

Entrance exam to 2<sup>nd</sup> year  
Academic year 2011-2012

Subject : Biology

Number of pages = 17

Please answer questions of each section strictly on the answer sheet at the end of the section. No answer will be taken into consideration outside the answer sheets !

**Cytology:** select the correct answer (s). One or more answer can be correct

1- Triglycerides

- a) comprise cholesterol
- b) belong to polysaccharides
- c) comprise sphingosine
- d) are digested by lipases

2- Starch

- a) is a proteoglycan
- b) is the stored disaccharide in plants
- c) is composed of monomers linked by glycosidic bonds
- d) is an energetic macromolecule

3- The plasma membrane

- a) is composed of three lipid leaflets
- b) is composed of two dark lamina (layers) separated by a clear one
- c) in all living cells is covered by a glycocalyx
- d) no correct answer

4- Regarding intercellular junctions

- a) occludins are the main proteins of tight junctions
- b) connexins are the main proteins of desmosomes
- c) are all linked to actin filaments
- d) hemidesmosomes are always located at the basal cell side

5- Regarding bacteria

- a) they contain a single, circular and double-stranded chromosome
- b) their ribosomes differ from eukaryotic ribosomes
- c) some of them have plasmids
- d) are all encapsulated

6- Regarding viruses

- a) they contain ribosomes
- b) they contain lipids in their capsid
- c) they all contain nucleic acids
- d) they produce viral particles during the lysogenic cycle

7- Regarding the nucleus

- a) its envelope is perforated by gap junctions
- b) the nuclear lamina is located at the nucleoplasmic side of the envelope
- c) the nuclear pores allow bidirectional transport
- d) none of the above

8- Regarding the cell cycle

- a) a cancerous cell is blocked in G<sub>0</sub>
- b) kinetochorian microtubules are polymerized before astral microtubules
- c) the anaphase chromosome is composed of one DNA molecule
- d) the centrosome links chromosomes to the mitotic spindle

9- A nucleosome includes

- a) proteins 2H<sub>2</sub>A, 2H<sub>2</sub>B, 2H<sub>3</sub> and 2 H<sub>4</sub>
- b) proteins 2H<sub>1</sub>, 2H<sub>2</sub>A, 2H<sub>2</sub>B, 2H<sub>3</sub> and 2 H<sub>4</sub>
- c) non-histone proteins
- d) DNA polymerases

10- The rough endoplasmic reticulum

- a) is responsible of microtubule polymerization
- b) is responsible of synthesis of membrane proteins
- c) is continuous with the nuclear envelope
- d) no correct answer

11- Golgi apparatus

- a) is composed of a constant number of cisterna
- b) receives vesicles from the rough endoplasmic reticulum through its trans face
- c) is involved in proteins glycosylation
- d) is the site of calcium storage

12- Peroxisomes

- a) contain DNA
- b) use oxygen (O<sub>2</sub>)
- c) originate from Golgi apparatus
- d) are rich in acid hydrolases

13- ATP synthetase

- a) is located in the internal mitochondrial membrane
- b) hydrolyses ATP
- c) phosphorylates ADP
- d) is activated by Ca<sup>2+</sup> gradient

14- Concerning plant cells

- a) the cell wall is rich in peptidoglycan
- b) their plasma membrane is a lipid bilayer containing proteins
- c) they contain lysosomes and centrosomes
- d) they are all heterotrophes

15- Regarding protein translation

- a) requires a mature mRNA in eukaryotic cells
- b) requires energy
- c) starts at the 3' end of the mRNA
- d) it is achieved by matching amino acids with anticodons of mRNA

16- The lysosomes

- a) are involved in intracellular digestion and defense
- b) have ATPase proton pumps in their membranes
- c) the primary ones, derive from Golgi apparatus
- d) no correct answer

17- The mitochondrial matrix comprises

- a) water, DNA, ribosomes and microtubules
- b) water, DNA, ribosomes and tRNA
- c) DNA, ribosomes and respiratory chain complexes
- d) DNA, ribosomes and Krebs cycle enzymes

18- A centriole cross section shows

- a) 9 triplets of microfilaments
- b) one central doublet of microtubules
- c) 9 complete microtubules + 18 incomplete (c-shaped) ones
- d) 18 complete microtubules + 9 incomplete (c-shaped) ones

19- Regarding intermediate filaments

- a) they are composed of fibrous monomers
- b) they contain keratin, lamins and actin
- c) they are found in the axis of microvilli
- d) no correct answer

20- The cytosol

- a) is rich in water
- b) is the site where glycolysis takes place
- c) is the site where transcription takes place
- d) is the site where replication takes place

cytology answer sheet:

1	2	3	4	5	6	7	8	9	10
<del>b, d</del>	<del>c, d</del>	<del>a, b, d</del>	<del>a, d</del>	<del>a, b, c</del>	<del>a, d</del>	<del>d</del>	<del>a</del>	<del>a, c, d</del>	<del>a</del>

11	12	13	14	15	16	17	18	19	20
<del>a, b, c</del>	<del>e</del>	<del>b, c</del>	<del>b, c</del>	<del>b, c</del>	<del>a, d</del>	<del>a, c</del>	<del>b, c</del>	<del>d</del>	<del>a, b, c</del>

d	c, d	b	a, d	a, b, c	c	b, c	c	a	b, c
c	b	a, c	b	a, b	a, b, c	b, d	c	a	a, b

**Histology: Choose the correct answer(s). One or more answers could be correct. (10 pts)**

1) Urothelium (or uroepithelium):

- a) Is a pseudostratified epithelium
- b) Is present in the urinary system
- c) Is a ciliated epithelium
- d) could have flattened cells at its surface

2) Endocrine cells:

- a) secrete proteins, mucus and steroids
- b) release their secretion through an unbranched duct
- c) May be present in the same organ with exocrine cells
- d) release hormones that act always through cell surface receptors

3) Glycosaminoglycans:

- a) are polysaccharides
- b) form the main part of proteoglycans
- c) are abundant in hyaline cartilage
- d) none of the above is correct

4) Loose connective tissue:

- a) has more fibers than dense connective tissue
- b) has an abundant ground substance
- c) could be regular or irregular
- d) is highly resistant to stress

5) Nutrition of articular cartilage is due to:

- a) Synovial fluid
- b) perichondrium
- c) diffusion through the basal lamina
- d) all of the above are correct

6) In a long bone diaphysis, we observe:

- a) Haversian bone
- b) spongy bone
- c) the epiphyseal growth plate
- d) a medullary cavity

7) Monocytes:

- a) are reniform (bean-shaped)
- b) have a small nucleus
- c) mature in the red bone marrow and the thymus
- d) are larger than basophils

8) Plasma cells:

- a) produce antibodies
- b) are phagocytic cells
- c) originate from the same precursor cell as basophils
- d) are involved in allergic reactions

- 9) During striated muscle contraction:
- a) sarcomere length decreases
  - b) Thick filaments slide towards thin filaments
  - c) the length of the A band doesn't change
  - d) T tubules transmit depolarization waves
- 10) Sensory ganglia:
- a) contain cell bodies of pseudo-unipolar neurons
  - b) contain cell bodies of multipolar neurons
  - c) are located in the central nervous system
  - d) none of the above is correct
- 11) Concerning epithelia:
- a) epithelial cells have morphological and functional polarity
  - b) renewal of stratified epithelium is due to the basal layer cells
  - c) basal lamina allows diffusion of nutrients from connective tissue to the epithelium
  - d) all stratified epithelia are keratinized
- 12) Collagen fibers are synthesized by:
- a) adipocytes
  - b) plasma cells
  - c) fibroblasts
  - d) monocytes
- 13) Fibrocartilage:
- a) is surrounded by an extensive perichondrium
  - b) contains a small number of chondrocytes
  - c) resists high pressure
  - d) is present in the epiphysial growth plate
- 14) Woven bone:
- a) is highly mineralized
  - b) contains randomly arranged collagen fibers
  - c) is vascularized
  - d) is made up of osteons
- 15) Cardiac muscle cells:
- a) have triads
  - b) have a branched cylindrical shape
  - c) have a less developed sarcoplasmic reticulum than skeletal muscle cells
  - d) have peripherally located nuclei
- 16) Oligodendrocytes:
- a) synthesize myelin in the central nervous system
  - b) are the smallest glial cells of the central nervous system
  - c) are ciliated
  - d) none of the above is correct

17) A meristematic cell:

- a) is an undifferentiated cell
- b) is always highly vacuolated
- c) does not contain differentiated plastids
- d) none of the above

18) A stoma:

- a) has 4 guard cells
- b) shows an aperture that allows transpiration
- c) is a part of the protective tissue
- d) is a part of the secretory tissue

19) Conductive tissue:

- a) conducts crude sap from leaves to roots
- b) conducts elaborated sap from roots to leaves
- c) is an undifferentiated tissue
- d) none of the above is correct

20) Collenchyma:

- a) is a living tissue
- b) is located at the periphery of organs
- c) is more flexible than sclerenchyma
- d) contains fibers

#### Animal and Plant Histology Answer sheet

1	2	3	4	5	6	7	8	9	10
b, d	c	a, b, c	b	a	a, d	d	a	a, c, d	a

11	12	13	14	15	16	17	18	19	20
a, b, c	c	b, c	b, c	b, c	a, d	a, c	b, c	d	a, b, c

## Genetics

Encircle the right answer(s). Note: One, two or three answers are possible/question.

1. Concerning chromosomes:

- a- A chromosome with the centromere located at one of the extremities is named acrocentric
- b- The nucleosome contains 8 different types of histones
- c- The centromere is a constitutive heterochromatin
- d- The centromeric index is equal to  $q/p+q$

- 
2. Concerning the experiments proving the identity of the genetic material:
    - a- Living R *Pneumococcus* are transformed by the proteins of S *Pneumococcus*
    - b- The injection of DNA only of S *Pneumococcus* can induce the death of mice
    - c- Following the injection of *E. coli* with either  $^{32}\text{P}$ - or  $^{35}\text{S}$ -radiolabeled bacteriophages, the radioactivity is always found in the bacteria
    - d- DNA of the bacteriophages is injected inside bacteria
  
  3. Concerning DNA structure:
    - a- Two consecutive nucleotides are linked by a 3'-5' phosphodiester bond
    - b- Nitrogenous bases in a double-helix DNA are paired up by covalent bonds
    - c- Two Nitrogenous bases of the same type may pair up
    - d- dAMP is deoxyadenosine monophosphate
  
  4. Concerning the cell cycle of a diploid cell, which can be wrong?
    - a- At the end of meiosis of a cell ( $2n=8$ ), there are 8 spermatids/cell
    - b- At the end of meiosis of a cell ( $2n=4$ ), there are 2 chromosomes/cell
    - c- During G2 phase, a cell has  $2n$  chromosomes,  $4n$  chromatids and  $2N$  DNA
    - d- A spermatocyte II contains  $2n$  chromosomes and 1 chromatid per chromosome
  
  5. Concerning mutations:
    - a- Sickle-cell anemia is due to frameshift mutation
    - b- Down syndrome results only from a non-disjunction between homologous chromosomes at anaphase I
    - c- Cri du chat syndrome results from a partial deletion in the short arm of the chromosome 5
    - d- Klinefelter syndrome is an aneuploidy mutation
  
  6. The cross between 2 individuals with the same genotype and differ with 6 characters yields 144 different phenotypes. The genotype of parents could be:
    - a- AaBbCC'DdEE'Ff
    - b- AaBB'CC'DdEE'Ff
    - c- AA'BB'CcDdEeFf
    - d- AA'BB'CcDD'EeFf
  
  7. The sexual heredity:
    - a- Sex-linked genes are located on the homologous regions of sex chromosomes
    - b- Given  $2n=18$  in a species with protenor mode; then females have 17 chromosomes and males have 18.
    - c- In birds, the female is hemizygote
    - d- None of the above

8. The cross  $AaBb \times aabb$  yields the following descendants:  
27 [AB], 33 [ab], 71 [Ab] and 69 [aB]  
a- A and B genes are *intrans* position  
b- The distance between A and B is 30 cM  
c- A and B are completely linked  
d- AB and ab are parental gametes
9. The cross  $AaBb \times AaBb$  yields two phenotypes: 21 and 12. This is the case of :  
a- Simple epistasis for recessive allele  
b- Lethal gene  
c- Complementarity between genes  
d- Incomplete dominance
10. A locus with 4 different alleles is linked to the X chromosome. The number of different genotypes is:  
a- 4 in males  
b- 10 in females  
c- 4 in females  
d- 10 in males
11. A  $Rh^-$  woman gives birth to a second child who is affected with hemolytic anemia.  
Then:  
a- The child is  $Rh^+$   
b- The mother must have produced anti-D  
c- The mother has antigen D  
d- The father has antigen D
12. A daltonian girl is issued from a daltonian father and a homozygote normal mother:  
a- The girl has turner syndrome  
b- His brother is daltonian  
c- She has inherited the mutant allele from her mother  
d- She has one barr body in her somatic cells
13. Concerning the transcription:  
a- The template strand of DNA is read in the 5'-3' direction  
b- It necessitates an RNA polymerase  
c- Euchromatin is transcribed  
d- None of the above

14. A man affected with a dominant X-linked disorder marries a normal woman:

- a- Half of their daughters are affected
- b- Their sons can be affected
- c- The man has inherited the disorder from his mother
- d- Can have a normal sister

15. A codon:

- a- Is read in the 5'-3' direction on mRNA during translation
- b- Each codon encodes for one amino acid
- c- One codon codes for many amino acids
- d- Is a triplet of ribonucleotides

16..... Is a dominant autosomal disorder:

- a- Achondroplasia
- b- Hemophilia
- c- Daltonism
- d- Tabagism

Answer sheet : Encircle the right answer (s):

