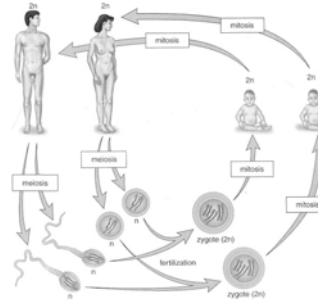
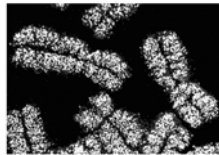


THE HUMAN LIFE CYCLE and CELL DIVISION



BODY CELLS ARE DIPLOID- (2n)
They contain two copies of each chromosome. One set from the dad's sperm and one set from the mom's egg. These replicate by MITOSIS.

GAMETES ARE HAPLOID- (n)
They contain one copy of each chromosome randomly chosen (and mixed up) from the two that are available. They are haploid so that they can combine to form a diploid zygote.



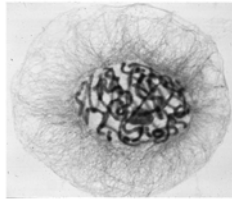
DNA- Deoxyribonucleic Acid

GENOME- all the genes an organism has

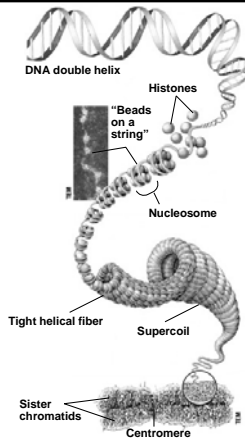
CHROMOSOMES- structures made of DNA and proteins

CHROMATIDS- "half-chromosomes"

CHROMATIN- DNA/protein complex that makes up chromosomes



- The DNA in a cell is packed into an elaborate, multilevel system of coiling and folding



**Chromosome?
Sister Chromatids?
What's in name?**

When the cell divides, the sister chromatids separate from each other and are called chromosomes again

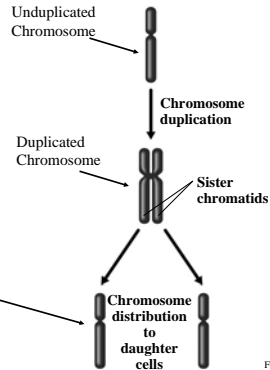


Figure 8.5

TWO PHASES OF THE CELL CYCLE

Interphase

- Cell growth and replication of DNA

Mitosis

- Cell divides

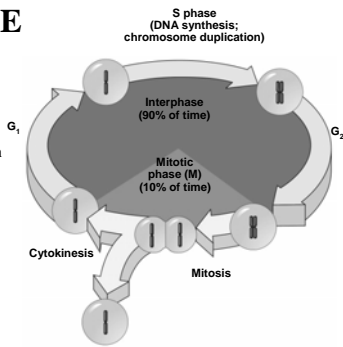
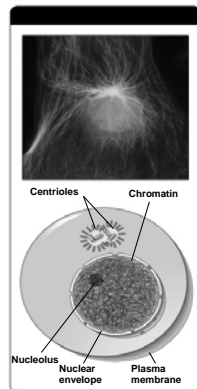


Figure 8.6

Interphase

- Interphase has three parts
 - G₁- Organelle duplication
 - S - DNA replication
 - G₂- Proteins needed for mitosis are produced
- Cell spends most of its time in interphase and DNA stays loosely packed in the nucleus as chromatin



Mitosis and Cytokinesis

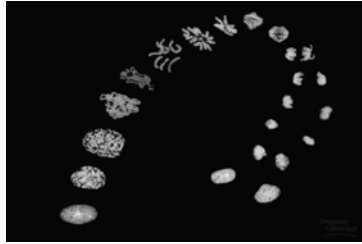
• Mitosis has 4 phases

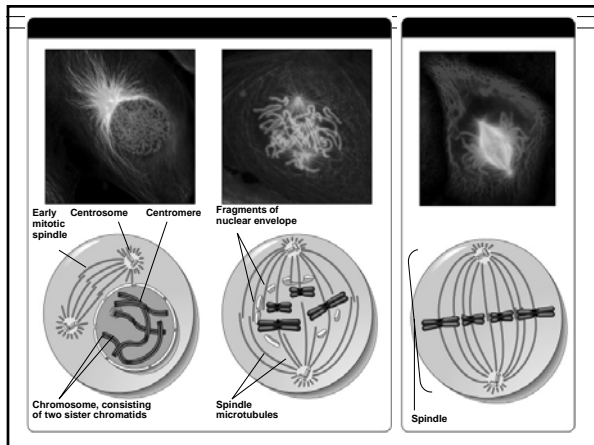
- Prophase
- Metaphase
- Anaphase
- Telophase

