

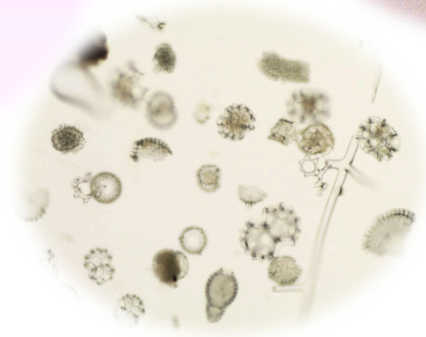
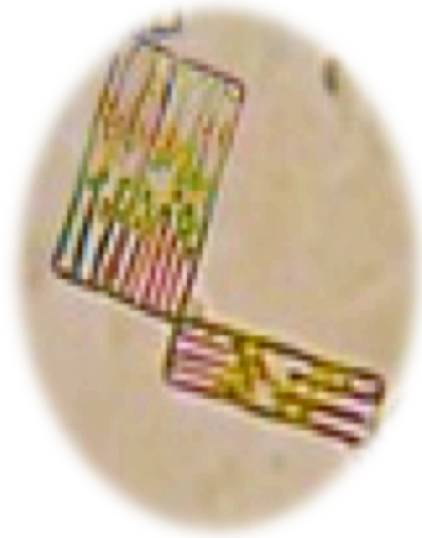
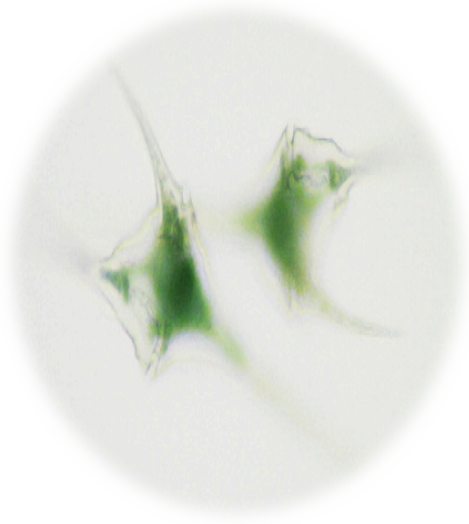


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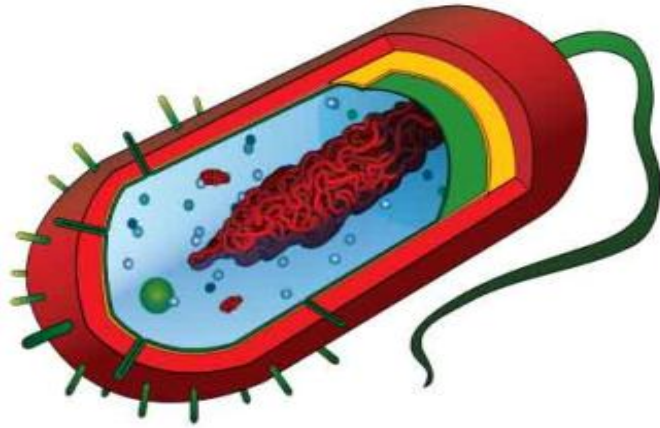
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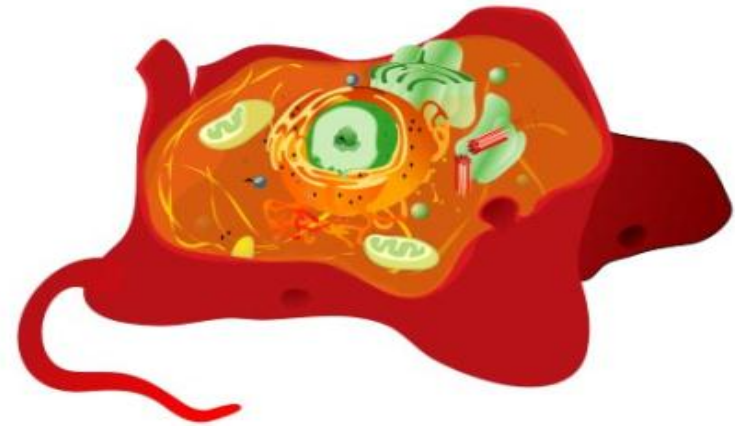


Diversity of Life: Protista

Two Basic Types of Cells



Prokaryotic
Cells



Eukaryotic
Cells

Cells:

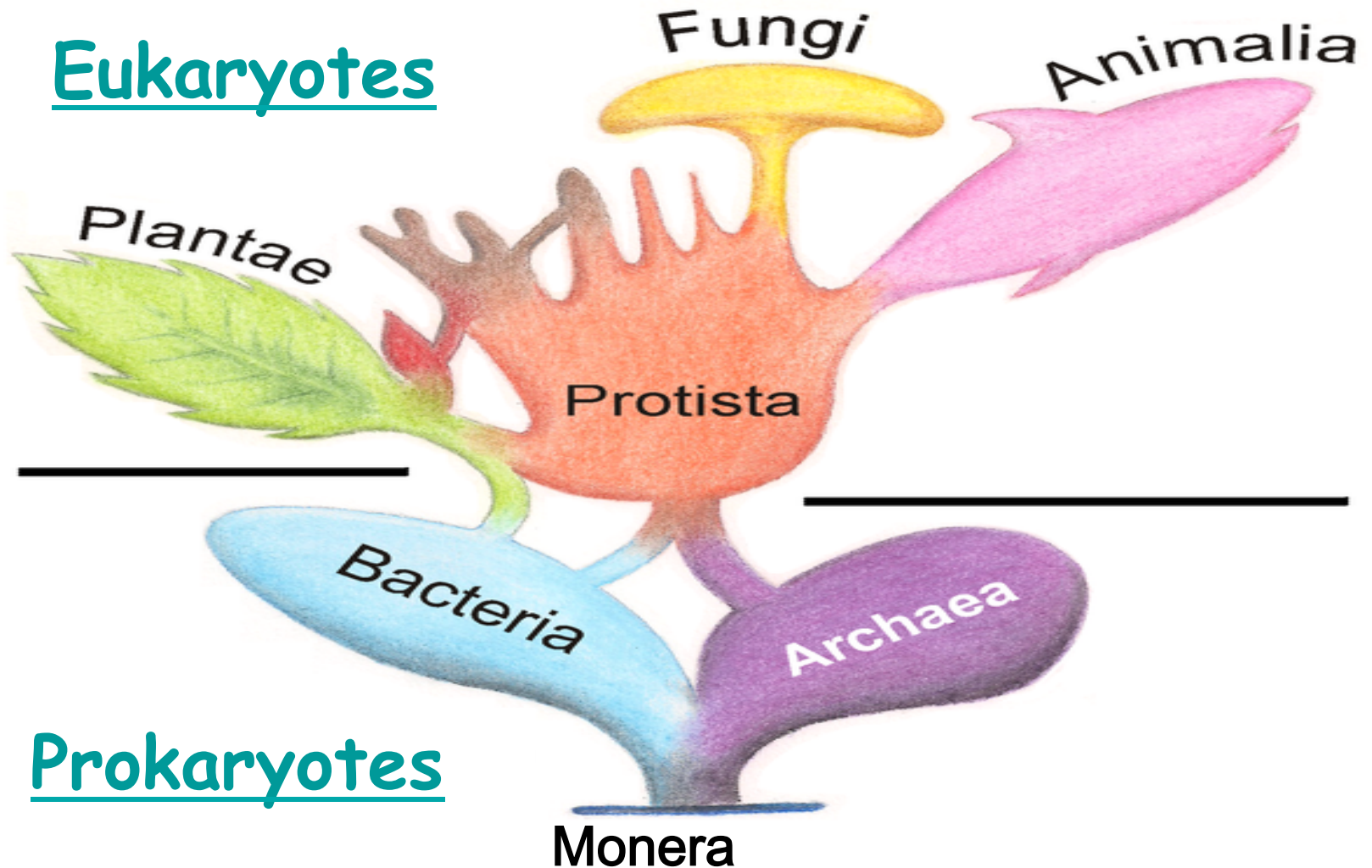
- are the building blocks of life!
- All living things are made of one or more cells.
 - only come from other cells.
- are , really small. How small are they?
- small because of surface to volume ratio

Classification of Kingdoms of Eukaryotes

	Monera	Protists	Fungi	Plants	Animals
Prokaryotic or Eukaryotic?					
Cell Organization (single or multicellular?)					
Examples of Organisms					
Distinguishing Characteristics					
Other Details					

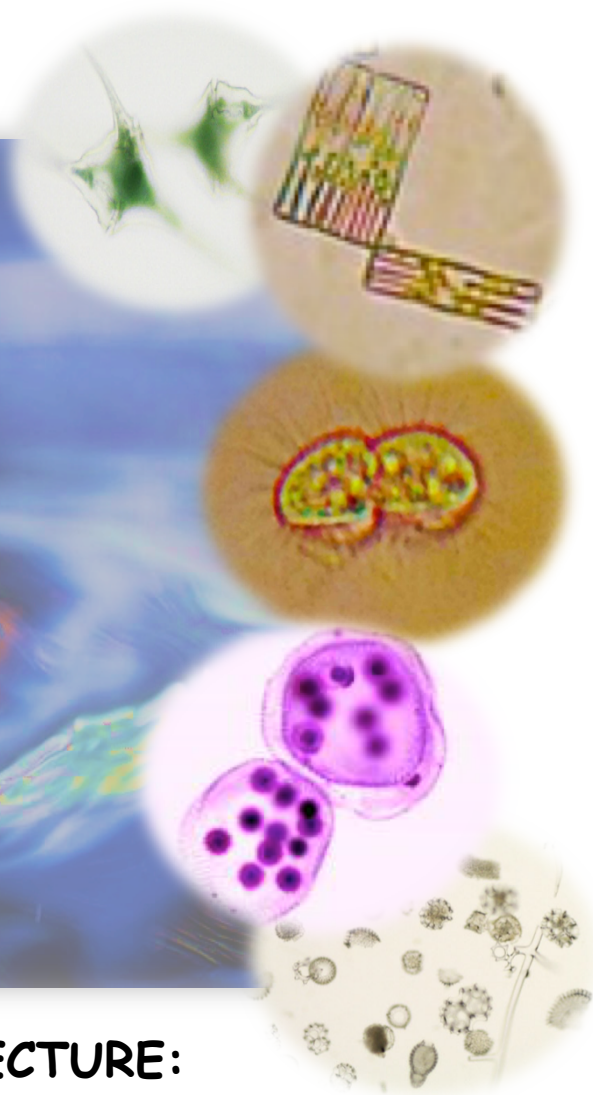
Name three ways in which eukaryotes and prokaryotes differ:

Classification of Organisms by Kingdom



Protista

Life in
a Drop
of
Water



- Eukaryotic
- Unicellular
- Need moist environment
- Some more plant-like (autotrophs)
- Some more animal-like (heterotrophs)
- Some are more fungus-like (saprophytes)

VIDEO LECTURE:
[Diversity of Protists](#)

Three Categories of Protists

Plant-like

Autotrophs

(Self-feeders, photosynthetic)

