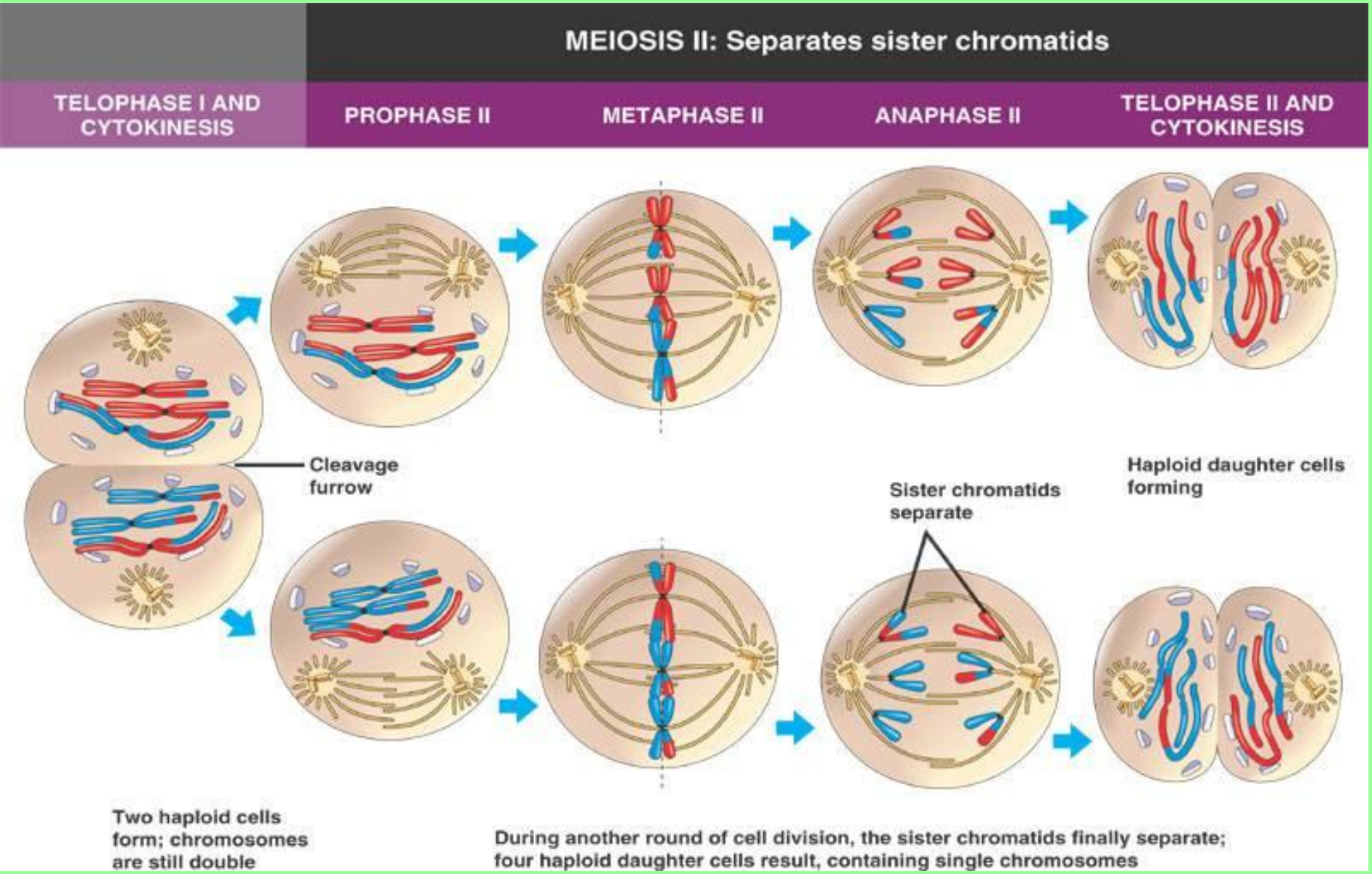
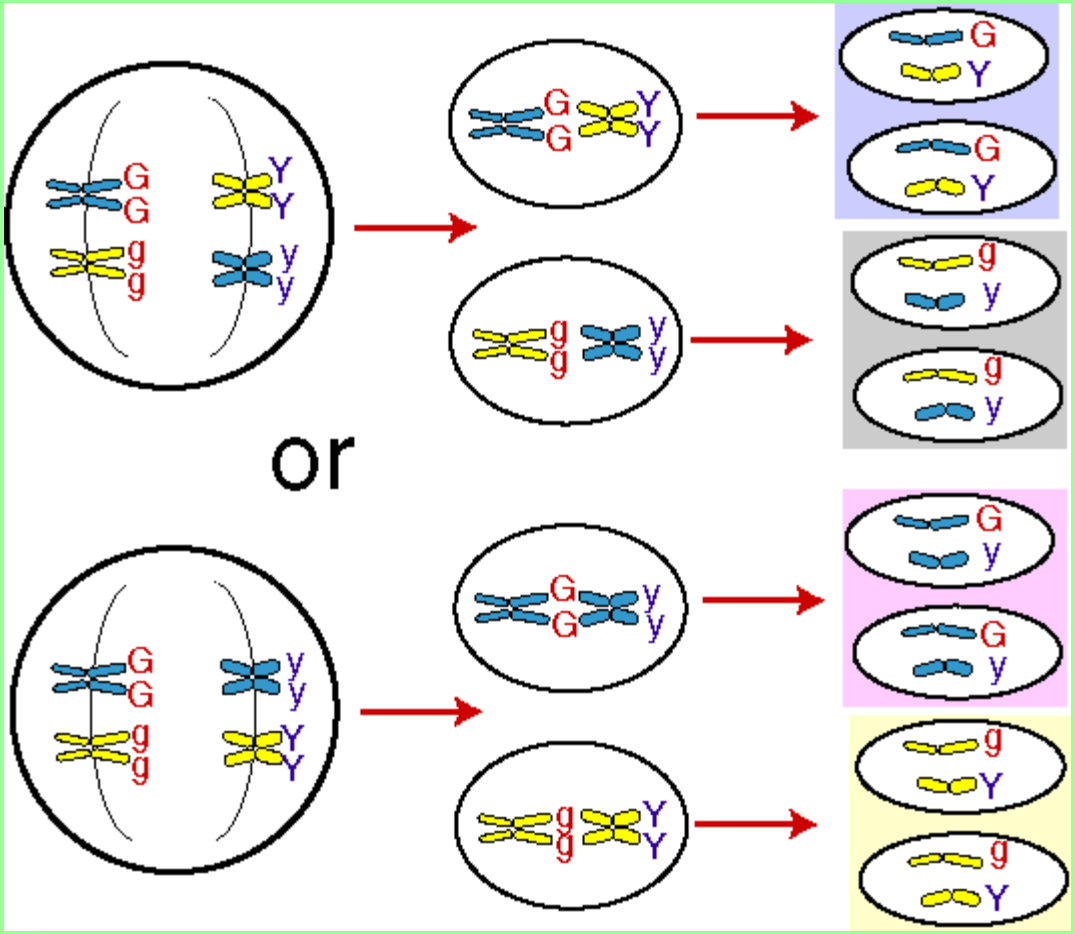
