

國立臺灣海洋大學 106學年度研究所碩士班招生考試試題

考試科目：普通生物學

系所名稱：水產養殖學系碩士班養殖科學組、水產養殖學系碩士班生命科學組

1. 答案以橫式由左至右書寫。2. 請依題號順序作答。

A. 選擇題：(20%)

1. The unit of life in which biological evolution actually occurs is usually considered to be the
(1) adaptive trait of an individual (2) whole organism (3) population (4) community (5) ecosystem
2. Which of the following properties or processes do we associate with living things?
(1) Evolutionary adaptations (2) Energy processing (3) Responding to the environment (4) Growth and reproduction (5) All of the above
3. At which of the following trophic levels is the greatest amount of free energy available?
(1) Producers (2) Decomposers (3) Herbivores (4) Secondary consumers (5) Tertiary consumers
4. If actively growing cells are fed ^{14}C -labeled glucose, what macromolecules will become radioactive first?
(1) Nucleic acids (2) Proteins (3) Fatty acids (4) Starch (5) All of the above
5. A cross between homozygous purple-flowered and homozygous white-flowered pea plants results in offspring with purple flowers. This demonstrates:
(1) Complete dominance (2) Incomplete dominance (3) Over-dominance (4) Co-dominance (5) Mosaic dominance
6. ABO blood type in humans exhibits co-dominance and multiple alleles. What is the likelihood of a type A father and a type B mother having a type O child?
(1) It is impossible (2) 25% if both parents are heterozygous (3) 50% if both parent are heterozygous (4) 25% if only the father is heterozygous (5) 25% if only the mother is heterozygous
7. What colors of light will drive photosynthesis by green plants most efficiently?
(1) Red and blue (2) Red and Yellow (3) Yellow and Green (4) Green only (5) Blue only
8. The complementary RNA sequence for GATCAA is?
(1) CTAGTT (2) CUAGUU (3) TTGATC (4) UUGAUC (5) AACTAG
9. Red algae and brown algae are able to live at greater depths in the ocean than other algae because
(1) they are heterotrophic (2) they have chlorophyll *b* (3) they can withstand cold temperatures (4) their accessory pigments absorb red light (5) their accessory pigments absorb blue and green light

10. To produce radiolabeled transcripts, the isolated nuclei from both liver and brain must have which of the following?

- (1) Reverse transcriptase (2) DNA polymerase (3) RNA polymerase (4) Ribosomes (5) Plasmid DNA

B.問答題：(80%)

1. 一名專業的生物攝影師在馬達加斯加的安達西貝-曼塔迪亞國家公園 (Andasibe-Mantadia National Park) 裡拍攝到壁虎、青蛙、魚類、昆蟲和鳥類等一系列動物的偽裝照片，其中有一隻俗稱撒旦葉尾壁虎的角葉尾壁虎 (satanic leaf-tailed gecko) 趴在掛滿枯葉的枝頭上，若無仔細觀察，極易將其誤認成一片枯葉。依據學習過演化、天擇及遺傳訊息等相關生物學知識，請詳加描述於自然界當中壁虎如何偽裝成枯葉外觀來達到自我保護以提高生存與繁殖機率等有利條件。(15%)
2. 地球的耕地面積有限，已無法負擔急速增加的世界人口，如何有效且快速地改良品種，提高農業產量或產值，已經成為農業研究的首要目標之一。人類進行遺傳操作至今已數千年，經由選拔育種及雜交等過程，已明顯改變生物的基因體組成，產生無數植物與動物的變異種，更已培育出許多優良的生物品種。然而，現代的基因工程，通常僅引進或修飾一個或少數基因，為何會面臨到如此多的公眾反對意見，請從一專業者角度來詳加解釋此問題。(15%)
3. 請詳細敘述 DNA 複製的過程。(10%)
4. Alfred Hershey and Martha Chase 利用噬菌體證明了 DNA 才是遺傳物質，請問實驗設計為何。(10%)
5. 請詳細敘述蛋白質表現的過程。(20%)
6. 請敘述台灣的生物技術如何能夠幫助水產養殖業的轉型?(10%)