

國立清華大學 命題紙

九十學年度 生命科學系轉學生招生考試

科目—普通生物學—科號 151 共 5 頁第 1 頁 *請在試卷【答案卷】內作答

一、問答題 (20%)，共二題、每題十分

1. 經過台灣東部的北太平洋洋流名稱為何？這個名稱和洋流本身的水質特性（營養鹽或是各種生物）有什麼關係？請從物理、化學和生物的特性上分析之。
2. 何謂 human genome project？這項工作有什麼功用？

二、選擇題 (80%) (每題兩分，如果沒有適當答案，請選 0)

- 1) In which of the following ways are ALL living things alike?
A) They all have circulatory systems.
B) They all undergo mitosis.
C) They are all composed of cells with nuclei.
D) They all contain complex, reduced molecules.
E) They all breathe.
- 2) Current theories of prebiotic evolution are based on evidence for all of the following EXCEPT
A) abiotic replication of oligopeptides.
B) abiotic origin of DNA-protein interactions.
C) abiotic production of proteinoid microspheres.
D) abiotic polymerization of amino acids.
E) abiotic production of small organic molecules.
- 3) In the following list of major metabolic pathways, which one must have been the most recent to evolve?
A) oxidative phosphorylation B) glycolysis
C) fermentation D) sulfur-producing photosynthesis
E) O₂-producing photosynthesis
- 4) All of the following are TRUE statements about prokaryotes EXCEPT:
A) Some prokaryotes can live in extreme habitats.
B) Prokaryotes are the most important photosynthesizers.
C) Prokaryotes are the most numerous organisms on Earth.
D) Prokaryotes dominate the biosphere.
E) Some prokaryotes are important as decomposers.
- 5) In what ways are all protists alike?
A) They are all photosynthetic. B) They are all marine.
C) They are all nonparasitic. D) They are all multicellular.
E) They are all eukaryotic.
- 6) According to the endosymbiont theory of the origin of eukaryotic cells, how did mitochondria originate?
A) a protoeukaryote becoming symbiotic with a protobiont
B) mutations of genes for oxygen-using metabolism
C) engulfed, originally free-living prokaryotes
D) the nuclear envelope folding outward
E) infoldings of the plasma membrane

- 7) The ancestors of land plants were most likely similar to modern-day members of the
A) Rhodophyta (red algae). B) Phaeophyta (brown algae).
C) Cyanobacteria (blue-green algae). D) Chrysophyta (diatoms and golden-brown algae).
E) Chlorophyta (green algae).
- 8) Which of the following organisms do NOT have a jacket of sterile cells that protect developing gametes and embryos?
A) mosses B) liverworts C) brown algae D) ferns E) vascular plants
- 9) Angiosperms are the most successful terrestrial plants. This success is due to all of the following EXCEPT
A) reduced gametophytes. B) sperm cells with flagella.
C) xylem with vessels. D) fruits enclosing seeds.
E) animal pollination.
- 10) All of the following plant structures are adaptations specifically for a terrestrial environment EXCEPT
A) waxy cuticle. B) roots. C) seeds. D) xylem. E) cell walls.
- 11) Which of the following do all fungi have in common?
A) absorption of nutrients B) symbioses with algae
C) coenocytic hyphae D) meiosis in basidia
E) sexual life cycle
- 12) What is the threadlike basic structural element of a fungus?
A) filament B) hypha C) mycelium D) mold E) pseudoparenchyma
- 13) All of the following are protostomes EXCEPT
A) mollusks. B) segmented worms. C) spiders.
D) echinoderms. E) insects.
- 14) Which of the following terms or structures are NOT associated with animal cells?
A) zygote B) eukaryotic C) blastula D) cell wall E) desmosomes
- 15) All of the following animal groups have evolved terrestrial life forms EXCEPT
A) Crustacea. B) Vertebrata. C) Arthropoda. D) Echinodermata. E) Mollusca.
- 16) Corals are most closely related to
A) jellyfish. B) sponges. C) sea anemones. D) freshwater hydras. E) comb jellies.
- 17) Which sequence of evolutionary relationships is consistent with the fossil record?
A) reptiles → birds → fishes → amphibians
B) reptiles → birds → amphibians → fishes
C) reptiles → amphibians → birds → fishes
D) fishes → amphibians → reptiles → birds
E) fishes → birds → reptiles → amphibians
- 18) The amniote egg first evolved in which of the following groups?
A) birds B) reptiles C) egg-laying mammals (monotremes)
D) amphibians E) fish

