

**Multiple Choice**, choosing the one alternative that best completes the statement or answers the question (2 points each).

- Which of the followings is **NOT** true for cilia or flagella?
  - They are involved in cell motility.
  - They require ATP to work.
  - They are composed of microfilaments.
  - They require motor proteins to work.
  - They are composed of an internal structure called the axoneme.
- Which would be the most accurate endomembrane route through which a protein is secreted from a cell?
  - Golgi apparatus→lysosome→vesicles→plasma membrane
  - plasmid→plasma membrane→nuclear envelope→smooth endoplasmic reticulum
  - nuclear envelope→vesicles→Golgi apparatus→plasma membrane
  - rough endoplasmic reticulum→lysosomes→vesicles→cell membrane
  - rough endoplasmic reticulum→ Golgi apparatus→vesicles →plasma membrane
- Which term most precisely describes the cellular process of breaking down large molecules into smaller ones?
  - catalysis
  - metabolism
  - anabolism
  - dehydration
  - catabolism
- Adenylyl cyclase is to cAMP as \_\_\_\_\_ is to IP<sub>3</sub>.
  - protein kinase A
  - protein kinase C
  - calmodulin
  - Raf1
  - phospholipase C
- A DNA specimen that contains 30% guanine has \_\_\_\_\_ thymine.
  - 10%
  - 20%
  - 30%
  - 40%
  - The amount of thymine cannot be determined.
- All of the following are critical factors for DNA replication on the leading strand **EXCEPT**?
  - primer
  - DNA ligase
  - DNA polymerase
  - DNA primase
  - deoxynucleoside triphosphates

7. Which of the following statements about DNA replication is **INCORRECT**?

- A) It begins at multiple origins of replication sites along eukaryotic chromosomes.
- B) It proceeds with the addition of new nucleotides to the 3' end of a growing DNA strand.
- C) It is powered by the hydrolysis of ATP.
- D) Each strand within the DNA double helix is used as a template for synthesis of a new strand.
- E) It requires that each strand in the double helix be separated from the other.

8. What molecule provides the energy for translation?

- A) ADP
- B) ATP
- C) GMP
- D) GDP
- E) GTP

9. The core promoter in eukaryotes is usually composed of which two features?

- A) transcriptional start site and enhancer
- B) transcriptional start site and response elements
- C) transcriptional start site and TATA box
- D) enhancer and TATA box
- E) response elements and TATA box

10. A mutation causes a gene to become overactive, contributing to uncontrolled cell growth. Which term best describes this gene?

- A) tumor-suppressor gene
- B) oncogene
- C) spliced gene
- D) alternatively spliced gene
- E) malignant gene

11. Meiosis I produces \_\_\_\_\_, and meiosis II produces \_\_\_\_\_ cells.

- A) two diploid, two haploid
- B) two diploid, 4 haploid
- C) two haploid, 4 haploid
- D) two haploid, two haploid
- E) two somatic, two gametic

12. When a single-gene mutation can have phenotypic effects at multiple stages of development, it is

- A) pleiotropic.
- B) incompletely dominant.
- C) recessive.
- D) causing a disease.
- E) codominant.

13. The karyotype of a young patient shows two Barr bodies per cell. What condition might this child have?

- A) Turner syndrome
- B) Triple X syndrome
- C) Down syndrome
- D) Klinefelter syndrome
- E) This child is a normal female.

14. Transduction is

- A) the transfer of viral genes to a bacteria by a virus.
- B) the transfer of bacterial genes to another bacteria by a virus.
- C) the use of bacterial replication machinery to produce viral particles.
- D) the transfer of bacterial genes from one bacteria to another.
- E) the transfer of bacterial genes to another via a pilus.

15. Following treatment with restriction enzymes, what procedure would be used to isolate DNA fragments of different lengths?

- A) transformation
- B) transfection
- C) gel electrophoresis
- D) colony hybridization
- E) Western blotting

16. The entire collection of a species' proteins is known as its

- A) genome.
- B) proteome.
- C) metabolome.
- D) microsome.
- E) transcriptosome.

17. Homologous genes in different species are called

- A) analogs.
- B) paralogs.
- C) orthologs.
- D) dialogs.
- E) monologs.

