Glasgow Science Festival

Monumental Women in Science

Scotland has a rich history as a powerhouse of science and innovation, from the Scottish Enlightenment to the present day. Scots like James Watt and Joseph Black were pioneers whose contributions pushed us into the modern world. **But where are the women and what are their stories?**

Launched in June 2017, Glasgow Science Festival's project **'Monumental'** invited the public and local organisations to help uncover these hidden gems and explore forgotten female Scottish scientists. Who are they? What was their field? What was their contribution? Where did they live?

This resulted in our **Monumental Gallery**, featuring the stories of 30 women in STEM from across the country. You can view the online gallery on the GSF website, Science on the Sofa – Exhibitions

This activity pack shares the story of four of our Monumental women, each with a fun activity linked to their work which you can do at home.

Monumental was supported by the Heritage Lottery Fund.

Sheina Marshall – The Sea Slime Scientist

Sheina Marshall was born in Rothesay in 1896. She graduated from the University of Glasgow in 1919 with a BSc in zoology, botany and physiology, before working at the Marine Biological Station at Millport where she would stay for the rest of her life.

Early in her career Marshall began investigating marine food chains, publishing a book with chemist Andrew Picken Orr "Biology of a Marine Copepod", before becoming one of the first women Fellows of the Royal Society of Edinburgh.

Marshall
Image courtesy of the University of Glasgow

The copepod, Calanus finmarchicus
Image courtesy of Cameron Thompson

Activity: Make your own deep sea slime

What you will need:

- Water
- Measuring jug
- Plastic bowl
- Baking Soda
- PVA glue (liquid)
- Spoons
- Food colouring
- Contact lens solution

How to do it:

1. To the plastic bowl, add 3 tablespoons of PVA glue and mix in ½ a teaspoon of baking soda. (Optionally, add 1 tablespoon of water and mix if you want stretchier, stickier slime!)

2. Stir in your choice of food colouring until the slime mix is as colourful as you want it.

3. Whilst stirring, add small drops of the contact lens solution until the mixture binds into a slime.

4. Once you have made your slime, you can remove it from the bowl and bind the mixture with your hands. If it's too sticky to handle, put it back in the bowl and keep adding the lens solution.

5. Take a snap with your slime and share it with us on Facebook and Twitter! Let's see your sea slime science, and remember to tag us #GlaSciFest #GSFMonumental

Elizabeth Blackwell – Botanical Illustrations

Elizabeth Blackwell was a Scottish botanical illustrator and author. Born in 1707 she trained as an artist before marrying her cousin Alexander Blackwell in secret.

After his publishing house collapsed and he was thrown in prison, Elizabeth and Alexander needed a new source of income, and so seized the opportunity to write a pharmacopeia on plants from the "New World". With Elizabeth illustrating and her husband providing his medical knowledge, they published "A Curious Herball" between 1737 and 1739.

Blackwell's incredible artistic talent led to a detailed and intricate book on many genus of plants that were unknown to western medicine at the time.

Activity: Petal Prints

What you will need:

- Mallet (or other dull, heavy object)
- Chopping board
  Paper
- Flowers and leaves
- White fabric
- A peg
- Sharpie/fabric pen

How to do it:

1. Pick a few petals and leaves from the flowers you've chosen.

2. Lay a sheet of paper on the chopping board and arrange your petals and leaves on top in any design you like. Why not try imitating the plant's shape and layout?

3. Cover with the white fabric, and using the mallet, carefully pound the cloth. This will release the pigments that contain the colours in the plant that will make your design.

4. Carefully peel the cloth off, dusting off any remaining plant material. Add to the design with a fabric pen. Perhaps you can find out the genus of the plant, and label it's parts and colours like Elizabeth and her husband did?

5. Hang the cloth using a peg somewhere to dry, and you'll have your petal print! Can you make your own pharmacopia out of all the plants you can find outside? Share them with us on Facebook or Twitter, and remember to tag us #GlaSciFest #GSFMonumental

Eliza Gordon-Cumming – Palaeontologist

Born in 1795, Lady Eliza Gordon-Cumming was a Scottish aristocrat. She was a skilled artist, taking up the study of fossils on her Altyre estate, amassing a large collection.

