

Proterozoic Eon

Proterozoic Eon




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Geological time scale and building height
(1 floor – 60Ma, 72 floors, 12 feet/floor)

- **Major Eons (Ma)**
 - **Phanerozoic**
 - (550 Ma to present time, top 9 floors')
 - **Proterozoic**
 - (2,500 – 550 Ma, 33rd -63rd)
 - **Archaean**
 - (3,800 – 2,500 Ma, 12th – 33rd)
 - **Hadean**
 - (4,500 – 3,800 Ma, 0-12th)



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2 billion years. Get eukaryote cells (nucleus).
Ends when cells finally get together and form
multicellular organisms.

Domains of life

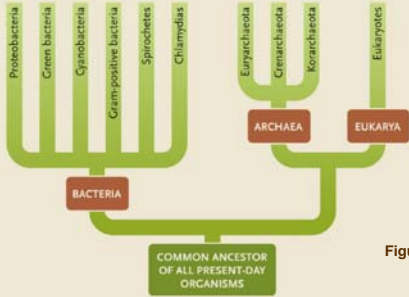


Figure 21.15

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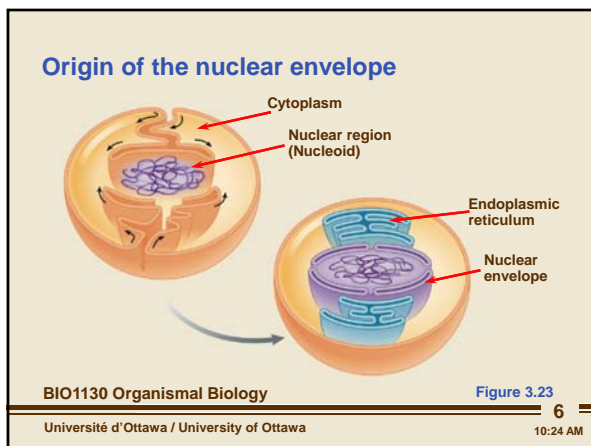
Archaea, Eubacteria & Eukarya
(Table 20.2)

	Archaea	Eubacteria	Eukarya
Cell Wall	No peptidoglycan	Peptidoglycan	Cellulose, chitin or none
Plasma membrane	Branched with ether links	Unbranched with ester links	Unbranched with ester links
Operon genes	Yes	Yes	No
Translation	Complex RNA polymerases	Simple RNA polymerase	Complex RNA polymerases
Nuclear envelope	No	No	Yes
Circular Chromosome	Yes	Yes	No, multiple linear
DNA/histones	Yes	No	Yes
1 st amino acid	Methionine	Formylmethionine	Methionine

Eukaryote autapomorphies

- Nuclear envelope
- Endomembrane system
- Mitochondria
- Multiple chromosomes and diploidy
- Centrosomes

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Endosymbiosis of bacterial cells

Nuclear material (Nucleoid)

Aerobic bacteria

Developing endomembranes

Mitochondria

Nuclear envelope

Endoplasmic retic.

Photosynthetic bacteria

Chloroplast

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Figure 3.21

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Eukaryote autapomorphies

- Nuclear envelope
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Eukaryote variability

Random segregation

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Eukaryote variability - Random segregation

Chromosomes	Combinations	Chromosomes	Combinations
3	8	25	33,554,432
6	64	30 - cow	1,073,741,824
9	512	35	34,359,738,368
12	4096	40	1.099x10 ¹²
15	32,768	44	1.759x10 ¹³
20 - mouse	1,048,576	50	1.125x10 ¹⁵
22 - human*	4,194,304		

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Eukaryote genetic recombination Meiosis and crossing over (chiasmata)

