

CHAPTER 15
THE CHROMOSOME AND
HUMAN GENETICS

- **PHYSICAL BASIS OF HEREDITY IS IN THE CHROMOSOMES.**
- **CHROMOSOMAL BASIS OF MENDEL'S LAWS.**
- **DISCOVERY OF SEX-LINKED GENES IN DROSOPHILA/FRUIT FLY.**
- **LINKED GENES ON SAME CHROMOSOME.**

Figure 15.0x Chromosomes

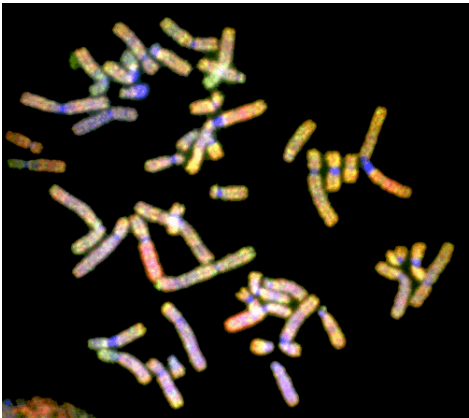


Figure 15.1 The chromosomal basis of Mendel's laws

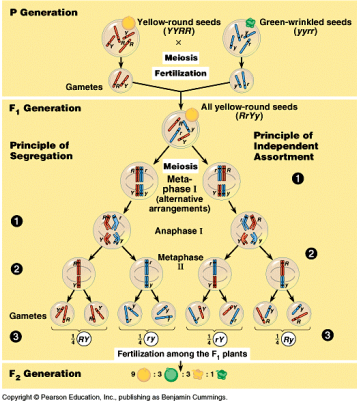
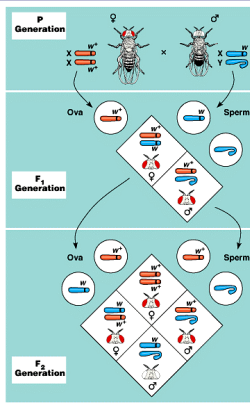


Figure 15.2 Morgan's first mutant

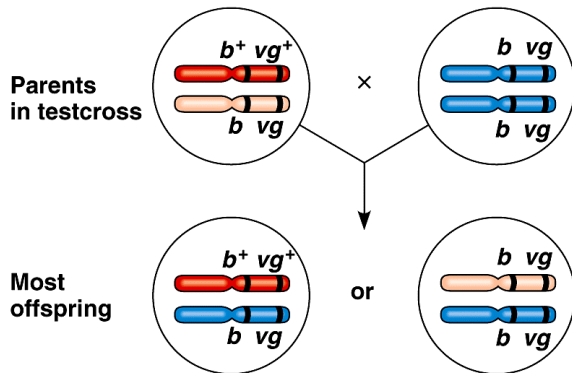


Figure 15.3 Sex-linked inheritance



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Unnumbered Figure (page 272) *Drosophila* testcross



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DROSOPHILA GENETICS

- **SEX LINKED GENES (MORGAN)**
- **8 CHROMOSOMES, 4 PAIR.**
- **1 PAIR OF SEX CHROMOSOMES.**
- **LINKED ON SAME CHROMOSOME.**
- **INDP. ASSORTMENT AND CO CAUSES RECOMBINATION.**
- **GENE MAPPING, GENE MAPS.**

