1.21 Interpretation of Concepts

Suppose that the DNA **(responsible for cell functionality inside the nucleus)** is a genetic program of a cell, which leads to a cytoplasm **(fluid in the cell, mostly water)**. It is like a data type that can be compared to a computer instruction which can change data so that at least one data type like integer must be available. The data type can be represented by metabolites or intermediate products and modified by biochemical reactions. If storing ten values of the same data type would be required it would be necessary to use ten variables, but that would be too complicated. A better approach would be to use molecular elements or group of similar atoms, which can be classified as the array meaning store elements of the same type together.

Enzymes **(strings of amino acids)** can catalyze or able to increase the rate of biochemical reactions using a material with a definite chemical composition in such a way that a substrate or a molecule that is acted upon by an enzyme **(strings of amino acids)** will be modified into a new product. Therefore, instructions can be classified as chemical reactions affected by enzymes which are represented by structure genes providing input sequence for the protein synthesis process. Structure genes can be compared to OO programming languages with a set of instructions, which are capable of changing data.

The metabolism is being controlled indirectly by the structure genes **(input sequence for the protein synthesis process)** with specific genes **(consist of DNA and are part of a larger structure called the chromosome)** being active during specific time periods, which can be classified as a behavior of specific DNA-units controlling the activity of genes thereby providing control instruction or a specific instruction, which specifies the order of the next executable instruction of the program.

Concerning specific cells, it is possible to see specific genes, which are active during specific time periods and this behavior demonstrates that specific DNA units control the activity of genes, which can be understood as the control instruction or a specific instruction which controls the order of the next executable instruction in the program. Lastly, the DNA unit, which is known as a telomer can be understood as the punctuation mark of the system or a specific sequence of the end of the chromosome **(consists out of DNA and protein)**.

What is to follow next is how objects, if-instructions or statements, and loops are formed applying OOB meaning heritage of all OOP languages creation.

Objects resemble cells and are created from a class which acts as a blueprint. Cells are created from a genetic blueprint in the form of DNA **(responsible for the cell functionality inside the nucleus)**. Genes **(consists out of DNA and are part of a larger structure known as chromosomes)** and classes define the attributes and behaviors of the objects they create even though these cells or objects consist out of different internal states, they originate as copies from the same blueprint. Cells can be of various classes, but they all originate from a class Cell that is a basic unit of life. Cells have a plasma membrane or a cell wall that defines their boundaries encapsulating the cell and protecting it where class definitions define the limits of the objects they instantiate. To pass information into or out of an objects public instance method must be used just like cell receptors are used to pass information through its plasma membrane or cell wall. Furthermore, internal cell processes exist that do not need to interact with the outside world meaning a cell has private methods or organelles like Golgi apparatus that modifies, packages, and sorts proteins sent from the endoplasmic reticulum or tubes that allow transportation of chemical compounds to and from the nucleus **(stores the cell genetic information)** and mitochondria, which produce energy for the cell and are responsible for internal cell processes which occur within the plasma membrane or cell wall.

Via specific operons **(unit of the protein synthesis)** it is possible to demonstrate control instructions such as composition, if- instruction, and while-instruction can be mimicked by gene controlled regulatory networks. The composition of basic instructions can be understood as a sequence of basic instructions signified by structure genes **(input sequence for the protein synthesis process)** or operons **(unit of the protein synthesis process)** separated by spacer units or separator sequence of genes.

The operon **(unit of the protein synthesis process)** can be represented as an if-instruction or statement meaning instruction S will be executed if and only if condition B is true, otherwise S will not be executed or if B then S. By focusing on the Escherichia coli or E. coli bacterium, which regulates its own synthesis. The boolean value of condition B can be classified by the state of the operator **(sequence of the gene regulation process)**, which is true if Operator_X gene is free or false if Operator_X gene is blocked by the repressor that is a protein that turns off the expression of one or more genes and the repressor protein works by binding to the gene's promoter region, preventing the production of mRNA **(RNA moves to ribosome)**. The if statement can be simulated once the operon **(unit of the protein synthesis)** is blocked after activation of the basic instruction. The synthesis of structure gene **(input sequence for the protein synthesis process)** S will realize the instruction S and the synthesis of Regulator_X will block the synthesis of operon L14.

By deleting the Regulator_X, which is found inside the operon L14 the while-instruction or statement can be imitated meaning let S be an instruction and B a condition, which can be true or false, therefore the instruction S will be executed as long as B is true or while B do S.

More precisely the **Tryptophan** (trp) can be classified as an α-amino acid that is used in the biosynthesis of proteins where trp operon is a group of genes **(consist of DNA and are part of a larger structure called the chromosome)** that is used, or transcribed, together—that codes for the components for production of trp and therefore structure genes S and the boolean value of condition B can be true that is operator **(sequence of the gene regulation process)** is free or false operator is blocked. Suppose the operon represents the state true the basic instruction is activated, and it will be active until the operator gene will be blocked and this logic simulates the while statement.

A telomere is understood as a region of DNA at the end of a chromosome where its purpose is to protect the end of the chromosome from deteriorating or fusing with other chromosomes. They are made of repeated sequences of DNA therefore the telomere sequence or chromosome and the terminator or promoter sequence **(cistron level)** can be simulated as punctuation mark or begin and end symbol.

1.22 Self-Checked Questions for Interpretation of Concepts

1. How can a data type be represented?
2. What is an array?
3. What does catalyze mean?
4. What is a telomer?
5. What do objects resemble?
6. Where are the cells created from?
7. What do internal cell processes do?
8. What are operons?
9. What is a Escherichia coli or E. coli?
10. What is a Tryptophan, trp?
11. What is a telomere?
12. What does the Escherichia coli or E. coli do?
13. What happens when Regulator_X gene is deleted inside the operon L14?
14. What blocks the Operator_X gene?
15. What is a repressor?
16. What does a repressor do?