

G11 – Variation

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p389-401



Learning Objectives

11.2.4.9 Classify the types of variability

11.2.4.10 Explain the causes of modification variability.

Success Criteria

1. Explain the causes and types of variability.

Variation 3 min music

<https://www.youtube.com/watch?v=gire-EWQspw>

Extra Help-Bite Sized
Variation and Inheritance

<https://www.bbc.com/education/guides/z2xbh39/revision/1>

Terminology

English	Google Russian 😊
Continuous / Discontinuous	Непрерывный / прерывистый
Uninterruptable / intermittent	Бесперебойный / прерывистый
Acquired or Environmental traits	Приобретенные или экологические
Interspecific / intraspecific	черты
<u>Genetic Variation</u>	Межвидовые / внутривидовые
Crossing over, independent	Генетическая вариация
assortment, random fertilization,	Пересечение, независимый
random mating, mutations	ассортимент, случайное
<u>Sources of Variations</u>	оплодотворение, случайное
Heredity	спаривание, мутации
Environmental	Источники вариаций
Somatic	Наследственность
Germinal	экологическая
	соматический
	зародышевый

Some clarification of vocabulary

Continuous is uninterrupted

Discontinuous is intermittent

Acquired traits – genetically inherited

Environmental traits – influenced by the environment

Interspecific – between different species

intraspecific – within a species

Heredity — offspring resemble the parental phenotype

- Defined as the transmission of characters from one generation to successive generations or from parents to their offspring's.
- Heredity involves the transfer of genetic characters from parents to the offspring's via the egg and sperm. These transferable characters are called “**hereditary**”



Variation – differences in phenotype

Two influences:

genetic differences and environmental influences

- ***Interspecific variation:*** When one species differs from another species.
- ***Intraspecific variation:*** When members of the same species differ from each other.



Interspecific



Intraspecific



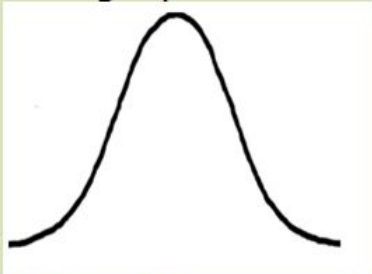
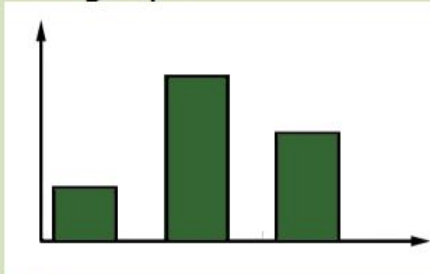
Categories of Variations: Based on the degree of differences, variation is ***classified into two types:***

1) **Continuous Variation:** Small and indistinct variations are called **continuous variation**.

- a) These are fluctuating with environmental conditions.
- b) These are non-heritable.
- c) They have no role in evolution.
- d) They are most common and occur in all organisms.

2) **Discontinuous Variation:** Large, distinct and sudden variations are called **discontinuous variation**.

- a) These are relatively unaffected by environmental conditions.
- b) These are heritable.
- c) They provide raw materials for evolution on which selection is based.
- d) They are not common and appear suddenly.

	Continuous variation	Discontinuous variation
Properties	- No distinct categories - No limit on the value - Tends to be quantitative	- Distinct categories. - No in-between categories - Tends to be qualitative
Examples	• height • weight • heart rate • finger length • leaf length	• tongue rolling • finger prints • eye colour • blood groups
Representation	Line graph 	Bar graph 
Controlled by	A lot of Gene and environment → range of phenotypes between 2 extremes, e.g. height in humans.	A few genes → limited number of phenotypes with no intermediates e.g. A, B, AB and O blood groups in humans

Types of Genetic Variation

These are due to the different genes that each individual organism possessed. These change from generation to generation.

Genetic variation occurs as a result of:

P = phenotypic variation

G- gene mutation

P-Crossing over between chromatids of homologous chromosomes during Meiosis

P-Random fertilization of gametes

P-Random mating between organisms within a species

P-Independent Assortment: of chromosomes, and therefore alleles during meiosis.

G-Mutations: These sudden changes to genes and chromosomes may be passed to the next generation.

Sources (Causes) of Variation

The variations may be classified into two types:

- 1) **Hereditary variation:** The variations which arise as a result of any change in the structure and function of the gene and are inherited from one generation to another are called **hereditary variation**.
- 2) **Environmental Variations:** Two individuals with the same genotype may become different in phenotype when they come in contact with different conditions of food, temperature, light, humidity and other external factors. Such differences among organisms of similar heredity are known as **environmental variation**. These are not heritable.

Based on the type of cells, variation is classified into two types.

- 1) **Somatic Variation:** The variation which occurs in somatic cells is called **somatic variation**. It is generally insignificant, because it is not inherited from parents. It is acquired by the organisms during their own lifetime and is lost with death. Hence, it is also called **acquired variation**.
- 2) **Germinal Variation:** The variation which affects the germinal or reproductive cells is called **germinal variation**. It is heritable and genetically significant. It provides raw materials for evolution.

List examples of variation by category

Hereditary

Environmental

Somatic

Germinal

Fill in the Blanks

What are the five main causes of Genetic Variation?

1. I _____ A _____ of
chromosomes, and therefore alleles, during meiosis

2. C _____ O _____ between chromatids of
H _____ chromosomes during meiosis

3. R _____ M _____ between organisms within a species

4. Random fertilization of G _____

M _____

Genetic Variation produced P _____ variation (what it looks
like)

Numbers 1-4 remix existing alleles in the P _____, where as

M _____ can produce completely new alleles.

Complete the Table

Sources of Genetic Variation	Description	Examples
1. Hereditary		
2. Environmental		
3. Somatic		
4. Germinal		