Algae

Proto-plants

Diatoms

Glass-like shells

Dinoflagellates

Plankton

Euglenoids

*Move like animals,
photosynthesize like plants*

Animal-like

Heterotrophs

(Eat other living things)

Pseudopods

false feet

Flagellates

move using flagella

Ciliates

move using cilia

Fungus-like

Saprophytes

(Eats dead, decaying matter)

Slime Molds

*Move like animals, absorb
food like fungi*

Water Molds

*often parasites, caused
Irish potato famine*

LECTURE VIDEO:

[Kingdom Protista](#)

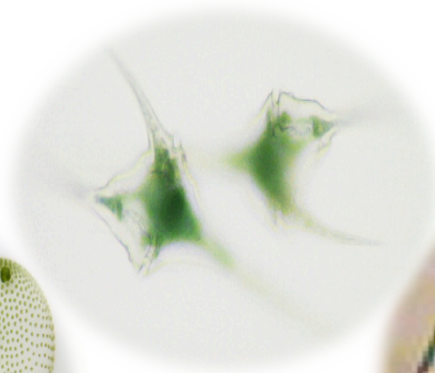
Plant-like Protists:

Algae, Dinoflagellates,
Diatoms, Euglenoids

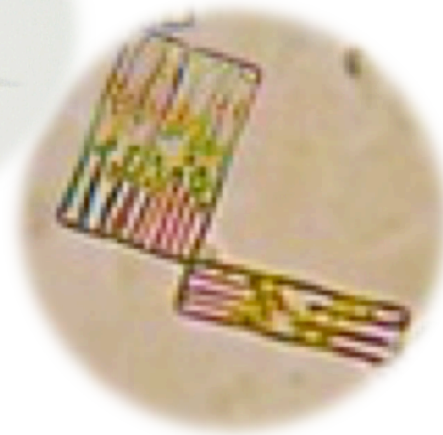
- Photosynthetic
- Source of most O₂ on earth.
- Base of the aquatic food chain.



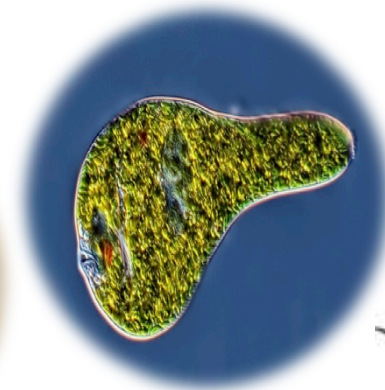
Volvox
Algae



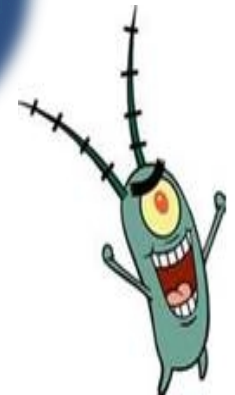
Ceratium
Dinoflagellate



Tabellaria
Diatom



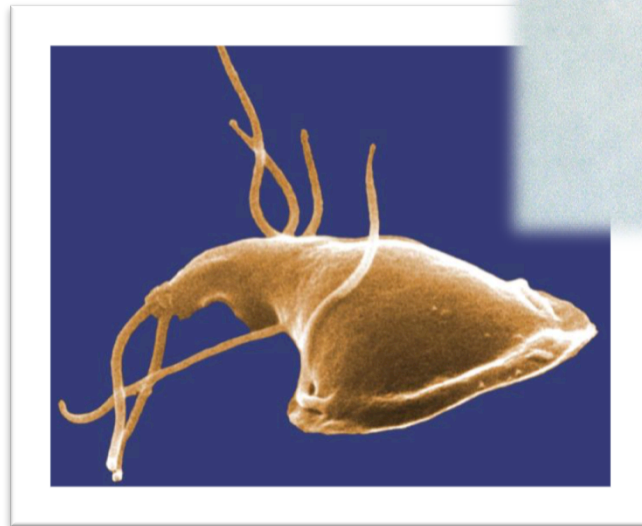
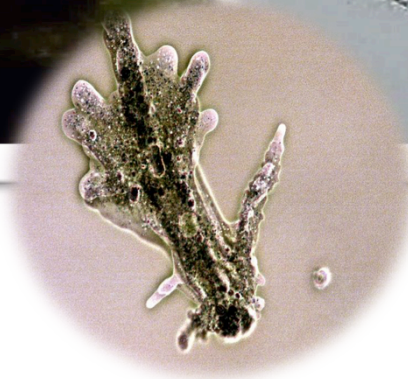
Euglena
Motile,
photosynthetic
Euglenoid



