Girlguiding Dundee/WCAIR Virtual Sleepover

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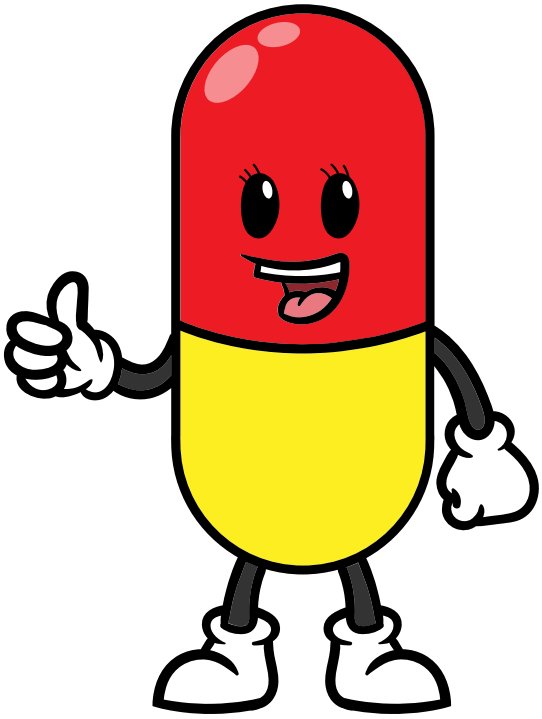
Saturday 5pm: All About Me

You have your fourth mini mission from Medi - all inspired by our genetics, and here you'll find all the other details you need to take part in this session of our sleepover. Join in with the ones that take your fancy, or try them all. We think everyone can join in with all of these activities.

We wanted to highlight that coming along to the panel discussion could work well with an interest badge for Brownies (Jobs) and Guides (Aspirations). Keep posting us your photos, then we can all feel connected over the weekend - you can post them on Facebook or email them to us at **info@girlguidingdundee.org.uk**

We'll see you again at 7.30pm for our campfire before you settle down to enjoy your chosen movie.

