

CHARACTERISTICS OF PROTOZOA

1) SHAPE

1. Protozoa do not have a cell wall and therefore can have a variety of shapes.

Nevertheless, some of the protozoans have a pliant layer, a pellicle^(zooflagellates), or a stiff shell outside the cell membrane.

*2) HABITAT

Protozoa prefer living in moist and aquatic habitats. Their cysts can be found in the bleakest part of the ecosphere.

Protozoas are found drifting in the oceans, seas, and freshwater. They are at the base of food chains.

3) MODE OF NUTRITION

The mode of nutrition of protozoa is heterotrophic, and most species obtain food by phagocytosis. Phagocytosis is the process where the cell changes shape by sending out pseudopodia to make contact with food particles.

*4) INTAKE OF FOOD

Protozoa take food into the cell at a point called the cytostome^(zooflagellates). The food is ingested by them and lysosomal enzymes digest the food. There are also certain types

of protozoa that take in food by their cell membranes. Some others such as the amoeba, surround food and absorb it. Others have mouth pores into which they pull in food.

5) DIGESTION OF FOOD

Protozoans digest their food in spaces called vacuoles. Contractile vacuoles that are found in protozoa thriving in freshwater, excrete water that penetrates into the cells by osmosis. While chewing down the food, protozoans ~~or~~ produce and release nitrogen.

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6) LOCOMOTION

Protozoa species move on their own by one of the three types of locomotor organelles such as flagella, cilia, or pseudopodia.

7) REPRODUCTION

Protozoa reproduce by the method of binary fission or multiple fission. Some of the members reproduce by asexual mode, some by sexual ~~mode~~ means, and some by both.

1) PHYLUM ZOOFLAGELLATES OR KINETOPLASTIDS OR MASTIGOPHORE

KINETOPLAST

Phylum Kinetoplastids is characterized by the presence of an organelle with a large massed DNA called kinetoplast (hence the name). Kinetoplast is an unusual DNA-containing granule located within the single mitochondrion associated with the base of cell's flagella (the basal body).

PARASITES

The group includes a number of parasites responsible for serious diseases in humans and other animals, as well as various forms found in soil and aquatic environments.

EUKARYOTES Koracademy.com

Kinetoplastids are eukaryotic and possess normal eukaryotic organelles, e.g. the nucleus, mitochondrion, golgi apparatus and flagellum. Along with these universal structures kinetoplastids have several distinguishing morphological features such as the kinetoplast.

CYTOSKELETON

The cytoskeleton of kinetoplastids is primarily made up of microtubules.

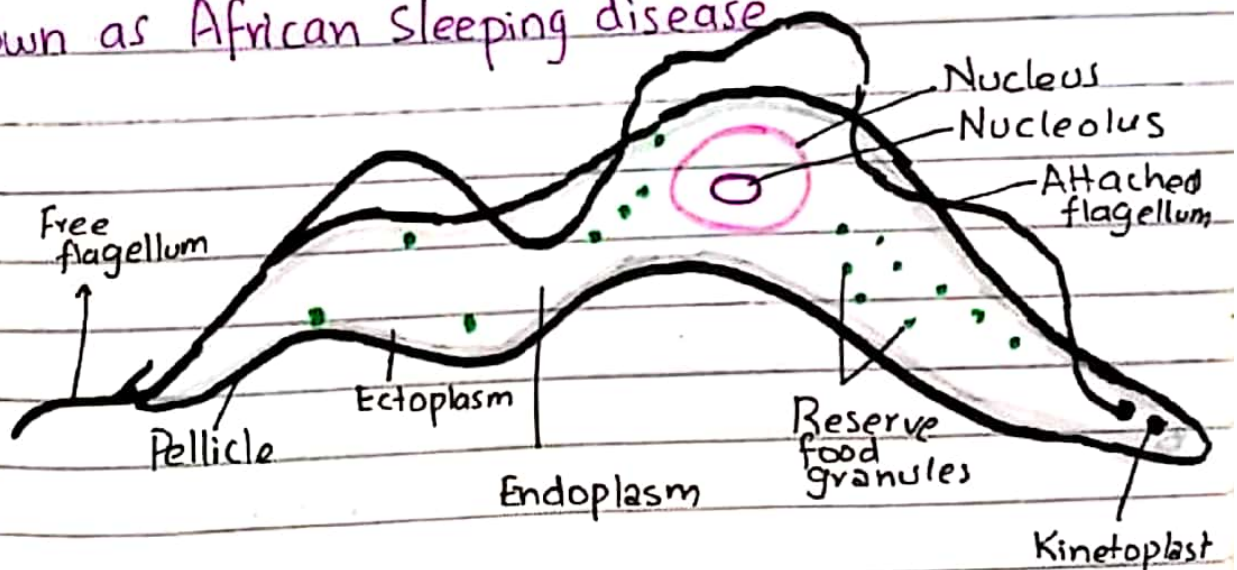
FLAGELLA

All kinetoplastids possess at least one flagellum. The flagella are used for locomotion and attachment to surfaces. The base of the flagella are found in a specialized pocket surface structure which is also the location of cytostome.

EXAMPLES

1. TRYPANOSOMES

Trypanosomes are kinetoplastids which cause many serious human diseases the most familiar being **trypanosomiasis**, also known as African sleeping disease.



Structure of Trypanosoma

2. TRACHONYMPH

Termites feed upon wood but they cannot digest it due to the absence of a specific enzyme which brings about the breakdown of to digest the wood eaten by termite. Trachonymph lies in the digestive tract of termites which

produce an enzyme that helps in the digestion of wood.

