

一、選擇題(每題1分，共10分)。請於答案卷內之「選擇題作答區」依序作答。

- 植物細胞的 Plasmodesmata 和下列那一個構造的功能最相近(A) peroxisomes (B) desmosomes (C) gap junctions (D) extracellular matrix (E) tight junctions.
- cell fractionation 技術最主要的目的是 (A) view the structure of cell membranes (B) identify the enzymes outside the organelles (C) determine the size of various organelles (D) separate the major organelles so that their particular functions can be determined (E) crack the cell wall so the cytoplasmic contents can be released.
- 為何紅藻的藻體多顯現紅色? (A) They live in warm coastal waters (B) They possess pigments that reflect and transmit red light (C) They use red light for photosynthesis (D) They lack chlorophyll (E) They contain the pigment bacteriorhodopsin.
- 如果所有的 mycorrhizae 都由地球上消失，下列敘述何者正確 (A) There would be fewer infectious disease (B) We wouldn't have any antibiotics (C) There would be no mushrooms for pizza (D) Most vascular plants would be stunted in their growth (E) Cheeses like blue cheese or Roquefort would not exist.
- 無論是 eukaryotes 或 prokaryotes，其基因的表現主要由下列那個層次來調控 (A) transcription (B) translation (C) mRNA stability (D) mRNA splicing (E) protein stability.
- 下列敘述何者正確? (A) Linked genes are found on different chromosomes (B) The observed frequency of recombination of two genes that are far apart from each other has a maximum value of 100% (C) All of the traits that Mendel studied—seed color, pod shape, flower color, and others—are due to genes linked on the same chromosome (D) The closer two genes are on a chromosome, the lower the probability that a crossover will occur between them (E) Crossing over occurs during prophase II of meiosis.
- 在 eukaryotic cells 中下列那一個過程不論氧是否存在都會進行? (A) electrontransport (B) glycolysis (C) the citric acid cycle (D) oxidative phosphorylation (E) chemiosmosis
- 在有氧的狀態下 pyruvate 會完全分解成\_\_，在缺氧的情況下則會分解為\_\_。 (A) glyceraldehydes-3-phosphate and dihydroxyacetone phosphate; citrate and fumarate (B) carbon dioxide and water; acetyl CoA and citrate (C) acetyl CoA and citrate; carbon dioxide and water (D) carbon dioxide and water; lactate or ethanol (E) lactate or ethanol; carbon dioxide and water
- 種子萌芽時為了打破種子休眠必須要進行下列那一個過程? (A) exposure to light (B) imbibition (C) abrasion of the seed coat (D) exposure to cold temperatures (E) covering of fertile soil
- 植物能成功的以孢子體世代生活在陸地上，主要是因為 (A) having no stomata, they lose less water (B) they all disperse by means of seeds (C) diploid plants are protected from the effects of mutation (D) their gametophytes are all parasitic on the sporophytes (E) eggs and sperm need not be produced.

二、簡答題(40分)

- 請畫一個毛茛根的橫切面，並標出 endodermis, pericycle, metaxylem 的位置及 symplastic 的途徑。(8分)(圖和標示都正確才給分)
- 請寫出植物體內兩種 photoreceptors, 並針對此二 photoreceptors 所調控的生理功能各舉一例介紹之。(10分)
- 何謂 apomixis? 請問在農藝上如何利用?(5分)
- 請說明蒸散作用(transpiration)在植物體上的重要性。(4分)
- 請說明何謂 photorespiration, 並請詳述 C<sub>4</sub> 植物如何降低 photorespiration。(10分)
- 請說明 Rosalind Franklin 對 DNA 研究的貢獻。(3分)

見背面

三、問答題(50分)

1. 請問動物體貯存能量之策略和植物的有何不同？何以演化出此類差異？  
食品包裝上之「營養標示」有反式脂肪(*trans fats*)含量，請問亦被稱為氫化油或氫化植物油(*hydrogenating vegetable oils*)之此成分為何種物質？對人體健康有何影響？(15分)
2. 請問屬於異營性有機體之動物為何必須攝食方能維持生命？反芻類動物如何經由消化作用而獲得比植物餌料更豐富之養份？反芻動物在日趨嚴重之溫室效應中擔任何種角色？(15分)
3. 何謂原核與真核細胞？請問原核生物之演化如何改變初期地球環境且對當時生物造成何種衝擊？真核細胞如何從原核生物演化而來？請闡述目前之學說。(20分)

試題隨卷繳回

