

# LEBANESE UNIVERSITY

Faculty of

MEDEWINE

Date : 27/9/2005

Time : 1 hour

2 h

Entrance exam to 2<sup>nd</sup> year  
Academic Year 2005-2006

Subject : Biology

Choose the correct answer(s) (9.5 pts)

- Disaccharides:

- a- are composed of three monomers.
- b- are composed of monomers that are linked by peptide bonds.
- c- are all composed of identical monomers.
- d- no correct answer.

- In a chain of nucleotides:

- a- we always find the same nitrogenous base.
- b- the nitrogenous base is carried by 5' carbon of ribose.
- c- nitrogenous bases are linked to each other by phosphodiester bonds.
- d- no correct answer.

- In a bacterium:

- a- the main genetic information is carried either by DNA or RNA.
- b- the mesosome belongs to the cell wall.
- c- we find ribosomes.
- d- no correct answer.

- All viruses have:

- a- ribosomes.
- b- envelope.
- c- capsid.
- d- capsule.

- Gap junctions comprise:

- a- occludins.
- b- membrane proteins.
- c- connexins.
- d- calmodulin.

- During exocytosis :

- a- vesicle's membrane is added to plasma membrane.
- b- plasma membrane is kept unchanged.
- c- vesicle's membrane detaches from the plasma membrane.
- d- cytoskeleton is involved.

- Cytoskeleton components found in microvilli:

- a- are the same as those found in cilia.
- b- are actin filaments.
- c- are intermediate filaments.
- d- comprise basal bodies.

- The smooth endoplasmic reticulum:

- a- contains glycosylation enzymes.
- b- contains enzymes of lipid synthesis.
- c- is tubular in shape.
- d- no correct answer.

- A dictyosome:

- a- has a cis maturing face.
- b- has a trans maturing face.
- c- comprises sacks that contain the same enzymes.
- d- no correct answer.

- Lysosomes:

- a- have proton pumps in their membranes.
- b- are active at alkaline pH.
- c- have double membranes that are glycosylated.
- d- that are primary, derive from trans Golgi face.

- Peroxisomes:

- a- carry out oxidation as a main function.
- b- use oxygen, similarly to mitochondria, to produce ATP.
- c- contain catalase.
- d- are absent from plant cells.

- Among histone proteins, there is (are):

- a- H1
- b- H5
- c- H2B
- d- H3

- Transcription of a gene:

- a- occurs on both DNA strands at the same time.
- b- starts and ends at any DNA sequence.
- c- takes place in euchromatin.
- d- no correct answer.

- DNA replication:

- a- involves DNA polymerases.
- b- starts at any sequence along DNA.
- c- requires deoxyribonucleotides.
- d- no correct answer.

- A cell in G<sub>0</sub> phase:

- a- does not replicate its DNA.
- b- can reenter the cell cycle if it is activated by adequate conditions.
- c- could stay in G<sub>0</sub> until its death.
- d- no correct answer.

- In the mitochondrial matrix there are:

- a- DNA, ribosomes and enzymes.
- b- DNA, ribosomes and ATP synthetase.
- c- DNA, enzymes and proteins of the respiratory chain.
- d- no correct answer.

- The following process(es) occur(s) in the cytosol:

- a- glycolysis.
- b- Krebs cycle.
- c- transcription.
- d- no correct answer.

- The genetic code:

- a- is the assignment of triplet of aminoacids to the nitrogenous bases.
- b- comprises 64 codons.
- c- comprises three stop codons.
- d- no correct answer.

- With respect to plant cells:

- a- they communicate with one another by plasmodesmata.
- b- they are deprived of centrioles.
- c- they have cell wall rich in peptidoglycans.
- d- no correct answer.

**Choose the correct answer (s) (8.5 pts)**

- Simple epithelia:

- a- Consist of many cell layers
- b- Are found in regions where there is little risk of mechanical abrasion
- c- Are all formed of cells with similar morphological aspect
- d- None of the above is correct

- Transitional epithelium:

- a- Is a simple epithelium
- b- Is found in the urinary tract
- c- Has superficial cells that vary in shape with organ distension
- d- All of the above are correct

- Lymphocytes:

- a- Have a large nucleus
- b- Are phagocytic cells
- c- All of them synthesize antibodies
- d- None of the above is correct

- Platelets:

- a- Are the smallest blood cells
- b- Are capable of cell division
- c- Play a role in hemostasis
- d- All of the above are correct

- The smooth muscle fiber:

- a- Does not contain actin and myosin
- b- Has triads at the Z line level
- c- Possess a basal lamina
- d- Is a multinucleated cell

