

Biology 10

Chapter 10-4

p292-297

“Cell Differentiation”

Objectives

- Explain how cells become specialized for different functions
- Describe stem cells
- Evaluate the potential benefits and ethical issues regarding stem cell research

Cell Differentiation

- Multicellular organisms start out as _____ (the **zygote**)
- The zygote divides repeatedly to form an _____
- The cells in the embryo then _____ in the organism
 - this is called **differentiation**

Mapping Differentiation

- In some organisms, a cell's role is specified at a certain point during development
 - _____, a microscopic worm, has 959 cells as an adult, and biologists have traced the origin of each of them!
- In higher organisms (like mammals), cell differentiation is more flexible
 - At some point, a cell becomes unable to differentiate, however

Stem Cells and Development

- **stem cell:** _____
- Three types
 - **totipotent:** a stem cell that can _____ of cell (ex: the zygote, and first few cell division daughter cells)
 - **pluripotent:** a stem cell that can _____ of cell types (ex: the inner mass of cells in a blastocyst)
 - **multipotent:** stem cells in an adult that can _____ types (ex: stem cells in bone marrow)

Stem Cell Research

- Damaged tissues could potentially be healed by injecting stem cells into them

- the stem cells could differentiate into the appropriate type, and help heal the damage
- Could be used to heal tissues that do not regenerate on their own very quickly
(_____)

What's the Catch?

- If the stem cells come from _____, generally there is little ethical concern
 - the problem is that adult stem cells found to this point are _____, so can't be used for all cases
- Stem cells that are harvested from embryos are _____, so can become more types of tissues
 - To get these cells, _____, which raises all kinds of ethical choices!