(一) 配合題 (2 points each)

A. Phenotypic plasticity
B. Quantitative trait
C. Antagonistic pleiotropy
D. Sexual selection
E. Biological species
F. Ecological speciation
G. Sympatric speciation
H. Conservative characters
I. Gene family
J. Horizontal gene transfer
K. Pseudogene

1. ____ A nonfunctional member of a gene family that has been derived from a functional gene.
2. ____ A population or group of populations within which genes are actually or potentially exchanged by inter-breeding, and which are reproductively isolated from other such groups.
3. ____ A phenotypic character that varies continuously rather than as discretely different character states.
4. ____ Movement of genes between individual organisms other than by transmission from parents to their offspring.
5. ____ Speciation in the same geographic location.
6. ____ Two or more loci with similar nucleotide sequences that have been derived from a common ancestral sequence.
7. ____ Speciation caused by divergent selection, by ecological factors, on characteristics that contribute to reproductive isolation.
8. ____ The capacity of an organism to develop any of several phenotypic states, depending on the environment.
9. ____ Features that evolve slowly and are retained with little or no change for long periods of evolutionary time
10. ____ Differential reproduction as a result of variation in the ability to obtain mates.
11. ____ Contrasting effects of a gene on two different characters, such that the effect of an allele substitution on one character increases fitness, but the effect on the other character decreases fitness.

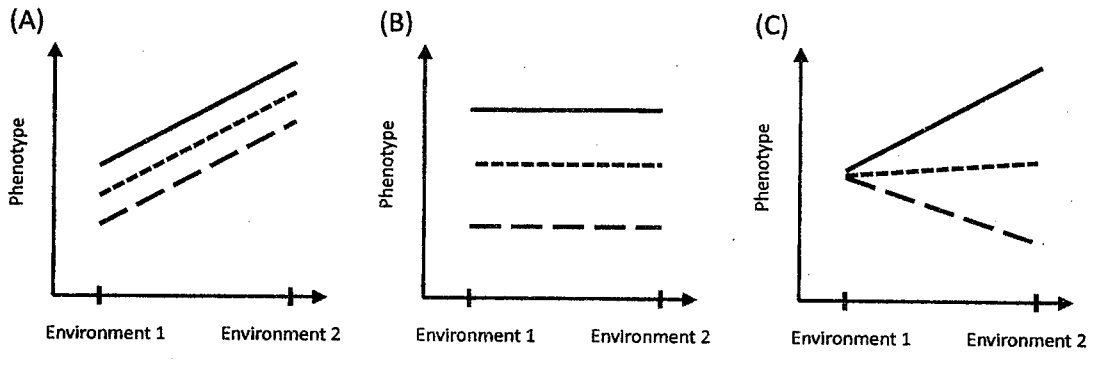
見背面

(二) 名詞解釋 (3 points each)

1. Adaptation
2. Kin selection
3. Bottleneck
4. Inbreeding
5. Polymorphism
6. Fitness
7. Maternal effect
8. Heterozygous advantage
9. Euploid
10. Locus

(三) 題組 (2 points each)

Below is the "reaction norm" of the phenotypes (the vertical axis) of three different genotypes (three lines) in two different environments (the horizontal axis). In (A) and (B), the lines are parallel to each other.



1. ____ Which one has genotype-by-environment interaction effect?
2. ____ Which one has both genetic and environmental effect, but not genotype-by-environment interaction?
3. ____ Which one has only genotype but no environmental effect?

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(四) 問答題

1. (6 points) Explain "**biological species concept**"

2. (6 points) Premating barriers between species reduce the likelihood to transfer gametes to members of other species. Please give one example of premating barrier in **plant**.

3. (5 points) In many cases sexual reproduction is more costly than asexual reproduction: Individuals need to spend time searching for and use energy to compete for mates. Why can sexual reproduction still evolve from asexual reproduction? Please give **one advantage** of sexual reproduction.

4. (5 points) A naturally outcrossing species, if forced to perform inbreeding (self-fertilization or mating between close relatives), the progeny would often have lower fitness. This is called inbreeding depression. Please give **one explanation** why inbreeding depression happens.

5. The genotype frequencies of a locus within a population are listed below.

	A_1A_1	A_1A_2	A_2A_2
Observed	181	239	80

5A. (5 points) What are the **allele frequencies** of A1 and A2?
5B. (5 points) What are the **frequencies** of three expected genotypes under Hardy-Weinberg equilibrium?

6. (10 points) On average 5% of offspring of genotype A are able to survival to reproduce and that percentage for genotype B is 3%. The number of egg laid by adult of genotype A is 20 and by adult of genotype B is 30. Which genotype has higher fitness?

試題隨卷繳回