1- a	b	<input checked="" type="radio"/> c	d
2- a	b	c	<input checked="" type="radio"/> d
3- <input checked="" type="radio"/> a	b	c	<input checked="" type="radio"/> d
4- <input checked="" type="radio"/> a	b	<input checked="" type="radio"/> c	<input checked="" type="radio"/> d
5- a	b	<input checked="" type="radio"/> c	<input checked="" type="radio"/> d
6- <input checked="" type="radio"/> a	b	<input checked="" type="radio"/> c	d
7- a	b	<input checked="" type="radio"/> c	d
8- <input checked="" type="radio"/> a	<input checked="" type="radio"/> b	c	d
9- a	<input checked="" type="radio"/> b	c	d
10- <input checked="" type="radio"/> a	<input checked="" type="radio"/> b	c	d
11- <input checked="" type="radio"/> a	<input checked="" type="radio"/> b	c	<input checked="" type="radio"/> d
12- a	b	c	d
13- a	<input checked="" type="radio"/> b	<input checked="" type="radio"/> c	d
14- <input checked="" type="radio"/> a	b	<input checked="" type="radio"/> c	<input checked="" type="radio"/> d
15- <input checked="" type="radio"/> a	b	c	<input checked="" type="radio"/> d
16- <input checked="" type="radio"/> a	b	c	d

**Zoology (8 pts.)**

**Choose the right answer(s) (3.5 pts.)**

1- The protozoa move by

- a- one or many flagella
- b- cilia
- c- pseudopods
- d- parapods

2- The digestion in sponges is

- a- intracellular
- b- extracellular
- c- extracellular and intracellular
- d- no correct answer

3- The cnidocytes in fresh-water hydra

- a- are localized in the epidermis
- b- are localized in the mesoglea
- c- are localized in the endodermis (gastrodermis)
- d- have protective function

4- All Platyhelminths

- a- are marine
- b- are parasitic
- c- have incomplete digestive system
- d- are coelomate triploblastic metazoan

5- In *Ascarislumbricoides*

- a- the excretory system is tubular
- b- the body wall assumes respiratory function
- c- the body is segmented
- d- the cavity between the body wall and internal organs is known as mesenchyme

6- The protostome coelomates are known as hyponeurians on the basis of the organization of their

- a- circulatory system
- b- excretory system
- c- respiratory system
- d- nervous system

7- In which of the following tetrapods the skull articulates with the vertebral column by two occipital condyles?

- a- amphibians
- b- reptiles
- c- birds
- d- mammals

**Match the letters with the numbers (2.5 pts.)**

8- Platyhelminths

9- Nematodes

10- Annelids

11- Mollusks

12- Arthropods

a- Epitoky

b- Malpighian tubules

c- Osphradia

d- Amphids

e- Neoblasts

Fill in the blank with the proper (correct) terms (2 pts.)

13- The protection (defense) in echinoderms is assumed by:.....

14- Fish have:.....pairs of cranial nerves

15- The endostyle is found in the following chordates: ..... and .....

**Answer sheet Zoology (8 pts.)**

Choose the right answer (s) (3.5 pts.)

1	2	3	4	5	6	7
abc	a	ad	d	ab	d	ad

Match the letters with numbers (2.5 pts)

8	9	10	11	12
e	d	a	c	b

Fill in the blank with the proper (correct) terms (2 pts)

13	14	15	
pedicellaria	10	Urochordates	Cephalochordates

**Animal Reproduction (6pts.)**

I. Choose the correct answer (s) (3pts.)

1-The maturation of the sperm

- a- concerns the lipid part of the plasma membrane
- b- contributes to the stabilization of the membrane
- c- is indispensable to the fertilization ability of the sperm
- d- none of the above

2- Fission,

- a- is prevalent in some invertebrates
- b- can be followed by regeneration
- c- implicates the formation of a bud which evolves into a complete organism
- d- happens only by binary division

3- Testosterone

- a- exerts a direct action on peritubular (myoid) cells
- b- is the only hormone which exerts a negative feedback control on FSH
- c- has only an endocrine action
- d- binds to receptors on the membrane of germinal cells

4- The ovulatory gonadotropic peak (LH, FSH)

- a- is due to a sudden decrease in the level of estradiol
- b- stimulates the enzymatic activity of proteases which is implicated in ovulation
- c- leads to the block of the passage of OMI to the oocyte
- d- does not have any effect on the endometrium

5- The control of folliculogenesis

- a- The growth of the primary follicle is stimulated by EGF
- b- FSH controls the activity of aromatase and the division of granulosa cells
- c- estradiol is formed from androgens secreted by theca interna cells
- d- None of the answers are correct

6- During fertilization

- a- the acrosomal reaction precedes the arrival of the sperm to the corona radiata
- b- ZP2 binds to beta-galactosyltransferase
- c- CSF is stabilized
- d- none of the answers are correct

II. Match the letters on the left to the numbers on the right (2pts.)

- |  |  |
|--|--|
| a- zygotene                                | 1- crossing over                       |
| b- pachytene                               | 2- chiasma                             |
| c- diplotene                               | 3- thickening of chromosomes           |
| d- thelytoky parthenogenesis               | 4- formation of synaptonemal complexes |
|  | 5- generation of female individuals    |
| 6- bivalent                                |  |
| 7- generation of male individuals          |  |
| 8- disappearance of synaptonemal complexes |  |

III. True or false (T or F) (1pts.)

1. The N-acetylglucosamine of ZP1 ensures the fixation of the sperm plasma membrane on the zonapellucida.
2. Ovoviviparity is the development of the embryo inside the mother within the egg and without histological exchanges with the mother.

Answer sheet Animal Reproduction (6pts.)

I. Choose the correct answer (s) (3pts.)

1	2	3	4	5	6
a, b, c	a, b	a	a, b, c (a, b, d)	a, b, c	d

II. Match the letters on the left to the numbers on the right (2pts.)

a	b	c	d
4,6	3,1	8,2	5

III. True or false (Tor F) (1pt.)

1	2
F	T

**Embryology**

Choose the correct answer(s) (2.5 points)

- 1- Which of the following(s) do not derive from the ectoderm in drosophila?
  - a. midgut
  - b. proctodeum (foregut, hindgut)
  - c. stomodeum
  - d. muscles
  
- 2- Which of the following cells undergo ingression in the sea urchin?
  - a. Macromeres of VgI
  - b. Micromeres
  - c. Macromeres of VgII
  - d. AnI
  
- 3- In amphibians, neuronal induction is achieved by:
  - a. Neural tube
  - b. Chordo-mesoderm
  - c. Ventral ectoderm
  - d. Dorsal lip of blastopore
  
- 4- In eye induction
  - a. The lens is induced from the ectoderm
  - b. The optic vesicle derives from the diencephalon
  - c. The lens induces the optic vesicle
  - d. The optic nerve derives from the mesoderm
  
- 5- During the differentiation of the gonads
  - a. The ovary derives from the secondary sex cords (cortical)
  - b. The undifferentiated status persists until the tenth week
  - c. The primordial germ cells migrate to the genital ridge
  - d. The differentiation of the gonads takes place after birth

Answer:

1	2	3	4	5
a,d	b	b	a,b	a,c

II- In the table, insert the letters corresponding to the following characteristics under the appropriate week of development in humans: (1.5 points)

- a- Hypoblast                      b- gastrulation                      c- syncytiotrophoblast  
 d- Blastocyst                      e- trilaminar embryo                      f- Amnion  
 g- Primary blastocoel                      h- somites

Week 1	Week 2	Week 3
d, g	a, c, f	b, e, h

III- In the table, insert the letters corresponding to the following terms under the appropriate stage of development in birds: (2 points)

- a- Meroblastic                      b- blastodisk                      c- hypoblast  
 d- anterior neuropore                      e- area pellucida                      f- Hensen's node  
 g- regression of the primitive streak                      h- neural groove                      i- convergence

Fertilization	Cleavage	Gastrulation	Neurulation
j	a, b, e	c, f, i	d, g, h

## BOTANY

### Encircle the right answer(s)

1- Concerning the organization of living organisms

- a- Scientific name of pine is *Pinus Sylvestris*  
 b- All plants are rhizophyte  
 c- Thallophytes include Algae, Fungi and Bryophytes  
 d- None of the above

2- In photosynthesis

- a- Light reaction occurs in the stroma and lead to the production of ATP  
 b- Oxygen that exits leaves originated from CO<sub>2</sub>  
 c- ATP and NADPH used during Calvin cycle originate from light reaction  
 d- in calvin cycle, atmospheric CO<sub>2</sub> will be fixed by a molecule with 3 C

3- Concerning photosynthesis

- a- in calvin cycle, the first stable molecule after CO<sub>2</sub> fixation is PGA (3C)  
 b- In C<sub>4</sub> plants, fixation of atmospheric CO<sub>2</sub> occurs in the presence of Rubisco  
 c- In C<sub>4</sub> plants, fixation of atmospheric CO<sub>2</sub> and Calvin Cycle occur in the same type of cell  
 d- In CAM plants, Calvin cycle occurs in the night

4- Concerning Eubacteria

- a- In photosynthetic bacteria, the photosynthesis occurs in chloroplast  
 b- Cell wall has peptidoglycan  
 c- Someone have true nuclei  
 d- All are aerobic

**5- Concerning Archeobacteria**

- a- Methanogens bacteria are strict anaerobes
- b- The cell wall of Archeobacteria lacks peptidoglycan
- c- Extreme halophile bacteria are eukaryotes heterotroph
- d- None of the above

**6- Concerning Algae**

- a- They are photoautotroph
- b- Brown Algae contain phycoxantin as pigment
- c- All green Algae are unicellular
- d- Some Algae have roots

**7- Concerning Algae**

- a- Euglenoids are unicellular
- b- Storage product in Red Algae is floridean starch
- c- *Fucus* is red algae
- d- None of the above

**8- Concerning Fungi**

- a- Cell wall contains chitin
- b- Some are saprophytes
- c- All form symbiotic association (Mycorrhizae) with roots of higher plants
- d- All have septate hyphae

**9- Concerning Fungi**

- a- Hymenium is the fertile layer
- b- All are edible
- c- Some are well fixed to substrate by rhizoids
- d- Deuteromycota are perfect fungi, their sexual stage has not been observed

**10- Bryophytes**

- a- are vascular cormophytes
- b- Gametophyte is the photosynthetic part
- c- Some are fixed by roots
- d- Sporophyte generation is dominant

**11- Pteridophytes**

- a- are flowering plants
- b- Sterile leaves are called sporophylls
- c- Sporophytic generation is dominant
- d- None of the above

**12- Concerning pteridophytes**

- a- Fern leaves are also called fronds
- b- In *Equisetium*, sterile stems always terminate with strobili
- c- In ferns, spores are arranged in clusters called Sorri
- d- None of the above

13- Concerning Gymnosperms

- a- Conifers have deciduous leaves
- b- Ovary will transform into fruit
- c- They are seed plants
- d- None of the above

14- Concerning Angiosperms

- a- Calyx is part of the reproductive organ of the flower
- b- They are divided into 2 classes
- c- Leaves lack cuticle
- d- None of the above

15- Dicots are characterized by

- a- Fibrous root
- b- Parallel veins
- c- Flowers part in 3's
- d- None of the above

16- Concerning plant adaptation

- a- Aquatic plants are characterized by a well developed vascular system
- b- Xerophytic plants have well developed leaves with several stomata
- c- Some xerophytic plants close their stomata during the day
- d- None of the above

Botany answer table

1	2	3	4	5	6	7	8
d	c	a	b	a,b	a,b	a,b	a,b
9	10	11	12	13	14	15	16
a,c	b	c	a,c	a,c	b	d	e

Plant Reproduction (Medecine)

Choose the right answer/answers.

1- The stolons are :

- a- Adventitious, horizontal roots produced at the soil surface that play a role in the asexual reproduction
- b. Aerial or underground storage organs that play a role in the asexual reproduction
- c. Aerial specific stems capable of producing naturally asexual new plants
- d. Underground horizontal stems that play a reproductive role

2- Grafting always consists of planting :

- a. A bud on a rootstock belonging to the same species or to two different species
- b. A stem fragment on a rootstock belonging to the same species or to two different species
- c. A bud or a stem fragment on a rootstock belonging to the same species or to two closely related species (compatible).
- d. A bud or a stem fragment on a rootstock with an intimate contact of their vascular tissues.

**3. The reproduction cycle of *Ulva lactuca* is :**

- a. Monobiontic haplontic cycle, with planogamy
- b. Monobiontic diplontic cycle, with heteromorphic generations
- c. Dibiontic cycle, with planogamy.
- d. Dibiontic cycle with isomorphic generations
- e. Dibiontic cycle with oogamy and isomorphic generations

**4. Ascomycota and Basidiomycota are characterized by:**

- a. Ascospores and basidiospores produced during sexual reproduction.
- b. Plasmogamy and Karyogamy separated in time and in space.
- c. Prolonged dikaryotic phase depending on the species.
- d. Oogamy and tribiontic cycle.

**5. The evolution of plants is characterized by:**

- a. The regression of the gametophytic phase in favor of the sporophytic phase.
- b. The regression of the sporophytic phase in favor of the gametophytic phase.
- c. Reproductive organs protected by a sterile pluricellular envelop
- d. Occurrence of pollination and regression of planogamy

**6. Double fertilization is :**

- a. A fusion between a sperm and an egg and between a sperm and polar nuclei.
- b. Found exclusively in Angiosperms.
- c. Found exclusively in Gymnosperms.
- d. Found exclusively in plants with Archegonia.
- e. Found exclusively in Spermatophytes.