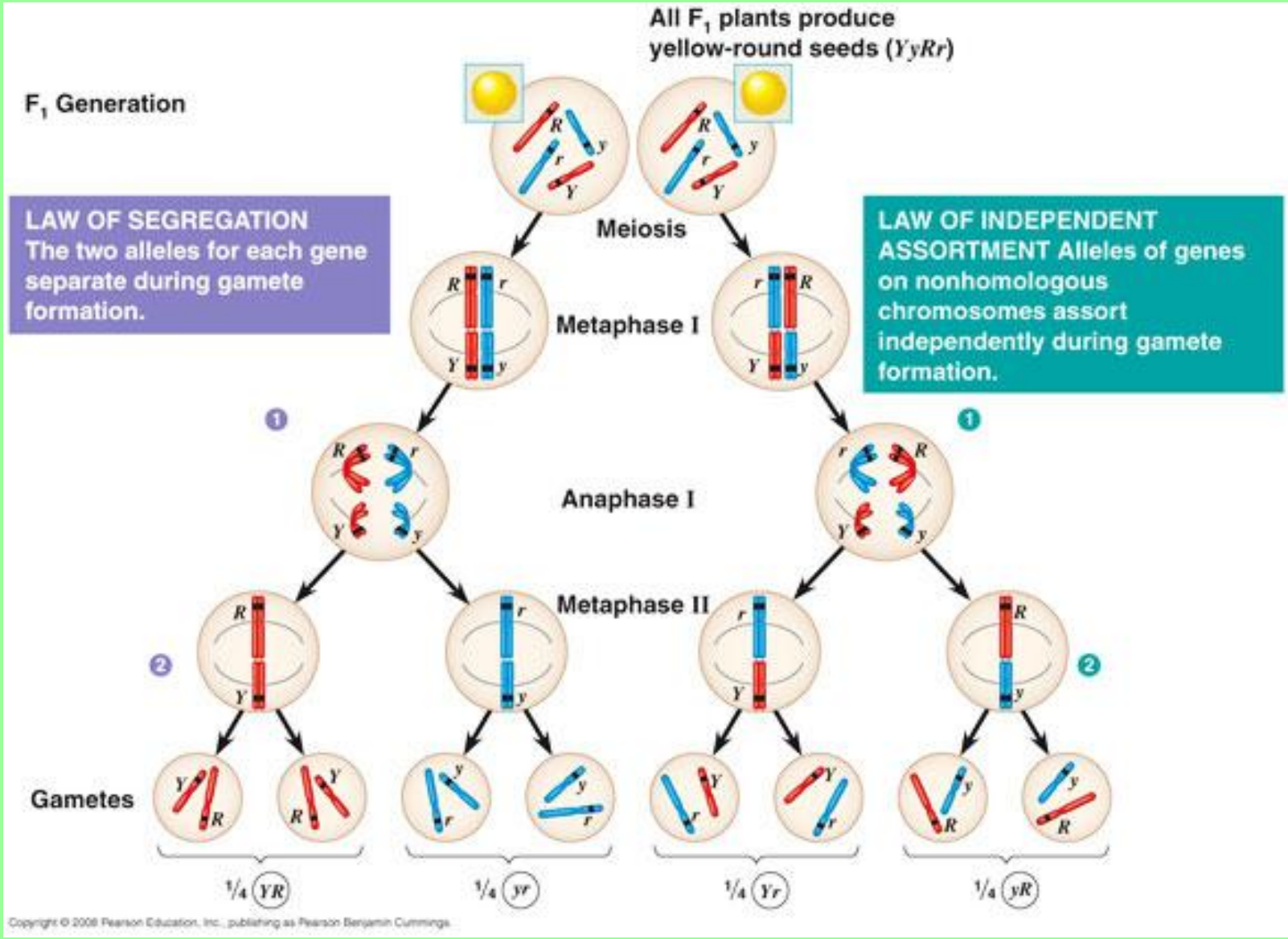

