

## 高醫後西醫 《生物》 試題評析

## 曾正老師試題評析

## 一、命題分佈比重：

範疇	題數	題目
生物無機 有機化學	1 題	第 51 題
細胞學	1 題	第 42 題
生物能量學	6 題	第 2、28、41、50、59、62 題
遺傳學	12 題	第 39、40、43、46、52、53、55、56、57、58、69 題 第 80 題
生物分類學	9 題	第 1、6、7、8、9、54、67、68、75 題
植物生理學	8 題	第 3、4、31、34、35、36、63、64 題
動物生理學	16 題	第 32、33、37、38、45、47、48、49、60、61、73 題 第 74、76、77、78、79 題
演化及生態學	24 題	第 5、10、11、12、15、16、17、18、19、20、21 題 第 22、23、24、25、27、29、30、44、65、66、70 題 第 71、72 題
動物行為學	3 題	第 13、14、26 題

## 二、試題評析：

- 今年高醫的生物學試題真是“太奇特了”
  - 簡單的試題幾乎一行便結束了，而內容卻是比插大還簡單。
  - 而生態學部份則使用了生物學教本，甚至是時下生態學教本也覓尋不到的內容，程度好及程度差的考生皆一起倒下。
- 此種試卷內容本身應驗了老師的叮嚀：把教本內容完全掌握，即可拿到 80 分以上，其餘盡力就好，即使有幾題跳脫生物範疇，考生亦不必太過執著，照常仍可取得高分。
- 命題老師用心，生物教本的題庫很少全部一字不漏的搬至試卷上，這對考生極為公平，選取思考力佳的同學極為有效；死背題庫，邊看答案邊選擇的考生被摒棄在門外了。
- 習慣老師理解式教法、不硬作死記題目，努力把握生物教本內容的同學必定獲得高分。
- 本班優等生可拿到 80 分以上的好成績，中等生亦有 70 分的實力。

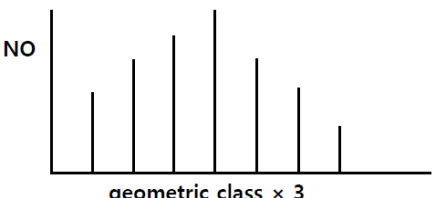
## 三、試題詳解：

題號	試題說明
1	屬於異營且外殼含有矽的原生生物，答案為放射蟲，而有孔蟲含碳酸鈣的外殼。 (命中生物分類學—原生生物)
2	克氏循環的第一個中間物為 acetyl-CoA 與 OAA 結合形成 citrate。 (命中生物能量學—克氏循環)
3	木材的組成爲次級木質部。 (命中植物生理學—莖的次級生長)
4	植物缺水的壓力激素，而且指定是 guard cell 製造的，答案只有 ABA。 (命中植物生理學—植物激素)
5	由大至小的組建爲生態系→群落→族群→個體。 (命中生態學—生物圈的尺度)
6	兩生類不屬於羊膜類。 (命中生物分類學—脊椎動物)
7	動物體制深受 Hox 基因的控制，特別是胚胎發育的控制。 (命中生物分類學—動物分類的序論)
8	地衣係由真菌結合綠藻或藍細菌所形成的共生體。 (命中生物分類學—真菌學)
9	黑麵包黴的接合孢子囊 (zygosporangium) 涉及有性生殖，但環境改善後，接合孢子囊萌發形成 sporangium 釋放單套的孢子(屬於無性生殖的部份)。 (命中生物分類學—真菌學)
10	有效的分化支(clade)必須是單系群(一祖先及其所有的子代)。 (命中演化論—系統發生樹)
11	蝴蝶的體色形態互異就答案的選項中以分歧型選擇最相關，而方向型選擇須由一體色轉變成另一體色，但題目陳述未指出，故捨棄之。 (命中演化論—天擇作用至表現型)
12	基因流的最大單位爲種(species)，但題目未言及，故“個體”亦可以，但題意似乎要選族群才恰當。 (命中演化論—微演化)
13	最佳覓食唯有受到天擇所青睞時，才是一種有效率的行爲。 (命中動物行爲學—最佳覓食策略)
14	利他行爲中協助者協助親緣相近的被協助者，是因被協助者的子代攜有協助者的基因，簡單說協助者與被協助者之間是互惠的。 (命中動物行爲學—利他行爲)
15	親生物性(biophilia)是人類與生俱來的，是天擇作用在聰明物種的演化產物。 (命中生態學—保育生態學)
16	早期消長生物的特徵是 r 選擇物種且是長壽命的。 (命中生態學—消長的種類)
17	大島嶼的物種數較多。 (命中生態學—群落多樣性估測)
18	物種-面積曲線指出二者呈正比關係，單位皆是 log 值。 (命中生態學—群落多樣性估測)
19	河川的特性中最接近水源頭處的是：水較冷、清澈、湍急、快速，河道窄小且爲岩層。 (命中生態學—水域生物相)

