Principles of Development 6th edition Wolpert Test Bank

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Type: MC question
Title: Chapter 02 - Question 01
01) What is the result of the first 12 nuclear divisions of a *Drosophila* embryo where roughly 6,000 nuclei share a single cytoplasm?
a. Micropyle
@ No, a micropyle is the structure through which sperm enters the anterior end of the egg.
Page reference: 38
b. Cellular blastoderm
@ No, the cellular blastoderm occurs only after membranes form around peripheral nuclei. A single cytoplasm is no longer shared at this point as cellularization has taken place.
Page reference: 39
***c.** Syncytium
@ Yes, the first twelve nuclear divisions occur without cytokinesis to give rise to a single cytoplasm containing roughly 6,000 nuclei. This single cell is referred to as a syncytium.
Page reference: 38
d. Pole cell
@ No, pole cells are a small population of individual cells that will become germ cells from which the gametes will be derived.
Page reference: 40

Type: MC question
Title: Chapter 02 - Question 02
02) Which of the options given is not true of the *Drosophila* mesoderm?
a. It gives rise to muscle and connective tissue.
@ No, this is true. Muscle and connective tissue are important mesoderm-derived tissues in vertebrate and invertebrate embryos.
Page reference: 40
b. Gastrulation internalizes the mesoderm.
@ No, this is true. Cellular rearrangements during gastrulation forces blastoderm cells to the interior of the embryo.
Page reference: 40
c. The mesoderm is a primary germ layer.
@ No, this is true. The mesoderm is a primary germ layer, along with endoderm and ectoderm.
Page reference: 40
***d.** The dorsal surface of the blastoderm gives rise to mesoderm.
@ Yes, this is not true. Gastrulation forces ventral blastoderm cells into the interior of the embryo, thus forming the mesoderm.
Page reference: 40

Type: MC question
Title: Chapter 02 - Question 03
03) Which term is not associated with a *Drosophila* larva?
a. Instar
@ No, an instar is a larval stage with successive periods of growth, molting, and shedding.
Page reference: 41
***b.** Metamorphosis
@ Yes, metamorphosis is a process within a pupa where a major transformation of the adult form takes place. The pupal stage occurs after the larval stage.
Page reference: 41
c. Denticles
@ No, denticles are belts of small tooth-like outgrowths from the epidermal cuticle.
Page reference: 41
d. Imaginal discs

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@ No, imaginal discs are small sheets of epidermal cells from which adult tissues, like legs and wings, are derived. Imaginal discs undergo cell proliferation during larval stages.
Page reference: 41

Type: MC question
Title: Chapter 02 - Question 04
04) What is the maternal anterior morphogen that controls head and thorax development?
***a.** Bicoid
@ Yes, *bicoid* mRNA translation at fertilization gives rise to an anterior to posterior gradient that is required for development of anterior structures.
Page reference: 47
b. Nanos
@ No, *nanos* mRNA translation at fertilization gives rise to a posterior to anterior gradient that is required for development of posterior structures.
Page reference: 47
c. Caudal
@ No, *caudal* mRNA translation at fertilization gives rise to a posterior to anterior gradient that is required for development of posterior structures.
Page reference: 50
d. Torso
@ No, Torso is required for development of the extreme ends (acron and telson) of the embryo.
Page reference: 51

Type: MC question
Title: Chapter 02 - Question 05
05) Which of the options given is not true of the *Drosophila* Dorsal protein?
a. Control regions of target genes differ in their affinity for the Dorsal protein.
@ No, this is true. Dorsal protein can bind with different affinity to control regions of its target genes. This characteristic adds to the complexity of target gene expression across the dorso-ventral axis of the *Drosophila* embryo.
Page reference: 62
b. The dorsal region of the *Drosophila* embryo expresses genes that are repressed by the Dorsal protein.
@ No, this is true. Dorsal protein can act as repressor and activator of gene expression. Because Dorsal protein is high in the ventral region, repressed genes show expression within dorsal cells of the Drosophila embryo.
Page reference: 62
c. The gradient of Dorsal protein divides the *Drosophila* embryo up into at least four well-defined domains.
@ No, this is true. A French flag model can be invoked to describe the patterning of the dorso-ventral axis within the *Drosophila* embryo.
Page reference: 62
***d.** Dorsal protein levels are higher within the dorsal region of the *Drosophila* embryo.
@ Yes, this is not true. Dorsal protein levels are higher within the ventral region of the *Drosophila* embryo.
Page reference: 62