**7. *Selaginella* has:**

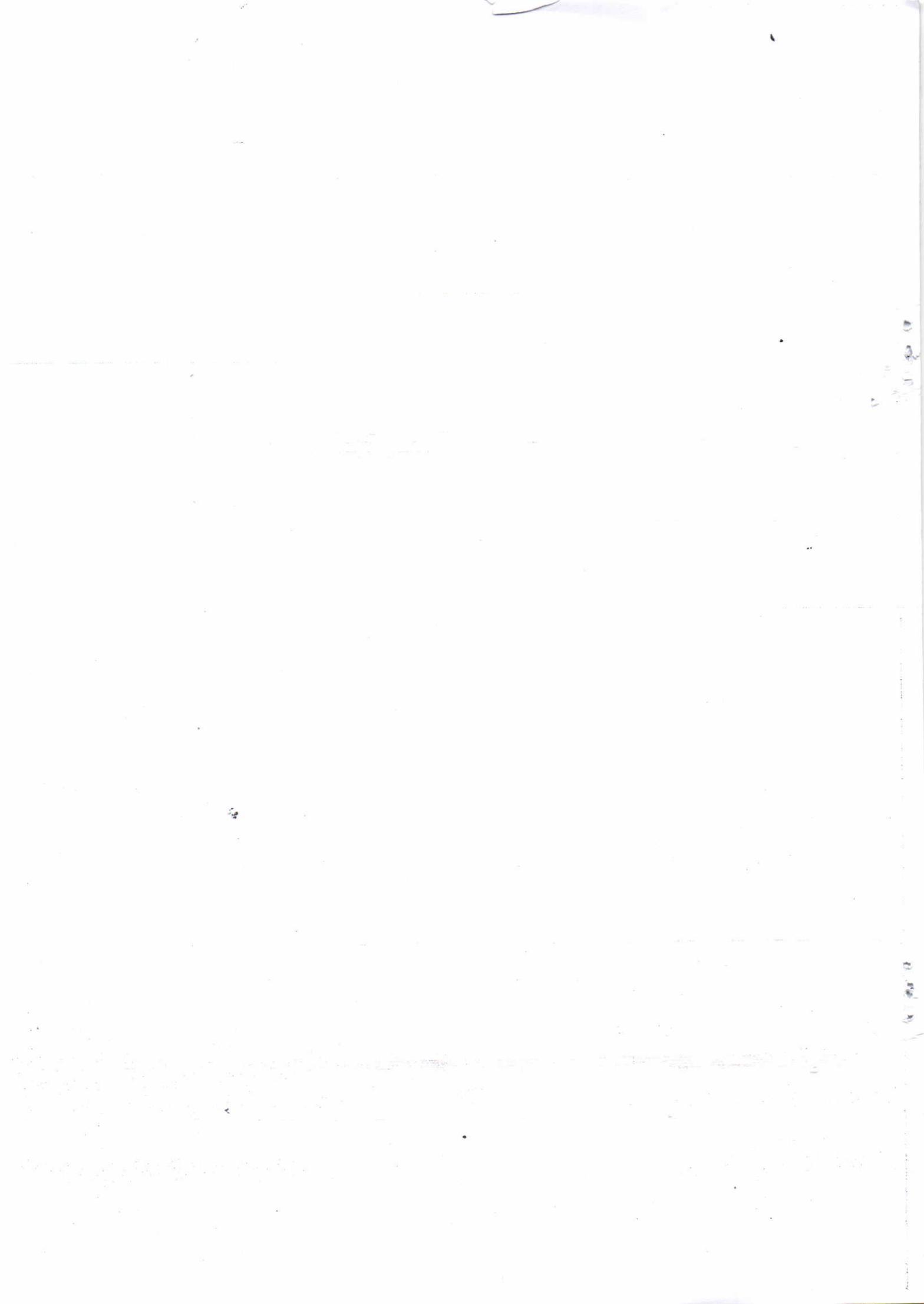
- a. Simple fertilization.
- b. Double fertilization.
- c. Heterospores
- d. Fertilization upon the liberation of male and female gametophytes from the mother plants.

**8. Double fertilization, match numbers to letters :**

A		B	
1. Ovule		a. Zygote	
2. Ovary		b. Seed	
3. Fertilized polar nuclei		c. Endosperm	
4. Fertilized egg		d. Fruit	

**Answer sheet**  
**PLANT REPRODUCTION**

1	2	3	4	5	6	7	8			
							1	2	3	4
C	e, d	e, d	a, b c	a, c d	a, b	a, c, d	b	d	c	a



Entrance Exam to 2<sup>nd</sup> Year (2009-2010)

Subject : BIOLOGY

Encircle the right answer(s) 10 points:

**Mineral salts:**

- a - are all non soluble
- b - occur at the same concentration in the cytosol and in the extracellular fluid
- c - are organic compounds
- d - no correct answer

**Proteins:**

- a - are polymers of fatty acids.
- b - always have fibrous tertiary structure.
- c - are composed of 30 amino acids.
- d - no correct answer.

**Starch is:**

- a - a storage carbohydrate.
- b - a disaccharide.
- c - a polysaccharide.
- d - no correct answer.

**A glycerophospholipid (glycerophosphatide) contains:**

- a - two fatty acid molecules, one glycerol molecule and one phosphate.
- b - one fatty acid molecule, one glycerol molecule and one phosphate.
- c - two fatty acid molecules, two glycerol molecules and one phosphate.
- d - a hydrophilic head and a hydrophobic tail.

**Plasma membrane of a bacterium:**

- a - contains respiratory chain enzymes.
- b - is wrapped by a glycocalyx.
- c - is a lipid monolayer.
- d - contain tight junctions.

**Intrinsic plasma membrane proteins:**

- a - contain hydrophobic segments.
- b - may be glycosylated.
- c - are totally located outside the lipid bilayer.
- d - no correct answer.

**Membrane fluidity:**

- a - depends on temperature.
- b - does not depend on cholesterol.
- c - depends on fatty acids nature.
- d - is indispensable to cell function.



**Tubulin in eukaryotic cells may exist in the following forms:**

- a - globular monomers (free) in the cytosol.
- b - stable polymers in the flagellum.
- c - unstable (labile) polymers in the mitotic spindle.
- d - no correct answer.

**Among the following structures, which ones are intermediate filaments:**

- a - actin and myosin.
- b - tubulin and keratin.
- c - keratin and lamins.
- d - no correct answer.

**In the mitochondrial matrix, we find the following enzymes:**

- a - catalase.
- b - acid hydrolases.
- c - glycolysis enzymes.
- d - krebs cycle enzymes.

**Nuclear pores allow:**

- a - passage of the ribosomal subunits.
- b - unidirectional transport.
- c - passage of DNA towards the cytosol.
- d - passage of mRNA towards the cytosol.

**Golgi apparatus:**

- a - consists of variable number of dictyosomes.
- b - is polarized (having different poles)
- c - directly communicates with the nucleus.
- d - no correct answer.

**Circle the correct answer(s). There could be more than one correct answer.**

**The apical domain of epithelial cells:**

- a - Is the site of intercellular junctions
- b - Is the site of morphological specializations
- c - Could be implicated in absorption or secretion
- d - None of the above is correct

**Exocrine glands:**

- a - Can secrete their products by exocytosis
- b - Always rest on a basement membrane
- c - Are often associated with myoepithelial cells
- d - Are highly vascularized

**Elastic fibers:**

- a - Are produced by adipocytes
- b - Are present in fibrocartilage
- c - Are constituents of the basement membrane
- d - None of the above is correct

**Gap junction:**

- a - forms a belt at the apical pole of epithelial cells.
- b - allows exchanges among neighboring cells.
- c - is always opened.
- d - no correct answer.

**The cytosol of a eukaryotic cell:**

- a - has an acidic pH.
- b - is mainly composed of water.
- c - is a site of transcription.
- d - no correct answer.

**The outer mitochondrial membrane:**

- a - is more permeable than the inner one.
- b - is less rich in proteins than the inner one.
- c - contains respiratory chain enzymes.
- d - no correct answer.

**Lysosomes:**

- a - have the same origin as peroxisomes.
- b - contain peroxidase.
- c - may digest mitochondria of the cell itself.
- d - similarly to mitochondria contain DNA.

**Regarding the cell cycle:**

- a - M-phase is the longer one.
- b - DNA replication occurs in the S phase
- c - G2 phase immediately follows the G1 phase.
- d - no correct answer.

**Histone proteins are:**

- a - catalases
- b - all found in the nucleosome.
- c - of five types.
- d - no correct answer.

**Regarding the smooth endoplasmic reticulum, it is:**

- a - the site of steroid synthesis.
- b - the site of protein maturation.
- c - lamellar in structure.
- d - no correct answer.

**H1N1 virus:**

- a - is a bacteriophage.
- b - must have nucleic acid.
- c - contain ribosomes.
- d - no correct answer.

**Astrocytes:**

(b)

- a- Conduct nerve impulses
- (b) Nourish and support neurons in the central nervous system
- c- Are the smallest glial cells
- (d) None of the above is correct

**A Schwann cell:**

- a- Is responsible for myelin formation in the central and peripheral nervous system
- b- Is abundant in white matter
- c- Is a multinucleated cell
- (d) None of the above is correct

**The following products are part of the plant cell wall except:**

- a- pectin
- b- hemi-cellulose
- (c) chitin
- d- cellulose

**Sclereids:**

- (a) are cells of short size
- b- have thick cellulosic cell wall
- (c) have thick lignified cell wall
- d- none of the above

**Latex:**

- a- is a component of the plant cell wall
- b- is transported in the tracheids
- c- is present in all plants
- (d) none of the above

**The cells of secondary meristem are:**

- (a) rectangular
- b- isodiametric
- (c) tightly joined together
- d- none of the above

**Phloem:**

- a- conducts crude sap
- (b) conducts elaborated sap
- (c) contains dead cells
- d- none of the above

**The cork is a:**

- (a) dead tissue.
- b- living tissue
- c- conductive tissue
- (d) protective tissue

**Dense regular connective tissue:**

- a- Provides great tensile strength
- b- Returns to its original length after stretching
- c- Is rich in reticular fibers
- d- None of the above is correct

**Endogenous (interstitial) growth of cartilage:**

- a- Is responsible for growth in diameter of bone
- b- Is possible because of the mitotic division of chondrocytes
- c- Leads to formation of isogenous groups (or clusters)
- d- None of the above is correct

**Osteoblasts:**

- a- Synthesize the organic component of the extracellular bone matrix
- b- Are surrounded by lacunae
- c- Are found on bone surface
- d- Are involved in bone mineralization

**Spongy bone:**

- a- Contains osteons
- b- Is found in the diaphysis
- c- Is an immature bone
- d- None of the above is correct

**Plasma:**

- a- Is about 55% by volume of blood
- b- Contains antibodies
- c- Contains collagen fibers
- d- Plays a role in blood coagulation

**Basophils:**

- a- Contain lysosomal granules
- b- Are involved in allergic reactions
- c- Are the least numerous leucocytes
- d- Have a reniform (bean-shaped) nucleus

**Thrombopoiesis:**

- a- Refers to the development of monocytes
- b- Takes place in the lymph tissues
- c- Leads to the formation of anucleated cells
- d- None of the above is correct

**Skeletal muscular tissue:**

- a- Is formed of cells with several central nuclei
- b- Is formed by cylindrical cells
- c- Has myofilaments arranged in sarcomeres
- d- Is surrounded by connective tissue

**Cardiac muscular tissue:**

- a- Is formed of cells connected with junctions
- b- Possesses T tubules at the A-I junctions
- c- Shares few common characteristics with smooth muscle
- d- Presents the same organization of myofibrils as skeletal muscle

Circle the correct answer : (1.5 pts)

**Budding :**

a-produces always colonies

b-dormant or resistant buds degenerate

c-in certain cases, buds separate from the maternal organism and become independent

d-no correct answer

**In pachytene stage, chromosomes**

a-continue their pairing

b-show nonsynaptic regions

c-paternal and maternal consist of only one chromatid

d-paternal and maternal form tetrads

**The first step of fertilization is**

a-binding of spermatozoon to ZP3 of the zona pellucida

b-acrosomal reaction

c-binding of spermatozoon to ZP2 of the zona pellucida

d-fusion of cytoplasmic membranes

Circle the correct answers : (1.5 pts)

**Sertoli cells**

a-secrete the antimullerian hormone (ABP)

b-forms the blood-testis barrier

c-phagocyte the degenerated spermatozoa

d-are present only in the basal compartment

**Inhibine**

a-stimulates leydig cells by paracrine action

b-exerts a positive feedback control on the anterior pituitary gland

c-is secreted by granulosa cells

d-is secreted by peritubular cells

**follicular growth**

a-the primary and tertiary follicles are stimulated by FSH hormone

b-the FSH receptors appear on the granulosa cells of the secondary follicle

c-FSH receptors appear during ovulation on the theca interna

d-usually only one follicle is selected

Match the Letters to the Numbers : (3 pts)

1-Ovulation

2-Cumulus oophorus

3-Sertoli Cells

4-Spermatozoon plasmic membrane

5-Cortical reaction

6-Hydrolysis of the zona pellucida

a-Galactosyl-transferase

b-Transferrin

c-Release of intracellular Ca<sup>++</sup>

d-Pic LH

e-Acrosin

f-Hyaluronic acid

Answer : 1-d 2-f 3-b 4-a 5-c 6-e

Choose the right answers : (1.5 pts)

**In heterolecithal egg**

a-the yolk is more concentrated in the animal pole

b-the ribosomal RNA is more abundant in the animal pole

c-the nucleus exists in the center of egg

d-the pigments of melanine (pigments granules) cover the animal hemisphere

**In centrolecithal egg**

a-the yolk is in the center of egg

b-the cleavage is total

c-the cleavage is meroblastic (partial)

d-the nucleus undergoes division in the yolk

Circle the right answer (3pts)