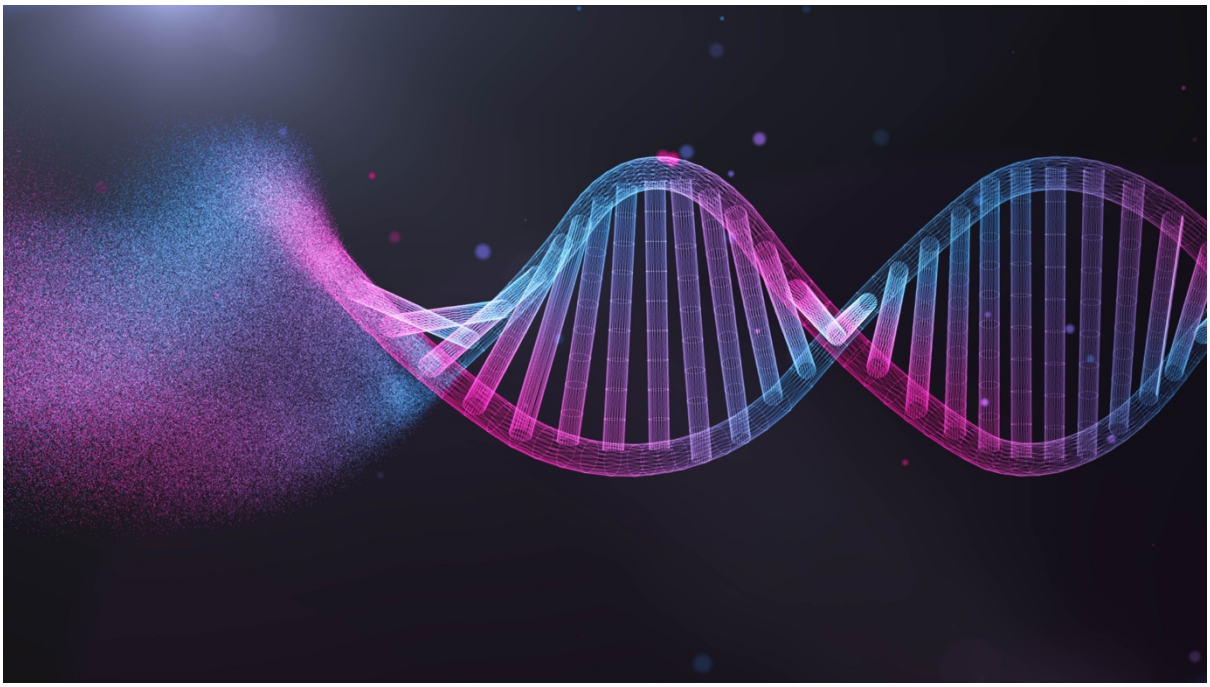


Spell your name in DNA

You might have heard people use phrases like "it's in your DNA" – but how does can DNA store information?

All about DNA

DNA is made up of four building blocks called A, G, C and T for short. (Sometimes you might see a U instead of T). DNA is a bit like a written recipe – only tasty when it's actually cooked!



To be useful, DNA has to be translated into a **protein molecule.**

Protein molecules are made up of twenty different building blocks called **amino acids** which can also be written as single letters.

The four DNA letters are read in sets of three known as **codons**. There are 64 possible combinations, from AAA to TTT, through combinations like AGC, GCT and so on.

Each codon is translated into one amino acid – one letter in the protein alphabet. Some protein letters have more than one codon, and there's also three ways to say STOP. The last page of this activity has a table showing the codons for each amino acid letter. For example, an "N" in the protein alphabet could be made up by AAT or AAC in DNA code.

Write your name the DNA way

Firstly, check if your name has any letters that are not allowed in the protein alphabet. There are no B, X, Z, J, O or U so if your name is Boris Johnson you might have a problem! Could you use your middle name, or write a message instead? Or you could substitute letters in your name, for example use an S instead of Z. Be creative!

Next write each letter of your name or message in a column. Then look up the table and choose one DNA codon for each letter and write it next to the letters of your name / message.

My name is Alice so this how I worked out my DNA code

A	GCT
L	TTA
I	ATT
C	TGT
E	GAA

or **GCT TTA ATT TGT GAA** in a straight line.

If your name has repeated letters you might want to use different codons for each letter. If you want more than one word you could put a STOP in between.

Now get your beads and string or elastic. Pick a colour for each letter of DNA and start stringing your codons together! Tie a knot at one end before you thread your beads on, and one at the other end once you've strung on all your beads.

What else could you code using the DNA alphabet? You could knit a scarf with four colours, use four colours of Hama beads, build with four colours of Lego bricks– the possibilities are endless! You might find it hard to knit as long a scarf as the DNA in your body – it would stretch 70 times as far as the distance from the Earth to the Sun!

This activity is very similar to the "Binary Beads" card in the Innovate Stage 4 Skills Builder – we've just used a different code.

A	GCT, GCC, GCA, GCG
C	TGT, TGC
D	GAT, GAC
E	GAA, GAG
F	TTT, TTC
G	GGT, GGC, GGA, GGG
H	CAT, CAC
I	ATT, ATC, ATA
K	AAA, AAG
L	TTA, TTG, CTT, CTC, CTA, CTG
M	ATG
N	AAT, AAC
P	CCT, CCC, CCA, CCG
Q	CAA, CAG
R	CGT, CGC, CGA, CGG, AGA, AGG
S	TCT, TCC, TCA, TCG, AGT, AGC
T	ACT, ACC, ACA, ACG
V	GTT, GTC, GTA, GTG
W	TGG
Y	TAT, TAC
STOP	TAA, TGA, TAG

Making blood

Aim

To name the key components in our blood and identify what each of them does

About this activity

Blood is incredibly important to our bodies. It helps us carry oxygen and nutrients from our lungs and guts to wherever it's needed. It also helps to keep us healthy and fight off infections. The blood is made of three components:

- **plasma**, which is the liquid part. It carries the cells and any medicines that you might need
- **red blood cells**, which carry oxygen around your body
- **white blood** cells, which are a key part of the immune system which fights illness

With some diseases, microbes can be found in the blood itself. Malaria parasites live in red blood cells, as well as the liver. The white blood cells are our body's defensive mechanism so they try to attack Tuberculosis by forming a defensive wall, known as a granuloma, around the Tuberculosis bacteria.