題號	試題說明
20	初級生產力是指自營生物將光能轉化成化學能的量，其值愈高所能支持的食草動物的生物量當然亦愈多。 (命中生態學—初級生產力定義)
21	去森林化，植物無法有效固定土壤中的礦物質甚至是水分，故導致水的溢流。 (命中生態學—去森林化的影響)
22	達爾文有關物種的起源之結論，未論及遺傳的顆粒假說。 (命中演化論—影響達爾文思想的理論)
23	異型合子的基因型頻率在哈-溫定律中，是以 $2pq$ 來表示。 (命中演化論—哈-溫定律)
24	族群按生物學定義是可相互交配的個體(同一種)所組成。 (命中生態學—群落的定義)
25	生境的破壞指的是物理環境遭受破壞而影響生物存活，而過度獵捕是指生物的數量因人為因子而受到影響，故不屬於生境破壞的特徵。 (命中生態學—生物多樣性破壞)
26	促進近親之生殖成功而有利於利他行為的天擇稱為 kin selection，而 Hamilton's Rule 便是評估上述的強度多寡。 (命中動物行為學—利他行為)
27	溫室效應的結果是地球上生物共同承擔，可能導致無法生存，其情況大於微演化的天擇，而水分可能會因蒸散作用旺盛而短缺，植物僅有 $C_3$ 植物之生長，因 $CO_2$ 量升高而更有利，但動物則否。 (命中生態學—溫室效應)
28	CAM 植物處於極乾旱的區域，故氣孔是在夜晚開啓，白日關閉。 (命中生物能量學—固碳反應)
29	第一個 metapopulation dynamics 的數學處理是 1969 年由 Richard Levins 提出：他預測佔據的區塊的比例將會隨時間而穩定至 $1 - (x/m)$ (其中 $x$ 為單位時間區塊中的族群滅絕速率，而 $m$ 為區塊之間移動的速率)。
30	異性相剋是屬於植物均勻分佈的主因，植物分泌毒素以限制其它鄰近植物的生長。 (命中生態學—群落的分佈)
31	植物透過種子散佈有以下的利益 (1)提高存活率(躲避捕食者及病原體)。 (2)減少與親代的競爭。 (3)使得植物抵達有利於存活的生境(稱為 Directed dispersal) (命中植物生理學—被子植物的生殖)
32	hCG 模擬黃體生成激素 (LH)，維持黃體的存在(為了安胎)，hCG 由胎盤製造。 (命中動物生理學—生殖系統)
33	亨利氏環上行支不會對 $H_2O$ 發生重吸收，而是發生在亨利氏環下行支。 (命中動物生理學—排泄系統)
34	屬於抑制性的植物激素並促進葉子老化為 ABA。 (命中植物生理學—植物激素)
35	植物的巨量養分：K、P、Ca、S，而 Mn 為微量養分。 (命中植物生理學—植物的營養)
36	植物葉上的氣體交換稱為氣孔。 (命中植物生理學—植物葉子的解剖)

題號	試題說明
37	錐狀細胞可用來區分色彩，桿狀細胞無此功能。 (命中動物生理學—感覺系統)
38	刺激腎上腺髓質是交感神經控制。(特別是在壓力情況之下) (命中動物生理學—內分泌系統)
39	模版股為 5' AGTAAT 3'，故轉錄出的 mRNA 為 3' UCAUUA 5'。 (命中分子生物學—DNA 的複製)
40	中心粒在間期複製完成 (G <sub>2</sub> 期)，故亦應在間期開始複製。 (命中細胞遺傳學—有絲分裂)
41	氧缺乏，丙酮酸轉變成乳酸 (稱為乳酸醱酵)。 (命中生物能量學—醱酵)
42	胞噬作用是藉由偽足吸收固體物質。 (命中細胞學—胞攝作用)
43	$I^A_i \times I^B_i \Rightarrow I^A I^B, I^A i, I^B i, ii$ (AB) (A) (B) (o) (命中古典遺傳學—基本遺傳計算)
44	肇因於有生育力的個體或其配子，而使得對偶基因由一族群轉移至另一個族群稱為基因流。 (命中演化論—微演化)
45	腎上腺皮質來自中胚層。 (命中動物生理學—發生學)
46	減數分裂 II 中期，尚未完成減數分裂，故仍有 24 條染色體。 (命中細胞遺傳學—減數分裂)
47	cAMP 屬於第二信使，並非是神經傳遞物質。 (命中動物生理學—內分泌系統)
48	Renin 可視為酵素性的激素或單純為酵素，於 low 血壓時由腎臟分泌，故選項中(B)(E)兩者皆符合。 (命中動物生理學—排泄系統)
49	血液中，CO <sub>2</sub> 可由三種方式運輸：CO <sub>2</sub> + H <sub>2</sub> O，CO <sub>2</sub> + H <sub>b</sub> ，HCO <sub>3</sub> <sup>-</sup> 。 (命中動物生理學—呼吸系統)
50	CO <sub>2</sub> 固定發生於 Calvin cycle，水的裂解伴隨 O <sub>2</sub> 釋放是發生在 photosystem II。 (命中生物能量學—固碳反應)
51	含有 N 的糖類為 N-acetylglucosamine，為幾丁質的組成。 (命中生物有機化學)
52	SNP 無法用於研究基因的表現，而是族群中個體間的遺傳變異的方法。 (命中分子生物學—遺傳工程)
53	Euk mRNA 不存在 promoter，它是存在於 DNA 中。 (命中分子生物學—DNA 轉錄)
54	HIV 為單股 RNA 的 virus。 (命中生物分類學—病毒學)
55	genomic imprinting 發生於配子形成過程中而非胚胎形成過程中。 (命中古典遺傳學—基因組印痕)