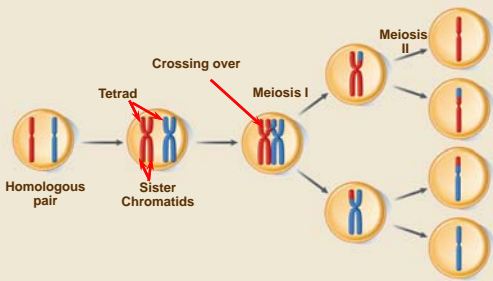
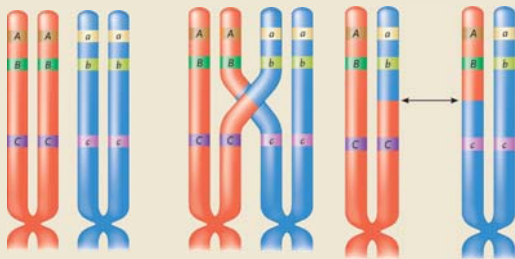


Figure. 9.10

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Genetic recombination – Crossing over



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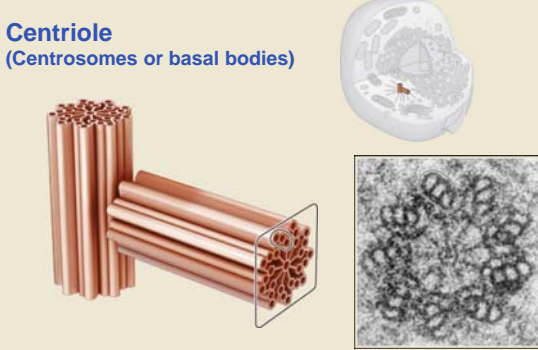
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Centriole
(Centrosomes or basal bodies)



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Microtubules

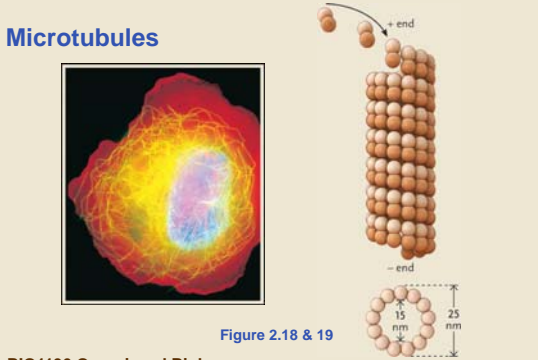


Figure 2.18 & 19

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Molecular motors

- Dyenin
- Kinesin
- Myosin

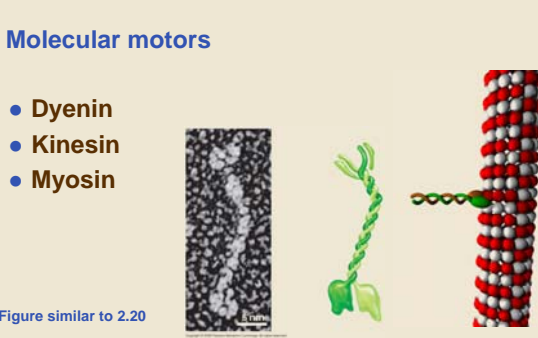


Figure similar to 2.20

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Literally grab onto things and move them around.

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Kinesin/Dynein motors

Motility of kinesin

Legend:
● ATPase domain (green)
● ATP (red)
● ADP (red)

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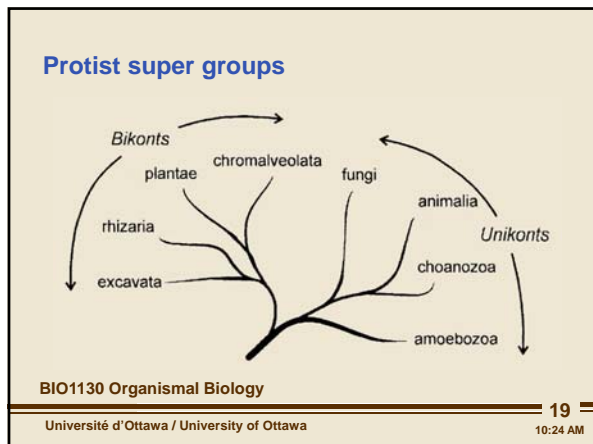
Origin of cellular motility

