一、問答題 (100 分)

1. An important cell-cell adhesion model in the blood stream involving at least two different adhesion events has been used to characterize both leukocytes and cancer cells in response to inflammatory and metastatic stimuli, respectively. **Please** use ***leukocytes as an example*** to describe how this model works, including ***cellular and molecular events***. **(10%)**

2. Three cell-cell adhesion mechanisms have been found to operate in animals. *"Cadherins, which play crucial roles in development, usually link cells by homophilic mechanism."* **Please design an experiment** to explain how this conclusion is drawn, including controls for the specificities of the two underlined issues. **(10%)**

3. Why small G proteins, particularly CDC42, Rac, and Rho, have been deemed important in tumorigenesis, progression, and even metastases without something like those oncogenes that very often carry cancer-inducing mutations, such as Ras, Her2, Myc, etc.? **(10%)**

4. The integrins serve as the main receptors in mediating the interactions between cells and the matrix, lacking of which leads to a cell disaster. Which **terminology** could you use to describe this phenomenon? Please draw 2 simple pictures to demonstrate an embryonic organogenesis that represents the outcome of this phenomenon. By what kind of signaling regulation (also answer by a **terminology**) do intergrins translate the signals to prevent cells from this kind of disaster? **(10%)**

5. Please first define the meaning of an eukaryotic cell and further describe the hypothesis that is used to explain the origin of eukaryotic cells. (10%)

6. Please first define the general features of uptake targeting sequences (or signals) that control gated transport of proteins between cytoplasm and nucleus and further describe the detailed processes of the gated transport of proteins between cytoplasm and nucleus. (10%)

7. Please first define the meaning and then describe the biological function of morphogen, asymmetric cell division, community effect, maternal effect genes, and zygotically acting genes. (10%)

8. Please describe the detailed processes of germ cell formation and give an example. (10%)

9. What are the three major factors that contribute to the genetic variation during cellular reproduction and mating? (10%)

10. What is autophagy? Please describe the possible mechanisms of cellular stress response regulated by cellular autophagy. (10%)