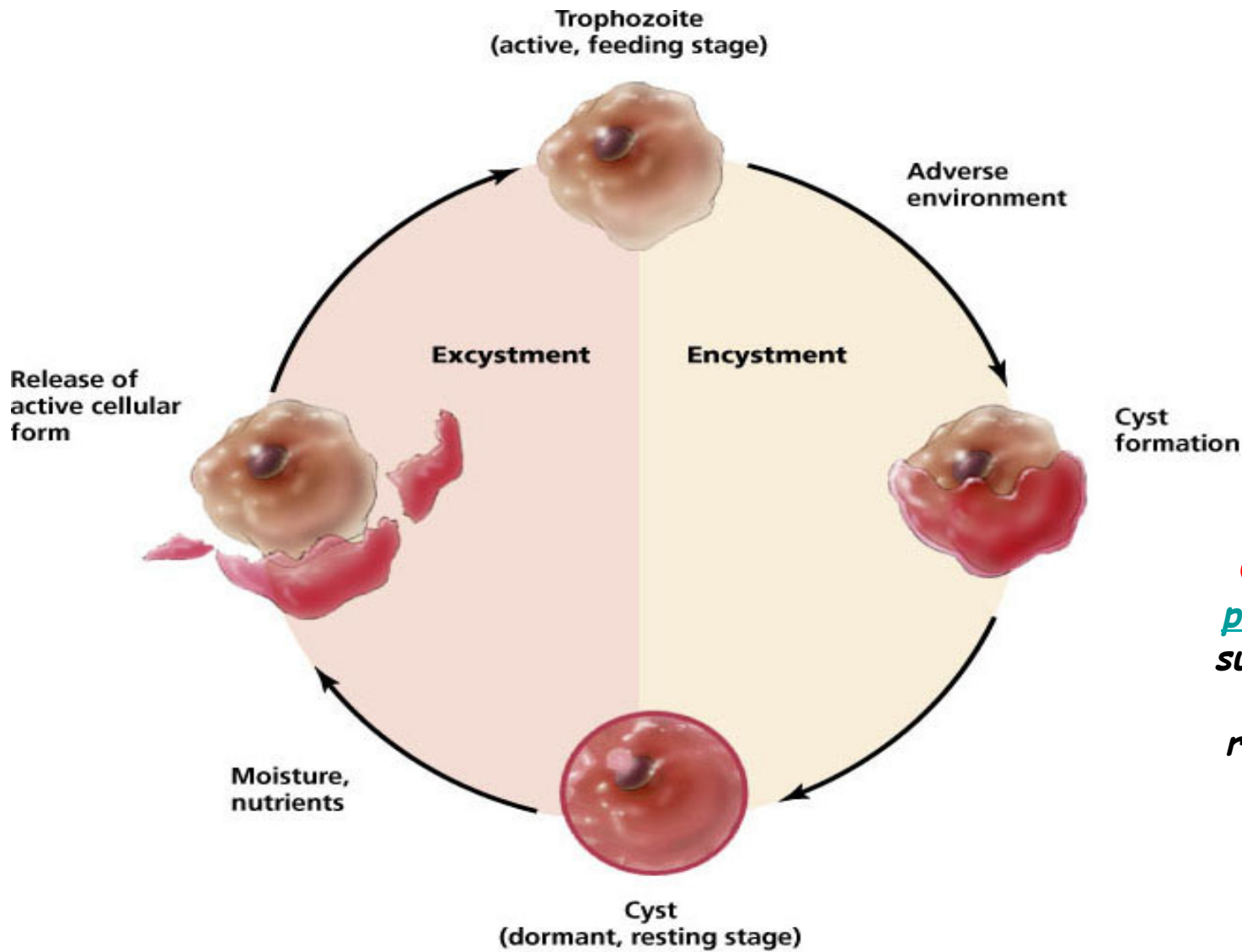
Autotrophic
Plankton

Animal-like Protists: Protozoans

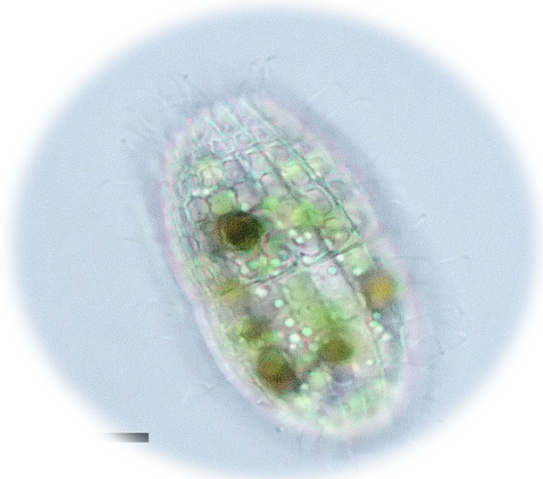
- Generally defined by four characteristics:
 - [Eukaryotic](#)
 - Single-celled (unicellular)
 - No cell wall
 - Motility (nearly all are able to move due to cilia, flagella or pseudopodia)
- Require moist environments.
- Most are free-living and harmless. Very few are pathogens.
- Motile feeding stage called **trophozoite**.
- Many have hardy resting stage called **cyst**.



Protozoan Life Cycle



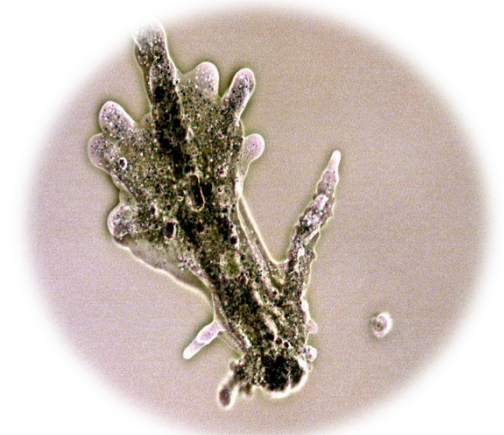
Q: What prokaryotic survival skill does this remind you of?



