

SECOND TERM SS 3 BIOLOGY WEEK THREE (3)

23 – 27 TH JANUARY, 2023

Variation in Population (Morphological, Physiological, Application)

CONTENT

- Definition of variation
- Types of variation
- Application of variation

A population is a group of organisms of the same specie living in a specified area within a given period of time. Variation refers to the differences which exist between individuals of the same species.

TYPES OF VARIATIONS

1. Morphological variation
2. Physiological variation.

Morphological variation is the noticeable physical appearance of individuals of the same species. This physical appearances change gradually within a population. The feature observed shows a gradual transition between two extreme forms (continuous variation) e.g. size (height or weight), colour and fingerprints.

Physiological variation is the difference in the ways individuals of the same species behave or react to conditions in their environment. It is not visibly apparent like morphological variation. It relates to the functioning of the body. In a physiological variation, organisms can be grouped into two or more classes within a population without any graduation or intermediate between or among them (discontinuous variation). Examples of such variation are behaviour which can be temperamental, accommodating, excited or calm, blood groups, ability to roll the tongue, ability to taste phenylthiocarbamide etc.

Evaluation

1. What is variation?
2. Differentiate between morphological and physiological variations.

CAUSES OF VARIATION

There are two causes. They include:

1. Genetic differences
2. Environmental influence.

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Genetic differences:

A sudden change in a gene called mutation can be inherited when sex-linked. This then brings about variation e.g. a gene responsible for green fruits in plants may be altered to produce a yellow fruit in the same plant.

Environmental differences:

The environment includes housing, food, healthcare, educational facilities, parental care etc. e.g. an intelligent person exposed to an unfavourable environment becomes dull.

Evaluation

1. What are the major causes of variation?
2. Give three examples each of continuous and discontinuous variations

APPLICATIONS OF VARIATION

1. **Crime detection:** Use of fingerprints which can be arch, loop, whorl or compound.
2. Determination of paternity using blood group
3. Development of hybrids of desired traits in agriculture
4. Classification of the human race based on skin colour, the shape of the nose, the texture of the hair into Caucasoid (European), Negroid (Black African) Mongoloid (Chinese and Japanese), Australoid (Australian).
5. **Blood transfusion:** The blood group of the donor must be compatible with that of the recipient. If not, the donor's RBC will clump in the recipient's blood vessels causing serious harm to the recipient. Each blood group is characterized by specific proteins in the blood which are antigens in the RBC and antibodies in the blood plasma. The table below shows antigen-antibody reactions between donor and recipient blood.

DONOR \ RECIPIENT	A (Antigen a)	B (Antigen b)	AB (Antigen a + b)	O (None)
A (Antibody b)	+	-	-	+
B (Antibody a)	-	+	-	+
AB (None)	+	+	+	+
O (Antibody a + b)	-	-	-	+

+ means positive reaction (no clumping)

– means negative reaction (clumping)

Note: **O** is a universal donor while **AB** is a universal recipient

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Evaluation

1. State four application of variation
2. How is a variation used to determine paternity?

General evaluation

1. Define population, hereditary and variation
2. Define morphological and physiological variation. Give two examples in each case.
3. Differentiate between continuous and discontinuous variations
4. State two causes of variation.
5. What is gene mutation?
6. Outline five applications of variation

Weekend assignment

1. The differences which exist between individual of the same species is known as A. hereditary B. mutation C. variation D. population
2. Which of these is not a continuous variation A. height B. skin colour C. intelligence D. ability to roll tongue
3. The differences in the way individual behave or reacts to changes in the environment is termed ———- variation A. morphological B. physiological C. continuous D. discontinuous
4. The following are a group of human fingerprint except for A. loop B. simple C. compound D. arch
5. Variation factor used in the determination of paternity is A. fingerprint B. skin colour C. blood group D. behavior

Theory

1. Outline five application of variation
2. In a tabular form, state five differences between continuous and discontinuous variation