題號	試題說明
56	(A)應為 Topoisomerase，(B)應為 Helicase (C) 應為 RNA primers (D)應為 RNAP III。 (命中分子生物學—DNA 的複製)
57	孟氏單個基因的延伸包括：pleiotropy、multiple alleles、incomplete dominance 及 codominance，而兩個或兩個以上的基因之延伸才包括 epistasis。 (命中古典遺傳學—孟氏定律的延伸)
58	每一個染色體的二個著絲點朝向相反方向，而每一複製的染色體含二條姐妹染色分體，故著絲點的數目也應為 24。 (命中細胞遺傳學—有絲分裂)
59	粒線體產生 ATP 的機制稱為化學滲透。 (命中生物能量學—氧化磷酸化)
60	bundle branches 及 Purkinje fibers 將衝動由 AV node 傳至心室。 (命中動物生理學—循環系統)
61	磷脂藉由 phospholipase C 作用可得到 $IP_3$ 及 DAG。 (命中動物生理學—內分泌系統)
62	$C_4$ plant 中，PEPCK 促進 $CO_2$ 與 PEP 結合形成 OAA。 (命中生物能量學—固碳反應)
63	auxin 造成芽鞘背光面的細胞延長，並非造成向光面的芽鞘之細胞減少生長。 (命中植物生理學—向光性實驗)
64	被子植物的雙重受精之產物為 $2n$ 的合子及 $3n$ 的胚乳。 (命中植物生理學—被子植物的生殖)
65	desert：降雨少，炎熱沙漠高溫超過 $50^\circ C$ ，而寒冷沙漠溫度可低於 $-30^\circ C$ 。 taiga：冬天冷 ( $-50^\circ C$ )，夏天熱 ( $20^\circ C$ )，周期性乾旱，全年雨量為 30~70cm。 temperate grassland：乾的冬季，潮溼的夏季。 temperate broadleaf forest：夏天降雨，冬天降雪，冬季溫度 $0^\circ C$ ，夏季溫度 $35^\circ C$ ，但濕而熱。 (命中生態學—陸地生物相)
66	廢棄的農田為次級消長的代表例。 (命中生態學—消長的種類)
67	陸生植物演化趨勢中由小葉至大葉，精子不必具有毛鞭，精子對水的依賴下降，孢子為異形孢子，而配子體變小，孢子體發達。 (命中生物分類學—植物的演化)
68	有些古細菌染色體含有 histone，而細菌缺。 (命中生物分類學—細菌學)
69	$F_1$ 應為 AaBb，於是 $F_1 \times F_1$ 為 AaBb $\times$ AaBb 所得 $F_2$ 之表現型比例為 9 : 3 : 3 : 1。 (命中古典遺傳學—孟氏遺傳計算)
70	小族群極易因近親繁殖的正回饋迴路而陷入滅絕漩渦。 (命中生態學—保育生態學)
71	入侵種之高競爭力不包括對氣候的預先適應。 (命中生態學—保育生態學)

題號	試題說明
72	<p>群落展現對數常態分佈意指</p>  <p>頗類似 bell-shaped curve。 (命中生態學—群落多樣性估測)</p>
73	<p>當 <math>E_2</math> 及 <math>P_4</math> 量下降，於是 GnRH 及 FSH、LH 量又再度上升。 (命中動物生理學—生殖系統)</p>
74	<p>GPCR 與 ligand 結合而活化 G protein，故 GPCR 行使功能並非是受 G protein 的協助，且 G protein 為 trimer 非 monomer。 (命中動物生理學—內分泌系統)</p>
75	<p>古細菌的 genome 通常是介於 1~6 Mb，而真核生物的 genome 於 10~4000 Mb，但古細菌的 gene 數目為 1500~7500；而真核生物的 gene 數目為 5000~40000。 (命中生物分類學—細菌學)</p>
76	<p>內細胞群出現在胚泡 blastocyst 或 blastula；而滋養層亦是出現在 blastocyst 或 blastula，而三個胚層形成是於原腸胚形成後，胚外層及胚外膜圍繞胚是發生在原腸胚形成完成之後。 (命中動物生理學—發生學)</p>
77	<p>平滑肌缺乏 T tubule。 (命中動物生理學—骨骼及肌肉)</p>
78	<p>正確的心動周期為：心房、心室舒張→心房收縮、心室舒張→心室收縮、心房舒張。 (命中動物生理學—循環系統)</p>
79	<p>Secretin 會抑制胃液分泌，而 CCK 則會抑制胃排空。 (命中動物生理學—消化系統)</p>
80	<p>histone tail 的乙醯化通常是導致染色質的去濃縮。 (命中分子生物學—真核基因表現的調節)</p>

【版權所有，翻印必究】

## 楊老師試題評析

- 一、最早後醫是中文出題，後來便改成英文出題，題目是 65 題，約七年前變成 75 題，今年又多了 5 題，變為 80 題，題目數目一直增多，但考試時間未增長，可見英文程度及看題目的速度，是致勝不可缺少的關鍵。
- 二、今年題目難易與去年相比大致不難，遺傳分生題目變少且容易，但是生態題目明顯增多，有些題目考的很細。
- 三、歷年考試所佔分數比例及試題難易分析如下：