18. A species that is naturally found only in a particular location is called

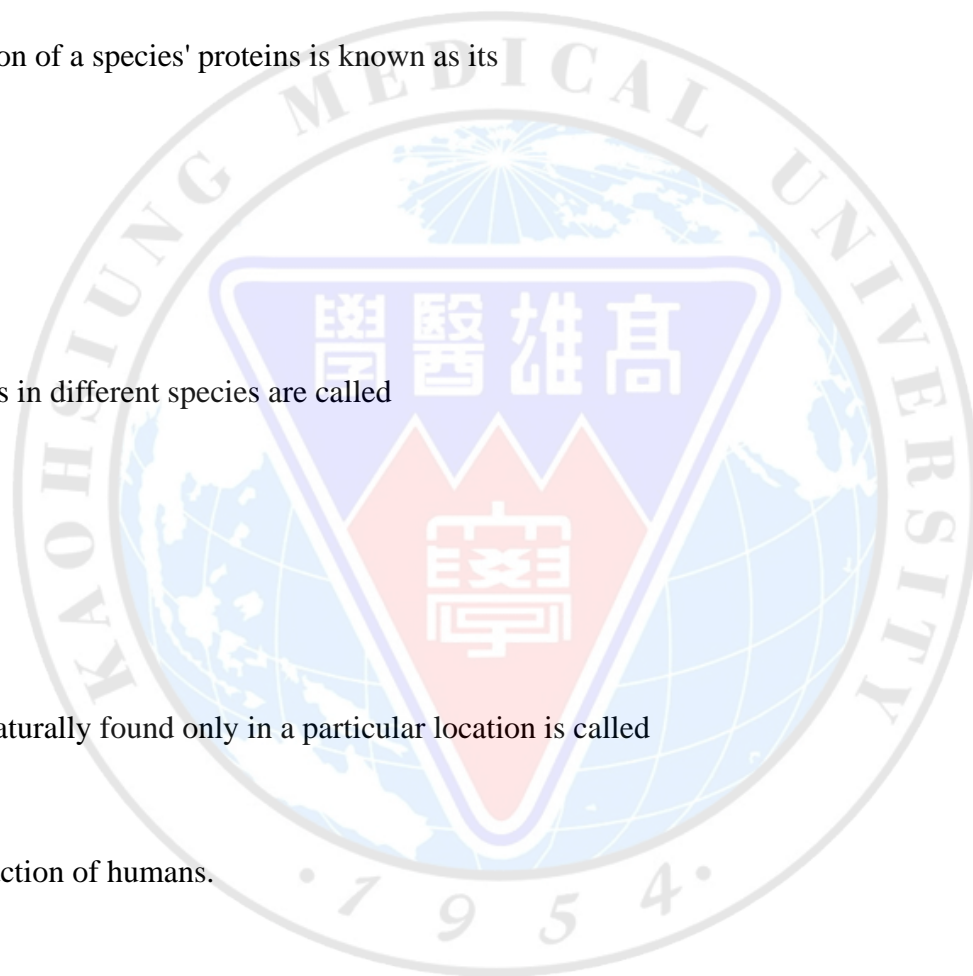
- A) extinct.
- B) endemic.
- C) extinct due to the action of humans.
- D) exotic.
- E) transitional.

19. If goats are crossed with sheep, embryos will form but cease development and spontaneously abort. This is an example of

- A) a prezygotic mechanism.
- B) hybrid inviability.
- C) hybrid sterility.
- D) hybrid breakdown.
- E) spermatid behavior.

20. The photosynthetic activity of cyanobacteria takes place in their:

- A) thylakoids
- B) chloroplast
- C) pili
- D) vesicles
- E) vibrios



21. Which of following is **NOT** true?

- A) Melatonin regulates functions related to light and to seasons marked by changes in day length.
- B) Vitamin D activation begins in the kidneys and is completed in the liver.
- C) Prolactin regulates fat metabolism in birds.
- D) Humans require thyroid hormones for the normal function of bone-forming cells.
- E) In mammals, melanocyte-stimulating hormone (MSH) functions in hunger and metabolism in addition to coloration.

22. Exchange of genetic material in ciliates is known as:

- A) macronucleosis
- B) micronucleosis
- C) conjugation
- D) panmixis
- E) myxomycetosis

23. The phloem:

- A) transports water from the roots to the stems and leaves
- B) transports food between the leaves and the roots
- C) transports minerals from the roots to the stems and leaves
- D) transports carbon dioxide from the leaves to the stems and roots
- E) All of the other choices provided are correct

24. Endosperm is found in:

- A) angiosperms
- B) gymnosperms
- C) ferns
- D) mosses
- E) horsetails

25. The cell walls of fungi are composed of:

- A) chitin
- B) cellulose
- C) dentine
- D) peptides
- E) glycerol

26. The putative ancestor of animals was:

- A) choanoflagellates
- B) chytrids
- C) gnetophytes
- D) stramenopiles
- E) euglenozoa

27. It is possible to make a form of nitrogen that is useable by plants; however, the major drawback to this process is:

- A) time involved
- B) getting enough nitrogen
- C) cost of converting nitrogen to a useable form
- D) temperatures must be extremely high
- E) it is difficult to contain the end product

28. Collagen is a tough, stretch-resistant protein. You would be most likely to find collagen in which type of tissue?

- A) nervous
- B) muscular
- C) epithelial
- D) connective
- E) epithelial and connective tissue

29. In negative feedback, the variable being regulated is changed in the \_\_\_\_\_ direction, while in positive feedback the variable is changed in the \_\_\_\_\_ direction.

- A) same, opposite
- B) decreasing, increasing
- C) negative, positive
- D) inhibitory, stimulatory
- E) opposite, same

30. Which part of the neuron is responsible for receiving information?

- A) axon
- B) dendrite
- C) soma
- D) nucleus
- E) axon hillock

31. Inside the CNS, groups of neuronal cell bodies that are clustered together to perform basic functions are termed

- A) nerve nets.
- B) ganglia.
- C) nuclei.
- D) spinal cords.
- E) soma.

