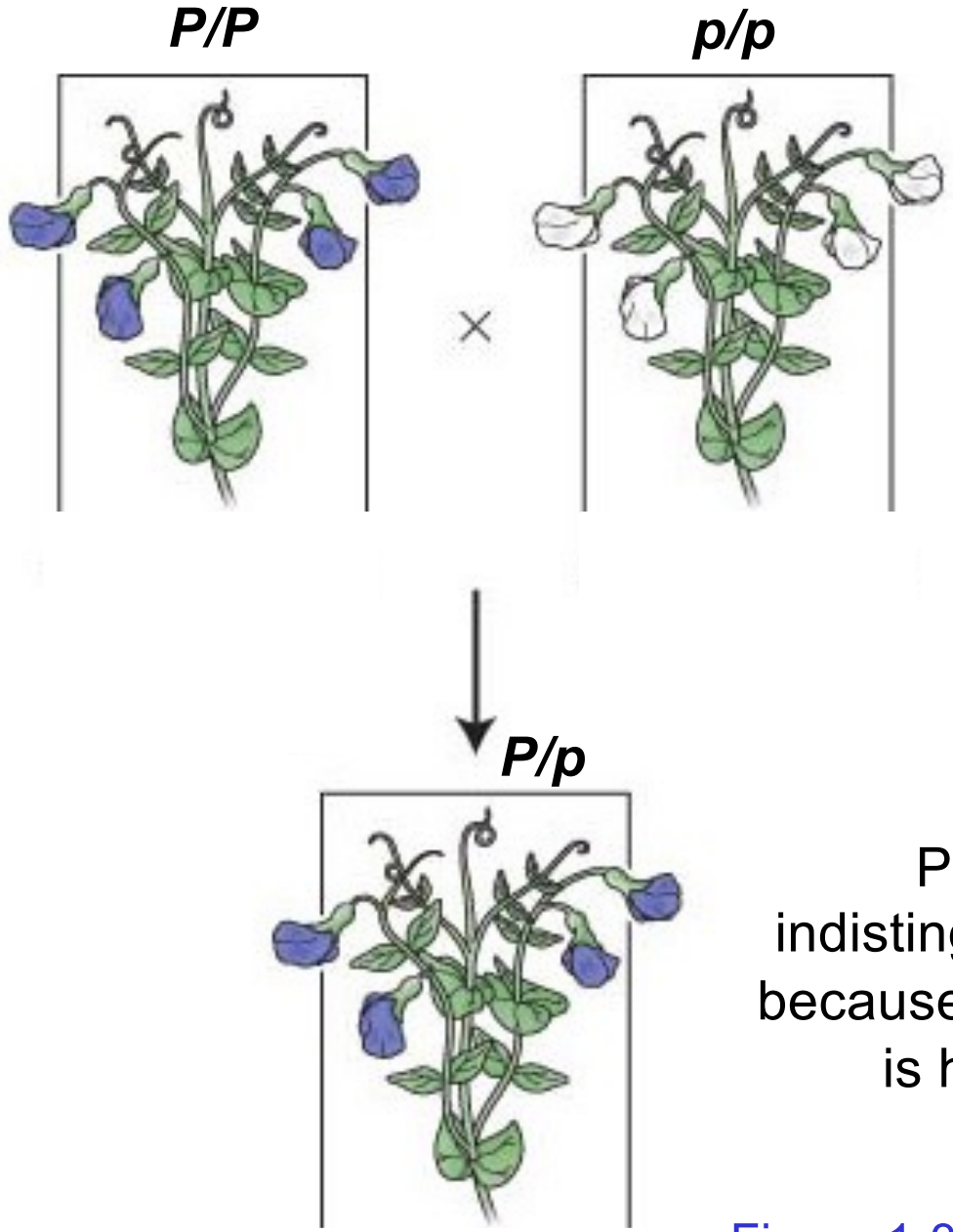
What gives dominance???

has genes required for producing purple pigments in the flower



has a loss-of-function mutation of a gene required for the pigment production that does not affect viability.

Phenotypically indistinguishable from *P/P* because the wild-type gene is haplosufficient.

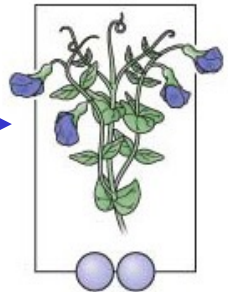
Figure 1-3

Testcross: the cross of an individual to a fully recessive individual

Testcross is very useful for determining the genotype a testee.

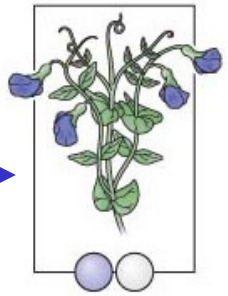
P/P

#1. Purple →



P/p

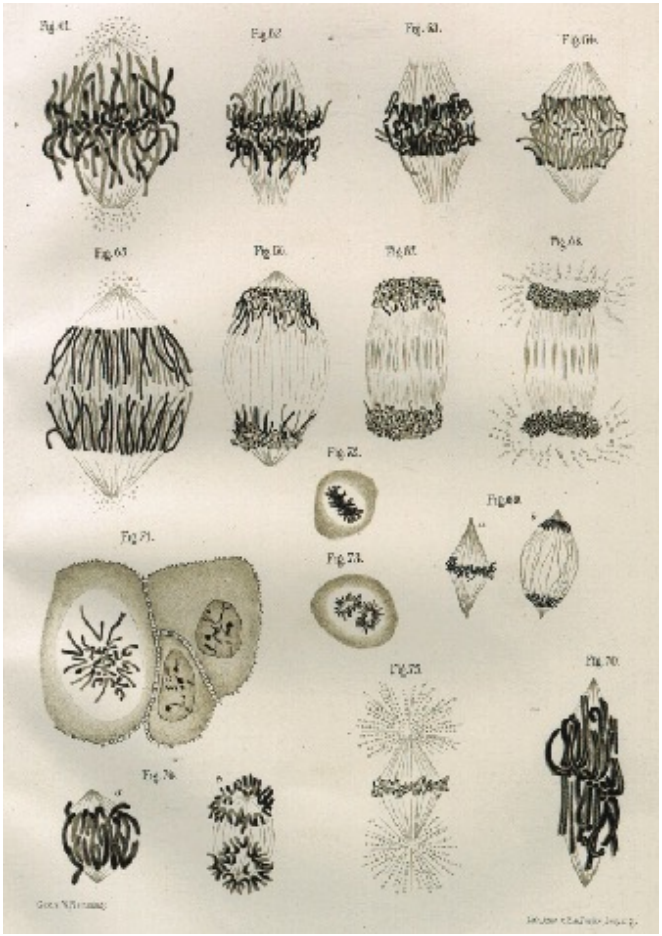
#2. Purple →



Cross with #1 will give 100% purple (*P/p*)
Cross with #2 will give 50% purple (*P/p*) & 50% white (*p/p*)

