

THE OPEN UNIVERSITY OF SRI LANKA

B. Sc. DEGREE PROGRAMME – LEVEL 04

ZLU2182 – ANIMAL DEVELOPMENT  
CAT 2 (OPEN BOOK TEST)



DATE: 30<sup>th</sup> October 2011

Time: 3.00 – 4.00 p.m.

REGISTRATION NUMBER: .....

**Answer all questions**  
**Answers should be written in the space provided**

**1. The following questions are on cell determination of amphibian embryos.**

1.1 What is cell determination?

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.....

1.2 How do you find out whether cells of a tissue are determined or not?

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1.3 State the ways/methods by which cell determination is achieved.

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In 1932, Hans Spemman and Oscar Schotte transplanted a piece of ectoderm from a body flank of a frog embryo to the mouth region of a salamander embryo. In the salamander, the transplanted tissue developed into a typical horny jaw of frog. Answer the following questions based on this experiment.

1.4 What is the reason for the grafted tissue to be developed as a tissue of a jaw and not as a tissue of a flank?

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.....

1.5 What is the characteristic feature of induction indicated by the result mentioned in the Part 1.4?

.....

1.6 Why does the graft develop into a horny jaw of a frog, in the host salamander?

.....  
.....

1.7 What is the characteristic feature of induction indicated by the result mentioned in the Part 1.6?

.....

1.8 If a graft of a flank taken from an adult frog is transplanted to the mouth region of a salamander embryo, what will it develop into?

.....

1.9 Give a reason for the answer in the Part 1.8.

.....

**2. Cell-cell adhesion is a process required during embryogenesis.**

2.1 Briefly explain how cells adhere to each other.

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.....

.....

2.2 Mention two phases of the ontogenetic development in which cell adhesion process is necessary? .....

In an experiment carried out by Townes and Holtfreter in 1955, single cell-suspensions were prepared from each of the three germ layers of an amphibian soon after the formation of neural tube. Two or more of these suspensions were combined in various ways on agar-coated petri-dishes as shown in (a), (b) and (c) in the Figure 1 given below.

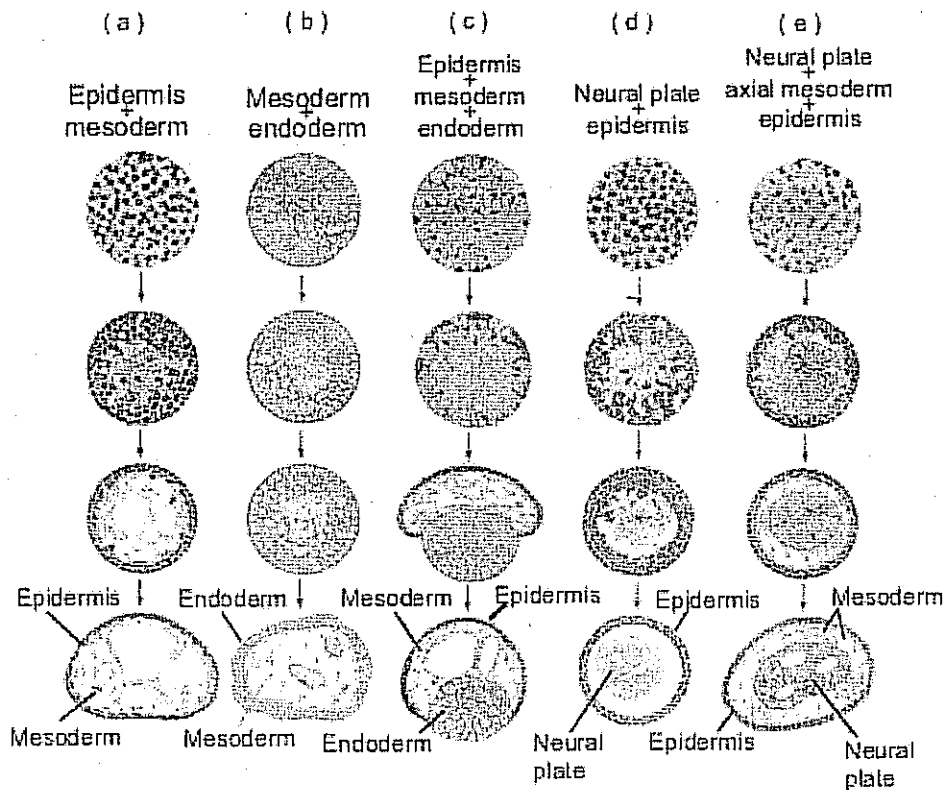


Figure 1

2.2 Describe how the cells of these suspensions namely (a), (b) and (c) given in the Figure 1, behaved on the agar media.

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2.4 How do you explain the final arrangement of cells of each germ layer on agar media?

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.....  
.....

2.5 During the preparation of (d) and (e) cell mixtures, the cells of different regions of the same germ layer were segregated and recombined. Explain the results of the experiment.

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2.6 Explain what you would expect in the Part 2.4, if the cells of the three germ layers were obtained from three different amphibian species.

.....  
.....

2.7 Evaluate the importance of the cell-cell adhesion process for embryonic development.

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**3. The following questions are based on the genes that control the development of the fruit fly, *Drosophila melanogaster*.**

3.1 List the three types of genes that have been found to be involved in the development of segmental structures of *Drosophila*, **in the order** that they are expressed.

1. ....
2. ....
3. ....

3.2 The first group of genes is not present within the egg or embryo.

Where are these genes found?

.....

The messages from these genes are stored in the egg in an inactive form. What is this form? .....

How do these messages enter the egg?

.....  
.....

What is the stimulus which converts these inactive messages to the active form?

.....

Draw a graph to show the distribution of these active products along the anterior posterior axis of the *Drosophila* embryo.

3.3 In the Figure 2, three (3) types of *Drosophila* larvae are given. The wild type one has no mutations in its genes, the bicoid mutant larva has a *bicoid* mutant gene and the nanos mutant larva has a *nanos* mutant gene. Explain the influence of the mutated genes on the body development of *Drosophila* larva.

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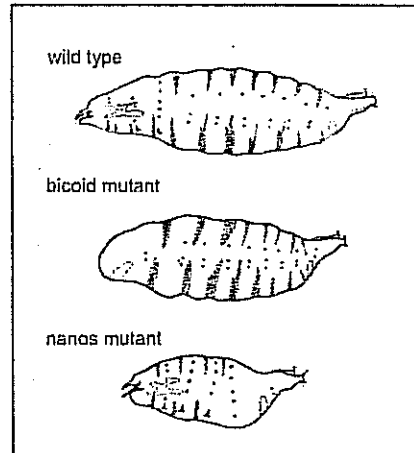


Figure 2

3.4 What is the type of genes that are involved in the development of discrete regions that will give rise to different segments in *Drosophila*?

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3.5 What is the type of genes that designate the final adult structures?

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3.6 Where are the genes mentioned in the Part 3.5 located in *Drosophila*?

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3.7 What are the two types of genes determine the expression of the genes that designate the final adult structure?

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