

110 學年度學士後醫學系招生考試

普通生物 試題

Choose one best answer for the following questions

【單選題】每題 1 分，共計 30 分，答錯 1 題倒扣 0.25 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。1~15 題為普通生物，16~30 題為生化概論。

- (C) 1. The formation of new species occurred in populations that are geographically isolated from one another is _____.
 (A) peripatric speciation (B) sympatric speciation (C) allopatric speciation
 (D) parapatric speciation (E) artificial speciation
- (E) 2. If a species contains 23% adenine in its genome, what is the percentage of guanine it would contain?
 (A) 23% (B) 46% (C) 25% (D) 44% (E) 27%
- (A) 3. Several butterfly species that are edible to birds have very similar color patterns to the generally inedible Monarch butterfly. This is best described as an example of _____.
 (A) Batesian mimicry (B) Müllerian mimicry (C) crypsis
 (D) aposematic coloration (E) subterfuge
- (C) 4. Which description about the status of action potential of voltage-gated Na^+ and K^+ channels is **FALSE**?
 (A) resting state: both Na^+ and K^+ channels close
 (B) depolarization: some Na^+ channels open and K^+ channels close
 (C) rising phase of action potential: both Na^+ and K^+ channels open
 (D) falling phase of action potential: Na^+ channels close and K^+ channels open
 (E) None of the above
- (D) 5. In vertebrates with four-chambered hearts, the _____ receives oxygenated blood directly from the _____.
 (A) right ventricle, lungs (B) right ventricle, right atrium
 (C) left atrium, left ventricle (D) left ventricle, left atrium
 (E) left ventricle, lungs
- (B) 6. Which description about the endocrine system is **FALSE**?
 (A) Epinephrine synthesized from tyrosine is secreted from adrenal medulla.
 (B) Posterior pituitary synthesizes and secretes antidiuretic hormone (ADH) and oxytocin.
 (C) Parathyroid hormone (PTH) raises blood Ca^{2+} level by stimulating kidneys and bones.
 (D) Glucocorticoids increase blood glucose and suppress immune system in long-term stress response.
 (E) None of the above

- (D) 7. Which description about digestive system is **FALSE**?
- (A) Pantothenic acid, a component of coenzyme A, causes fatigue in deficiency.
 - (B) Magnesium, an enzyme cofactor, causes nervous system disturbance in deficiency.
 - (C) Cholecystokinin (CCK) stimulates the release of enzyme from pancreas.
 - (D) Leptin, produced by adipose tissue, stimulates appetite.
 - (E) None of the above
- (A) 8. Which description about cyclic AMP (cAMP) is **FALSE**?
- (A) It is formed from ATP by phosphodiesterase.
 - (B) It activates protein kinase A.
 - (C) It regulates the activity of synaptic ion channels.
 - (D) It regulates the expression of *LacZ* (β -galactosidase) in *E. coli*.
 - (E) None of the above
- (A) 9. Which ion in plants is **NOT** matched with its function?
- (A) Zn^{2+} -- water balance
 - (B) K^{+} -- stomata operation
 - (C) Fe^{3+} -- chlorophyll synthesis
 - (D) Mg^{2+} -- component of the chlorophyll
 - (E) None of the above
- (C) 10. Which one is **NOT** a common model organism in developmental genetics?
- (A) *Mus musculus*
 - (B) *Caenorhabditis elegans*
 - (C) *Cinnamomum camphora*
 - (D) *Arabidopsis thaliana*
 - (E) None of the above
- (C) 11. During the local inflammatory response, what chemical is released by mast cells that increase capillary permeability?
- (A) proteases
 - (B) heparin
 - (C) histamine
 - (D) IgE
 - (E) complement
- (D) 12. If the smooth endoplasmic reticulum was removed from the cell, which of the following processes would be mostly affected?
- (A) protein synthesis
 - (B) packaging proteins
 - (C) secreting proteins
 - (D) lipid synthesis
 - (E) transporting proteins
- (C) 13. Blockage of the common bile duct would affect ____.
- (A) starch digestion
 - (B) cellulose digestion
 - (C) lipid digestion
 - (D) protein digestion
 - (E) nucleotide digestion
- (D) 14. Which bone belongs to the appendicular skeleton?
- (A) skull
 - (B) vertebral column
 - (C) rib cage
 - (D) femur
 - (E) sternum