MEIOSIS II: Separates sister chromatids
TELOPHASE I AND CYTOKINESIS
PROPHASE II
METAPHASE II
ANAPHASE II
TELOPHASE II AND CYTOKINESIS
Cleavage furrow
Sister chromatids separate
Haploid daughter cells forming
Two haploid cells form; chromosomes are still double
During another round of cell division, the sister chromatids finally separate; four haploid daughter cells result, containing single chromosomes

Law of Segregation





mono-hybrid

Aa x Aa

	A	a
A	AA	Aa
a	aA	aa

Phenotype - 3:1

(normal : albino)

Genotype - 1:2:1

(normal : het for albino : albino)

Probability

The same rules of probability apply to tossing a coin or rolling a die.

- The probability of tossing a head with a two-headed coin is 1. The probability of tossing a tail with the two-headed coin is 0.
- The probability of tossing a head with a normal coin is 1/2 with the probability of tossing a tail also being 1/2.
- The probability of rolling a 3 on a six-sided die is 1/6.
- The probability of rolling a number other than 3 is 5/6.

The probabilities of all possible outcomes for an event must add up to 1.

- For every toss of a normal coin, the probability of heads is 1/2.

The outcome of any particular toss is unaffected by what has happened on previous attempts.

- This phenomena is referred to as *independent events*.
- It is possible the five successive tosses of a normal coin will produce five heads; however, the probability of heads on the sixth toss is still 1/2.

