

TOPIC: VARIATION, EVOLUTION, POPULATION GENETICS AND MECHANISMS OF SPECIATION

Time: 2 ½ hours

Attempt all questions in this paper

SECTION	MARKS
A	
B	
TOTAL	

SECTION A (40MARKS)

- The theory of spontaneous generation states that:
 - life arose from living forms only
 - life can arise from both living and non-living
 - life can arise from non-living things only.
 - life arises spontaneously, neither from living nor from the non-living.
- The gene for albinism is recessive to that form normal skin pigment in human. In a population where the frequency of albinism is 10%, the expected proportion of albinos in the population would be
 - 0.1
 - 0.01
 - 0.8
 - 0.9
- Insect and vertebrate living on land have jointed limbs for locomotion. This is an example of
 - Convergent evolution
 - Adaptive radiation
 - Divergent evolution
 - Natural selection
- Which one of the following factors is least likely to contribute to the development of new species?
 - Gene mutation
 - Reproductive isolation
 - Geographical isolation
 - Stabilizing selection
- Which one of the following may cause adaptive radiation to a variety of species?
 - Stabilizing selection
 - Directional selection
 - Cessation of selection
 - Disruptive selection
- Which one of the following may occur to a community of organism as a result of natural selection?
 - Increase in the number of species
 - Adaptive to the environment by all organism
 - Extinction of species
 - Reduction in the level of mutation
- Which one of the following pairs of structures are not homologous?
 - Arms of humans and wings of birds
 - Legs of insects and those of mammals
 - Ponds of bean and pericarp of maize grain
 - Pectoral fins of fish and arms of humans
- From the following sources of variation, which one has the highest chance of producing new species
 - Crossing over
 - Independent assortment
 - Mutation
 - Random fusion of gametes
- Animal husbandry and plant breeding programmes are examples of:
 - Reverse evolution
 - Artificial selection
 - Mutation
 - Natural selection
- Which one of the following results when a gamete with non-disjunction is fertilized?
 - Duplication
 - Translocation
 - Monosomy
 - Polyploidy
- Which one of the following is least likely to occur when organism of similar species competes for some limited resource?
 - Range restriction
 - Aggression towards each other
 - Extinction
 - Individuals lacking desired qualities are prevented from mating during artificial selection using the following methods except
 - Extermination
 - Segregation
 - Sterilization
 - Cross breeding
- Structures of common origin modified in various ways to adapt animals to different modes of life is an illustration of
 - Homologous structure
 - Convergent evolution
 - Analogous structure
 - Cooperative anatomy character
- Which one of the following is likely to cause a faster rate of evolution?
 - Stabilizing selection
 - Directional selection
 - Disruptive selection
 - Slow changing environment
- The more the variation in population, the greater is its potential to
 - Give rise to gene flow
 - Adapt to new changes in environment
 - Produce more offspring

- D. Grow fast
16. Which of the following conditions result from gene mutation?
 - A. Klinefelter's syndrome
 - B. Turners syndrome
 - C. Sick cell anemia
 - D. Down's syndrome
 17. Which of the following factors would contribute least to the development of new species?
 - A. Gene mutation
 - B. Chromosomal mutation
 - C. Geographical isolation
 - D. Environmental stability
 18. Insects have different mouth parts modified to suit their different modes of feeding. This shows:
 - A. Speciation
 - B. Convergence evolution
 - C. Divergent evolution
 - D. Development of analogous structures
 19. A possible explanation for occurrence of gill slits on a human embryo is that
 - A. gill slits are required for respiration at early stages
 - B. human may have evolved from fish
 - C. human and fish have a common ancestry
 - D. evolution still occurs
 20. Among the following sets of organs; which contains homologous structures only?
 - A. bat wing, bird wing, human fore arm
 - B. fish pectoral fin, human fore arm, insect wings
 - C. bird wing, bat wing, insect wings
 - D. fish pectoral fin, bat wing, human forearm
 21. Which one of the following would not lead to evolution?
 - A. Better suited phenotype in a specific environment increasing in number
 - B. The environment remains stable for a long time.
 - C. Organism producing more offspring than the environment can support
 - D. A large number of offspring dying before reproduction.
 22. The camel family is found only in North Africa, Asia and South America. This is an example of
 - A. Adaptive radiation
 - B. Convergence radiation
 - C. Divergent evolution
 - D. Discontinuous distribution
 23. The appearance of a gene of evolutionary advantage is a function of
 - A. Chance
 - B. Environmental demand
 - C. Needs of organism
 - D. Nature plan
 24. Which one of the following would cause phenotypic variation among organisms of the same genotype?
 - A. Exposure to different environment
 - B. Continuous variation within the species
 - C. Different sex
 - D. Mutation
 25. The phylogenetic approach to classification is used because it groups together all animals that show
 - A. analogous structures
 - B. homologous structures
 - C. convergent evolution
 - D. Adaptive radiation
 26. Which of the following may be a result of inbreeding?
 - A. Improved fertility
 - B. Accumulation of lethal gene
 - C. Polyploidy
 - D. Increased mutation rate
 27. Two population of a given species could only evolve into two distinct species if they are subjected to
 - A. Disruptive selection
 - B. Geographical isolation
 - C. Stabilizing selection
 - D. Genetic isolation
 28. The pastoralist usually retains which his herd, a bull whose ancestor have got desirable characteristics. This is an example of
 - A. Inbreeding
 - B. Natural selection
 - C. Cross breeding
 - D. Artificial selection
 29. The existence of different castes within termite is an instance of
 - A. Polymorphism
 - B. Genetic drift
 - C. Melanism
 - D. natural selection
 30. Which one of the following effects of deforestation will least affect the gene pool of a population in a forest?
 - A. Accumulation of carbon dioxide in the atmosphere
 - B. Decrease in the number of individual at each trophic level
 - C. Loss of habitat for animal species
 - D. Decrease in the number of trophic levels in the forest ecosystem
 31. The occurrence of a genetic defect among individuals of an isolated population in a percentage higher than expected is likely to be a result of
 - A. Natural selection
 - B. Speciation
 - C. Adaptation
 - D. Genetic drift
 32. The similarity of the skeletal structures of mole, monkeys and whales lead to the conclusion that they
 - A. Belong to the same class
 - B. Originate from the same environment
 - C. Descend from a common ancestor
 - D. Evolved converging

