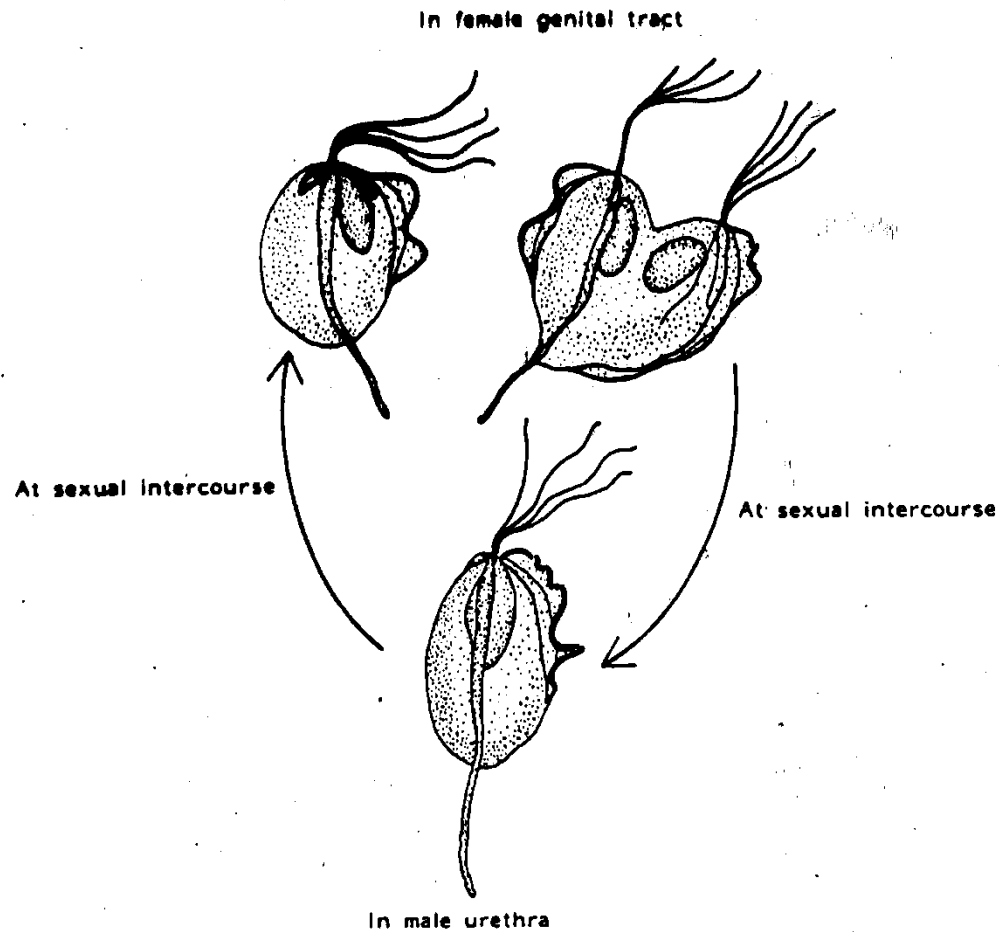
# Life cycle

- The life cycle consist only of a trophozoite stage
- Transmitted by direct contact during sexual intercourse
- Reproduces by longitudinal binary fission