Multiplication Rule in Monohybrid Crosses

1. If two coins are tossed simultaneously, the outcome of each coin is an independent event, unaffected by the other coin.
2. The probability that both coins will come up heads (a compound event) is equal to the product of the separate probabilities of the independent single events: 1/2 x 1/2 = 1/4.
3. A Mendelian F1 cross with one trait which has two alleles (pea pod color) is analogous to the coin toss. With an F1 genotype of Gg, the probability that an F2 plant will have yellow pods is 1/4.
   - The probability that an egg from the F1 will receive a g allele is 1/2.
   - The probability that a sperm from the F1 will receive a g allele is also 1/2.
   - Thus the probability that two g alleles will unite at fertilization is 1/2 x 1/2 = 1/4.

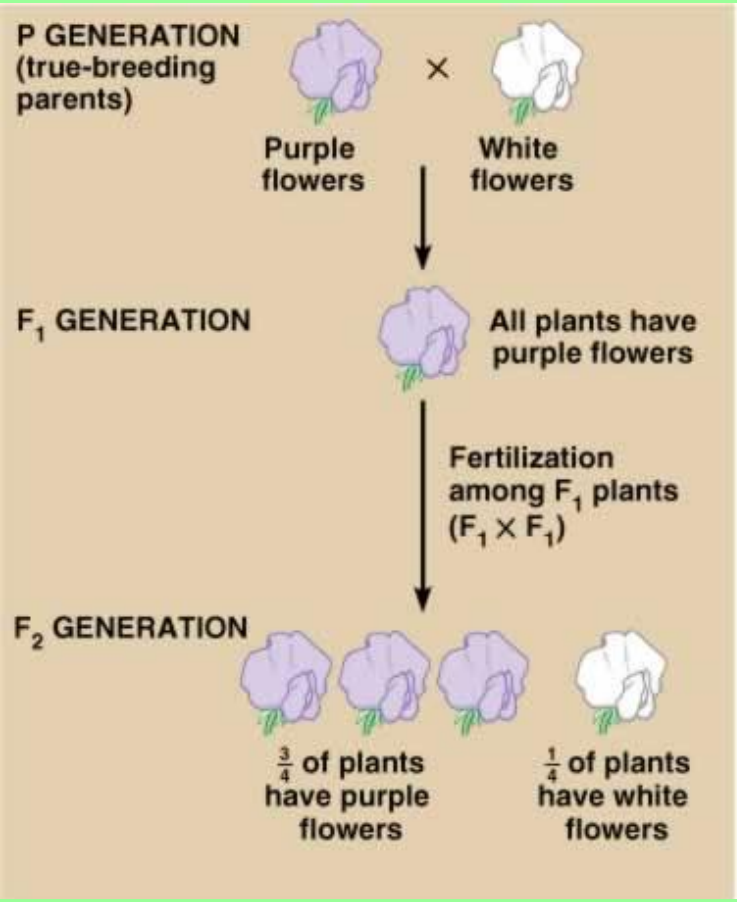
Addition Rule in Monohybrid Crosses

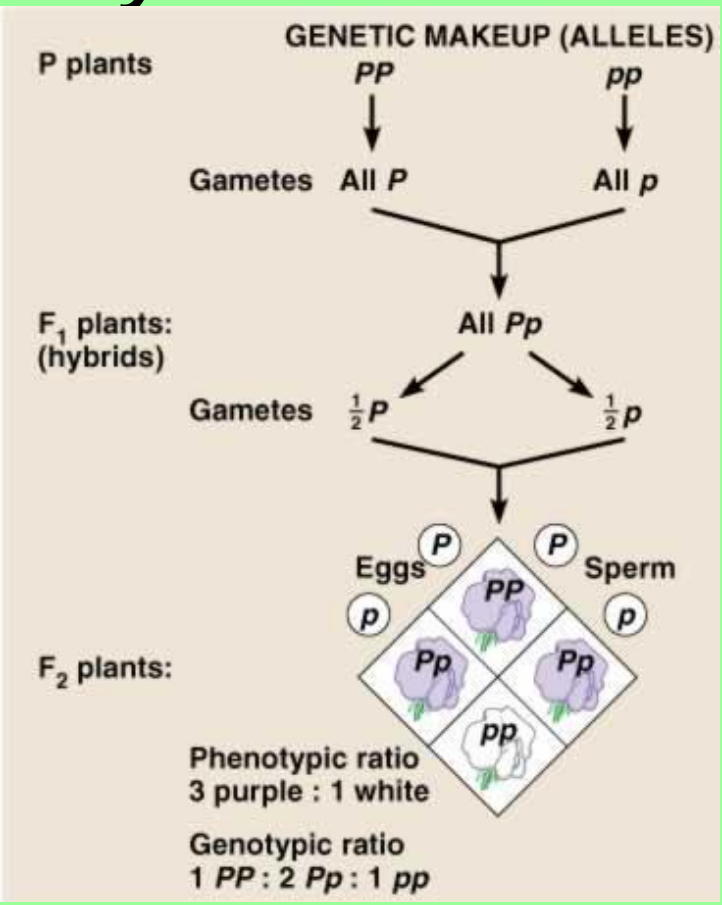
1. The probability that an F2 plant will be heterozygous is the sum of the two single events.
2. Summation is used since there are two ways in which a heterozygous F2 may be produced: the dominant allele (G) may be in the egg and the recessive allele (g) in the sperm or the dominant allele may be in the sperm and the recessive in the egg.
   - The probability that the dominant allele will be in the egg with the recessive in the sperm is 1/2 x 1/2 = 1/4.
   - The probability that the dominant allele will be in the sperm and the recessive in the egg is 1/2 x 1/2 = 1/4.
   - Using this rule, the probability that a heterozygous F2 will be produced is 1/4 + 1/4 = 1/2.

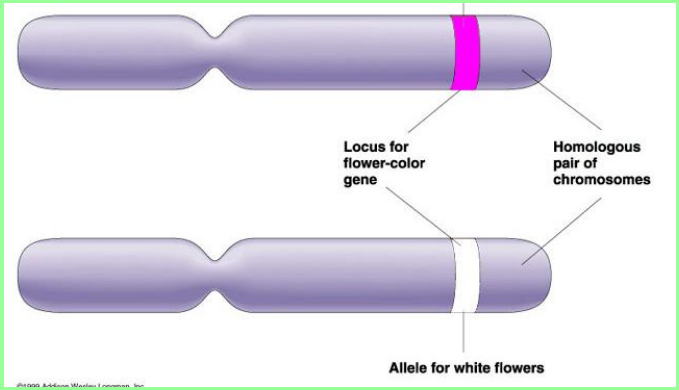
The Statistical Nature of Inheritance

1. If a seed is planted from the F2 generation, we cannot predict with absolute certainty that the plant will grow up to produce yellow pods.
2. It can be said that there is exactly a 1/4 chance that the plant will have yellow pods.
   - Stated in statistical terms: among a large sample of F2 plants, 25% (one-fourth) will have yellow pods.
   - The larger the sample size, the closer the results will conform to predictions.

