

## Homework 5.5: Multicellular Life

**KEY CONCEPT** Cells work together to carry out complex functions.

Your body began as a single fertilized egg. Since that time, your cells have not only gone through millions of cell divisions, but those cells have also undergone the process of **cell differentiation** by which unspecialized cells develop into their mature form and function. Groups of cells that work together to perform a similar function make up **tissues**. Groups of tissues that work together to perform a similar function make up **organs**. Groups of organs that carry out related functions make up **organ systems**. The interaction of multiple organ systems working together helps organisms maintain homeostasis.

An organism's body plan is established in the very earliest stages of embryonic development. In both animals and plants, a cell's location within the embryo helps determine how that cell will differentiate. In animals, cells migrate to specific areas that will determine how they specialize. Plant cells cannot readily migrate because of their cell walls. However, the cells remain very adaptable throughout the life of the plant.

**Stem cells** are a unique type of body cell characterized by three features:

- They divide and renew themselves for long periods of time.
- They remain undifferentiated in form.
- They can develop into a variety of specialized cell types.

Because of their ability to develop into other types of cells, stem cells offer great hope for curing damaged organs and currently untreatable diseases. However, they also raise many ethical concerns. Stem cells can be categorized by their developmental potential, as *totipotent*, *pluripotent*, or *multipotent*. Stem cells can also be classified by origin, as adult or embryonic.

1. What is cell differentiation?

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2. What are three distinguishing characteristics of stem cells?

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## Section Quiz 5.5: Multicellular Life

Choose the letter of the best answer.

- \_\_\_\_\_ 1. Which sequence shows the progression from least complex structure to most complex structure?
- a. cell → organ → tissue → organ system
  - b. cell → tissue → organ → organ system
  - c. organ system → tissue → organ → cell
  - d. organ system → organ → tissue → cell
- \_\_\_\_\_ 2. Which phrase best describes an organ system?
- a. group of specialized cells that forms organs
  - b. group of cells that differentiates at the same rate
  - c. group of tissues that performs a function
  - d. group of organs that work together
- \_\_\_\_\_ 3. Which of the following is a direct result of a normal cell's ability to express only certain genes?
- a. Cells can become totipotent.
  - b. Cells can grow and reproduce.
  - c. Cells can mutate and adapt.
  - d. Cells can differentiate and specialize.
- \_\_\_\_\_ 4. Stem cells are important to multicellular organisms because of their
- a. capacity to differentiate.
  - b. tendency to maintain homeostasis.
  - c. potential to become totipotent.
  - d. ability to relocate.
- \_\_\_\_\_ 5. Which type of stem cell can grow into any other cell type?
- a. somatic
  - b. multipotent
  - c. totipotent
  - d. pluripotent