What you'll need

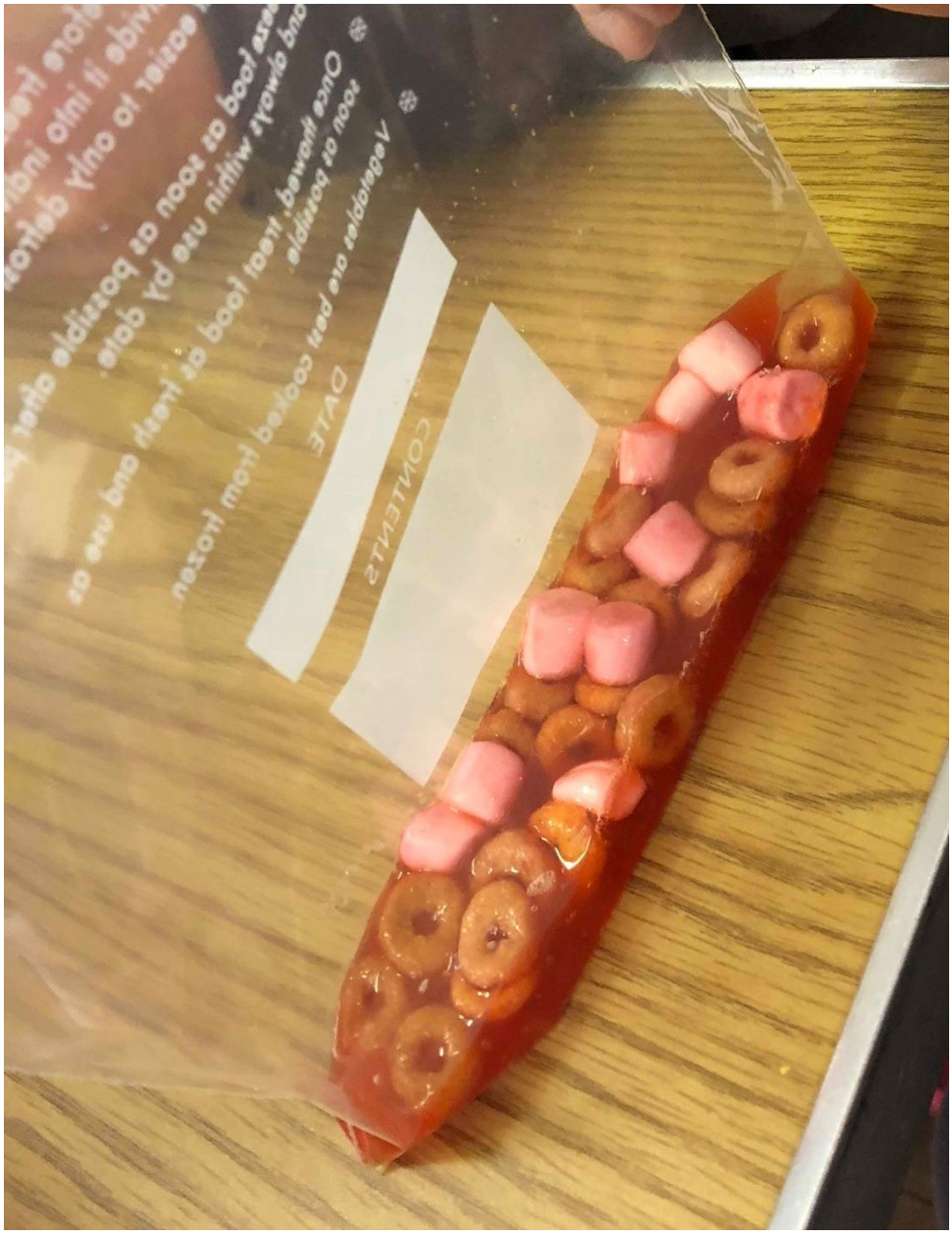
- a plastic bottle
- a sandwich bag
- yellow and red food dyes
- water
- Cheerios
- small white marshmallows

