Difference Between Euploidy and Aneuploidy

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Key Difference - Euploidy vs Aneuploidy

A normal diploid cell contains a total of 46 chromosomes, arranged in 23 pairs. This is called a 2n cell. Diploid cells multiply by mitotic cell division. During reproduction, gametes such as sperms and egg cells are produced by meiosis cell division. Gametes contain 23 chromosomes and are called n cells or haploid cells. However, due to several errors in cell divisions, the daughter cells can obtain an abnormal number of chromosomes per cell. The resulting conditions are known as chromosomal variations. There are several types of chromosomal variations in plants and animals. Euploidy and aneuploidy are two such chromosomal variations. The key difference between euploidy and aneuploidy is that **euploidy refers to the variation in the complete set of chromosomes in a cell or organisms** while **aneuploidy refers to the variation of the total chromosome number from the normal chromosome number of a cell or organism due to addition or deletion of chromosomes.**

What is Euploidy?

Euploidy refers to the variation in the complete set of chromosomes in a cell or organism. Euploidy is common in plants and occurs in high frequency than animals. Since chromosomal number in a cell affects the sex balance of animals, euploidy in animal cells results in sterility. Hence, euploidy is often related to plants more than animals.

During euploidy, the entire set of chromosomes is duplicated once or several times during cell division. Diploidy, triploidy, tetraploidy, pentaploidy, polyploidy, autopolyploidy, allopolyploidy are different types of euploidy conditions. Cells that contain 3 copies of each chromosome is known as triploid and it can occur when one ovum is fertilized with 2 sperms. Tetraploid cells or organisms contain 4 copies of each chromosome. Autopolyploid have an additional set of chromosomes received from a parent or identical parental species. Allopolyploids have an additional set of chromosomes derived from another species.

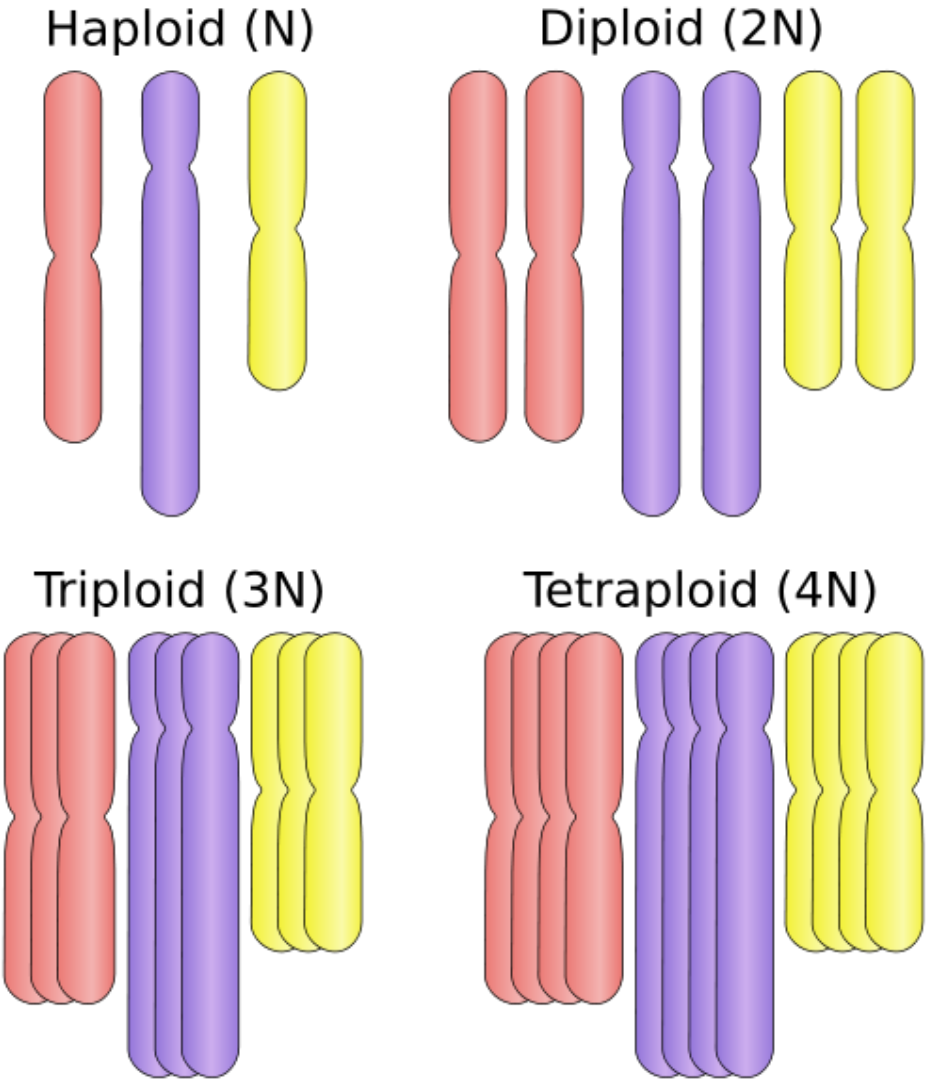

Figure 01: Euploidy

What is Aneuploidy?

