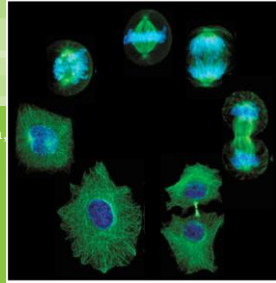


Chapter 10: Cell Growth and Division

Section 10.1: Cell Growth, Division, and Reproduction

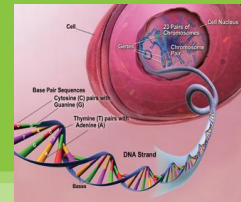
Mrs. Michaelsen



Limits to Cell Size

Information Overload

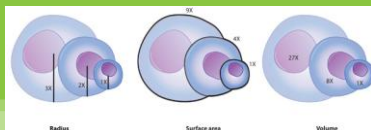
- ⊗ Demands on DNA become greater as the cell gets bigger.
- ⊗ Information crisis would occur (DNA cannot grow).
- ⊗ Cell must divide.



Limits to Cell Size

Exchanging Materials

- ⊗ Surface area of the cells (total area) influences rate of diffusion across the cell membrane.
- ⊗ Food, oxygen, water enter.
- ⊗ Wastes leave.
- ⊗ Cell must divide because they are unable to grow.



Limits to Cell Size

Ratio of Surface Area to Volume

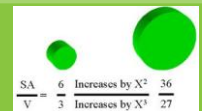
$$\otimes \text{Area} = 1 \times w$$

$$\otimes \text{Volume} = 1 \times w \times h$$

- ⊗ Can use ratio of volume to area to see how they compare.

- ⊗ Surface area does not increase as fast as volume.

- ⊗ Need surface area to exchange materials!



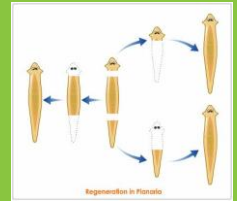
Limits to Cell Size

- Cell division: Process by which a cell divides into two daughter cells.
 - Eliminates cell overload (DNA replicates and is passed on).
 - Eliminates surface area to volume issue (two cells increases the surface area available).

Ratio of Surface Area to Volume in Cells			
	1 cm 1 cm 1 cm	2 cm 2 cm 2 cm	3 cm 3 cm 3 cm
Surface Area (length x width) x 6 sides	1 cm x 1 cm x 6 = 6 cm ²	2 cm x 2 cm x 6 = 24 cm ²	3 cm x 3 cm x 6 = 54 cm ²
Volume (length x width x height)	1 cm x 1 cm x 1 cm = 1 cm ³	2 cm x 2 cm x 2 cm = 8 cm ³	3 cm x 3 cm x 3 cm = 27 cm ³
Ratio of Surface Area to Volume	6 / 1 = 6 : 1	24 / 8 = 3 : 1	54 / 27 = 2 : 1

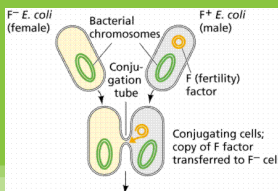
Cell Division and Reproduction

- Asexual Reproduction
 - The production of genetically identical offspring from a single parent.
 - Simple, efficient, and effective.
 - Both prokaryotic and eukaryotic single-celled organisms and many multicellular organisms can reproduce asexually.



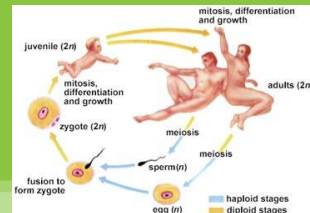
Cell Division and Reproduction

- Bacteria reproduce by binary fission.
- Kalanchoe plants form plantlets.
- Hydras reproduce by budding.



Cell Division and Reproduction

- Sexual Reproduction
 - Involves fusion of gametes from two parents.
 - Offspring inherit genetic information from each parent.



Cell Division and Reproduction

Asexual	Sexual
Produces genetically identical offspring	Produces genetically diverse offspring
Reproduction is quick and produces large number of offspring	Genetic diversity helps ensure survival of species when environment changes