

國立彰化師範大學 100 學年度碩士班招生考試試題

系所：生物學系

組別：甲組

科目：演化生態學

☆☆請在答案紙上作答☆☆

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1. 請讀完下列有關 genetic drift 的描述，說明並闡述之。(10 分)

In each generation, some individuals may, just by chance, leave behind a few more descendents (and genes) than other individuals. The genes of the next generation will be the genes of the “lucky” individuals, not necessarily the healthier or “better” individuals. That is genetic drift. It happens to ALL populations—there’s no avoiding the vagaries of chance. Genetic drift affects the genetic makeup of the population but, unlike natural selection, through an entirely random process. So although genetic drift is a mechanism of evolution, it doesn’t work to produce adaptations.

2. 請讀完下列有關 coevolution 的描述，說明並闡述之。(10 分)

Sexual selection theory predicts a coevolution between male sexual ornamentation and female preference. The implication of this prediction for sensory ecology is that there should be a tight coupling between the physiology of male signal production and the physiology of female signal reception. Indicator models of sexual selection predict that male ornamentation is correlated with male condition, and that female preference is correlated with male ornamentation. Indicator models of sexual selection have a conceptual overlap with resource acquisition and investment models of behavioral ecology. Empirical studies with fishes, particularly with guppies (*Poecilia reticulata*) and threespine sticklebacks (*Gasterosteus aculeatus*), suggest a strong connection between acquired resources, male condition, male ornamentation, male courtship, and female preference.

3. 請利用下圖說明，脊椎動物演化的歷史，說明中一定要包括的內容：sister group、monophyletic group、paraphyletic group、shared character、synapomorphy、plesiomorphy。(15 分)

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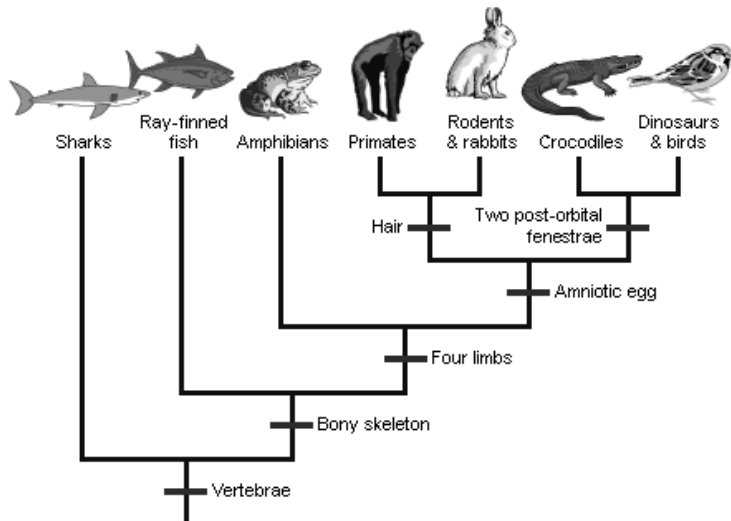
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4. 請闡述說明 Mutation、Gene flow、Sexual reproduction，如何作用和影響一個族群內的基因變化(Genetic Variation)。(15 分)
5. 請說明下段文字描述生態學的內容 (10 分)

Organisms are open systems that interact continuously with their environment. The scientific study of the interactions between organisms and the environment is called ecology (from the Greek oikos, home, and logos, to study). It is these interactions that determine both the distribution of organisms and their abundance leading to three questions that ecologists often ask about organisms: Where do they live? Why do they live where they do? And how many are there?

6. 請說明何謂生態學上的能量金字塔 (energy pyramid)、生物量 (pyramid of biomass) 及數量金字塔 (pyramid of numbers)? (15 分)
7. 請解釋何謂 niche，及 fundamental niche 與 realized niche 的差異性(10 分)。
8. 說明行為生態學(Behavioral Biology)中 (1) Hamilton's Rule、(2) Kin Selection 及 (3) Optimal foraging theory (15%)。