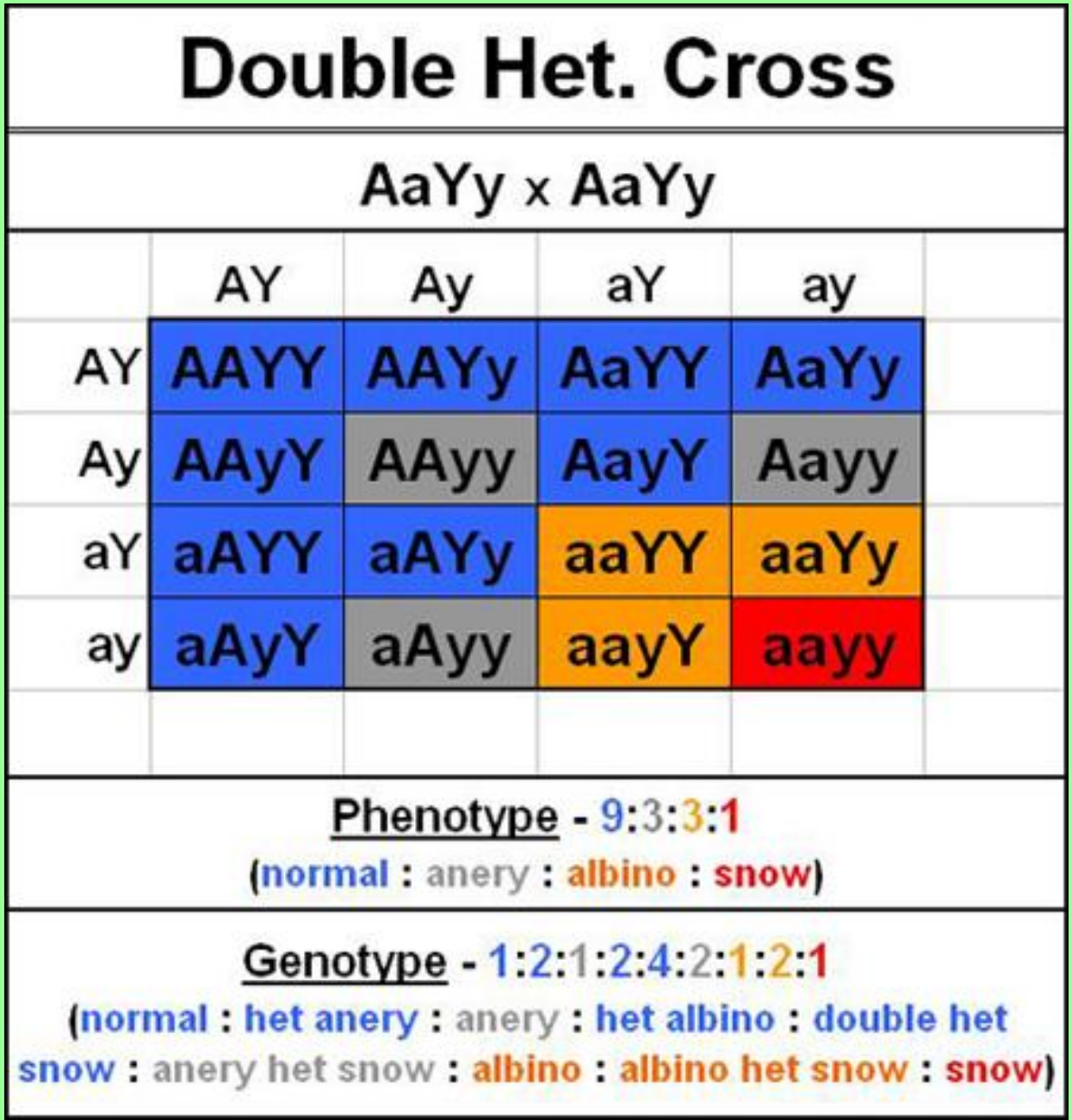
Monohybrid Cross





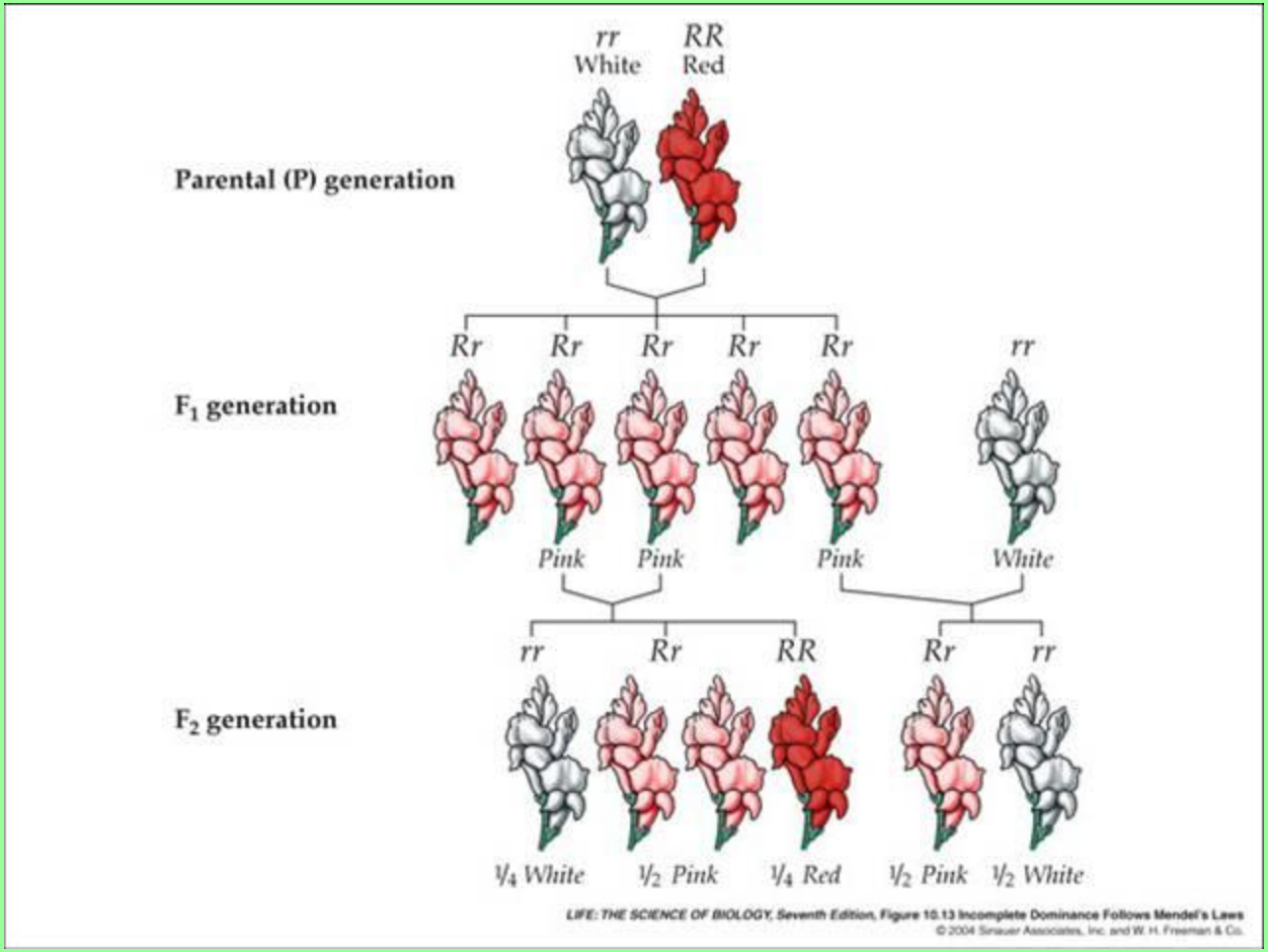


Dihybrid Cross



- Epistasis
- Multiple alleles
- Polygenic inheritance
- Incomplete Dominance
- Pleiotropy
- Sex-linked inheritance
- X-inactivation
- nondisjunction