Coleps
Cilia



Rotifer
Ciliate



Amoebae
Pseudopod



Stentor
Ciliate

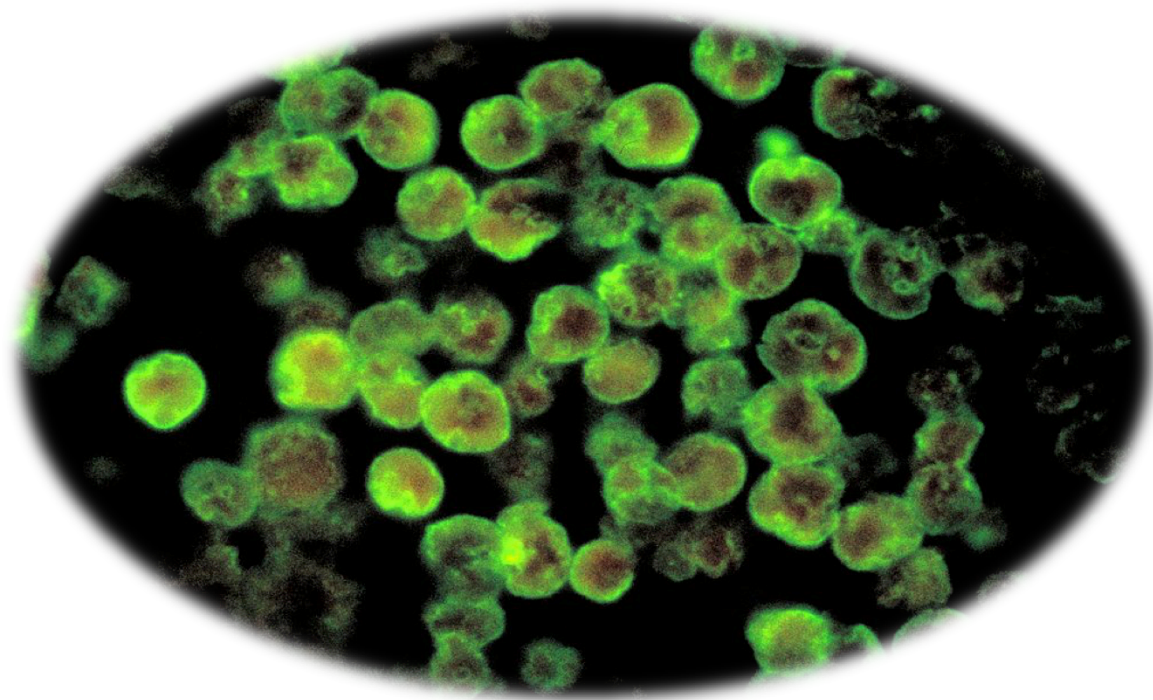


Cyclidium
Ciliate



Gastrotrich
Related to nematodes
(roundworm & flatworms)

Some Protozoans of Interest to Medical Microbiologists



Disease, Please: Dysentery

- Inflammatory disorder of the intestine, especially the colon, that results in severe diarrhea containing mucus and/or blood in the feces.
- Untreated, dysentery can be fatal due to massive dehydration.
- Can be caused by bacteria, protozoans or parasitic worms.



WATER

New formulation! 50% less dysentery!*

"I preferred the old formulation."

Don't Fret!

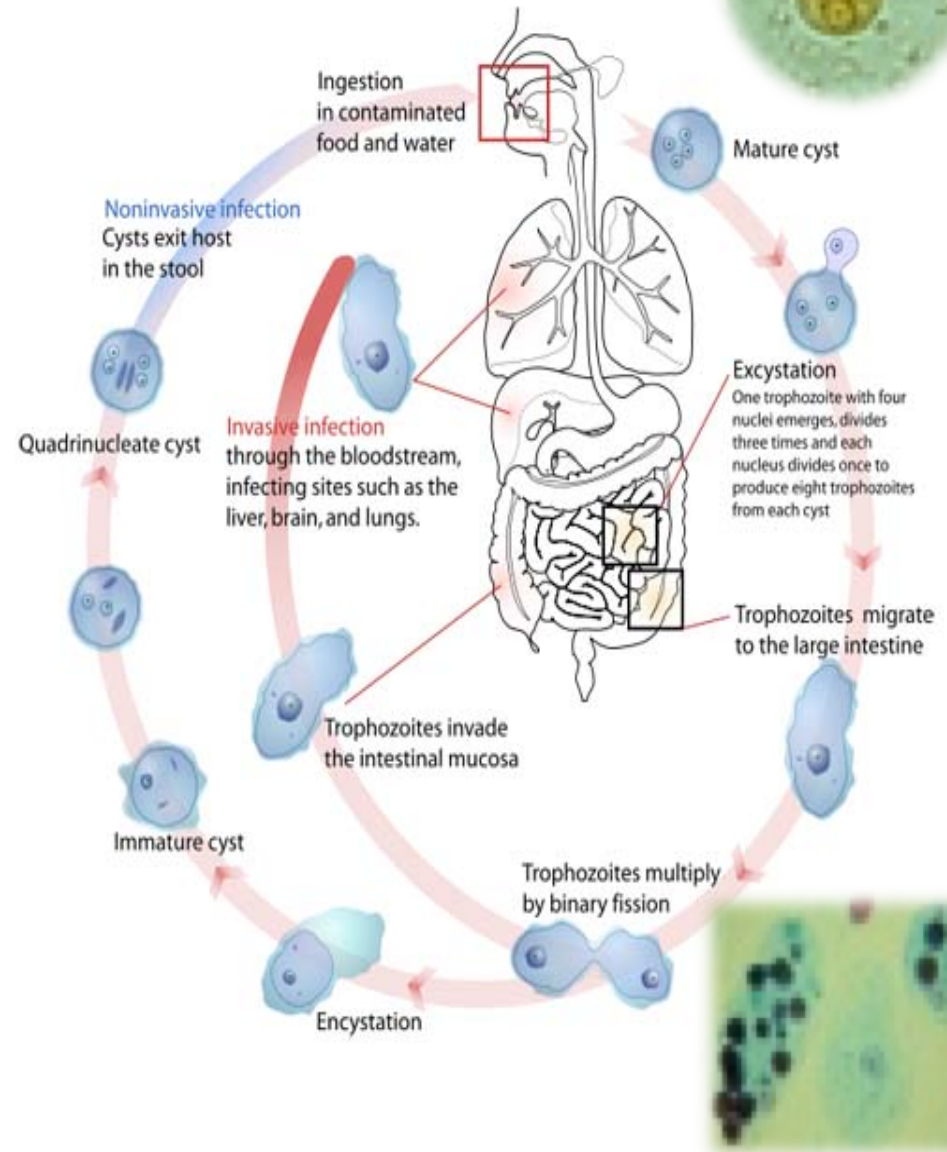
Water Classic contains our originally available amount of dysentery, and is available in drinking fountains across the country.