How to make blood:

1. Half fill a plastic bottle with water and then add a few drops of yellow food dye. This is the plasma.

2. Fill a sandwich bag with cheerios and a few drops of red food colouring. Give the bag a good shake. These are the red blood cells that give blood its colour.
3. Add the red blood cells to the bottle. You should see it change from yellow to red.
4. Add a few small white marshmallows. These are the white blood cells.

You have made blood!



Build a lung

Do you know how your lungs work?

All about lungs

Understanding how different body parts work is vital when designing new medicines – different treatments are required to reach different organs in the body! For example, medicines that treat tuberculosis (TB) need to target the lungs whereas medicines that target Alzheimer's need to target the brain.

Your lungs are respiratory organs which means they are required to help you breathe – this is how oxygen enters the body and how carbon dioxide is eliminated. When we inhale, our diaphragm moves down, and this is what draws air into our lungs. When we exhale, the diaphragm moves back up and the air is pushed back out of our lungs.

In this activity, we're going to build a model lung to see how it works!

What do I need:

- 1 empty plastic bottle
- 3 Balloons
- 2 Straws
- Tape (preferably duct tape or packing tape)
- Play-Doh or Clay

What do I do:

For younger girls, adult help will be required.

1. Tape the end of a balloon around one end of each straw. Make sure the balloons are tightly in place.
2. Cut the bottom off of your empty 1 bottle.
3. Put the two straws into the bottle with the balloon end inside the bottle and the other end of the straws sticking out through the neck of the bottle.
4. Tie the opening of the 3rd balloon and cut the top part off.
5. Take this balloon and stretch the cut opening over the opening at the bottom of the plastic bottle. It is tricky to stretch the balloon into place, please take care.

6. Tape this balloon tightly into place.
7. Use your play-doh or clay to hold the straws sticking out the top in place. You don't want any air to be able to get through except what comes through the straws.

Now the model is ready! Pull back on the balloon taped to the bottom of the bottle and as you do so the two balloons inside the bottle will start to inflate! Once you released the balloon at the bottom, the two balloons should deflate. In this model, the bottom balloon is acting as your diaphragm to help you breathe!

Find out more at the link below:

https://team-cartwright.com/working-lung-model-for-kids/

Build a model heart

Do you know how your heart works?

The heart

The heart is a very important organ in the body – it works like the engine for our bodies pumping blood carrying oxygen and nutrients from our lungs and guts to wherever it's needed in the body.

In this experiment, we will be building our own heart model to explore how blood flows through the heart chambers. We have four chambers in our heart, the right and left atrium, and right and left ventricle. Blood will flow in only one direction – into the heart, to the lungs to be oxygenated, back into the heart, then back out into the body. The four valves of our heart are important for ensuring this one way blood flow.

What do I need:

- 3 x Plastic bottles with caps, labels removed.
- 4 x Bendy straws
- 3 Cups of water
- Food colouring
- Tape
- Modeling clay or play dough
- Drill or other device for making holes in the plastic caps – please ask an adult to do this bit for you

What do I do:

1. Make holes in two of the bottle caps, just big enough for the straws to slide through. In the one cap, make two holes the same size and in the other, make one straw-sized hole and one smaller hole.
2. Prepare your "blood" – mix red food colouring and water in a glass or separate bottle.
3. Take two straws, stretch and bend them to create a 90 degree angle. Slide one straw into the other straw and then tape up the join. Repeat with the second set of straws.
4. Place your three bottles on the table. Fill the first two with your "blood" to about 80% full. Leave the third one empty.

5. On the first bottle place the cap with one straw hole and one small hole. On the middle bottle place the cap with two straw holes. Leave the third bottle without a cap.
6. Carefully slide the straws through the bottle caps. Place clay or play dough around the straw bases on the middle bottle to make an airtight seal with the bottle cap.