Incomplete Dominance

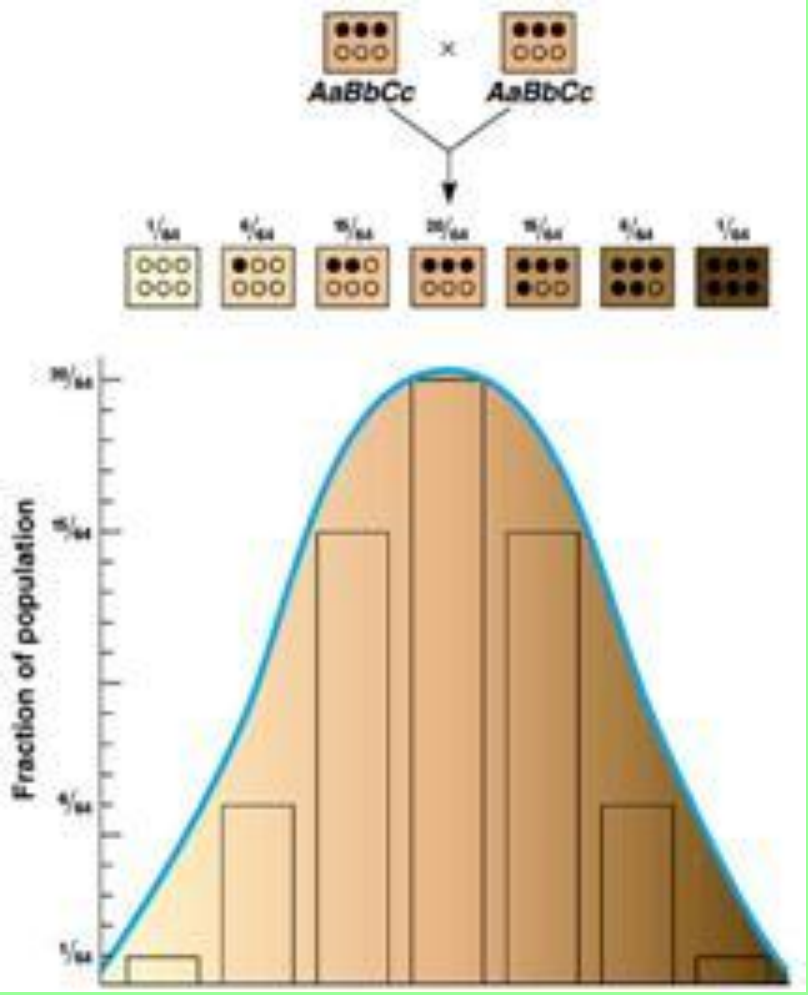


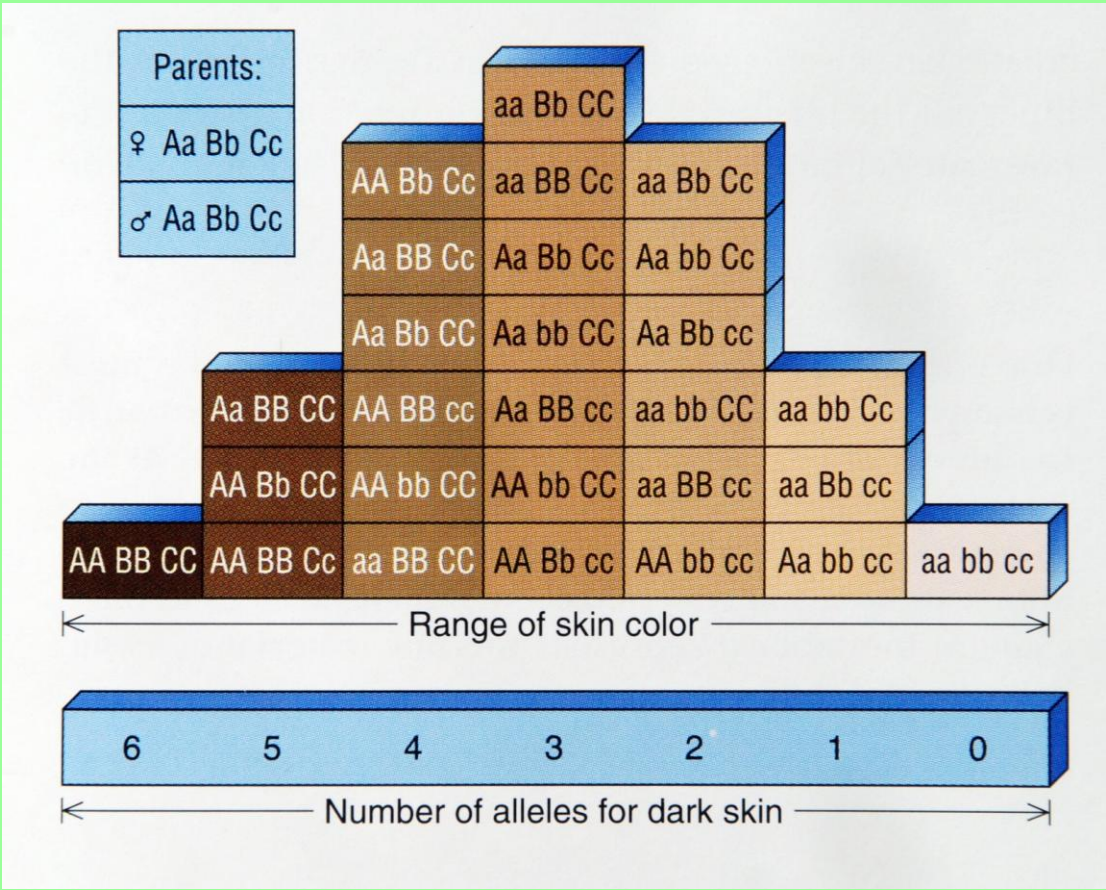
Human Blood Types/Multiple Alleles

Table 14.2 Determination of ABO Blood Group by Multiple Alleles

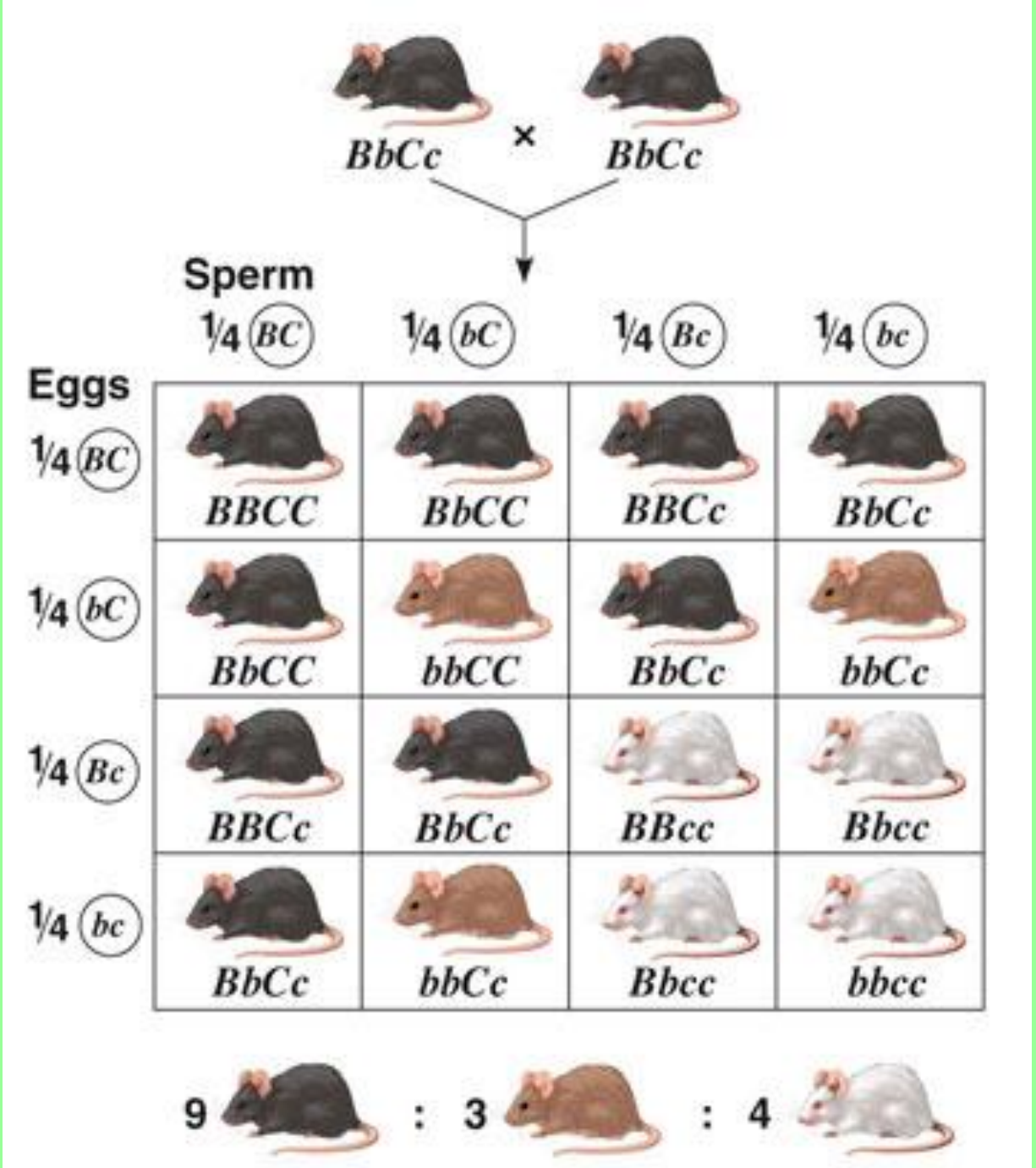
Genotype	Phenotype (Blood Group)	Red Blood Cells
I^AI^A or I^Ai	A	
I^BI^B or I^Bi	B	
I^AI^B	AB	
ii	O	