Protozoan Species: *Entamoeba histolytica*

(ENT-ah-MEE-bah HISS-tow-LIT-ick-ah)

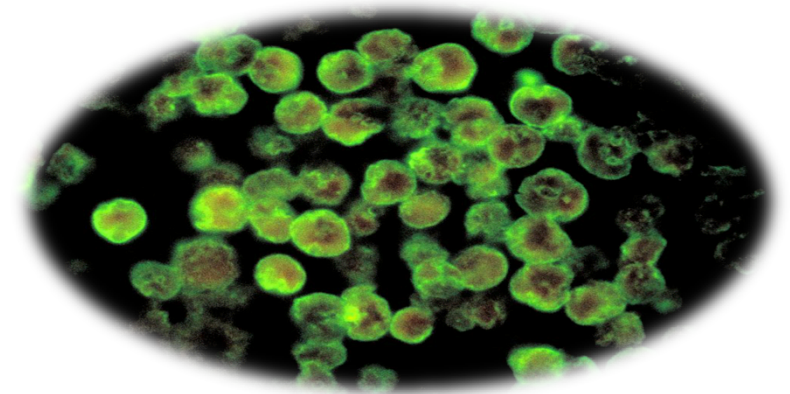
- A type of **amoebae**.
- Eat and move by extending parts of their bodies to form pseudopods (SUE-dough-pods).
- Exists asymptotically in 10% of world's population.
- When disease develops, can be fatal (kills 100,000 annually).
- Feeds on the lining of the gut. Irritation created can lead to condition known as **amoebic dysentery**.
- Contracted by eating or drinking fecally contaminated food or water.



Protozoan Species:

Naegleria fowleri

Meningoencephalitis caused by the amoeba *Naegleria fowleri* (nuh-GLEER-ee-uh FOWL'-erh-eye), a parasitic microorganism that feeds on brain tissue.



How Common is *N. fowleri*?

- Infection very rare (34 US cases in past 10 years, but nearly always fatal).
- Cases most often occur during the dry, hot summer months, when water is warm and at low levels.

How *N. fowleri* Attacks

- Enters body through the nose; invades CNS by penetrating the olfactory mucosa and nasal tissues.
- Early infections: necrosis (tissue death) and hemorrhaging in the olfactory bulbs.
- Amoeba then climbs along nerve fibers through the floor of the cranium, into the brain.

Where Is *Naegleria* Found?

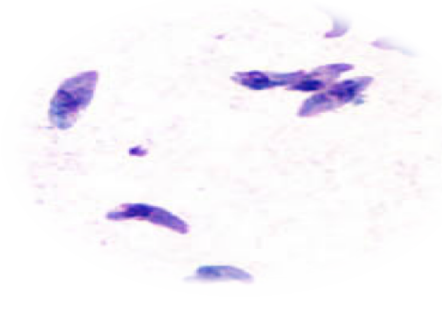
- Worldwide distribution, typically found in warm fresh water, temperatures ranging from 77 - 95 F.

How to Reduce Your Risk

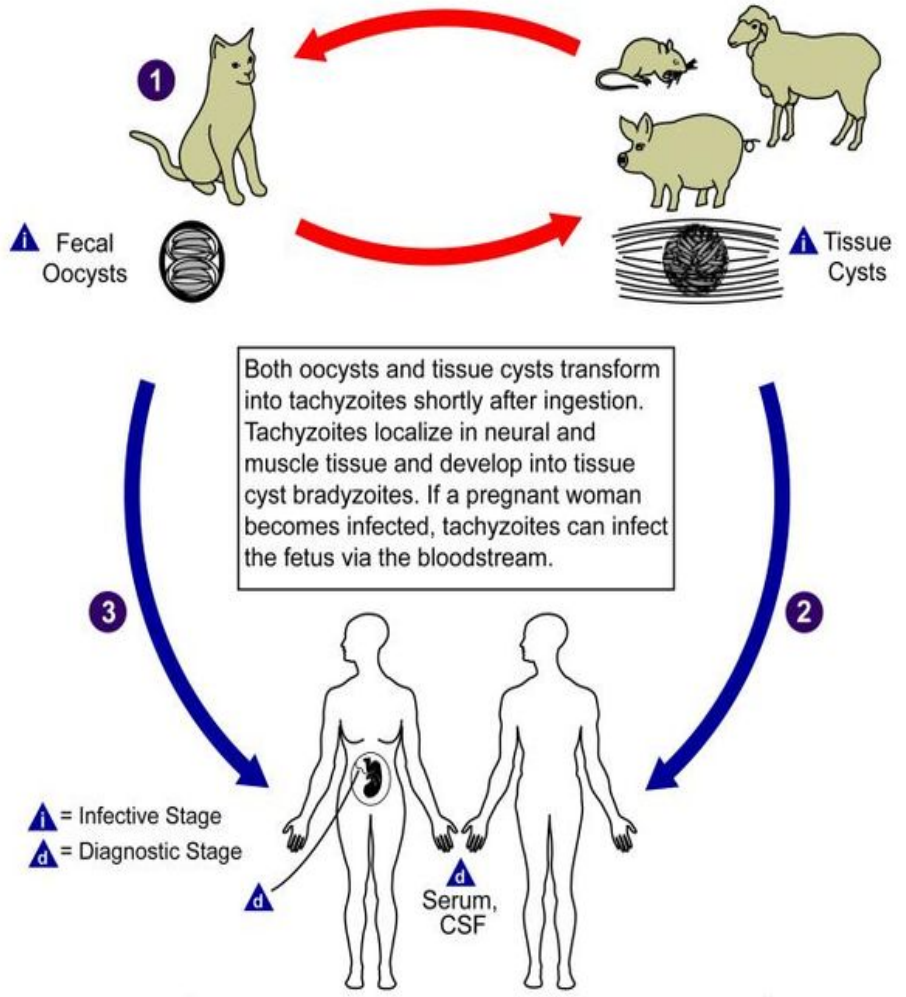
- Infection usually follows water-related activities (swimming underwater, diving, or any water sport that results in water going up the nose).
- Infection can only result from exposure to the amoeba's environment, not from person-to-person contact.