Figure 15.4 Evidence for linked genes in *Drosophila*

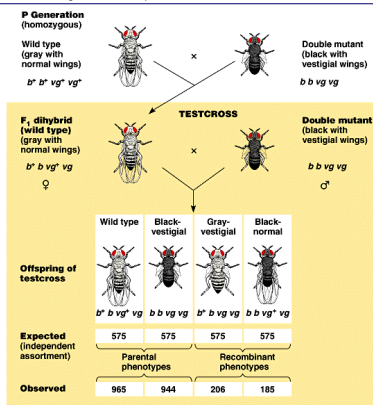


Figure 15.5a Recombination due to crossing over

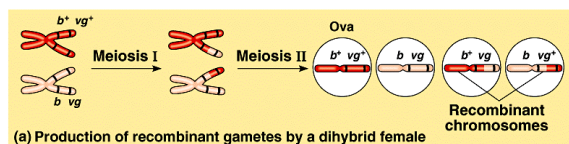


Figure 15.5b Recombination due to crossing over

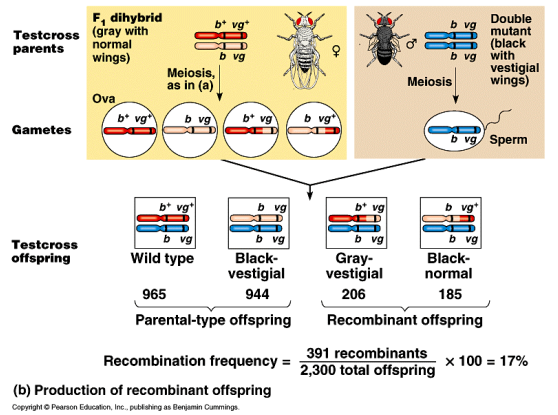


Figure 15.6 Using recombination frequencies to construct a genetic map

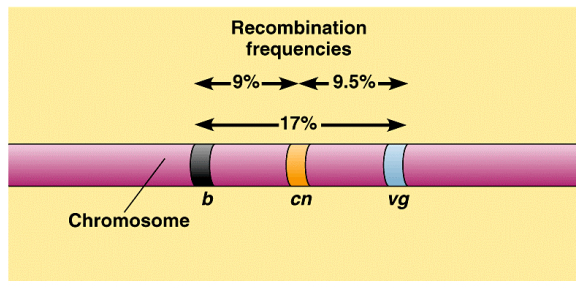


Figure 15.7 A partial genetic map of a *Drosophila* chromosome

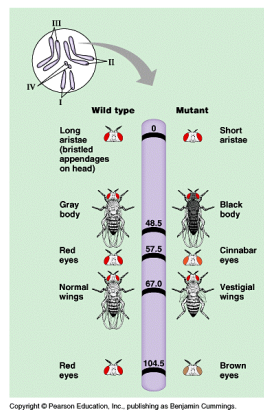
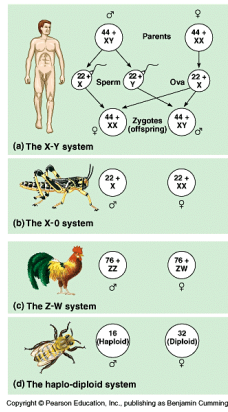


Figure 15.8 Some chromosomal systems of sex determination



X-LINKED INHERITANCE

- **RECESSIVE GENES (aa,bb, etc).**
- **HEMOPHILIA, BLEEDERS DISEASE. FACTOR VIII NOT INHERITED.**
- **COLORBLINDNESS.**
- **DUCHENNE MUSCULAR DYSTROPHY**
- **FAULTY TOOTH ENAMEL.**