Chromosome theory of inheritance

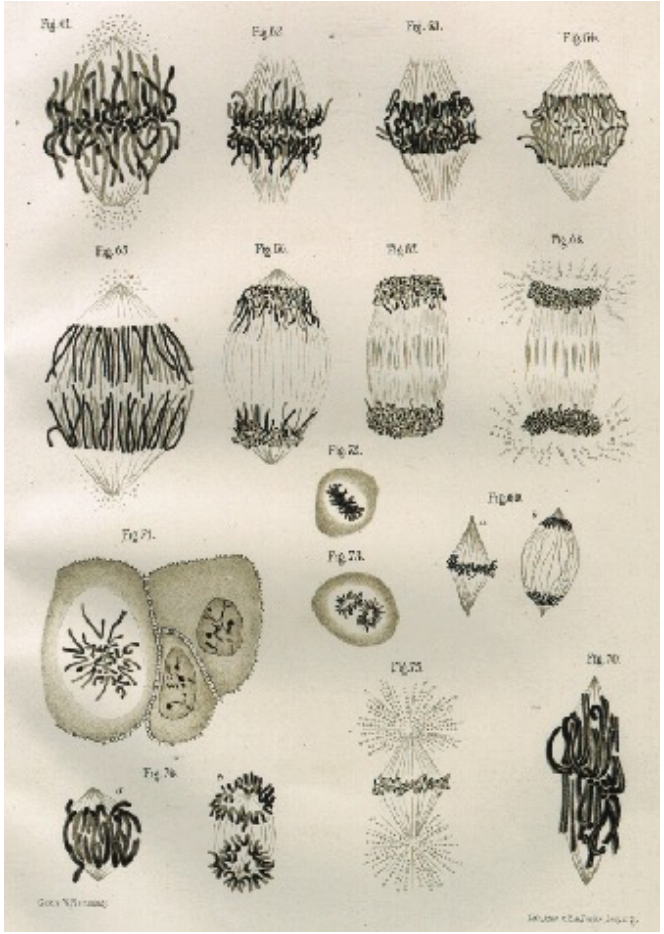
Ch2.5 & 2.6



Drawing of mitosis by Walther Flemming, 1882.

Chromosomes “colored (stainable) bodies”

Chromosome theory of inheritance



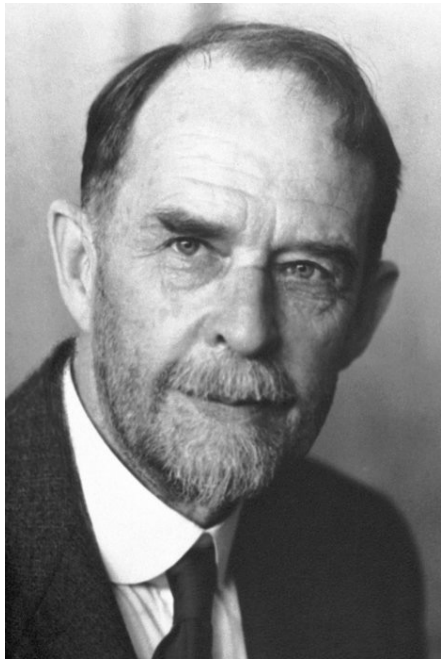
Chromosomes, like Mendel's "elements", come in matched (homologous) pairs in an organism.

The members of a homologous pair separate during meiosis, so each sperm or egg receives just one member.

The members of different chromosome pairs are sorted into gametes independently of one another in meiosis, just like the alleles of different genes in Mendel's

But could they be simple correlation?

Thomas Hunt Morgan was skeptical about the “Chromosome theory of inheritance”



WHAT ARE "FACTORS" IN MENDELIAN EXPLANATIONS?

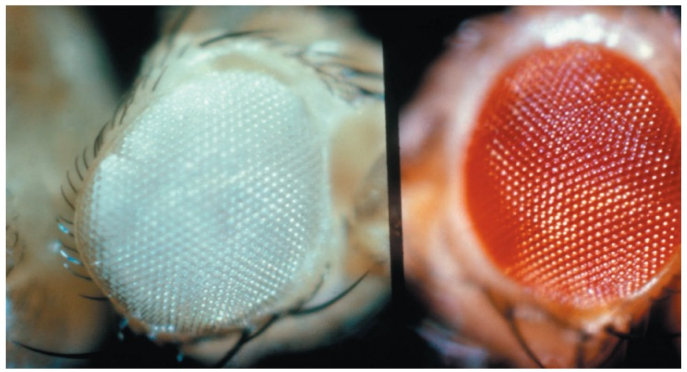
By Prof. T. H. Morgan.

Columbia University, New York, N. Y.

