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Topic

Nutrition in Amoeba

Delivered by,

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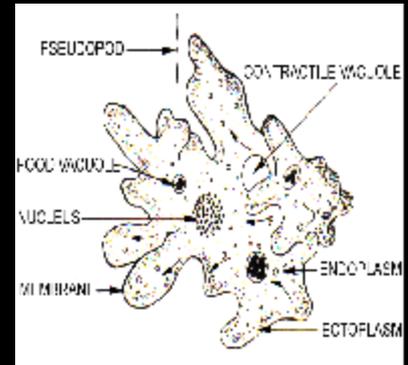
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Nutrition:-

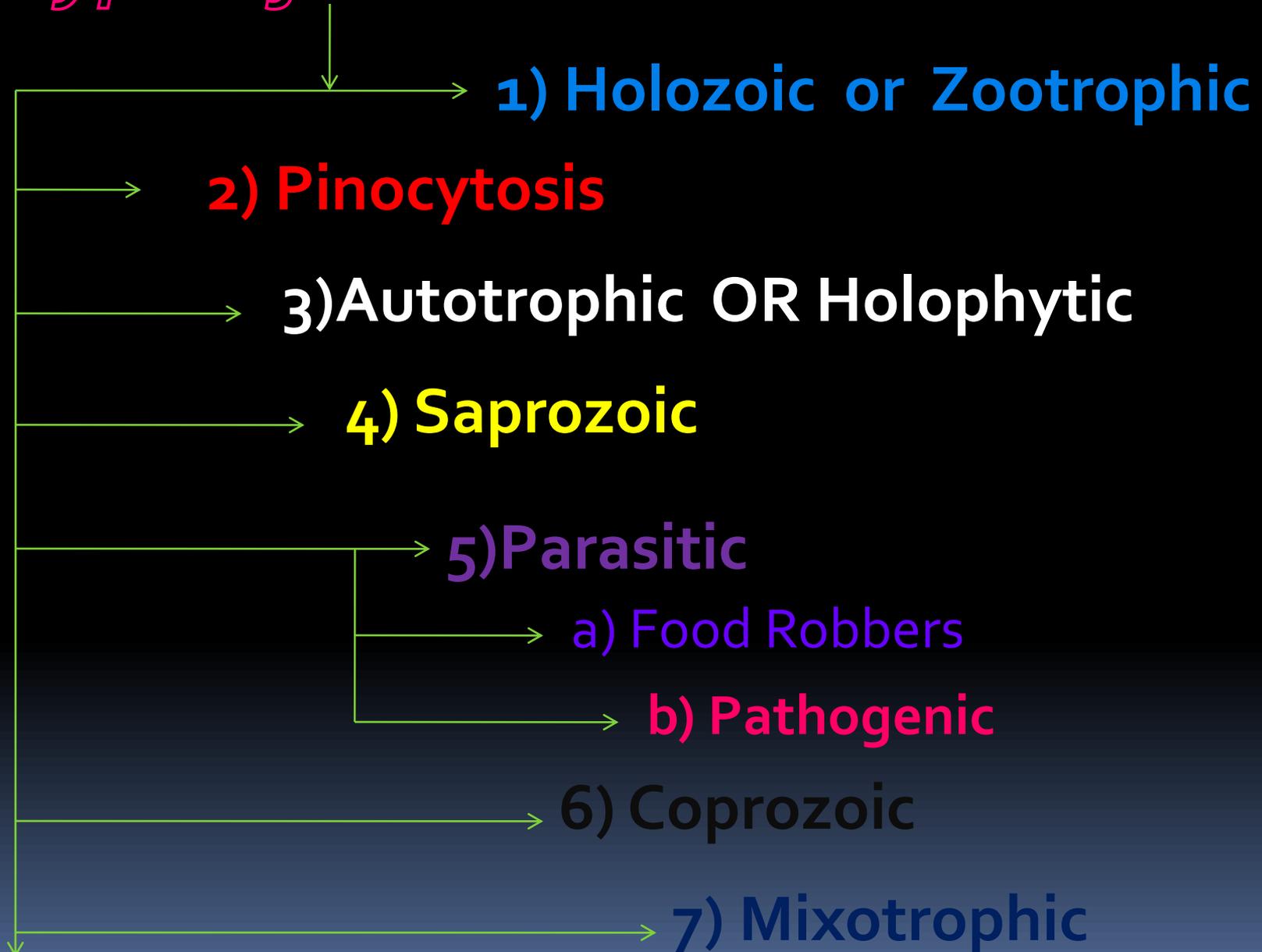


A process in which food is taken in, digested, absorbed and assimilated.

