

Extracting DNA from kiwi fruit

DNA (or **Deoxyribonucleic Acid**) is a long molecule that is found in all living things. It is the instruction manual that tells each of the cells in your body what to do. DNA determines the colour of your eyes and the colour of your hair. Here's a simple experiment to extract and visualise the DNA from kiwi fruit.

Children should be supervised!

1) Prepare your equipment

You will need:

- Two kiwis
- Pineapple juice
- Table salt
- Washing up liquid
- Cold alcohol - put in the freezer before you start the experiment (I used surgical spirit but strong rum also works well)
- Two small glass beakers (or plastic cups)
- Sieve
- Bowl
- Tall glass/measuring cylinder
- Kitchen Roll
- Stirring rod (or chopstick)
- Knife
- Fork
- Chopping board



2) Make the extraction solution

DNA is tightly packaged inside the nucleus of cells. The membranes of the cell and of the nucleus are rich in fats so we can break them down using a detergent. The salt helps to get rid of the proteins that package the DNA tightly inside the nucleus.

- In one of your beakers measure out about 80mls water
- Add half a teaspoon of salt and stir until dissolved



- Add two teaspoons of washing up liquid and stir gently avoiding making too many bubbles

3) Prepare your fruit mush

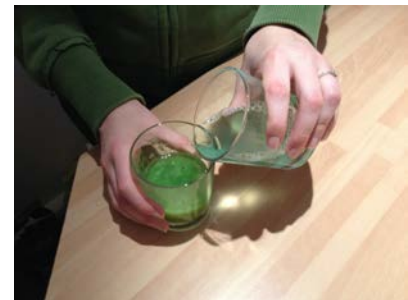
DNA can be extracted from anything living so you could also try this experiment with strawberries or bananas. Make sure you remove the fruit skins as they are mostly dead and don't contain DNA. The kiwi needs to be broken up so the extraction solution can get to the cells.



- Peel your kiwis and chop into small pieces
- Add the chopped up kiwi to the second small beaker and use the fork to mush it up

4) Add the extraction solution to the fruit mush

In this step the detergent breaks down the cell membranes so the DNA can be released. The salt removes proteins that are bound to the DNA.



- Add your extraction solution to the kiwi mush
- Leave at room temperature for about 20 minutes

5) Filter the solution

This gets rid of the fruit pulp and seeds and should leave a pure solution of DNA



- Put your sieve over a clean bowl and line the sieve with a few sheets of damp kitchen roll
- Pour your green mush into the sieve carefully. Be careful not to break the kitchen roll
- Use a fork to gently push the mixture through the sieve
- The pulp and seeds should be left in the sieve and there should be a greenish liquid in the bowl. Transfer this to a tall glass or measuring cylinder.

6) Purifying the DNA

If you want an even purer solution of DNA then we need to remove proteins that are bound to the DNA. Pineapple juice contains an enzyme



that breaks down proteins. If you haven't got any pineapple juice then contact lens cleaning solution could also be used.

- Add pineapple juice to the green liquid. You will need about 1ml of pineapple juice to 5mls of the greenish DNA solution.
- Leave at room temperature for about 5 minutes

7) Precipitating the DNA

DNA dissolves in water so will not be visible. However, it does not dissolve in alcohol so if we add surgical spirit then the DNA will collect as a white mass at the top of the tube.

- Remove the alcohol from the freezer
- Carefully pour the alcohol down the side of the glass
- You need about equal volumes of DNA solution to alcohol



8) Visualise the DNA sample

After about 10 minutes you should be able to see a mass of white stringy stuff at the top of the tube (see right hand photo). This is the kiwi DNA! You can fish this out using the chopstick and place it onto a piece of card to take home.



Sources

This protocol is adapted from the following sources:

http://www.funsci.com/fun3_en/dna/dnaen.htm

<http://www.thenakedscientists.com/HTML/content/kitchenscience/exp/how-to-extract-dna-from-a-kiwi-fruit/>

<http://www.nuffieldfoundation.org/practical-biology/extracting-dna-living-things>

More about DNA

http://www.chem4kids.com/files/bio_dna.html

http://www.sciencemuseum.org.uk/centenary/home/icons/dna_double_helix.aspx

Katie Howe/The Node, December 2013