She sent illustrations, letters and specimens around Europe, developing her own hypotheses on how the many fossilised piscine species in her collection would have appeared in life.

Her collection is currently in the possession of the Natural History Museum in Scotland, the Natural History Museum in London, and the Unvereristy of Neuchatel.

Activity: Start a fossil collection

What you will need:

- Plastic container
- Water
- Modelling clay
- Something to imprint – shells, plastic dinosaurs.

<u>Optional</u>

- Paper for envelopes
- Pens
- Glue sticks

How to do it:

1. Prepare your clay as per the instructions you'll have got with them. Typically, this involves mixing with water to make a soft, mouldable substance. Flatten out a chunk of clay so that it is about 1cm thick

2. Press in your plastic dinosaur, shell, or leaf, whatever it is you'd like to fossilize, making sure you don't press too hard.

3. Alternatively, you can use a plastic modelling tool, spoon or a stick to draw in the shape of something you want to make a fossil of.

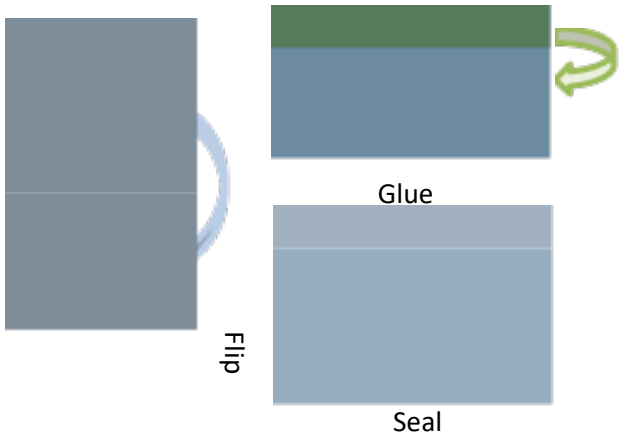
4. Remove the object from the clay, be careful not to tear the clay or you'll have to start again, but that's ok. Most fossils aren't recovered whole anyway, having been damaged over time.

5. Leave your clay to dry out, and boom! Fossil! Share your collections with us on Facebook and Twitter! Let's see your paleontological skills, and remember to tag us #GlaSciFest #GSFMonumental

<u>Preparing an envelope</u>

You may want to start a collection, like Eliza did. In that case, you'll need a way to categorise and store your fossils!

Follow these steps to create an envelope form a slip of paper. You can then write the name of your fossil and the date you discovered it on the front, officially making you a palaeontologist!



Charlotte Auerbach – Geneticist

Charlotte Auerbach, born 1899 in Germany, was a pioneering geneticist who contributed to founding the science of mutagenesis.

She worked with fruit flies to prove DNA could be damaged, and became well known as part of the team that proved that mustard gas (used prolifically in WW1) could cause mutations.

She wrote a colossal 91 scientific papers, and was a Fellow of the Royal Societies of Edinburgh and London, winning the Darwin Medal in 1976.

Activity: DNA Origami

What you will need:

- Paper
- Pens
- A printer, although that's not necessary
- Scissors
- A ruler

You can download the worksheet and instructions here: DNA origami, an watch a tutorial here: tutorial

How to do it:

1. Follow the links provided to access the STEM resources for making DNA origami, you can also watch the YouTube tutorial and follow along!

2. If you can't get to a printer, that's ok! You can make these yourself pretty easily. Get a sheet of paper and make sure it's rectangular. Using a ruler, draw a line down the middle.

3. From the middle, work outwards to replicate the template online. It's not super important to make sure everything is exactly symmetrical but using the ruler to measure the width of each part of the design will help if you're a perfectionist.

4. After that, you can colour it in yourself! DNA comes in "base pairs", so to make it look realistic, only pair up two of the same colours, for example red with green, and yellow with blue. Use the reference online as a guide.

5. Follow along the instructions or the video, and when you're done don't forget to share your results with us on Facebook or Twitter, and remember to tag us #GlaSciFest #GSFMonumental