

Delhi Public School, Jammu

Question Bank

Class : XII

(2017- 18)

Subject : Biology

Q1. It is a common sight in villages where cattle egrets and the grazing cattle are found in close association. What kind of interaction do they show? Explain. Give an example of such an interaction from plants.

Ans. It is commensalism, an example of the interspecific interaction, where one of the species is benefitted and other is neither harmed nor benefitted. This type of interaction is known as neutral interaction. In this egrets are benefitted as they eat the insects from cattle's body.

An orchid growing as an epiphyte on the mango tree is an example of such an interaction from plants.

Q2. The number of trophic level in a food chain is limited? Justify.

Ans. During photosynthesis only 1% of the light energy is converted by producers into chemical energy. 10% of the energy is transferred from one trophic level to another in a food chain. After a few transfers the amount of energy at the higher trophic levels will be very less to sustain those organisms, hence the number of trophic levels in a food chain is limited.

Q3. Why are exonucleases not useful in genetic engineering?

Ans. Exonucleases remove the nucleotides from the ends of DNA strands either from 5' or 3' end and not at the required desired sites; hence they are not useful in genetic engineering.

Q4. Why should a bacterial cell be made competent to introduce rDNA into it?

Ans. Since DNA is hydrophilic and cannot pass through the cell membrane easily, so in order to facilitate the process of transformation bacterial cells are treated with CaCl_2 to make them competent to introduce rDNA into them by heat shock or electroporation method.

Q5. Given below is the nucleotide sequence of a hypothetical mRNA and amino acids coded by this mRNA:

UUUAUGUUCGAGUUAGUGUAA

Phe-Met-Phe-Glu-Leu-Val

Describe the properties of genetic code that can be correlated from the above given information.

Ans . i) Genetic code is specific and unambiguous i.e., codon code for a particular amino acid e.g. AUG methionine and UUU for Phenylalanine.

ii) Genetic code is degenerate i.e., one amino acid is coded by more than one codon e.g. UUU and UUC code for Phenylalanine.

iii) Genetic code is without any punctuation.

iv) UAA is a termination codon as it does not code for any amino acid.

Q6. How Innate Immunity is different from Acquired immunity? Describe any two ways by which innate immunity can be accomplished.

Ans. Innate Immunity

Acquired Immunity

Innate immunity consists of inborn immunity

Acquired immunity is gained after birth

It consists of different barriers

It consists of specialised cells

Lysozymes

Vaccination (polio, diphtheria, etc.)

Innate immunity can be accomplished by any one of the following ways:

1. Physical barriers
2. Physiological barriers
3. Cellular barriers
4. Cytokine barriers

Q7. State the functions of primary and secondary lymphoid organs in humans.

Ans. Primary lymphoid organs: These are the organs where T lymphocytes and B lymphocytes mature and acquire their antigen specific receptors e.g. bone marrow and thymus.

Secondary lymphoid organs: These are the organs where the lymphocytes undergo maturation and proliferation in response to specific antigens e.g. lymph nodes, spleen.

Q8. Name two commonly used vectors in rDNA technology. Enlist and explain the three characteristic features of cloning vectors.

Ans. Two commonly used vectors are Plasmids and bacteriophages.

Characteristics of a cloning vector

- i) Origin of replication (ori): This is a sequence where replication starts. Any DNA segment attached can be made to replicate in host cell.
- ii) Selectable marker: This helps in selection of transformed host cells from non transformed cells.
- iii) Cloning sites: This consists of recognition site of restriction endonucleases.

Q9. Write the scientific name of the source plants and the effect on the human body of these drugs.

- i) Morphine
- ii) Cocaine
- iii) Marijuana

Ans. i) Morphine is extracted from the latex of the plant *Papaver somniferum*. It is depressant and slow down body functions.

- ii) Cocaine is extracted from coca plant (*Erythroxylon coca*). It produces a sense of euphoria and increased energy.
- iii) Marijuana is obtained from the inflorescence of *Cannabis sativa*. They affect the cardiovascular system of the body.

Q10. Trace the development of a zygote of a dicot angiosperm into a fully developed embryo.

Ans. The zygote under goes mitotic divisions during embryogeny. The first division is transverse and results in a basal cell and a terminal cell. The basal cell forms the suspensor while the terminal cell forms the embryo proper. It first forms a filamentous proembryo which later forms sequence of structures like a globular embryo, heart shaped embryo and then a mature embryo.

Q11. Mention two objectives of setting up GEAC by our Government.

Ans. The two objectives for setting up GEAC are:

- i) To check the validity of GM crops.
- ii) To check the safety of introduction of GM products to the public.

Q12. Expand MOET and what is the role of genetic mother in MOET?