33. Which one of the following would lead to genetic death in animal population?
- Hemophilia in a population
 - Sickle cell trait in a population
 - Infertile males in a population
 - Albinism in a population
34. The following can result in some variation of the offspring except
- Haploid parthenogenesis
 - Fragmentation
 - Conjugation
 - Self-fertilization
35. The possession of similar structures in an organism having different ancestral origin is a result of
- Convergence evolution
 - Divergence evolution
 - Adaptive radiation
 - Parallel evolution
36. Which one of the following may occur to a community of organisms as a result of natural Selection?
- Increase in the number of species.
 - Adapting to the environment by all the organisms.
 - Extinction of species.
 - Reduction in the level of mutation,
37. Which one of the following would happen to individuals of the population in the shaded area in the figure below if selection pressure continued for generations acting on the phenotype? They would
- Develop onto two distinct population
 - Die off and become extinct
 - Evolve into new species
 - Multiply in number
38. Which one of the following genetic abnormalities does not result from non-disjunction?
- Klinefelter's syndrome
 - Turner's syndrome
 - Hemophilia
 - Down's syndrome
39. In breeding, the propagation of a variety with desirable characteristics is referred to as
- Hybridization
 - Artificial selection
 - Cross breeding
 - inbreeding
40. Human eye and octopus' eye are examples of
- Homology
 - Divergent evolution
 - Analogy
 - Adaptive radiation

SECTION B (60MARKS)

41. (a) (i) How does Hardy Weinberg principle of populations dynamic state?

(1mark)

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(ii) List the five conditions for a lack of evolution, according to the Hardy-Weinberg principle.

(2½marks)

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(iii) In a certain population, the frequency of three genotypes is as follows:

Genotype	BB	Bb	bb
Frequency	22%	62%	16%

What is the likely frequency of B and b alleles?

(2marks)

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(b) Explain how the following affect the frequency of a particular allele in a population.

(i) Founder principle

(2marks)

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(ii) Mutations

(2½marks)

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42. Describe micro and macro evolution and give an example of each.

(3marks)

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(ii) How do populations evolve.

(2marks)

(b) Explain how fossil records can show the evolution of organisms

(2marks)

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(c) Mention how Lamarck would describe the formation of the Galapagos finches.

(3marks)

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43. (a) What is meant by the term hybrid vigour?

(2marks)

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(b) Explain

(i) The concept of heterozygosity and parasitic symbiosis apply to the persistence of hemoglobin alleles that cause sickle cell anaemia in human populations.

(4marks)

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(ii) How allopolyploidy can change the phenotype of an organism.

(4marks)

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44. (a) Describe an example that disproves Lamarck's theory about the inheritance of acquired traits. (2marks)

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(b) (i) Explain what Descent with modification means and results in evolution and relates it to Darwin's finches. (3marks)

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(ii) Had Darwin been aware of Mendel's work, would he be able to explain the origin of variations? Discuss. (2marks)

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(c) Explain how artificial selection has changed tomatoes. (3marks)

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45. (a) What is the difference between sympatric and allopatric speciation. (2marks)

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(b) (i) Explain two prezygotic isolating mechanisms. (4marks)

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(ii) What are the possible outcomes of the postzygotic isolating mechanism? (2marks)

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(c) Why is it easier to envision allopatric speciation than sympatric speciation? (2marks)

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46. (a) In what ways are speciation events "Happy accidents"? (2marks)

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b) Explain the following using examples in each case

(i) Two organisms occupying a particular geographical area show similar adaptive strategies.

(3marks)

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(ii) Evolution is a continuing phenomenon for all living things like humans.

(2marks)

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(c) Why is speciation in bacteria a tricky concept.

(2marks)

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END