Aneuploidy refers to a variation in the total chromosome number in a cell or organism by addition or deletion of chromosomes. Unlike euploidy, it does not include a difference of one or more complete sets of chromosomes. In fact, aneuploidy does not change the number of chromosome sets, it only changes the normal total number of chromosomes in a cell or organism. This variation affects the genetic balance of the cell or organism. It changes the amount of genetic information or products of a cell or organism and is an abnormal condition which can lead to different syndromes such as Down syndrome, Edwards syndrome, triple X syndrome, Klinefelter syndrome, Turner's syndrome, Cri du chat syndrome, etc.

Monosomy and trisomy are two common aneuploidy conditions seen in organisms. The term monosomy is used to describe a chromosomal abnormality in which one chromosome is absent from one pair of homologous chromosomes. The term trisomy is used to describe the abnormal chromosome number in which three chromosomes (usual pair + extra chromosome) are present from

one type of homologous chromosomes. Those two conditions can be indicated as 2n-1 and 2n+1 respectively.

There are another two types of aneuploidy conditions named nullisomy and tetrasomy. Nullisomy refers to the abnormal chromosomal composition that occurs due to the loss of both chromosomes in a homologous chromosome pair. It can be indicated as 2n-2. Tetrasomy refers to the abnormal condition that occurs due to the addition of an extra pair of homologous chromosomes and it can be indicated as 2n+2. All these conditions cause abnormal chromosomal numbers or numerical changes in the total number.

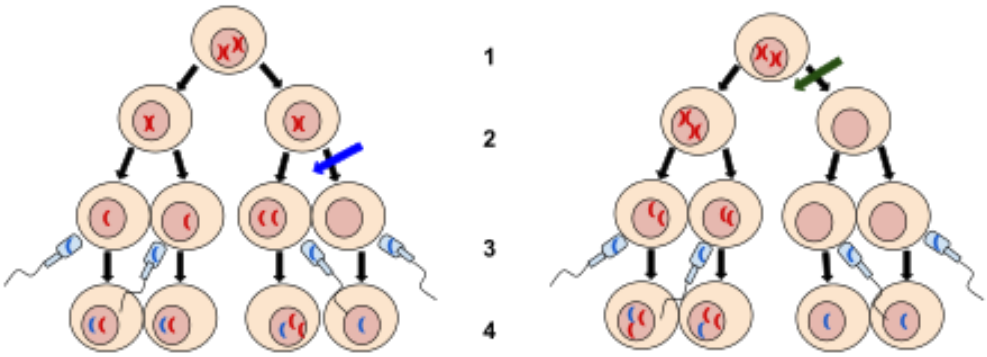

Figure 02: Aneuploidy conditions due to nondisjunction

What is the difference between Euploidy and Aneuploidy?

Euploidy vs Aneuploidy	
Euploidy is a variation of a chromosomal set of a cell or organism.	Aneuploidy is a variation in total chromosome number of a cell or organism.
Number of Chromosome Sets	
The number of chromosome sets is changed.	The number of chromosome sets is not changed.
Chromosomal Composition	
Cells have states of 3n, 4n, etc.	Cells are in the states on 2n+1, 2n-1, n-1, n+1, etc.
Reasons	
Euploidy occurs due to fertilization of one ovum with two sperms etc.	Aneuploidy arises due to nondisjunction in meiosis 1 and 2 and mitosis.
In Humans	
Euploidy is not seen in humans.	Aneuploidy is seen in humans.

Summary - Euploidy vs Aneuploidy

Aneuploidy is a mutation in which chromosomal number is abnormal. It changes the total number of chromosomes either due to loss of one or more chromosomes or due to addition or deletion of one or more chromosomes. Euploidy is a variation in the complete set of chromosomes in a cell or organism. This is the difference between euploidy and aneuploidy. Euploidy changes the number of

copies of the chromosome set. Both aneuploidy and euploidy conditions are variations from the normal conditions. Hence, both cause different syndromes as well as different characteristics.

References

1. Variation in Chromosome Number. N.p., n.d. Web. Available here. [Accessed 31 May 2017].
2. Compton, Duane A. "Mechanisms of Aneuploidy." Current opinion in cell biology. U.S. National Library of Medicine, Feb. 2011. Web. 31 May 2017
3. Griffiths, Anthony JF. "Aberrant euploidy." An Introduction to Genetic Analysis. 7th edition. U.S. National Library of Medicine, 01 Jan. 1970. Web. 31 May 2017.

Image Courtesy:

1."Haploid, diploid ,triploid and tetraploid" By Haploid_vs_diploid.svg: Ehambergderivative work: Ehamberg (talk) - Haploid_vs_diploid.svg (CC BY-SA 3.0) via Commons Wikimedia
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