OR

The process by which organism derived their nutrients necessary for their growth and maintenance of their life activities.

Types of Nutrition in Protozoa



Holozoic Nutrition

Majority of Protozoa nutritive holozoically, i.e., like animals on solid food. The food of Protozoa consists of microorganisms like bacteria, diatoms, rotifers, crustacean larvae, other protozoans, algae, small fragments of large animals and plants, etc. This mode of nutrition essentially involves the processes like intake of food, i.e., ingestion, digestion, absorption and egestion of undigested residues.

Ingestion:

The food is captured by flagella in protozoans and ingested at definite site through cytostome or cytopharynx.

* In some flagellates like *Paramecium* rod like structure called Trichites helps for Ingestion.

* In *Sarcodina*, pseudopodia helps in food capturing by forming food cup.

In ciliates like *Paramecium*, the feeding apparatus is well developed with a definite cytostome. The cytostome is usually present at the base of the oral groove leading into the cytopharynx. The feeding apparatus is provided with some specialised cilia. The beating of the cilia of cytopharynx creates a whirl pool of water current. The food particles in the water current are directed into the cytopharynx through cytostome.

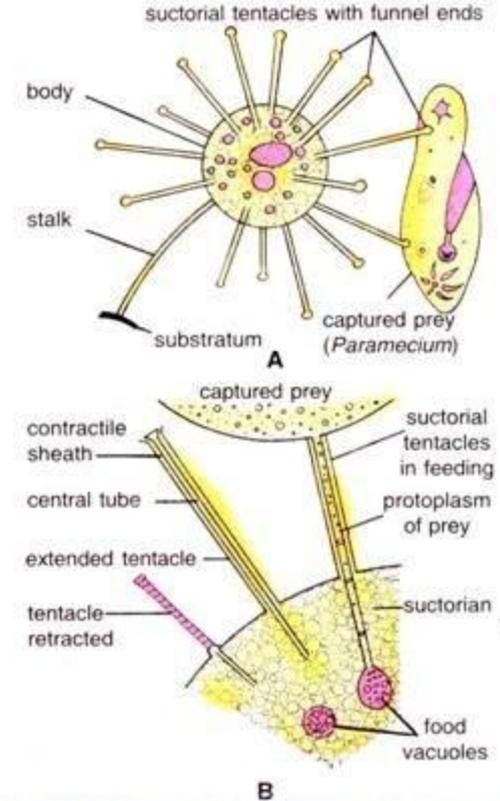
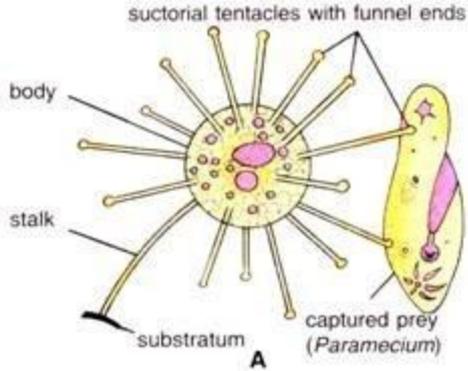
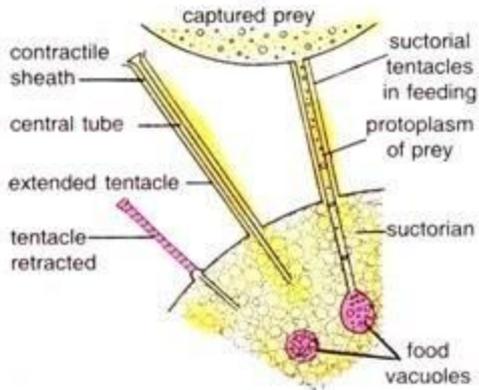


Fig. 23.6. Mode of feeding in Suctoria. A—*Podophrya* (a suctorian) sucking *Paramecium* (prey). B—Prey's cytoplasm flowing through tubular tentacle in suctorian's body.



A



B

Fig. 23.6. Mode of feeding in Suctoria. A—*Podophrya* (a suctorian) sucking *Paramecium* (prey). B—Prey's cytoplasm flowing through tubular tentacle in suctorian's body.

The mode of feeding in suctorians is very characteristic, they feed with the help of their tentacles which are mostly knobbed at their tips. Each tentacle consists of a central tubular canal surrounded by a contractile sheath. The prey, when comes in contact with the tips of tentacles, soon gets adhered and paralyzed by some toxin secreted by the suctorian.