Figure 15.9 The transmission of sex-linked recessive traits

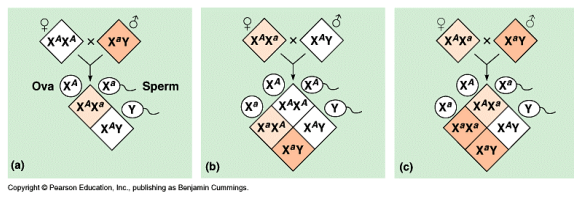


Figure 15.10 X inactivation and the tortoiseshell cat

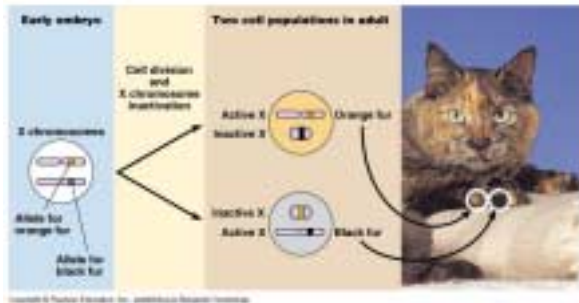


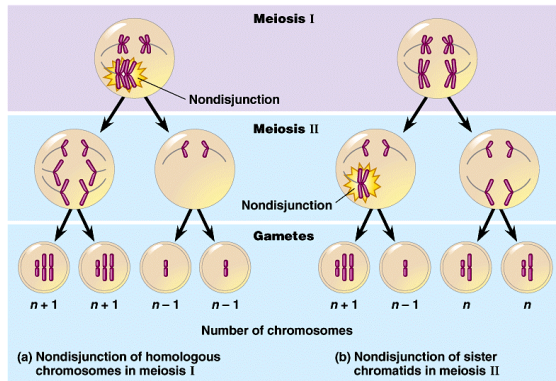
Figure 15.10x Calico cat



X-LINKED INHERITANCE

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- **COLORBLINDNESS.**
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Figure 15.11 Meiotic nondisjunction

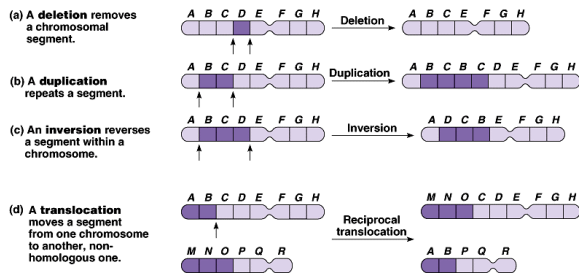


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CHROMOSOME CHANGES

- **DELETION:** SEGMENT MISSING OF THE CHROMOSOME, CRI-DU-CHAT
- **DUPLICATION:** EXTRA CHROMOSOME/ 3X REPEATS OF CH3 ON A CHROMOSOME.
- **INVERSION:** INVERTING 1 CHR.
- **TRANSLOCATION:** A RELOCATION OF A CHROMOSOME.

Figure 15.13 Alterations of chromosome structure



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NON-DISJUNCTION

- EXTRA CHROMOSOMES, POLY-PLOIDY OR ANEUPLOIDY.
- METAFEMALE, XXX
- KLEINFELTER SYNDROME, XXY
- ANAPHASE I AND II OF MEIOSIS.
- TURNER'S SYNDROME, XO
- R. SPECK SYNDROME, XXY

Figure 15.14 Down syndrome

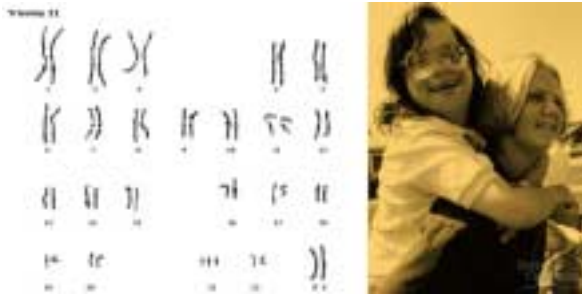


Figure 15.x2 Klinefelter syndrome

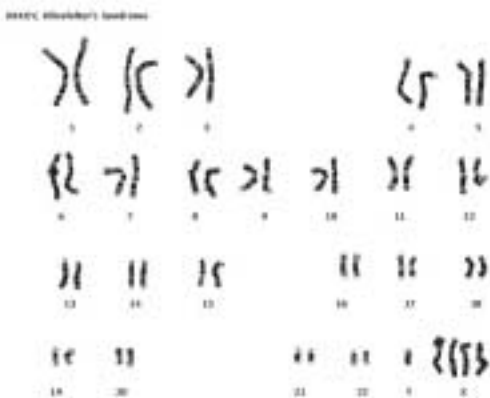


Figure 15.x3 XYY karyotype

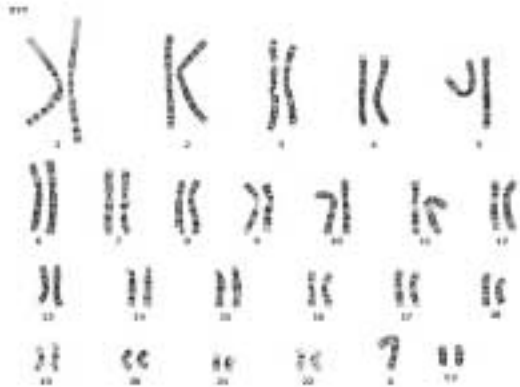


Figure 15.15 Genomic imprinting (Layer 3)