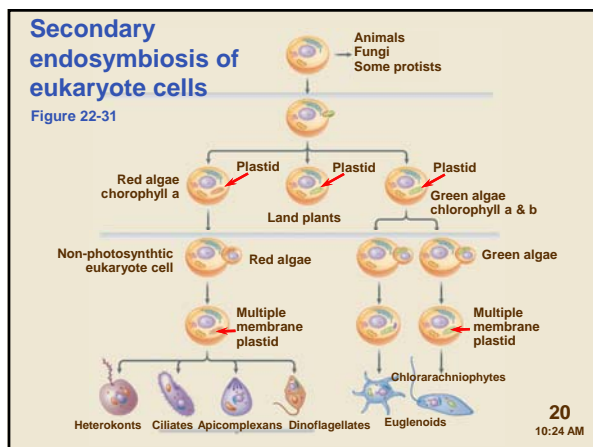
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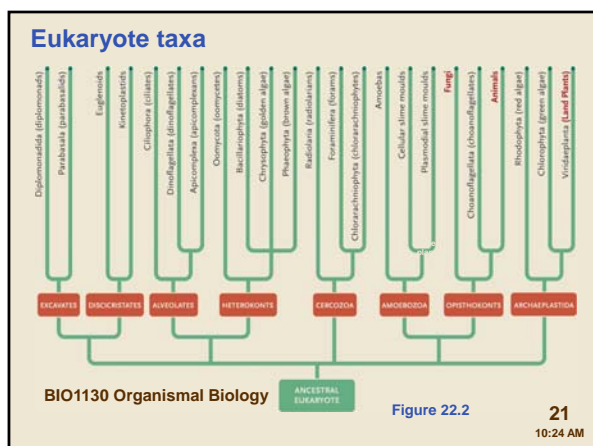
Unikont and bikont protists

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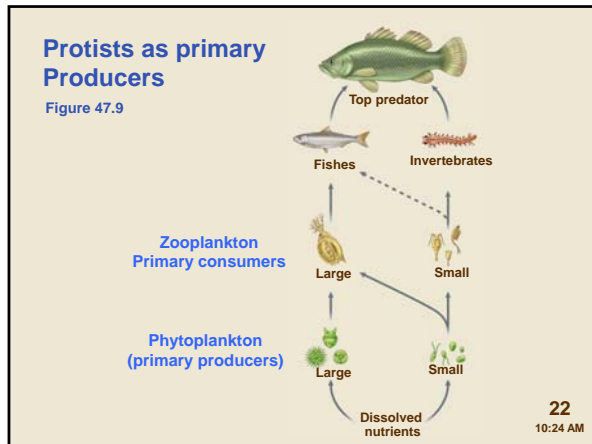
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Protist locomotion

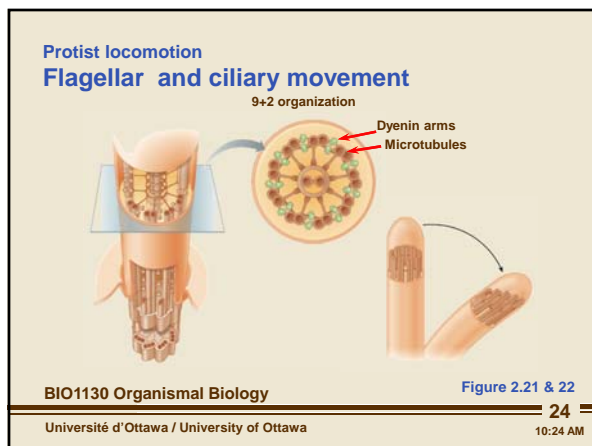
- Flagellar
- Ciliary
- Amoeboid

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Flagella are usually found in 1 or 2's
Cilia can be found as thousands across the surface of the organism.