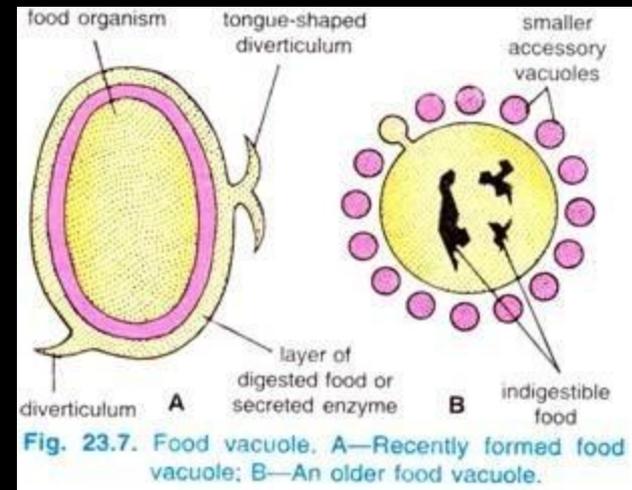
The prey's cytoplasm is then gradually sucked into the suctorian body through the central tubular canal of the tentacles .

Digestion

Digestion in Protozoa is intracellular within food vacuoles. The food vacuoles undergo changes in pH and in their size during digestion. At first the contents of the food vacuole are acidic and the vacuoles decrease in size, during this phase living prey dies.

After the initial acid phase the cytoplasm of the protozoan produces enzymes in an alkaline medium, the enzymes pass into the food vacuoles and the vacuoles increase in size and become alkaline.

Then the contents of the vacuoles are digested. In fact, proteolytic and carbohydrate digesting enzymes are reported in Protozoa; the proteins are converted into dipeptides in acidic medium and the dipeptides into amino-acids in alkaline medium. The carbohydrates are hydrolysed in alkaline medium. The fat digesting enzymes have also been reported in some Protozoa.



Absorption & Assimilation

The digested food from the food vacuole is diffused out into the endoplasm and finally assimilated in the body to manufacture the protoplasm. The excess of food is stored in form of glycogen paramylon, Para glycogen bodies in the endoplasm.

Egestion

The undigestible remains of the food are egested out from the body at anybody surface, e.g., in Amoeba. But ciliates possess a definite opening for the egestion of undigested remains called cytoproct or cytopyge.

The summarized process used in Holozoic nutrition

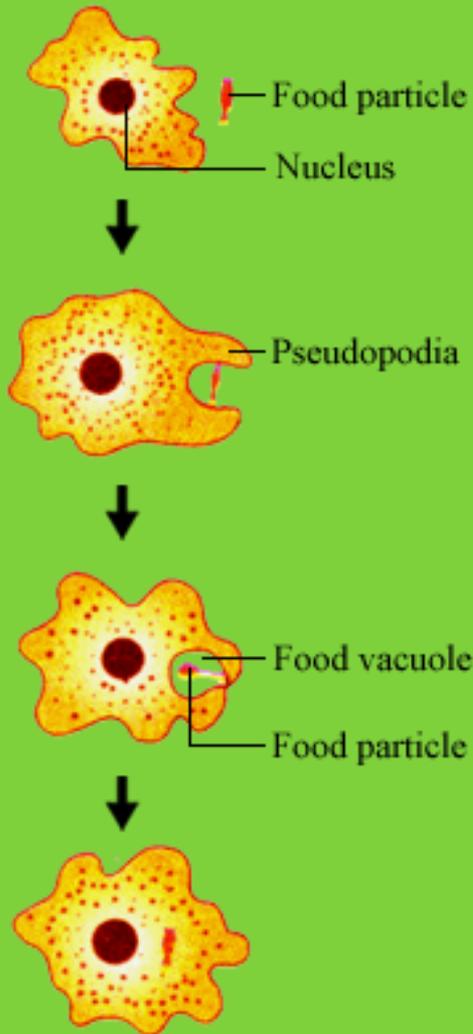
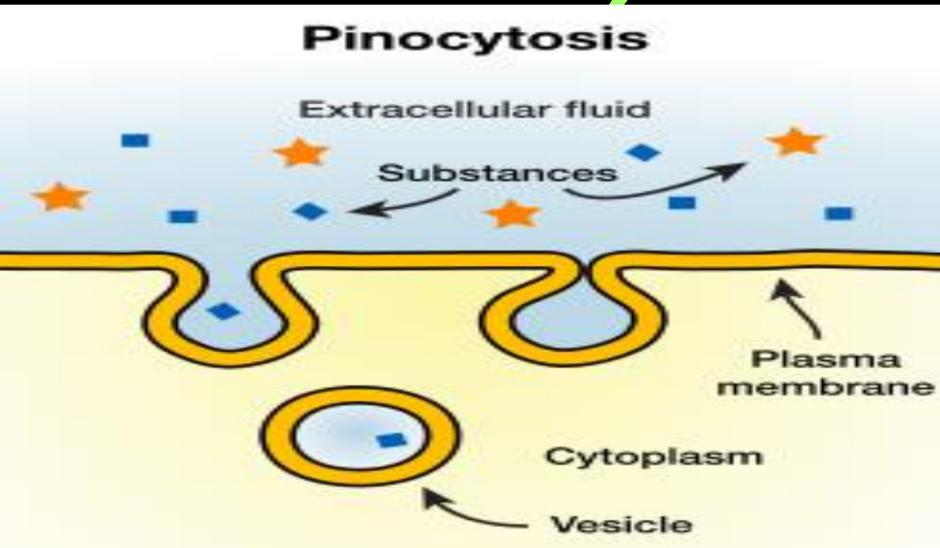