Now your model is ready! In this simple model the first bottle is the atrium of the heart, the second bottle is the ventricle, and the third bottle represents either the lungs or body. Our fingers function as the valves of the heart.

To make your heart model work, squeeze the middle bottle only. Start by pinching the straw between the atrium and ventricle bottle. Squeeze the middle bottle and watch your "blood" squirt out into the body.

Keeping the middle bottle "squeezed" move your fingers and pinch the straw between the ventricle and body. Now release the middle bottle and watch your blood move from the atrium into the ventricle.

Find out more at the link below:

https://www.steampoweredfamily.com/activities/heart-model-heart-stem/

Extracting DNA

Aim

To extract DNA from strawberries and explore its structure and function.

About the activity

Life on earth comes in all different shapes and sizes – people, animals, plants, even bacteria and parasites. One thing they have in common is something called *DNA*, or deoxyribonucleic acid (you don't have to learn that, though!).

All of these living things are made up of tiny, tiny things called cells. Bacteria live as single cells, all by themselves, while most plants and animals like you and me are made up of thousands, millions, billions or trillions of cells! DNA is a chemical which sits in the centre of each of our cells, telling them what to do, and how to be each kind of cell.

Like a long recipe from a cook book, it's made up of lots of chemical letters. Unlike our alphabet, which has 26 letters, DNA only has 4 – A, T, G and C. Each letter represents a different chemical compound. They're so small we can't see them, but we can use science to read them. The order of these letters tells a cell what to do. To make a human, it takes around 3 billion letters, or enough to fill a whole case of books.

The DNA in each cell is tiny, but if we extract DNA from lots of cells we can actually see it. For our experiment, you can try it from one of our plant relatives: strawberries.

What you'll need

- Some cups
- A jug
- Filter funnels

- Test tubes – you may find that sample tubes work well. You can find them online, for instance on Amazon, for around £3 for 10. Alternatively, you might want to contact your local university's outreach team to see if they can give you any, or your GP or local hospital. Anyone else who works in healthcare might be able to give you some.
- Sandwich or freezer bags with a good seal
- Coffee filters
- Water
- Strawberries
- Salt
- Washing up liquid
- Rubbing alcohol, also known as ***isopropanol***, kept nice and cold in the freezer

First things first…

Well in advance:
The experiment works best if you freeze the strawberries overnight, then leave them out to thaw. If you have to microwave them that's okay, just be careful not to let them get too hot. If they're a bit icky for the experiment, that's ideal.

You'll also need a mixture of dish soap, salt and water – using around 500ml of water with 3-4 large squirts of dishsoap and a teaspoon or so of salt should work. Stir gently – you want them mixed, but not frothy.

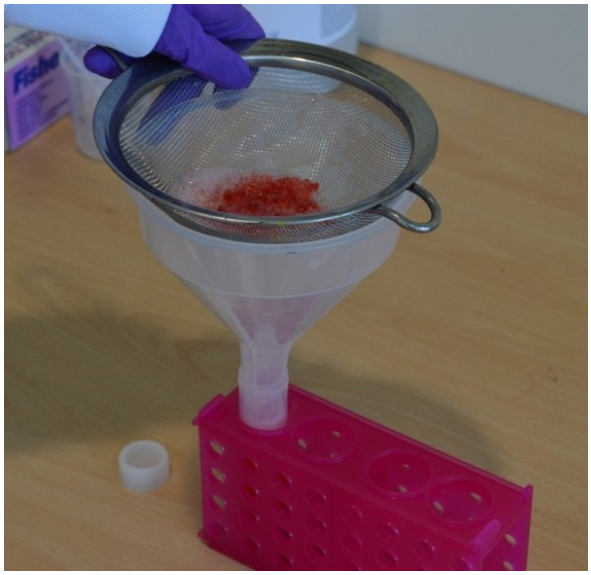
Experimental procedure

1. Put 3 smooshy strawberries in a sandwich bag. Add 1-2 tablespoons of soapy salty water mix.

2. Squeeze most of the air out of the bag and seal really well. Smoosh the strawberries up in the soap and salt mix. You should be able to get it so that there are very few chunks of strawberry left – just some skin and bits of leaf.

