

Reasons why genetic variation occurs in species



essay: Reasons why Genetic Variation Occurs in Speciespaper This is not always that offspring only resemble partners but they also vary from them. Of course, the resemblances are due to the units of information, the genes, they inherit. However, not all the inherited genes express themselves, i. e. , exhibit their phenotype. Some may be hidden or be recessive in the presence of dominant counter-parts, during expression. Genetic variation in sexually reproducing species develops primarily because parental genes are shuffled into new combinations, i. e., new genotypes, in the offspring. The recombination™s are produced by the routine reshuffling of genes as follows: 1.

Independent assortment of chromosomes during meiosis: During the formation of gametes in the metaphase I of meiosis homologous chromosomes come together in pairs and then segregate into daughter cells independent of eaqfe other. For example, the maternal and paternal chromosomes of an organism with two pairs of chromosomes can recombine in $2^2 = 4$ possibilities in the gametes. With 3 pairs of chromosomes $2^3 = 8$ possible types of gametes are formed. The humans have 23 pairs of chromosomes which can give rise to 2^{23} or about 8. 6 million combinations.

2. Reciprocal recombination of linked genes by crossing-over in meiosis:

Here during crossing over in meiosis chromatids of homozygous chromosomes break and recombine to produce new linkage groups. As a result new genetic varieties or recombination™s are produced. 3. Random fertilization of gametes: The fusion of male and female gametes takes place by random fertilization. During random fertilization any one of the 8.

6 million recombination™s in the sperm can fuse with any of the 8.6 million combination in the egg producing a total of $(8.6 \times 10^6) \times (8.6 \times 10^6) = 70 \times 10^{12}$ possible combinations. The possible combinations far exceed human population, and therefore, no two human beings are exactly alike.

Along with heredity there is always a component of variation. This means

that a whole set of characters is transmitted from the parents to the

offspring. Thus, there is always a component of variation due to which they

not only look different but also the offspring can be distinguished from each

other. Such variations may arise due to different mechanisms, such as (i)

recombination (ii) gene mutation (iii) gene environment interactions and by

(iv) chromosomal aberrations.

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