- Skeletal muscle fibers:

- a- Have a cylindrical form
- b- Have central nuclei
- c- Are rich in mitochondria
- d- All of the above are correct

- The cardiac muscle fibers:

- a- Have T-tubules at the A-I junction
- b- Do not contain sarcomeres
- c- Are joined transversly by intercalated discs
- d- None of the above is correct

- A nerve fiber in the central nervous system:

- a- Is a long cell
- b- Can be non myelinated
- c- Is always covered by Schwann cells
- d- None of the above is correct

- Multipolar neurons:

- a- Have many axons
- b- Are abundant in sensory ganglia
- c- Have a cell body rich in cellular organelles
- d- None of the above is correct

- Endocrine glands:
  - a- Are highly vascularized
  - b- Possess an excretory canal
  - c- Remain connected to surface epithelia during histogenesis
  - d- None of the above is correct
  
- Adipose cells:
  - a- Are capable of active cell division
  - b- Are metabolically inactive
  - c- Have a central nucleus
  - d- None of the above is correct
  
- Collagen fibers:
  - a- Have a double helical structure
  - b- Are synthesized only by fibroblasts
  - c- Are absent in the bone matrix
  - d- None of the above is correct
  
- Cartilage:
  - a- Is a specialized epithelial tissue
  - b- Has a hydrated matrix
  - c- Forms the embryo skeleton
  - d- All of the above are correct
  
- Appositional growth of cartilage:
  - a- Involves the perichondrium
  - b- Is responsible for growth in length of cartilage
  - c- Leads to isogenous cell clusters
  - d- None of the above is correct
  
- Osteons:
  - a- Are connected by Volkmann's canals
  - b- Are formed by concentric lamellae
  - c- Are abundant in spongy bone tissue
  - d- All of the above are correct
  
- Osteoblasts:
  - a- Are young inactive cells
  - b- Have a hematopoietic origin
  - c- Are responsible for the synthesis of the organic extracellular bone matrix
  - d- None of the above is correct
  
- Osteoclasts:
  - a- Are huge mononucleated cells
  - b- Are ciliated cells
  - c- Are responsible for bone resorption
  - d- None of the above is correct

Choose the correct answer (s) (3.5 pts)

- The secondary-cell wall is :
  - a- Thin
  - b- Made of regularly arranged microfibrils
  - c- Made of one cell layer
  - d- None of the above is correct
  
- The primary meristem:
  - a- Is an embryonic tissue
  - b- Is responsible for increase in length and width of the plant
  - c- Has isodiametric cells
  - d- All of the above are correct
  
- The chloroplast containing parenchyma tissue cells:
  - a- Have always the same shape
  - b- Could be separated by air spaces
  - c- Are rich in starch
  - d- None of the above is correct
  
- Epidermal cells:
  - a- Are tightly joined
  - b- Are dead cells
  - c- Have a suberified outer wall
  - d- None of the above is correct
  
- Tracheids:
  - a- Are conductive tissues
  - b- Have completely lignified secondary cell walls
  - c- Are present in all plants
  - d- None of the above is correct
  
- The following tissue(s) is (are) made of living cells:
  - a- Sclerenchyma
  - b- Phloem
  - c- Laticifers
  - d- All of the above are correct
  
- Collenchyma:
  - a- Is a protective living tissue
  - b- Is made of cells with thick cellulosic walls
  - c- Are present in the periphery of plant organs
  - d- All of the above are correct

What do you call? 1pt.

a) the organism that doesn't tolerate a wide range of temperature?

b) The aquatic organisms which live in or on the bottom?

a: ... Stenothermal

b: ... Benthos

Rearrange the following terms in an organized increasing ecological order:

Individual, Synusy, Biocoenosis, population. 1 pt.

... individual, population, Synusy, Biocoenosis

Complete with the appropriate words: 1 pt.

a- The ecological division using the term Demecology is designated to study the dynamic of populations.

b- The terrestrial ecosystem known as ... Tundra is characterized by a short summer.

