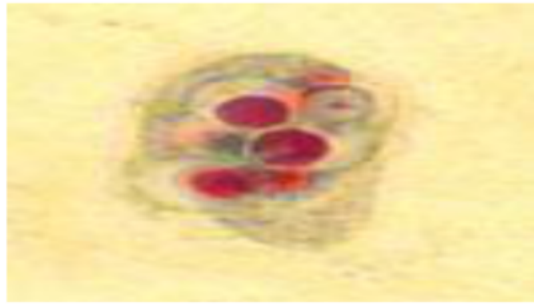


7. Entamoeba gingivalis

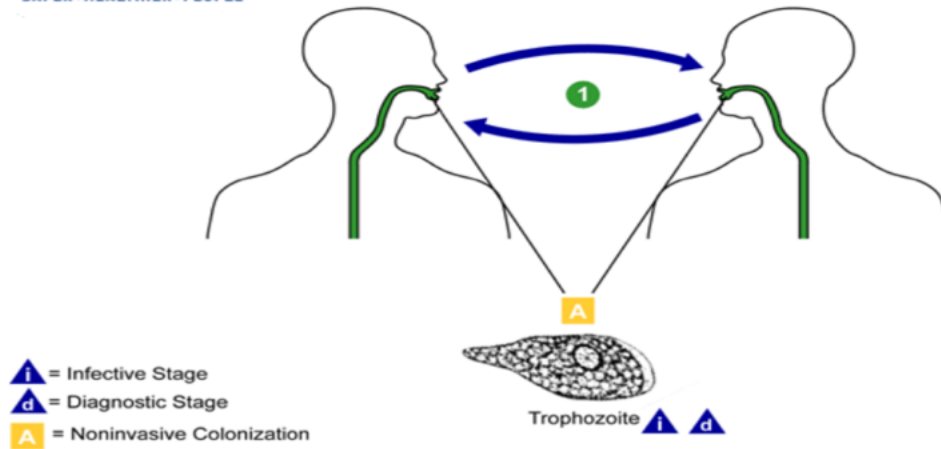


Entamoeba gingivalis trophozoite

Infective site: in the mouth; the organism thrives in diseased gums, but is not considered a causal agent or pathogen. If swallowed, it is destroyed in stomach.

Transmission: contact with fomites (drinking glasses, eating utensils, etc.; kissing).

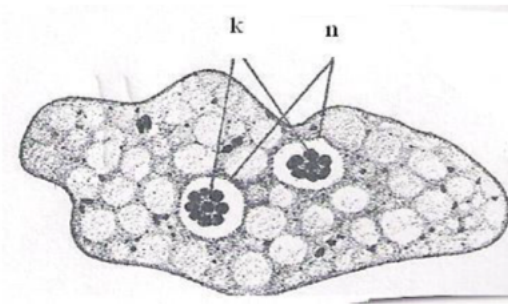
Morphology: The trophozoite is about 10–20 μm , actively motile with multiple pseudopodia. The cytoplasm contains food vacuoles with ingested bacteria, leucocytes, and epithelial cells. Nucleus is round with central karyosome lined by coarse chromatin granules. The amoeba lives in gingival tissues and is abundant in unhygienic mouths. It is a commensal and is not considered to cause any disease.



There is no known cyst stage for *Entamoeba gingivalis*; trophozoites live in the oral cavity of humans, residing in the gingival pockets near the base of the teeth **A**. They are not considered pathogenic, and feed on bacteria and other debris. Trophozoites are transmitted person-to-person orally by kissing or fomites (such as eating utensils).

8. *Dientamoeba fragilis*:

D. fragilis was previously considered as an amoeba but has now been reclassified as an amoeboflagellate, based on electron microscopic study and antigenic similarity to *Trichomonas*



