

1. A recent paper published in the *Journal of Ethology* (行為學) reports an observation of California ground squirrels hunting, killing, and eating a vole (田鼠). From an evolutionary perspective, what is your interpretation of this behavior? (10%)
2. The Vertebrate Genomes Project aims to build a "genome ark" by sequencing the genomes of approximately 70,000 animal species, encompassing all known vertebrate species. What is the significance of this project to life, and what are the current techniques and principles used for genome sequencing? (10%)
3. Last summer, U.S. officials approved a new drug, Kisunla, which could delay the progression of Alzheimer's disease (AD). The primary component of Kisunla is an antibody. What do you think is the possible target of this antibody, and how might Kisunla work to treat AD? Could this approach be applicable to other neurodegenerative diseases? Why? (10%)
4. Several hormones play key roles in maintaining body weight homeostasis. Please explain how ghrelin, insulin, leptin, and peptide YY (PYY) interact to regulate body weight. (10%)
5. Explain how carbon dioxide (CO_2) is transported in the blood and how changes in pH affect the binding of oxygen (O_2) and carbon dioxide (CO_2) to hemoglobin. (10%)
6. Please explain the role of helper T cells in humoral and cell-mediated immune responses. (10%)
7. Explain how crossing over generates new combinations of alleles and how it is used to determine a genetic map. (10%)
8. Explain the following terms (5% each)
 - i. The luteal phase of the reproductive cycle
 - ii. Pseudocoelomate (body cavity)
 - iii. Florigen
 - iv. Cohesion-tension hypothesis of transpiration in plant
 - v. Auxin (in plant)
 - vi. Nitrogen fixation