	100 年	101 年	102 年	103 年	說 明
簡介	0%	1%	2%	1%	考 organization is arranged (易)
生化	1%	0%	6%	1%	考 nitrogen-containing carbohydrate 基本概念 (易)
細胞學	9%	4%	4%	1%	考 phagocytosis 基本概念 (易)
能量學	5%	1%	8%	6%	考 Krebs cycle thylakoid、CAM stomata open、Calvin cycle; photosystem II、C4 PEP carboxylase、CO <sub>2</sub> to be added、chemiosmosis 基本概念 (易)
遺傳	5%	13%	12%	5%	考 chromatids、metaphase II、duplicate DNA、cross AABB x aabb 基本概念 (易)
分生	17%	17%	6%	9%	考 template strand→ mRNA、DNA replication、mature mRNA、HIV、Acetylation of histone tails、epistasis、methylation of cytosine、SNP 基本概念 (易)
胚胎	4%	2%	2%	5%	考 Hox、amniote、trophoblast 基本概念 (易) ectoderm (中)
生理	13%	33%	21%	23%	1.消化: secretin and CCK (易) 2.循環: 考 AV node、cardiac cycle 基本概念 (易) 3.血液: blood type(s) 4.呼吸: 考 Carbon dioxide is transported 基本概念 (易) 5.排泄: 考 Renin (中)、Ascend limb loop of Henle (易) 6.肌肉: lactic acid is produced、muscle and skeletal system、Skeletal, cardiac, and smooth muscle 7.神經概論: 考 PNS、neurotransmitter 基本概念 (易) 8.特殊感覺: 考 cones 基本概念 (易) 9.訊號傳遞: PIP2、GPCRs 基本概念 (易) 10.內分泌: 考 GnRH, estradiol and progesterone 基本概念 (易) 11.生殖: hCG, LH, placenta 基本概念 (易)
演化學	17%	7%	9%	6%	考① Darwin's、gene flow、heterozygotes→2pq、disruptive selection 基本概念 (易) ② valid clade (難)
分類學	9%	3%	14%	7%	考① archaea genome、Lichens 基本概念 (易) ②矽質→radiolarian (細) ③ sporangia of bread molds (中) ④比較 Bacteria and Archaea (難)
植物學	3%	8%	2%	11%	考 gametophyte phase、secondary xylem、stomata、manganese、double fertilization、ABA 基本概念 (易)
行為	3%	3%	3%	3%	考基本概念 利他主義、Hamilton's Rule (易)

生態學	12%	9%	9%	23%	Optimal foraging (中) 考 chaparral、Succession、island biogeography、 biophilia、extinction vortex 基本概念 (易) Populations best defined、primary production increases、Indirect dispersal、global warming are accurate、habitat destruction、森林覆蓋面積清除 樹 (中)河上游、succession → Long seed longevity、 對數常態分佈排名多如牛毛、Allelopathy、對數-對 數坐標圖、Climate pre-adaptation、extinction (難)
-----	-----	----	----	-----	---

四、生物補充教材 B15 命中或提到相關概念事實如下，歡迎參閱：

題號		頁數	題號		頁數	題號		頁數	題號		頁數
1	總整理	P56	21	總整理	P39	41	總整理	P27	61	總整理	P32
2	總整理	P5	22	總整理	P47	42	總整理	P3	62	總整理	P6
3	總整理	P42	23	總整理	P48	43	總整理	P21	63	總整理	P46
4	總整理	P46	24	總整理	P37	44	總整理	P48	64	總整理	P45
5	總整理	P1	25	總整理	P39	45	總整理	P17	65	總整理	P36
6	總整理	P17	26	總整理	P35	46	總整理	P7	66	總整理	P38
7	總整理	P16	27	總整理	P39	47	總整理	P28	67	總整理	P41
8	總整理	P54	28	總整理	P6	48	總整理	P24	68	總整理	P52
9	總整理	P54	29	總整理	P40	49	總整理	P23	69	總整理	P9
10	總整理	P49	30	總整理	P38	50	總整理	P6	70	總整理	P40
11	總整理	P48	31	總整理	P38	51	總整理	P2	71	總整理	P39
12	總整理	P48	32	總整理	P34	52	總整理	P15	72	總整理	P37
13	總整理	P35	33	總整理	P24	53	總整理	P12	73	總整理	P33
14	總整理	P35	34	總整理	P46	54	總整理	P13	74	總整理	P32
15	總整理	P40	35	總整理	P44	55	總整理	P14	75	總整理	P52
16	總整理	P37	36	總整理	P43	56	總整理	P11	76	總整理	P17
17	總整理	P39	37	總整理	P31	57	總整理	P14	77	總整理	P27
18	總整理	P39	38	總整理	P28	58	總整理	P7	78	總整理	P20
19	總整理	P36	39	總整理	P11	59	總整理	P10	79	總整理	P19
20	總整理	P38	40	總整理	P8	60	總整理	P20	80	總整理	P14



# 《生物》

I. 【單選題】1-60 題，每題 1 分，共計 60 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。

- (E) 1. An unicellular eukaryote with a siliceous shell and heterotrophic nutrition should belong to \_\_\_\_\_.  
 (A) dinoflagellate (B) brown algae (C) amoeba (D) foraminiferan (E) radiolarian
- (D) 2. The first stable intermediate produced in the Krebs cycle is \_\_\_\_\_.  
 (A) pyruvate (B) FAD (C) acetyl CoA (D) citrate (E) oxaloacetate
- (B) 3. The tissue makes up most of the wood of a tree is \_\_\_\_\_.  
 (A) primary xylem (B) secondary xylem (C) primary phloem  
 (D) secondary phloem (E) cork
- (D) 4. A plant produces a guard cell hormone under water-deficit conditions. Most likely the hormone is \_\_\_\_\_.  
 (A) 2, 4-D (B) gibberellin (C) IAA (D) abscisic acid (E) ethylene
- (B) 5. Which of the following levels of organization is arranged in the correct sequence from most to least inclusive?  
 (A) community, ecosystem, individual, population.  
 (B) ecosystem, community, population, individual.  
 (C) population, ecosystem, individual, community.  
 (D) individual, population, community, ecosystem.  
 (E) community, individual, population, ecosystem.
- (A) 6. Which of these is NOT considered an amniote?  
 (A) amphibians (B) reptiles (C) avians (D) mammals (E) all of the above
- (D) 7. The number of legs an insect has, and the number of vertebrae in a vertebral column are all strongly influenced by \_\_\_\_\_ genes.  
 (A) haploid (B) introns within (C) heterotic (D) Hox (E) SRY
- (D) 8. Lichens are symbiotic associations of fungi and \_\_\_\_\_.  
 (A) mosses (B) cyanobacteria+ mosses (C) green algae+ mosses  
 (D) cyanobacteria+ green algae (E) all of the above
- (A) 9. What are the sporangia of bread molds?  
 (A) asexual structures that produce haploid spores  
 (B) asexual structures that produce diploid spores  
 (C) sexual structures that produce haploid spores  
 (D) sexual structures that produce diploid spores  
 (E) asexual structures that produce sporophytes
- (A) 10. A valid clade must be \_\_\_\_\_.  
 (A) monophyletic (B) convergent (C) paraphyletic (D) polyphyletic (E) divergent
- (C) 11. An African butterfly species exists in two strikingly different color patterns. This is an example of \_\_\_\_\_.  
 (A) directional selection (B) stabilizing selection (C) disruptive selection