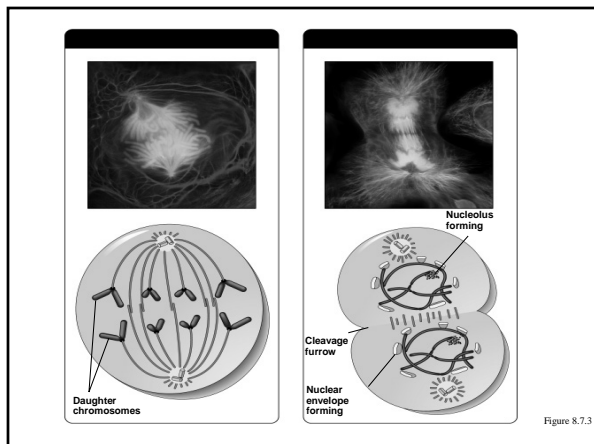
AND

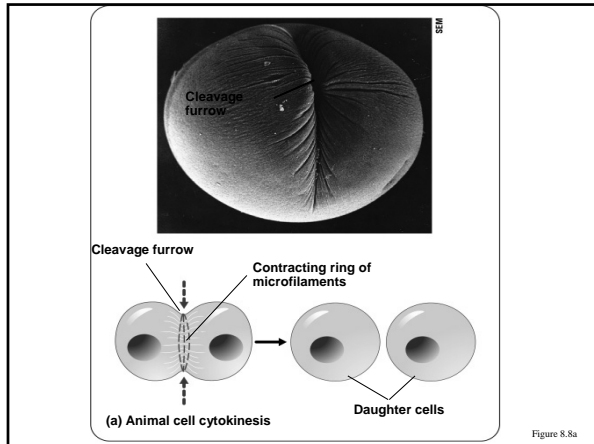
- Cytokinesis

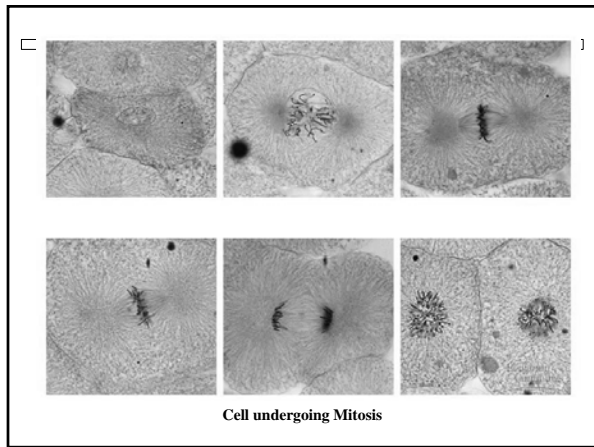
- We will go through each individually

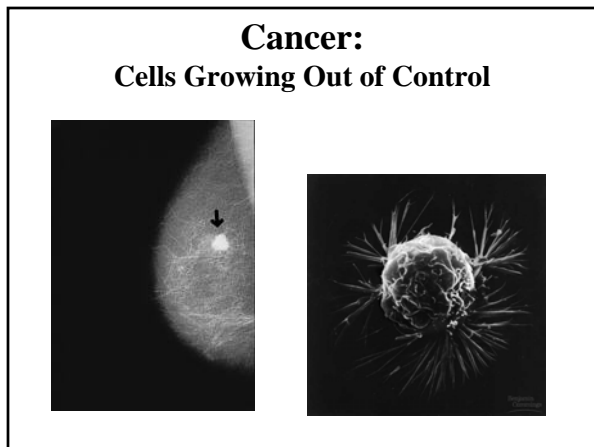












MEIOSIS: THE BASIS OF SEXUAL REPRODUCTION



Gametes and the Life Cycle of a Sexual Organism

- The life cycle of a multicellular organism is the sequence of stages leading from the adults of one generation to the adults of the next

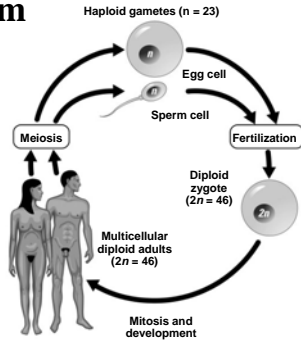
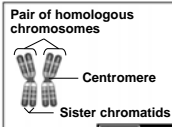
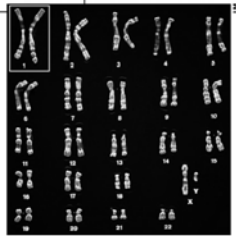