*Trypanosoma* reproduces by

- a-transverse binary fission
- b-longitudinal binary fission
- c-budding
- d-a+c

The common character between Nematodes, Mollusks and Echinoderms is

- a-asexual reproduction
- b-protostome coelomates
- c-cerebral ganglia
- d-segmentation, absence of

The common character between Urochordates and Cephalochordates is

- a-atrionpore
- b-heart
- c-hermaphroditic
- d-endostyle

The common character between Amphibians and Reptiles is

- a-two aortic arches
- b-cutaneous respiration
- c-one occipital condyle
- d-12 pairs of cranial nerves

All arthropods possess

- a-respiratory pigment
- b-cuticle
- c-tracheal respiration
- d-one pair of mandibles

The radial canals of water-vascular system in sea urchin originate from

- a-madrepore
- b-stone canal
- c-ring canal
- d-tube feet

Match the letters with the numbers (2pts)

spheridia	adult frog
statocyst	fish
lateral line	sea urchin
middle ear	gastropod

1 c , 2 d , 3 b , 4 a

Put the symbol (+) in the appropriate cell (3pts)

Animal	Free moving	Sessile
Ascon		+
Planula	+	
adult Ascidiacea (Tunicates)		+
Planaria	+	
Trochophore	+	
Echinopluteus	+	

**In DNA:**

- a -  $A+T=0.7$  then  $C=0.3$
- b - The synthesis of DNA occurs in the 3'-5' direction
- c - Nitrogenous bases are linked with covalent bonds
- d - None of the above

**The 47, XYY syndrome results from chromosome non-disjunction:**

- a - At male meiosis I or II
- b - At male meiosis I only
- c - At male meiosis II only
- d - At female meiosis I only

**Which of the following cases do (es) not contain any barr body?**

- a - A normal man
- b - A normal woman
- c - An individual with Klinefelter syndrome
- d - An individual with Turner syndrome

**Consider 3 pairs of codominant alleles. In F<sub>2</sub>, we obtain:**

- a - 8 different phenotypes
- b - 12 different phenotypes
- c - 27 different phenotypes
- d - 18 different phenotypes

**Holandric genes:**

- a - May be located on the homologous portions of chromosomes X and Y
- b - May be located on the non-homologous portions of X and Y
- c - May be located on an autosome
- d - Can be found in birds

**The ratio 35:9:4 corresponds to:**

- a - Double epistasis for dominant alleles
- b - Double epistasis for recessive alleles
- c - Simple epistasis for one recessive allele
- d - None of the above

**A testcross results in: 108 [Ab], 112 [aB], 43 [AB], 37 [ab]. We can conclude:**

- a - [Ab] and [aB] are recombinants
- b - [AB] and [ab] are parental
- c - The genetic distance between A and B is 26 centimorgan
- d - The genetic distance between A and B is 80 centimorgan

**A mother with blood group [A, Rh<sup>+</sup>, M] has a child with blood group [B, Rh<sup>-</sup>, N]. The father can be:**

- a - [B, Rh<sup>+</sup>, M]
- b - [AB, Rh<sup>-</sup>, N]
- c - [A, Rh<sup>+</sup>, MN]
- d - [O, Rh<sup>-</sup>, M]

**A gene locus with 4 alleles located on an autosome:**

- a - The number of homozygotes = 10
- b - The number of heterozygotes = 6
- c - The number of homozygotes = 6
- d - The number of heterozygotes = 4

**The cross between two individuals [Aa] x [Aa] yields the following descendants: 25 [A] and 14 [a]. This is the case of:**

- a - A gene with complete dominance
- b - Codominance
- c - A lethal gene
- d - An epistatic gene

### The movements of gastrulation

- a) the movement of invagination is observed in oligolecithal and heterolecithal eggs (Echinoderms and Amphibians)
- b) the movements of delamination is observed in telolecithal eggs (Birds)
- c) the movement of immigration is observed in centrolecithal egg (Drosophila)
- d) the movement of epiboly is observed in heterolecithal eggs (Amphibians)

Choose the right answers : (2.5 pts)

#### In Sea Urchins

- a) the ectoderm originates from animal 1, animal 2 and vegetal 1
- b) the micromeres give rise to the blood cells
- c) the secondary mesenchyme gives rise to the spicules
- d) the endoderm originates from the vegetal 1

#### In Amphibians

- a) the optic vesicles originate from the telencephalon
- b) the heart originates from the somatic mesoderm
- c) the mesonephros originates from the mesoderm
- d) the neural crests originates from the endoderm

#### In Birds

- a) the amnion has a nutritive function
- b) the amnion originates from the ectoderm and the somatic mesoderm
- c) the area opaca overlies the subgerminal cavity
- d) the cleavage of the egg is total

#### In Mammals

- a) the egg reaches the uterine cavity at stage 2 blastomeres
- b) the trophoblast gives rise to the embryo
- c) the allantois originates from the ectoderm
- d) the implantation occurs at the stage blastocyst

#### The striated muscles originate from :

- a) ectoderm
- b) endoderm
- c) mesoderm
- d) ectoderm and endoderm

#### Match the letters to the numbers : (2 pts)

- |                               |   |   |                 |
|-------------------------------|---|---|-----------------|
| 1-Gastrula                    | → | b | a-Gray crescent |
| 2-Blastocyst                  | → | d | b-Yolk plug     |
| 3-Heterolecithal egg          | → | a | c-Sclerotome    |
| 4-Epimeric mesoderm (somites) | → | c | d-trophoblast   |

#### Encircle the right answer(s) (8 marks):

##### Concerning chromatin:

- a - The centromere is composed of facultative heterochromatin
- b - The euchromatin is decondensed during interphase
- c - The octamer of the nucleosome contains histone H1
- d - The constitutive heterochromatin is sometimes transcribed

##### During the cell cycle:

- a - A spermatid contains  $2n$  quantity of DNA
- b - There is one chromatid per chromosome in an ovocyte II
- c - If  $2n=6$  the possible number of oocytes II after crossing over is 8
- d - During G2 phase, there is  $2n$  DNA per cell

**Red algae:**

- a- Are always found at water surface
- b- Are multi-cellular
- c- Are fixed by roots
- d- All of the above
- e- None of the above

**Fungi are characterized by:**

- a- The presence of chitin in their wall
- b- Photoautotrophic metabolism
- c- Hyphae that always have cross walls
- d- All of the above
- e- None of the above

**Basidiomycota:**

- a- Are characterized by their mycelium where hyphae have cross walls
- b- Their spores are formed within ascus
- c- Could establish symbiotic associations with green algae known as mycorrhizae
- d- All of the above
- e- None of the above

**The characteristics which permit higher plants to adapt to terrestrial conditions:**

- a- Presence of conductive tissue
- b- Presence of leaves with stomata
- c- Presence of lignin
- d- All of the above
- e- None of the above

**Calvin cycle:**

- a- Occurs at thylakoid membranes (Grana)
- b- Fixes 3 CO<sub>2</sub> to produce 1 PGAL (G3P) which exit the cycle to participate in sugar production
- c- Needs only ATP
- d- All of the above
- e- None of the above

**Concerning the photosynthesis of CAM plants:**

- a- It occurs in 2 different types of cells
- b- Fixation of atmospheric CO<sub>2</sub> occur during the day
- c- Enzyme used in fixation of atmospheric CO<sub>2</sub> is RUBISCO
- d- All of the above
- e- None of the above

**In C3 plants:**

- a- Enzyme used in fixation of atmospheric CO<sub>2</sub> is PEP ase (PEP carboxylase)
- b- Photosynthesis occurs in mesophyll cells
- c- Atmospheric CO<sub>2</sub> is fixed by a 4 carbon molecule
- d- All of the above
- e- None of the above

**Bryophytes are characterized by:**

- a- The presence of conductive tissues
- b- The dominance of sporophytes over the gametophytes
- c- The sporophyte living as parasite on the gametophyte
- d- All of the above
- e- None of the above

**Transversion corresponds to:**

- a - Deletion
- b - Substitution
- c - Addition
- d - Chromosomal mutation

**The following DNA sequence 5' AGTCCATACCG 3' is transcribed into:**

- a - 5' AGUCCAUACCG 3'
- b - 3' GCCAUACCUGA 5'
- c - 5' CGGUAUGGACU 3'
- d - 3' UCAGGUAUGGC 5'

**A gene that governs several characters is called:**

- a - Polygenic
- b - Pleiotropic
- c - A gene with simple interactions
- d - None of the above

**The loss of one chromosome corresponds to:**

- a - Monosomy
- b - Aneuploidy
- c - Euploidy
- d - Haploidy

**Botany medicine (8 pts)**

**Encircle the right answer (8 pts)**

**Concerning the organization of the living world:**

- a - Species is defined as a group of organisms that breed with one another to produce fertile offspring
- b - The 6 kingdoms are: Archaeobacteria, Protista, algae, Fungi, Plants and animals
- c - In classification, order ends with : -opsida
- d - All of the above
- e - None of the above

**Archaeobacteria are different from Eubacteria by:**

- a - Having different composition and structure of their wall
- b - Having different lipids in their membranes
- c - Their capacity to live in medium with extreme ecological conditions
- d - All of the above
- e - None of the above

**Cyanobacteria are:**

- a - Photo-autotrophs
- b - Photo-heterotrophs
- c - Chemo-heterotrophs
- d - All of the above
- e - None of the above

**Green algae and plants have in common:**

- a - The presence of chlorophylls a and b
- b - The presence of cellulose in their wall
- c - Photoautotrophic metabolism
- d - All of the above
- e - None of the above

**In the life cycle, the term heteromorphism means that:**

- a- the gametophyte and the sporophyte are of different form
- b- the male and female individual are of different form
- c- fertilization happens between male and female gametes originating from different individuals
- d- fertilization happens between male and female gametes originating from the same individual

**All higher vascular plants have:**

- a- dominance of the gametophytic generation
- b- production of seeds
- c- double fertilization
- d- production of flowers

## Ferns

- a- Are vascular cryptogams
- b- Have an aerial stem called rhizomes
- c- Have sporangia aggregated in strobili
- d- All of the above
- e- None of the above

## Monocotyledons are characterized by:

- a- A ring of vascular bundles
- b- Leaves with branched veins
- c- Flowers with 4 or 5 parts
- d- All of the above
- e- None of the above

## Plants adapted to aquatic environment are characterized by:

- a- Well developed root system
- b- Numerous stomata
- c- Well developed conductive tissue
- d- All of the above
- e- None of the above

## The flower of Angiosperms is characterized by:

- a- The stamens and carpels as the sterile floral parts
- b- The stamens and sepals as the fertile floral parts
- c- The perianth as the male reproductive parts
- d- All of the above
- e- None of the above

## Choose the right answer (4 pts)

### Cutting taken from the above ground parts of a plant consists of:

- a- planting a piece of a stem only
- b- planting a piece of a stem or a part of a leaf
- c- inserting parts of a stem in soil, while keeping attached to the mother plant
- d- is a type of vegetative multiplication which is performed to all higher plant

### Grafting:

- a- is the joining of scion and stock belonging always to the same species
- b- is the joining of scion and stock belonging always to different species
- c- necessitates an intimate contact between the vascular tissue of the scion and the stock
- d- necessitates an intimate contact between the different parenchyma tissue of the scion and the stock

### Which of the following is correctly paired with its description?

- a- *Fucus* ---- Oogamy, dibiontic cycle
- b- *Ulva lactuca* ---- Anisogamy, alternation of isomorphic generations
- c- *Spirogyra* ---- Oogamy, monobiontic diplontic cycle
- d- *Rhodophyta* ---- Tribiontic cycle, zoospores

### The spore formation:

- a- is the result of sexual reproduction only
- b- is the result of asexual reproduction only
- c- is the result of sexual or asexual reproduction
- d- results always in the formation of active flagellated spores

### Which of the following proposition is true?

- a- the unicellular yeast reproduce only asexually
- b- Hepatophyta have well developed protonema
- c- the spore dispersal in mosses happens through longitudinal opening of the capsule
- d- Ascomycota and Basidiomycota have plasmogamy and karyogamy separated in time and space

②

**LEBANESE UNIVERSITY**  
**Faculty of Medical Sciences**  
**Faculty of Dentistry**

**Duration : 2 hours**

**Date : October 7<sup>th</sup> 2008**

②

**Entrance exam to 2<sup>nd</sup> year**  
**Academic year 2008-2009**

**Subject : Biology (15 pages)**

Encircle the correct answer(s) 5.5 points:

- Carbohydrates of a cell play only:

a - a protective role.

b - an energetic role.

c - a structural role.

d - no correct answer.

- Tight junctions:

a - show an enlarged intercellular space.

b - contain occludins as membrane proteins.

c - are intercellular channels.

d - no correct answer.

- Mesosome is an invagination (inward growth) of plasma membrane of a:

a - virus.

b - bacterium.

c - eukaryotic plant cell.

d - no correct answer.

- The mitotic spindle comprises:

a - three varieties of microtubules.

b - three varieties of microfilaments.

c - elements that consists of 13 tubulin protofilaments each.

d - no correct answer.

- The rough endoplasmic reticulum

a - is abundant in adipocytes.

b - starts glycosylation of proteins.

c - is continuous with the nuclear envelope.

d - no correct answer.

- Respiratory chain complex is found in:

- a - the outer mitochondrial membrane.
- b - the inner mitochondrial membrane.
- c - the mitochondrial matrix.
- d - no correct answer.

- The nucleolus:

- a - is limited by a membrane.
- b - belongs to the cytosol.
- c - is the site of transfer RNA synthesis.
- d - no correct answer.