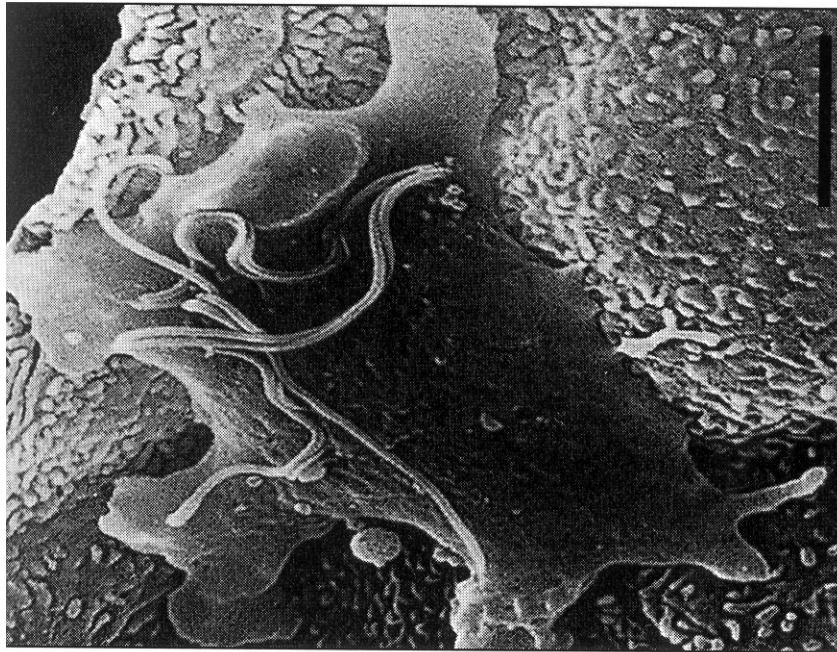
# Life cycle

- It begins by division of the nucleus, followed by the division of the neuromotor apparatus and finally, separation of cytoplasm into two daughter trophozoites
- On sexual contact, trophozoites are transmitted to male and localize in urethra and prostrate gland
- Multiplies when vaginal condition become more basic than usual (normal pH 3.8-4.2)
- None venereal transmission is rare

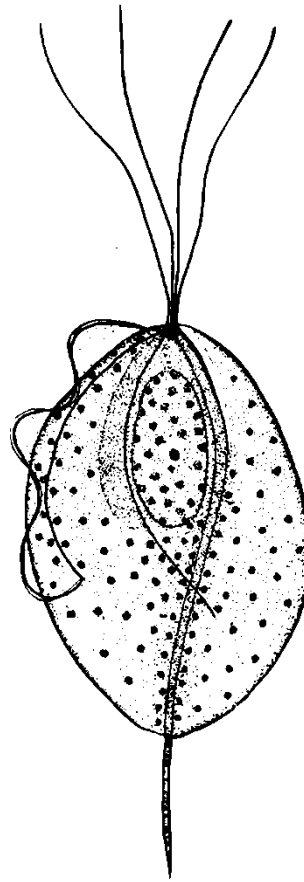
# Life cycle:



The cycle of *Trichomonas vaginalis*, a cause of vaginitis in women. This is an example of the simplest type of cycle in which asexually propagating forms are transferred directly from host to host, in this case by sexual intercourse. No special forms for transmission exist.



**Trichomonas vaginalis** on epithelial cells : When the flagellates make contact with vaginal epithelial, they within a few minutes transform to a cytoadherent amoeboid form with thin lamellipodia that make multiple contact points with the cells. The axostyle disappears, but the flagella and undulating membrane remain on free surface. The readiness with which this transformation occurs in different strains is apparently related to their virulence.



**Trichomonas vaginalis**

## **Transmission:**

STI, no cystic stage

Promiscuity, poor personal hygiene =  
100% prevalence

- Congenital (mother to child during delivery)
- Toilet seats, communal bathing have been implicated in transmission
- Trophozoite divides by binary fission
- Incubation period is roughly 10 days

# Pathogenesis of *T. vaginalis*

- It is not an invasive parasite
- It remains adherent to the squamous epithelium but not columnar epithelium using adhesins

## Virulence factors

- Protein liquids & proteases – help in adherence
- Lactic acid & acetic acid which lowers the vaginal pH
- Enzyme cystine proteases - responsible for haemolytic activity of parasites

# Symptoms (women)

- **Asymptomatic in most cases**
- **Vulvovaginitis**
  - Severe inflammatory response that is manifested as a copious frothy white or greenish/yellow vaginal discharges
  - Vaginal discharge contains a large number of parasites and leucocytes (Purulent vaginal discharge)
  - (leukorrhoea) concurrent with *Candida albicans*

