一、解釋名詞 (每題4分，共40分)

1. Natural selection
2. Neo-Darwinism
3. Kimura's neutral theory
4. Runaway sexual selection
5. Evolutionary stable strategy
6. Trade-off between life histories
7. Hamilton's rule (on selection)
8. Fisher's fundamental theorem (on natural selection)
9. Modes of selection
10. Cultural evolution & Dual inheritance theory

二、簡答題 (每題10分，共60分)

1. 動物合作&利他行為與達爾文的天擇理論（Natural Selection）有何矛盾之處，如何以近代的演化生物學觀點來詮釋？

2. 試舉例說明為何生物器官的不完美性(imperfection)可以做為支持演化學的證據。

3. (1) 試給駢系群(paraphyletic group)下一個定義並繪圖說明。(2) 舉一個已知的駢系群生物類群，說明在分類系統的命名上要如何解決這個問題？

4. (1) 試舉五個Hardy-Weinberg theorem成立的先決條件（5分）。(2) 在一個雙套族群中有2000個個體，你發現在一個具有兩個等位基因(alleles)之等位基因座(locus)上的異結合型個體共有1300個。試問此族群是否處於Hardy-Weinberg equilibrium？你如何得知？若非處於平衡狀態，是什麼樣的情形或力量會導致你看到的結果？（5分）

5. 試解釋何謂生物種定義(biological species concept)？試舉一生物的例子說明這個定義可以被適當的應用，再舉一無法適用這個定義的例子

6. 閱讀下段文字並回答問題。

In the first part of the 20th century, soapberry bugs *Jadera haematoloma* (Hemiptera) that were collected in Florida tended to have extremely long beaks. These insects feed on seeds that are located within the fruits at varying distances from the fruit perimeter. At that time the most important host plant for the bugs was the Florida native large-fruited balloon vine *Cardiospermum corindum* (Sapindaceae 倒地鈴屬，無患子科). In the mid 20th century however, most populations of soapberry bugs began feeding on the small fruits of a plant that had just been imported from Asia as an ornamental species, called the flat-potted golden rain tree *Koelreuteria elegans* (台灣樂樹, Sapindaceae). The beak lengths of soapberry bugs collected are plotted in the figure (Fig. 1). How did the bugs respond evolutionarily to the new plant? What experiment could you do to test the hypothesis that the change in beak length was causally related to the new fruit? What are the expected results, and why do you think so?

見背面

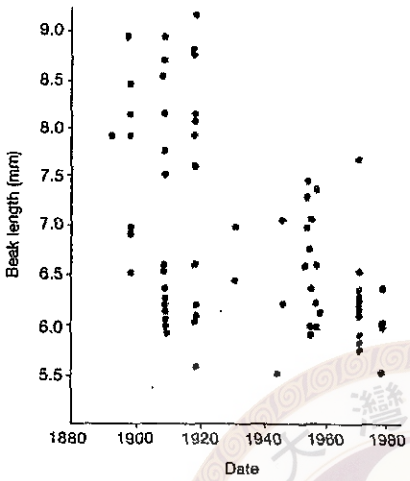

Fig. 1. The recorded beak lengths of soapberry bugs during 1880 and 1980.

試題隨卷繳回