Fig:- Holozoic nutrition by Amoeba.

2) Pinocytosis

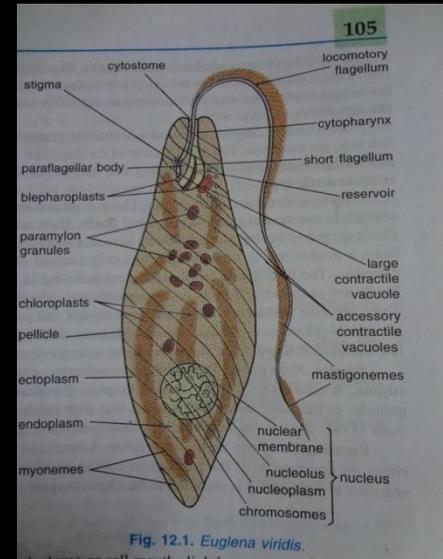


Pinocytosis or cell-drinking has also been reported in some Protozoa like Amoeba proteus, and also in certain flagellates and ciliates.

It is related to the ingestion of liquid food by invagination of the general body surface. It may occur at any part of the body; during pinocytosis, some pinocytic channels are formed from the outer body surface deep into the body. The inner ends of these channels' contain pinocytic vesicles or pinosomes which get separated after engulfing liquid food through the channels. The separated pinosomes become the food vacuoles. This process is induced in presence of certain salts and some proteins.

3) Autotrophic or Holophytic Nutrition

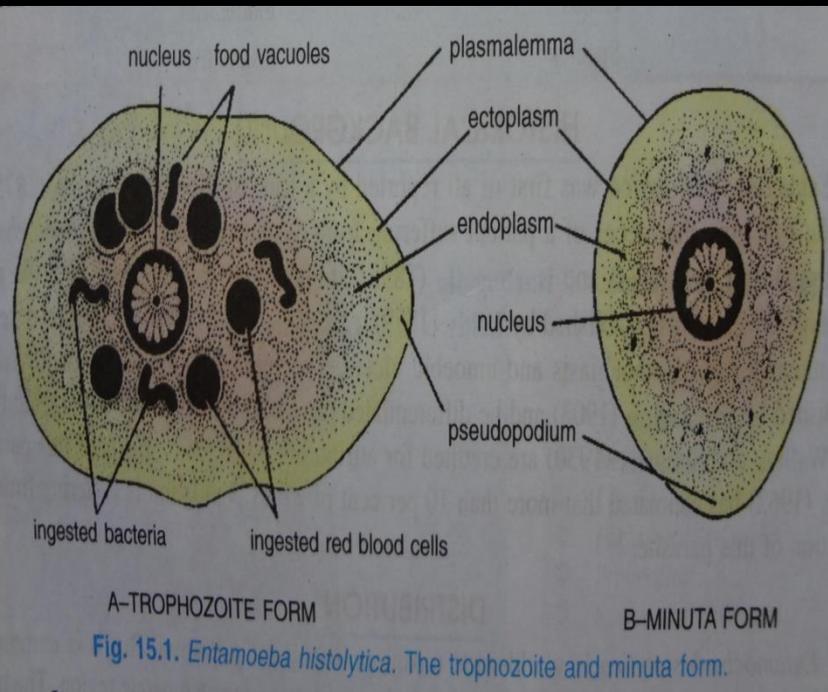
Protozoa with chlorophyll or some allied pigment can manufacture complex organic food, like those of green plants, from simple inorganic substances, e.g., *Euglena*, *Noctiluca*. Often there may be protein bodies called pyrenoids which are the centres of photosynthesis.