Ans. Multiple Ovulation and Embryo Transfer (MOET). Genetic mother is the super ovulatory mother. It produces 6-8 eggs per cycle instead of normal 1 egg per cycle. FSH like hormones are given to genetic mother in order to induce the super ovulation.

Q13. What is aminoacylation? State its significance.

Ans. Aminoacylation of tRNA refers to the process in which the tRNA gets charged with its specific amino acid with the help of enzyme amino acyl tRNA synthetase.

Aminoacylation is important as when two such charged tRNA's are brought closer formation of peptide bond between two amino acids become energetically favourable.

Q14. $p^2+2pq+q^2=1$. Explain this algebraic equation on the basis of Hardy Weinberg's principle.

Ans. Hardy Weinberg's equation is a mathematical equation that can be used to calculate the genetic variation of a population at equilibrium.

$p^2+2pq+q^2=1$ where p is the frequency of the 'A' allele and q is the frequency of the 'a' allele in the population. In the equation, p^2 represents the frequency of the homozygous genotype AA, q^2 represents the frequency of the homozygous genotype aa, $2pq$ represents the frequency of the homozygous genotype Aa. Sum of all the allele frequencies of all the alleles at the locus must be 1, so $(p+q)^2=1$. If value of p and q is known then the frequencies of three genotypes can be predicted. This equation is used to measure whether the observed genotype frequencies in a population differ from the frequencies predicted by the equation. If there is any difference in the frequencies, it indicates the extent of evolutionary change.

Q15. Name and describe any three causes of biodiversity losses.

Ans. The three cause of biodiversity losses are:

- i) **Habitat destruction:** It is considered as the primary cause of biodiversity loss. It is generally caused by deforestation, fire and over use and urbanization. It leads to the extinction or decrease in the number of animals living in that particular area.
- ii) **Alien species invasion:** Sometimes the alien species introduces in a geographical area may turn invasive and can cause decline or extinction of the indigenous species.
- iii) **Over exploitation of natural resources:** Over exploitation of natural resources is the major cause of biodiversity loss. Due to increasing human population, resource demand has increased which resulted into exploitation of already present resources.

Q16. Write the characteristics of *Ramapithecus*, *Dryopithecus* and Neanderthal man.

Ans. *Ramapithecus*: It walks erect on its hind feet. Its jaws and teeth were like those of humans. Hairy and walk like gorillas and chimpanzees more like man.

Dryopithecus: It was more ape like but had arms and legs of the same length. It has large brain and large canines. Hairy and walk like gorillas and chimpanzees more like ape.

Neanderthal man: It has slightly prognathous face. It walked upright, receding jaws and domed head. Brain capacity is 1400cc, used hides to protect their body and buried their dead.

Q17. Explain the following phases in the menstrual cycle of a human female.

- i) Menstrual phase ii) Follicular phase iii) Luteal phase

Menstrual phase: The cycle starts with this phase and lasts for 3-5 days. It results due to breakdown of endometrial lining of the uterus and its blood vessels, if the released ovum is not fertilized.

Follicular phase: This is also known as proliferative phase and starts from 5-14 day of the cycle. Endometrium regenerates through proliferation, level of LH and FSH increases and stimulates secretion of estrogen by growing follicles, maximum level of LH induces rupture of Graafian follicle to release ova (ovulation).

Luteal phase: This phase is during last 15-28 days. Remnants of Graafian follicle forms corpus luteum which secretes large amount of progesterone essential for maintain endometrium necessary for implantation and for pregnancy. In absence of fertilization corpus luteum degenerates leading to disintegration of endometrium and resulting in menstruation flow.

Q18. a) Explain why some organisms are conformers and some regulators in the world.

b) Why there are more conformers than regulators in the world?

Ans. Conformers: Organisms which cannot maintain a constant internal environment under varying external environmental conditions. They change body temperature and osmotic concentration with change in external environment. For example plants, fishes, amphibians and reptiles.

Regulators: Organisms which can maintain a constant internal environment (homeostasis) by physiological or behavioural means. They maintain constant body temperature and osmotic concentration. For example, birds and mammals.

b) There are more conformers than regulators in the world because they lack the capacity to maintain a constant internal environment or homeostasis.

Q19. Describe the inter relationship between productivity, gross primary productivity and net productivity.

Ans. Productivity is the rate of production of biomass per unit area over a period of time.

Gross primary productivity is the rate of production of organic matter during photosynthesis in an ecosystem.

Net productivity is the gross primary productivity minus respiration losses.

$NPP = GPP - R$ (R) is the respiratory loss.

Q20. When a seed of an orange is squeezed, many embryos instead of one are observed. Explain how it is possible?

