

(每題 2 分，共 50 題)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Which of these provides evidence of the common ancestry of *all* life?
 - A) the structure of chloroplasts
 - B) the structure of the nucleus
 - C) the ubiquitous use of catalysts by living systems
 - D) the structure of cilia
 - E) the universality of the genetic code

- 2) The α -helix and the β -pleated sheet are both common forms found in which level of protein structure?
 - A) primary
 - B) secondary
 - C) tertiary
 - D) quaternary

- 3) Which of the following relationships between cell structures and their respective functions is *not* correct?
 - A) chloroplasts: chief site of cellular respiration
 - B) cell wall: support, protection
 - C) ribosomes: site of protein synthesis
 - D) chromosomes: genetic control information
 - E) mitochondria: formation of ATP

- 4) According to the endomembrane model for the formation of cell membranes, what components of the membrane of an animal cell will be at the extracellular surface exposed directly to the cytosol?
 - A) A and C
 - B) peripheral proteins
 - C) phospholipids
 - D) membrane carbohydrates
 - E) A, B, and C

- 5) During aerobic cellular respiration, a proton gradient in mitochondria will be generated by _____ and used primarily for _____.
 - A) diffusion of protons ... ATP synthesis
 - B) the electron transport chain ... ATP synthesis
 - C) fermentation ... NAD reduction
 - D) the electron transport chain ... substrate-level phosphorylation
 - E) glycolysis ... production of H₂O

- 6) In an experiment studying photosynthesis performed during the day, you provide a plant with radioactive carbon (^{14}C) dioxide as a metabolic tracer. The ^{14}C is incorporated first into oxaloacetic acid. The plant is best characterized as a
- A) chemoautotroph.
 - B) C_4 plant.
 - C) CAM plant.
 - D) C_3 plant.
 - E) heterotroph.
- 7) Which of the following is *true* of synaptic signaling and hormone signaling?
- A) Hormone signaling is important between cells that are at greater distances apart than in synaptic signaling.
 - B) Hormone signaling occurs in animals only.
 - C) Both use neurotransmitters, but hormone signaling is for adjacent cells in animals only.
 - D) Both are forms of paracrine signaling.
- 8) If a cell has 8 chromosomes at metaphase of mitosis, how many chromosomes will it have during anaphase?
- A) 1
 - B) 2
 - C) 16
 - D) 8
 - E) 4
- 9) How does the sexual life cycle increase the genetic variation in a species?
- A) by allowing crossing over
 - B) by allowing random fertilization
 - C) by allowing independent assortment of chromosomes
 - D) Both A and B are correct.
 - E) A, B, and C are correct.
- 10) A couple who are both carriers of the gene for cystic fibrosis have two children who have cystic fibrosis. What is the probability that their next child will have cystic fibrosis?
- A) 75%
 - B) 0%
 - C) 100%
 - D) 25%
 - E) 50%
- 11) People who have red hair usually have freckles. This can best be explained by
- A) reciprocal translocation.
 - B) nondisjunction.
 - C) independent assortment.
 - D) sex-influenced inheritance.
 - E) linkage.

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- 12) Which enzymes catalyze the elongation of a DNA strand in the 5' → 3' direction?
- A) primase
 - B) DNA ligase
 - C) helicase
 - D) DNA polymerases
 - E) topoisomerase
- 13) A particular triplet of bases in the coding sequence of DNA is AGT. The corresponding codon for the mRNA transcribed is
- A) TCA.
 - B) AGT.
 - C) AGU.
 - D) UCA.
 - E) either UCA or TCA, depending on wobble in the first base.
- 14) What are the coding segments of a stretch of eukaryotic DNA called?
- A) introns
 - B) transposons
 - C) codons
 - D) replicons
 - E) exons
- 15) What does the operon model attempt to explain?
- A) the control mechanism of gene expression in bacteria
 - B) horizontal transmission of plant viruses
 - C) bacterial resistance to antibiotics
 - D) how genes move between homologous regions of DNA
 - E) the mechanism of viral attachment to a host cell
- 16) All of the following statements concerning the eukaryotic chromosome are true *except* that
- A) gene expression is controlled by the histones.
 - B) active transcription occurs on euchromatin.
 - C) it consists of a single molecule of DNA wound around nucleosomes.
 - D) the nucleosome is the structural subunit.
 - E) it is composed of DNA and protein.
- 17) Gene regulation in both prokaryotes and eukaryotes is achieved by controlling which process?
- A) transcription
 - B) histone coiling
 - C) RNA splicing
 - D) cellular differentiation
 - E) translation