- (C) 15. A patient has a blood pressure of 120/75, a pulse rate of 50 beats/min, a stroke volume of 60 mL/beat, and a respiratory rate of 25 breaths/min. This person's cardiac output per minute will be _____.
- (A) 1,000 mL (B) 1,500 mL (C) 3,000 mL (D) 4,500 mL (E) 7,200 mL

【單選題】每題 2 分，共計 120 分，答錯 1 題倒扣 0.5 分，倒扣至本大題零分為止，未作答，不給分亦不扣分。31~60 題為普通生物，61~90 題為生化概論。

- (E) 31. Which description about the hormones regulation in human reproduction is **FALSE**?
- (A) Inhibin inhibits anterior pituitary to secrete follicle-stimulating hormone (FSH) in male.
 (B) Testosterone inhibits hypothalamus to secrete gonadotropin-releasing hormone (GnRH) in male.
 (C) Low levels of estradiol inhibits anterior pituitary to secrete FSH in female.
 (D) High levels of estradiol stimulates hypothalamus to secrete GnRH in female.
 (E) None of the above
- (D) 32. Regarding to the mitochondria, which statement is **FALSE**?
- (A) According to the concept of endosymbiotic theory, the mitochondria extracted from monkey can be transferred into human cells.
 (B) The genome size of plant mitochondria is much larger than animal's.
 (C) A cell can contain more than one mitochondria.
 (D) Mitochondria can produce ATP more quickly than glycolysis.
 (E) Mitochondria can do transcription and translation.
- (D) 33. What do synaptic signaling and paracrine signaling have in common?
- (A) Cells bind a membrane bound signal on a neighboring cell.
 (B) Cells release a signal that affects cells at long distances.
 (C) Cells release a signal that affects itself and neighboring cells.
 (D) Cells release a signal that affects neighboring cells.
 (E) Cells release a signal through gap junctions to affect neighboring cells.
- (A)(E) 34. Which of the following descriptions about cell division is **FALSE**?
- (A) Animal cells form centrioles during cell division.
 (B) Animal cells form a cleavage furrow to form new daughter cells.
 (C) There is phragmoplast alignment of Golgi-derived vesicles in plant cell division.
 (D) The cell plate is the final partitioning of plant cells.
 (E) Plant cells resort to binary fission.

(A) 35. Which is a common feature of gymnosperms and angiosperms?

- (A) pollen tubes (B) flagellated sperms
- (C) sperms carried by windborne pollen (D) fruits
- (E) flowers

(A) 36. Which description about the immune system is **FALSE**?

- (A) Helper T cells bind antigen-presenting cells (APCs) need Class II major histocompatibility complex (MHC) and accessory protein (CD8).
- (B) APCs secrete cytokines such as interleukin-1 (IL-1) and tumor necrosis factor (TNF) for T cell activation.
- (C) Cytotoxic T cell releases perforin and granzymes to kill infected cells.
- (D) Pathogens can be disposed by antibodies through neutralization, opsonization, or complement system activation
- (E) None of the above

(D)(E) 37. Which description about virus is **FALSE**?

- (A) Provirus is the viral DNA incorporated into host cell's DNA.
- (B) The envelope of RNA virus contains the cell membrane of host and glycoproteins of virus.
- (C) Adenovirus, papillomavirus, herpesvirus, and poxvirus are DNA viruses.
- (D) Viroids are DNA molecules that infect plant cells.
- (E) None of the above

(D) 38. Breakdown of the fat storage at brown fat tissue in some animals increases when _____.

- (A) torpor (B) exercising (C) shivering (D) hibernation (E) sleeping

(A) 39. In nature, population size could be controlled by a density-independent factor. Which of the followings would be a possible case?