Figure 8.13



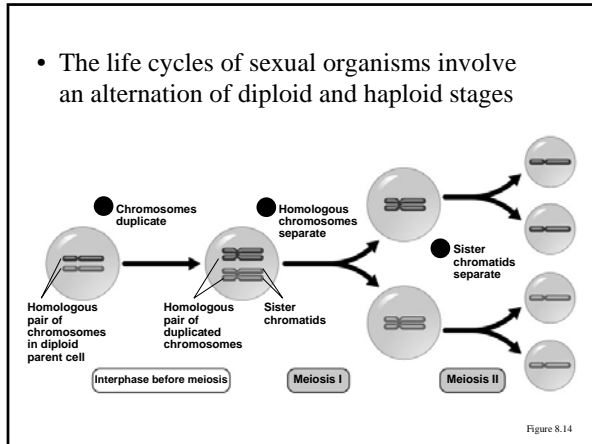
Homologous Chromosomes



A karyotype

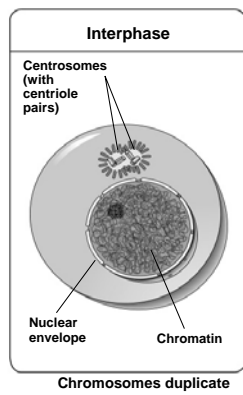
Figure 8.12

- The life cycles of sexual organisms involve an alternation of diploid and haploid stages

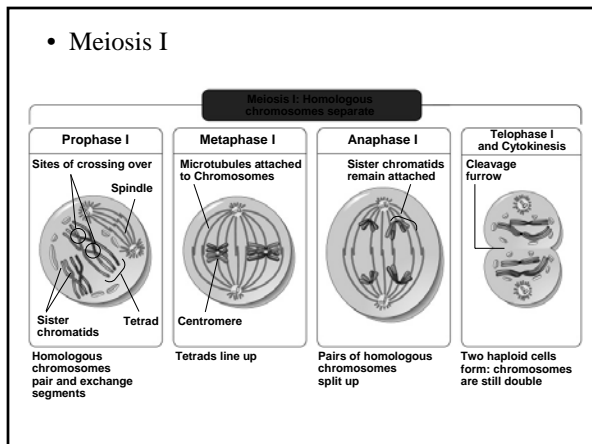


The Process of Meiosis

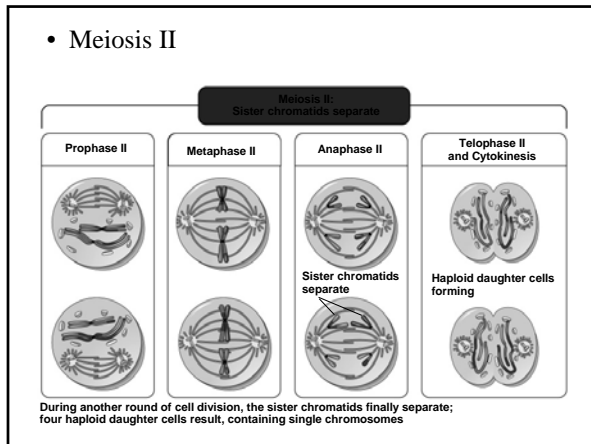
- Haploid gametes are produced in diploid organisms
- Two consecutive divisions occur, **meiosis I** and **meiosis II**, preceded by interphase
- **Crossing over** occurs

