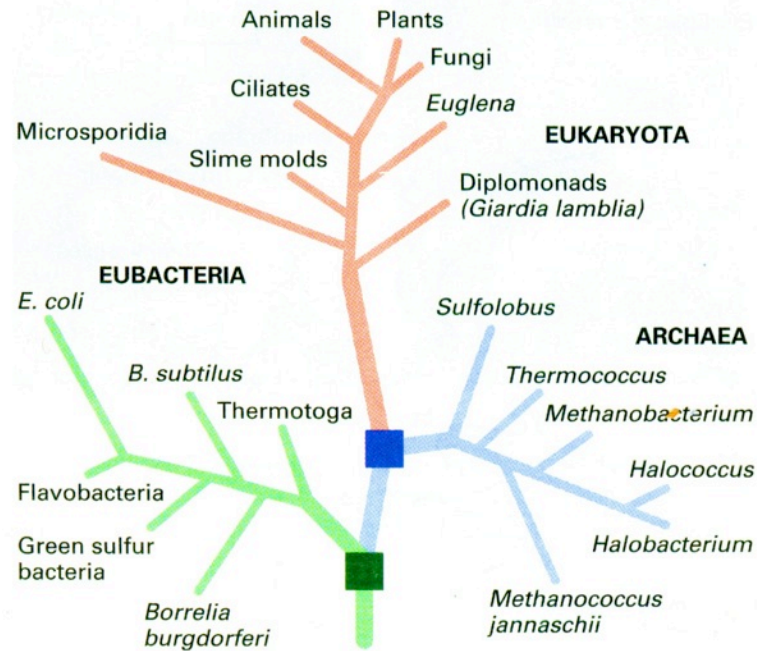


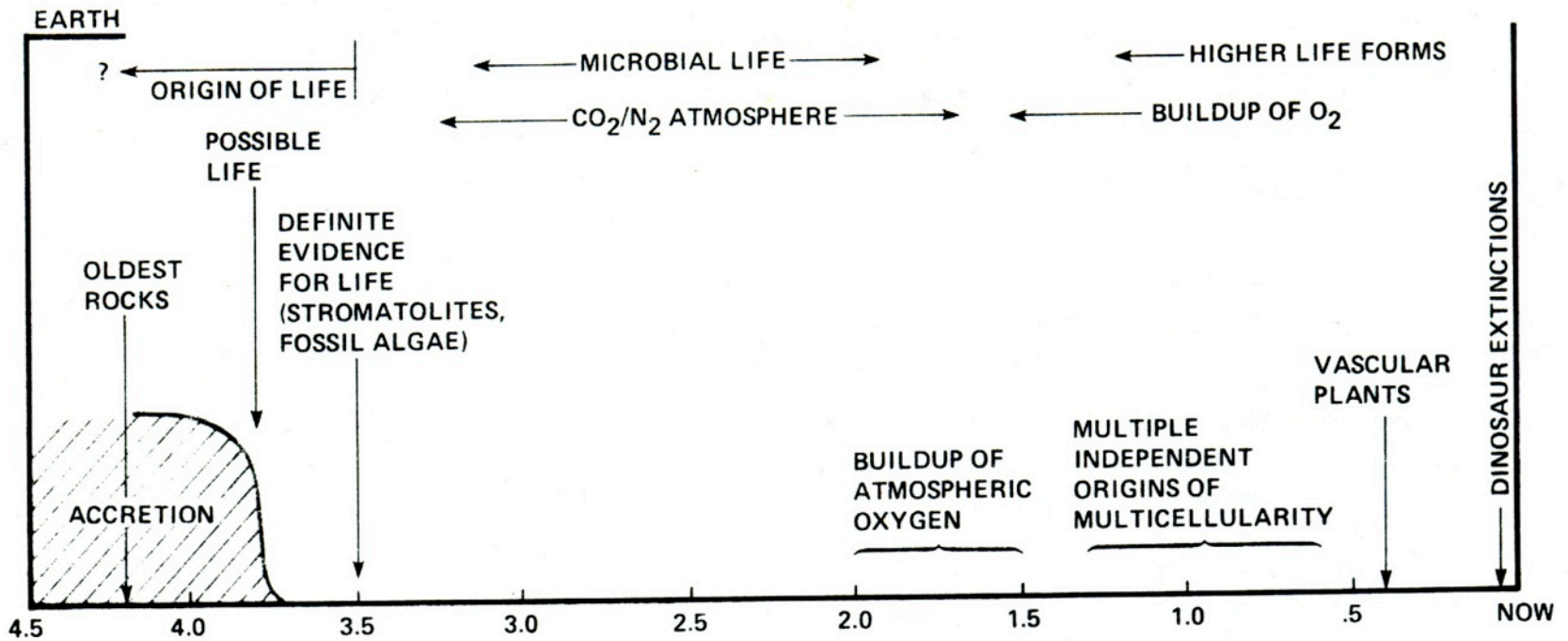
NUCLEATED CELLS...EUKARYOTES

The Eukaryota is a domain of life that comprises everything except bacteria.