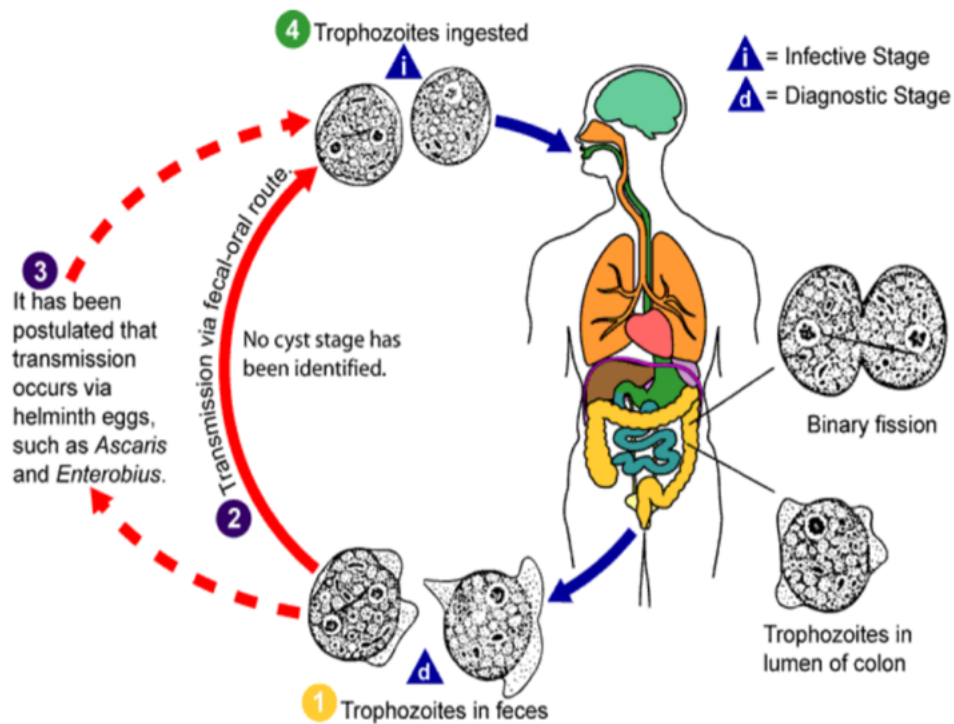
it has only trophozoite stage but no cyst stage. The name

Dientamoeba fragilis is derived from the binucleate nature of trophozoite (*Dientamoeba*) and the fragmented appearance (*fragilis*) of its nuclear chromatin. It lives in colonic mucosal crypts, feeding on bacteria. It does not invade tissues, but may rarely ingest RBCs.

Trophozoite :The trophozoite is 7–12 μm in diameter. It is motile with broad hyaline leaflike pseudopodia. They have 1–4 nuclei; the binucleate form being the most common. The nuclear chromatin is present as 3–5 granules in the center, with no peripheral chromatin on the nuclear membrane. It is transmitted from person to person by the fecal-oral route or by the eggs of *Enterobius vermicularis* and other nematodes, which may serve as a vector.

Pathogenicity: Formerly believed to be nonpathogenic, it has now been associated with a variety of symptoms like intermittent diarrhea, abdominal pain, flatulence, anorexia, nausea, malaise, and fatigue

Diagnosis: by demonstrate trophozoites in formed or diarrhetic stool.



Free – Living Pathogenic amoebae:-

Some free-living amoebae (facultative) can cause serious even fatal disease if reach human body. These amoebae has found to have the ability to live in the tissues of mammals.

It can invade human nervous system, usually result in the death of the patient.

Naegleria fowleri (brain – eating amoeba):-

N. fowleri causes the disease **primary amoebic meninge encephalitis** (PAM), a brain infection that leads to destruction of brain tissue.. It is a heat-loving (thermophilic) amoeba that thrives in warm water at low oxygen tension and is commonly found in warm freshwater (e.g. lakes, rivers, and springs) and soil. It is world wide in distribution.