Match Letter (s) with number (s): 1.5 pts.

a- Photophilic

b- Sciaphilic

c- Hygrophilic

1- Shade

2- Light

3- Humidity

4- No matching

a: ... 2

b: ... 1

c: ... 3

- Fill in the blank with the proper term (2 pts)

a. The symmetry in adult echinoderms is pentaradial

b. The resistant stage, during unfavorable conditions, in sponges is gemmule

c. The free form of adult cnidarians is called medusa

d. The larva of annelids is called Trochophore

- Choose the correct answer(s) (3.5 pts)

- The haemocyanin is a respiratory pigment in the blood of:

a. Platyhelminths

b. Annelids

c. Mollusks

d. Nematodes

- The molt occurs in:

- a. Nematodes
- b. Arthropods
- c. Mollusks
- d. Annelids

- The development is indirect in:

- a. Urochordates
- b. Amphibians
- c. Birds
- d. Oligochaetes

- The kidneys are of the type mesonephros in:

- a. Fish
- b. Birds
- c. Amphibians
- d. Metatherians

- The body is not segmented in:

- a. Arthropods
- b. Annelids
- c. Nematodes
- d. Echinoderms

- The common characters in birds and mammals are:

- a. Left aortic arch
- b. Anucleated erythrocytes
- c. Homeotherms
- d. Tetrapods

- The Malpighian tubules assume excretory function in:

- a. Insects
- b. Mollusks
- c. Crustaceans
- d. Annelids

**Choose the correct answer (4.5 pts)**

-The correct sequence is:

- a- cleavage, zygote, blastula, gastrula and morula.
- b- zygote, cleavage, morula, blastula and gastrula.
- c- cleavage, zygote, morula, blastula and gastrula.
- d- zygote, cleavage, blastula, morula and gastrula.

-The capacity of an embryonic tissue to affect the development of another one is known as:

- a- morphogenesis
- b- induction
- c- cell differentiation
- d- totipotency

-What is the correct couple:

- a- sea urchin ↔ periblastula
- b- mammal ↔ discoblastula
- c- amphibian ↔ irregular coeloblastula
- d- insect ↔ stereoblastula

-What is the false couple:

- a- liver ↔ endoderm
- b- heart ↔ mesoderm
- c- cornea ↔ mesoderm
- d- telencephalon ↔ prosencephalon

-The yolk plug appears at the:

- a- beginning of cleavage
- b- end of cleavage
- c- end of gastrulation
- d- beginning of gastrulation

-In birds, the amnion and the chorion (serosa) are separated by the:

- a- amniotic cavity
- b- archenteron
- c- extraembryonic coelum
- d- blastocoel

-The human embryo develops from the:

- a- inner cell mass
- b- cytotrophoblast
- c- syncytiotrophoblast
- d- blastocoel

-In frog, the bilateral symmetry is observed with the formation of the:

- a- gray crescent
- b- primitive streak
- c- neural tube
- d- area pellucida

-In Vertebrates the dermis develops from the:

- a- dermatome

- b- myotome
- c- sclerotome
- d- notochord

Choose the correct answer (s) (8 pts)

- A chromosome is composed of

- a) two chromatids in phase G1
- b) one chromatid in phase G1
- c) one chromatid in phase G2
- d) two chromatids in phase G2

- A cell is

- a) polyploid with  $2n+1$  chromosomes
- b) polysomic with  $2n + 1$  chromosomes
- c) aneuploid with  $n$  chromosomes
- d) euploid with  $2n-1$  chromosomes

- Mutation by substitution could be

- a) a transition
- b) an addition
- c) an inversion
- d) a translocation

4- A double epistaxis for dominant alleles gives in F 2 the following phenotypic proportions

- a) 9/6/1
- b) 9/4/3
- c) 9/7
- d) 13/3

- Concerning the nature of DNA genetic material

- a) S pneumococcus are virulent
- b) DNA S is able to transform R pneumococcus to S
- c) DNA R is able to transform S pneumococcus to R
- d) none of the above is true

- A character is influenced by sex if:

- a) it is expressed similarly in males and females
- b) it could be over expressed in males
- c) it could be over expressed in females
- d) it is only expressed in one sex

- The crossbreeding  $Aa Bb \times aa bb$  gives the following phenotypic outcomes :

82 [AB] 14[Ab] 16[aB] 88 [ab]

Distance between genes A and B will be :

- a) 30 centimorgan
- b) 15 centimorgan
- c) 20 centimorgan
- d) 60 centimorgan

- An individual of genotype  $hh I^A i$  :

- a) possesses the H antigen
- b) belongs to blood group A
- c) h is hypostatic
- d) none of the above is true

- As a disease, hemoglobinopathy (drepanocytosis) is :

- a) metabolic
- b) molecular
- c) sex linked
- d) sex influenced

- What is the probability to obtain an individual [ABCDE] from the following crossbreeding  $AaBBCC'DdEE \times AaBbCC'DdEE$

- a) 1/64
- b) 3/64
- c) 9/64
- d) 27/64

- As a disease Ichtiosis is:

- a) dominant sex linked
- b) recessive sex linked
- c) autosomal dominant
- d) autosomal recessive

