

國立中山大學 106 學年度碩士暨碩士專班招生考試試題

科目名稱：科學英文【海資系碩士班乙組】

題號：452002

※本科目依簡章規定「不可以」使用計算機(問答申論題)

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PART I Essay questions (問答題 60%, 每題 10 分)

1. Differences in the sensitivity of marine species to ocean acidification will influence the structure of marine communities in the future. Reproduction is critical for individual and population success, yet is energetically expensive and could be adversely affected by rising CO₂ levels in the ocean. We investigated the effects of projected future CO₂ levels on reproductive output of two species of coral reef damselfish, *Amphiprion percula* and *Acanthochromis polyacanthus*. Adult breeding pairs were maintained at current-day control (446 μ atm), moderate (652 μ atm) or high CO₂ (912 μ atm) for a 9 month period that included the summer breeding season. The elevated CO₂ treatments were consistent with CO₂ levels projected by 2100 under moderate (RCP6) and high (RCP8) emission scenarios. Reproductive output increased in *A. percula*, with 45–75 % more egg clutches produced and a 47–56 % increase in the number of eggs per clutch in the two elevated CO₂ treatments. In contrast, reproductive output decreased at high CO₂ in *Ac. polyacanthus*, with approximately one-third as many clutches produced compared with controls. Egg survival was not affected by CO₂ for *A. percula*, but was greater in elevated CO₂ for *Ac. polyacanthus*. Hatching success was also greater for *Ac. polyacanthus* at elevated CO₂, but there was no effect of CO₂ treatments on offspring size. Despite the variation in reproductive output, body condition of adults did not differ between control and CO₂ treatments in either species. Our results demonstrate different effects of high CO₂ on fish reproduction, even among species within the same family. A greater understanding of the variation in effects of ocean acidification on reproductive performance is required to predict the consequences for future populations of marine organisms [Welch, M.J. & Munday, P.L. Coral Reefs (2016)].

Read the above article then answer the following two questions.

Question 1: What is “ocean acidification”? (以英文作答, 10 分)

Question 2: Please describe the significant findings of this study. (以英文作答, 10 分)

2. Trophic cascades occur when predators in a food web suppress the abundance or alter the behavior of their prey, thereby releasing the next lower trophic level from predation (or herbivory if the intermediate trophic level is a herbivore). For example, if the abundance of large piscivorous fish is increased in a lake, the abundance of their prey, smaller fish that eat zooplankton, should decrease. The resulting increase in zooplankton should, in turn, cause the biomass of its prey, phytoplankton, to decrease. (This article is excerpted from Wikipedia)

Read the above paragraph then answer the following two questions.

Question 1: What is “trophic cascade”? (以中文作答, 10 分)

Question 2: Please give an example of trophic cascade you can find in the marine ecosystem. (以中文作答, 10 分)

3. Read the description below and following two cases then determine which type of speciation they belong to.

In general, there are 4 types of speciation including

Allopatric speciation: a population splits into two geographically isolated populations (for example, by habitat fragmentation due to geographical change such as mountain formation). The isolated populations then undergo genotypic or phenotypic divergence as: (a) they become subjected to dissimilar selective pressures; (b) they independently undergo genetic drift; (c) different mutations arise in the two populations.

Peripatric speciation: In peripatric speciation, a subform of allopatric speciation, new species are formed in isolated, smaller peripheral populations that are prevented from exchanging genes with the main population. It is related to the concept of a founder effect, since small populations often undergo bottlenecks. Genetic drift is often proposed to play a significant role in peripatric speciation.

Parapatric speciation: In parapatric speciation, there is only partial separation of the zones of two diverging populations afforded by geography; individuals of each species may come in contact or cross

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habitats from time to time, but reduced fitness of the heterozygote leads to selection for behaviours or mechanisms that prevent their interbreeding. Parapatric speciation is modelled on continuous variation within a "single," connected habitat acting as a source of natural selection rather than the effects of isolation of habitats produced in peripatric and allopatric speciation.

Sympatric speciation: Sympatric speciation refers to the formation of two or more descendant species from a single ancestral species all occupying the same geographic location.

1. Africa's Lake Victoria is home to one of evolution's greatest experiments. In its waters, what began as a single lineage belonging to the cichlid family of fishes has since given rise to a dazzling array of forms. These cichlids represent a textbook example of what biologists term an adaptive radiation—the phenomenon whereby one lineage spawns numerous species that evolve specializations to an array of ecological roles. The more than 500 species that live there and only there today all evolved within the past 15,000 to 10,000 years. (Scientific American) (以中文作答, 10 分)
2. Darwin's finches (also known as the Galápagos finches) are a group of about fifteen species of passerine birds. They are often classified as the subfamily Geospizinae or tribe Geospizini. They belong to the tanager family and are not closely related to the true finches. The closest known relative of the Galápagos finches is *Tiaris obscura*. They were first collected by Charles Darwin on the Galápagos Islands during the second voyage of the Beagle. Apart from the Cocos finch, which is from Cocos Island, the others are found only on the Galápagos Islands. (Wikipedia) (以中文作答, 10 分)

PART II Translation (翻譯 40%)

For each of the following articles, please translate into Chinese 英翻中 (20%, 20 分)

In 2016, record oceans temperatures have led to record widespread coral bleaching on Australian coral reefs. This bleaching is part of the ongoing third global bleaching event, declared by the National Oceanic and Atmospheric Administration (NOAA) in 2015.

Between February and May, the Great Barrier Reef experienced record warm sea surface temperatures. Extensive field surveys and aerial surveys found bleaching was the most widespread and severe in the Far Northern management area, between Cape York and Port Douglas. Here, bleaching intensity was 'Severe' (more than 60% community bleaching). Bleaching intensity decreased along a southerly gradient. While most reefs exhibited some degree of bleaching, this bleaching varied in intensity (from less than 10% to over 90% community bleaching) and was patchy throughout most of the management area. (View the GBRMPA map for more information.)(Australian Institute of Marine Science)

For each of the following articles, please translate into English 中翻英(20%, 20 分)

大部分的深海珊瑚生長緩慢而且脆弱，容易被底拖漁具破壞。美國國家海洋大氣管理局（NOAA）不惜砸重金研究，經過三年的調查，定位珊瑚棲地，舉辦工作坊與漁民溝通，劃出禁止底拖的地區和界線。該保護區位於美國大西洋中部外海，面積超過 3 萬 8000 平方英里，約合 9 萬 8000 多平方公里，相當於 2.7 個台灣。（環境資訊中心）