Disease, Please:

- Caused by parasite *Toxoplasma gondii*.
- Can get from contaminated water, eating undercooked infected meat (especially pork, lamb & venison), or contact with cat feces that contain *Toxoplasma*.
- 1/3 of the global population and 60 million people in US may be infected, but few have symptoms.
- Mild symptoms are flu-like.
- Pregnant women and people with compromised immune systems could develop serious health problems.
- Severe toxoplasmosis can damage the brain, eyes and other organs. Severe cases are more likely in individuals who have weak immune systems.
- A leading cause of death attributed to foodborne illness in the United States.



Toxoplasmosis (*Toxoplasma gondii*)



LISTEN: Radiolab segment on Toxoplasma, "[The Scratch](#)"

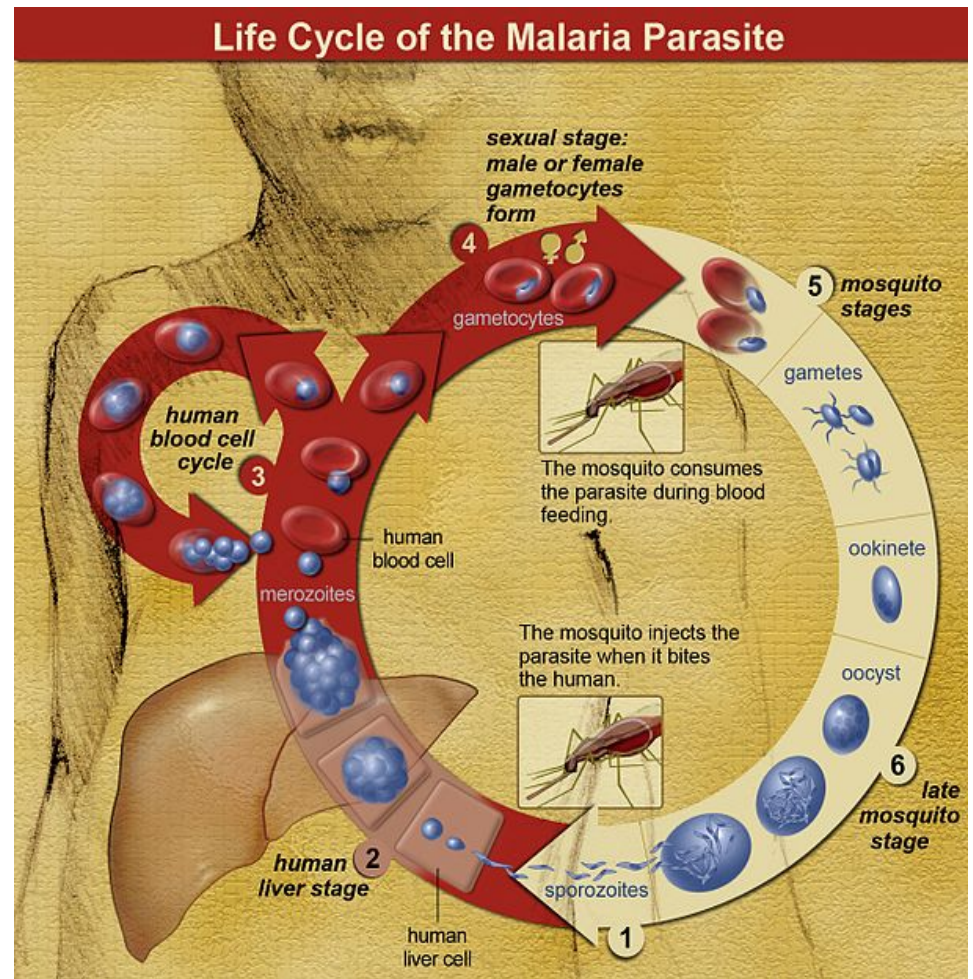
Disease,

Please:

Malaria



- Life-threatening disease caused by *Plasmodium* protozoan parasite transmitted through the bites of infected mosquitoes.
- Symptoms include fever, chills, and flu-like illness. Left untreated can cause coma and death if progresses to cerebral malaria.
- ~ 198 million cases of malaria in 2013.
- In 2013, malaria caused an estimated 584 000 deaths, mostly among African children.
- Increased malaria prevention and control measures are dramatically reducing the malaria burden in many places.
- ~ 1,500 cases diagnosed in US each year. Most are travelers and immigrants returning from countries where malaria commonly occurs (mainly sub-Saharan Africa and South Asia).
- Travellers from malaria-free areas are very vulnerable to the disease.



Fungus-like Protists: Slime & Water Molds

Slime & Water Molds are
saprophytes:

Decomposers; recycle nutrients

Mobile stage of life cycle.

Spores have cilia.

