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Extracting DNA

Every living thing, from humans and animals to plants and bacteria, has DNA (Deoxyribonucleic Acid). It's the material that provides the instructions for that living thing to develop and live.

Everyone's DNA is different (except identical twins) and is stored inside cells. In order to study it, scientists have to extract it from the nucleus (the command centre) of the cell.

Did you know?

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A single human cell contains about 2 metres of DNA tightly coiled up. If all the DNA in your body was straightened out and lined up end-to-end it could reach from the Earth to the Sun - and back again about 200 times!

HOW THE EXPERIMENT WORKS

Cells contain a barrier called the cell membrane that separates the internal bits (including the nucleus with the DNA) from the outside environment. This membrane is made up of lots of fatty chains which can be broken apart by washing up liquid, just like greasy on dirty dishes at home.

The bicarbonate of soda is added to neutralise the overall negative charge on the DNA, making it clump together better later on.

Once the DNA has been released from the cell and its charge neutralised, there are millions of individual strands floating in the mixture. Each strand is far too small to see, even with a powerful microscope.

Adding alcohol makes the DNA strands clump together into a solid or precipitate, forming stringy white stuff. Each piece contains millions of DNA strands clumped together.

TURN OVERLEAF FOR THE INSTRUCTIONS.

WHAT YOU WILL NEED

In this experiment you will be extracting the DNA from plant cells.

Equipment

- Measuring jug
- Medium-sized mixing bowl
- Spoon for measuring and stirring
- Tall narrow glass/measuring cylinder
- Small cup

Chemicals

- DNA Source (1 tablespoon): We recommend using wheat germ but you can try lots of different fruit or vegetables such as spinach, strawberries, split peas, or kiwis (fruit and vegetables must be peeled then chopped/mashed)
- Washing up liquid (1 small squirt)
- Bicarbonate of soda (1 teaspoon)
- Water (100ml)
- Alcohol (25ml): We recommend vodka or rubbing alcohol, but you could also use any clear drinking alcohol, such as strong white rum (18+ supervision required)

How to do the experiment

- Measure out 100ml of water using the measuring jug and add this to the mixing bowl.
- 2. Add one tablespoon of your DNA source and a small amount of washing up liquid to the mixing bowl.
- 3. Stir the mixture gently for at least one minute to make sure the cells are broken apart.
- **4.** Add a spoonful of bicarbonate of soda and stir the mixture for one minute. The more you stir, the more DNA is released.
- 5. Leave the mixture to settle to allow the pieces of your DNA source to sink to the bottom of the bowl.
- 6. Carefully pour some of the mixture into the measuring jug, being careful not transfer any of the DNA source that has settled to the bottom. You need about 25ml.
- 7. Hold the narrow glass with the DNA mixture at around 45 degrees and slowly pour the alcohol into the glass. Aim for about the same amount as there is DNA mixture.
- 8. Try to get the alcohol to pour down the inner side of the glass so the liquids don't mix.
- **9.** Hold the glass upright and still. Do not mix the layers.
- **10.** After a couple of minutes you should start to see some white stringy stuff form. This is the DNA.

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Check out other activities to try at home on our website and send us a message if there's anything you want to see us cover!