國　立　清　華　大　學　命　題　紙

99 學年度生命科學院甲組及醫學生物科技學程碩士班入學考試

科目　細胞生物學　科目代碼　0205、0505　共 1 頁第 1 頁 *請在【答案卷】內作答

(1) Why does treadmilling of microtubules occur? (5%)
(2) What motor MAP is used to carry vesicles from rough ER to Golgi complex? Why? (5%)
(3) Describe how *Listeria* (the gram-positive bacterium) co-opts the cell's normal cell adhesion and cell motility systems to invade other eukaryotic cells. (5%)
(4) Describe an experiment to show both E-cadherin and P-cadherin on cell adhesion is homophilic interactions. (5%)
(5) What is FRET? Briefly describe its principle. (5%)

(6) Please describe the current model for the cotranslational import of polypeptides into the ER (8%)
(7) Please describe how G protein-linked receptor, via cAMP, can activate gene expression in the nucleus (8%).

(8) Please describe how mitotic Cdk-Cyclin complex (MPF) controls both G2 checkpoint and spindle assembly checkpoint (9%).

(9) A molecule has a characteristic size and shape. Why molecular shape is crucial in biology? (5%)
(10) As a cell grows, its plasma membrane expands. Does this involve endocytosis or exocytosis? Explain. (8%)
(11) Imagine a new type of cells was discovered on Mars in an organism growing in benzene, a nonpolar liquid. The cell had a lipid bilayer made of phospholipids, but its structure was very different from that of our cell membrane. (12%)
  (a) Draw what might be a possible structure for this new type of membrane. What might be characteristic features of the phospholipid head groups?

  (b) What properties would you except to find in membrane proteins imbedded in this membrane?

(12) 請問 Goldman equation 與 Nernst equation 有何不同?
其不同之處對應到細胞膜的何種構造? 主要是描述何種相關特性與功能? (13%)
(13) 談到 signal 在神經細胞內的傳導; 許多原文書裡會分別使用 spread 及 propagation 兩個字,請問爲什麼需要用這兩字來表示 signal 的傳導? 它們有何差異? (12%)