Slime Molds

Move like animals, absorb food like fungi

Large, ~1 meter; single-celled mass of cytoplasm.

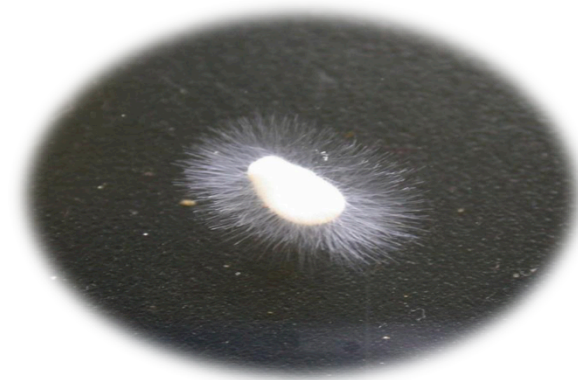
Water Molds

often parasites, caused Irish potato famine



Fuligo septica

The “Dog Vomit” Slime Mold

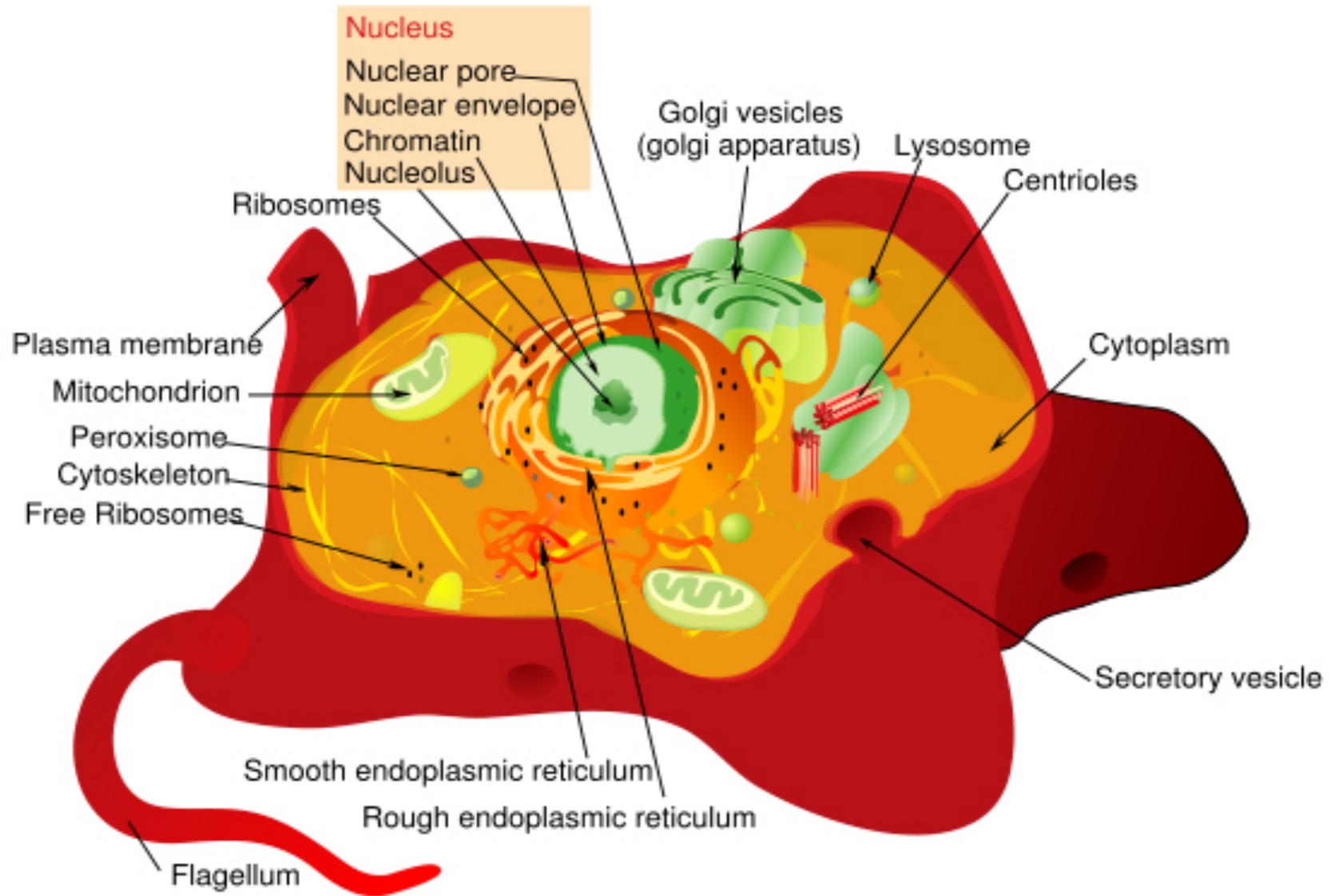


Water
mold
from a
stream

VIDEO:

[You don't need a brain to be intelligent - Slime Mold](#)

Animal Cell (Eukaryote)



Confused?

Here are some links to fun resources that further explain the biology of kingdom Protista:

Smart Links

- [Diversity of Protists](#), video from JBF School.
- [Kingdom Protista, Lecture Video](#) from Beverly Biology
- [You Don't Need a Brain to Be Intelligent - Slime mold](#), video from PBS
- [Old & Odd: Bacteria, Archaea & Protists](#), from Crash Course Biology.
- [Life in a Drop of Water](#), from Rainbow Educational Media.
- [Eukaryotic Cells Main Page](#) on the Virtual Cell Biology Classroom of [Science Prof Online](#).
- [Eukaryotic Cell: Structures, Functions & Diagrams](#), an article from SPO.

(You must be in PPT slideshow view to click on links.)