- Given a locus of sex linked 4 alleles, the number of different genotypes in the population is :

- a) 4 ♀ and 10 ♂
- b) 4 ♀ and 4 ♂
- c) 10 ♀ and 10 ♂
- d) 10 ♀ and 4 ♂

- In the chromosome

- a) euchromatine may be facultative or constitutive
- b) heterochromatine may be facultative or constitutive
- c) centromeres are always present
- d) none of the above is true

- The number of Barr corpuscles is equal to :

- a) one in trisomy 21 female
- b) one in the individual with turner's syndrome
- c) zero in XYY individual
- d) zero in the individual with klinefelter's syndrome

- The gene governing the Rhesus system is carried by chromosome:

- a) 1
- b) 4
- c) 6
- d) 9

- Given a cyte I with  $2n = 8$  the theoretical number of the different possible cyte II obtained following crossing over is :

- a) 16
- b) 32
- c) 64
- d) 256

Choose (circle) the correct answer (s) (4.5 pts)

Budding

- a- occurs only in Protozoa
- b- leads always to the formation of colonies
- c- starts with undifferentiated cells
- d- is identical to the fission

Meiosis I

- a- starts during fetal stage of the male
- b- could continue in the secondary follicle
- c- is at the origin of the genetic diversity of the gametes
- d- is discontinued in the female gametes

The spermatogonia

- a- start meiosis at each spermatogenetic cycle
- b- have LH receptors
- c- have several morphological types
- d- secrete testicular fluid.

Epididymal maturation

- a- is essentially controlled by testosterone
- b- where nuclear condensation begins
- c- the membrane modification of spermatozoa stops
- d- the spermatozoa are hypermobile

The spermatogenetic activity

- a- The polyspermia is a higher number than normal of spermatozoa in the semen
- b- Azoospermia(y) is the total absence of spermatozoa in the semen
- c- Asthenospermia(y) is the abnormal shape of spermatozoa
- d- Oligospermia(y) is the moderate (reduced) number of spermatozoa in the semen

The ovary:

- a- the primordial follicle are at the center
- b- the ruptured follicle evolve into atretic follicle
- c- is controlled by the pituitary gland
- d- is the place where the mitosis of the oogonia occur in the adult female

The luteal phase

- a- the Slavjanski membrane (basement membrane) of the granulosa remains intact
- b- the luteal cells originate from the theca interna and the granulosa
- c- the secretion of estrogen is dominant
- d- the corpus luteum undergoes luteolysis if fertilization occurs

Fertilization

- a- the internal acrosomal membrane and plasma membrane contribute to the acrosomal reaction
- b- the equatorial region of the spermatozoon's head is responsible for the fusion of the membrane's gametes
- c- the acrosomal reaction is  $Ca^{++}$  dependent
- d- the first spindle fiber of the zygote derives from the distal centriole.

Fixation of the spermatozoon on the zona pellucida

- a- is assumed by ZP1
- b- is secondary when it takes place through ZP3
- c- is in direct contact between the spermatozoon membrane and ZP3
- d- follows the passage through the cumulus oophorus

Circle the right answer (3 pts):

-Fungi

- a- are all eukaryotic, multicellular and autotrophs
- b- have all a haplo-diplontic cycle
- c- Ascomycota and Basidiomycota present a dikaryotic stage
- d- are all saprophytes

-Algae:

- a- are all unicellular
- b- are mostly photoautotrophs
- c- present the same development cycle
- d- are all Chlorophytes

- During the photosynthesis process:

- a- the light-independent phase takes place in the stroma of the chloroplast
- b- the photolysis of  $\text{CO}_2$  is the source of hydrogen for the light-dependent phase
- c- RuBP is the enzyme that is used to fix atmospheric  $\text{CO}_2$  in  $\text{C}_4$  plants
- d- the light-dependent phase supplies the Calvin cycle with  $\text{H}_2\text{O}$  and NADPH

- Hydrophytes possess:

- a- a developed supporting tissue
- b- abundant stomata
- c- a well developed vascular tissue
- d- an abundant aerenchyma

- The photosynthetic symbiont in Lichens is a (n):

- a- Rhodophyte
- b- Chlorophyte
- c- Bryophyte
- d- Ascomycota

- In the kingdom Plantae:

- a- gametes of Bryophytes are formed in the gametangia after a meiotic division
- b- Sphenophyta (Sphenopsida), Lycophyta (Lycopsida) and Pterophyta (Pteropsida) belong to the same plant group
- c- the endosperm of Gymnosperm seeds is the result of double fertilization
- d- the ovule of Angiosperms contains eggs inside the archegonium