



New plants from old

Worksheet 4 - What did Mendel discover?

Here is what Mendel discovered in the pea plants that he studied when he crossed different pea plants with different characteristics. Lets use the characteristics of Tall and Short (there were no medium sized plants).

Generation 1: There are Tall peas There are Short peas

We need to 'cross' two plants to create a new one — meaning we need to use the pollen from one to fertilise the other. Think of these as two 'parents' to the new children'.

We can have three different sets of 'parents' here. So to mix these plans to create new plants we can have:

Tall 'parent' Tall 'parent' <input type="radio"/>	Short 'parent' Short 'parent' <input type="radio"/>	Tall 'parent' Short 'parent' <input type="radio"/>
These 'parents' give us: New plant A	These 'parents' give us: New plant B	These 'parents' give us: New plant C

1. What do you think the 'children' in generation 2 — A, B and C — will be like: tall or short? Circle your answer.

A will be: Tall Short B will be: Tall Short C will be: Tall Short

Mendel discovered that:

A (Tall + Tall 'parents') = Tall

B (Short + Short 'parents') = Short

C (Tall + Short 'parents') = Tall

This means that there are two versions of the gene determining height, one version is Tall and the other version is Short. When the Tall and Short version of the gene are together, the Tall gene is stronger than the Short one. This means the Tall version is dominant one, and the Short version is recessive. Remember that this is only an example, and it does not mean that tall people are stronger or better or more dominant than shorter ones — we could be talking about genes that determine size, height, weight, texture of skin, colour of leaf, need for water, attractiveness to bees — all sorts of things.

What if you now cross the 'children' that we have just created to make Generation 3? Remember, we need two 'parents' for a new 'child', and we can have 6 possible parent combinations here:

A + A	A + B	A + C	B + B	B + C	C + C
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
D	E	F	G	H	I



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2. Work out what you think the 'children' will be.

D has Tall plus Tall 'parents' so will be	Tall	Short
E has Tall plus Short 'parents' so will be	Tall	Short
F has Tall plus Tall 'parents' so will be	Tall	Short
G has Short plus Short 'parents' so will be	Tall	Short
H has Short plus Tall 'parents' so will be	Tall	Short
I has Short plus Short 'parents' so will be	Tall	Short

Here's what Mendel discovered — that for every 4 'children' of these parents there would be:

D — Tall (A) + Tall (A)	=	4 Tall	0 Short
E — Tall (A) + Short (B)	=	4 Tall	0 Short
F — Tall (A) + Tall (C)	=	4 Tall	0 Short
G — Short (B) + Short (B)	=	4 Short	0 Tall
H — Short (B) + Tall (C)	=	2 Short	2 Tall
I — Tall (C) + Tall (C)	=	3 Tall	1 Short

Hang on - D, E and G look right - Half tall (dominant) and half small (recessive) = Tall, and All tall and all short = all short.

But where did the short 'children' come from in F and I, and the tall 'children' in H?

The answer is that there were some tall and some short genes that were 'hiding'. The short genes did not show in this generation, but then came back in the next generation. Remember this paragraph?

By 1863, Mendel's experiments with peas were finally complete. He didn't know that he was studying what we now know as genes, but he knew that for the features he was studying, every plant had two factors that determined its appearance for a particular characteristic, one inherited from each parent. He learned that these factors could be dominant or recessive, and that when a plant inherited both a dominant and a recessive factor, the recessive factor was masked but could reappear in a later generation.

Now you know what it is saying.

To see how this happened you can look at the next page, or you can just accept it and go on to the page following. But try it — it is good fun!