- (A) forest fires (B) competition (C) parasites
- (D) predation (E) infection disease

(A) 40. In plants, the red light can be absorbed by _____.

- (A) Pr type phytochrome
- (B) Plastoquinone (PQ) of photosystem II (PSII)
- (C) carotenoids
- (D) ribulose biphosphate (RuBP)
- (E) ATP synthase

(A) 41. Which event for muscle contraction is **FALSE**?

- (A) Binding of acetylcholine to receptors stimulates Ca^{2+} pumping into sarcoplasmic reticulum.
- (B) Binding of tropomyosin to actin covers myosin-binding site.
- (C) Binding of Ca^{2+} to troponin exposes myosin-binding site of actin.
- (D) Binding of ATP releases myosin from actin.
- (E) None of the above

(B) 42. Which description about the diseases is **FALSE**?

- (A) Severe combined immunodeficiency (SCID) is caused by adenosine deaminase deficiency.
- (B) Cystic fibrosis (CF) is caused by a Na^+ transporter gene deficiency.
- (C) Tay-Sachs disease is caused by a lipid metabolized gene deficiency.
- (D) α_1 -Antitrypsin deficiency causes emphysema.
- (E) None of the above

(C) 43. Which description about the excretory system is **FALSE**?

- (A) The nasal glands of marine birds concentrate salt.
- (B) The Malpighian tubes of insects remove nitrogenous wastes.
- (C) Glucose and amino acids are reabsorbed in descending limb of the loop of Henle.
- (D) The juxtaglomerular apparatus (JGA) releases renin when blood pressure drops.
- (E) None of the above

(A) (D) 44. Which description about the circulatory and respiratory systems is **FALSE**?

- (A) The spike (QRS complex) of electrocardiogram (ECG) represents the signal passing from atrioventricular (AV) node to heart apex.
- (B) Individuals with a high ratio of LDL/HDL have risk for atherosclerosis.
- (C) The diaphragm contracts during inhalation in human.
- (D) Medulla can detect the decreased blood pH.
- (E) None of the above

(A) 45. Which description about the nervous system is **NOT** matched with its function?

- (A) Acetylcholine stimulates heart muscle.
- (B) Reticular formation regulates arousal and sleep.
- (C) Parasympathetic nerves stimulate stomach activity.
- (D) Amygdala controls emotional memory.
- (E) None of the above

(B) (C) 46. Which assumption is **NOT** the basis for Hardy-Weinberg equilibrium?

- (A) random mating
- (B) natural selection
- (C) large population with genetic drift
- (D) no gene migration of alleles into or out of the population
- (E) no mutation

(A) 47. What is the primary original source of genetic variation in a population?

- (A) mutation
- (B) genetic drift
- (C) inbreeding
- (D) cloning
- (E) None of above

(D) 48. Which protist is **NOT** matched with its disease?

- (A) *Plasmodium* - malaria
- (B) *Trichomonas* - sexual transmitted disease
- (C) *Leishmania* - skin disease
- (D) *Trypanosoma* - intestinal infection
- (E) None of the above

(D) 49. Which description about fungi is **FALSE**?

- (A) Athlete's foot and ringworm are caused by fungi.
- (B) *Candida albicans* is a fungi to infect vagina.
- (C) Forming buds instead of spores are more effectively in sticking to lung cells.
- (D) Coccidioidomycosis is treated with antibiotics.
- (E) None of the above

(D) 50. Which description about the reproductive system is **FALSE**?

- (A) Spermatheca is used to store sperms in female fruit fly.
- (B) Epididymis is used to store sperms in men.
- (C) Oogenesis begins at embryonic development of women.
- (D) Hypothalamus is stimulated by combinations of high levels estradiol and progesterone.
- (E) None of the above

(E) 51. Which of the following animals has the largest basic metabolic rate (BMR) per body mass?

- (A) 500 kg horse
- (B) 60 kg human
- (C) 60 kg alligator
- (D) 0.5 kg lizard
- (E) 0.5 kg rat

(B) 52. Which is the **WRONG** description about sexual reproduction of fungi?