- (D) sexual selection (E) linkage disequilibrium
- (C) 12. Gene flow is a concept best used to describe an exchange between \_\_\_\_\_.  
 (A) species (B) males and females (C) populations  
 (D) individuals (E) habitats
- (D) 13. Optimal foraging as a form of efficient behavior would be favored by \_\_\_\_\_.  
 (A) mutualism (B) transduction (C) energy expended  
 (D) natural selection (E) none of these choices are correct
- (C) 14. Why might unrelated individuals engage in altruistic acts?  
 (A) They are trying to mate with each other.  
 (B) It is possible they may mate with each other.  
 (C) The altruism is likely to be reciprocated.  
 (D) Individuals are part of the same large flock.  
 (E) None of these choices are correct.
- (D) 15. The idea that humans have a love of life or living systems, coined by E.O. Wilson, is known as \_\_\_\_\_.  
 (A) biodiversity (B) the call of the wild (C) the last of the wild  
 (D) biophilia (E) biotheology
- (E) 16. Which of the followings is a characteristic of species which occur in the early stages of succession?  
 (A) Poor seed dispersal  
 (B) High photosynthetic efficiency in low light  
 (C) Low resource acquisition  
 (D) K-selected  
 (E) Long seed longevity
- (A) 17. In island biogeography compared to smaller islands, larger islands support \_\_\_\_\_ species.  
 (A) more (B) fewer (C) bigger-size (D) the same (E) smaller
- (B) 18. How are species-area relationships traditionally plotted?  
 (A) On a bar graph (B) On a log-log plot (C) On a semi-log plot  
 (D) As a regular graph (E) As a pie chart
- (C) 19. Which of the following properties of a river is the closest to the headwaters?  
 (A) Channel depth (B) Mean flow velocity (C) Bed material grain size  
 (D) Stream discharge volume (E) Volume of stored alluvium
- (E) 20. If primary production increases in an ecosystem, it would be reasonable to expect that \_\_\_\_\_.  
 (A) nutrients are a limiting factor  
 (B) gross production would not increase  
 (C) cellular respiration would decrease  
 (D) the food web has become more complex  
 (E) the biomass of herbivores would increase
- (C) 21. If a forested area surrounding a stream is cleared of trees, what might happen?  
 (A) Increased import of nutrients to the soil  
 (B) Decreased rates of soil and rock weathering  
 (C) Increased run-off of water  
 (D) Decreased rates of chemical leaching  
 (E) Increased denitrification

- (D) 22. Darwin's main conclusions about the origin of species were \_\_\_\_\_.  
 (A) all organisms are descended with modification from common ancestors  
 (B) the mechanism for evolution was natural selection  
 (C) inheritance is generally particulate  
 (D) A and B  
 (E) B and C
- (B) 23. The Hardy-Weinberg equation states that  $p^2 + 2pq + q^2 = 1$ ; the genotype frequency of heterozygotes is represented by \_\_\_\_\_.  
 (A)  $p^2$  (B)  $2pq$  (C)  $q^2$  (D)  $p^2 + q^2$  (E)  $p^2 + 2pq$
- (E) 24. Populations are best defined as \_\_\_\_\_.  
 (A) all members of a species  
 (B) all organisms found in an environment  
 (C) families  
 (D) metacommunities  
 (E) groups of interbreeding individuals
- (D) 25. Which is **NOT** a feature of habitat destruction?  
 (A) swamp drainage (B) deforestation (C) strip mining  
 (D) overharvesting (E) river channelization
- (E) 26. Hamilton's Rule is a calculation of the strength in a population of \_\_\_\_\_.  
 (A) sexual selection (B) group selection (C) natural selection  
 (D) genetic relatedness (E) kin selection
- (D) 27. What is a major consequence for plants and animals if current predictions of global warming are accurate?  
 (A) Rates of natural selection will increase at the same pace.  
 (B) New continental land masses will appear.  
 (C) Water will be more widely available for plants and animals.  
 (D) Anticipated changes in climate will occur faster than many organisms can move or adapt.  
 (E) Many plants and animals will become smaller.
- (C) 28. Which type of plants keeps their stomata open at night, but closed in the day?  
 (A)  $C_3$  (B)  $C_4$  (C) CAM (D)  $C_3$  and  $C_4$  (E)  $C_4$  and CAM
- (C) 29. If  $x$  is the extinction rate of populations in patches per unit time and  $m$  is the rate of movement between patches, then, according to Richard Leurs, the proportion of occupied patches in a metapopulation will stabilize over time to \_\_\_\_\_.  
 (A)  $x/m$  (B)  $1 + (x/m)$  (C)  $1 - (x/m)$  (D)  $1/(x/m)$  (E)  $(1+x)/m$
- (B) 30. Allelopathy is \_\_\_\_\_.  
 (A) interference competition  
 (B) the secretion of toxins into the environment by plant roots  
 (C) intraspecific competition  
 (D) the transmission of viruses from deer to rabbits  
 (E) the death of one species from diseases transferred from a second species
- (D) 31. What is **NOT** a hypothesis to explain why seed dispersal is so advantageous to plants?  
 (A) Competition avoidance (B) Predator escape (C) Colonization  
 (D) Indirect dispersal (E) Directed dispersal
- (E) 32. If fertilization occurs, the hormone\_\_\_\_, which mimics the hormone \_\_\_\_\_, is produced by

