Chromosomes (chapters 10, 12, 13, and 14) **Page 1**

Gene (as defined by biologists before DNA was discovered)

Something in an organism that (a) controls one of its traits, and (b) can be passed from parent to offspring

- Gregor Mendel = Discovered laws of heredity and the concept of the gene *(1860's)*

- Flemming = Discovered chromosomes in the nucleus *(1880's)*

- Sutton, Boveri, and others = The first to hypothesize that genes were part of chromosomes *(early 1900's)*

- Morgan = Found a specific gene in fruit flies is always inherited when a certain chromosome is inherited *(early 1900's)*

  √ Most scientists of the time believed the proteins of chromosomes were the genetic molecules, not the DNA

- Avery (extending the work of Griffith) = Showed genes can be passed from bacteria to bacteria when DNA molecules (not proteins) pass between them *(1940's)*

- Hershey and Chase = Showed conclusively that virus genes are DNA, not proteins *(1950's)*

- Watson and Crick (using data from Rosalind Franklin) = Discover double helix structure of DNA *(1950's)*

- Various biologists work out details of DNA replication and gene expression *(1960's and 1970's)*

Chromosomes

Structures in the nucleus composed of…

- Double stranded DNA
- Histone proteins
- A centromere

Chromatid

The double stranded DNA (and its histone proteins) in a chromosome

Chromatin

The diffuse, spread out state of the chromosomes

Chromosome number

The number of chromosomes per cell in an organism

- Example: Human chromosome number = 46

Each chromosome is distinguishable from other chromosomes in these three ways:

- Its length
- Its centromere location
- The genes it contains

√ Each chromosome carries hundreds of genes, but they are different genes than the genes on any other chromosomes

√ A gene's locus is consistent in all members of a species

– Example: The gene for eye color is always located at the same spot on chromosome 15 in all human beings

Fig 13.3

Locus

A gene's location on one specific chromosome

Fig 14.4

Homologous pair

Two chromosomes of the same size, centromere location, and containing genes that affect the same traits.

Figs 13.4 and 13.5

Diploid ("2n")

A cell or an organism that has two sets of chromosomes (one set is inherited from each parent)

• Diploid organisms have a pair of each chromosome

√ Therefore they have 2 of each gene

Figs 13.4 and 13.5

Haploid ("n")

A cell or an organism that has only one set of chromosomes

• Haploid organisms have only one of each chromosome

√ Therefore they have only one of each gene

Alleles

Different versions of the same gene

Heterozygous

An organism with different alleles for a gene

Homozygous

An organism with two of the same alleles for a gene