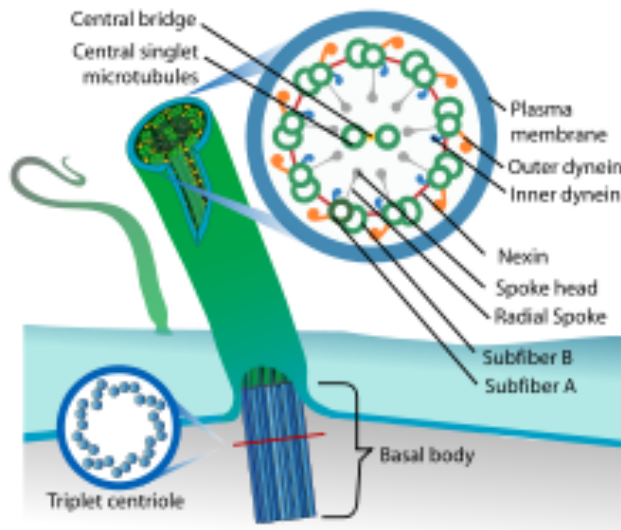
There are a number of depictions of the tree of life. Most modern Trees of Life have 3 domains: 1) Eubacteria (sometimes called just Bacteria). This first domain is where most of the common bacteria belong...all its members are single celled organisms with no nuclei. The most famous bacteria *E. Coli* belongs to this domain. The domain called Archaea has single celled bacteria also but they seem to have evolved along a different path as the domain "Bacteria". Initially, most of the Archaea were bacteria that are considered "extremophiles" because they live in extreme habitats, but we later found these single celled organisms in other habitats. The domain with the most familiar organisms is the Eukaryota. This domain has organisms with nucleated cells. They range from single celled organisms such as *Euglena* and *paramecia* to multi-cellular fungi, plants and animals.

Life on Earth



Paramecium

The Paramecium has numerous cilia, and this is one reason they are in the phylum Ciliophora. All eukaryotic cells have the same type of cilia with an internal structure as shown below with 9 doublets of fibers arranged in a circle and 2 separate fibers in the middle. Prokaryotes with cilia all have a different internal structure. This is one of the many reasons we place prokaryotes in a different domain.



Paramecium

A Paramecium is amazingly complex.

Pellicle - a membrane covering that protects the paramecium like skin

Cilia - hair like appendages that help the paramecium move food into the oral groove