- 18) Bacteria that did not take up any plasmids would grow on which media?
- A) the tetracycline and ampicillin broth only
 - B) the nutrient broth and the ampicillin broth only
 - C) the nutrient broth and the tetracycline broth only
 - D) the nutrient broth only
 - E) all four broths
- 19) Which of the following is involved in embryonic development?
- A) cell differentiation
 - B) morphogenesis
 - C) cell division
 - D) A and B
 - E) A, B, and C
- 20) In most cases, differentiation is controlled at the level of
- A) nucleosome formation.
 - B) translation.
 - C) post-translational activation of the proteins.
 - D) replication of the DNA.
 - E) transcription.
- 21) Darwin's mechanism of evolution differed from Lamarck's by proposing that
- A) inherent variations in the population are more important in evolution than variations acquired during individual lifetimes.
 - B) species are not fixed.
 - C) evolution leads to adaptation.
 - D) life on Earth did not evolve abruptly but rather through a gradual process of minute changes.
 - E) life on Earth has had a long evolutionary history.
- 22) The probability of a mutation at a particular gene locus is _____ and the probability of a mutation in the genome of a particular individual is _____.
- A) high ... high
 - B) low ... high
 - C) moderate ... moderate
 - D) high ... low
 - E) low ... low

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- 23) If one organ is an exaptation of another organ, then what must be true of these two organs?
- They are homologous organs.
 - They have the same function.
 - They are undergoing convergent evolution.
 - They are found together in the same hybrid species.
 - They are both vestigial organs.

Use Figure 25.1 to answer the following questions.

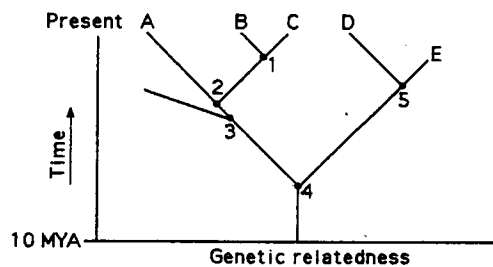


Figure 25.1

- 24) A common ancestor for species C and E could be at position number
- 1.
 - 2.
 - 3.
 - 4.
 - 5.
- 25) Why do biologists now reject the use of a single kingdom Monera for all prokaryotic organisms?
- Molecular evidence shows that archaea and eukaryotes share a more recent common ancestor than archaea and bacteria.
 - Structural data show that bacteria are more closely related to eukaryotes and that archaea differ in a greater number of characteristics.
 - Only eukaryotic organisms have membrane-enclosed organelles.
 - Only species of archaea lack the noncoding parts of genes (that is, introns).
 - Only prokaryotic organisms show growth inhibition in the presence of antibiotics.
- 26) Biologists have discovered the kingdom Protista to be paraphyletic and therefore obsolete. Which of the following statements is consistent with this conclusion?
- Animals, plants, and fungi arose from different protistan ancestors.
 - Archaezoa are intermediate and should not be considered part of the Protista.
 - Multicellularity has evolved independently in different groups of protists.
 - Various combinations of prokaryote ancestors gave rise to different lineages of protists.
 - Chloroplasts in different eukaryotes are similar to different prokaryotes.

- 27) A biologist discovers an alga that is marine, multicellular, lives in fairly deep water, and has phycoerythrin. It probably belongs to which group?
- A) Rhodophyta (red algae)
 - B) Phaeophyta (brown algae)
 - C) Chrysophyta (golden algae)
 - D) dinoflagellates
 - E) Chlorophyta (green algae)
- 28) The most recent common ancestors of all land plants were most likely similar to modern-day members of which group?
- A) Charophyceae
 - B) Phaeophyta (brown algae)
 - C) Rhodophyta (red algae)
 - D) Chrysophyta (golden algae)
 - E) Cyanobacteria
- 29) Assume that a botanist was visiting a tropical region for the purpose of discovering plants with medicinal properties. All of the following might be ways of identifying potentially useful plants *except*
- A) asking local people which plants they use as medicine.
 - B) observing which plants are the most used food plants.
 - C) observing which plants sick animals seek out.
 - D) observing which plants animals do not eat.
 - E) collecting plants and subjecting them to chemical analysis.
- 30) Fungi are all of the following *except*
- A) decomposers.
 - B) predators.
 - C) symbionts.
 - D) autotrophs.
 - E) absorptive heterotrophs.
- 31) The following are all generally observed among animals *except*
- A) unique types of intercellular junctions such as tight and gap junctions.
 - B) nervous and muscle tissue.
 - C) autotrophic nutrition.
 - D) multicellularity.
 - E) sexual reproduction.