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- 19) Vascular plant tissue includes all of the following cell types EXCEPT
A) sieve cells. B) tracheids. C) cambium cells. D) companion cells. E) vessels.
- 20) What tissue makes up most of the wood of a tree?
A) secondary phloem B) mesophyll cells C) secondary xylem
D) primary xylem E) vascular cambium
- 21) Hydrophytes, plants that are adapted to live in aquatic habitats, are most likely to show which of the following morphologies?
A) stomata located on the top of leaves B) stomata located in pits
C) no vascular tissue D) no roots E) leaves reduced to spines
- 22) Water flows into the source end of a sieve tube because
A) sucrose has diffused into the sieve tube, making it hyperosmotic.
B) the companion cell of a sieve tube actively pumps in water.
C) water pressure outside the sieve tube forces in water.
D) sucrose has been dumped from the sieve tube by active transport.
E) sucrose has been actively transported into the sieve tube, making it hyperosmotic.
- 23) What are epiphytes?
A) plants that have a symbiotic relationship with roots
B) plants that live in poor soil and digest insects to obtain nitrogen
C) plants that grow on other plants but do not obtain nutrients from their hosts
D) haustoria for anchoring to host plants and obtaining xylem sap
E) aerial vines common in tropical regions
- 24) In the nutrition of a plant, which element is classified as a macronutrient?
A) calcium B) manganese C) chlorine D) zinc E) molybdenum
- 25) Morphogenesis in plants is largely a result of
A) genetic differences among the cell lineages involved.
B) the plane of cell divisions and the direction of cell expansion.
C) morphogens that create gradients in developing leaves.
D) Only B and C are correct.
E) A, B, and C are correct.
- 26) In plants, which of the following could be an advantage of sexual reproduction as opposed to asexual reproduction?
A) greater longevity B) mitosis C) stable populations
D) rapid population increase E) genetic variation
- 27) One effect of gibberellins is to stimulate the aleurone layer of certain seeds to produce
A) lipids. B) abscisic acid. C) RuBP carboxylase. D) starch. E) amylase.
- 28) The only known naturally occurring auxin is
A) ABA. B) 2, 4-D. C) IAA. D) GA. E) TCA.

29) Interstitial fluid

- A) provides for the exchange of materials between blood and cells.
- B) forms the extracellular matrix of connective tissue.
- C) is found inside the small intestine.
- D) is the internal environment found in animal cells.
- E) is composed of blood.

30) Which of the following materials would NOT be important to a protozoan?

- A) oxygen B) carbohydrates C) blood D) water E) enzymes

31) All of the following are adaptations to an herbivorous diet EXCEPT

- A) a rumen. B) bile salts. C) broad, flat teeth. D) amylase. E) ingestion of feces.

32) Some nutrients are considered "essential" in the diets of certain animals because

- A) they cannot be manufactured by the organism.
- B) they are necessary coenzymes.
- C) they are subunits of important polymers.
- D) only those animals use the nutrients.
- E) only some foods contain them.

33) Where do air-breathing insects carry out gas exchange?

- A) in the alveoli of their lungs
- B) in specialized external gills
- C) in specialized internal gills
- D) across the thin cuticular exoskeleton
- E) across the membranes of cells

34) Which of the following features do all gas exchange systems have in common?

- A) They are enclosed within ribs. B) The exchange surfaces are moist.
- C) They are exposed to air. D) They are maintained at a constant temperature.
- E) They are found only in animals.

35) What are antigens?

- A) antibody-generating foreign macromolecules
- B) proteins embedded in B-cell membranes
- C) proteins that consist of two light and two heavy polypeptide chains
- D) proteins found in the blood that cause foreign blood cells to clump
- E) Both A and C are correct.

36) The clonal selection theory implies that

- A) antigens activate specific lymphocytes.
- B) related people have similar immune responses.
- C) only certain cells can produce interferon.
- D) memory cells are present at birth.
- E) the body selects which antigens it will respond to.

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- 37) Most terrestrial animals dissipate excess heat by
A) acclimation. B) evaporation. C) hibernation. D) countercurrent exchange.
E) vasoconstriction.
- 38) All of the following represent adaptations by terrestrial animals to drying conditions EXCEPT
A) impervious surfaces. B) efficient kidneys.
C) salt glands. D) anhydrobiosis.
E) increased thirst.
- 39) Which of the following hormone sequences is CORRECT?
A) LH → FSH → adrenal glands
B) GnRH → FSH → LH → pineal gland
C) GnRH → FSH → ovaries
D) CRH → LH → testes
E) CRH → ACTH → FSH → thyroid gland
- 40) Which of the following is an endocrine gland?
A) sweat gland B) sebaceous gland C) gall bladder D) salivary gland E) parathyroid gland