

## Chapter 13 Meiosis

- Mitosis: normal cell division; growth ; repair; asexual reproduction; duplication (daughter cells have same number and kind of chromosomes as parent)
- Meiosis: special cell division associated with sexual reproduction; daughter cells have  $\frac{1}{2}$  the chromosome number of the parent cell.; occurs only once per turn of life cycle
- Life cycle: course of biological events in an organism's life from one generation to the next
- Asexual reproduction: one individual self reproduces; off spring genetically identical to parent
- Sexual reproduction: genetic mixing; two individuals involved; offspring not identical to either parent; EUKARYOTES
- Gametes: cells that fuse in sexual reproduction
- Syngamy (fertilization): fusion of gametes
- Zygote: product of fusion
- Gametes are haploid (n) have a single set of chromosomes
- The zygote is diploid (2n)
- Sexual fusion produces cell with two copies of each chromosome.
- Isogamy: compatible gametes are of same size and shape.
- Anisogamy: compatible gametes are of different size
- Oogamy: compatible gametes are of different size and shape; only one is motile
- Meiosis returns chromosome number to (n)
- Life cycle: meiosis and syngamy alternate; one full turn of the life cycle= one generation.
- Diploid Cells; have two sets of chromosomes (2n) one from each parent; each chromosome has a HOMOLOGOUS PAIR.
- N= number of different kinds of chromosomes present in each cell; characteristic for every species
- Meiosis cuts chromosome number in half; two consecutive divisions Meiosis 1 & Meiosis 2
- Meiosis 1 & 2
  - Interphase: passed through S-phase; replication of DNA
  - Prophase 1: chromosomes condense; nuclear envelope dissolves; spindle forms; microtubules attach to chromosomes; homologous chromosomes pair (synapse); crossing over exchanging homologous portions
  - Metaphase 1: homologous pairs line up in central plane
  - Anaphase 1: homologs separate; move to opposite poles
  - Telophase 1: chromosomes at poles: cytokinesis
  - Prophase 2: new spindle forms
  - Metaphase 2: chromosomes align in center
  - Anaphase 2: chromatids separate, migrate to poles
  - Telophase 2: chromosomes at poles; formation of nuclear envelopes; cytokinesis
- In Mitosis, chromosomes align separately at metaphase (NO pairing of homologs)
- In meiosis, homologous chromosomes pair at metaphase 1.

- In meiosis, homologous chromosomes separate at anaphase 1; sister chromatids separate at anaphase 2; four cells result, each with one copy of each chromosome
- In meiosis 1, members of a homologous pair can line up and separate to either side at anaphase
- Chromosomes that came from the same parent don't necessarily stay together
- Meiosis deals out complete sets of chromosomes in new combinations.
- After crossing over (prophase 1), each chromosome is now a mixture of paternal and maternal DNA.
- Synapsis and crossing over (Meiosis Prophase 1)
- Homologous chromosomes synapse (come together)
- Crossing over corresponding bits from different parents.
- Nondisjunction: homologous chromosomes fail to separate; when meiosis goes wrong
- Down syndrome (humans): sufferers have an extra copy of chromosome 21.
- All sexually reproducing organisms have haploid and diploid phases that alternate.
- Life cycle: meiosis and syngamy alternate
- Haploid and diploid phases alternate
- Mitosis produces a multicellular organism from a single cell
- Typical animal life cycle: zygote undergoes mitosis form multicellular diploid; here meiosis produces gametes (haploid stage)
- Many fungi and algae: multicellular haploid; zygote (the only diploid stage) undergoes meiosis directly; gametes formed by mitosis
- Plants have multicellular haploid and diploid stages; gametes produced by mitosis; meiosis produce spores
- Spore germinates, grows, divides; does not fuse
- Zygote undergoes meiosis; diploid never becomes multicellular