“Here it seems to me is the point where we are in danger of over-looking other possibilities that may equally well give us the two kinds of germ-cells that the Mendelian explanation calls for”

Wild-type flies have red eyes

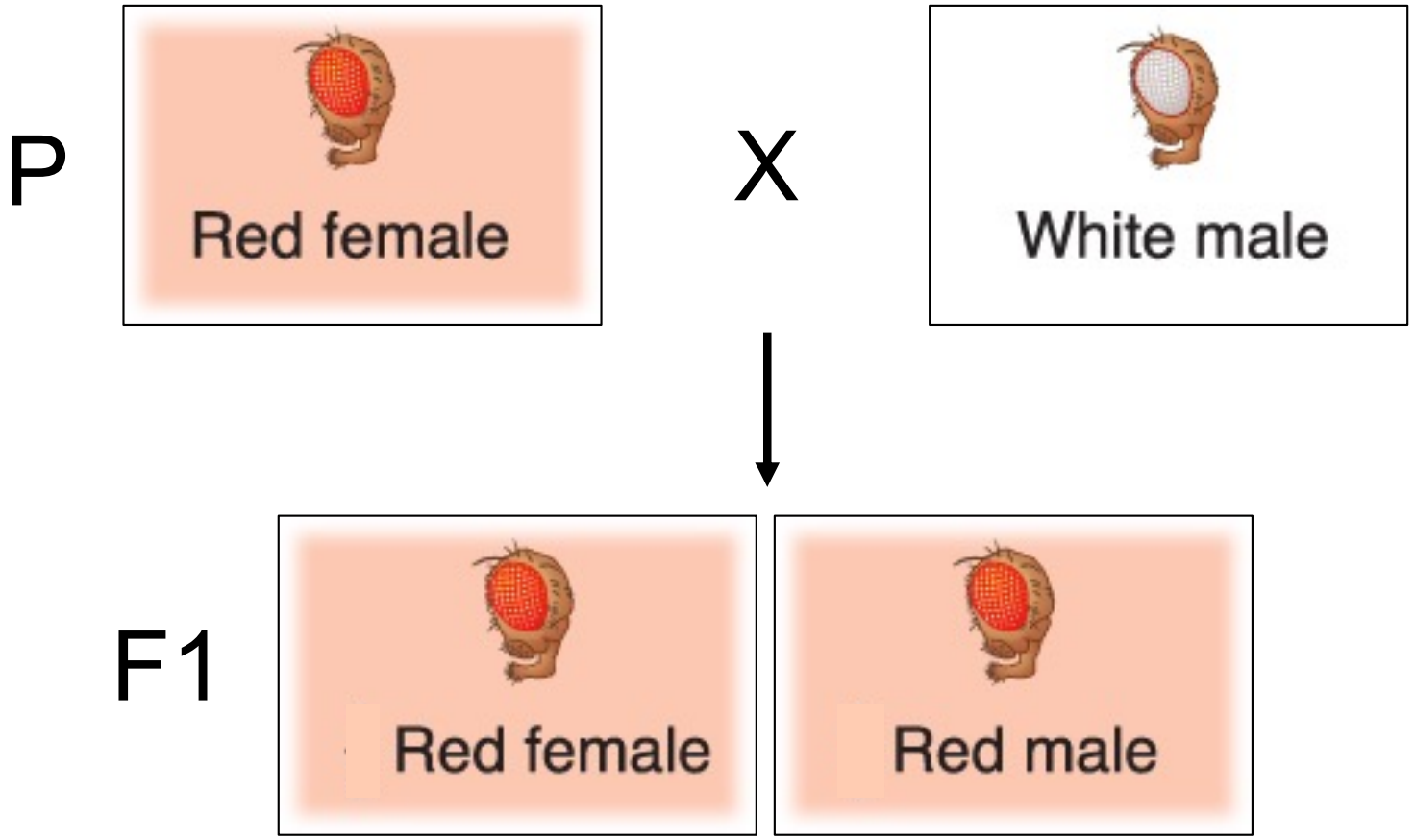
White-eyed and red-eyed *Drosophila*



Science Source/Getty Images.

