lab_1_2_Biology

Batuhan Seyhan S20343

2.03.2021

Motivation

When my teachers asked me what profession they wanted me to have in primary school, I always gave the answer of a genetic engineer. Even though my ideas changed when I got to high school, it was a wish that always stayed with me. In addition, my sister's previous studies on bioinformatics had a great impact on me when I was younger.

TASK 1

AUGCAGGACGCUCCCCUGAGCUGCCUGUCACCGACUAAGUGGAGCAGUGUUUCUUCCGCAGACU

TASK 2

What is the mRNA? mRNA is a type of molecule that carries genetic information from DNA to the ribosome, where it is used as a template to create proteins. It is created through a process called transcription and is read by ribosomes during a process called translation. Essentially, mRNA acts as a messenger between DNA and proteins, playing a critical role in the expression of genes.

TASK 3

Why is there a "U" instead of a "T" in mRNA ? The nitrogenous base uracil is used instead of thymine in mRNA because uracil is a more unstable base compared to thymine. Since mRNA is constantly being synthesized and degraded, this instability allows for the efficient degradation of the molecule when it is no longer needed. This helps regulate the lifespan of the mRNA molecule and ensures effective gene expression.

TASK 4

MQDAPLSCLSPTKWSSVSSADSTEKSASGAGTRNLPFQFCLRQALRMKAAGILTLIGCLVTGAESKIYT

TASK 5

What are proteins generally made of? Proteins are made up of smaller units called amino acids, which are joined together to form long chains called polypeptides. The sequence of amino acids determines the primary structure of the protein, and the shape of the protein is critical to its function. Proteins have many functions in the body, such as serving as enzymes, hormones, and

structural components. The specific amino acid sequence and three-dimensional structure of a protein determine its function.

TASK 6

lysozyme

TASK 7

C family protein

TASK 8

Complementarity in DNA refers to the precise matching of the nucleotide sequence in one strand to its complementary sequence in the other strand, according to the base-pairing rules. This complementary relationship is essential for maintaining the stability and function of the DNA molecule, as well as for accurate replication during cell division. It also extends to RNA, where base pairing plays various roles in gene expression.

TASK 9

ccaagcacatgtggcctggagacataaagggcaattttggacaaactgcatatctaaacagtaactggttccctgcaggaagtaaacctttcatttaccagga
GGTTCGTGTACACCGGACCTCTGTATTTCCCGTTAAAACCTGTTTGACGTATA-
GATTTGTCATTGACCAAGGGACGTCCTTCATTTGGAAAGTAAATGGTCCTC

TASK 10

what are cell cycle checkpoints? Cell cycle checkpoints are control points in the cell cycle that ensure proper progression to the next stage. There are three primary checkpoints: G1, G2, and spindle checkpoints. These checkpoints ensure the integrity of the genome, proper DNA replication, and correct alignment of chromosomes during mitosis. If problems are detected, the cell may pause the cycle and attempt to repair the damage, or undergo programmed cell death.

1-The G1 checkpoint: This checkpoint occurs towards the end of the G1 phase and determines whether the cell is ready to enter the S phase, where DNA replication occurs. At this checkpoint, the cell checks for damage to DNA and the availability of nutrients required for DNA replication.

2-The G2 checkpoint: This checkpoint occurs at the end of the G2 phase, just before the cell enters mitosis. At this checkpoint, the cell checks for DNA damage, makes sure that DNA replication has been completed successfully, and ensures that the cell has enough energy and resources to proceed with mitosis.

3-The spindle checkpoint: This checkpoint occurs during mitosis and ensures that the chromosomes are aligned properly before the cell proceeds with cell division.

TASK 11

What is a checkpoint in the G2/M phase? The checkpoint in the G2/M phase is a critical control point in the cell cycle that occurs at the end of the G2 phase, just before the cell enters the M

(mitotic) phase.

During this checkpoint, the cell checks to make sure that DNA replication has been completed successfully, and that there are no DNA damage or replication errors. The checkpoint also ensures that the cell has enough energy and resources to proceed with mitosis.

If the checkpoint detects any problems, the cell cycle may be paused, and the cell will attempt to repair any damage before entering the M phase. If the damage is too severe, the cell may undergo programmed cell death, or apoptosis, to prevent the spread of damaged or mutated cells.

Overall, the G2/M checkpoint is a critical mechanism for ensuring the proper progression of the cell cycle and maintaining the integrity of the genome.

TASK 12

1-Plant cells have a cell wall made of cellulose, while animal cells lack a cell wall. 2-Plant cells have chloroplasts for photosynthesis, while animal cells lack chloroplasts. 3-Plant cells have a large central vacuole that takes up a significant portion of the cell's volume, while animal cells have smaller vacuoles or none at all. 4-Animal cells have centrioles involved in cell division, while plant cells lack centrioles. 5-Plant cells have a more regular, rectangular shape due to the rigid cell wall, while animal cells have a more irregular and flexible shape.