Morphology

N. fowleri occurs in 3 forms:

1. Cyst
2. trophozoite: a-Amoeboid trophozoite form b- Flagellate trophozoite form

Amoeboid form

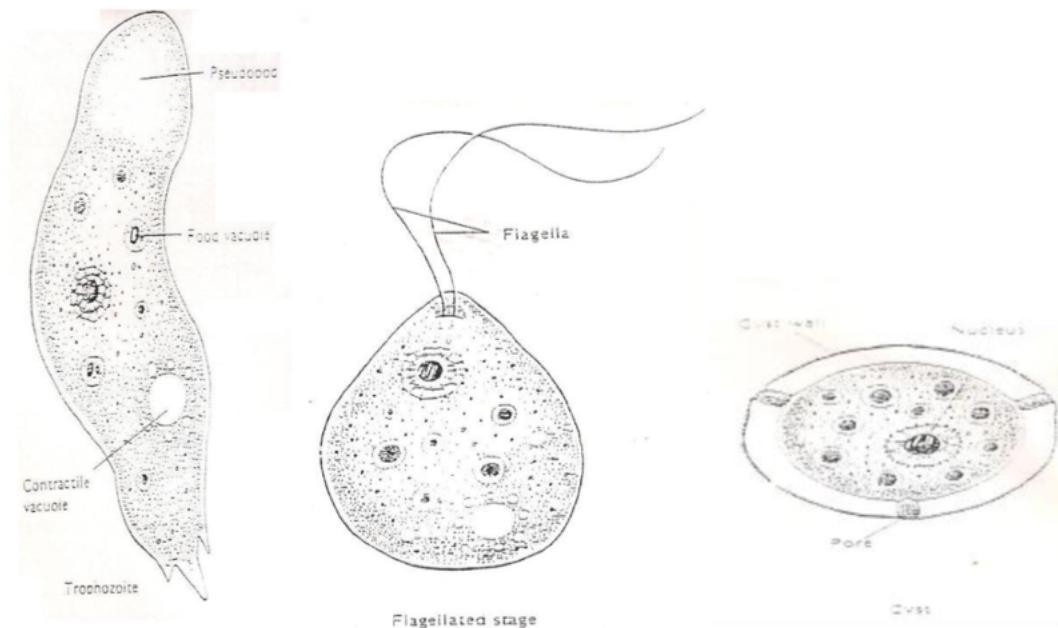
The amoeboid form is about 10–20 μm , showing rounded pseudopodia (lobopodia), a spherical nucleus with big endosome, and pulsating vacuoles. With electron microscopy, vacuole appear to be densely granular in contrast to highly vacuolated body of amoeba and are **called as amoebostomes**. They are used for engulfing RBCs and WBCs and vary in number, depending on the species. € Amoeboid form is the feeding, growing, and replicating form of the parasite, seen on the surface of vegetation, mud, and water. € It is the invasive stage of the parasite and the infective form of the parasite.

Flagellate form:

The biflagellate form occurs when trophozoites are transferred to distilled water. This transformation of trophozoites to biflagellate pear-shaped form occurs within a minute. The flagellate can revert to the amoeboid form, hence *N. fowleri* is classified as amoebiflagellate.

Cyst Stage :

Trophozoites encyst due to unfavorable conditions like food deprivation, desiccation, cold temperature, etc. The cyst is 7–10 μm in diameter and has a smooth double wall. € They are the resting or the dormant form and can resist unfavorable conditions, such as drying and chlorine up to 50 ppm.