# Symptoms (women)

- Malodourous smell
- Punctate haemorrhages on the cervical mucosa or strawberry cervix
- Vulva & vaginal epithelium fiery red & inflamed
- Dyspareunia constant
- Cervical erosion due to Trich. predisposes to uterine cervical carcinoma

# Symptoms (women)

- Urethritis
  - Dysuria
  - Increased frequency of micturition

# Symptoms (men)

- Usually asymptomatic
- Urethritis, epididymitis, prostatitis and superficial penile ulcerations
- Irritation inside the penis, mild discharge, discharge may be purulent to mucoid or slight burning after urination or ejaculation
- Mostly self limiting trichomoniasis due to action of the prostatic fluid or flushing out of the flagellate during micturation

# Complications (women)

- PID
- Premature birth
- Low birth weight
- Increased risk of transmission of HIV
- Increased chance of cervical cancer

# Complications (men)

- Prostatitis
- Epididymitis
- Urethral stricture
- infertility

## **Diagnosis:**

1. Finding Trich. in exudates, saline smear, swim with undulating membrane
2. Pap smear
3. Fecal samples
4. In urethrititis Trich. seen in urine
5. No discharge in males – massage needed
6. Antigen detection
7. PCR
8. Culture

# Treatment

- Single dose of Metronidazole 2 gm once or metronidazole PO 500 mg TDS for 7 days
- Metronidazole is contraindicated in pregnancy due to its mutagenicity, so topical therapy with clotrimazole is applied
- Simultaneous treatment of both partners is recommended
- Tinidazole is an alternate drug
- Prognosis a full recovery (100%)

## **Epidemiology:**

1. Cosmopolitan, 16 – 35 yr olds
2. Highest in population at risk for other STDs. E.g 75% women with STIs have Trich.  
30% of pregnant women attending antenatal clinics
3. Infected males infect 100% their female partners
4. males are symptomless carriers
5. An estimated 200 million women suffer from trichomoniasis every year worldwide

# Prevalence of STDs among antenatal clinic attenders in developing countries.

Country	<b>Neisseria Gonorrhoeae</b> (%)	<b>Chlamydia trachomatis</b> (%)	<b>Treponema pallidum</b> (%)	<b>Trichomonas vaginalis</b> (%)
Gambia	6.7	6.9	1	32
Kenya	6.6	10.0	-	-
Swaziland	3.9	-	14	23
Zambia	11.2.	-	12.5	38
Nigeria	3.4	-	0.5	21
Ghana	3.4	7.7	-	-

# Risk factors

- Multiple sexual partners.
- A history of other sexually transmitted infections (STIs)
- A previous episode of trichomoniasis.
- Sex without a condom.

## **Prevention: Good personal hygiene**

- Barrier precautions as in other STDs (use of condoms)
- Avoidance of sexual contact with infected partners or avoidance of multiple sex partners
- Detection & treatment of cases either males/females
- **NO VACCINE IS AVAILABLE**

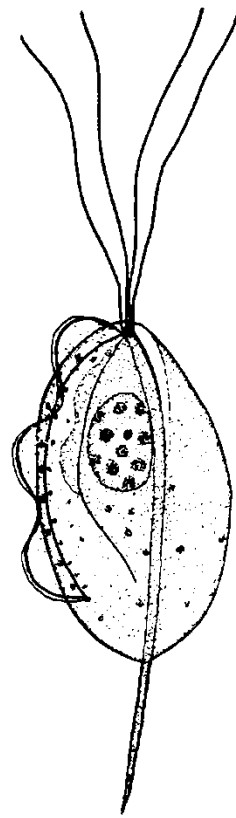
# Trichomonas tenax

## Habitat:

Mouth, Gingivals, margins of gums Tartar  
around teeth, cavities of carious teeth,  
tonsillar crypts

**Transmission:** close personal contact,  
kissing, sharing utensils

**Treatment:** oral hygiene



**Trichomonas tenax.** Comparative morphology of the trichomonad flagellates of man. Am. J. Trop. Med., 23:125-127.)

