

ZOO501 MID TERM

Subjective

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Regards VUWAYS Team

Welcome To vuways Study Help

Define sex and reproduction

Sex and reproduction are two distinct and separable processes. Reproduction involves the creation of new individuals. Sex involves the combining of genes from two different individuals into new arrangements.

Diff between exon and intron

Exon: Coding region of DNA

Intron: Non Coding region of DNA

Zp3 and its role in

Thus, ZP3 is the specific glycoprotein in the mouse zona pellucida to which the sperm bind. ZP3 also initiates the acrosomal reaction after sperm have bound to it.

Transcription factor

Transcription factors are proteins that bind to enhancer or promoter regions and interact to activate or repress the transcription of a particular gene. Most transcription factors can bind to specific DNA sequences. Transcription factors have three major domains. 1. DNA-binding domain 2. Protein-protein interaction domain 3. Trans-activating domain

Lifecycle of calaymadomonas 5m

Let us take an example of the life cycle of Chlamydomonas. Which is usually haploid, having just one copy of each chromosome. The individuals of each species, however, are divided into two mating types: plus and minus. When a plus and a minus meet, they join their cytoplasm, and their nuclei fuse to form a diploid zygote. The flagella of two individuals twist around each other, enabling specific regions of the cell membranes to come together. These specialized regions contain mating type-specific components that enable the cytoplasm to fuse. Following flagellar agglutination, the plus individuals initiate fusion by extending a fertilization tube. This tube contacts and fuses with a specific site on the minus individual. In evolving sexual reproduction, two important advances had to be achieved. The first was the mechanism of meiosis whereby the diploid complement of chromosomes is reduced to the haploid state. The second was a mechanism whereby the two different mating types could recognize each other.

DNA-binding domain: It recognizes a particular DNA sequence. □

Protein-protein interaction domain: It allows the transcription factor's activity to be modulated by TAFs or other transcription factors.

Trans-activating domain: It activates or suppresses the transcription of the gene whose promoter or enhancer it has bound. Usually, this trans-activating domain enables the transcription factor to interact with proteins involved in binding RNA polymerase.

Blastocoels .2

A fluid-filled cavity, the blastocoel, forms in the animal hemisphere. This cavity will be important for allowing cell movements to occur during gastrulation

Function of egg jelly. 2

Many types of eggs have glycoprotein meshwork called egg jelly outside the vitelline envelope which is used either to attract or to activate sperm.

Differentiate b/w potency cell and fate cell. 3

Potency is the entire range of the cell types a particular cell can give rise to in all possible environments.

Fate of a cell is all the different cell types, its descendants can become during normal development

Differentiate b/w dyenin and the axoneme 3

The force for sperm propulsion is provided by **dyenin**, a protein that is attached to the microtubules

The major motor portion of the flagellum is called the **axoneme**. It is formed by microtubules emanating from the centriole at the base of the sperm nucleus.

Detail of protostomes 5

(Greek, "mouth first"), which include the mollusc, arthropod, and worm phyla, are so called because the mouth is formed first, at or near the opening to the gut, which is produced during gastrulation. The anus forms later at another location. There are two major branches of the protostomes. 1. The Ecdysozoa includes those animals that molt. Its major constituent is Arthropoda, a phylum containing insects, arachnids, mites, crustaceans, and millipedes. 2. The second major group of protostomes are the Lophotrochozoa. They are characterized by a common type of cleavage (spiral), a common larval form, and a distinctive feeding apparatus. These phyla include annelids, molluscs, and flatworms.

Step of sperm attraction with egg in simple step 5

1. The interaction of sperm and egg generally proceeds according to five basic steps; 2. The chemo-attraction of the sperm to the egg by soluble molecules secreted by the egg.

3. The exocytosis of the acrosomal vesicle to release its enzymes.
4. The binding of the sperm to the extracellular envelope (vitelline layer or zona pellucida) of the egg.
5. The passing of the sperm through this extracellular envelope.
6. Fusion of egg and sperm cell plasma membranes **What is pronucleus?**

Pro-Nucleus is the nucleus of either gametes i.e. sperm and egg cells in the process of fertilization but before the fusion of genetic materials of both gametes.

Regulation of gene expression

The regulation of gene expression can be accomplished at several levels

Differential gene transcription: It regulates that which of the nuclear genes is transcribed into RNA.

Selective nuclear RNA processing: It regulating which of the transcribed RNAs (or which parts of such a nuclear RNA) enter into the cytoplasm to become messenger RNAs.

Selective messenger RNA translation: It regulates that which of the mRNAs in the cytoplasm becomes translated into proteins.

Differential protein modification: It regulates that which proteins are allowed to remain or function in the cell.