Oral Groove - collects and directs food into the cell mouth

Cell Mouth - opening for food

Anal Pore - disposes of waste

Contractile Vacuole - contracts and forces extra water out of the cell

Radiating Canals - paths to the contractile vacuole

Cytoplasm - intercellular fluid needed to contain vital cell parts

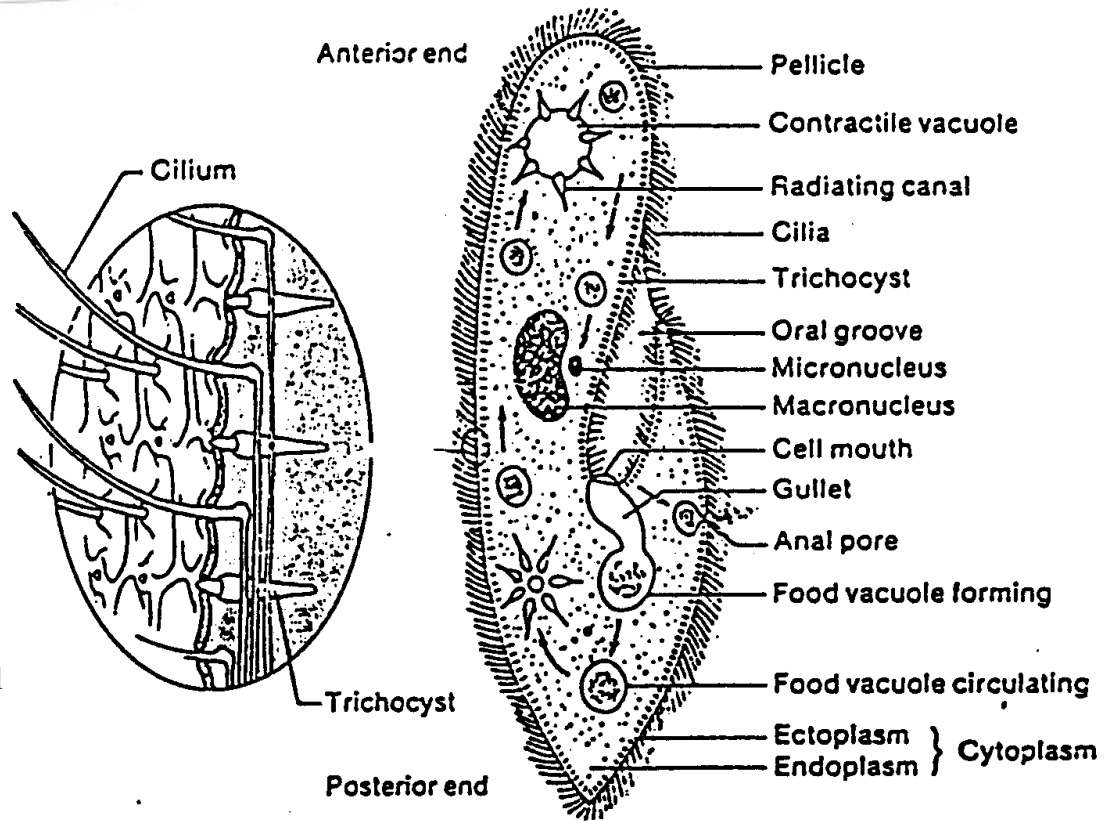
Trichocyst - used for defense

Gullet - forms food vacuoles

Food Vacuole - storage pocket for food

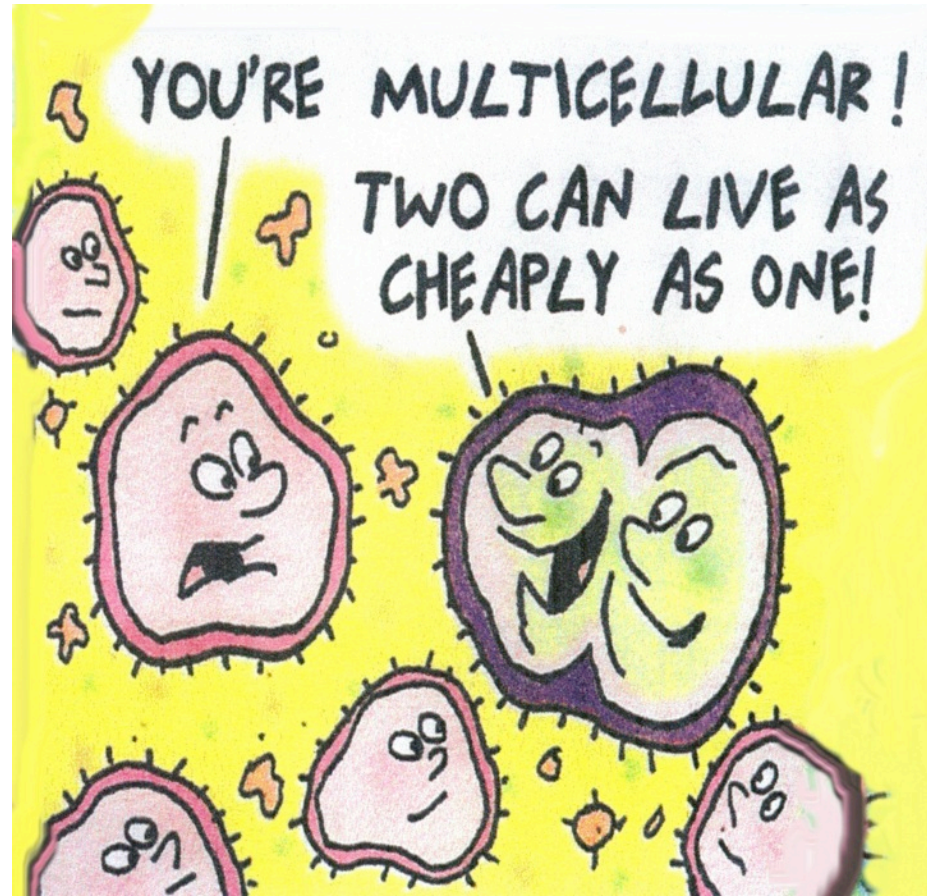
Macronucleus - larger nucleus which performs normal cell functions

Micronucleus - smaller nucleus which is responsible for cell division.



Paramecium are capable of both sexual and asexual reproduction. Asexual reproduction is the most common, and this is accomplished by the organism dividing transversely. The macronucleus elongates and splits. Under ideal conditions, Paramecium can reproduce asexually two or three times a day. Normally, Paramecium only reproduce sexually under stressful conditions. This occurs via gamete agglutination and fusion. Two Paramecium join together and their respective micronuclei undergo meiosis. Three of the resulting nuclei disintegrate, the fourth undergoes mitosis. Daughter nuclei fuse and the cells separate. The old macronucleus disintegrates and a new one is formed. This process is usually followed by asexual reproduction.

At some point in evolution, multicellular organisms arose. Multicellularity organisms have the advantage of different cells performing different functions.



Multicellularity is a property we associate with Eukaryotes...the domain shown on the right in this slide. The most obvious multicellular organisms are the plants, animals, and fungi.

