Long uncoiled strands of dna in plant cell

Chromosomes are the things that make organisms what they are. They carry all the information used to help a cell grow, thrive and reproduce. Chromosomes are made up of DNA. Parts of DNA in specific patterns are called genes. Your genes make you who you are. You will find chromosomes and genetic material in the nucleus of a cell. In prokaryotics, DNA floats on the cytoplasm in an area called nucleoids. Loose and tight chromosomes are not always visible. They usually sit around uncoiled and as loose strands called chromatin. When it is time for the cell to reproduce, they condense and wrap very tightly. The hermetic DNA is the chromosome. Chromosomes look like long, lame, white hot dogs. They are usually found in pairs. Completing the totals Scientists measure the individual strands of chromosomes. They count people that not all organizations have pairs. You probably have 46 chromosomes (23 pairs). Peas only have 12. A dog has 78. The number of chromosomes is NOT related to plasma intelligence or complexity. There's a crayfish with 200 chromosomes. Does this make a crayfish five times smarter or more complicated than you are? Not. There are even organisms of the same species with different chromosome numbers. You will often find plants of the same species with multiple sets of chromosomes. Chromosomes work with other nucleic acids in the cell to build proteins and help in cell division. You'll probably find mRNA in the nucleus with DNA. tRNA is located outside the nucleus in cytosol. When chromosomes are visible, cells with two complete sets of chromosomes are called diploids (46 in a human). Most cells are diploid. Cells with a single set (23 in a human) are called simple cells. Haploids are most often found in cells involved in sexual reproduction such as a sperm or an egg. Haploid cells are created in the cell division called meiosis. Chalk Talk: DNA (US-NSF Video) Learning goals briefly describe the process of DNA reproduction. Compare prokaryotic and eukaryotic DNA reproduction in terms of the origin of reproduction. Set the telomeres and indicate if they are in prokaryotic or eukaryotic DNA. Name the stages of mitosis and state what happens during each. As in prokaryotes, the linear chromosomes of eukaryotes are reproduced by splitting strands and supplementary base matching of free deoxyribonucleotides with those in each strand of maternal DNA. As with prokaryotics, DNA reproduction in eukaryotic cells is two-way. However, unlike cyclic DNA in cells that usually have only one source of reproduction, the linear DNA of an eukaryotic cell contains multiple reproductive roots (Figure \(\PageIndex{11}\)). Figure \(\PageIndex{11}\): Reproduction of two-way DNA in eukaryotic cells. DNA reproduction (arrows) occurs in both directions from the multiple origin of reproduction in linear DNA DNA eukaryotic cells. As discussed earlier in the context of reproduction of prokaryotic DNA, DNA can only be synthesised in a direction of 5' to 3' and all DNA polymerase requires primer. To solve this problem, the ends of linear eukaryotic DNA strands, called telomeres, have short, repetitive, non-DNA base meanings. A unique enzyme called telomerase binds to telomere DNA at the end of 3'. Telomerase contains a small RNA pattern as a co-factor copied from DNA nucleotides to extend the end of 3'. Once the expansion is large enough, primase can assemble a short RNA primer to delay strand and DNA replication can proceed in a manner similar to the delayed strand of prokaryotic DNA. Animation: Reproduction of DNA from complementary base mapping. As the strands of DNA unfold and separate, new complementary strands are produced by the hydrogen connection of free DNA nucleotides to those in each maternal strand. As the new nucleotides align opposite each maternal strand with hydrogen bonding, enzymes called DNA polymerases join nucleotides through phosphodide bonds. The DNA polymerase responsible for these events is not presented here. Once the chromosomes are reproduced, the nucleus is divided by mitosis (see Figure \(\PageIndex{12}\) to 16). The eukaryotic cell cycle is divided into two main phases: intraphase and cell division. Ninety percent or more of the cell cycle is spent in the interphase phase. During the phase, the cell organelles double in number, DNA reproduces and protein synthesis occurs. Chromosomes are not visible and DNA appears as indocate chromatin. Endphase in a plant cell: see Shape \(\PageIndex{17}\) Shape \(\PageIndex{17}\): Intraphase in a plant cell. Ninety percent or more of the cell cycle is spent in the interphase phase. During the phase, the cell organelles double in number, DNA reproduces and protein synthesis occurs. Chromosomes are not visible and DNA appears as indocate chromatin. These are cells found on the roor edge of an onion plant. Endophase in an animal cell: see Image \(\PageIndex{18}\) Figure \(\PageIndex{18}\): Endocess in an animal cell. Ninety percent or more of the cell cycle is spent in the interphase phase. During the phase, the cell organelles double in number, DNA reproduces and protein synthesis occurs. Chromosomes are not visible and DNA appears as indocate chromatin. These are cells from a whitefish. Interference is divided into the following stages: G1, S and G2. Phase G1: During phase G1, the period immediately following the division, the cell grows and differentiates. New organelles are made, but chromosomes have not yet been reproduced in preparation for cell division. Phase S: DNA synthesis occurs during phase S. Chromosomes reproduce in preparation for cell division. Phase G2: During phase G2, molecules are synthesized that will be required for cell reproduction. Cell. consists of nuclear division and cytoplasmatic division. Nuclear division is referred to as mitosis, while cytoplasm division is called cytokenesia. 