- (A) Fungi release pheromones to find the correction mating type.
- (B) After plasmogamy, nuclei of two mycelia fuse immediately.
- (C) A zygote is formatted after karyogamy.
- (D) A heterokaryon contains two coexisting, genetically different nuclei.
- (E) A heterokaryon can be extended hours, days, or even years.

(E) 53. In a large population of a plant species, which of the following situations is the least likely to change allele frequencies within the population?

- (A) A forest fire destroys most of individuals in the population
- (B) Radioactive fallout from an accident at a nuclear power plant
- (C) Microhabitats within the range of the population where certain phenotypes have a better chance of surviving
- (D) The preference of a pollinator for a certain flower color
- (E) Wind pollination of the flowers

(B) 54. Which of the following is **NOT** related to the parasympathetic nervous system?

- (A) Lacrimal glands that produce tears
- (B) Fight or flight responses
- (C) Nerves in the stomach and trunk
- (D) Nerves that go to the bladder
- (E) Nerves and blood vessels responsible for the male erection

(E) 55. Which of the followings is **NOT** a steroid hormone?

- (A) progesterone
- (B) testosterone
- (C) mineralocorticoid
- (D) estradiol
- (E) follicle-stimulating hormone

(E) 56. A patient **CANNOT** form new long-term memories after a serious brain damage of _____.

- (A) somatosensory cortex
- (B) motor cortex
- (C) frontal lobe of cortex
- (D) thalamus
- (E) hippocampus

(E) 57. Which is **NOT** a function of the pigment epithelium in retina?

- (A) absorption of scattered light
- (B) phagocytizing shed outer discs
- (C) isomerize the all-trans retinal to the 11-cis form
- (D) delivery of nutrients to the photoreceptors
- (E) creating the dark current of the photoreceptors

送分 58. The form and function of nephrons in vertebrate kidney have a different adaptation to meet their requirements for osmoregulation. Which one is **CORRECT**?

- (A) Freshwater fishes conserve salt in their proximal tubules and excrete large volumes of dilute urine.
- (B) Amphibians conserve water on land by reabsorbing water from collecting duct.
- (C) Mammals that inhabit in fresh water have relatively long loops of Henle.
- (D) Birds have shorter loops of Henle.
- (E) Most reptiles excrete uric acid by juxtamedullary nephron.

(D) 59. Which organ or tissue is differentiated from mesoderm?

- (A) epidermis of skin
- (B) nervous system
- (C) adrenal medulla
- (D) dermis of skin
- (E) thymus

(C) 60. _____ are **NOT** derived from myeloid stem cell.

- (A) Basophils
- (B) Erythrocytes
- (C) Lymphocytes
- (D) Monocytes
- (E) Platelets

生 物

曾正(曾蘇賢)老師提供

試題分佈

範疇	題數	題目
基礎生化	0題	
細胞學	3題	第12、32、34題
生物能量學	0題	
細胞遺傳學	0題	
古典遺傳學	1題	第42題
分子生物學	2題	第2、10題
動物生理學	26題	第4、5、6、7、8、11、13、14、15、31題 第33、36、38、41、43、44、45、50、51、54題 第55、56、57、58、59、60題
生物分類學	5題	第35、37、48、49、52題
演化論	4題	第1、46、47、53題
生態學	2題	第2、39題
植物生理學	2題	第9、40題

試題評析

1. 本年度學士後西醫生物試題，令人意想不到的簡單，甚至有些程度與插大的生物試題難易度不相上下。
2. 可能是出題者的背景，試題分佈的範圍極不平均，生物能量學、遺傳學、分子生物學居然不見命題或僅蜻蜓點水或出了一下。
3. 想不到動物生理學一口氣出了26題，且幾乎完全可在Campbell生物教本中找到。
4. 有些題目甚至出了研究文獻的範圍，例如：57題網膜中色素上皮的功能，按生物教本所陳及的內容根本找不到選項，這亦是讓同學拿不到生物學滿分的代表例。
5. 整份試題程度高的同學可拿到70分左右的高分，若想進入面試的同學，亦須拿到60分左右的成績。

