

Difference Between Continuous and Discontinuous Variation

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Key Difference – Continuous vs Discontinuous Variation

Differences which exist between organisms belonging to the same natural population or species are described by the term ‘variation.’ These differences or diversity in structure within any species was first recognized by Darwin and Wallace. If a study is conducted on one large population, two forms of variation could be seen as continuous variation and discontinuous variation. The key difference between continuous and discontinuous variation is **that continuous variation is the variation that has no limit on the value that can occur within a population while discontinuous variation is the variation that has distinct groups for organisms to belong to.**

What is Continuous Variation?

In continuous variation, a series of successive changes of a particular characteristic in a population is demonstrated from one extreme to the other without a break. Different characteristics of a population might show continuous variation. Such characteristics are formed by the combined effect of polygenes and environmental factors. If a population of cows is considered as an example, the milk yield is not only influenced by genetic factors but also by environmental factors. If the genetic factors are present for a high yield of milk, it can be suppressed by environmental factors like quality of pasture, inadequate diet, extreme weather conditions, diseases, etc.

The frequency distribution of a characteristic that presents a continuous variation is a normal distribution curve with a typical bell shape. In such a curve, the mean, mode and median are considered to be the same. The height of humans, weight, hand span and shoe size are several examples of continuous variation.

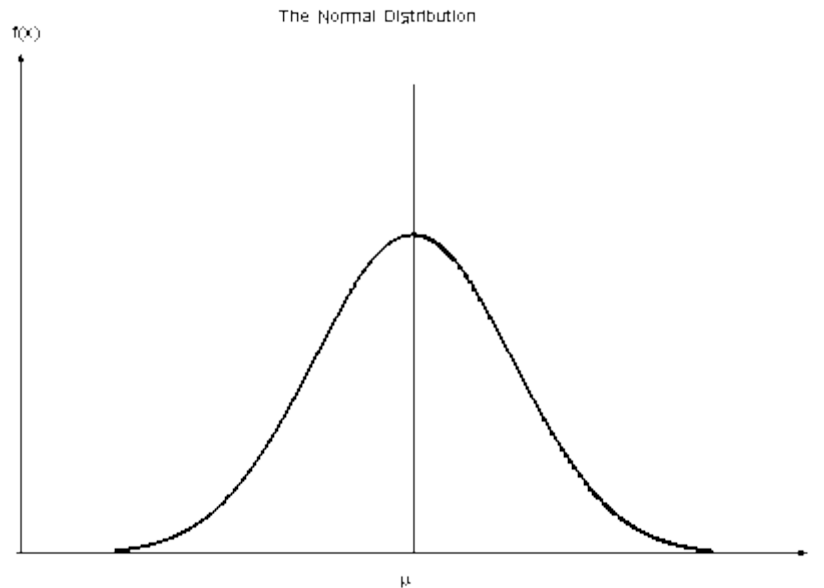


Figure 01: Shape of the distribution of a continuous variation

As shown in the above figure, continuous variation fluctuates around an average (mean) of species. This variation shows a smooth bell shaped curve within the population. Continuous variations are common, and they do not disturb the genetic system. Moreover, these variations are caused due to [polygenic inheritance](#) and are often affected by environmental influences.

What is Discontinuous Variation?

Few characteristics of individuals in a population may exhibit a limited form of variation. These individuals possess precise variations within them without the presence of any intermediates for the particular characteristic. Blood groups in the human population is an example. In human blood group system, only four blood groups are possible (A, B, AB, and O). Since no intermediate values are present for the human ABO blood group system, it is considered as a discontinuous variation. Discontinuous variations are decided by a single gene or a small number of genes. The [phenotypic](#) appearances of them are generally not affected due to environmental factors.

Discontinuous variation does not show a normal distribution. It does not produce a curve and can be represented using only a bar graph. An average or mean cannot be seen in discontinuous variation, unlike in continuous variation. These variations are produced by changes in [genome or genes](#). Hence, they disturb the genetic system. However, these variations occur occasionally in populations. Some

examples of discontinuous variation include tongue rolling, finger prints, eye colour, blood groups, etc.



Figure 02: Discontinuous variation – Tongue rolling

What are the similarities between Continuous and Discontinuous Variation?

- Continuous and discontinuous variations occur within a natural population or species.

What is the difference between Continuous and Discontinuous Variation?

Continuous vs Discontinuous Variation

Continuous variation is a variation that has no limit on the value that can occur within a population.

Discontinuous variation is a variation that has distinct groups for organisms to belong to.

Direction

Continuous variation has a predictable direction,

The direction of the discontinuous variation is unpredictable.

Examples

Examples of continuous variation include height, weight, heart rate, finger length, leaf length, etc.

Examples of discontinuous variation include tongue rolling, finger prints, eye colour, and blood groups.

Mean or Average

Continuous variation fluctuates around an average or a mean of species.

Discontinuous variation does not have an average or mean.

Formation

Continuous variations are formed due to crossing over, independent assortment and random fusion of gametes during fertilization.

Discontinuous variations are formed due to changes in the genome.

Occurrence

Continuous variations are common in a population.

Discontinuous variations develop periodically.

Influence on Genetic System

Continuous variations do not influence the genetic system of the organism.

The genetic system is disturbed by discontinuous variations.

Fluctuations around a Mean

Continuous variation fluctuates around a mean or an average of a species.

Mean is absent in discontinuous variation.

Results

Continuous variation leads to increment in the adaptability of a population but it is unable to form new species.

Discontinuous variation is the prime factor in developing continuous variations and in the process of evolution.

Graphical Representation

When a continuous variation is represented graphically, it provides a normal distribution curve with a perfect smooth bell shape.

No curve is produced in a graphical representation of discontinuous variation.

Summary – Continuous vs Discontinuous Variation

Variations are the different characteristics that exist in organisms of a natural population or species. Variations can be of two different forms: continuous variation and discontinuous variation. The two forms of variation contain many differences. Discontinuous variation is a cooperating factor in the process of evolution. The main difference between continuous and discontinuous variation is that continuous variation has no limit on the value that can occur within a population while discontinuous variation has distinct groups for organisms to belong to.

References:

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2. Cheung, V. G., and R. S. Spielman. “The genetics of variation in gene expression.”Nature genetics. U.S. National Library of Medicine, Dec. 2002. Web. [Available here](#). 02 Aug. 2017.

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