Fig 2-17

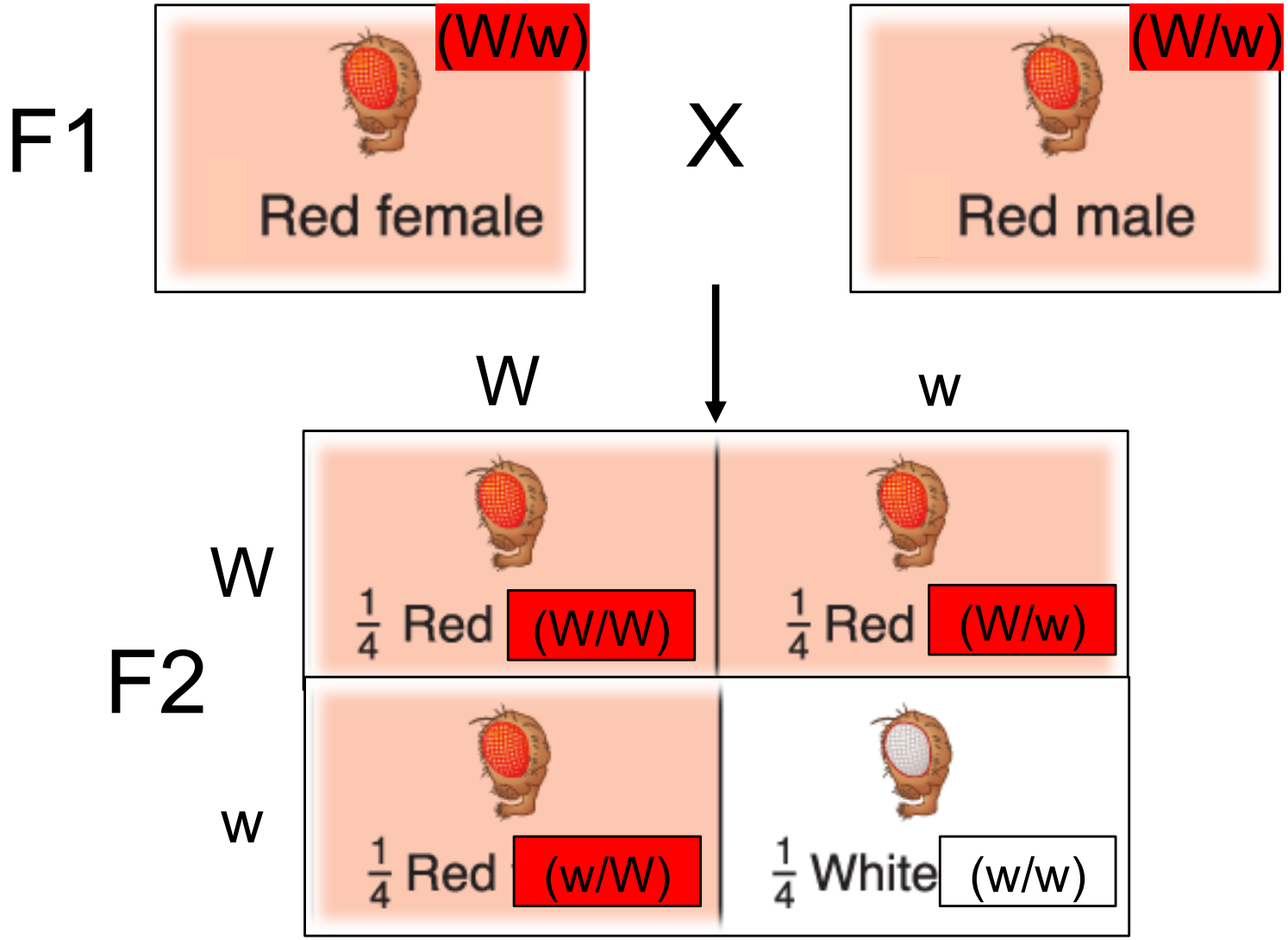
Morgan's experiment 1



white is recessive (*w* flies have mutations in the gene that transports precursors of red pigment to the eye)

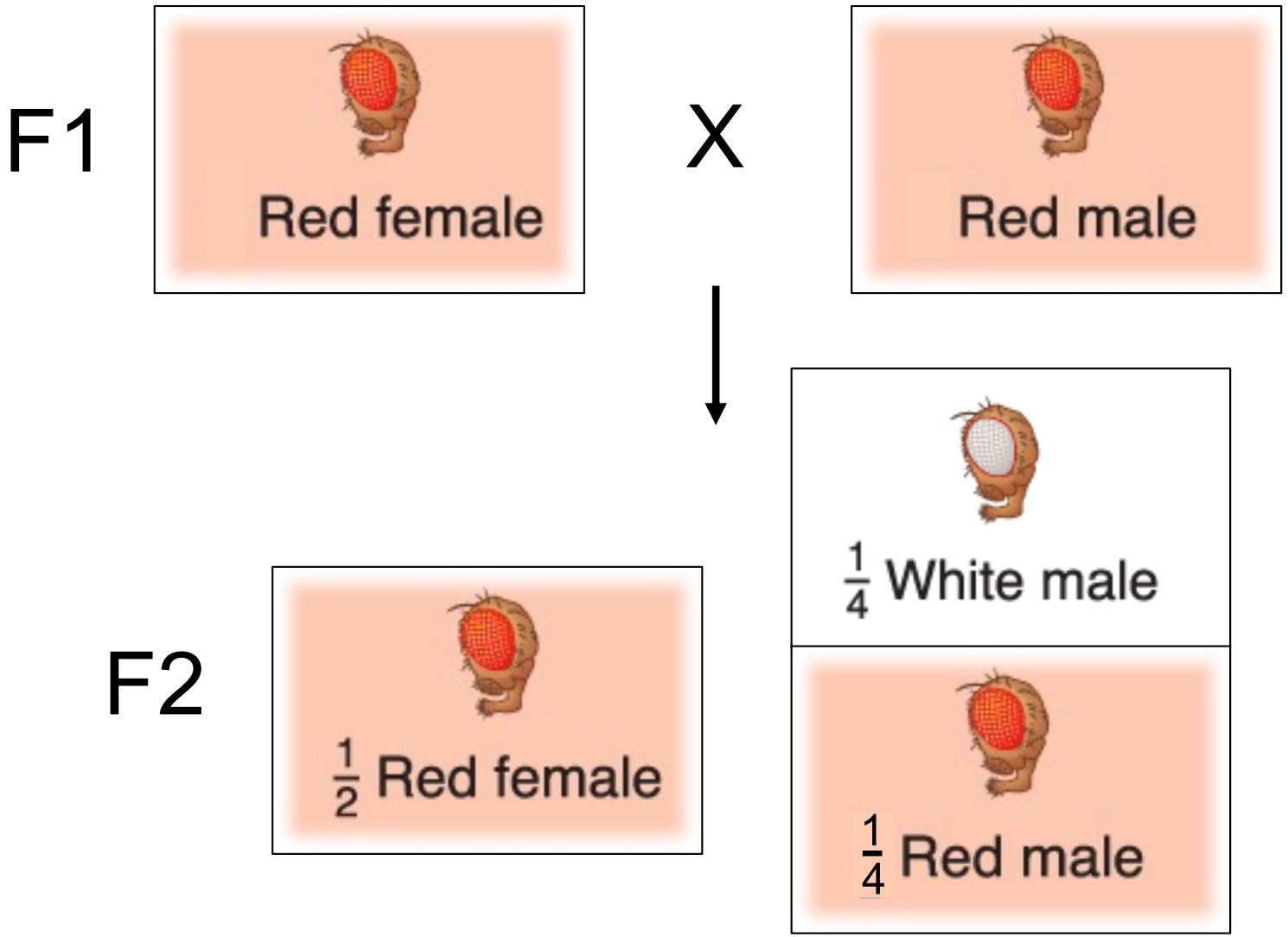
Prediction according to the Mendel's law