- the \_\_\_\_.
- (A) prolactin, estradiol, anterior pituitary  
(B) oxytocin, estradiol, anterior pituitary  
(C) inhibin, progesterone, uterus  
(D) hCG, FSH, uterus  
(E) hCG, LH, placenta
- (C) 33. Which of the following statements concerning excretory system is **FALSE**?
- (A) Urea can be processed by filtration, reabsorption, and secretion during the process of urine formation.  
(B) Kidney contributes pH balance in body fluid.  
(C) Ascend limb of the loop of Henle is the site for reabsorption of water.  
(D) Proximal tubule is the major site for reabsorption of nutrients.  
(E) The final concentration of the urine is determined in the collecting duct.
- (A) 34. The plant hormone that inhibits growth and promotes leaf senescence is \_\_\_\_.
- (A) abscisic acid (B) auxin (C) cytokinin (D) gibberellin (E) strigolactone
- (D) 35. Which of the following elements is **NOT** macronutrients for plants?
- (A) potassium (B) phosphorus (C) calcium (D) manganese (E) sulfur
- (B) 36. Pores on the leaf surface that function in gas exchange are called \_\_\_\_.
- (A) xylem cells (B) stomata (C) phloem cells (D) cuticle (E) upper epidermis
- (A) 37. The cells which allow us to distinguish different colors are \_\_\_\_.
- (A) cones (B) rods (C) both cones and rods  
(D) only certain rods (E) none of the above
- (D) 38. Which function is **NOT** controlled by parasympathetic nervous system?
- (A) stimulates salivary gland secretion (B) stimulates activity of pancreas  
(C) stimulates gallbladder (D) stimulates adrenal medulla  
(E) stimulate activity of intestine
- (E) 39. The particular sequence in the template strand of DNA is 5' AGTAAT 3'. The corresponding sequence for the mRNA transcribed is \_\_\_\_.
- (A) 3' AUUACU 5' (B) 3' UGAUUA 5' (C) 3' AGUAAU 5'  
(D) 3' UAAUGA 5' (E) 3' UCAUUA 5'
- (A) 40. At which phase is centrioles beginning to duplicate in animal cells?
- (A) interphase (B) prophase (C) metaphase (D) anaphase (E) telophase
- (D) 41. During strenuous exercise, lactic acid is produced by human muscles because of an insufficiency of \_\_\_\_.
- (A) NADH (B) NAD (C) ADP (D) oxygen (E) glucose
- (B) 42. In \_\_\_\_, a cell engulfs a particle by wrapping pseudopodia.
- (A) receptor-mediated endocytosis (B) phagocytosis (C) pinocytosis  
(D) exocytosis (E) osmosis
- (E) 43. If one parent has the blood genotype A i and the other parent has the blood genotype B i, what (is, are) all the possible blood type(s) of their children?
- (A) A, O (B) B, O (C) A, B (D) A, B, O (E) A, B, AB, O
- (D) 44. The emigration or immigration of fertile individuals from or to a small population may alter the

- gene pool of the population. This example of a change in allele frequency is best characterized as \_\_\_\_.
- (A) natural selection (B) population bottleneck (C) founder effect  
(D) gene flow (E) convergent evolution
- (C) 45. Which of the following structures does **NOT** develop from ectoderm of vertebrates?  
(A) epidermis of skin (B) nervous system (C) adrenal cortex  
(D) teeth (E) germ cells
- (C) 46. A given bird has 24 chromosomes in its body cells. How many chromatids will be present in each prospective gamete cell during metaphase II of meiosis?  
(A) 6 (B) 12 (C) 24 (D) 48 (E) 96
- (C) 47. Which of the followings is **NOT** a neurotransmitter?  
(A) nitric oxide (B) substance P (C) cAMP (D) serotonin (E) carbon monoxide
- (E) 48. Renin is a(n) \_\_\_\_\_. Its secretion is stimulated by \_\_\_\_\_.  
(A) hormone, high osmolality (B) hormone, low blood pressure  
(C) hormone, low pH (D) enzyme, high osmolality  
(E) enzyme, low blood pressure
- (E) 49. Carbon dioxide is transported in the blood \_\_\_\_\_.  
(A) dissolved in the plasma (B) attachment to hemoglobin  
(C) as bicarbonate ion (D) both A and C  
(E) all of A, B, and C
- (B) 50. During photosynthesis, carbon dioxide is incorporated into glucose in \_\_\_\_; water is broken down and oxygen gas produced in \_\_\_\_\_.  
(A) photosystem I; photosystem II (B) Calvin cycle; photosystem II  
(C) photosystem II; Calvin cycle (D) Calvin cycle; photosystem I  
(E) photosystem I; Calvin cycle
- (A) 51. A nitrogen-containing carbohydrate is \_\_\_\_\_.  
(A) chitin (B) glucose (C) starch (D) cellulose (E) glycogen
- (E) 52. Which method **CANNOT** detect the gene expression levels?  
(A) Northern blotting (B) RT-PCR (C) DNA microarray assay  
(D) in situ hybridization (E) SNP
- (A) 53. In eukaryotic cell, a mature mRNA does **NOT** contain \_\_\_\_\_.  
(A) promoter (B) 5' CAP (C) 5' UTR (D) 3' UTR (E) poly-A tail
- (A) 54. Which of the following statements about human immunodeficiency virus (HIV) is **FALSE**?  
(A) HIV is double –stranded RNA virus.  
(B) HIV is equipped with reverse transcriptase.  
(C) It can infect T lymphocytes and cause AIDS.  
(D) Its genome serves as template for DNA synthesis and the newly made viral DNA can integrate into the host's chromosome as provirus.  
(E) The host's RNA polymerase transcribes the proviral DNA into mRNAs and viral genomes.
- (B) 55. Which of the following statements concerning “genomic imprinting” is **FALSE**?  
(A) It is an exception to standard Mendelian inheritance.  
(B) In many cases, methylation of cytosine involves in genomic imprint during embryo formation.  
(C) A given allele will have different effect that depends on father or mother passed along the allele.