- Golgi apparatus is:

- a - responsible for protein sorting.
- b - the site of termination of protein glycosylation.
- c - the origin of primary lysosomes.
- d - no correct answer.

- Enzymes of a primary lysosome are:

- a - active.
- b - polymerases.
- c - inactive.
- d - no correct answer.

- Chloroplast DNA:

- a - is double stranded similarly to the mitochondrial DNA.
- b - is linear.
- c - encodes a part of its proteins.
- d - no correct answer.

- Actin filament:

- a - forms the axis of microvilli.
- b - consists of fibrous subunits.
- c - forms the axis of cilia.
- d - no correct answer.

**Encircle the correct answer (5.5 pts) :**

Epithelial tissue is characterized by all of the following except:

- a- Renewal
- b- Polarity
- c- An important intercellular space
- d- Absence of vascularization

Endocrine glands:

- a- Secrete their products by an apocrine mechanism
- b- Are richly vascularized
- c- Are formed by specialized epithelial cells
- d- None of the above are correct

Brown adipocytes:

- a- Are unilocular cells
- b- Are abundant in the new born
- c- Are rich in mitochondria
- d- Are capable of cell division

The perichondrium:

- a- Is a connective tissue that surrounds bone
- b- Is responsible for the interstitial growth of cartilage
- c- Has an outer chondrogenic layer
- d- None of the above is correct

Osteons:

- a- Communicate together by Haversian canals
- b- Don't contain collagen fibers
- c- Are found in compact bone
- d- Are innervated and vascularized

Monocytes:

- a- Are the immature form of macrophages
- b- Have a multilobed nucleus
- c- Can be found in connective tissues
- d- None of the above is correct

Smooth muscle fibers:

- a- Have sarcomeres that contract unvoluntarily
- b- Don't have a basal lamina
- c- Have a well-developed T-system
- d- None of the above is correct

Ependymal cells:

- a- Are arranged in a single layer
- b- Are ciliated cells
- c- Synthesize myelin in the central nervous system
- d- Are phagocytic cells

Epidermal cells:

- a- Have always a cubic shape
- b- Contain chloroplasts
- c- Always form a continuous layer around organs
- d- Surround all young plant organs

Collenchyma cells:

- a- Play a role in the support of most plant organs
- b- Have a thick secondary wall
- c- Are dead at maturity
- d- Have uneven thickenings of various shapes

Which of the following function(s) is (are) not ensured by xylem ?

- a- Support
- b- Conduction
- c- Nutrition
- d- Protection

Match the letters with the numbers:

- |                |               |
|----------------|---------------|
| 1- paramecium  | a- flagellum  |
| 2- trypanosome | b- parapodium |
| 3- Nereis      | c- cilia      |
| 4- planaria    | d- no match   |

1: C, 2: a, 3: b, 4: C

Fill in the blanks with the right term:

- a- the layer found between the epidermis and the gastrodermis of fresh water hydra: Mesoglea
- b- the larva of annelids: Trochophore
- c- the cells responsible for regeneration in planaria: neoblasts
- d- the oviparous mammals: Prototheria

Circle the right answer:

The cytostome is the:

- a- mouth of amoeba
- b- anus of paramecium
- c- pore of contractile vacuole
- d- mouth of paramecium

The circulatory system is closed in:

- a- Cephalopoda
- b- Insecta
- c- Echinodermata
- d- Bivalvia

The middle ear appears for the first time in:

- a- chondrichthyes
- b- osteichthyes
- c- amphibians
- d- reptiles

The atriopore, an external opening of the peribranchial chamber, is found in:

- a- urochordates
- b- amphioxus
- c- sea lampreys
- d- Vertebrates

Circle the right answer (5.5 pts)

In chromatin

- a) euchromatin might be facultative or constitutive
- b) heterochromatin is always facultative
- c) heterochromatin is always constitutive
- d) none of the above

In DNA

- a) a nucleoside contains a sugar, a nitrogenous base and a phosphate group
- b) a nucleotide does not contain a phosphate group
- c) synthesis occurs always in 5' → 3' direction
- d) none of the above

Concerning the centromeric index

- a)  $I_c = p/p+q$
- b)  $I_c = q/p+q$
- c)  $I_c$  equals to zero if the chromosome is metacentric
- d)  $I_c$  equals to zero if the chromosome is acrocentric

The replacement of thymine by adenine is a:

- a) transition
- b) transversion
- c) inversion
- d) translocation

In tetrahybridism with 4 independent genes, the  $F_2$  produces:

- a) 81 phenotypes for all pairs of alleles in the dominant condition
- b) 16 genotypes for all pairs of alleles in the dominant condition
- c) 24 phenotypes for one pair of alleles in the codominant condition
- d) 24 phenotypes for two pairs of alleles in the codominant condition

A sex-limited trait:

- a) is more expressed in one of the two sexes
- b) is expressed equally in males and females
- c) is expressed in only one sex
- d) none of the above

A cross between [AB] x [ab] gives the following: [AB]= 14% and [ab]= 16%

- a) the map distance between A and B is 15cM
- b) A and B are on the same chromosome
- c) A and B are on different chromosomes
- d) the map distance between A and B is 70cM

A  $hhI^A I^B$  individual:

- a) has AB as blood group
- b) h allele is hypostatic
- c)  $I^A$  and  $I^B$  are hypostatic
- d)  $I^B$  is epistatic

Consider the following autocross  $AaBB'CC'DdEeFF$  in which A, D, E, F are dominant to a, d, e, f alleles while B and C are in codominance condition. What is the probability in  $F_2$  to observe an individual with the [ABCDE] phenotype?

- a) 27/1024
- b) 9/1024
- c) 9/256
- d) none of the above

**Down's syndrome results from:**

- a) an euploid mutation
- b) a non-disjunction of chromosome 21 at anaphase II of meiosis
- c) a gene mutation
- d) none of the above

**A double epistasis by a dominant allele and a recessive allele is expected to cause a modification in the F<sub>2</sub> Mendelian ratio:**

- a) 13/3
- b) 15/1
- c) 9/7
- d) 9/6/1

**Choose the best answer: (5.5 pts)**

- To synthesize a heat resistant rubber, we use

- a- 3-chlorobuta-1,3-diene.
- b- a polyisoprene.
- c- 2-methylbuta-1,3-diene.
- d- 2-chlorobuta-1,3-diene.

- The vulcanization process

- a- is used to let the rubber becomes harder.
- b- is used to increase the elasticity of the rubber.
- c- corresponds to the incorporation of oxygen.
- d- is used to decrease the elasticity of the rubber.

- The vitamin A

- a- is a sesquiterpen.
- b- is also called retinal.
- c- is obtained by the cleavage of the beta-carotene.
- d- is a steroid.

- The carboxylic salts

- a- are tensio-active agents.
- b- are totally soluble in water
- c- form double layers.
- d- possess hydrophilic alkyl chains

- The nitrosamines

- a- are anti-cancerous agents.
- b- are found in all conserved nutriments
- c- possess an NO<sub>2</sub>function.
- d- provoke genetically serious problems.

- The dysidazirine

- a- is a precursor of the sphingosine.
- b- possess an azacyclopropene cycle.
- c- is an anti-fungus agent.
- d- is an aminoalcohol.

- The ethanol

a- is a product provoking the blindness.

b- is metabolized into formic acid.

c- is oxidized in the organism using the  $\text{NAD}^+$ .

d- is a product provoking the acidose.

- Lactams

a- are cyclic amides.

b- are cyclic esters.

c- are powerful toxic products.

d- neither.

- The mutarotation of glucose

a- allow to create a new stereocentre.

b- allow the inversion of the specific rotation

c- allow the interconversion of D-glucose into L-glucose.

d- allow the interconversion of the anomers alpha into beta.

- The sucrose

a- is a reducing sugar

b- is a disaccharide formed by glucose and fructose.

c- can do a mutarotation.

d- is obtained by the hydrolysis of the starch.

- The amylopectine

a- is a polymer having one ramification each 10 units of glucose.

b- is a linear polymer.

c- is a poly-alpha-glucose.

d- is an energetic reserve for animals

**Circle the right answer or answers : (4 pts)**

**In gamete formation, meiosis :**

a. produces identical gametes

b. is a source of genetic diversity

c. allows random segregation of parental chromosomes

d. produces the same number of gametes in both sexes

**Blood-testis barrier :**

a. consists of tight junctions between adjacent Sertoli cells

b. consists of tight junctions between Sertoli cells and germinal cells

c. consists of gap junctions

d. formed between spermatogonia and spermatocytes II

**During spermiogenesis :**

a. nuclear chromatin condenses

b. histones are replaced by protamines

c. nuclear condensation contributes to the nuclear stability

d. all of the above are correct

a) b) c)

ou

**In the hormonal control of spermatogenesis :**

- a. Sertoli cells have receptors to testosterone
- b. testosterone is synthesized and secreted under the stimulation of FSH
- c. inhibin acts on both hypothalamus and anterior pituitary gland
- d. activin stimulates FSH secretion

**During the maturation of the male gametes :**

- a. spermatozoa motility is acquired in the epididymis
- b. spermatozoa released from the seminiferous tubules are motile
- c. galactosyl transferase is inactive (masked) in the epididymal secretions
- d. the composition of membranous lipids is modified

**Granulosa cells :**

- a. possess receptors to both LH and FSH
- b. secrete a meiotic inhibitory factor (MIF) or (OMI)
- c. remain with the secondary oocyte at the time of ovulation
- d. do not synthesize hormones

**Yellow body (*corpus luteum*) :**

- a. is formed from the two theca
- b. persists in the ovary in the absence of fertilization
- c. remains functional for the first few months of pregnancy
- d. has no influence on the endometrium

**After the acrosomal reaction :**

- a. the secondary fixation occurs between acrosin and ZP3
- b. the internal acrosome membrane fuses with the plasma membrane of the oocyte II
- c. fusion between the oocyte and the sperm occurs at the equatorial region of the sperm and the plasma membrane of the oocyte
- d. this fusion (in c) is known as amphimixis

Choose the right answer (3 pts)

The stolon is (0.5 pt):

- a- a horizontal stem or root
- b- an above-ground horizontal stem
- c- a horizontal rhizome
- d- an adventitious horizontal root

The grafting (0.5 pt):

- a- consists of planting only a bud on a stock
- b- requires an ultimate contact between the conductive tissues of the scion and the stock
- c- happens only between 2 identical species
- d- necessitates the rooting of the scion

Which of the following algae is correctly paired with its description (0.5 pt):

- a- *Spirogyra* -- diplobiontic cycle
- b- *Ulva* -- monobiotic diplontic cycle
- c- *Fucus* -- monobiotic haplontic generations
- d- Most Rhodophyta (e.g. *Nemalion*, *Aanthitaminion*) -- tribiontic cycle

Double fertilization is (0.5 pt):

- a- the characteristic of all spermatophytes
- b- the fertilization of both, the egg and the polar cells
- c- the fertilization of both, the egg and the antipodal cells
- d- the fertilization of both, the egg and the synergids

Precise the characteristics of the following plants (1 pt):

- a- heterosporous
- b- homosporous
- c- micro- and macro-sporangia
- d- sporophyte dominance
- e- gametophyte dominance
- f- sporangia and gametangia protected by sterile layers

<i>Mnium</i> (Mosses)	<i>Selaginella</i>
b, e, f	a, c, d, f.

Choose the right answer (4 pts) :

The type of egg depend of the :

- a- quantity of the yolk
- b- distribution of RNA in the cytoplasm
- c- site of emission of polar bodies
- d- entry site of spermatozoon

**In the stereoblastula (sterroblastula) the blastocoele :**

- a. occupies a central position
- b. is located at the region of animal pole
- c. is occupied by the yolk
- d. is virtual

**In Drosophila, the polar cells give rise to :**

- a. germinal cells
- b. nervous cells
- c. muscular cells
- d. intestinal cells

**In Sea Urchins, the embryonic origin of calcareous spicules is the :**

- a. secondary mesenchyme
- b. vegetal 1
- c. vegetal 2
- d. primary mesenchyme

**In Amphibians, the gray crescent is formed :**

- a. at the ventral side
- b. during organogenesis
- c. after fertilization
- d. at gastrulation stage

**In Chicken, the function of amnios is :**

- a. nutritive
- b. protective
- c. respiratory
- d. excretory

**In Mammals, the implantation of the embryo occurs at the stage :**

- a. gastrula
- b. morula
- c. blastocyst
- d. neurula

**In Spemann experiment, the transplant corresponds to the :**

- a. ectoderm
- b. dorsal lip of blastopore
- c. ventral lip of blastopore
- d. endoderm

**Encircle the correct answer: (11 pts)**

- Osmosis through a semi-permeable membrane:

- a- is the passage of water from region with high concentration to region with low concentration
- b- is the passage of water from region with low concentration to region with high concentration
- c- is a type of active transport
- d- is the passage of solutes from hypertonic medium to hypotonic medium

- G protein:

- a- is activated when associated with GDP
- b- acts only via its  $\alpha$  subunit
- c- is a dimeric protein
- d- None of the above

-  $\text{Na}^+/\text{K}^+$  pump:

- a- is a V (vacuolar)-class pump
- b- binds 2  $\text{Na}^+$  when phosphorylated
- c- binds 3  $\text{K}^+$  when phosphorylated
- d- prevents the cell burst

- Active transport:

- a- requires energy
- b- occurs down the gradient
- c- does not require ATPase
- d- None of the above

- A symporter:

- a- is implicated only in active transport
- b- is implicated only in passive transport
- c- ensures the transport of two elements in the same direction
- d- ensures the transport of two elements in opposite direction

- In a nerve cell, the reestablishment of the membrane rest potential is due to:

- a- an electron transfer through the membrane
- b- the  $\text{Na}^+/\text{K}^+$  pump work through the membrane
- c- closure of voltage-dependant sodium channels
- d- opening of voltage-dependant calcium channels

- The propagation of a nerve impulse:

- a- is very slow in myelinated fibers
- b- varies along the axon
- c- is saltatory in myelinated fibers
- d- requires high-density of ligand-dependant ionic channels on the axon membrane

- Which of the following is an actin-associated protein:

- a- myosin
- b- dynein
- c- kinesin
- d- keratin

- Paracrine signaling:

- a- involves substances released in blood
- b- occurs between two distant cells
- c- is the pathway of NO transduction
- d- all of the above

- Growth factors bind mainly to:

- a- guanylyl cyclase receptors
- b- tyrosine kinase receptors
- c- intracellular receptors
- d- none of the above

- Electron transport chain is localized at the level of:

- a- mitochondrial matrix
- b- cristae (internal mitochondrial membrane)
- c- external mitochondrial membrane
- d- all of the above

- Fermentation takes place at:

- a- mitochondrial matrix
- b- electron transport chain
- c- external mitochondrial membrane
- d- cytosol

- Plasma membranes:

- a- are symmetrically organized
- b- are selectively permeable
- c- are essentially composed of phosphoproteins
- d- all of the above

- In Calvin cycle, the  $\text{CO}_2$  acceptor is :

- a- ribulose biphosphate
- b- phosphoglyceric acid
- c-  $\text{H}_2\text{O}$
- d- NADPH,  $\text{H}^+$

- Adenylate cyclase:

- a- is activated by an intracellular calcium
- b- degrades cAMP to produce AMP
- c- produces cAMP as a second messenger ✓
- d- none of the above

- Inositol 1,4,5 – triphosphate (IP3) causes the release of calcium in the cytoplasm from:

- a- mitochondria
- b- lysosome
- c- endoplasmic reticulum
- d- extracellular medium

- Second messengers:

- a- are highly variable
- b- are not implicated in the signal transduction pathways
- c- bind to membrane receptors
- d- none of the above

- The number of ATP molecules released following glycolysis of a glucose molecule is:

- a- 2
- b- 4
- c- 6
- d- 8

- Muscular contraction:

- a- does not require the presence of cytosolic calcium
- b- is due to the stretching of sarcomere
- c- is due to the sliding of myosin heads on actin
- d- all of the above

- In mitochondria, accumulated electrons in (NADH, H<sup>+</sup> /FADH<sub>2</sub>):

- a- are directly accepted by oxygen in the mitochondrial matrix
- b- pass through a transport chain of electrons and protons
- c- do not contribute to ATP production
- d- None of the above

- Endocytosis:

- a- requires a plasma membrane movement
- b- is a passive transport
- c- increases the surface of plasma membrane
- d- none of the above

- Membrane sugars:

- a- are present at the outer leaflet
- b- are present at the inner leaflet
- c- bound only membrane proteins
- d- bound only membrane lipids

I- Encircle the right answer: (5 pts)

- The bottom dwelling animals belong to:

- a- Necton
- b- Benthos
- c- Pleuston
- d- None of the above answers

- The most important precipitation is found in the:

- a- Arctic zone
- b- Temperate zone
- c- Steppe zone
- d- Tropical zone

II- What do you call?

- 1- The upper part of a stream or a river where the water current is fast (rapid). *Rhithron*
- 2- The organisms feeding on dead animals or carrions. *microphages*
- 3- The group of individuals of one species. *Population*
- 4- The organism that doesn't tolerate a great variation of salinity. *Stenohaline*
- 5- The temporarily and occasionally formed fraction of a biocoenosis. *Synonim*
- 6- The vital space that is occupied and defended by an animal against intruders. *Territory*

III- Fill in the blank:

- 1- The *Xerophilic* organism lives in dry places.
- 2- The *Cooperation* is a non obligatory association or inter-relation between two species.



LEBANESE UNIVERSITY

Faculty of Medical Sciences

Faculty of Dentistry

Bis Angle

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Time : 2 hours

Date : Octobre 17th 2007

(b)

Entrance Exam to 2<sup>nd</sup> year  
Academic year 2007-2008

Subject : Biology

Page Number = 12

Encircle the correct answer(s) : (5.5 pts)

A tRNA :

- a) is a double stranded molecule.
- b) is the longest RNA molecule.
- c) has an anticodon on loop number 2.
- d) no correct answer.

A virus :

- a) has usually a capsid.
- b) is usually smaller than bacteria.
- c) has a wall composed of peptidoglycans.
- d) no correct answer.

Membrane fluidity :

- a) does not depend on fatty acids.
- b) varies with cholesterol amount.
- c) depends on temperature.
- d) no correct answer.

Nuclear pores allow passage of :

- a) molecules in one single direction.
- b) chromosomal DNA from the cytosol to the nucleoplasm.
- c) all RNA from the nucleoplasm to the cytoplasm.
- d) no correct answer.

Regarding the cell cycle:

- a) it presents the same stages in both eukaryotes and prokaryotes.
- b) entry of cells in S phase is always followed by G2.
- c) kinetochore microtubules appear in S phase.
- d) no correct answer.

Mitochondria:

- a) occur in gram negative bacteria.
- b) have circular DNA.
- c) have ATP synthase (synthetase) in the matrix.
- d) no correct answer.



Regarding the smooth endoplasmic reticulum, it :

- a) is involved in lipid synthesis.
- b) Has a tubular structure.
- c) synthesizes lysosomal enzymes.
- d) no correct answer.

Regarding Golgi apparatus :

- a) it comprises dictyosomes.
- b) it receives vesicles from the RER through the trans face.
- c) it is composed of polarized units.
- d) no correct answer.

Lysosomes:

- a) have proton pumps in their membranes.
- b) contain enzymes such as lipases.
- c) are delimited by a double membrane.
- d) no correct answer.

Intermediate filaments:

- a) occur in the cytoplasm as well as in the nucleoplasm.
- b) contain actin.
- c) contain tubulin.
- d) no correct answer.

Chloroplasts:

- a) have photosynthetic pigments in the inner membrane.
- b) contain RNA.
- c) contain DNA in the stroma.
- d) no correct answer.

Circle the right answer (s) (5.5 pts) :

Which of the following criteria is not used in the classification of epithelial tissue:

- a- number of cells
- b- number of cell layers
- c- specialization of the apical cell surface domain
- d- shape of the surface cells.

Which of the following function does not belong to connective tissue:

- a- nourishment
- b- support
- c- secretion
- d- defense.

The tropocollagen molecule:

- a) is the precursor of collagen fiber
- b) has a triple helix structure of polypeptide chains
- c- has a double helix structure secreted by fibroblasts
- d- all of the above are correct.

Appositional growth of the cartilage:

- a- results from the division of chondrocytes
- b- gives rise to isogenous groups
- c- is responsible for the growth in diameter of the cartilage
- d- is an endogenous growth.

Osteoclasts:

- a- are phagocytic cells
- b- have a totally smooth-contoured plasma membrane
- c- are transformed into osteocytes
- d- secrete the ground substance of bone.

Platelets:

- a- are small anucleated cells
- b- play a major role in the prevention of blood loss
- c- have a lifespan of 120 days
- d- are the most abundant elements in blood.

Cardiac muscle fibers:

- a- are multinucleated
- b- don't contain sarcomeres
- c- are very rich in mitochondria
- d- contract involuntarily.

Axons of neurons:

- a- contain Nissl bodies
- b- are responsible for the propagation of nerve impulses to effector cells
- c- are always myelinated
- d- none of the above is correct

Chlorophyll parenchyma (chlorenchyma) :

- a- is abundant in the underground organs of plants
- b- contains air spaces
- c- has only a storage role
- d- plays an important role in photosynthesis.

Sclerenchyma:

- a- is a dead tissue
- b- is mainly localized superficially in the aerial organ
- c- is more flexible than collenchyma
- d- is made up of fibers and sclereids.

Apical meristems:

- a- are located at the extremities of roots and stems
- b- are made of closely bound isodiametric cells
- c- contain differentiated plastids
- d- insure the growth in length.

**Circle the right answer (5.5 points)**

**In Chromatin:**

- a. Heterochromatin can only be constitutive
- b. Heterochromatin is less condensed than euchromatin
- c. Euchromatin is facultative
- d. None of the above

**If one chain of the DNA double-helix has the following sequence:  
5' ATGCAACGA3' the complementary DNA molecule should be :**

- a. 5'TACGTTGCT3'
- b. 5'TCGTTGCAT3'
- c. 5'TACGTUGCT3'
- d. 5'UCGUUCCA3'

**If the centromeric index is equal to zero, the chromosome should be:**

- a. Metacentric
- b. Submetacentric
- c. Telocentric
- d. Acrocentric

**A substitution mutation can be:**

- a. A transition
- b. An addition
- c. An inversion
- d. A translocation

**The number of Barr Bodies in following is:**

- a. Zero for the syndrome of Turner
- b. Zero for the syndrome of Klinefelter
- c. Two for a trisomic 21
- d. Two for a normal subject

**When the father has a blood type [A N<sup>-</sup>] and the mother [B MN<sup>+</sup>], the couple cannot have a child of the following blood groups:**

- a. [A MN<sup>+</sup>]
- b. [B MN<sup>-</sup>]
- c. [AB M<sup>-</sup>]
- d. [O N<sup>+</sup>]

**When the number of pairs of alleles is equal to three, we obtain in F<sub>2</sub>:**

- a. 8 phenotypes in case of a single codominant condition
- b. 8 phenotypes in case of two codominant conditions
- c. 27 phenotypes in case of three codominant conditions
- d. 18 phenotypes in case of a single codominant condition

In birds:

- a. Females are ZZ
- b. Females are XX
- c. Females are ZW
- d. Females are WW

Four linked genes A, B, C and D are known to have the following recombinant percentages: AB = 25%, AD = 45%, BC = 15% and CD = 35%. The gene order on the chromosome is:

- a. ABCD
- b. ADCB
- c. BCAD
- d. ACBD

In ABO blood system, the "h" allele is said to be:

- a. Hypostatic
- b. Epistatic
- c. Holandric
- d. Hemizygotic

Polydactyly is:

- a. A recessive autosomal trait
- b. A dominant autosomal trait
- c. A sex-linked recessive trait
- d. A sex-linked dominant trait

Choose the correct answer (s) : (4 pts)

**Pairing process**

- a- occurs between homologous chromosomes
- b- occurs only in sex chromosomes
- c- is specific to mitosis
- d- occurs during leptotene stage

**Steroid hormones**

- a- are hydrosoluble hormones
- b- have nuclear receptors
- c- are liposoluble hormones
- d- are glycoproteins

**Sertoli cells**

- a- junctions constitute the blood testis barrier
- b- Secrete inhibin which control the secretion of the anterior pituitary
- c- Are influenced by testosterone
- d- Have membranous receptors for LH

### Spermatogonia

- a- are absent before puberty
- b) spermatogonia type A constitute germ cells
- c) spermatogonia type B enter spermatogenesis
- d) are connected by cytoplasmic bridges

### Primordial follicles

- a- are formed in the medullary region of the ovary
- b) may be present in the female ovary at birth
- c- are surrounded by many layers of follicular cells
- d- their initial growth is FSH dependent

### During ovulation

- a- tight junctions exist between granulosa cells and the plasma membrane of oocyte
- b) granulosa cells possess receptors to both LH and FSH
- c- gonadotropic hormones secreted by the anterior pituitary decrease
- d) estradiol secreted by granulosa exerts a positive feed-back action on the hypothalamus and the anterior pituitary gland

### During fertilization

- a) primary fixation induce acrosomial reaction
- b) the fusion between the two gametes occurs at the equatorial segment
- c) non capacitated spermatozoa are capable to fertilize the egg
- d) male mitochondria contribute to the pool of the mitochondria in the zygote

### Parthenogenesis

- a) involves female gametes only
- b) produces only male individuals
- c) may occur naturally in some invertebrate species
- d) May produce haploid or diploid organisms

### Choose the Right Answer. (4 points)

In *Drosophila*, the pole cells develop in to :

- a) Nerve cells
- b) Muscular cells
- c) Germinal cells
- d) Intestinal cells

The cells which surround the archenteron are :

- a) Ectodermic
- b) Mesodermic
- c) Endodermic
- d) Ectodermic and mesodermic

In Chick, the blastula is called :

- a) Periblastula
- b) Discoblastula
- c) Stereoblastula
- d) Irregular coeloblastula

In Amphibians, the vitellogenin is synthesized in the :

- a) Ovary
- b) Liver
- c) Stomach
- d) Blood

In Chick, the central area of the blastoderm is called :

- a) Area opaca
- b) Area pellucida
- c) Extraembryonic area
- d) Vitelline area

In Mammals, the function of annion is :

- a) Nutritive
- b) Protective
- c) Excretory
- d) Respiratory

The neural induction occurs between the :

- a) Mesoderm and ectoderm
- b) Mesoderm and endoderm
- c) Endoderm and ectoderm

The origin of the optic vesicles is the :

- a) Mesencephalon
- b) Myelencephalon
- c) Metencephalon
- d) Diencephalon

**Choose the Right Answer : (3 pts)**

- Which of the following is a common type of reproduction between Monera and Protista:

- a- transduction
- b- transformation
- c- spore formation
- d- all of the above

- In Bryophyta, the zygote develops :

- a- on the male gametophyte
- b- on the female gametophyte
- c- directly on the protonema
- d- on the sporophyte