Monohybrid cross

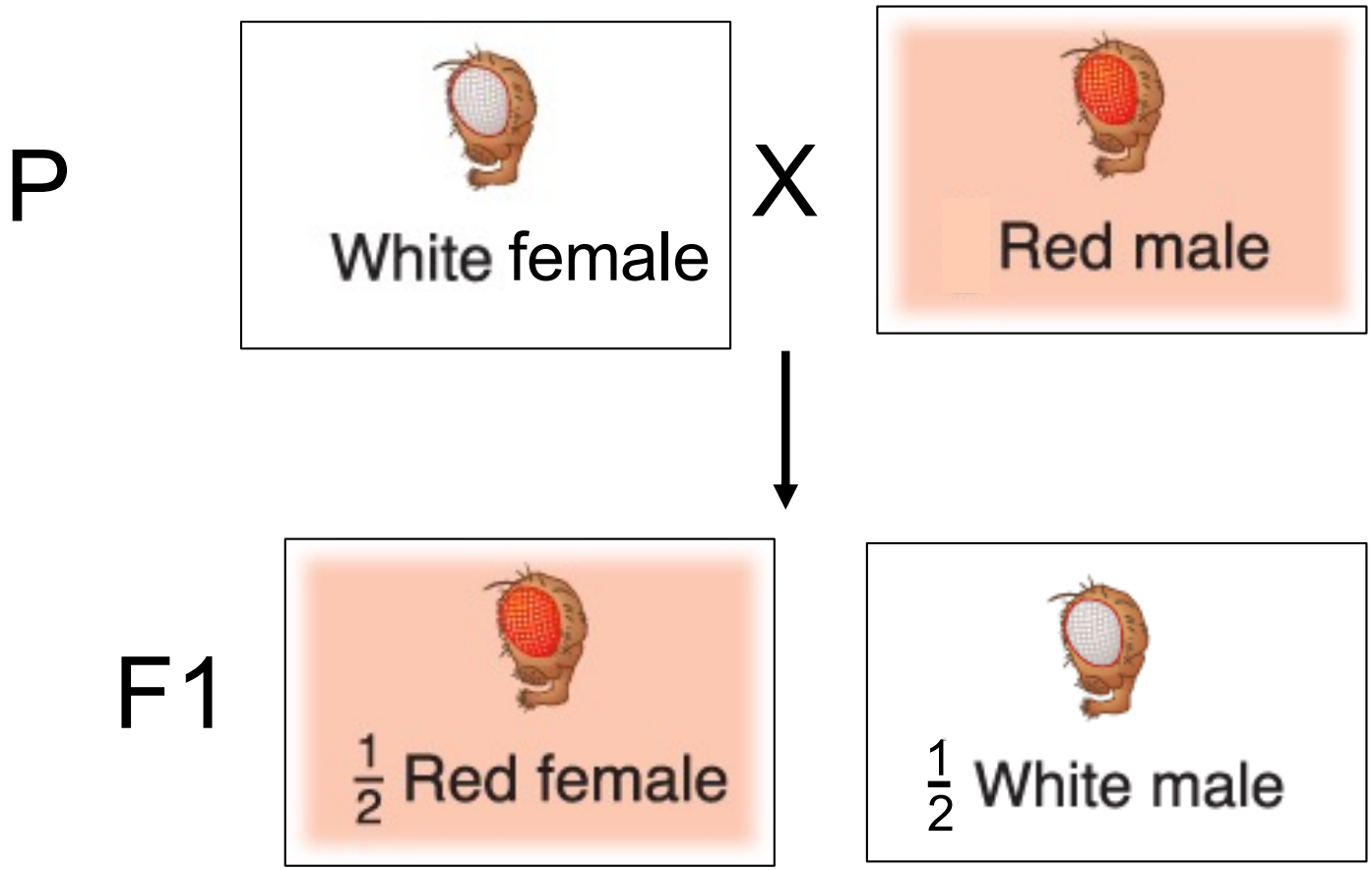


The actual result

Monohybrid cross

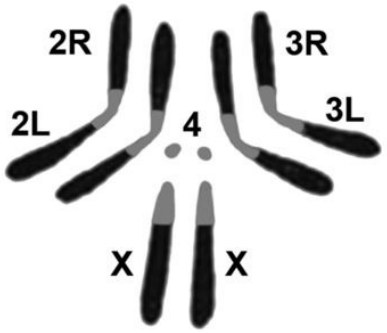


Morgan's experiment 2

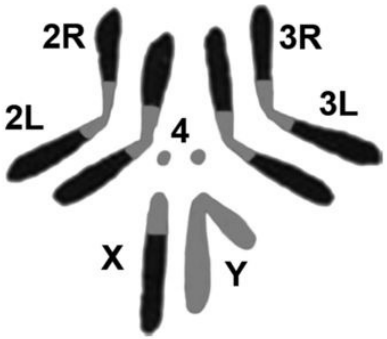


Was Mendel wrong?