- (D) Most of the known imprinted genes are critical for embryonic development in mammal.  
 (E) In heterozygous of normal and recessive mutant Igf2 gene, the dwarf phenotype can be seen.
- (E) 56. Which statement about DNA replication is true?  
 (A) Helicase breaks, swivels, and rejoins the parental DNA.  
 (B) Topoisomerase unwinds and separates the parental DNA strands.  
 (C) Primase synthesizes DNA primers, using the parental DNA as a template.  
 (D) In *E. coli*, DNA polymerase I and II are the main enzymes in synthesis of new DNA.  
 (E) Okazaki fragments are found both in *E. coli* and eukaryotes.
- (B) 57. Which of the followings is an extending Mendelian genetics for two or more genes?  
 (A) pleiotropy (B) epistasis (C) multiple alleles  
 (D) incomplete dominance (E) codominance
- (C) 58. If there are 24 chromatids in a mammalian skin cell, how many kinetochores are there?  
 (A) 6 (B) 12 (C) 24 (D) 36 (E) 48
- (C) 59. Which of the following statements concerning mitochondria are correct, **EXCEPT** \_\_\_\_\_.  
 (A) mitochondrion is a double membrane organelle  
 (B) both pyruvate oxidation and Krebs cycle are carried out in mitochondria matrix  
 (C) chemiosmosis can promote ATP hydrolysis  
 (D) most mitochondria genes are maternal inheritance in human  
 (E) leber's hereditary optic neuropathy is a mitochondria disorder
- (A) 60. The bundle branches and Purkinje fibers conduct impulses from the \_\_\_\_\_.  
 (A) AV node to the ventricles (B) AV node to the SA node  
 (C) SA node to the atria (D) SA node to the AV node  
 (E) atria to the SA node

II. 【單選題】61-80 題，每題 2 分，共計 40 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。

- (C) 61. Which of the following statements is **FALSE**?  
 (A) The presence of scaffolding proteins can increase the efficiency of signal transduction.  
 (B) Enzyme cascades amplify the cell's response to a signal.  
 (C) Inositol triphosphate and diacylglycerol are produced by phospholipase A cleavage of certain kind of phospholipid.  
 (D) Phosphodiesterase converting cAMP to AMP is one of the ways to terminate the signal.  
 (E) The activation of cell surface receptors of growth factors may regulate the activity of a specific gene.
- (C) 62. Regarding photosynthesis, which statement is **INCORRECT**?  
 (A) Light-harvesting complex may consist of chlorophyll a, chlorophyll b and carotinoids.  
 (B) RuBp carboxylase-oxygenase is thought to be the most abundant protein on Earth.  
 (C) In C<sub>4</sub> pathway, PEP carboxylase promotes CO<sub>2</sub> to be added to malate.  
 (D) Sugarcane is a kind of C<sub>4</sub> plant.  
 (E) C<sub>4</sub> plants contain C<sub>4</sub> and C<sub>3</sub> pathways.
- (D) 63. In a dark environment, plants will grow toward light in a response called phototropism. Which of the followings is an **INCORRECT** statement regarding phototropism?  
 (A) Phototropism is caused by a chemical signal.  
 (B) One chemical involved is auxin.  
 (C) Auxin causes an increase in growth on one side of the stem.

- (D) Auxin causes a decrease in growth on the side of the stem exposed to light.  
 (E) Removing the apical meristem prevents phototropism.
- (A) 64. The result of double fertilization in angiosperms leads to \_\_\_\_\_.  
 (A) formation of both a diploid embryo and triploid endosperm  
 (B) the endosperm developing into a diploid nutrient tissue  
 (C) formation of a triploid zygote  
 (D) two embryos in every seed  
 (E) the fertilized antipodal cells developing into the seed coat
- (E) 65. Which type of biome would most likely occur in a climate with mild, rainy winters and hot, dry summers?  
 (A) desert (B) taiga (C) temperate grassland  
 (D) temperate broadleaf forest (E) chaparral
- (D) 66. Which statement is **FALSE**?  
 (A) Succession is predictable.  
 (B) Pioneer species have wide ranges of tolerances.  
 (C) Pioneer plant species are usually small annuals with an abundance of easily dispersed seeds.  
 (D) The succession that occurs in an abandoned field is primary succession.  
 (E) Climax species are those that are best adapted to the specific climate where the succession occurs.
- (B) 67. Which of the followings is a trend in the evolution of land plants?  
 (A) Decrease in the size of the leaf  
 (B) Reduction of the gametophyte phase of the life cycle  
 (C) Elimination of sperm cells or sperm nuclei  
 (D) Increasing reliance on water to bring sperm and egg together  
 (E) Increasing spore size
- (C) 68. Prokaryotic organisms have recently been divided into two domains, Bacteria and Archaea. This division is based on characteristics such as \_\_\_\_\_.  
 (A) circular genome  
 (B) no nucleus or membrane-bound organelles  
 (C) presence or absence of histones  
 (D) no introns  
 (E) all of the above
- (D) 69. Assuming complete dominance, crosses between two dihybrid F1 plants, which are offspring from a cross AABB x aabb, result in F2 phenotype ratios of \_\_\_\_\_.  
 (A) 1:2:1 (B) 3:1 (C) 1:1:1:1 (D) 9:3:3:1 (E) 9:1
- (A) 70. Inbreeding and small population size of a threatened species can combine to form a downward spiral for the species known as a(n) \_\_\_\_\_.  
 (A) extinction vortex  
 (B) random change of allele frequencies attributable to chance  
 (C) random mutation  
 (D) accelerated evolution of new traits  
 (E) none of the possibilities are correct
- (E) 71. Which is **NOT** a recognized hypothesis to account for the strong competitive ability of invasives?  
 (A) Enemy release (B) Superior competition  
 (C) Lack of environmental constraints (D) Propagule pressure