解析

- (C) 1. The formation of new species occurred in populations that are geographically isolated from one another is _____.
 (A) peripatric speciation (B) sympatric speciation (C) allopatric speciation
 (D) parapatric speciation (E) artificial speciation

解析

透過地理隔離而導致的物種形成，稱為異域物種形成。

[命中生物第(十)回講義演化論之物種形成機制]

- (E) 2. If a species contains 23% adenine in its genome, what is the percentage of guanine it would contain?
 (A) 23% (B) 46% (C) 25% (D) 44% (E) 27%

解析

$A = T = 23\%$ $\therefore A + T = 46\%$

故 $G + C = 54\%$ 故 $G = C = 27\%$

[命中生物第(四)回講義分子生物學之DNA結構的探討]

- (A) 3. Several butterfly species that are edible to birds have very similar color patterns to the generally inedible Monarch butterfly. This is best described as an example of _____.
 (A) Batesian mimicry (B) Müllerian mimicry (C) crypsis
 (D) aposematic coloration (E) subterfuge

解析

不適口的物種模擬有毒物種的擬態，稱為Batesian mimicry。

[命中生物第(十一)回講義生態學之擬態種類]

- (C) 4. Which description about the status of action potential of voltage-gated Na^+ and K^+ channels is **FALSE**?
 (A) resting state: both Na^+ and K^+ channels close
 (B) depolarization: some Na^+ channels open and K^+ channels close
 (C) rising phase of action potential: both Na^+ and K^+ channels open
 (D) falling phase of action potential: Na^+ channels close and K^+ channels open
 (E) None of the above

解析

動作電位上升期， Na^+ channel開， K^+ channel關。

[命中生物第(八)回講義神經系統之動作電位過程]

- (D) 5. In vertebrates with four-chambered hearts, the _____ receives oxygenated blood directly from the _____.
 (A) right ventricle, lungs (B) right ventricle, right atrium
 (C) left atrium, left ventricle (D) left ventricle, left atrium
 (E) left ventricle, lungs

解析

2心房2心室的動物，左心室接收來自左心房的充氧血經主動脈至全身循環。

[命中生物第(五)回講義循環系統之脊椎動物心臟]

- (B) 6. Which description about the endocrine system is **FALSE**?
- (A) Epinephrine synthesized from tyrosine is secreted from adrenal medulla.
 - (B) Posterior pituitary synthesizes and secretes antidiuretic hormone (ADH) and oxytocin.
 - (C) Parathyroid hormone (PTH) raises blood Ca^{2+} level by stimulating kidneys and bones.
 - (D) Glucocorticoids increase blood glucose and suppress immune system in long-term stress response.
 - (E) None of the above

解析

ADH及OT由下視丘合成，而由後葉分泌。

[命中生物第(六)回講義內分泌系統之下視丘結構]

- (D) 7. Which description about digestive system is **FALSE**?
- (A) Pantothenic acid, a component of coenzyme A, causes fatigue in deficiency.
 - (B) Magnesium, an enzyme cofactor, causes nervous system disturbance in deficiency.
 - (C) Cholecystokinin (CCK) stimulates the release of enzyme from pancreas.
 - (D) Leptin, produced by adipose tissue, stimulates appetite.
 - (E) None of the above

解析

Leptin由脂肪組織製造，功能是抑制食慾。

[命中生物第(八)回講義消化系統之控制食慾的訊息分子]

- (A) 8. Which description about cyclic AMP (cAMP) is **FALSE**?
- (A) It is formed from ATP by phosphodiesterase.
 - (B) It activates protein kinase A.
 - (C) It regulates the activity of synaptic ion channels.
 - (D) It regulates the expression of *LacZ* (β -galactosidase) in *E. coli*.
 - (E) None of the above

解析

cAMP係由adenylyl cyclase催化而形成。

[命中生物第(六)回講義內分泌系統之第二信使種類]