- During the triplobiontic cycle of the algae, meiosis takes place ;
  - a- within the carposporophyte
  - b- within the tetrasporophyte
- Concerning Pteridophytes (seedless plants) :
  - a- homosporous species have bisexual gametophytes
  - b- homosporous species have separate male and female gametophytes
  - c- heterosporous species have bisexual gametophytes
  - d- none of the above
- Concerning spermatophytes (seed plants), the male gametophyte is a (an) :
  - a- microspore
  - b- megaspore
  - c- endosperm
  - d- germinated pollen grain
- Within an embryo sac, the egg is located:
  - a- near the synergids
  - b- near the antipodal cells
  - c- near the polar (central) cells
  - d- at the base of the ovule

**Encircle the right answer : (5.5pts)**

**Roses belongs to the family:**

- a) *Rosaceae*
- b) *Rosales*
- c) *Magnoliopsida*
- d) *Anthophyta*

**Cyanobacteria are:**

- a) Photosynthetic Eukaryotes
- b) Archaeobacteria
- c) Prokaryotes with sexual reproduction
- d) Prokaryotes with photosynthetic pigments localized at thylakoids

**Fungi are characterized by:**

- a) Cellulosic cell wall
- b) Vegetative body called hyphae
- c) Their capacity to undergo photosynthesis
- d) Saprophytic metabolism only

**One of the following is Fungal-like protista:**

- a) Basidiomycota
- b) Zygomycota
- c) Oomycota
- d) Ascomycota

**Bryophytes are:**

- a) Vascular cryptogams
- b) Characterized by the dominance of gametophyte generation
- c) Fixed by their roots
- d) Plants with seed

**Lycophyta have:**

- a) Sporophylls grouped in sori
- b) Sporophylls sterile leaves
- c) Rhizoids
- d) Strobilli

**Monocots:**

- a) have leaves with parallel veins
- b) have flower parts in 5's or 4's
- c) Vascular bundles in a ring
- d) are not herbaceous plants

**In plants, light-dependent (photochemical) reactions of photosynthesis:**

- a) occur in stroma
- b) Produce organic molecules
- c) Produce energetic molecules
- d) Produce CO<sub>2</sub>

**Mycorrhizae have:**

- a) Symbiotic association between fungi and algae
- b) Sparophytic association between fungi and root of trees
- c) Symbiotic association between fungi and root of trees
- d) Fungi provide the plant with organic matter

**Plant adapted to dryness are characterized by:**

- a) Well developed root system
- b) High number of stomata
- c) Increased leaf surface
- d) Thin cuticle

**Perianth is composed of:**

- a) Carpels and stamens
- b) Sepals and stamens
- c) Carpels and corolla
- d) Sepals and petals

**Circle the right answer : (1 pt) Ecology**

**The bottom-dwelling aquatic organisms belong to:**

- a- Necton
- b- Plankton
- c- Neuston
- d- None of the above

The biome of coniferous forests belongs to:

- a- Tundra
- b- Savanna
- c- Taiga
- d- None of the above

What do you call (3 pts)

1. The region of the river's source or headwater. ... CRENON .....
2. The type of interaction between two species population, in which one population is inhibited and the other not affected. ... AMMENSALISM
3. The organism that can survive and grow or better grow in shady areas. ... SCIAPHILE
4. The chemical substance that is used between members of the same species to give signals or to transmit different kind of information. ... PEROMONE
5. The study of one individual or one species in relation to environmental conditions. ....  
..... AUTOECOLOGY
6. The process or the reaction of Ammonium transformation into Nitrite. NITRIFICATION, NITRITATION, NITROSATION, OXYDATION, NITRISATION

Fill in the blank (1 pt)

1. The COPROPHAGES are organisms that ingest fecal pellets.
2. The TERRITORY is any area defined by one or more individuals and protected against intrusion by others of the same or different species.

Choose the right answer (5.5 pts)

-In *Paramecium*

- a- the micronucleus is polyploid
- b- the macronucleus has an essential role in sexual reproduction
- c- the synkaryon is haploid
- d- in conjugation, the micronucleus undergoes meiosis

- The mesoglea in sponges contains the following cells

- a- choanocytes
- b- pinacocytes
- c- scleroblasts (sclerocytes)
- d- interstitial

- The fresh- water hydra

- a- has bilateral symmetry
- b- has medusa form
- c- can reproduce asexually
- d- belongs to the Scyphozoa

- The neoblasts are cells

- a- with rhabdites
- b- for regeneration
- c- for digestion
- d- for excretion

**- The cestodes**

- a- have complete digestive system
- b- are free-living organisms
- c- have coelom
- d- have proglottids

**- In *Ascaris***

- a- the epidermis is ciliated
- b- the digestion is extracellular
- c- the excretion takes place by protonephridia
- d- the development passes by a veliger larva

**- All mollusks and annelids**

- a- reproduce asexually
- b- have a segmented body
- c- have closed circulatory system
- d- are hyponeurians

**- The epitoky in annelids**

- a- occurs in all classes
- b- is related to the asexual reproduction
- c- is submitted to morphological modifications
- d- no correct answer

**- In all arthropods**

- a- the cuticle grows by successive molts
- b- the respiration takes place by gills
- c- the circulatory system is closed
- d- the blood assumes respiratory function

**- In sea urchin, the aboral zone contains**

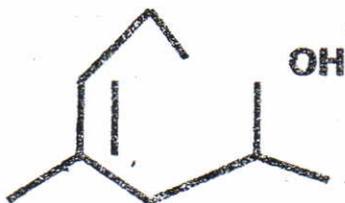
- a- smooth peristomium
- b- five genital plates in the interradial (interambulacral) zones
- c- five pairs of gills
- d- a madreporite perforated by many genital pores

**- The Cephalochordates and Urochordates**

- a- have a notochord found in the cephalic region
- b- have a notochord only in the larval (immature) stage
- c- are deuterostome epineurians
- d- have a tubular heart

Choose the correct answer (only one answer is correct). (5.5 pts)

The name of this structure is:



- a- 4-methyl hept-3-ene-6-ol.
- b- 4-propenyl pentan-2-ol.
- c- 4-methyl hept-4-ene-2-ol.
- d- 2-propenyl pentan-4-ol.

Natural Rubber :

- a- is not a polyisoprene.
- b- is a polymer of 1,4 of 2-methyl-but-1,3-diene.
- c- is very resistant to heat.
- d- is a sesquiterpene.

Protector groups :

- a- Can be used in the case of polyfunctional molecules.
- b- increase the reactivity of the functional group.
- c- increase the formation of secondary products.
- d- none of the above.

Triglycerides (triacylglycerols):

- a- form micelles in water.
- b- are hydrosolubles.
- c- are triesters of glycerol and fatty acids.
- d- form a bilayer structure.

NAD<sup>+</sup> :

- a- is an important reducing agent in biology.
- b- Oxidize ethanol to acetaldehyde.
- c- is converted to NADH after an oxidation reaction.
- d- is a terpene.

Alkaloids :

- a- are nitrogenous heterocyclic compounds.
- b- are acids.
- c- are used to make perfume.
- d- are used to treat cancer.

Folic acid are:

- a- azacyclopropene.
- b- hallucinogen.
- c- helps to protect against a number of congenital malformations.
- d- treat malaria.



Entrance exam to 2<sup>nd</sup> year  
Academic year 2006-2007

Subject : Biology

Encircle the correct answer(s) :

Plasma membrane :

- a) has exactly the same chemical components in the 2 leaflets (layers)
- b) has a glycocalyx at the cytoplasmic face
- c) comprises cholesterol in all living things
- d) no correct answer

1 pt

A nucleosome is composed of :

- a) DNA + histones + RNA
- b) DNA + histones
- c) RNA + histones
- d) DNA only

1pt

A somatic cell of human being comprises :

- a) 46 DNA molecules during G1
- b) 92 DNA molecules during G1
- c) 92 DNA molecules during metaphase
- d) 46 DNA molecules during metaphase

-1 pt

The smooth endoplasmic reticulum :

- a) is continuous with the nuclear envelope
- b) is responsible for glycosylation
- c) is tubular in structure
- d) no correct answer

1 pt

A dictyosome :

- a) is the structural and functional unit of Golgi apparatus
- b) is polarized (oriented)
- c) has a trans face that is related to the endoplasmic reticulum
- d) no correct answer

1 pt

Bacteria :

- a) require host cells to reproduce
- b) have all the same chemical components of the cell wall
- c) all of them have capsids
- d) no correct answer

1 pt



An autolysosome :

- a) comprises extracellular material
- b) has a membrane that derives from the plasma membrane
- c) is a secondary lysosome
- d) contains acid hydrolases

1 pt

Mitochondrial matrix contains:

- a) linear DNA
- b) proteins of the respiratory chain
- c) tRNA
- d) no correct answer

1 pt

A capsid of a virus :

- a) is made up of proteins
- b) is made up of phospholipids
- c) is always envelopped by a lipid bilayer
- d) is envelopped by nucleic acids

1 pt

Microtubules are found :

- a) in microvilli axis
- b) in the mitotic spindle
- c) in axoneme of cilia
- d) no correct answer

1 pt

**Circle the letter next to the correct answer(s): (1 point/question)**

The stratified squamous epithelium:

- a) Is well adapted to withstand friction
- b) Has a flattened basal layer
- c) Could be keratinized

Glands that have a merocrine mode of secretion :

- a) Are endocrine glands
- b) Secrete their products by exocytosis
- c) Loose their cells during secretion

Loose connective tissue:

- a) Contains variable types of connective tissue cells
- b) Is resistant to tension
- c) Has an abundant intercellular matrix

Fibrocartilage:

- a) Does not have a perichondrium
- b) Has little collagen fibers
- c) Is absent at the level of the joints

Erythrocytes:

- a) Cannot move by pseudopodia
- b) Have a multilobed nucleus
- c) Are the most abundant cells in blood

The sarcomere:

- a) Is the functional unit of striated muscles
- b) Does not undergo change in size during contraction
- c) Is limited by 2 Z lines

Astrocytes:

- a - Produce myelin in the central nervous system
- b) Nourish and support neurons
- c - Conduct nerve impulse

Secondary meristems:

- a) Are localized in young parts of the plant
- b) Consist of elongated cells
- c) Are responsible for increase in width of the plant

Secondary cell wall:

- a) Is plastic
- b) Is present in all plant cells
- c) Is made of regularly arranged fibrils

Xylem:

- a) Has a role in support
- b) Is a complex tissue
- c) Is made up only of dead element

**Encircle the correct answer (1 point/question):**

Intra and extracellular media:

- a - are identical
- b - contain different chemical elements
- c) contain the same chemical elements but at different concentrations
- d - contain the same organic compounds

1 pt

Proteins in biomembranes (cell membranes)

- a - have hydrophilic transmembrane segments
- b - make flip-flop movement
- c - never play enzymatic functions
- d) that belong to porins present hydrophilic channels

1 pt

Regarding synthesis and renewal of membrane proteins it is correct to say that:

- a - proteins exposed at the cytosolic leaflet are glycosylated
- b - transmembrane proteins are synthesized by ribosomes that are attached to the endoplasmic reticulum
- c - glycosylation occurs in lysosomes
- d - membrane constituents are randomly inserted

1 pt

Passive transport across plasma membrane:

- a - is performed by simple diffusion only
- b - occurs without a gradient of the transported solute
- c - is performed by both simple and facilitated diffusion
- d - does not depend on solute molecular weight

1 pt

Active transport is performed:

- a - downhill the concentration gradient
- b - generally mediated by pumps that are ATPases
- c - by ATPase pumps that work as uniport systems only
- d - no correct answer

1 pt

Homeostasis:

- a - does not involve regulators
- b - is a dynamic equilibrium
- c - is a static equilibrium
- d - means that the internal medium of an organism is always constant

1 pt

The chemical signaling molecules of intercellular communication:

- a - are all of the same chemical nature
- b - may be liposoluble or hydrosoluble
- c - necessarily act through membrane receptors
- d - no correct answer

1 pt

A membrane receptor may be:

- a - a kinase
- b - internalized by endocytosis
- c - associated with G-protein
- d - all of the above are correct

1 pt

Nitric oxide is a signaling molecule that mediates:

- a - paracrine signaling
- b - synaptic transmission
- c - endocrine signaling
- d - exocrine effect

1 pt

The G-proteins:

- a - are active in the GDP-bound form
  - b - are active in the GTP-bound form
  - c - are transmembrane proteins
  - d - are exposed at the extracellular face of the plasma membrane
- 1 pt

Regarding intracellular receptors:

- a - they are activated by insulin
  - b - they are activated by steroid hormones
  - c - their hormone-bound forms act on cytosolic enzymes
  - d - no correct answer
- 1 pt

Among the second messengers there is (are):

- a - cyclic AMP
  - b - cyclic GMP
  - c - IP3
  - d - all of the above are correct
- 1 pt

During receptor mediated endocytosis:

- a - the cell internalizes the extracellular material in a random manner
  - b - the internal leaflet of the pit is covered by clathrin
  - c - accessory proteins are not involved
  - d - the receptors are not recycled after internalization
- 1 pt

Internalization:

- a - of liquids from the surrounding medium is performed by phagocytosis
  - b - of vesicles by the cell involves the cytoskeleton
  - c - of solid particles is performed by pinocytosis
  - d - process does not require energy
- 1 pt

Generation of an action potential:

- a - results in the inversion of membrane electrical polarity
  - b - requires opening of Na<sup>+</sup> channels first and K<sup>+</sup> channels later on
  - c - involves closing of K<sup>+</sup> channels
  - d - involves activation of Na<sup>+</sup>/K<sup>+</sup> pumps
- 1 pt

Propagation of an action potential:

- a - along a nerve fiber occurs through electron movement inside the axon
  - b - along myelinated fibers is slower than along naked fibers
  - c - is unidirectional in the axon of a neuron
  - d - no correct answer
- 1 pt