1. Mitosis (nuclear division) Mitosis is the process of nuclear division in eukaryotic cells and ensures that each child cell receives the same number of chromosomes as the original parent cell. Mitosis can be divided into the following phases: prephase, metaphase, rephase and telophase. a. Prephase: During the prephase, chromatin condenses and chromosomes become visible. Also the nucleolius disappears, the fragments of nuclear membrane, and the axle device forms and binds to the centromeres of chromosomes. b. Metaphase: During the metaphase, the fragmentation of the nuclear membrane is complete and the duplicate chromosomes align along the equator of the cell. c. Rephase: During the rephase, the diploid sets of the daughter's chromosomes separate and are pushed and pulled towards the opposite poles of the cell. This is achieved by polymerizing and depolymerizing the microtubules that help form the axle device. d. Telophase: During telophase, nuclear membrane and nuclei reform, cytokinesis is almost complete and chromosomes eventually peel off the chromotin. Usually cytokinesis occurs during telophase. YouTube movie depicting mitosis. 2. Cytokinesis (cytoplasmatic division) During cytokinesis, the separator cell is divided into two diploid child cells. In animal cells, which lack a cell wall and are surrounded only by cytoplasmic membrane, micro-beams of actin and myosin associated with the membrane form a contraction of the rings around the central part of the dividing cell and eventually divide the cytoplasm into two child cells. In the case of plant cells, which are surrounded by a cell wall other than the cytoplasmic membrane, the carb-filled comatose accumulates and merges along the equator of the cell forming a cell plaque that divides the cytoplasm into two child cells. Summary During DNA replication, each parent strand acts as a model for the composition of the other part through complementary base mapping. The complementary base mapping refers to DNA nucleotides with the adenine base forming only hydrogen bonds with thymine-based nucleotides (A-T). Similarly, nucleotides with the tropin base may be associated hydrogen only with cytosine-based nucleotides (G-C). Each DNA strand has two ends. The 5' end of DNA is the one with the final phosphate group 5' deoxyrivose carbon. the end 3' is the one with a final hydroxyl group (OH) in the deoxyrivose of 3' deoxyrivose carbon. To synthesize the two chains of deoxyribonucleotides during DNA reproduction, these DNA polymerase enzymes are able to join the phosphate group only in 5' carbon of a new nucleotide in the hydroxyl group (OH) of carbon 3' of one already in the chain. While the two strands of DNA are complementary, they are oriented in opposite directions to each other. One leg is said to run 5' to 3'. the opposite strand of DNA runs antiparadel, or 3' to 5'. Unlike circular DNA in prokaryotic cells that usually has only one origin of reproduction, the linear DNA of an eukaryotic cell contains multiple roots of reproduction. Because DNA can only be synthesised in a direction of 5' to 3' and all DNA polymerase requires an injector, the ends of linear eukaryotic DNA clones, called telomeres, have short, repetitive, non-cosy DNA base sequences. A unique enzyme called telomerase binds to telomere DNA at the end of 3'. Telomerase contains a small RNA pattern as a co-factor copied from DNA nucleotides to extend the end of 3'. Once the expansion is large enough, primase can assemble a short RNA primer to delay strand and DNA replication can proceed in a manner similar to the delayed strand of prokaryotic DNA. Once the chromosomes are reproduced, the nucleus is divided by mitosis. During the phase, the cell organelles double in number, DNA reproduces and protein synthesis occurs. Chromosomes are not visible and DNA appears as indocate chromatin. During phase G1, the period immediately following cell division, the cell grows and differentiates and becomes new organelles. DNA synthesis (chromosome reproduction) occurs during phase S. During phase G2, molecules are synthesized that will be required for cell reproduction. Nuclear division is referred to as mitosis, while cytoplasm division is called cytokenesia. During the prephase, chromatin condenses and chromosomes become visible, the nucleolo disappears, fragments of the nuclear membrane and the axis apparatus is formed and connected to the centered chromosomes. During the metaphase, the fragmentation of the nuclear membrane is complete and the duplicate chromosomes align along the equator of the cell. During anaphase, diploid sets of daughter chromosomes separately and are pushed and pulled towards opposite poles of the cell. During telophase, nuclear membrane and nuclei reform, cytokinesis is almost complete and chromosomes eventually unravel chromotin in chromatin. During cytokinesis, the separator cell is divided into two diploid child cells. Contributors and performances Dr. Gary Kaiser (BALTIMORE COUNTY COMMUNITY COLLEGE, CATONSVILLE CAMPUS) CAMPUS)