Polygenic Inheritance

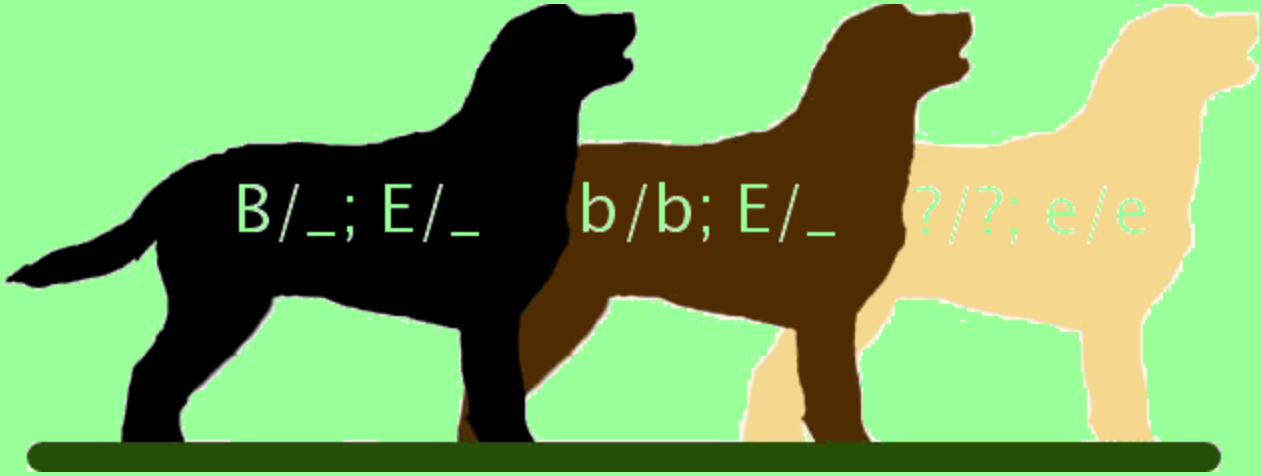




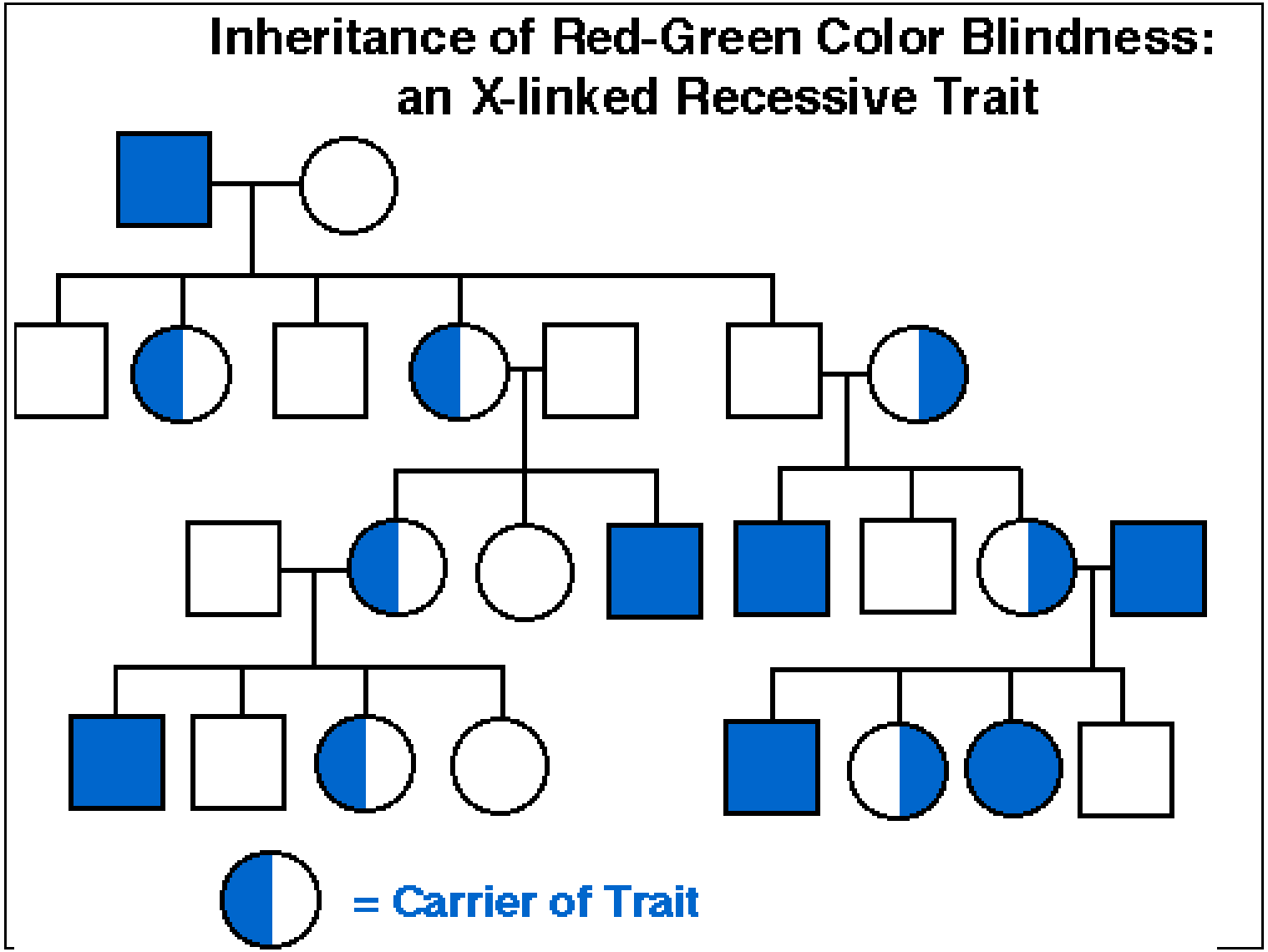
Epistasis



Epistasis



Pedigree


Inheritance of Red-Green Color Blindness:
an X-linked Recessive Trait
= Carrier of Trait

