

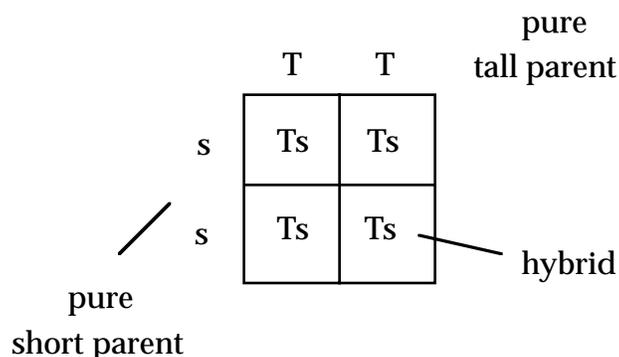
Heredity and Traits : Notes/W.S.-80

In sexual reproduction, the offspring are like the parents, but not exactly alike. The offspring have distinguishing features called **traits**, which are inherited from the parents. Children have traits such as hair color, height, and so on. The study of inherited traits is called **heredity**.

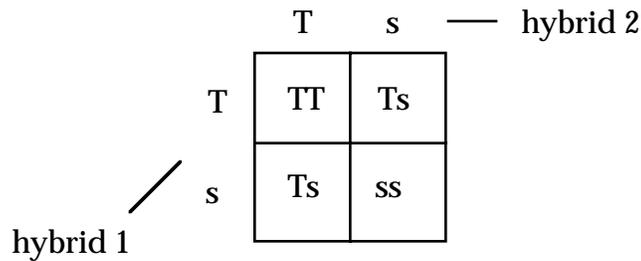
The offspring have DNA (**genes**) from both parents that determines which traits are passed on. Many traits are determined by two genes, a gene from the male parent and a gene from the female parent.

Mendel's Experiment with Pea Plants

The idea that offspring have two genes that determine a trait was discovered by Gregor Mendel, who carried out an important series of experiments on pea plants. The pea plant is generally self pollinating. The eggs are fertilized by the pollen from the same plant. Mendel bred tall and short pea plants. The tall plants when self pollinating produce only tall offspring. The short plants when self-pollinating produce only short offspring. Mendel assumed that the two genes for the tall plants were both "tall" genes from the sperm and the egg. This is (T T). He assumed that the two genes for the short plants were (s s). Mendel then "crossed" a pure tall plant with a pure short plant. All of the offspring, called **hybrids**, were tall. Mendel thought that the "tall" gene was **dominant** and that the "short" gene although still there, was not expressed (**recessive**). This can be explained using a **Punnett square**. This square shows all of the combinations of genes from the egg and sperm.



Mendel knew that when hybrid plants were cross pollinated with other hybrids, some of the offspring were short, and some were tall. He carefully recorded data on the numbers of each type of plant produced. He found that 1/4 of the plants were short and 3/4 were tall. This can be explained using a Punnett square.



Any offspring with at least one “tall” gene (T) will be tall. One in four offspring will be short, as it has only “short” genes (s).

Questions:

- 1)a) What is a trait?
- b) What is heredity?
- c) What is a gene?
- 2) How many genes determine a trait?
- 3) Explain what a dominant trait is.
- 4) What is a Punnett Square?
- 5) Write down the Punnett Square for a hybrid (Ts) parent crossed with a pure short (ss) parent. What percentage of the offspring will be short?
- 6) Pea pods can be green (G) or yellow (y). The gene for green pods is dominant. Write down the Punnett Square to explain what happens when two hybrids (Gy) are crossed. What percentage of the offspring will be yellow?

Answers: 1)a) A trait is a distinguishing feature., b) Heredity is the study of inherited traits., c) A gene is part of the DNA code., 2) Two,

one from each parent., 3) If at least one of the two genes for a trait is dominant, then the offspring will have that trait., 4) A Punnett Square is a picture that shows all of the combinations of genes from the gametes (egg and sperm) of the parents., 5)

		T	s	— hybrid
pure short	s	Ts	ss	
	s	Ts	ss	

50.% of offspring will be short.

6)

		G	y	— hybrid
hybrid	G	GG	Gy	
	y	Gy	yy	

25.% of offspring will be yellow.