題號： 97
科目：生態學(B)
節次： 4

國立臺灣大學 105 學年度碩士班招生考試試題

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答案請填寫於試卷內，附上題號，並依序作答。可用中文或英文作答。

一、選擇題 (每題 3 分，共 30 分)

1. Which of the following statements is most likely to be true about two species? A) they occupy different niches; B) they can never hybridize; C) they will intergrade extensively if they occur in the same area; D) none of the above is true

2. The realized niche of an organism is A) the area a species can occupy in the face of exploitive competition; B) the habitat of a species within a community resulting from clumping; C) the habitat that exists in nature as opposed to the ideal; D) the actual space that an organism inhabits and the resources it can access

3. Gause's principle of competitive exclusion is, essentially, A) the more abundant species will exclude the less abundant species through competition; B) competition for the same resources excludes species having different life styles; C) no two species can occupy the same niche indefinitely when resources are limited; D) larger organisms exclude smaller ones through competition as in the case of large trees controlling underbrush

4. A lake rich in nutrients and species is classified as A) dystrophic; B) oligotrophic; C) eutrophic; D) ecotrophic

5. Fighting over shared resources is called A) character displacement; B) competitive exclusion; C) predation; D) exploitative competition; E) interference competition

6. Which of the following statements about symbiotic relationships is true? A) in a parasitic relationship, both organisms are harmed; B) symbiotic organisms have usually undergone little or no coevolution; C) a relationship that appears to be commensalistic may in fact be mutualistic or parasitic; D) the most efficient type of parasite is one that kills its host; E) none of the above is true

7. A metapopulation is A) a population in an urban area; B) a network of distinct and non-interacting species C) a population that constantly occupies all suitable habitats in an area; D) a network of distinct but interacting species

8. r strategists tend to have A) few offspring; B) little parental care; C) sigmoid growth curves; D) all of the above; E) none of the above

9. The number of individuals that a particular place can support indefinitely is called the A) biotic potential; B) survivorship; C) cohort; D) carrying capacity; E) community

10. Keystone species are A) Species important in animal's social structure; B) Species that determines that shape of the community; C) The prime predators of a communities D) the species that were most numerically dominant

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二、簡答(共 15 分)

A) (5 分) Based on the bottom-up cascade hypothesis, draw arrows in the following diagram to describe changes in abundance over time for different trophic levels following the eutrophication of the ecosystem. (答案請填寫於試卷內，勿於試題上作答)

B) (5 分) Based on the top-down cascade hypothesis, draw arrows in the following diagram to describe changes in abundance over time for different trophic levels following fisheries' removal of top predators. (答案請填寫於試卷內，勿於試題上作答)

C) (5 分) Based on the wasp-waist hypothesis, draw arrows in the following diagram to describe changes in abundance over time for different trophic levels following fisheries' removal of 'Wasp-waist' prey. (答案請填寫於試卷內，勿於試題上作答)
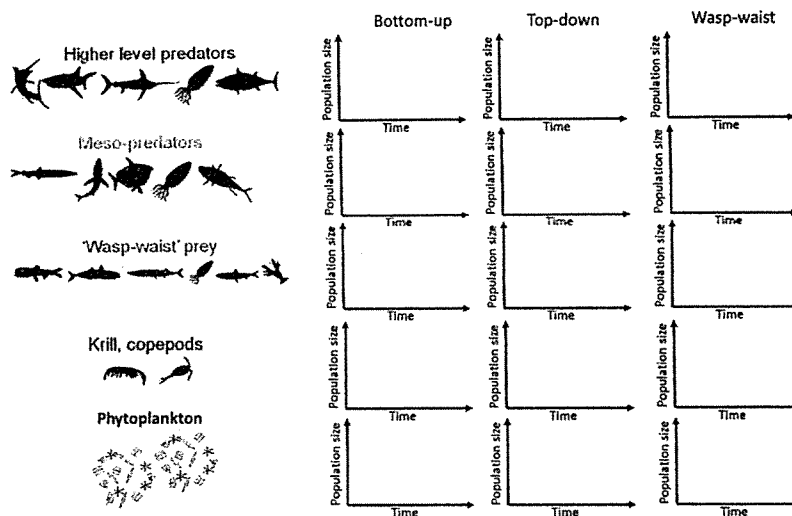
三、簡答(每題 7 分，共 35 分)

A) (7分) **Sea level rise (SLR):** Due to thermal expansion of seawater caused by global warming and the melting of major land ice, the global sea level has been rising at a rate of 3 mm/year. The sea level is expected to rise 2 m by the end of this century. Describe one potential impact of SLR on marine organisms or communities.

