

The Living World

Case Study Based Questions

Read the following passages and answer the questions that follow:

1. Taxonomy and systematics are branches of science that include the study of the classification, nomenclature, identification, and evolutionary history of an organism. Thus, the taxonomic characteristics of an organism along with its evolutionary history come under systematics. In 1913, A.P de Candolle was the first to introduce the term taxonomy while systematics was introduced during the time of human civilization. The term systematics is derived from the Latin word 'systema' which means the systematic arrangement of organisms. Linnaeus (father of taxonomy) published his book *Systema Naturae* where the classification of plants and animals was based on taxonomy. In 1940, Julia Huxley was the one who developed the concept of neo-systematics. It involves the known characteristics of an organism and also the known evidence from different fields of biology.

(A) What are the basis of modern taxonomical studies?

(B) Who is the father of taxonomy?

(C) What do we call the organising of taxonomic information in logical classification?

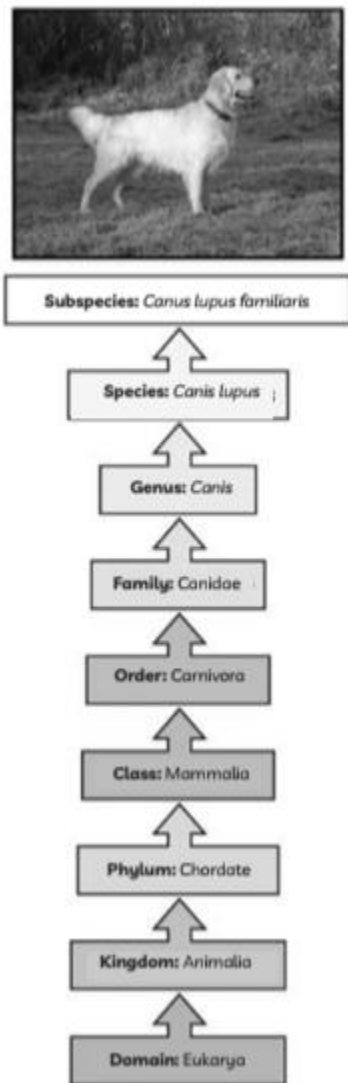
Ans. (A) The basis of modern taxonomical studies are external and internal structure, structure of cell, development process and ecological information.

(B) Carolus Linnaeus.

(C) Systematics is the process where taxonomic information of organisms is organized into a logical framework. Taxonomy and systematics are together referred to as systematic biology.

2. Classification involves hierarchy of steps in which each step represents taxonomic category. Each taxonomic category is referred to as a unit of classification and is commonly termed as taxon. Taxonomic hierarchy is a system of arranging all taxonomic categories in descending order with kingdom at the top and species at the base. As we go up the taxonomic hierarchy, the number of individuals' increases but the number of

common characteristics goes on decreasing.



(A) Modern classification is based on:

- (a) Fossils
- (b) Taxonomy
- (c) Morphology
- (d) Phylogeny

(B) A scientist who made significant contribution of field of classification is:

- (a) Pasteur
- (b) Darwin
- (c) Oparin
- (d) Linnaeus

(C) If two organisms are in the same phylum, then the two organisms belong to the same:

- (a) Class
- (b) Order
- (c) Kingdom
- (d) Species

(D) Assertion (A): Taxonomic hierarchy is the unit of classification that arranges all the taxonomic categories.

Reason (R): Taxonomic hierarchy is the arrangement of all taxonomic categories in descending order from kingdom to species.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true and R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

(E) Choose the correct statement.

- (a) Taxonomy is the study of diversity of organisms and all their comparative and evolutionary relationships.
- (b) Taxonomy is the study of organisms on the basis of their characteristics.
- (c) Taxonomy deals with comparative anatomy, ecology, physiology, phylogenetics and biochemistry.
- (d) Both (a) and (c)

Ans. (A) (d) Phylogeny

Explanation: Modern classification is based on Phylogeny. Phylogeny is the history of the evolution of a species or group, mainly in reference to lines of descent and relationships among broad groups of organisms.

(B) (d) Linnaeus

Explanation: Carolus Linnaeus introduced a binomial system of nomenclature. He gave two names to a species-One is a generic name while the other is a specific name.

(C) (c) Kingdom

Explanation: If two organisms are in the same phylum, then it means they both belong to the same kingdom, because kingdom is the rank of classification higher than phylum.

(D) (a) Both A and R are true and R is the correct explanation of A.

Explanation: The assertion "Taxonomic hierarchy is the unit of classification that arrange

all the taxonomic categories" is true. The taxonomic hierarchy is a system of classification that arranges all taxonomic categories in a specific order, with kingdom at the top and species at the base. This is a unit of classification because it is a way of grouping and organising different organisms into categories based on shared characteristics. The reason "Taxonomic hierarchy is the arrangement of all taxonomic categories in descending order from kingdom to species" is also true and correctly explains the assertion. The taxonomic hierarchy does indeed arrange all taxonomic categories in a descending order, with kingdom at the top and species at the base.

(E) (b) Taxonomy is the study of organisms on the basis of their characteristics.

Explanation: It is the study of organisms on the basis of their characteristics. It includes morphological and anatomical features for identification. Systematics is the study of diversity of organisms and all their comparative and evolutionary relationships. It deals with comparative anatomy, ecology, physiology, phylogenetics and biochemistry.