- (E) Climate pre-adaptation
- (B) 72. If a community exhibits lognormal rank abundance, we may conclude there are \_\_\_\_\_.  
 (A) a large number of rare species, a large number of common species, and a few species of intermediate rank  
 (B) a few rare species, a few common species, and a large number of species of intermediate rank  
 (C) a few rare species and a large number of very common species  
 (D) a few common species and a large number of rare species  
 (E) rare species are very common
- (B) 73. A new menstrual cycle begins with the production of \_\_\_\_\_, following the removal of inhibition by combination of \_\_\_\_\_.  
 (A) GnRH, FSH and LH (B) GnRH, estradiol and progesterone  
 (C) LH, estradiol and progesterone (D) estradiol, FSH and LH  
 (E) estradiol, GnRH and LH
- (A) 74. Which of the followings is **NOT** true of G protein-coupled receptors (GPCRs)?  
 (A) GPCRs are cell-surface transmembrane receptors that work with the help of monomer G proteins.  
 (B) GPCRs have similar structure in which a single polypeptide has seven transmembrane helices.  
 (C) Epinephrine can target the same type of GPCR in liver cell and skeletal muscle blood vessel.  
 (D) G protein systems are involved in cholera and pertussis diseases.  
 (E) G protein functions as a molecular switch that is either on or off depending on GTP or GDP is attached.
- (B) 75. Which of the following statements about genome is **FALSE**?  
 (A) Usually, the gene density of archaea genome is higher than eukaryotes.  
 (B) Usually, the number of genes of archaea genome is more than eukaryotes genome.  
 (C) The genome size of archaea is less than eukaryotes.  
 (D) The number of genes of fruit fly genome is less than Arabidopsis thaliana genome.  
 (E) The number of genes of fruit fly genome is less than C. elegans genome.
- (C) 76. Which of the following statements concerning human embryonic development is correct?  
 (A) Inner cell mass is a group of cells that cluster at one end of the gastrula.  
 (B) The trophoblast, the outer epithelium of the gastrula, supports embryo growth.  
 (C) The trophoblast continues to expand into the endometrium, and four new extraembryonic membranes appear.  
 (D) By the end of blastocyst, three embryonic germ layers have formed.  
 (E) By the end of gastrulation, the extraembryonic ectoderm and extraembryonic membranes surround the embryo.
- (B) 77. Which of the following descriptions about muscle and skeletal system is **NOT** true?  
 (A) The strength of a muscular contraction is determined by the number of neurons delivering action potentials.  
 (B) Skeletal, cardiac, and smooth muscle all have transverse tubules.  
 (C) A hydrostatic skeleton consists of fluid held under pressure in a closed body compartment.  
 (D) Gap junctions provide direct electrical coupling between the cardiac muscle cells.  
 (E) Calcium ions cause smooth muscle contraction by binding to calmodulin.
- (B) 78. The correct sequence of the cardiac cycle in a healthy adult human is \_\_\_\_\_.  
 (1. atrial systole and ventricular diastole 2. ventricular systole and atrial diastole 3. atrial and ventricular systole 4. atrial and ventricular diastole)  
 (A) 1 → 3 → 2 (B) 4 → 1 → 2 (C) 4 → 2 → 1 (D) 2 → 4 → 3 (E) 1 → 4 → 3



- (C) 79. Which of the following statements concerning hormonal control of digestion is **FALSE**?
- (A) Secretin stimulates the pancreas to release bicarbonate.
  - (B) Cholecystokinin (CCK) stimulates the release of digestive enzymes from the pancreas and of bile from the gallbladder.
  - (C) Both secretin and CCK act on the stomach to promote secretion of gastric juices.
  - (D) Secretin and CCK are released from duodenum.
  - (E) Gastrin is released from stomach and regulates production of gastric juices.
- (B) 80. Which of the following statements concerning regulation of eukaryotic gene expression is **FALSE**?
- (A) DNA methylation can activate or inactivate gene expression.
  - (B) Acetylation of histone tails promotes condensation of the chromatin.
  - (C) Enhancers are segments of DNA that may be within an intron.
  - (D) Unlike operons in *E. coli*, dispersed genes can be coordinately controlled by transcription activators or repressors in eukaryotes.
  - (E) Alternative RNA splicing can produce different mRNA molecules from the same primary transcript.

點

醫

護

【版權所有，翻印必究】