9 + 2 organization is 9 around the outside and 2 in the middle. The little motors are walking along distorting the cylinder, then they get pulled back down and the other ones move

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Protist locomotion
Flagellar and ciliary movement

Helicoid  

planar  

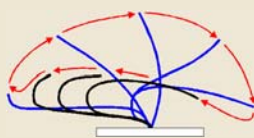

BIO1130 Organismal Biology Figure 2.22

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Helicoid does a rotational or spinning motion.
Planar is like a breast stroke. First a power stroke and then a recovery. Not a bacterial beat

Protist locomotion
Ciliary movement




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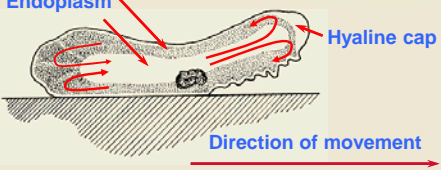
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The recovery stroke is at a different angle so that the cilia do not entangle. They stagger their power strokes using the metachronal wave. There is always some cilia doing the power stroke allowing for very precise and dynamic movement.

Protist locomotion
Amoeboid movement (Pseudopods)



Ectoplasm
Endoplasm



Hyaline cap

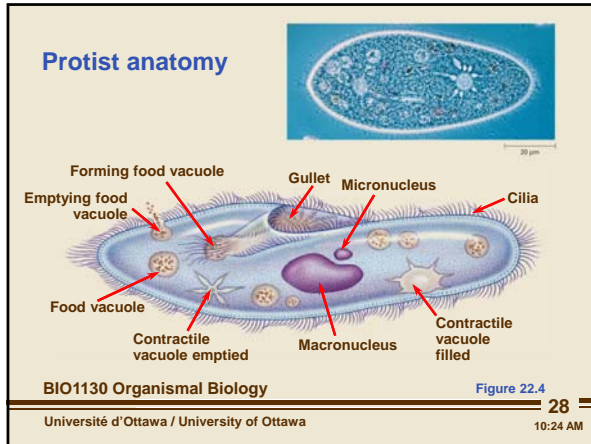
Direction of movement

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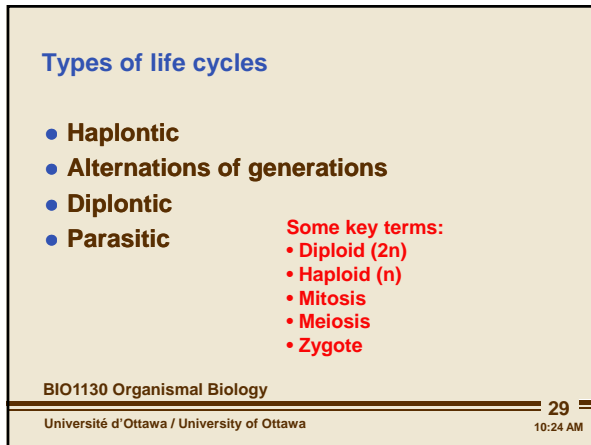
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3rd molecular motor is called myosin. The cytoplasm in an amoeba exists in 2 forms. The ectoplasm is stiff and gel like and the endoplasm is liquid. As the cytoplasm of the organism moves, active monomers are being polymerised at the front and become stiffer. The endoplasm is shot forward and almost out, except it hits the hyaline cap in the front and is deflected back.

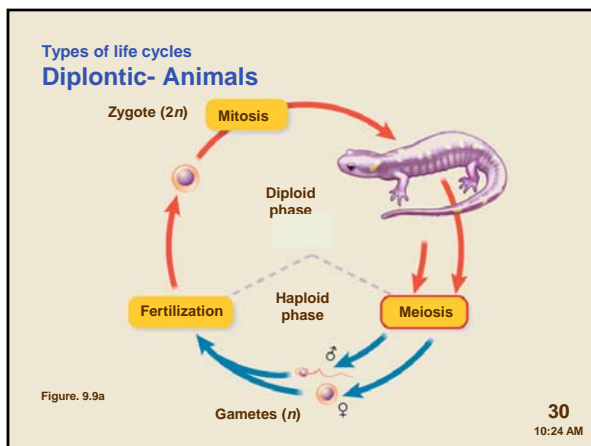
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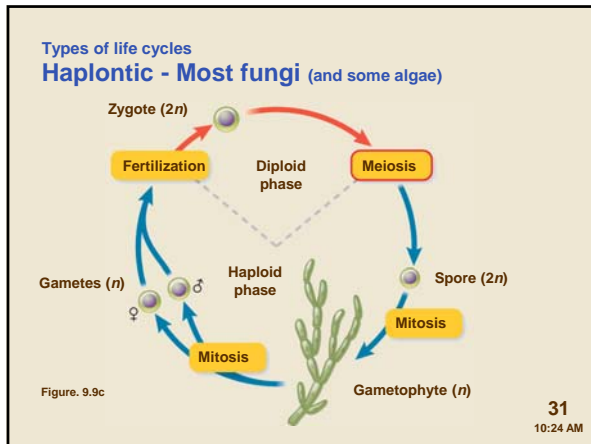
paramecium is a ciliate. They have 2 different types of nuclei, macro and micronucleus. The macronucleus is a polyploid. When ciliates undergo binary fission, they duplicate both nucleuses. the macronucleus is used to run the cell while the micronucleus is used for reproduction. The cilia are divided up, some for feeding and some for swimming. Phagocytosis is when the cell is absorbing a chunk of nutrients while pinocytosis is when the cell absorbs dissolved nutrients.

