

Isolate DNA from wheatgerm!

Genetic engineering is a very simple process when we look at the basic activities involved. To understand this simple process we have to have a very basic understanding of DNA, proteins and enzymes. As is clearly explained in the previous article, DNA consists of genes, and the genes contain the “programmes” or “codes” that produce proteins.

Some proteins are enzymes and enzymes control cellular functions. All organisms consist of cells where each cell is performing certain biological functions. If we now change the genes within the DNA of the cells, different enzymes will be produced and therefore the cells will perform different biological functions.

The very basic objective of genetic engineering is to completely or slightly alter the genes within the DNA of an organism, to allow that organism to produce different proteins and enzymes and therefore perform different, more desirable biological functions. These different functions result in different behaviour, performance, or characteristics of the particular organism.

However, before this can be done, one first has to isolate the DNA of a particular organism.

Isolating DNA is not as difficult as you think. In fact, it was first done in 1869 by the Swiss scientist, Frederick Miescher. However, splitting the DNA and replacing genes is quite something else. Even more difficult, is to keep the new DNA in the cell. This is the major reason why it took more than 100 years to progress from isolating DNA, to the point where we are today.

To isolate DNA yourself, follow the instructions on the next page and end up with visible DNA. Although each DNA molecule is obviously too small to view individually, it is quite visible and amazing to see one of the basic elements of life – isolated DNA. This experiment will allow you to extract DNA from plant cells and takes about an hour to perform. Enjoy!

To isolate DNA in this experiment, you will need to find a few chemicals, basic equipment and raw wheatgerm. The items you need include:



1. A cup of wheatgerm (you can buy it at any health shop or even at some grocery stores)
2. Normal table salt (about 8 heaped teaspoons full)
3. Clear alcohol (something like Cane spirit or Gin would do just fine!)
4. Washing-up liquid (not the gel type)
5. Lemon juice (bottled lemon juice is fine)
6. Two glass bottles or large glasses
7. A sieve or even a tea strainer
8. Clean water
9. A teaspoon

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1
STEP

BREAK DOWN THE CELL WALLS OF THE WHEATGERM.

Using a large glass, dissolve one level tablespoon of salt in 300ml of cold water. Add four squirts of lemon juice. Now add half a cup of wheatgerm to the solution and stir gently for 15 minutes. The lemon juice will break down the cell walls of the wheatgerm. Press this mixture through the sieve or strainer and discard the liquid. You will be left with a soggy pulp. Do this again for the other half a cup of wheatgerm. The soggy pulp you now have, contains the cell contents without the cell walls.

2
STEP

DISSOLVE THE DNA

Put one level tablespoon of salt in 300ml of water, stir the mixture until the salt is dissolved and add six teaspoons of alcohol. Add nine large drops of the washing-up liquid and stir gently. Add the soggy pulp from step one and stir it gently for about 20 minutes. During this period, the detergent in the washing-up liquid, will dissolve the DNA into the mixture. Now add about 10 level teaspoons of salt and stir gently for 10 minutes.

3
STEP

SEPARATE THE DNA SOLUTION FROM THE MIXTURE.

This step is quite easy – just let the mixture stand and allow the solids to settle out. After the solids have settled, gently pour the solution (liquid) into another glass, until it is about a quarter full, taking care that the solids do not mix with the solution. The solution in the new glass now contains the DNA in a dissolved form.

4
STEP

EXTRACT THE DISSOLVED DNA FROM THE SOLUTION.

Take the quarter-filled glass, fill it up with alcohol and stir very gently. As you stir, you will notice that the DNA precipitates out as very fine white threads. You can leave this mixture to further allow the DNA to settle. Gently pour the liquid off and *voilà* – there is your DNA!