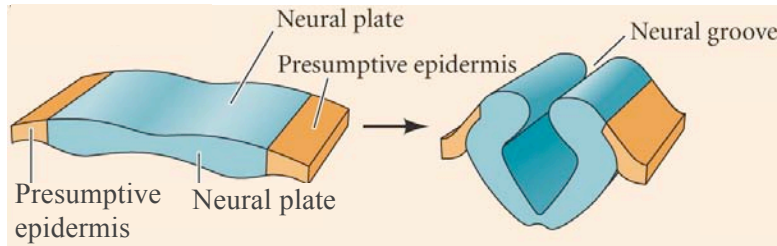


Zoology 470 - Quiz #3 - 2009

This quiz has **8** questions on **2 pages** and is worth a total of **8** points. It is designed to test basic knowledge about morphogenetic movements important in developmental biology.

Use the accompanying answer sheet to enter your answers for the following multiple-choice questions. There is **one** right answer for each question. Please make sure you enter your student ID number on the answer sheet.

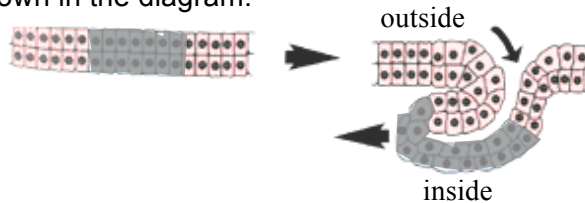
1. Neurulation in most vertebrates begins with a flat sheet, the neural plate, which buckles inward to form a groove, as in the figure.



Neurulation is an example of which of the following morphogenetic movements?

- a. Ingression
- b. Delamination
- c. Epiboly
- d. Invagination**
- e. None of the above

2. During frog gastrulation, some cells of the early gastrula originally on the surface eventually become internalized as shown in the diagram.



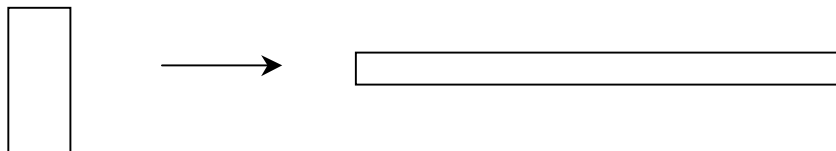
Such internalization is an example of which of the following?

- a. Ingression
- b. Delamination
- c. Involution**
- d. Revolution
- e. Evagination

3. Ventral enclosure of the *C. elegans* by embryonic epidermis occurs by which of the following movements? **[everyone got credit for this one!]**

- a. Convergent extension
- b. Invagination
- c. Ingression
- d. Epiboly**
- e. Delamination

4. Fate mapping in amphibians has shown that tissues formed by deep cells that become dorsal mesoderm undergo the following change in overall shape:

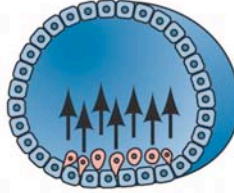


Which of the following morphogenetic movements is likely to account for this overall change in shape?

- a. Epiboly
- b. Convergent extension**
- c. Delamination
- d. Ingression
- e. c or d

5. Which of the following is the best definition of **epiboly**?
- a. Rolling of a tissue sheet that results in internalization of cells within the sheet
 - b. Inward buckling of a tissue sheet to produce an inpocketing
 - c. Internalization of individual cells as they leave a tissue sheet
 - d. Directed rearrangement of cells along a preferred axis to lengthen and narrow a sheet
 - e. None of the above**

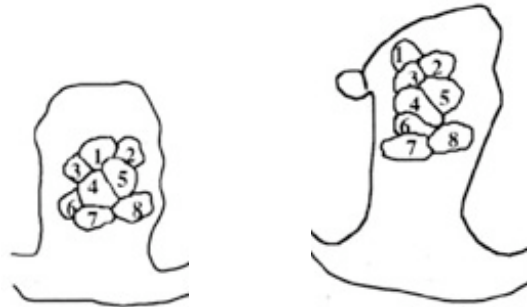
6. Primary, or skeletogenic, mesenchyme cells in the sea urchin embryo move into the interior of the early gastrula as shown in the diagram.



Which of the following morphogenetic movements is this an example of?

- a. Invagination
- b. Involution
- c. Ingression**
- d. Indenture
- e. Evagination

7. A group of cells was tracked in the sea urchin archenteron (cells 1-8), and found to undergo the following morphogenetic change:



This is an example of which of the following?

- a. Epiboly
- b. Ingression
- c. Convergent extension**
- d. Involution
- e. None of the above

8. Which of the following are accurate statements regarding morphogenetic movements during gastrulation?

- a. All animals use one major morphogenetic mechanism to accomplish gastrulation.
- b. Gastrulation across the animal kingdom is accomplished through a limited number of different types of morphogenetic movements.
- c. Gastrulation results in internalization of the endoderm and mesoderm.
- d. b & c are both accurate**
- e. None of the above are accurate