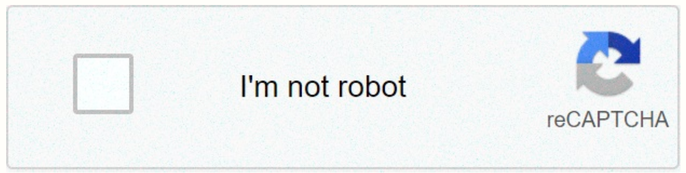

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Crossing over occurs during

Cite the crossing, the process of genetics by which the two chromosomes of the homologous pair exchange equal parts with each other. Crossing occurs in the first class of meiosis. At this stage, each chromosome is replicated into two strands called sibling chromatids. The two homologous chromosomes have a pair of synapses or come together. While chromosomes are synapses, fractures occur at the corresponding points of two non-sibling chromatids, i.e. one chromatid in each chromosome. Because chromosomes are homologous, fractures at the appropriate points mean that broken segments contain appropriate genes, i.e. alleles. The broken sections are then replaced between chromosomes to form completely new units, and the pair can go to another female sex cell for each new recombined chromosome. Crossing the recombination of genes on the same chromosome, the so-called linked genes, which would otherwise always be transmitted together. Since the frequency of crossing between any two interconnected genes is proportional to the chromosome distance between them, the crossing of frequencies is used to geneticly or interconnect gene maps of chromosomes. Mutations, temperature changes and radiation all affect the passage of frequency. Under the microscope, the crossover has an x appearance and is called chiasma. Columbia Electronic Encyclopedia, 6. Copyright 2012© Columbia University Press. All rights reserved. More encyclopedia articles: Genetics and genetic engineering What helps ensure the survival of a species? Genetic variation. This variation is the essence of evolution. Without genetic differences between individuals, survival of the most suitable is unlikely. Either they all survive, or they're all destroyed. \(\PageIndex{1}\): (CC BY 3.0; Profiles Diversity Journal via wikimedia.org) Sexual reproduction results in endless possibilities for genetic variation. In other words, sexual reproduction results in genetically unique offspring. They're different from both parents and each other. There are several reasons for this. When homologous chromosomes form pairs in the I. profases of meiosis, the crossing may occur. Strikethrough is the exchange of genetic material between homologous chromosomes. This results in new combinations of genes in each chromosome. When cells divide during meiosis, homologous chromosomes are randomly distributed among the daughter cells and the different chromosomes are distributed independently. It's called independent assortment. This results in pots having a unique combination of chromosomes. In sexual reproduction, two siens swipe to create offspring. But which two million possible offspring will be? It's probably a question of chance. This is obviously another source of genetic variation in offspring. This is called random insemination. All these mechanisms, which work together, possible deviations. Every human couple, for example, has the potential to produce more than 64 trillion genetically unique children. No wonder we're all different. The crossing takes place in phase I, and this genetic material is exchanged between non-sibling chromatids of homologous chromosomes. During recall prophase I, homologous chromosomes line up in pairs, gene-for-gene down the entire length, forming a configuration of four chromatids, called tetrad. At this point, the chromatides are very close together, and some substances connect chromosomes from two chromatids, i.e. the substance break off and are returned to the homologous chromosome in the same position (fig.\\PageIndex{2}\)). This genetic metabolism can often happen within the same homologous chromosomes, creating a unique combination of genes. This process is also called recombination. \(\PageIndex{2}\): Crossing. The maternal DNA strand appears in red. The paternish of DNA is displayed in blue. Crossing produces two chromosomes that previously did not exist. The recombination process involves breaking and reconnecting parental chromosomes (M, F). This results in the formation of new chromosomes (C1, C2), which share the DNA of both parents. (CC BY 2.5; David Eccles (Gringer) via Wikimedia). Figure \(\PageIndex{3}\): Crossover between homologous chromosomes crossover occurs between non-sibling chromosomes with homologous chromosomes. The result is the exchange of genetic material between homologous chromosomes. (CC BY 4.0 via OpenStax College). During Phase I, chromosomes condense and become visible in the nucleus. As the nuclear envelope begins to decompose, homologous chromosomes move closer together. The synaptonemal complex, the grid of proteins between homologous chromosomes, is formed in specific places and covers the entire length of chromosomes. The close pairing of homologous chromosomes is called synapse. In the synapse, the genes of chromatids of homologous chromosomes are in line with each other. The synaptonemal complex also supports the exchange of chromosome segments between non-sibling homologous chromatids in a process called crossing. The crossover events are the first source of genetic variation produced by meiosis. A single interspases event between homologous non-sibling siblings leads to the exchange of DNA between chromosomes. After the crossover, the synaptonemal complex degenerambles and the interconnectedness between homologous pairs is also removed. At the end of phase I, the pairs are held together only in chiasmata; these are called tetrads because the four sibling chromatids in each pair of homologous chromosomes can now be seen. In metaphases I, tetradok move to the metaphases plate, where kinetochores facing the opposite poles. Homologous pairs are randomly oriented at the equator. This event is the second mechanism into the drinking or spores. In each cell that goes through meiosis, the arrangement of tetradok is different. The number of variations depends on the number of chromosomes that make up the set. There are two options for orientation on a metaphasic disk. The possible number of alignments is therefore 2n, where n is the number of chromosomes per set. Given these two mechanisms, it is highly unlikely that the two haploid cells from meiosis will have the same genetic composition. Figure \(\PageIndex{4}\): Meiosis I provides unique inks Random, independent assortment in metaphases I can prove considering the cell in a set of two chromosomes (n = 2). In this case, there are two possible solutions on the equatorial plane in Phase I. The possible number of different siens is 2n, where n equals the number of chromosomes in a set. In this example, there are four possible genetic combinations for the offspring. In human cells, n = 23 is a possible combination of pateral and maternal chromosomes of more than 8 million. (CC BY 4.0 via OpenStax College). In humans, there are more than 8 million configurations where chromosomes are lined up in metaphase I meiosis. This is the specific process of meiosis, which results in four unique haploid cells that results in many combinations. This independent assortment, in which the chromosome is inherited or the father or mother can sort out any kind of siens, produces the potential for huge genetic variation. Along with random insemination, there are more possibilities for genetic variation between any two people than the number of individuals living today. In humans, there are more than 8 million (223) chromosome combinations in the production of sexes in both male and female. The sperm cell, with more than 8 million chromosome combinations, fertilizes an egg, which also has more than 8 million chromosome combinations. That's more than 64 trillion unique combinations, not counting the unique combinations produced by the crossing. In other words, each human couple can produce more than 64 trillion unique chromosome combinations! Sexual reproduction is capable of producing a huge genetic variation in the offspring. During Phase I, homologous chromosomes condense and become visible, like the x shape we know, pairing up to form tetrad and exchange genetic material. In metaphases I, tetradok line up at the metaphasic plate, and homologous pairs orient at random. This change is due to the independent choice and crossing during meiosis, and random union of sienes during fertilization. What is the crossing and when does it occur? Describe how crossing, independent selection and random insemination lead to genetic variation. How many combinations of chromosomes are possible to reproduction in humans? Create a diagram that shows how the crossing happens and how it creates new gene combinations on each chromosome. Watch the video below to learn how genetic variations arise during sexual reproduction. Leeches look like disgusting creatures with little intelligence. But, in this video from Science Friday, Dr. Mark Siddall discusses his research on leeches and some interesting properties. Properties.

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