

本試題是否可以使用計算機：可使用，不可使用（請命題老師勾選）

2006 Entrance examination for life sciences master's program—ecology

一、解釋名詞：每題五分（請解釋名詞定義及意涵 40%）

1. cline
2. genetic drift
3. fitness
4. balanced polymorphism
5. naturalized plant vs. weed
6. species invasion vs. species richness
7. ectomycorrhiza vs. endomycorrhiza
8. detritivory vs. herbivory

二、問答題 (50%)

1. What is global warming? According to your knowledge, which population (or community/ecosystem) in Taiwan is most vulnerable to global warming? Why do you think so? (10%)

2. Give an example of metapopulation structure. To understand the sustainability of this metapopulation, what ecological variables will you study? And why? (10%)

3. Please read the following sentence carefully and then answer the question.

Consider a species of lizard that is known to occur only in Taiwan. The currently most comprehensive information shows that there are five populations existing at five areas of different types of habitats, all are south of 濁水溪, and west of 高屏溪、阿里山、and 玉山山脈. Each of these five areas is apart from one another in different distances of more than 10 km. Within a year and a population, these lizards may move along elevations, but never go beyond 1000 m high. They don't seem to move far enough from one area to another either. Within a population, young lizards tend to leave their birth place for living, but a certain proportion of individuals constantly return to their birth places to reproduce. In each mating event one male will mate with one female only, and leave the female to lay eggs, but both males and females may mate more than one time during the entire breeding season, and they don't necessarily mate with the same lizard. Often, females tend to mate with a male with more reddish bands on their back and a longer tail, but males also will fight each other for the chance to mate with a female. On average, lizards in hill forest lay fewer eggs each time than those in lowland and coastal areas. The mortality rate of eggs is nearly 55%, which remains throughout the life stage of lizards till adulthood. The mortality rate is similar between males and females, but young lizards hatched from eggs tend to have 1.5 times of females than males. Their life span is about 5-year long, and so far we found relatively similar number of individuals in each age class.

Based on the provided information, provide five specific ecological terms (in English, please), and their respective information found in the text, to describe the population properties of this lizard (10%).

4. Distinguish scramble vs. contest competition and numerical vs. functional response of predators (10%)

(背面仍有題目,請繼續作答)

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5. Species A and Species B both eat the same nut from a certain tree. Species A has a beak that is better equipped to open the nut than species B. Because Species A uses the resource more efficiently, Species B will eventually be eliminated. What is this called? (2.5%)

6. What is the major problem in the study of microbial communities? (2.5%)

7. What class of chemical is given most credit with the destruction of the Ozone Layer. (2.5%)

8. What is the energy source that drives the water cycle. (2.5%)

### 三、選擇題(10%)

In the following multiple choice questions there can be any number of answers, including none.

1. Coexistence of closely related species having similar niches:

- A. is promoted by niche displacement
- B. is more likely when there is significant intraspecific variation in one or more of the species
- C. can't happen because of Gause's Rule
- D. can result in character displacement

2. Rapidly changing habitats generally are favorable to:

- A. K-selected species
- B. species which reproduce numerous times in their lives
- C. small organisms
- D. organisms which practice exploitative competition

3. In extremely dense populations (i.e., those exceeding carrying capacity):

- A. emigration must occur
- B. decreases in reproductivity must eventually occur
- C. increased death rates must eventually occur
- D. none of these must occur

4. Ultraviolet radiation:

- A. Has a longer wavelength than visible light.
- B. Increases in solar radiation as carbon dioxide decreases
- C. Causes cellular damage by altering DNA
- D. Is not dangerous to human skin

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5. Acid rain is:

- A. caused by gases such as NO<sub>2</sub> and SO<sub>3</sub> in rainwater
- B. any precipitation with a pH less than 7.0
- C. is harmful where buffering materials are present
- D. is most harmful where cations such as aluminum and lead are common

6. Why are mature ecosystems said to be closed systems?

- A. there is no cycling of nutrient
- B. the nutrients are mostly intrabiotic
- C. the nutrients mostly are tied up in the soil
- D. energy is very scarce at trophic levels of large, fierce animals

7. What percentage of the world's water is fresh?

- A. 25%
- B. 1%
- C. .75%
- D. 3%

8. Which of the following is responsible for the most water usage?

- A. Homes
- B. Industries and Factories
- C. Landscaping
- D. Agriculture

9. Select the correct order from the choices below:

- A. Ecosystem, population, community, organism
- B. Population, organism, ecosystem, community
- C. Organism, population, community, ecosystem
- D. Community, population, organism, ecosystem

10. Who wrote "Silent Spring"?

- A. James Watt
- B. Rachel Carson
- C. Aldo Leopold
- D. Henry Thoreau