Ans. Occurrence of more than one embryo in a seed is called as polyembryony. In orange the nucellar cells, synergid or integument cells develop into number of embryos of different sizes. Sometimes formation of more than one egg in an embryo sac can lead to polyembryony. These embryos are genetically similar as they are produced from nucellar cells by mitosis or without fertilization.

Q21. Differentiate between annual and biennial plants. Provide one example of each.

Ans. Annual plants complete their life cycle in one season. They grow, set seeds and die within one year. For example, rice, wheat, rye, barley, etc.

Biennial plants require two seasons to complete their life cycle. In the first year they grow their root system, leaves and short stem and then become dormant in the winter season. In the second year the plants grow quickly before flowering, setting seeds and then die. For example, onion, carrot, radish, etc.

Q22. How does the application of cyanobacteria help to improve agriculture output?

Ans. Cyanobacteria are free living or symbiotic blue green algae which are capable of converting atmospheric nitrogen into soluble forms like nitrites or nitrates. They enrich the nitrogen content of the soil thus acting as a natural fertilizer of the soil. They act as biofertilizers.

Q23. Name a genus of baculovirus. Why are they considered good biocontrol agents?

Ans. Nucleopolyhedrovirus is a genus of baculovirus. They are good biocontrol agents as:

1. They are extremely species specific, narrow spectrum biocontrol agents.
2. They do not have any harmful effect on the mammals, plants animals or birds.
3. They are useful when an ecologically sensitive area is being treated.

Q24. How do organic farmers control pests? Give two examples.

Ans. Organic farmers treat pests with biocontrol agents such as natural predators and parasites rather than chemicals. For example Lady bird beetle and dragonfly can be used for getting rid of aphids and mosquitoes, *Bacillus thuringensis* spores to control caterpillars.

Q25. What are the two growth models that represent population growth?

Ans There are two models of population growth exponential and logistic model.

Exponential (J shaped): In exponential growth model the resources (space and food) are unlimited, so the population grows exponentially. Such a growth is not sustainable as the resources will soon get limited and due to environmental resistance there may be a population crash.

Logistic (S shaped): In logistic growth after a short phase of exponential growth resources get depleted and thus population reaches an equilibrium near the carrying capacity of the habitat.

Q26. Explain any two defence mechanism plants evolved against their predators.

Ans. 1. Thorns are the morphological defence mechanism.

2. Produce or store chemicals which inhibit digestion or disrupt reproduction or produce highly poisonous cardiac glycosides.

3. Nicotine, caffeine, quinine, opium are produced as defence.

Q27. How does predation differ from parasitism?

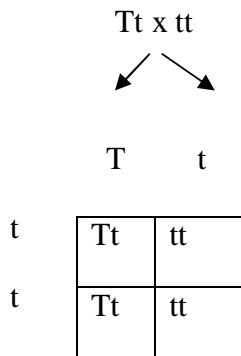
Ans. Predation: The interaction between predator and prey. Predator feeds on prey. Predation is not prey specific. Controls prey population.

Parasitism: Interaction between parasite and host. Parasite lives and feeds on the host. Parasite is host specific. Co-evolve with the host.

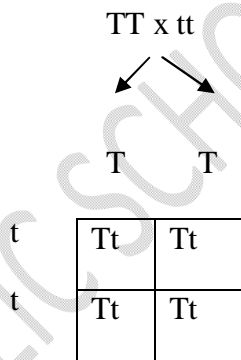
Q28. What is a test cross? How can it decipher the heterozygosity of a plant?

Ans. Test cross is made between F1 or F2 dominant phenotype plant with recessive phenotype parent in order to know the genotype of the dominant phenotype plant.

There are two cases if a dominant phenotyoe plant is there TT/Tt.



50% dominant and 50% recessive i.e. 1:1 then it is concluded the dominant plant is heterozygous.



All are dominant phenotype, then it is concluded the dominant plant is homozygous.

Q29. Mention two advantages of micropropagation. Give two examples where it is commercially adopted.

Ans. 1. Micropropagation helps in the propagation of a large number of plants in a short span of time.

2. It leads to the production of healthier plants which exhibit disease resistance.

3. It helps in the preservation of endangered and exotic plants.

4. Production of genetically identical plants.

5. It brings variation (somaclonal variations).

Q30. Why the insertion inactivation method is proffered to antibiotic resistance to detect rDNA?

Ans. The presence chromogenic substrate gives blue coloured colonies in non transformants in absence of an insert. Presence of insert leads to the insertion inactivation of the Lac Z gene results into colonies which do not produce colour. In comparison antibiotic resistance requires replica plating which is a cumbersome procedure.

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