3. Leave to rest for a few minutes. While it rests, think about some of the traits that DNA gives us – our hair and eye colour, freckles, height, whether we start out as a girl or a boy, even some aspects of taste! Coriander – yuck!

4. Once it has rested for about 5 minutes, set up a filter funnel with a coffee filter in it over a test tube. Pour the sample through and wait for the liquid to drip to into the tube.



5. You should have a pink liquid. The DNA is in the liquid, free of its cells – the soap and salt should have broken them up. We can't see it yet because of one of DNA's properties. It's a bit like sugar – if you add it to tea, it disappears into the water. The scientific word for this is *dissolves*. If something dissolves in water, we say it's *soluble*.

6. Like sugar in tea, DNA is soluble in water. It isn't soluble in another liquid, though – rubbing alcohol! So, if we add some rubbing alcohol it should make the DNA turn solid, which means we'll be able to see it.

7. Take a small amount of cold rubbing alcohol and very gently, pour it down the side of the test tube. It should sit neatly on top of the pink liquid – they don't mix.

8. Does anything start to happen? With a bit of luck you should start to see a white, lumpy, fluffy bit of gunk appear.

9. Once you have this white gloop, congratulations! You have extracted DNA! If you have something like a skewer or a toothpick nearby you can even, with a little bit of care, pull the lump out.

Take it further

There are lots of different ways of exploring DNA – you can even try origami DNA at https://www.yourgenome.org/activities/origami-dna

Jobs - Know Myself Theme

Brownie Interest Badge

1. Interviews

For the first clause of the interest badge you need to find out about different jobs by interviewing 3 people.

Medi would like to introduce you to some Scientists so you can find out about the jobs they do at the University of Dundee. Join us for our panel discussion at 5pm on Saturday and throughout the event you can ask questions of our scientists by getting an adult to post on our Facebook Page for you or emailing us at info@girlguidingdundee.org.uk. Let your Brownie Leader know what you've done to complete this first clause.

2. Dream Job

The second clause asks you to create a picture of you in your dream job.

We hope our scientists have inspired you and given you some ideas for your picture and you'll find some "science" pictures in our files that might help you create your picture. Complete this during and after the event and show it to your Brownie Leader to complete this second clause.

You will also have completed the Medicine Maker Badge clause, Draw a Scientist, from the Medicines and Me section (page 47).

3. Advertise It

The third clause asks you to produce an advert for your dream job.

We think you'll learn lots this weekend about the jobs our scientists do here in Dundee and the skills they use. Try and include this in an advert that will make others want to apply for your dream job. You can see examples of recruitment adverts in newspapers and on the internet. To complete this badge show your Brownie Leader your advert.

Aspirations - Know Myself Theme

Guide Interest Badge

1. Your Vision

For the first clause of the interest badge you need to display a collection of what you find important, what inspires you and motivates you to achieve your ambition.

During our sleepover we'll introduce you to inspiring scientists, learn about their work and the world of science at Dundee University. We hope that this will give you some inspiration and material for your own "vision board". Complete this during and after the event and show it to your Guider to complete this first clause.

2. Your Role Models

The second clause asks you to choose an inspiration role model, find out what's made them successful and find out about their skills.

We have some inspirational role models for you to meet (virtually) as they lead us through our activities. Our panel session at 5pm on Saturday is the ideal opportunity to ask your questions about their route to Dundee and our world-class School of Life Science. Complete this during and after the event and show it to your Guider to complete this second clause.

3. Make it Happen

The third clause asks you to plan your own mini-goals.

Create your own plan to achieve your "Vision" from clause 1. The badge syllabus asks you to set dates to achieve your mini-goals and tick off your progress or take photographs to show your achievements. To complete this badge show your Guider your progress.