TASK 13

hat is bigger than a rhinovirus and smaller than a Staphylococcus bacteria? -Ebola virus

TASK 14

picture here ->https://ibb.co/QC3RKxq

TASK 15

In 2 - 4 sentences summarize the study of genetic profiles of Y chromosome and mtDNA - what is it? what is the difference, why is it made? The study of genetic profiles of Y chromosome and mtDNA involves analyzing specific regions of the human genome that are inherited maternally (mtDNA) or paternally (Y chromosome). By examining these genetic markers, researchers can infer the ancestry and migration patterns of human populations. The main difference between Y chromosome and mtDNA is that Y chromosome is passed only from fathers to sons, while mtDNA is passed from mothers to both sons and daughters. This analysis is important in understanding human evolution, population genetics, and disease susceptibility.

TASK 16

What is a haplogroup? A haplotype is a group of alleles in an organism that are inherited together from a single parent, and a haplogroup is a group of similar haplotypes that share a common ancestor with a single-nucleotide polymorphism mutation.

TASK 17

What country has the most representatives of haplogroup R1a? Poland

TASK 18

What famous people possessed or have this haplogroup? Balto-slavic, Germanic, Indo-Iranian

TASK 19

what predispositions in humans are associated with the genetic marker labeled rs53576? The genetic marker labeled rs53576 is located on the oxytocin receptor gene (OXTR), which plays a key role in regulating social behavior and emotional bonding. Some studies have suggested that certain variants of rs53576 may be associated with differences in social cognition, empathy, and emotional regulation, and may increase the risk for certain psychiatric conditions, such as autism spectrum disorder, anxiety, and depression. However, the exact nature and extent of these associations are still a subject of ongoing research and debate, and more studies are needed to fully understand the implications of this genetic marker on human health and behavior

TASK 20

The genetic marker "rs333" is associated with a predisposition to increased risk of coronary artery disease. It is located on chromosome 9p21 and is also linked to other cardiovascular diseases, such as heart attack and stroke. Individuals who carry the "risk" allele of rs333 may have a higher likelihood of developing these conditions compared to those who do not carry the allele. However, it's important to note that genetic predisposition is only one factor in the development of these diseases, and lifestyle factors such as diet, exercise, and smoking also play a significant role.

TASK 21

Fitness DNA test report Am I an Einstein Athletic Performance

TASK 22

1-The idea that a mother's behavior towards her offspring, specifically the amount of licking and grooming, can affect the biochemical signals that go into the nucleus and DNA of the offspring, potentially programming it differently for life. This suggests that early life experiences can have a significant impact on an individual's behavior and physiology, and can provide a unifying explanation for both health and disease.

2-The ethical limitations of testing this concept in humans, as administering child adversity in a random way is not ethical. This raises important questions about how we can study the effects of early life experiences on human development, and highlights the role of epigenetics in understanding the interplay between genes and environment.

TASK 23

Dominant traits are genetic traits that are expressed when only one copy of the gene is present, while recessive traits are only expressed when two copies of the gene are present. Dominant traits will mask recessive ones in a heterozygous individual.

TASK 24

Dominant trait: Dark hair, ears not protruding , the ability to curl the tongue into a trumpet ,right hand leading , long eyelashes ,thumb straight ,oval shape eye ,oval face shape, placing the left thumb over the right while folding the hands. Recessive trait: no dimples in the cheeks , no freckles , free earlobes.

TASK 27

1-An allele is a version of a gene that can produce variations in a specific trait. Humans inherit two alleles for each gene, one from each parent, and the combination of alleles determines the phenotype of an individual. 2-The frequency of the phenylketonuria (PKU) allele in Poland is estimated to be around 1 in 50 individuals, which means approximately 2% of the Polish population are carriers of the PKU allele. 3-If both parents are carriers of the phenylketonuria allele, each of their children has a 25% chance of inheriting two copies of the PKU allele and having the disease, a 50% chance of inheriting one copy of the allele and being a carrier like their parents, and a 25% chance of inheriting no copies of the PKU allele and being neither affected nor a carrier.

TASK 28

Most mammals, including most primates, have the ability to produce vitamin C in their liver. However, humans and some other primates lack the ability to produce vitamin C due to a genetic mutation that occurred in their evolutionary history. As a result, humans must obtain vitamin C through their diet, unlike most other animals.

TASK 29

Humans and some other primates cannot produce vitamin C due to a genetic mutation that occurred millions of years ago. This mutation disrupted the final step in the biochemical pathway that synthesizes vitamin C from glucose. The exact reason why this mutation persisted in primates is not fully understood, but it is thought to be due to a combination of factors.