Extracting DNA from split peas

Transcript

DNA stands for deoxyribonucleic acid. It is the chemical that makes up our genes and chromosomes. It is the material we inherit from our parents giving us many of our characteristics.

A molecule of DNA is made up of two long strands twisted together to form a helix. In this experiment, DNA will be extracted from the nucleus of split pea cells.

About 100 centimetres cubed of split peas are mashed with 200 centimetres cubed of ice cold water, and a pinch of salt. The salt helps the DNA precipitate later.

Blending the split peas separates the cells and starts to break them open.

Some of the mixture is put into a boiling tube.

Muslin cloth is stretched over a beaker

and secured with an elastic band. A small well is pressed into the surface of the muslin.

The solution from the boiling tube is poured onto the muslin, to filter it. The split pea mixture that collects in the beaker is poured into a fresh boiling tube. The boiling tube is then placed into an ice-water bath. The cold temperature prevents enzymes from the broken cells breaking down the DNA.

Washing-up liquid is added. The washing up liquid breaks open the nuclear membrane, releasing the contents of the nucleus into the solution.

The solution is mixed and left to settle for 5 to10 minutes. This gives time for the washing up liquid to work.

After this time, pineapple juice is added. Protease enzymes in the pineapple juice break down any protein around the DNA.

Next, chilled ethanol is added.

The boiling tube is tilted to an angle of 45 degrees and ethanol is slowly added until there is about the same volume of ethanol as there is green solution. The ethanol should float on top as it is less dense than water.

DNA is soluble in water but insoluble in ethanol, so it forms a white precipitate where the split pea solution and the ethanol meet.

It is already possible to see some white precipitate in the ethanol layer.

A glass rod is gently moved around on this white layer. A twirling and pulling motion is used to pull the strands of DNA out of the split pea solution and into the ethanol, where they will precipitate.

A dropping pipette is used to extract the DNA from the boiling tube and put into a small dish of ethanol.

To test that the white precipitate is actually DNA and not a protein, methylene blue is added. This is a stain that DNA absorbs. Blue precipitates are an indication of DNA.

If no blue precipitates are seen, as in this example, then DNA was not successfully extracted. Another test would be to add pectinase. If the collected strands dissolve, then they are the protein pectin, and not DNA.

The extraction of DNA from cells is an essential step in genetic engineering, forensic science and in the detection of genetic disorders.