- 32) While working in your garden, you uncover an animal with many legs, mostly as two pairs per segment. The animal is probably a
- A) centipede.
 - B) millipede.
 - C) sow bug.
 - D) caterpillar.
 - E) polychaete worm.
- 33) Which of these statements is a noted similarity between sharks and fishes?
- A) They are able to exchange gases while stationary.
 - B) They are highly maneuverable due to their flexibility.
 - C) A swim bladder helps control buoyancy.
 - D) The skin is typically covered by flattened bony scales.
 - E) They have a lateral line that is sensitive to changes in water pressure.
- 34) A friend has discovered a new plant and brings it to you to classify. The plant has the following characteristics: a fibrous root system; no petioles; parallel leaf veins; thick, lignified cell walls; and a vascular cambium. Which of the following best describes the new plant?
- A) woody dicot
 - B) woody monocot
 - C) herbaceous monocot
 - D) herbaceous dicot
 - E) woody annual
- 35) Photosynthesis begins to decline when leaves wilt because
- A) there is insufficient water for photolysis during light reactions.
 - B) the chlorophyll of flaccid cells cannot absorb light.
 - C) stomata close, preventing CO₂ entry into the leaf.
 - D) CO₂ accumulates in the leaves and inhibits photosynthesis.
 - E) flaccid cells are incapable of photosynthesis.
- 36) Why is nitrogen fixation such an important process?
- A) Fixed nitrogen is most often the limiting factor in plant growth.
 - B) Nitrogen fixation is very expensive in terms of metabolic energy.
 - C) Nitrogen-fixing capacity can be genetically engineered.
 - D) Nitrogen fixers are sometimes symbiotic with legumes.
 - E) Nitrogen fixation can only be done by certain prokaryotes.

- 37) In flowering plants, pollen is released from the
A) pollen tube. B) anther. C) carpel. D) sepal. E) stigma.
- 38) All of the following may function in signal transduction in plants *except*
A) second messengers.
B) receptor proteins.
C) phytochrome.
D) nonrandom mutations.
E) calcium ions.
- 39) Cells are to tissues as tissues are to
A) organs. B) organelles. C) membranes. D) organisms. E) organ systems.
- 40) Which of the following is *not* one of the four classes of essential nutrients?
A) essential fatty acids
B) essential amino acids
C) essential minerals
D) essential vitamins
E) essential sugars
- 41) If a person were suffering from edema, which of the following conditions would reduce it?
A) enlarged clefts between capillary endothelial cells due to damage or inflammation
B) a prolonged starvation diet
C) lower blood pressure
D) decreased plasma protein production by the liver
E) an obstruction in the lymphatic system
- 42) In mammalian defenses against invading pathogens, all of these are considered nonspecific defense mechanisms *except*
A) the skin.
B) mucous membranes.
C) the inflammatory response.
D) the immune system.
E) antimicrobial proteins.
- 43) Terrestrial animals mainly exchange heat with the environment by all of the following physical processes *except*
A) conduction. B) evaporation. C) convection. D) radiation. E) illumination.

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- 44) Hormones are able to control homeostasis because
- A) they are steroids.
 - B) they are not produced by exocrine glands.
 - C) they may be found in the lymphatic system.
 - D) they are present at low concentrations.
 - E) they are subject to negative feedback.
- 45) Which of the following are possible advantages of asexual reproduction?
- A) It enables the species to rapidly colonize new regions.
 - B) It enhances genetic variability in the species.
 - C) It allows the species to endure periods of fluctuating or unstable environmental conditions.
 - D) A and B only.
 - E) A, B, and C.
- 46) The blood-brain barrier
- A) uses chemical signals to communicate with the spinal cord.
 - B) provides support to the brain tissue.
 - C) is formed by oligodendrocytes.
 - D) tightly regulates the intracellular environment of the CNS.
 - E) is formed by tight junctions.
- 47) Which of the following is a good example of sensory adaptation?
- A) rods in the human eye responding to mechanical stimulation from a blow to the eye so that a flash of light is perceived
 - B) hair cells in the organ of Corti not responding to high-pitched sounds after prolonged exposure to high levels of sound at a concert
 - C) hair cells in the utricle and saccule responding to a change in orientation of the head
 - D) cones in the human eye failing to respond to light in the infrared range
 - E) olfactory receptors ceasing to produce receptor potentials when triggered by perfume molecules
- 48) All of the following statements about ecology are correct *except*:
- A) Ecological studies may involve the use of models and computers.
 - B) Ecology is the study of the interactions between biotic and abiotic aspects of the environment.
 - C) Ecologists may study populations and communities of organisms.
 - D) Ecology spans increasingly comprehensive levels of organization, from individuals to ecosystems.
 - E) Ecology is a discipline that is independent from natural selection and evolutionary history.

- 49) A population is *correctly* defined as having which of the following characteristics?
- I. inhabiting the same general area
 - II. individuals belonging to the same species
 - III. possessing a constant and uniform density and dispersion
- A) I only B) III only C) I and II only D) II and III only E) I, II, and III
- 50) Which of the following most directly relates to the current biodiversity crisis?
- A) increased atmospheric carbon dioxide
 - B) ozone depletion
 - C) the rate of extinction
 - D) introduced species
 - E) zoned reserves