第一單元 翻譯題 [共 60 分]

說明：
1. 將下列各短文譯成中文，共 15 題，每題 4 分。
2. 請按題號順序依序作答，違者扣 10 分。
3. 譯文中首度遇重要專有名詞時，請加註英文（參考下列範例）。

範例：
Antidiuretic Hormone (ADH) is released from the posterior pituitary gland when the osmolarity of blood rises above a set point. ADH increases epithelial permeability to water in the distal tubules and collecting ducts of the kidney. The permeability increase in the collecting duct results from an increase in water channels in the membrane.

答：當血漿滲透壓升高超過設定值時，腦橈後葉素會釋放抗利尿素（antidiuretic hormone, ADH）, ADH 增加腎臍遠曲小管和集尿管上皮對水的通透性，集尿管通透性的增加是膜中之水通道增加的結果。

1. Expression of a gene can be investigated using hybridization with labeled probes to look for specific mRNAs, either on a gel (Northern blotting) or in a whole organism (in situ hybridization). Also, RNA can be transcribed into cDNA by reverse transcriptase and the cDNA amplified with specific primers (RT-PCR). Microarrays allow researchers to compare the expression of many genes at once in different tissues, at different times, or under different conditions.

2. The genes encoding the various globin proteins evolved from one common ancestral globin gene, which duplicated and diverged into α-globin and β-globin ancestral genes. Subsequent duplication and random mutation gave rise to the present globin genes, all of which code for oxygen-binding proteins. The copies of some duplicated genes have diverged so much that the functions of their encoded proteins are now substantially different.

3. In animals, pattern formation, the development of a spatial organization of tissues and organs, begins in the early embryo. Positional information, the molecular cues that control pattern formation, tell a cell its location relative to the body’s axes and to other cells. In Drosophila, gradients of morphogens encoded by maternal effect genes determine the body axes. For example, the gradient of Bicoid protein determines the anterior-posterior axis.

4. The mitotic spindle is an apparatus of microtubules that controls chromosome movement during mitosis. In animal cells, the spindle arises from the centrosomes and includes spindle microtubules and asters. Some spindle microtubules attach to the kinetochores of chromosomes and move the chromosomes to the metaphase plate. In anaphase, sister chromatids separate, and motor proteins move them along the kinetochore microtubules toward opposite ends of the cell. Meanwhile, motor proteins push nonkinetochore microtubules from opposite poles away from each other, elongating the cell.
5. Each catalytic protein in a signaling pathway amplifies the signal by activating multiple copies of the next component of the pathway; for long pathways, the total amplification may be a millionfold or more. The particular combination of proteins in a cell gives the cell great specificity in both the signals it detects and the responses it carries out. Scaffolding proteins can increase signal transduction efficiency. Pathway branching and cross-talk further help the cell coordinate incoming signals. Signal response is terminated quickly by the reversal of ligand binding.

6. In nonamniotes, unevenly distributed cytoplasmic determinants in the egg are important in establishing the body axes and in setting up differences between the blastomeres resulting from cleavage of the zygote. Cells that receive different cytoplasmic determinants undergo different fates. In amniotes, local environmental differences play the major role in establishing initial differences between cells and later the body axes. As embryonic development proceeds, the developmental potential of cells becomes progressively more limited in all species.

7. An action potential is a brief, all-or-none depolarization of a neuron’s plasma membrane. When a graded depolarization brings the membrane potential to the threshold, many voltage-gated Na⁺ channels open, triggering an inflow of Na⁺ that rapidly brings the membrane potential to a positive value. The membrane potential is restored to its normal resting value by the inactivation of sodium channels and by the opening of many voltage-gated potassium channels, which increases K⁺ outflow.

8. Both taste and smell depend on the stimulation of chemoreceptors by small dissolved molecules that bind to proteins on the plasma membrane. In humans, taste receptors are organized into taste buds on the tongue and in the mouth. Sensory cells within taste buds express a single receptor type specific for one of the five taste perceptions—sweet, sour, salty, bitter, and umami (elicited by glutamate).

9. Neurosecretory cells in the adrenal medulla release epinephrine and norepinephrine in response to stress-activated impulses from the nervous system. These hormones mediate various fight-or-flight responses. The adrenal cortex releases three functional classes of steroid hormones. Glucocorticoids, such as cortisol, influence glucose metabolism and the immune system; mineralocorticoids, primarily aldosterone, help regulate salt and water balance. The adrenal cortex also produces small amounts of sex hormones.

10. In some people, the immune system turns against particular molecules of the body, causing an autoimmune disease. This loss of self-tolerance can take many forms. In systemic lupus erythematosus, the immune system generates antibodies against histones and DNA released by the normal breakdown of body cells. These self-reactive antibodies cause skin rashes, fever, arthritis, and kidney dysfunction. Another antibody-mediated autoimmune disease, rheumatoid arthritis, leads to damage and painful inflammation of the cartilage and bone of joints.
11. After fertilization and the completion of meiosis in the oviduct, the zygote undergoes cleavage and develops into a blastocyst before implantation in the endometrium. Human pregnancy can be divided into three trimesters. All major organs start developing by eight weeks. Positive feedback involving prostaglandins and the hormones estradiol and oxytocin regulates labor.

12. When blood pressure or blood volume in the afferent arteriole drops, renin released from the juxtaglomerular apparatus initiates conversion of angiotensinogen to angiotensin II. Functioning as a hormone, angiotensin II raises blood pressure by constricting arterioles and triggering release of the hormone aldosterone. The rise in blood pressure and volume in turn reduce the release of renin.

13. RNA processing in the nucleus and the export of mature RNA to the cytoplasm provide several opportunities for regulating gene expression that are not available in prokaryotes. One example of regulation at the RNA-processing level is alternative RNA splicing, in which different mRNA molecules are produced from the same primary transcript, depending on which RNA segments are treated as exons and which as introns. Regulatory proteins specific to a cell type control intron-exon choices by binding to regulatory sequences within the primary transcript.

14. Although many harmful alleles are recessive, a number of human disorders are due to dominant alleles. One example is achondroplasia, a form of dwarfism that occurs in one of every 25,000 people. Heterozygous individuals have the dwarf phenotype. Therefore, all people who are not achondroplastic dwarfs—99.99% of the population—are homozygous for the recessive allele. Like the presence of extra fingers or toes, achondroplasia is a trait for which the recessive allele is much more prevalent than the corresponding dominant allele.

15. Many enzymes are allosterically regulated: Regulatory molecules, either activators or inhibitors, bind to specific regulatory sites, affecting the shape and function of the enzyme. In cooperativity, binding of one substrate molecule can stimulate binding or activity at other active sites. In feedback inhibition, the end product of a metabolic pathway allosterically inhibits the enzyme for a previous step in the pathway.
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用中文或英文答题皆可

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第4页
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