國　立　清　華　大　學　命　題　紙

九十三學年度 生科院甲組 、生科院（結構生物學程）甲組 碩士班入學考試

科目 細胞生物學 科號 0806、1105 共 1 頁第 1 頁　*請在試卷【答案卷】內作答

Provide the best answer for the following questions

1. The fluid mosaic model is now the accepted view of membrane structure. What are the major kinds of molecules considered as (a) "fluid" part and (b) "mosaic" part of the model? Please also describe three different ways by which the molecules of mosaic part are associated with the molecules of fluid part. (**10 %**)

2. Please provide **two mechanisms** of how water moves across the plasma membrane of cells. Frog oocytes and eggs, which have an internal salt concentration of 150 mM, do not swell when placed in water with a very low solute concentration. Erythrocytes that have a similar internal solute concentration swell rapidly and burst in solutions of very low osmolarity. What could account for this difference? (Hint: 2003 Nobel Prize in Chemistry) (**10 %**)

3. Distinguish between the following: (a) endocytosis and exocytosis (b) pinocytosis and phagocytosis (**10 %**)

4. Describe in detail the mechanism underlying action potential (include Na and K conductance change, membrane potential change). (**15 %**)

5. Describe an experiment to show the existence of gap junction between adjacent cells, and an experiment to show that the gap junction is regulated by calcium. (**10 %**)

6. Why Type A persons cannot accept the blood from Type B persons? (**5 %**)

7. Describe the roles of tropomyosin and troponin in muscle contraction. (**5 %**)

8. Please describe the current models for (a) cotranslational import of polypeptides into ER lumen, and (b) posttranslational import of polypeptides into the inner membrane of mitochondria. (**14 %**)

9. Please describe (a) the structural organization of the nucleus and nuclear envelope, (b) the mechanism of how a 100 KDa transcription factor can be transported into the nucleus, and (c) the role of Ran in this process. (**21 %**)