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B) (7分) **Biodiversity-ecosystem function (BEF):** Describe the possible mechanism caused one the following three BEF relationships
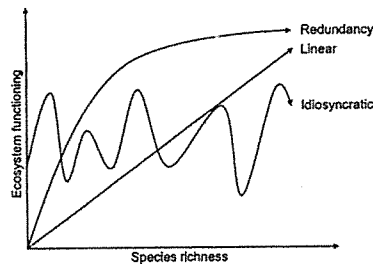

C) (7分) **Intermediate disturbance hypothesis (IDH):** Using IDH to explain how disturbance and competition may shape biodiversity pattern
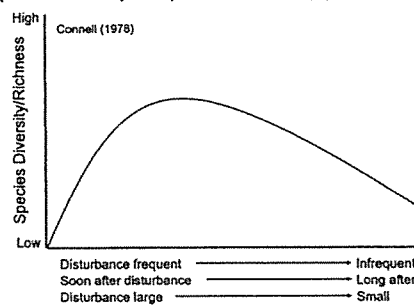
D) (7分) **Latitudinal diversity gradient (LDG):** The increase in species richness or biodiversity from the poles to the tropics is one of the most widely recognized patterns in ecology. Describe one possible ecological hypothesis to explain the LDG pattern.

E) (7分) **Alternative stable state (ASS):** Catastrophic shifts between states can occur in nature and are often surprising and difficult to reverse. Use examples and the following ball-in-cup model to describe one of the two possible mechanisms of ASS in ecology.

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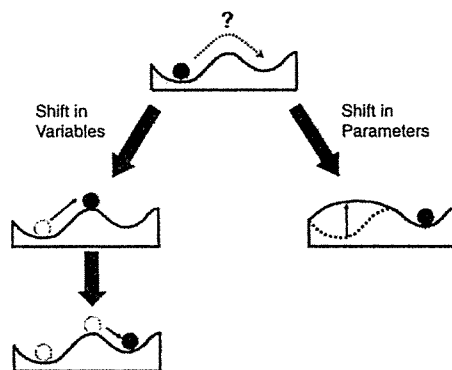
四、計算與簡答題(每題 10 分，共 20 分)

A) Please calculate biodiversity across spatial scales in the following hypothetical intertidal rocky shore habitats. Different symbols in the heuristic diagram represent different species. You can use any diversity indices of your choice (including the numbers of species) to answer the following questions: a) (2.5 分) Alpha (within-habitat) diversity for each habitat; b) (2.5 分) Beta (between-habitat) diversity between the habitats; c) (2.5 分) Gamma (landscape) diversity among all habitats; d) (2.5 分) Based on your assessment, which habitats are likely healthy vs. polluted intertidal rocky shores? Please give your reasoning.

Habitat A   Habitat B
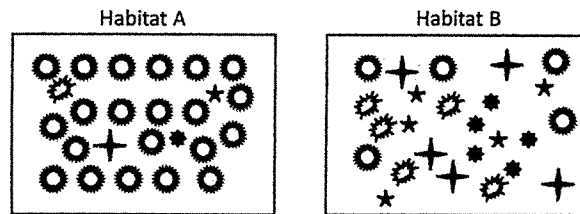
B). A single age group (or cohort) of the dragonfly *Epitheca spp* was quantitatively sampled at regular intervals throughout a year (from 30-May 2014 to 28-Mar, 2015). The production between each interval can be calculated from their population density (N) and individual mass (W), as well as the increase of individual mass (ΔW) and average population density ($\bar{N}$) between intervals. Please calculate the annual (or cohort) production for the dragonfly Epitheca spp using the following table. (a) (5 分) correctly filling out the table; (b) (5 分) Annual production (reported with unit)?

Date	N (no./m^2)	W (mg)	ΔW (mg)	$\bar{N}$ (no./m^2)	$\bar{N}\,\Delta W$
30-May	279.0	0.076			
13-Jun	172.0	0.344			
27-Jun	139.8	0.898			
11-Jul	96.8	1.919			
25-Jul	145.5	4.256			
7-Aug	80.6	6.344			
28-Aug	75.3	9.080			
27-Sep	53.8	11.989			
25-Oct	43.0	18.991			
22-Nov	59.1	24.832			
24-Jan	43.0	25.709			
28-Mar	16.1	27.670			

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