

THRIPP

SUPPLEMENTAL INSTRUCTION FOR SURVEY OF BIOLOGY by Richard X. Thripp  
Week 9, Fall 2009, Oct. 27 / 28 / 29. Mitosis & Meiosis Ch. 8. daytonastate.org/biology

A genome is a complete set of an organism's genes.

What is abnormal cell division? cancer

A karyotype is a numbered display of an organism's chromosomes, sorted by type and size. Body cells (i.e. heart, brain, liver, skin, etc.) are diploid in animals (2N: 2 sets of chromosomes). Germ cells divide to make gametes (sperm or eggs). They are haploid in animals (1N).

Humans have 44 autosomal chromosomes (22 pairs) and 2 sex chromosomes.

Humans are by default female (XX). If the "master switch gene" is on, our sex chromosomes are XY

and we become male. || A chromatid is half of a duplicated chromosome.

Chromatin is relaxed chromosomes in the interphase nucleus.

ALL cells in your body are diploid and have 46 chromosomes EXCEPT:

- 1.) Sperm in men and eggs in women which have 23 chromosomes each (haploid).
- 2.) Cancerous cells, which divide uncontrolled and may have abnormal chromosomes.
- 3.) People with Down syndrome (trisomy 21, 47 chromosomes) or abnormal sex chromosomes.

All dogs have 78 chromosomes (39 pairs): 76 autosomes (38 pairs) and 2 sex chromosomes.

After mitosis, a somatic cell in a dog has 78 chromosomes (2N / diploid).

After meiosis, a germ cell (sperm or egg) in a dog has 39 chromosomes (1N / haploid).

Cells are in mitosis 10% of the time, which has 4 phases which can be remembered as PMAT.

Prophase (3%): Nuclear membrane and nucleolus disassemble, centrioles move to poles, chromatin condenses into chromosomes, spindle fibers form.

Metaphase (4%): Chromosomes are lined up at the equator (middle).

Anaphase (1%): Chromatids separate and move AWAY from the equator (toward the poles), now called chromosomes. Spindle fibers shorten by disassembly.

Telophase (2%): CYTOKINESIS (split in two by contracting ring of microfilaments) by cleavage furrow in animals or cell plate in plants. Chromosomes BEGIN to relax and the nuclear membrane and nucleolus reassemble.

Cells are in interphase 90% of the time, which consists of:

G1: Gap 1: protein Synthesis and cell growth.

S: DNA synthesis (copying for the new cell during mitosis).

G2: Gap 2: same as gap 1 with mitosis preparation.

P → M → A → T → G1 → S → G2 → P → M → A → T → G1 → S → G2 → and so on.

In meiosis, cells divide twice in a row. After producing two 1N cells with homologous chromosomes in Meiosis I (crossing over, etc.), the new cells split again (Meiosis II), producing 4 haploid cells with half the DNA of the parent and unduplicated chromosomes (i.e. 39 of 78 in dogs).

Brain and spinal cord cells enter G<sub>0</sub>, a “resting” or non-dividing stage.

A benign cancerous tumor grows wildly but does not invade neighboring cells.

A malignant cancerous tumor grows wildly AND invades neighboring cells.

Metastasis is when cancerous cells migrate through the lymph or circulatory system.

Homologous chromosomes have the same genes but may code for different alleles (variations), i.e. blue or brown eyes.

In meiosis, independent assortment is when every chromosome pair orients independently of the others. Crossing over is homologous chromosomes exchanging DNA. Also: recombination.

A centromere is the joining point of two chromatids.

A telomere is one end of a chromatid.

DNA is copied in the S-phase of interphase. Interphase is not a phase of mitosis or meiosis.

Turner syndrome has X0 sex chromosomes (1 instead of 2; boyish girl).

Klinefelter syndrome has XXY sex chromosomes (3 instead of 2; girlish boy).

What syndrome results from XYY sex chromosomes? none

Prophase = pre (first); Metaphase = middle; Anaphase = away; Telophase = end

miTOsis is for my TOes . . . mEiosis is for my Eggs (or sperm)