Supplementary information

DNA extraction at home

This method can be used to extract DNA from pretty much any living thing. It works well on a variety of fruits and vegetables. For this example I use strawberries as they look and smell nice. Two methods are listed, the first working well on soft fruit, the second works well for all fruit an veg. In both methods pineapple juice is used. Within the method we are using the fact that pineapple juice contains protease enzymes to degrade the proteins with the mixture an alternative would be to use meat tenderiser.

Zip lock bag method

You will need: 1 zip lock back

3-4 strawberries

Washing up liquid

100ml water

Table salt

Coffee filter

Cup

Pineapple Juice

Methylated Spirts or Surgical Spirit [available from pharmacies] – chilled in the fridge.

Take some [3-4] strawberries and place in a zip lock bag. Seal and place on a surface. Squash/gently smash the strawberries in the bag by hand.

Add 1 tsp of washing up liquid, 100ml of tap water and ½ a tsp of salt to the bag. Squash the strawberries further for about 1 minute.

Open the bag and pour the contents into the coffee filter placed over a cup. The liquid will then drip down into the cup leaving behind the strawberry debris.

Add roughly 5ml of pineapple juice to the liquid in the cup and mix. Leave 5-10 minutes

Add the total volume of chilled methylated spirits or surgical spirit to the cup. Do not mix.

You should now notice a white precipitate forming. This is DNA. You can scoop this out using a wooden stick or straw.

Blender method

You will need: 1 blender

3-4 strawberries

Washing up liquid

100ml water

Table salt

Coffee filter

Cup

Pineapple Juice

Methylated Spirts or Surgical Spirit [available from pharmacies] – chilled in the fridge.

Take some [3-4] strawberries and blend in the blender.

Add 1 tsp of washing up liquid, 100ml of tap water and ½ a tsp of salt to the blender. Leave with the strawberries for around 5-10 minutes.

Pour the contents into the coffee filter placed over a cup. The liquid will then drip down into the cup leaving behind the strawberry debris.

Add roughly 5ml volume of pineapple juice to the liquid in the cup and mix. Leave for 5-10 minutes.

Add the total volume of chilled methylated spirits or surgical spirit to the cup. Do not mix.

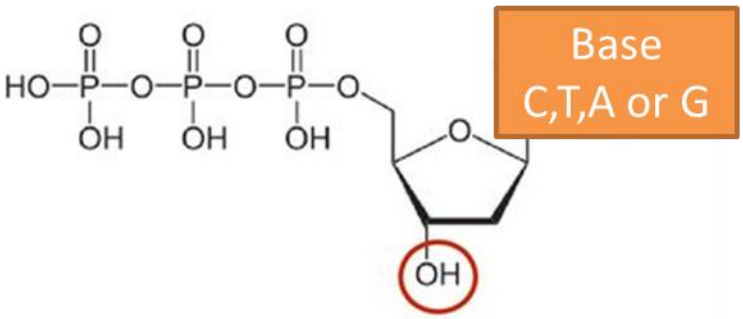
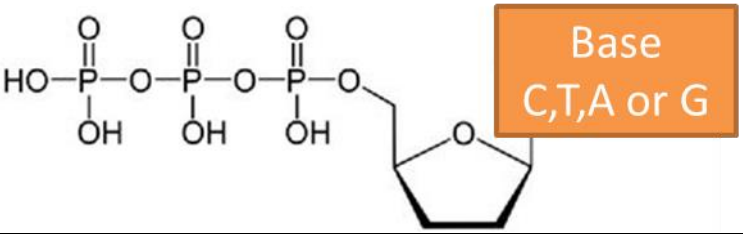
You should now notice a white precipitate forming. This is the DNA. You can scoop this out using a wooden stick or straw.

Gel electrophoresis at home

It is possible to do simple electrophoresis on food dyes at home. The uses the same principles which are behind the DNA electrophoresis. To do this you will need a margarine/butter container or equivalent, some wire and 9V batteries to use as a power source. A detailed protocol with pictures can be found at

https://www.instructables.com/id/Building-and-Running-a-Homemade-Agarose-Gel-Electr/

Glossary

Bacteriophage	Viruses that infect bacteria. Some of these result in the killing of the bacterial cell (lytic phages).
Base	A single nucleotide on one of the strands of the DNA sequence. A nucleotide is linked to the next nucleotide in the DNA sequence by a phosphate group.
Base Pair	Two nucleotides one on each strand of the DNA linked by hydrogen bonds. This is either adenine & thymine or cytosine and guanine within DNA.
Cas9	An enzyme that cuts DNA directed by a guide RNA. It is derived from bacteria where the guide RNAs are encoded in the CRISPR region.
Complementary	
Deoxynucleotide	A nucleotide tri-phosphate which is the building block for DNA. This has a hydroxyl (OH) group on carbon 3 (3') of the sugar, circled in red. 
Di-deoxynucleotide	A nucleotide tri-phosphate which is lacking a hydroxyl (OH) group on carbon 3 (3') of the sugar. This means that it cannot have further bases attached to it, to extend the DNA chain. 
Denature	In this context this means to split DNA into from double strand to single stranded DNA. This can be done by heat or chemical (eg: strong alkali) means.
DNA polymerase	An enzyme that copies DNA. Requires both a primer to tell it where to start and a DNA template to work from
DNA sequencing	A process by which the order of the bases in DNA is read.
Electrophoresis	Using a gel and an electrical circuit to separate a sample (in this case DNA) by size. In the case of DNA the negatively charged DNA moves towards the positive electrode with smaller pieces of DNA moving more quickly as they are impeded less by the gel.
Eukaryote	An organism containing cells which have a cell nucleus. This includes

	humans, plants and yeast but does not include bacteria.
Expressed	A DNA sequence that has been read and used to make protein
Exonuclease	An enzyme that breaks down DNA (or RNA) from one end. These work on a single strand of DNA (or RNA) and thus result in sticky ends. These enzymes play an important role in DNA repair and replication [ref]
Genome	The DNA in an organism that encodes for that organism. The human genome is made up of 46 chromosomes. Some bacterial genomes only have one chromosome.
Homology	Two pieces of DNA with the same sequence.
Marker	Something that labels your item of interest. In terms of a vector, this usually gives the cell containing it a unique property such as antibiotic resistance or the ability to produce a nutrient. This allows you to use this property to select or screen for cells containing the vector.
Nuclease	An enzyme that breaks cuts the backbone of DNA. Examples can include restriction endonucleases and endonucleases that only work on one strand.
Nucleotide triphosphate	The building block of DNA with three phosphates. Two of those phosphates are lost when this is used to form DNA.
PCR	Polymerase chain reaction, an artificial method of copying/amplifying a specific piece of DNA
Phage	See Bacteriophage
Plasmid	A circular piece of DNA found within cells. This can be used as a vector to carry a piece of DNA of interest.
Primer	A short piece of DNA (or RNA) typically 20-30base pairs in length
Restriction Endonuclease	An enzyme that cuts DNA at a specific site, termed a restriction site
Sonication	The use of ultrasound (high frequency sound waves) to break things apart.
SYBR Green / SYBR safe	Synthetic dyes which bind DNA and can be observed by illuminating the DNA with light of a specific wavelength
Thermostable	An enzyme that is able to work and that does not denature (fall apart) at high temperatures, typically this means above 37 degrees