32. Our sense of balance depends most directly on

- A) the vestibular system.
- B) the auditory system.
- C) the visual system.
- D) mechanoreceptors in our hands and feet.
- E) stretch receptors in our skeletal muscles.

33. Bile is crucial for \_\_\_\_\_ digestion because of its function in \_\_\_\_\_.

- A) protein, protecting the stomach lining
- B) fat, solubilizing glycerol:fatty acid bonds
- C) nucleic acids, uncoiling DNA strands
- D) fat, emulsification
- E) protein, lyophilization

34. Which of the following bacteria is known to be a contributing factor in the development of stomach ulcers?

- A) *Clostridium tetani*
- B) *Vibrio cholerae*
- C) *Helicobacter pylori*
- D) *Staphylococcus aureus*
- E) *Escherichia coli*



35. Estivation in animals is an example of what specific phenomenon?

- A) sleep
- B) rest
- C) torpor
- D) hiding
- E) activity

36. \_\_\_\_\_ do **NOT** depend on the circulatory system to deliver oxygen to the tissues.

- A) Insects
- B) Molluscs
- C) Mammals
- D) Birds
- E) Amphibians

37. The volume of air normally breathed in and out of the lungs in a single breath at rest is referred to as the \_\_\_\_\_ volume.

- A) tidal
- B) total
- C) reserve
- D) inspiratory reserve
- E) expiratory reserve

38. The bulk of the reabsorption of useful materials by the kidney takes place in the

- A) renal corpuscle.
- B) proximal convoluted tubule.
- C) loop of Henle.
- D) distal convoluted tubule.
- E) collecting ducts.

39. The descending portion of the loop of Henle is

- A) permeable to water and impermeable to sodium.
- B) permeable to water and permeable to sodium.
- C) impermeable to water and permeable to sodium.
- D) impermeable to water and impermeable to sodium.
- E) the site of active transport of water

40. \_\_\_\_\_ is a water-soluble hormone derived from the nervous system that regulates blood volume and blood pressure?

- A) Antidiuretic hormone
- B) Aldosterone
- C) Cortisol
- D) Oxytocin
- E) Adrenocorticotrophic hormone

41. The ectoderm is to the central nervous system as the mesoderm is to the

- A) epidermis.
- B) respiratory tube.
- C) digestive tract.
- D) skeletal muscle.
- E) peripheral nervous system.

42. The clonal selection theory is an explanation for
- A) how a single type of stem cell can produce both red blood cells and white blood cells.
  - B) how antibody proteins can be molded to fit antigens after the antigen interacts with the antibody-producing type of cell.
  - C) how an antigen can induce the multiplication of very few cells to result in production of high levels of specific antibodies.
  - D) how HIV can disrupt the immune system.
  - E) how macrophages can recognize specific T cells and B cells.
43. Which of following is **NOT** true?
- A) Amino acid neurotransmitters are active in the vertebrate CNS and PNS.
  - B) Binding of GABA to receptors in postsynaptic cells increases membrane permeability to potassium.
  - C) The biogenic amine serotonin made from tryptophan.
  - D) In the PNS, CO acts as an inhibitory neurotransmitter that hyperpolarized the plasma membrane of intestinal smooth muscle cells.
  - E) In the CNS, the amino acid glutamate is the most common neurotransmitter.
44. Patterns of species change and succession are one focus of
- A) behavioral ecology.
  - B) environmental science.
  - C) biological control.
  - D) community ecology.
  - E) physiological ecology.
45. What is the process through which many animals develop irreversible species-specific behavior patterns?
- A) altruism
  - B) taxis
  - C) operant conditioning
  - D) cognitive learning
  - E) imprinting
46. Organisms that produce all of their offspring in a single event are
- A) always successful.
  - B) never successful.
  - C) autogenous.
  - D) semelparous.
  - E) iteroparous.
47. Similar species can coexist in a community because of
- A) resource partitioning.
  - B) competitive exclusion.
  - C) allopatric competition.
  - D) sympatric competition.
  - E) allopatric competition and sympatric competition.

48. Ecosystem ecology is primarily concerned with

- A) ecosystem stability.
- B) interactions among species.
- C) the synthesis of new forms of nutrients.
- D) patterns of species diversity.
- E) movement of energy and materials through organisms and their communities.

49. Species that create, modify and maintain habitat are known as

- A) indicator species.
- B) keystone species.
- C) dominant species.
- D) SLOSS builders.
- E) ecosystem engineers.

50. Which of following is **NOT** true?

- A) Many Alu elements are transcribed into RNA.
- B) Simple sequence DNA makes up 3% of the human genome.
- C) The chimpanzee contains many copies of a retroviral provirus not present in humans.
- D) There are more Alu elements in the chimpanzee genome than in the human genome.
- E) Copy-number variants (CNVs) are more likely to have phenotypic consequences and to play a role in complex diseases and disorders.