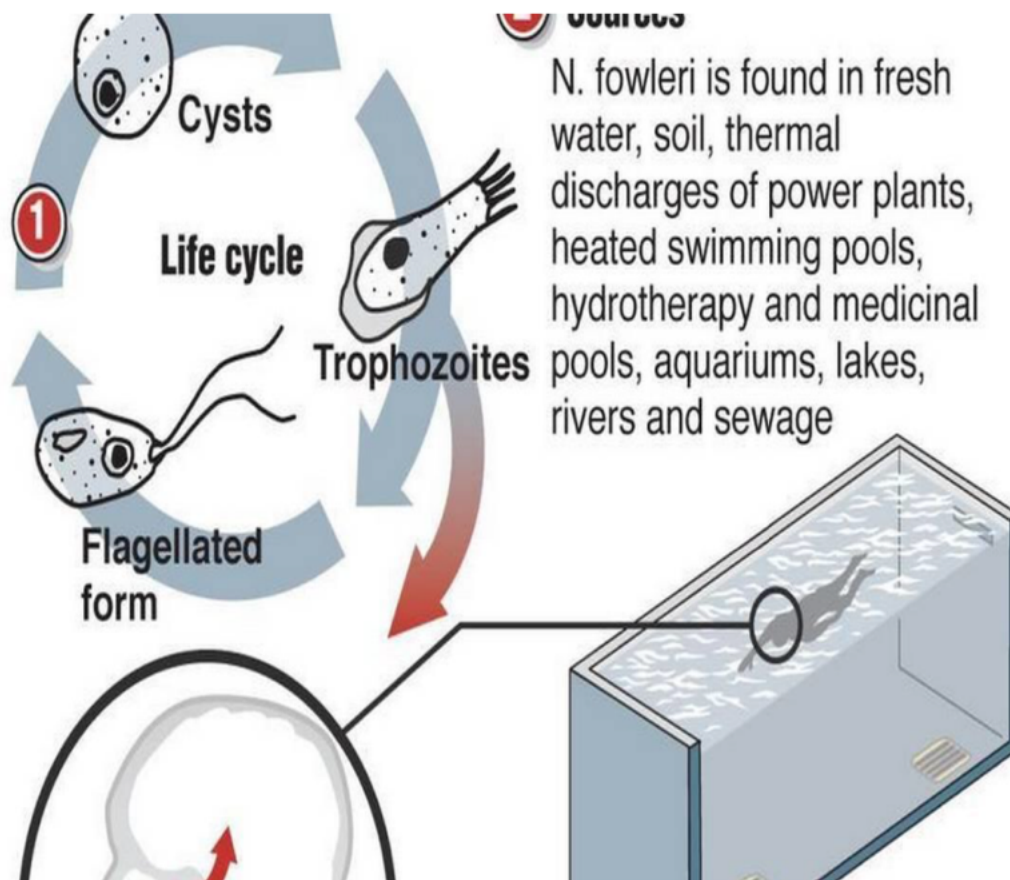


The trophozoites can withstand moderate heat (45°C), but die at chlorine levels of 2 ppm and salinity of 0.7%. € Cysts and flagellate forms of *N. fowleri* have never been found in tissues of cerebrospinal fluid (CSF).

Life Cycle

Typically, infection occurs when people go swimming or diving in warm freshwater river or ponds and poorly maintained swimming pools or nasal irrigation using contaminated tap water. The life cycle of *N. fowleri* is completed in the external environment. The

amoeboid form of trophozoite multiplies by binary fission. Under unfavorable conditions, it forms a cyst and which undergoes excystation in favorable conditions. Flagellate form of trophozoite helps in the spread of *N. fowleri* to new water bodies. Since the amoeboid form is the invasive stage, hence, the flagellate forms revert to amoeboid forms to become infective to man.

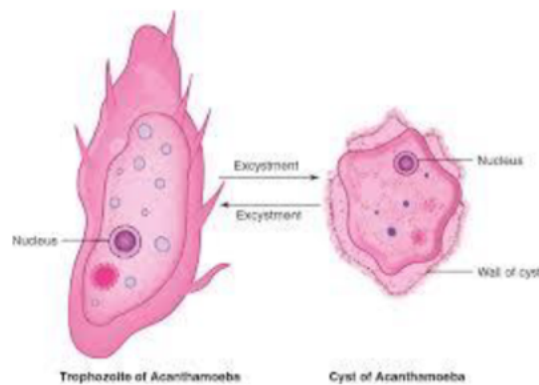


Pathogenesis:-

Early in the infection the patient complains of upper respiratory tract symptoms e.g. running nose, sore throat, fever and headache. Within 2 – 3 days the headache becomes more severe and there may be vomiting, stiff neck, mental confusion, coma as a result of intracranial pressure. Death usually within 10 days of the onset of symptoms.

Diagnosis:-

1. Direct demonstration of motile amoebae in unstained CSF or nasal discharge.
2. Stained smear of CSF.
3. Stained section of brain tissue at autopsy.
4. Culture on non-nutrient agar medium coated with *E. coli* bacteria.
5. Serological tests.

Acanthamoeba spp.

it is found in **moist soil and in the air and water**. *Acanthamoeba* exists as active trophozoite form and a resistant cystic form.