Drosophila chromosomes in females and males



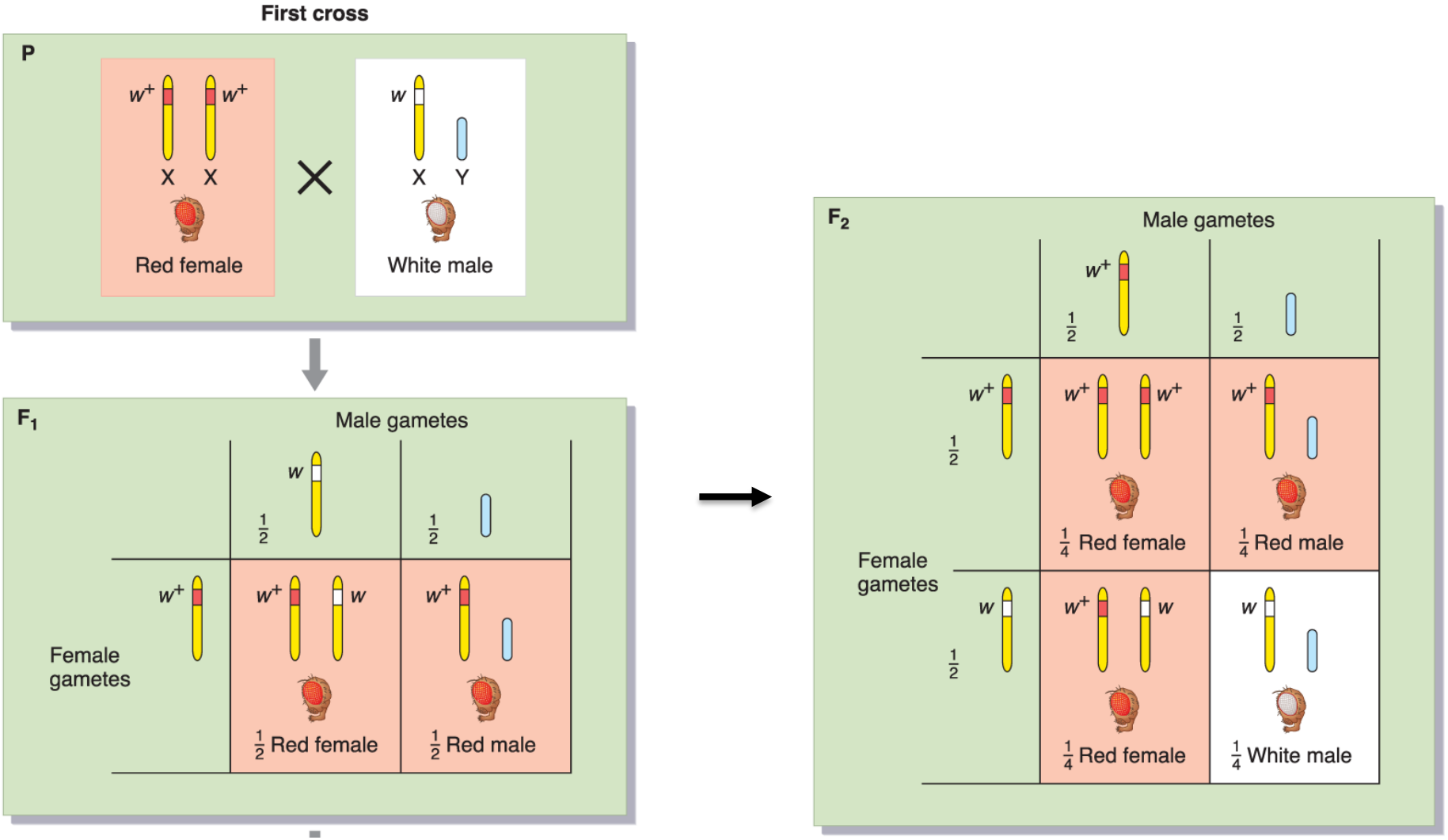
Female



Males

The pattern of *W* inheritance resembles how the X chromosomes are sorted during meiosis!!!

Morgan's experiment 1



Morgan's experiment 2

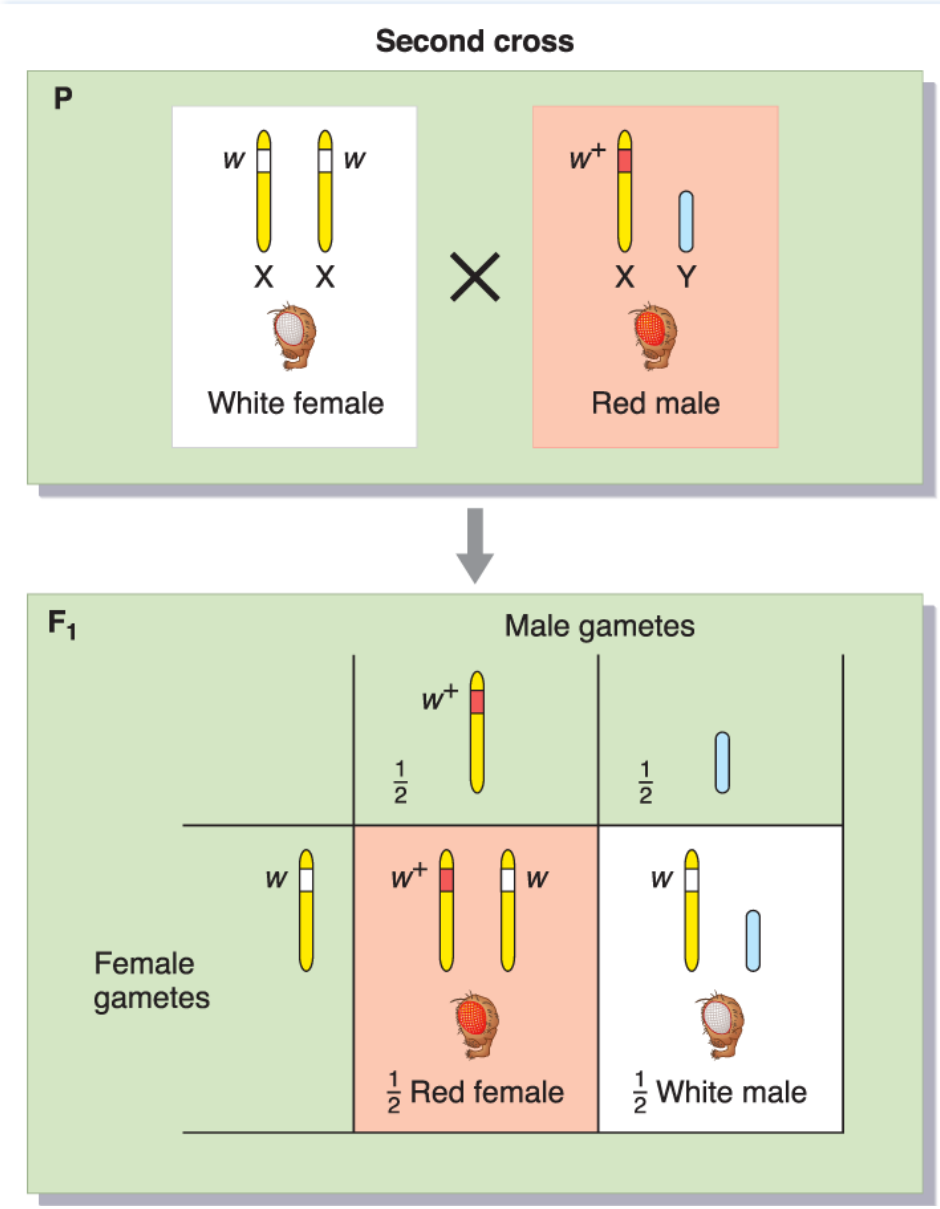
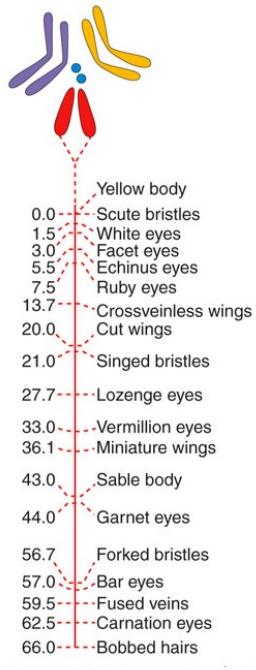


Fig 2-17

The *white* gene inheritance pattern, which doesn't seem to follow Mendel's law, can be explained by the inheritance pattern of the X chromosome




© David Scharf/Corbis

The Nobel Prize in Physiology or Medicine 1933 for his discoveries concerning the role played by the chromosome in heredity

The reason why Mendel's experiments worked

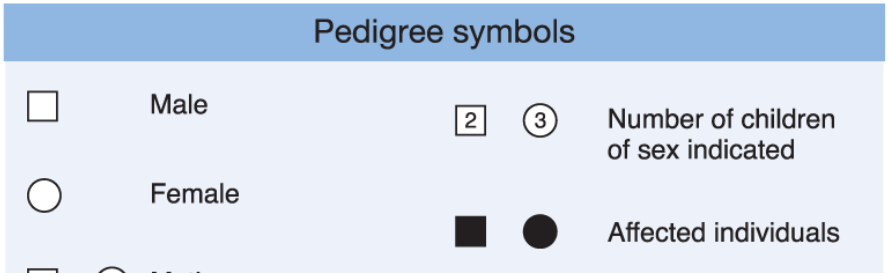
Traits affected by only one gene. Many traits (people's height) are affected by multiple genes.

