

THE OPEN UNIVERSITY OF SRI LANKA
B. Sc. DEGREE PROGRAMME – LEVEL 04
ZLU2182 – ANIMAL DEVELOPMENT
CAT 2 (OPEN BOOK TEST)

DATE: 31st October 2010

Time: 4.00 – 5.00 p.m.

REGISTRATION NUMBER:

Answer all questions
Answers should be written in the space provided

Q1. This question is based on cell determination of animal embryos.

1.1 What is cell determination?

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

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1.3 State the stage/s of embryonic development during which cell determination occurs.

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In 1920s, Hans Spemann and Hilde Mangold performed a series of transplant experiments on newts embryos. In one of these experiments, the dorsal lip of blastopore of an unpigmented newt embryo was grafted into the blastocoels roof of a pigmented species. As shown in Figure 1, the grafted blastopore material triggered formation of an entire secondary embryo in the recipient's embryo.

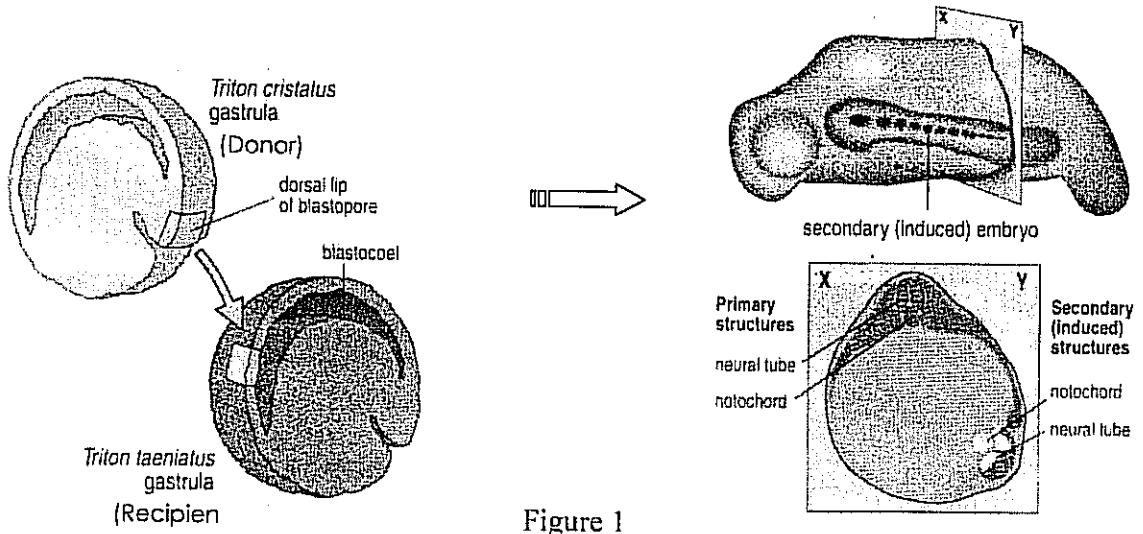


Figure 1

1.4 When selecting a donor gastrula and a recipient gastrula for the above experiment, a pigmented one and an unpigmented one of two closely related species had been chosen.

(i) Why was it necessary to select a pigmented gastrula and an unpigmented gastrula?

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(ii) Why was it necessary to select embryos of two closely related species?

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1.5 The secondary embryo formed in this experiment contained more tissues made out of host (recipient) cells rather than the grafted cells. How do you explain this observation?

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1.6 State whether the following statements on the characteristics features of cell induction are **true or false**.

- (a) Induction informs the cells of an embryo that where they are in the body and to which tissues or organs that they should be developed into.
- (b) Cells of any developmental ~~state~~ respond in the same way to the same inductive signal.
- (c) The response of a cell to inductive signal depends only on the cells ability to convey signals to its nucleus.
- (d) Induction allows the responding cells to differentiate using proteins produced by their own genes.

Q2. This question is based on cell differentiation.

2.1 Explain the importance of differential protein production for the process of cell differentiation.

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2.2 List the five major steps in the process of protein synthesis.

- Step 1 -
- Step 2 -
- Step 3 -
- Step 4 -
- Step 5 -

2.2 Which of these steps occur only within nucleus?

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2.3 What is the name given to the product obtained after Step 1?

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2.4 What is the name of the product formed during Step 4?

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2.5 Controlling/regulation of protein synthesis by unwanted genes in a cell is necessary for its differentiation. Which step mentioned in 2.2 is most important for this purpose?

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2.6 Explain two ways by which the control/regulation is achieved at Step 1?

1.

2.

2.7 Explain the process occurring at the Step 2.

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2.8 State one of the ways by which control/regulation can be achieved at Step 4?

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Q3. This question is based on current applications of the knowledge of developmental biology.

3.1 Select the most appropriate assisted reproductive technique that suits the infertile couples with defects given below.

(a) Both fallopian tubes blocked

(b) Low sperm motility

(c) With only one good fallopian tube

(d) Low sperm count

A-

3.2 Does cloning naturally occur? If yes, give an example.

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3.3 What is reproductive cloning?

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3.4 In reproductive cloning, why is it essential to use an unfertilized egg to receive nuclear material of the parent animal to be cloned?

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3.5 In the technique of reproductive cloning, why is it necessary to stimulate the egg cell after introducing the nucleus?

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3.6 What is the main difference between reproductive cloning and therapeutic cloning?

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