The trophozoite

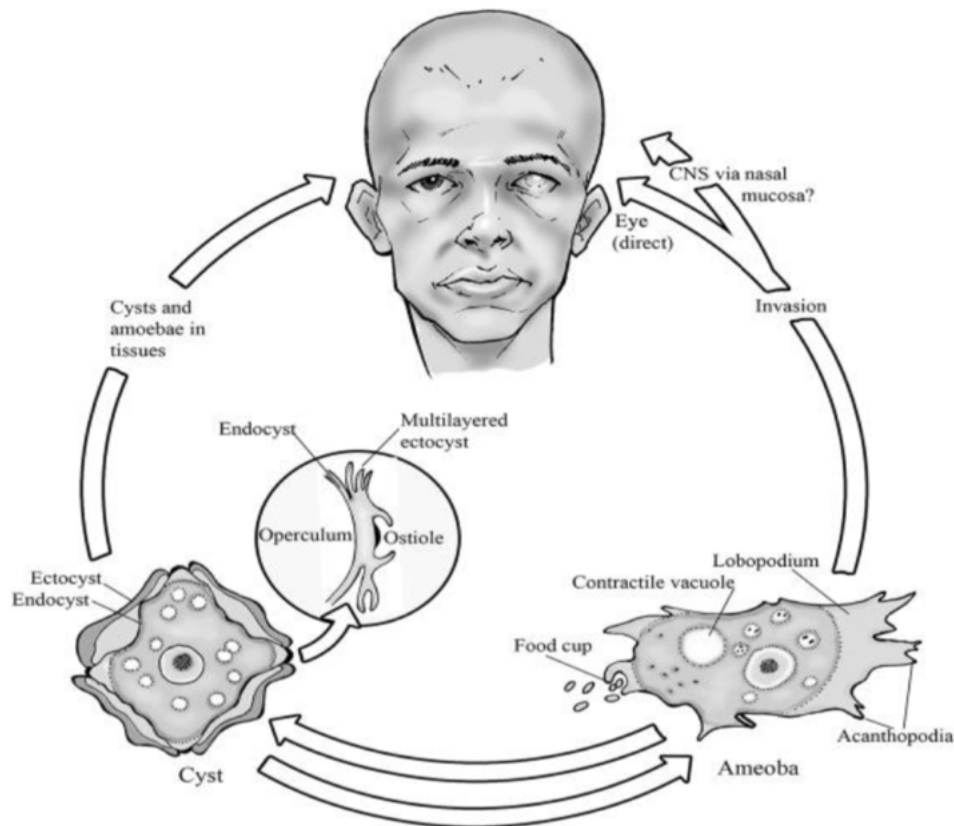
is large, 20–50 μm in size and characterized by spine-like pseudopodia (acanthopodia). It differs from *Naegleria* in not having a flagellate stage and in forming cysts in tissues.

Cyst

The polygonal double-walled cysts are highly resistant. The cysts are present in all types of environment, all over the world.

Life Cycle:-

Both trophozoites and cysts are infective. Human beings acquire by inhalation of cyst or trophozoite, ingestion of cysts, or through traumatized skin or eyes. After inhalation of aerosol or dust containing trophozoites and cysts, the trophozoites reach the lungs and from there, they invade the central nervous system through the blood stream, producing granulomatous amoebic encephalitis (GAE).



Symptoms: slow onset (10 or more days). Presents as chronic, granulomatous lesions in brain. In eye lesions, the infection resembles a herpes virus infection.

Diagnosis:

1. By finding amoebae in wet mount (10% KOH) of corneal ulcer scraping or in stained smear.

2. By isolation of amoebae from contact lenses or washing solutions.

Superclass Mastigophora

the flagellates; members of this group can inhabit mouth, bloodstream, tissues, gastrointestinal, or urogenital tracts.

Morphological Characteristics:-

1. Flagellum(ae) - characteristic organelle of locomotion. It is an extension of ectoplasm and resembles a tail; moves with a whip-like motion.
2. Axostyle - a supporting mechanism; a rod-shaped structure; not all Genera exhibit these.
3. Undulating membrane - a protoplasmic membrane with a flagellar rim extending out like a fin along the outer edge of the body of some flagellates. Moves in a wave-like motion.
4. Costa - a thin, firm rod-like structure running along the base of the undulating membrane in some flagellates.
5. Cytosome - a rudimentary mouth; also referred to as a gullet.

Note: Identification of a flagellate is based upon:-

1. Size
2. Shape
3. Motility
4. Number and morphology of nuclei
5. Number and location of flagellae