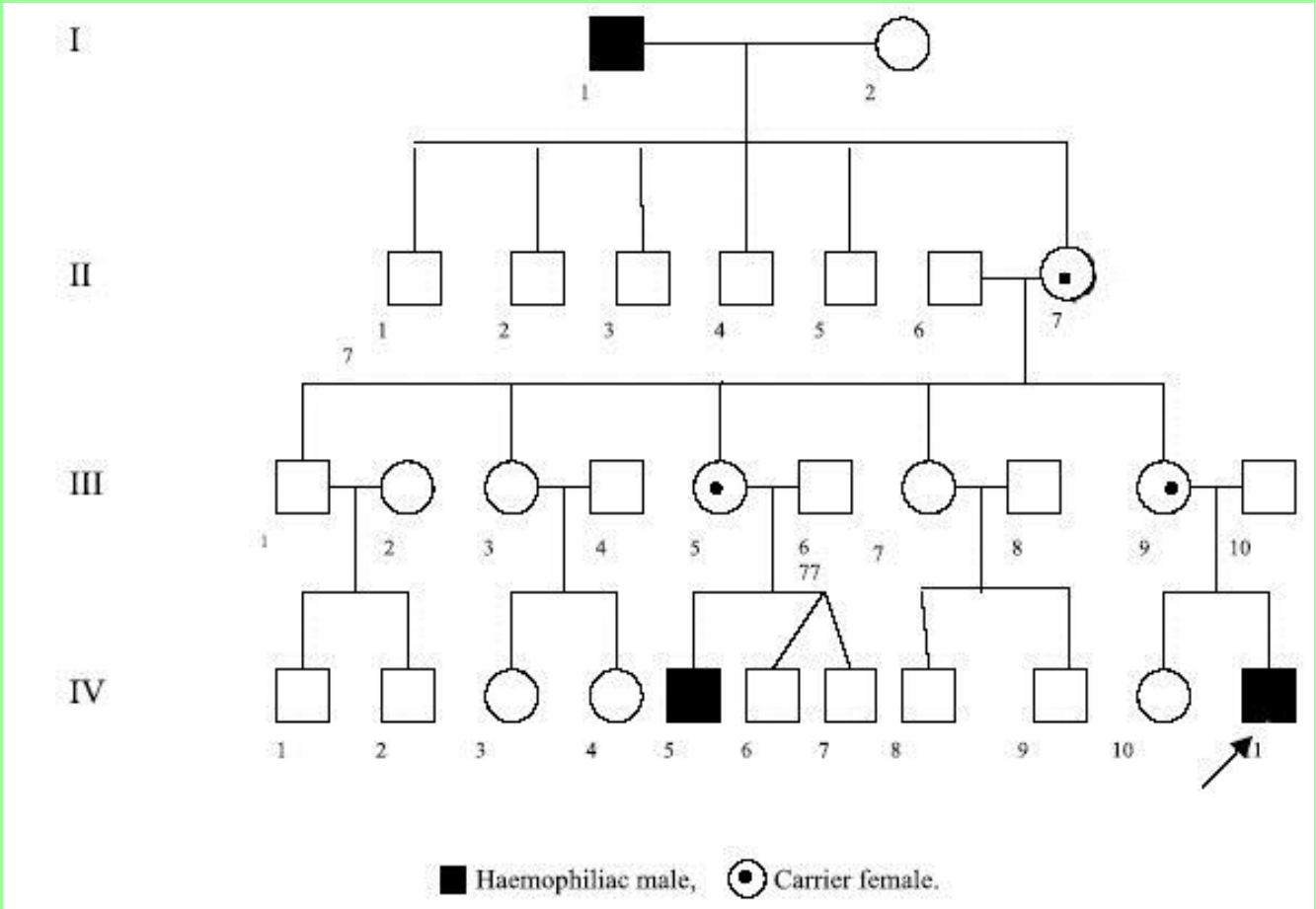
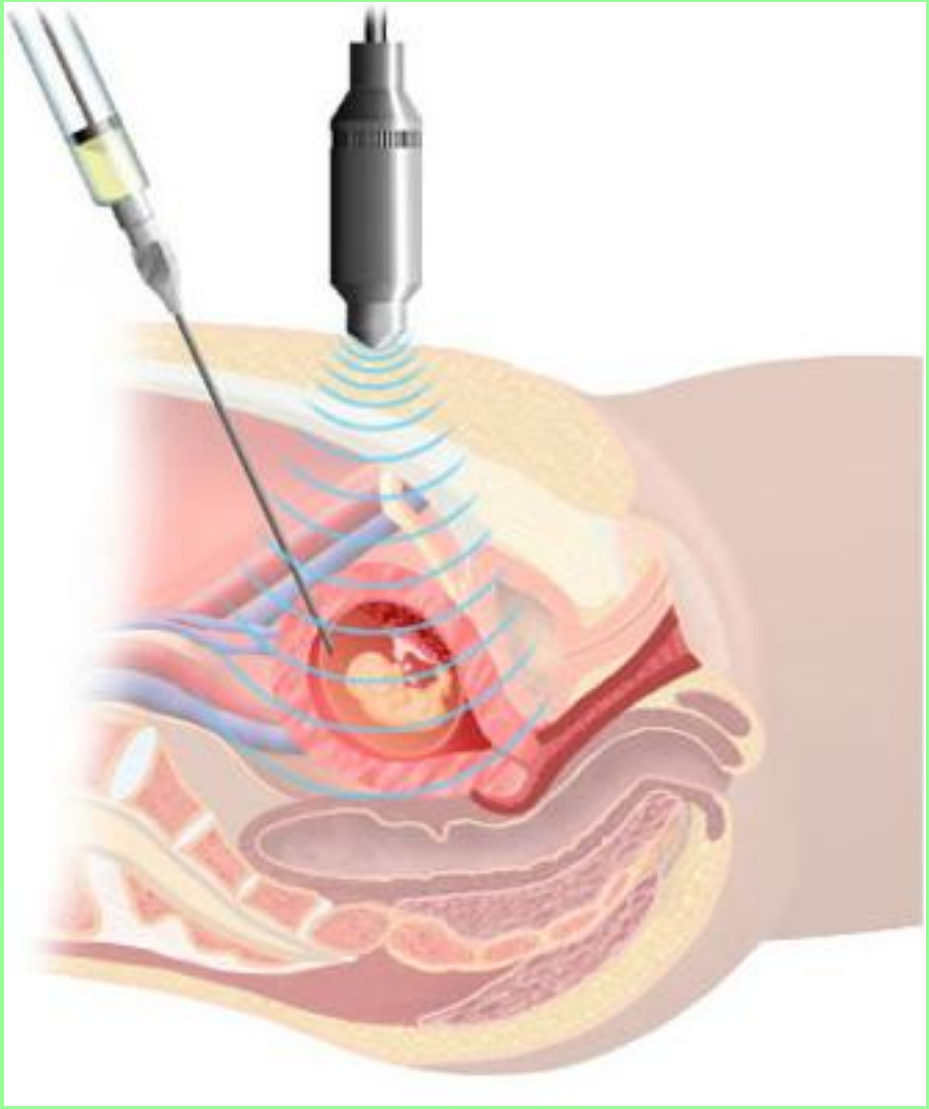


Fig. 1. Family showing familial type of Haemophilia A.
Haemophilia (2002), 8, 680–684

- Autosomal dominant
- Autosomal recessive
- Sex linked dominant
- Sex linked recessive

Amniocentesis



Karyotype