國　立　清　華　大　學　命　題　紙

96 學年度__生命科學院、生命科學院醫學生物科技學程__系（所）__甲__組碩士班入學考試

科目____細胞生物學___ 科目代碼__0205、0505__共__1__頁第__1___頁 *請在【答案卷卡】內作答

1. Goldman 推導出穩定狀態時細胞膜電位與各離子的關係為如下:

$$V_m = \frac{RT}{F} \ln\left(\frac{p_K[K^+]_o + p_{Na}[Na^+]_o + p_{Cl}[Cl^-]_i}{p_K[K^+]_i + p_{Na}[Na^+]_i + p_{Cl}[Cl^-]_o}\right)$$

(a) 請問式中三種 P 值由大而小之順序為何?為什麼? (5%)

(b) 請問式中三種 P 值是否為定值?為什麼? (5%)

(c) Goldman 是用 Nernst 方程式導出此式子,請問 Nernst 方程式為何?為什麼 Nernst 方程式無法計算出膜電位? (5%)

2. Ligand (A)與 Receptor (R)結合可用 (A) + (R) → (AR) → Response + (R) 式子來表示。式子中應該有三個反應常數。請解釋有那三個反應常數?且常數分別會如何影響 Ligand 與 Receptor 結合所產生之 Response? (8%)

3. 請針對"Acetylcholine is always an excitatory neurotransmitter."這句話寫出你的看法想法。(7%)

4. Please define the following terms (20%)

(a) NO (b) Ran (c)Nuclear lamina (d) The function of MPF

5. Please describe the current model for the signal mechanism of cotranslational import (10%)

6. If the objective lens is inscribed ∞/0.17, what does the "∞" mean? What does the "0.17" mean? (5%)

7. Why is the two-photon microscope better than the confocal microscope? (5%)

8. Why Type O person is a universal donor, and Type AB person is an universal recipient? (5%)

9. Why the steroid cholesterol is a "temperature buffer" in membrane? (5%)

10. Define the "Endomembrane system" (5%)

11. How to demonstrate that ATP hydrolysis is not a strict requirement for microfilament elongation? (5%)

12. Calcium is important in regulating muscle contractions. Compare the difference in calcium's roles between skeleton and smooth muscles. (10%)