2) PHYLUM SARCODINA

EXAMPLE: AMOEBA

SHAPE

Amoebas are the soft, shapeless masses of cytoplasm. The change in shape is brought about by cytoplasmic streaming which forms cell extensions called pseudopodia.

PSEUDOPODIA Koracademy.com

The pseudopodia are the means of both locomotion and food procurement. Amoebae move and feed by using pseudopods, which are bulges of cytoplasm formed by the coordinated action of actin microfilaments pushing out the plasma membrane that surrounds the cell.

INTAKE OF FOOD THROUGH PSEUDOPODIA

Pseudopodia stream around the prey and engulf it in a vacuole. The prey is digested by enzymes and the digested parts are absorbed into the cytoplasm.

OUTER SHELL

Free-living amoeba may be "testate" (enclosed within a hard shell) or "naked" (lacking any hard covering). The shells of testate amoeba may be composed of various substances, including calcium, silica, chitin etc.

OCCURANCE / HABITAT

Amoebas are abundant throughout the world in fresh and salt waters and in soil.

CONTRACTILE VACUOLE

To regulate osmotic pressure, most freshwater amoebae have a contractile vacuole which expels excess water from the cell.

Marine amoeba do not usually possess a contractile vacuole.

PHAGOCYTOSIS

Amoeba typically ingest their food by phagocytosis, extending pseudopods to encircle and engulf live prey or particles of scavenged material.

REPRODUCTION

Amoeba reproduces by binary fission

FOOD SOURCE

The food sources of amoebae vary. Some amoebae are predatory and live by consuming bacteria and other protists. Some are detritivores and eat dead organic material.

Many species are parasites of animals and humans.

DYSENTERY

Entamoeba ~~by~~ *histolytica* cause dysentery. Dysentery is a type of gastroenteritis that results in diarrhea with blood.

When amoeba inside the bowel of an infected person are ready to leave the body, they group together and form a shell that surrounds and protects them. This group of amoeba is known as a cyst, which is then passed out of the person's body in the feces and can survive outside the body. If hygiene standards are poor then it can contaminate the surrounding, such as nearby food and water. If another person then eats or drinks food or water that has ~~become~~ been contaminated with feces containing the cyst, that person will also become infected with the amoeba. Amoebic dysentery is particularly common in parts of the world where human feces are used as fertilizer. After entering the person's body through the mouth, the cyst travels ^{into} down the stomach. The amoeba inside the cyst ^{stays safe} from the stomach's digestive acid. From the stomach, the cyst travels to the intestines, where it breaks open and releases the amoeba, causing the infection. The amoeba can burrow into the walls of the intestines and cause small abscesses and ulcers to form. The cycle then begins again.

3. FORAMINIFERA

Foraminifera is a Latin word which means hole bearer.

HABITAT

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Most foraminifera are marine, but living individuals have been found in freshwater and even terrestrial habitats. Forams are so abundant in sea that their shells litter the seafloor.

MODE OF NUTRITION

Members of Foraminifera are heterotrophic in nature.

SHELLS (TEST)

Members of Phylum Foraminifera resemble tiny snails. They secrete beautifully sculpted shell (called a 'test') made out of calcium carbonate or limestone.

PSEUDOPODIA

There are found microscopic holes in their shells through which their pseudopodia spoke. Food particles stick to these cellular extensions and are then absorbed into the cell.

IMPORTANCE

They help in determining the geological age of the strata.

4. PHYLUM SPOROZOA OR APICOMPLEXES

Api means top
Complexes means infolds

Api complexes are spore-forming, unicellular parasites of animals. They are called apicomplexes because of the unique arrangement of fibrils, microtubules, vacuoles and other cell organelles at one end of the cell.

EXAMPLE: PLASMODIUM

The best known ~~example~~ apicomplex is malarial parasite *Plasmodium*. ^{Female Anopheles mosquito is the carrier of plasmodium.} When an infected female Anopheles Mosquito bites a person, sporozoites (needle shaped spores) are injected into the blood stream. Sporozoites are carried to the liver where they stay and divide (for ~~up to~~ 5-15 days) forming large number of merozoites (spherical or round shaped spores). Merozoites emerge (come out) from the liver and invade (enter) red blood cells and start reproducing more merozoites. ^{when they rupture the RBCs they} ~~which~~ again enter other red blood cells. The host at this stage starts showing the symptoms of malaria including chill and fever accompanied by nausea, vomiting and severe headache. Some of the merozoites convert into gametophytes and these gametophytes develop

Apicomplexes lack contractile vacuoles and locomotor processes.

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into male and female gametes. If the infected human host is again bitten by a female Anopheles mosquito, these gametes are taken by the mosquito (when it sucks blood) and sexual reproduction starts. The male gamete fertilizes the female gamete to produce a zygote. The zygote reaches the midgut of the mosquito and then encysts (covers itself with a cyst) forming an oocyst. The oocyst produces a number of sporozoites and transfers to the salivary glands of the mosquito. When this mosquito bites a healthy person, the sporozoites are discharged into the body ~~of~~ of the host and a new cycle starts.

APICOPLAST / UNIQUE ORGANELLE

Apicomplexes possess a unique form of organelle that comprises a type of plasmid called an apicoplast, and an apical complex structure. The organelle is an adaptation that the apicomplexes apply in penetration of a host cell.

FLAGELLA

Flagella are found only in motile gametes. Otherwise they have no locomotor processes.

MODE OF NUTRITION

Apicomplexes are parasitic. They feed by absorbing either dissolved food ingested by the host or the host's cytoplasm and body fluids.