Type: MC question
Title: Chapter 02 - Question 06
06) What class of patterning genes are expressed within seven transverse stripes in the *Drosophila* embryo?
***a.** Pair-rule genes
@ Yes, pair-rule genes are expressed in seven transverse stripes within alternating parasegments.

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Page reference: 72
b. Segmentation genes
@ No, segmentation genes are expressed in 14 transverse stripes.
Page reference: 76
c. Gap genes
@ No, gap genes are expressed in broad regions.
Page reference: 66
d. Hox genes
@ No, Hox genes are expressed in broad regions along the anterio-posterior axis.
Page reference: 84

Type: MC question
Title: Chapter 02 - Question 07
07) What class of patterning genes encodes members of intercellular signaling pathways?
a. Pair-rule genes
@ No, pair-rule genes encode transcription factors that function within a syncytium prior to cellularization.
Page reference: 72
***b.** Segmentation genes
@ Yes, segmentation genes function after the blastoderm becomes cellularized. Therefore, signaling proteins and their receptors are necessary to define parasegment boundaries.
Page reference: 78
c. Gap genes
@ No, gap genes encode transcription factors that function within a syncytium prior to cellularization.
Page reference: 66
d. Hox genes
@ No, all Hox genes encode transcription factors that define the identity of embryonic segments.
Page reference: 85

Type: MC question
Title: Chapter 02 - Question 08
08) Which of these segmentation genes is a transcription factor that defines parasegment boundaries?
a. Frizzled
@ No, Frizzled is the receptor for the Wingless signaling protein.
Page reference: 78
b. Hedgehog
@ No, Hedgehog is an intercellular signaling protein.
Page reference: 78
c. Patched
@ No, Patched is the receptor for the Hedgehog signaling protein.
Page reference: 78
***d.** Engrailed
@ Yes, Engrailed is a transcription factor that limits the pattern of Hedgehog and Wingless signaling pathways to define parasegment boundaries.
Page reference: 78

Type: MC question
Title: Chapter 02 - Question 09
09) What is the term that describes the relation between the order of the Hox genes along the chromosome and the order of their expression along the antero-posterior axis?
a. Homeosis
@ No, homeosis is the transformation of a whole segment into another related one.

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Page reference: 85
b. Posterior dominance
@ No, posterior dominance is the phenomenon in which Hox gene products normally expressed in anterior regions are suppressed by more posterior products.
Page reference: 87
c. Gene cluster
@ No, Hox genes are organized into two clusters of genes that make up the HOM-C complex.
Page reference: 91
***d.** Co-linearity
@ Yes, co-linearity refers to the correspondence between the order of Hox genes along the chromosome and the order in which they are expressed along the antero-posterior axis of the embryo.
Page reference: 93

Type: MC question
Title: Chapter 02 - Question 10
10) What type of gene, such as a Hox gene, is sufficient to cause cells to adopt a particular fate?
***a.** Selector
@ Yes, a selector gene's activity is sufficient to cause cells to adopt a particular fate.
Page reference: 77
b. Repressor
@ No, a selector gene's activity is sufficient to cause cells to adopt a particular fate. A repressor protein represses a gene's expression.
Page reference: 62
c. Activator
@ No, a selector gene's activity is sufficient to cause cells to adopt a particular fate. An activator protein activates a gene's expression.
Page reference: 62
***d.** Recessive
@ No, recessive is just a general name for any gene that only shows a normal phenotype when two copies are present in the cell.
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