Accessory proteins that are associated with actin filaments:

- a - mediate their breaking and disassembly
  - b - mediate their anchoring with the plasma membrane
  - c - help them moving the plasma membrane
  - d - all of the above are correct
- 1 pt

Dynein and kinesin are motor proteins that transport vesicles along:

- a - microfilaments of actin
- b - intermediate filaments
- c - microtubules
- d - thick filaments of myosin

1 pt

Oxidation of an organic compound in the cell is the:

- a - loss of electrons
- b - gain of hydrogen
- c - gain of electrons
- d - loss of oxygen

1 pt

Transformation of light energy into chemical energy during photosynthesis involves:

- a - PSII only
- b - PSII and PSI that transfer electrons from water to NADP
- c - ATPases
- d - no correct answer

1 pt

Choose the correct answer: (1 pt per question)

The cycle of *Ulva lactuca* is:

- a- monobiontic haplontic
- b- diplobiontic with isomorphic generations
- c- diplobiontic with heteromorphic generations
- d- Monoibiontic dipiontic

During sexual reproduction of fungi:

- a- caryogamy and plasmogamy are separated in time and space
- b- caryogamy takes place before the plasmogamy
- c- caryogamy and plasmogamy happen at the same time
- d- none of the above

The gametophyte dominates the sporophyte in case of:

- a- Pteridophytes
- b- Bryophytes
- c- Gymnosperms
- d- Angiosperms

The gymnosperms are characterized by:

- a- the presence of flowers
- b- the double fertilization
- c- the presence of ovaries
- d- the simple fertilization

Stolons:

- a- are above ground horizontal stems
- b- are roots
- c- could be roots or stems
- d- none of the above

**Choose the right answer (s) (1 pt per question)**

- The steroid hormones are:

- a- liposoluble
- b- effective on the nuclear receptors
- c- effective on the cytoplasmic membranes
- d- hydrosoluble

- Which of the following cells have direct or indirect effect on Sertoli cells

- a- peritubular
- b- germinal
- c- leydig
- d- gonadotrophic of hypophysis

-The movement of spermatozoon flagellum depends on the:

- a- proximal centriole
- b- distal centriole
- c- production of energy by the mitochondria
- d- acrosomial enzymes

- The secondary oocyte appears:

- a- at fetal life
- b- at birth
- c- at puberty
- d- after the menopause

-The abnormal motility of spermatozoa is known as:

- a- teratospermia
- b- oligospermia
- c- asthenospermia
- d- none of the above

- The inhibin:

- a- is secreted by Sertoli cells
- b- is secreted by Leydig cells
- c- is secreted by the granulosa
- d- inhibits the secretion of FSH

- The secondary fixation of the spermatozoon and oocyte takes place between:

- a- cytoplasmic membrane of the spermatozoon and ZP1
- b- cytoplasmic membrane of the spermatozoon and ZP3
- c- cytoplasmic membrane of the spermatozoon and ZP2
- d- internal acrosomial membrane and ZP2

- During the fusion of male and female pronuclei (Karyocēnesis):
  - a- the histones of spermatozoon nucleus are replaced by protamines
  - b- the nuclear membranes are not submitted to any modification
  - c- the male and female pronuclei migrate towards the center of the oocyte
  - d- the chromosomes of male and female pronuclei are attached in the equatorial plate of the spindle

**Choose the right answer : (1 pt per question)**

- In the egg, the yolk is
  - a- more abundant in the vegetal pole
  - b- more abundant in the animal pole
  - c- absent
  - d- none of the above
  
- In Drosophila, the pole cells give rise to
  - a- the nervous cells
  - b- the germinal cells
  - c- the muscular cells
  - d- the intestinal cells
  
- In Sea Urchins, the first movement of gastrulation occurs by
  - a- epiboly
  - b- involution
  - c- ingression or invagination
  - d- delamination
  
- In Amphibians, the kidney originates from
  - a- the ectoblast
  - b- the endoblast
  - c- the axial mesoblast
  - d- the intermediate mesoblast
  
- In Chick, the yolk sac is constituted by
  - a- the splanchnic mesoderm and the endoderm
  - b- the ectoderm and the endoderm
  - c- the ectoderm and the somatic mesoderm
  - d- the endoderm and the axial mesoderm
  
- In Mammals, the implantation of the egg occurs at the stage of
  - a- morula
  - b- blastocyst
  - c- gastrula
  - d- neurula

- The neural induction occurs between
- a- the mesoblast and the endoblast
  - b- the endoblast and the ectoblast
  - c- the mesoblast and the ectoblast
  - d- the endoblast and the neuroblast

**Choose one right answer : (1 pt per question)**

1- Euchromatin

- a. Corresponds to the active part of chromatin
- b. Does not contain genes
- c. Contains inactive genes
- d. Is highly condensed

2- The bond between two nucleotides in a nucleic acid molecule is called:

- a. 5' → 3' phosphodiester
- b. 2' → 5' phosphodiester
- c. 3' → 5' phosphodiester
- d. 5' → 2' phosphodiester

3- At the G<sub>2</sub> phase of the cell cycle of a diploid cell we have:

- a. 4N chromosomes
- b. 4N chromatids
- c. N chromosomes
- d. 2N chromatids

4- The loss of a chromosome fragment is a:

- a. Deletion
- b. Translocation
- c. Substitution
- d. Inversion

5- Consider the following cross *AaBbCc* x *AABbCc*. What is the probability to observe an individual with the [ABC] phenotype?

- a. 9/32
- b. 9/16
- c. 3/32
- d. 3/16

6- In sex-linked dominant mode of inheritance, if an affected man is married to a healthy woman we expect in the progeny:

- a. 50% of their sons to be affected
- b. 100% of their sons to be affected
- c. 50% of their daughters to be affected
- d. 100% of their daughters to be affected

7- *A*, *B*, *C*, and *D* are linked genes with the following recombination frequencies:  
[AB] 8%                      [BC] 5%                      [CD] 14%                      [AD] 17%

The gene order is:

- a. ABCD
- b. ACDB
- c. ACBD
- d. ADBC

8- A dihybrid cross *AaBb* x *AaBb* yields the ratio 12:3:1. This modification to the Mendelian ratio results from:

- a. Epistasis by one dominant allele
- b. Epistasis by one recessive allele
- c. Epistasis by two recessive alleles
- d. Epistasis by two dominant alleles

9- An X-linked gene has 5 alleles. How many genotypes can be produced?

- a. 15 in males and 5 in females
- b. 5 in males and 15 in females
- c. 15 in males and 15 in females
- d. 5 in males and 5 in females

10- A father with a blood type [A, rh-, MN] has a child with blood type [O, Rh+, N]. What blood type the mother can belong to?

- a. [A, rh-, MN]
- b. [B, Rh+, N]
- c. [AB, Rh+, M]
- d. [AB, rh-, N]

Choose the right answer (S) (1 point/question)

1- Hemoglobin :

- a. Contains heme and globin
- b. Contains 3 chains of peptides
- c. Transports oxygen to the blood
- d. Have the same molecular weight of myoglobin

2- Nitric oxide (NO) :

- a. Comes from alanine
- b. Causes a vasodilatation
- c. Overdose of NO causes a destruction of neurological cells
- d. Is not a neuro-transmitter

3- Amylopectine :

- a. Is formed of ramified chains connected in  $\alpha$ -1,4 glycosidic linkages
- b. Is the major component of starch
- c. Is a polyglycosylamine

4- **Mutarotation of glucose :**

- a- Permits the conversion of  $\alpha$  to  $\beta$  anomer
- b- Acids do not have any effect on mutarotation phenomena
- c- Allows the conversion of D- to L- glucose
- d- None of the above

5- **N-nitrosodialkanamines**

- a- Liberate strong electrophylic compounds
- b- Are not present in conserved aliments
- c- Are anti-carcinogenic products

6- **Pyridinium salt NAD<sup>+</sup>:**

- a- Is an agent of reduction in biochemistry
- b- Contains 2 molecules of ribose linked as pyrophosphate
- c- Is a non-acceptor of hydrogen

7- **Disydazirine :**

- a- Contains an azacyclopropene
- b- Is an aminoalcohol
- c- Treats cancer
- d- Is a precursor of D-sphingosine

8- **Terpenes :**

- a- Are present in soil and are characterized by their strong odor
- b- Are biosynthesized and build up from two or more isoprene units
- c- Are either cyclic or open-chained

9- **Phospholipids are**

- a- The major constituents of cellular membranes
- b- Ethers of fatty acids
- c- Hydrophobic and hydrophilic

10-  $\text{CH}_2=\underset{\substack{| \\ \text{CH}_2-\text{CH}_3}}{\text{C}}-\text{C}\equiv\text{CH}$  is named :

- a- 2-Ethylbut-1-ene-3-yne
- b- 3-Ethylbut-3-ene-1-yne
- c- 3-Methylidinpent1-yne

**Choose the right answer (1 pt per question)**

**In the actual classification, living organisms are classified in:**

- a- 3 kingdoms
- b- 4 kingdoms
- c- 2 kingdoms
- d- all of the above
- e- none of the above

**According to Linné, the scientific name of opium is:**

- a- *Papaver somniferum* L.
- b- *Papaver Somniferum* L.
- c- *Papaver somniferum* L.
- d- all of the above
- e- none of the above

**Algae are:**

- a- heterotrophs
- b- chimiotrophs
- c- autotrophs
- d- all of the above
- e- none of the above

**Fungi are characterized by:**

- a- a cell wall rich in chitin
- b- being heterotrophs
- c- a mycelium as a vegetatif body
- d- all of the above
- e- none of the above

**Bryophytes are:**

- a- vascular cryptogams
- b- flowering plants
- c- fixed by roots
- d- all of the above
- e- none of the above

**Pteridophytes are characterized by having:**

- a- flowers
- b- grains
- c- conductive tissues
- d- all of the above
- e- none of the above

**Concerning photosynthesis:**

- a- light reactions generate ATP and NADPH
- b- oxygen liberated in the atmosphere results from the reduction of atmospheric CO<sub>2</sub>
- c- dark reactions take place outside the chloroplasts
- d- all of the above
- e- none of the above

**Monocots are characterized by having:**

- a- leaves with parallel veins
- b- floral parts that are multiple of five
- c- grains with 2 cotyledons
- d- all of the above
- e- none of the above

**Pteridophytes include:**

- a- Hepatophyta, Psilophyta, Lycophyta
- b- Psilophyta, Lycophyta, Sphenophyta and Pterophyta
- c- Gnetophyta, Hepatophyta, Lycophyta, Pterophyta
- d- all of the above
- e- none of the above

**Xerophytic plants are characterized by:**

- a- the reduction of leaf surface
- b- very well developed root system
- c- adaptation to dryness
- d- all of the above
- e- none of the above

**Choose the right answer : (1 pt per question)**

- During conjugation in *Paramecium*

- a- the macronuclei persist
- b- the meiosis occurs at the end of this process
- c- four new individuals are produced
- d- the attached individuals are known as conjugants

- In sponges the

- a- sclerocytes (scleroblasts) secrete the mesoglea (mesohyl)
- b- choanocytes secrete the spicules
- c- choanocytes assume digestive function
- d- pinacocytes are endodermic

- The nematocysts

- a- have a central coiled thread
- b- are found in the mesoglea
- c- are regenerated from the amoebocytes
- d- have a phagocytic function

- The epidermis of planaria

- a- contains rhabdite cells
- b- is multilayered
- c- assume only respiratory function
- d- does not have gland cells

In *Ascaris*-

- a- the spermatozoa are ciliated
- b- the asexual reproduction is by budding
- c- the female reproductive system includes two ovaries
- d- the male reproductive system includes two testes

- The osphradia are organs for

- a- sensation
- b- defence
- c- excretion
- d- equilibrium

- The Malpighian tubules

- a- are found in all arthropods
- b- are found in insects
- c- are found in aquatic crustaceans
- d- assume a digestive function

- The madreporite

- a- possesses a single opening
- b- is found in the radial (ambulacral) zone
- c- is a genital plate
- d- is found in the oral zone

- The Amniotes

- a- possess 10 pairs of cranial nerves
- b- the kidneys are of the type metanephros
- c- include only birds and mammals
- d- are homeotherms

- Birds and mammals

- a- the heart consists of two auricles and two ventricles
- b- are placental
- c- are oviparous
- d- possess anucleated red blood cells

**I. Choose one correct answer: (1 pt/question)**

1. When a community has reached an equilibrium phase, it is called a:

- a - forest
- b - climax
- c - biocenoses
- d - ecotone

2. Which biome would be more richly numerous in species?

- a - tropical forest
- b - temperate forest
- c - desert
- d - none of the above

3. What are the results of deforestation?

- a - decrease in atmospheric oxygen level
- b - increase in desertification
- c - soil erosion
- d - all of the above

4. A factor that is important to all aquatic ecosystems is:
- a - how deep sunlight penetrates
  - b - the amount of nutrients
  - c - the water temperature
  - d - all of the above
5. A biome characterized by low annual temperatures, low precipitation, lack of woody vegetation, and a permanently frozen soil layer is:
- a - boreal forest (taiga)
  - b - temperate deciduous forest
  - c - tundra
  - d - steppe

**II. Give words that define each of the following. Do not give examples. (1 pt/question)**

1. Organisms that are floating or suspended in the water without generally showing a resistance to water currents..... *Plankton*
2. Transition zone between different ecosystems ..... *ecotone*.....
3. Organisms that do not tolerate high variation of salinity... *stenohaline*
4. Obligatory interaction between two species in which both benefit from the association ... *Symbiosis*....
5. Organisms that feed on organic matter in decomposition ... *Saprotrophs*  
*saprophytes*