Developmental genetics? 2

Developmental genetics is the discipline that examines how the genotype is transformed into the phenotype, and the major paradigm of developmental genetics is differential gene expression from the same nuclear repertoire.

Difference b/w Bicoid and Nanos? 2

In *Drosophila*, for instance, the anterior most portion of the egg contains an mRNA that encodes a protein called **Bicoid**.

The posterior most portion of the egg contains an mRNA that encodes a protein called **Nanos**.

Somit, tadpole and neural tube? 3

Somite: The mesodermal tissue adjacent to the notochord becomes segmented into somites, the precursors of the frog's back muscles, spinal cord, and dermis

Neural Tube: Notochord is a rod of mesodermal cells in the most dorsal portion of the embryo. At this stage, the embryo is called a Neurula. The neural precursor cells elongate, stretch, and fold into the embryo forming the neural tube.

Tadpole: Somites appear as blocks of mesodermal tissue. The embryo develops a mouth and an anus, and it elongates into the typical tadpole structure.

Cumulus and corona radiata? 3

The mammalian egg is also surrounded by a layer of cells called the **cumulus**.

The innermost layer of cumulus cells, immediately adjacent to the zona pellucida, is called the **corona radiata**.

Developmental hierarchy 2

The developmental hierarchy is the hierarchical series of decisions involving specific preexisting cell types. These developmental decisions are usually irreversible, that progressively and irreversibly restrict cell fate.

Differentiate between animal pole and vegetable pole 3

vegetal pole: the point on the surface of an egg that is diametrically opposite to the animal pole and usually marks the center of the protoplasm containing more yolk, dividing more slowly and into larger blastomeres than that about the animal pole,

Modes of commitment 5

Three basic modes of commitment are,

Autonomous specification

Conditional specification

Syncytial specification

Autonomous specification: Specification by differential acquisition of certain cytoplasmic molecules present in the egg. Characteristic of most invertebrates. Cell type specification

Conditional specification: Characteristic of all vertebrates and few invertebrates. Specification by interactions between cells. Relative positions are important. Variable cleavages produce no invariant fate assignments to cells. o Massive cell rearrangements and migrations precede or accompany specification. o Capacity for "regulative" development: allows cells to acquire different functions.

Syncytial specification: • Characteristic of most insect classes. • Specification of body regions by interactions between cytoplasmic regions prior to cellularization of the blastoderm. Modes of commitment

• Variable cleavage produces no rigid cell fates for particular nuclei. • After cellularization, conditional specification is most often seen.

2 objectives of development 2 marks

1. It generates cellular diversity and order within each generation.
2. It ensures the continuity of life from one generation to the next.

MITF 2

(Microphthalmia-Associated Transcription Factor. The microphthalmia (MITF) protein is necessary for the production of pigment cells and their pigments.

Fertilization

Fertilization is the process whereby two sex cells (gametes) fuse together to create a new individual with genetic potentials derived from both parents.

Fertilization accomplishes two separate processes: Sex (the combining of genes derived from the two parents) and Reproduction (the creation of new organisms)

How we can get knowledge about gene activity in human

Knowledge of gene activity in humans can be obtained by candidate gene mapping or positional cloning.

Teratology and Evolutionary embryology

The third anatomical approach to developmental biology is **teratology**, the study of birth defects. These anatomical abnormalities may be caused by mutant genes or by substances in the environment that interfere with development.

Evolutionary Embryology: The study of how changes in development may cause evolutionary changes and of how an organism's ancestry may constrain the types of changes that are possible

Role of Calcium and bicarbonate ions in capacitation

Calcium and bicarbonate ions may be critical in activating cAMP (Cyclic adenosine monophosphate) production and in facilitating the membrane fusion events of the acrosomal reaction

Hammerling Hypothesis:

The nucleus synthesizes a stable mRNA that lies dormant in the cytoplasm until the time of cap formation". Nucleus contains information specifying the type of cap produced (i.e., it contains the genetic information that specifies the proteins required for the production of a certain type of cap).

Fertiline and Gametogenesis:

In mammals, the **fertilin** proteins in the sperm plasma membrane are essential for sperm membrane-egg membrane fusion.

The development of gametes, called **gametogenesis**, is usually not completed until the organism has become physically mature.

MCS

- 1) J.R Whittaker stained blastomere in the presence of enzyme.....(Acetylcholinesterase)
- 2) The nuclei region containing high amount bicoid will be instructed to activate those gene necessary for producing...(head)
- 3) A cytoplasm that contain many nuclei is called...(Syncytium)
- 4) Potency is...(intrinsic property)
Autonomal abnormalities may be caused by(mutant genes)