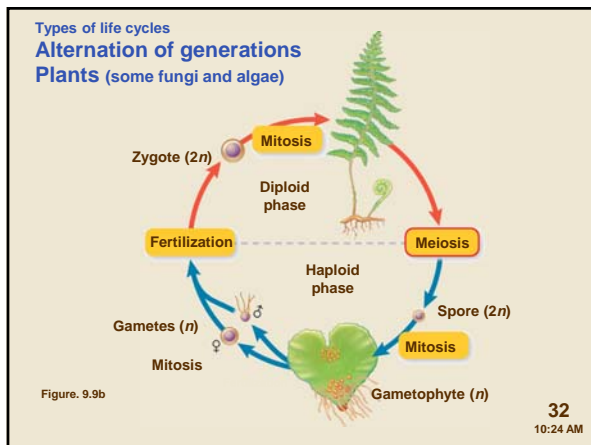


Diplontic organisms spend most of their life in a diploid state. The haploid state cells are often specific to certain organs and end up returning to the diploid state. The group that spends its entire life in a haploid state is called haplontic (most fungi).



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Nutritional strategies

- Ingestive - Animal-like protists
- Absorptive- Fungal-like protists
- Photosynthetic- Plant-like protists

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Types of life cycles

- Haplontic - Fungal-like protists
- Alternations of generations - Plant-like protists
- Diplontic - Animal-like protists
- Parasitic

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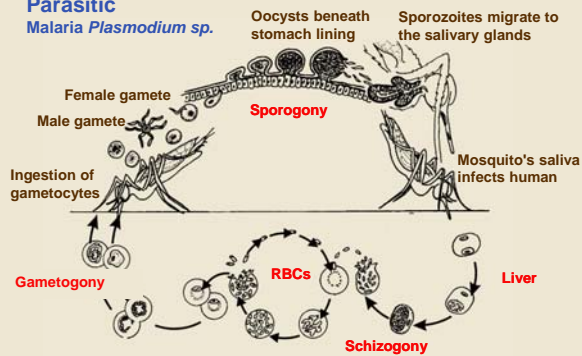
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Types of life cycles

Parasitic

Malaria Plasmodium sp.



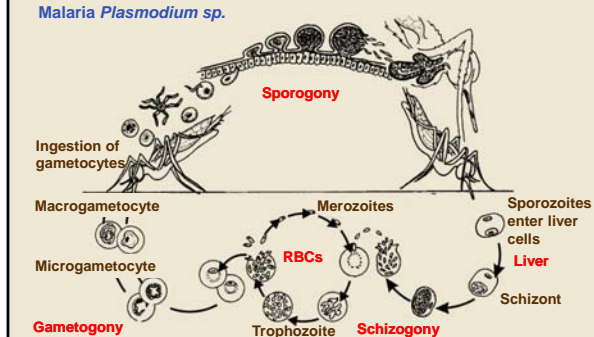
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Types of life cycles

Parasitic

Malaria Plasmodium sp.



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