國立嘉義大學 99 學年度
生化科技學系碩士班招生考試試題

科目：專業英文

1. Read the following paragraph and described briefly how they evidenced that calcineurin regulates cardiac growth and function (25%)

Calcineurin is a protein phosphatase that is uniquely regulated by sustained increases in intracellular Ca^{2+} following signal transduction events. Calcineurin controls cellular proliferation, differentiation, apoptosis, and inducible gene expression following stress and neuroendocrine stimulation. In the adult heart, calcineurin regulates hypertrophic growth of cardiomyocytes in response to pathologic insults that are associated with altered Ca^{2+} handling. Here we determined that calcineurin signaling is directly linked to the proper control of cardiac contractility, rhythm, and the expression of Ca^{2+}-handling genes in the heart. Our approach involved a cardiomyocyte-specific deletion using a *CnB1-LoxP*-targeted allele in mice and three different cardiac-expressing Cre alleles/transgenes. Deletion of calcineurin with the *Nkx2.5-Cre* knock-in allele resulted in lethality at 1 day after birth due to altered right ventricular morphogenesis, reduced ventricular trabeculation, septal defects, and valvular overgrowth. Slightly later deletion of calcineurin with the α-myosin heavy chain Cre transgene resulted in lethality in early mid adulthood that was characterized by substantial reductions in cardiac contractility, severe arrhythmia, and reduced myocyte content in the heart. Young calcineurin heart-deleted mice died suddenly after pressure overload stimulation or neuroendocrine agonist infusion, and telemetric monitoring of older mice showed arrhythmia leading to sudden death. Mechanistically, loss of calcineurin reduced expression of key Ca^{2+}-handling genes that likely lead to arrhythmia and reduced contractility. Loss of calcineurin also directly impacted cellular proliferation in the postnatal developing heart. These results reveal multiple mechanisms whereby calcineurin regulates cardiac development and myocyte contractility. (*J. Biol. Chem. 2010, 285: 6716-6724)*

2. Read the following paragraphs and answer the questions(25%)

Spiders initially started producing silk for reasons other than web-making. When spiders moved from the water to the land in the Early Devonian period, they started making silk to protect their bodies and their eggs. Spiders gradually started using silk for hunting purposes, first as guide lines and signal lines, then as ground or bush webs, and eventually as the aerial webs which are so famous today. Spiders produce silken thread using several paired spinneret glands located at the tip of their abdomen. Each gland produces a thread for a special purpose – for example a trailed safety line, sticky silk for trapping prey or fine silk for wrapping it. Spiders use different gland types to produce different silks, and some spiders are capable of producing up to 8 different silks during their lifetime. About 35,000 known kinds of spiders make webs; a third of the web weavers make orb webs. Science most orb weavers belong either to the Araneidae or the Uloboridae families, the origin of the orb web can be determined only by ascertaining whether the families are related. According to Kullman, web structure is the only characteristic that suggests a relationship between families. Further identification will undoubtedly answer the question of the evolution of the spider web. (Wikipedia)

(1) What is the primary purpose of the passage is to (10%)
- (A) describe the function of spider web.
- (B) analyze the evolution of the spider web.
- (C) demonstrate that spider web is a tool for the identification of spider family.
- (D) demonstrate how to make spider web.

(2) Which one is not the function of spider web? (5%)
- (A) trapping prey
- (B) protect their bodies and their eggs
- (C) trailed safety line
- (D) identification

(3) Which part of spider can make silk? (10%)

3. Read the following paragraphs and answer the questions(25%)

Warm-blooded animals have elaborated physiological controls to maintain constant body temperature (in humans, 37° C). Why then during sickness should temperature rise, apparently increasing stress on the infected organism? It has long been known that the level of serum iron in animals falls during infection. Garibaldi first suggested a relationship between fever and iron. He found that microbial synthesis of siderophores -- substances that bind iron -- in bacteria of the genus Salmonella declined at environmental temperatures above 37° C and stopped at 40.3° C. Thus, fever would make it more difficult for an infecting bacterium to acquire iron and thus to multiply. Cold-blooded animals were used to test this hypothesis because their body temperature can be controlled in the laboratory. Kluger reported that of iguanas infected with potentially lethal bacterium A. hydrophilia, more survived at temperatures of 42°C than at 37°C, even though healthy animals prefer the lower temperature. When animals at 42°C were injected with an iron solution, however, mortality rates increased significantly. Research to determine whether similar phenomena occur in warm-blooded animals is sorely needed. (GRE practice question)

(1) Which of the following *titles* best *summarizes the content of the* passage*?* (10%)
- (A) the role of siderophores in the synthesis of serum iron
- (B) the function of fever in warm-blooded animals
- (C) the mechanisms that ensure constant body temperature
- (D) iron utilization in warm-blooded animals

背面尚有試題

(2) According to the passage, Garibaldi determined which of the following? (10 %)

(A) That serum iron is produced through microbial synthesis.

(B) That bacteria of the genus Salmonella require iron as a nutrient.

(C) That there is a relationship between the synthesis of siderophores in bacteria of the genus Salmonella and environmental temperature.

(D) That microbial synthesis of siderophores in warm-blooded animals is more efficient at high temperatures.

(3) In the sentence “similar phenomena occur in warm-blooded animals”, similar phenomena means _____. (5%)

4. Please read the “information for authors” of an SCI journal and translate briefly in Chinese. (25%)

We generally use a two-column format averaging 60 characters, including spaces, per line. The maximum length of a research article is eight printed pages, including all text, spaces, and the number of characters displaced by figures, and tables. Manuscripts must be typed in English and double-spaced. All text including legends, footnotes, tables and references are to be on one side of the page only. All manuscript pages must be numbered.

- Text: When submitting tables, figures, and/or equations in addition to text, you should keep the text for your manuscript under 39,000 characters (including spaces).
- Figures: Calculated at 180 characters per cm in height for one column.
- Tables: Calculated at 55 characters per line for one column.