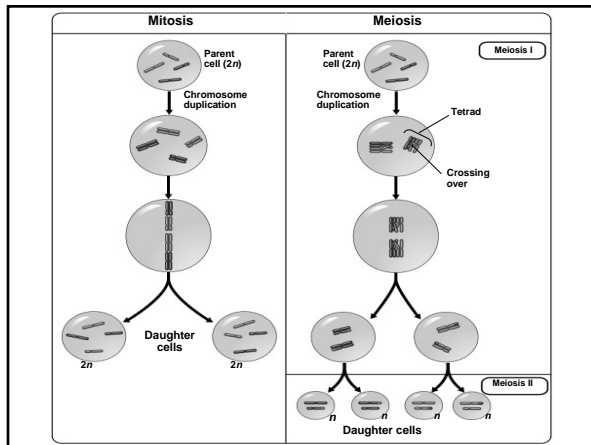


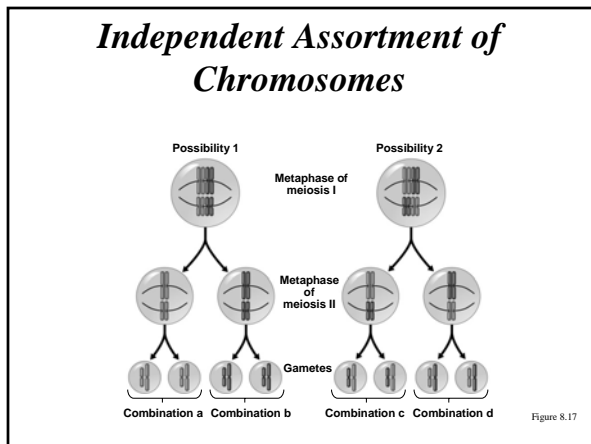
• Meiosis I



• Meiosis II







Random Fertilization

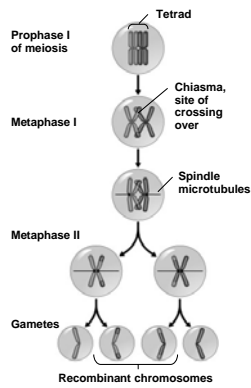


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- The human egg cell is fertilized randomly by one sperm, leading to genetic variety in the zygote

Crossing Over

- Homologous chromosomes exchange genetic information
- Genetic recombination occurs



Down Syndrome: An Extra Chromosome 21



Figure 8.19

- The incidence of Down Syndrome increases with the age of the mother

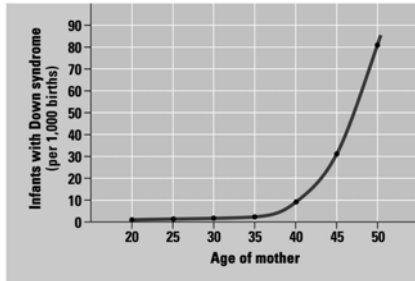
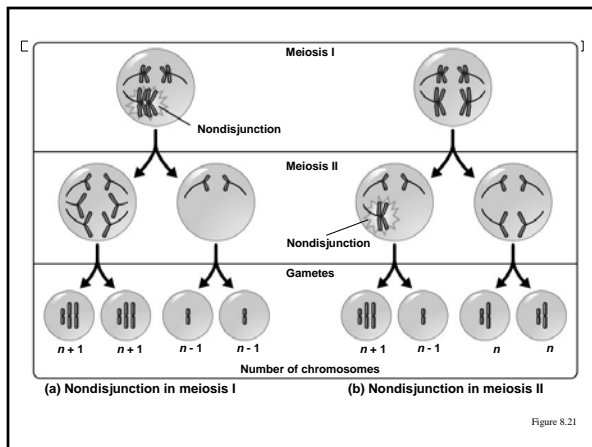


Figure 8.20

Accidents During Meiosis Can Alter Chromosome Number

- **NONDISJUNCTION**

- The members of a chromosome pair fail to separate during anaphase
- Gametes with an incorrect number of chromosomes are produced



- The result of nondisjunction

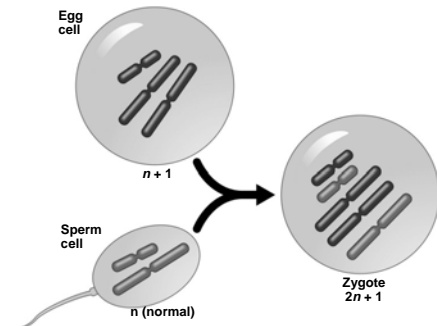


Figure 8.22

Other Chromosomal Abnormalities

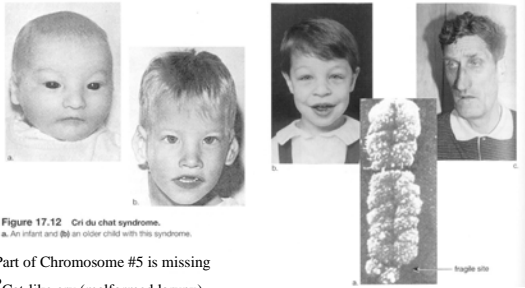


Figure 17.12 Cri du chat syndrome. a. An infant and b. An older child with this syndrome.

Part of Chromosome #5 is missing

- Cat-like cry (malformed larynx)
- Deformed ears/eyelids
- Severe retardation

Fragile X Syndrome
X chromosome is broken

Abnormal Numbers of Sex Chromosomes

- Nondisjunction
 - Also affects the sex chromosomes

Sex Chromosomes	Syndrome	Origins of Nondisjunction	Frequency in Population
XXY	Klinefelter syndrome (male)	Meiosis in egg or sperm formation	$\frac{1}{2,000}$
YYY	None (normal male)	Meiosis in sperm formation	$\frac{1}{2,000}$
XXX	Metafemale	Meiosis in egg or sperm formation	$\frac{1}{1,000}$
XO	Turner syndrome (female)	Meiosis in egg or sperm formation	$\frac{1}{5,000}$