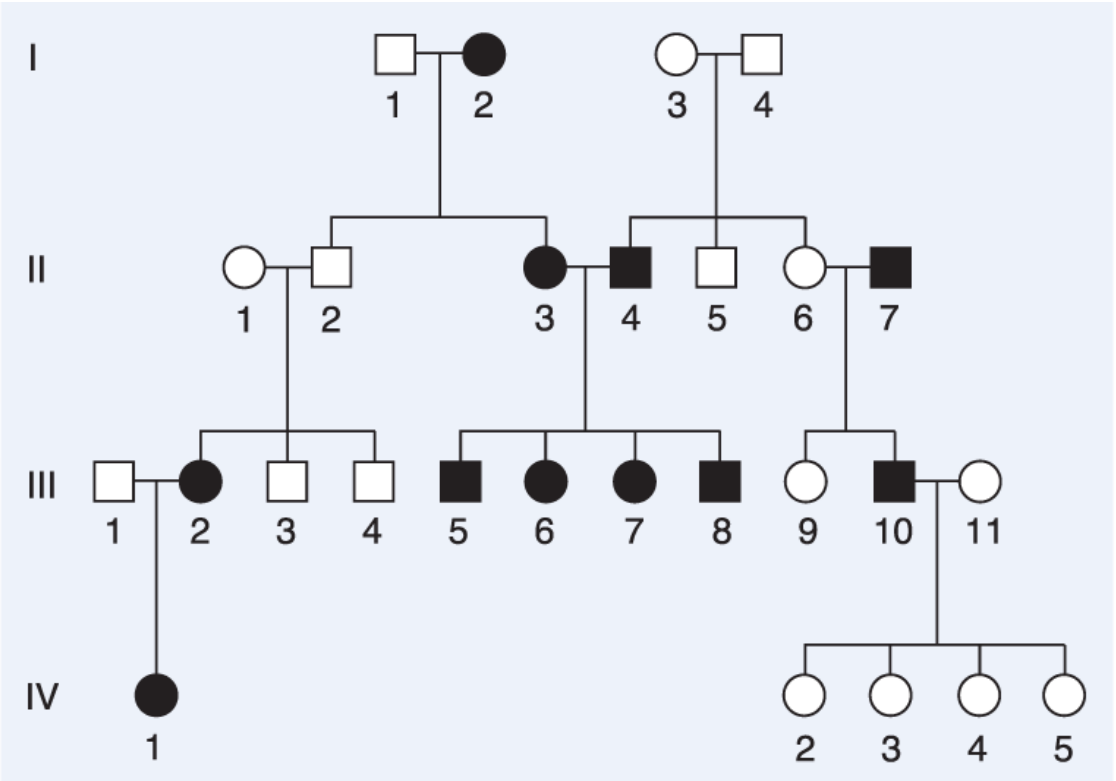
Pure genetic background and ability to cross- or self-pollinate (ability to control cross/mating).

Ability to obtain a large number of progeny.

How does the Mendel's work apply to humans?

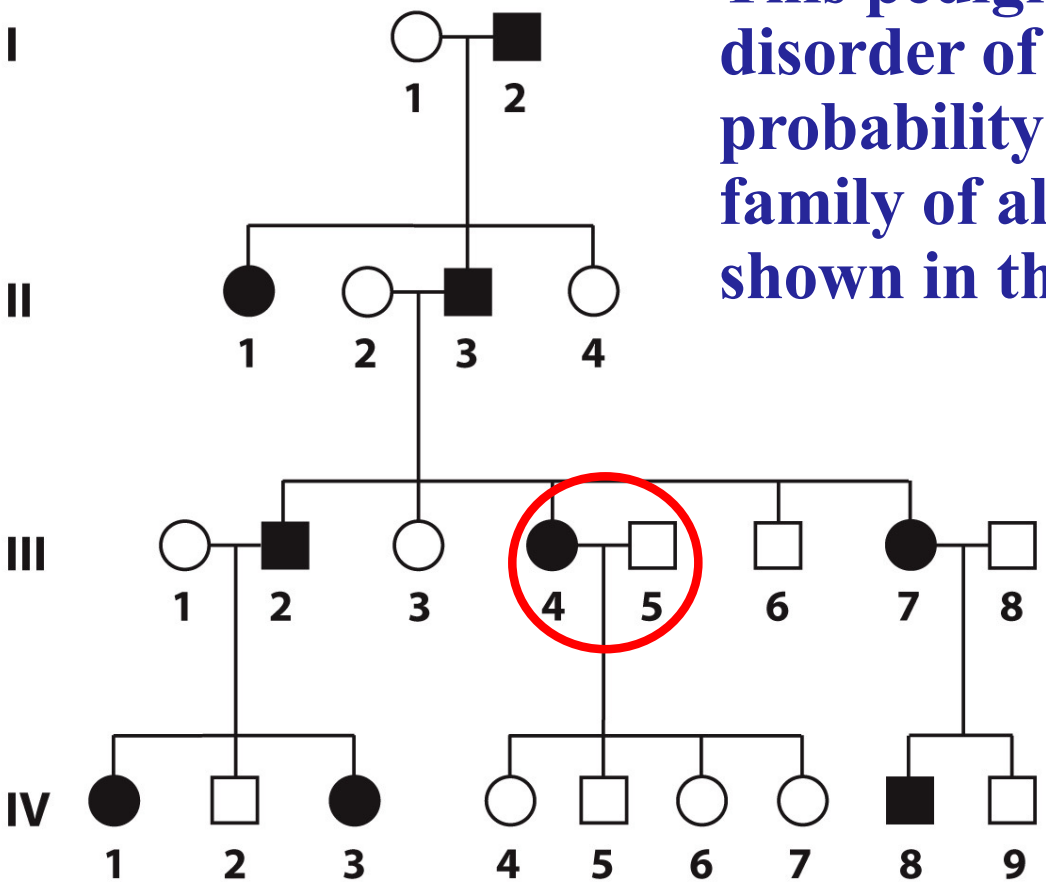
The pedigree can tell us about a trait/phenotype/disease





Dominant or recessive?
Autosomal or Sex-linked?
A common or rare trait?

