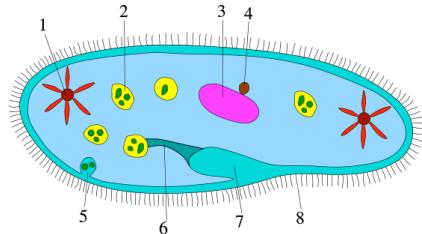


Life from the pond

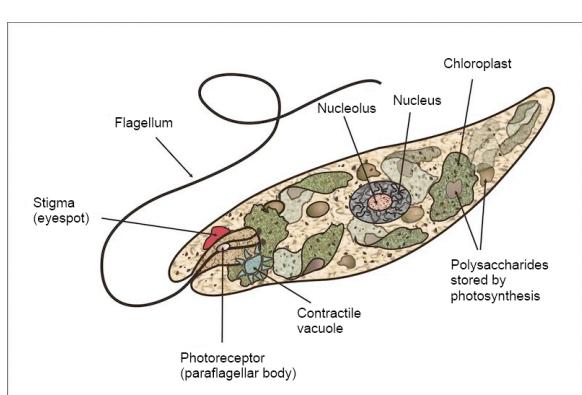
Paramecium is a group of unicellular ciliate protists (phylum Ciliophora, family Paramecidae), and can measure up to 0.5mm in length. Simple cilia cover the cell and beat with a synchronous motion allowing the paramecia to move at speeds of approximately 12 body lengths per second. They feed through a deep oral groove containing tongue-like compound oral cilia used to draw food inside.



1-contractile vacuole, 2- digestive vacuole, 3-macronucleus, 4-micronucleus, 5-cytoprocto, 6-cytopharynx, 7-cystostome, 8-cilium.

They feed mostly on bacteria, but also on small algae or yeasts. Osmoregulation is carried out by a pair of contractile vacuoles, which actively expel water from the cell absorbed by osmosis from their surroundings. Reproduction is usually asexual by transverse binary fission, occasionally sexual by conjugation. Paramecia are widespread in freshwater environments, with very few species found in the sea.

Chlamydomonas is a genus of unicellular photosynthetic algae (kingdom Plantae, phylum Chlorophyta) of average 10mm in length, and an important model for research of fundamental processes such as photosynthesis, motility, responses to stimuli such as light, and cell-cell recognition. *Chlamydomonas reinhardtii*, the most commonly studied species of *Chlamydomonas*, has a relatively simple genome, which has been sequenced. They can be found in soil, fresh water, oceans, and even in snow on mountaintops. Chlamydomonas have a cellulose membrane (*theca*), a chloroplast, an eyespot (*stigma*) and two anterior flagella with which they can swim using a breaststroke type motion. Although photosynthesis occurs, nutrients also may be absorbed through the cell surface. Asexual reproduction is by zoospores and sexual reproduction occurs by formation of gametes.



Euglena is a genus of unicellular protists measuring 25-100mm, of the class Euglenoidea of the phylum Euglenozoa (also known as Euglenophyta). Euglena can feed by *heterotrophy*, by surrounding a particle of food and consuming it by phagocytosis, and by *autotrophy*, using chloroplasts containing chlorophyl and some carotenoid pigments to produce sugars by photosynthesis. Euglenas are able to move in aquatic environments using

a large flagellum for locomotion. They contain an eyespot, a primitive organelle that filters sunlight into the light-detecting photo-sensitive structures at the base of the flagellum, which they use to move in the direction of light. Euglena can survive in fresh and salt water. In low moisture conditions, Euglena forms a protective wall around itself and lies dormant as a spore until environmental

conditions improve. Euglenas reproduce asexually through transverse division and longitudinal division.

Tetrahymena is a group of unicellular ciliate protists (phylum Ciliophora, family Tetrahymenidae), widely used in biomedical research. Studies on *Tetrahymena* have contributed to several scientific milestones such as the identification and purification of the first cytoskeleton motor protein- dynein - and determination of its directional activity, one of earliest molecular descriptions of somatic genome rearrangement, Nobel-prize winning discovery (2009, in Physiology or Medicine) of the molecular structure of telomeres and telomerase enzyme and their roles in cellular senescence and chromosome healing, Nobel-prize winning co-discovery (1989, in Chemistry) of catalytic RNA (ribozyme) among others.

Volvox is a genus of freshwater green algae (kingdom Plantae, phylum Chlorophyta) that forms spherical or oval hollow colonies containing from 500 to 50,000 bi-flagellated cells embedded in an extracellular matrix made of a gelatinous glycoprotein. The cells swim in a coordinated fashion, with distinct anterior and posterior poles, and they have eyespots, which enable the colony to swim towards light. Asexual colonies have reproductive cells (gonidia) that produce small daughter colonies within the parent. Developing ova or spermatozoa replace gonidia in sexual colonies. Fertilization of eggs results in zygotes, which encyst and are released from the parent colony usually at the end of summer and serve as winter resting stages. *Volvox* exhibits differentiation between somatic and reproductive cells, a phenomenon considered by some zoologists to be significant in tracing the evolution of higher animals from Protozoa. Certain species, in which somatic cells appear to be joined by cytoplasmic strands called protoplasmates, may be considered as multicellular organisms.