Euglena viridis

Some Protozoa have no chromatophores but they have chlorophyll-bearing algae Zooxantliellae or Zoochldrellae which manufacture organic food for the host by photosynthesis, e.g., *Stentor*, *Thalassicola*, *Paramecium bursaria*. Nitrates or ammonium compounds are sufficient as the source of nitrogen for autotrophic forms.

4) Saprozoic Nutrition



The saprozoic Protozoa are usually parasites like *Monocystis*. But some parasites, like *Entamoeba histolytica* and *Balantidium coli* feeding holozoically also absorb dissolved organic substances through their general body surface. However, some colourless flagellates like *Chilomonas*, *Polytoma* and species of *Euglena* absorb nutrients from their surrounding environment through their general body surface.

Entamoeba histolytica

Some Protozoa absorb complex organic substances in solution through the body surface by the process of osmosis called osmotrophy. These Protozoa are called saprozoic. Saprozoic forms need ammonium salts, amino acids, or peptones for their nutritional requirements. Decaying of animals and plants in water forms proteins and carbohydrates.

5. Parasitic Nutrition:

The parasitic forms feed either holozoically or saprozoically.

Thus, the parasites may be grouped into two categories on the nature of food and their mode of feeding:

(i) Food-robbers:

The parasites feeding upon the undigested or digested foodstuffs of their hosts are known as food-robbers, such as some ciliate parasites like *Nyctotherus*, *Balantidium*. These parasites feed holozoically on solid food particles, while few others like *Opalina* feed upon the liquid food by the process of osmosis through their general body surfaces. The food-robbers are generally non-pathogenic to their hosts.

(ii) Pathogenic:

The protozoan parasites causing harm to their hosts, usually feed upon the living tissues of the host. They absorb liquid food through their general body surface, e.g., *Trypanosoma*, *Plasmodium*, etc.

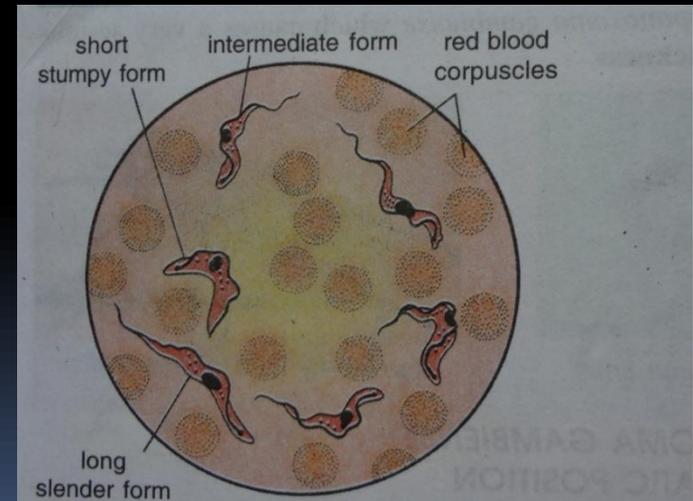


Fig. 13.1. *Trypanosoma gambiense*. Human blood smear to show its various forms.

Trypanosoma gambiense

6.) Coprozoic Nutrition:

Certain free-living protozoans are in habit of feeding upon the faecal matters of the other organisms like *Clamydophrys* and *Dimastigamoeba*.

7. Mixotrophic Nutrition:

Some Protozoa nourish themselves by more than one method at the same time or at different times due to change in environment. This is called mixotrophic nutrition, e.g., *Euglena gracilis* and *Peranema* are both saprozoic and autotrophic in their nutrition, and some flagellates are both autorophic and zootrophic.

However, Protozoa which feed on a large variety of food organisms are called euryphagous, and those which feed only on a few kinds of food are stenophagous.

Queries ?



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A photograph of several bright yellow flowers, possibly poppies, against a clear blue sky. The flowers are in various stages of bloom, with some fully open and others as buds. The lighting is bright, creating a high-contrast, cheerful scene. The text 'Thank you!' is overlaid on the right side of the image in a pink, 3D-style font.

Thank you !