- (A) 9. Which ion in plants is **NOT** matched with its function?
- (A) Zn^{2+} -- water balance
 - (B) K^{+} -- stomata operation
 - (C) Fe^{3+} -- chlorophyll synthesis
 - (D) Mg^{2+} -- component of the chlorophyll
 - (E) None of the above

解析

植物中與 H_2O 平衡最主要的離子為 K^{+}

[命中生物第(十三)回講義植物生理學之植物營養元素]

- (C) 10. Which one is **NOT** a common model organism in developmental genetics?
 (A) *Mus musculus* (B) *Caenorhabditis elegans*
 (C) *Cinnamomum camphora* (D) *Arabidopsis thaliana*
 (E) None of the above

解析

樟樹(*Cinnamomum camphora*)並非是發育遺傳學中的model organism

[命中生物第(九)回講義發生遺傳學之模型生物種類]

- (C) 11. During the local inflammatory response, what chemical is released by mast cells that increase capillary permeability?
 (A) proteases (B) heparin (C) histamine (D) IgE (E) complement

解析

mast cell分泌的histamine在local inflammatory response 扮演主要的介質。

[命中生物第(五)回講義免疫系統之發炎反應]

- (D) 12. If the smooth endoplasmic reticulum was removed from the cell, which of the following processes would be mostly affected?
 (A) protein synthesis (B) packaging proteins (C) secreting proteins
 (D) lipid synthesis (E) transporting proteins

解析

SER與lipid synthesis合成有關，若SER移除，其lipid合成的功能會受影響

[命中生物第(一)回講義細胞學之平滑內質網功能]

- (C) 13. Blockage of the common bile duct would affect _____.
 (A) starch digestion (B) cellulose digestion (C) lipid digestion
 (D) protein digestion (E) nucleotide digestion

解析

common bile duct 阻塞，膽汁無法進入十二指腸，故lipid 消化會受阻。

[命中生物第(八)回講義消化系統之膽囊的膽汁運送]

- (D) 14. Which bone belongs to the appendicular skeleton?
 (A) skull (B) vertebral column (C) rib cage
 (D) femur (E) sternum

解析

femur為附肢骨，其餘骨為中軸骨。

[命中生物第(七)回講義骨骼系統之附肢骨與中軸骨]

- (C) 15. A patient has a blood pressure of 120/75, a pulse rate of 50 beats/min, a stroke volume of 60 mL/beat, and a respiratory rate of 25 breaths/min. This person's cardiac output per minute will be _____.
 (A) 1,000 mL (B) 1,500 mL (C) 3,000 mL (D) 4,500 mL (E) 7,200 mL

解析

$$\begin{aligned} \text{CO} &= \text{SV} \times \text{HR} \\ &= 60 \times 50 \\ &= 3000 \text{ mL/min} \end{aligned}$$

[命中生物第(五)回講義循環系統之CO的定義]

- (E) 51. Which of the following animals has the largest basic metabolic rate (BMR) per body mass?
 (A) 500 kg horse (B) 60 kg human (C) 60 kg alligator
 (D) 0.5 kg lizard (E) 0.5 kg rat

解析

內溫性愈小的動物 (0.5 kg rat) 其 $\frac{\text{BMR}}{\text{Kg body mass}}$ 愈大

[命中生物第(七)回講義生物溫學之BMR影響因子]

- (E) 55. Which of the followings is **NOT** a steroid hormone?
 (A) progesterone (B) testosterone (C) mineralocorticoid
 (D) estradiol (E) follicle-stimulating hormone

解析

FAH 為 glycoprotein類的激素。

[命中生物第(六)回講義內分泌系統之激素的化學組成]

- (E) 56. A patient **CANNOT** form new long-term memories after a serious brain damage of _____.
 (A) somatosensory cortex (B) motor cortex (C) frontal lobe of cortex
 (D) thalamus (E) hippocampus

解析

hippocampus 受損，無法形成新的長期記憶

[命中生物第(八)回講義神經系統之記憶的機制]

(其他試題詳解，歡迎參考高點出版 67MU201506【生物學經典題型解析】一書)

【版權所有，翻印必究】