

※ 注意：請於試卷內之「非選擇題作答區」依序作答，並應註明作答之大題及小題題號。

I. 配合題-將左邊名詞的最適名詞解釋，從右邊選出 (20 points, 4 points each)

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| 1. Red Queen Hypothesis | A. The expression of the phenotype under different environmental conditions |
| 2. Norm of Reactions | B. Maintenance of a homogenous nucleotide sequence among the members of a gene family, which evolves over time |
| 3. Co-option | C. Each species has to evolve as fast as possible to survive because its competitors also continue to evolve |
| 4. Concerted evolution | D. A pattern of rapid evolutionary change in the phenotype of a lineage separated by long periods of little change |
| 5. Punctuated equilibria | E. The evolution of a function for a gene than the one it was originally adapted for |

II. 名詞解釋 (32 points, 4 points each)

1. Canalization
2. Cost of sex
3. Phylogeography
4. Apomorphy
5. Macroevolution
6. Fitness
7. Genetic drift
8. Neutral theory

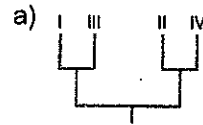
III. 問答題 (28 points)

1. What is "RNA world"? (4 points) What are the evidence suggesting "RNA world" hypothesis? (4 points) What experimental data suggest that nature selection and evolution might operate in an "RNA world"? (5 points)
2. Based on biological species concept, reproductive isolation at various stages prevent genetic exchange between two species. Please list and explain five isolation mechanisms. (5 points)
3. Using protein electrophoresis, Lewontin and Hubby (1966) examined 18 loci in population of *Drosophila pseudoobscura*. In every population, about one-third of the loci were polymorphic, represented by two to six different alleles, and these alleles segregated at high frequency. Please explain the importance of Lewontin and Hubby's work in evolution. (5 points)
4. Compare and contrast the "out-of-Africa hypothesis" and "multiregional hypothesis" for human evolution. (5 points)

IV 簡答題 (20 points)

1. 由表中四個物種的DNA序列分析看來，利用最簡約法則 (most parsimonious)，哪一株重建的演化樹最能代表這些物種的演化關係？答案需列出分析演算過程。(10分)

Sites in DNA Sequence							
Species	1	2	3	4	5	6	7
I	A	G	C	A	A	G	T
II	G	G	A	A	G	G	T
III	G	A	C	T	A	C	T
IV	G	A	C	A	G	C	G



2. 人為栽培的某種草莓，因市場上普遍喜歡糖份更多、重量更重的果實，但果農往糖份多、果實重兩個性狀不斷人擇選汰四個子代後，發現只能使子代果實重量增加，但糖份無法變的更多，這現象可以用演化生物學中哪些觀念來解釋？(5分)。若果農想育種出高重量果實，已知栽培草莓族群中重量性狀每世代遺傳累加變量 (additive genetic variance) 等於 1.25 g^2 ，而每世代能產生之重量外表型變量 (phenotypic variance) 等於 2.0 g^2 。若果農一開始所選的世代族群果實平均重量是50克，每一代果農選擇差異 (selection differential) 增加量是2克，請問兩代之後，果實平均重量能提高至多少克？需列出算式。(5分)

試題隨卷繳回