Other examples in the textbook



This pedigree is for a rare hereditary disorder of the skin. What is the probability that III-4 and III-5 produce a family of all unaffected children as shown in the pedigree?

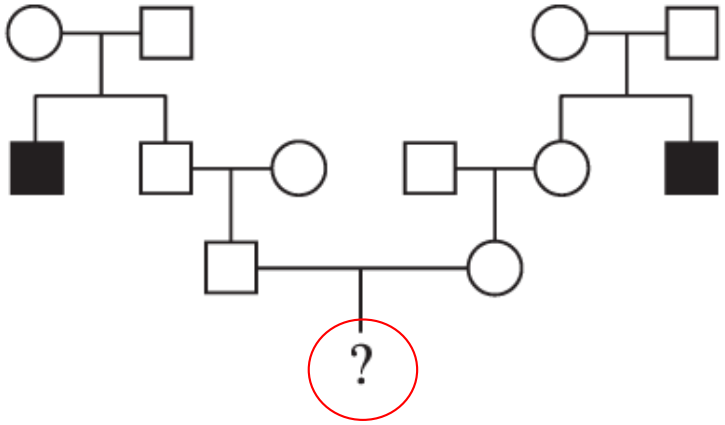
slido

What is the probability that III-4 and III-5 produce a family of all unaffected children as shown in the pedigree?

ⓘ Start presenting to display the poll results on this slide.

Calculating the risk (probability)

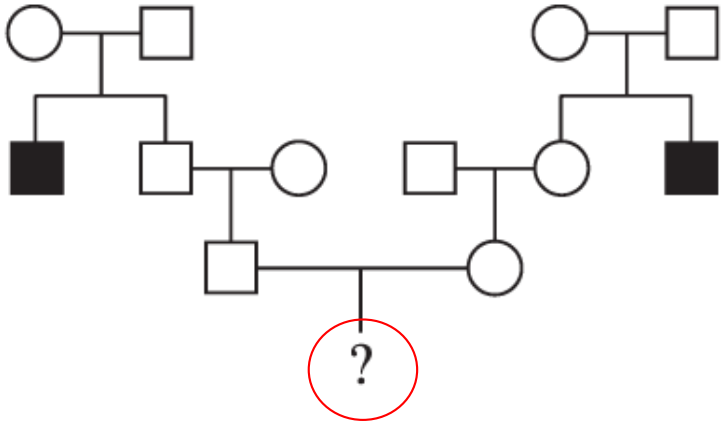
Rare genetic disorder caused by an autosomal recessive mutation!!!



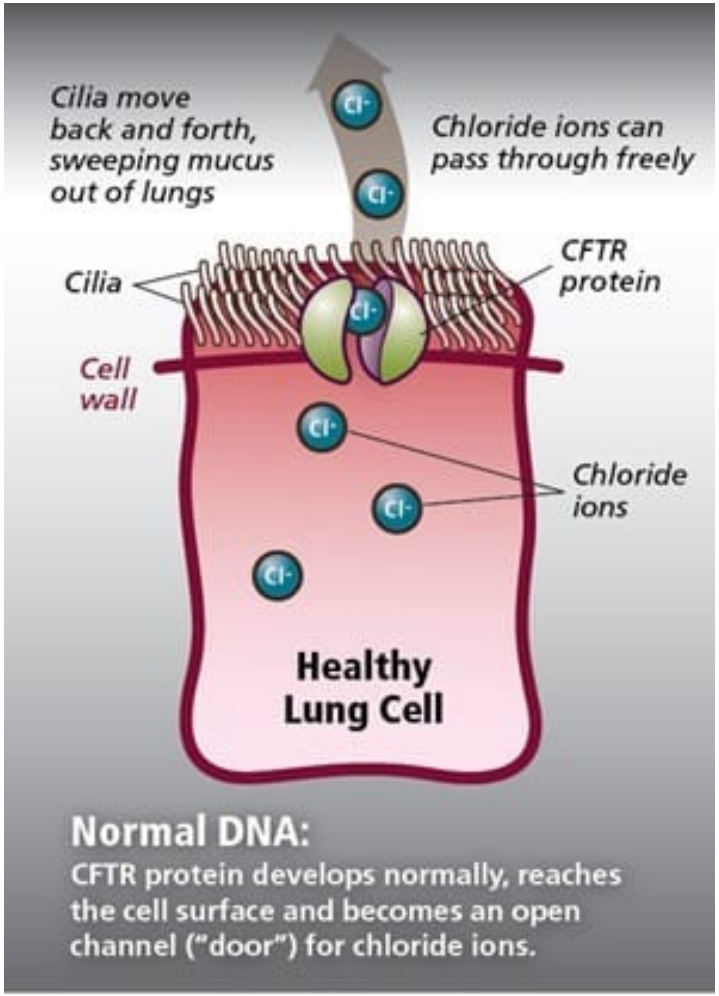
What is the probability that ○ is affected?

Calculating the risk (probability)

Rare genetic disorder caused by an autosomal recessive mutation!!!



Why is the prevalence of CF in Canada around 1/3600 when 1/30 is a carrier?



- Cystic Fibrosis is the most common fatal genetic disease with prevalence in Canada around 1/3600. Around 1/30 is a carrier.
- Caused by mutation in the Cystic Fibrosis Transmembrane Receptor (CFTR gene)
- Gene identified by researchers at Hospital for Sick Children - Toronto