Teachers' Learning Resource

I Spy...Nature

National Museum Cardiff

19th June – April 2015

Content	pg.

Background information for teachers

The exhibition

During this exhibition you will discover how Museum scientists see and explore nature, using specimens from the natural history collections, modern and historical photographs and illustrations. Scientists have always needed to accurately record the things they see in nature to give evidence for their ideas. The exhibition will allow visitors to follow in the footsteps of scientists from the 1500s to the present day to record the nature they see.

Alongside real objects and the illustrations and photographs that seek to record or capture them, children can use the gallery to try their hand at scientific illustration, photography, and drawing or tracing from microscopes.

•Children will learn that new ways of looking lead to new discoveries, and will therefore see the importance of keeping scientific collections

• Children will see how ways of recording nature have changed over time

Booking a visit

The exhibition can be seen from July 19th 2014 to April 2015. Contact the Learning Department to book your visit on (029) 2057 3240, or learning@museumwales.ac.uk. In addition we offer a range of museum-led learning workshops to help support your visit, go to our webpages for more details:

www.museumwales.ac.uk/learning/cardiff/

Using this pack

This pack is designed to support Foundation Phase and Key Stage 2 teachers and educators in preparing for a self-led museum visit, but can also be used to support classroom learning. It includes information on some of the work of scientists studying nature. There are also ideas and activities to explore before your visit, in the gallery, and back at school. There is a resources section at the back of the pack with worksheets and activities. This pack is intended as a private resource and is for educational purposes only. All images are for internal use only and may not be copied, distributed or used for any other purposes without appropriate permissions being sought. Amgueddfa Cymru cannot be held responsible for the content of any external web-links provided.

Curriculum links

Skills framework

The ideas within this pack will help develop enquiry, communication, and thinking skills and support the literacy and numeracy framework.

The Curriculum Cymraeg

The exhibition provides information on Welsh scientists past and present.

Foundation Phase

The exhibition can be used to support a number of areas of the foundation phase curriculum, in particular:

- Personal and social development, well-being and cultural diversity – foster curiosity and develop positive attitudes to new experiences and learning.
- Language, literacy and communication – listen to and carry out instructions, extend vocabulary and write independently and collaboratively.
- Welsh language development – view a variety of visual stimuli in the galleries.
- Knowledge and understanding of the world – explore, observe and investigate different environments, and 'Embracing science'.
- A visit also provides an opportunity to sequence events e.g. 'a journey to the Museum'.

Key Stage 2

- Science – the exhibition can help to develop skills and range in science
- Interdependence of Organisms – explore environments and local plants and animals.
- Use apparatus and equipment correctly and safely. Make careful observations and accurate measurements. It's also an opportunity to find out about science in the world of work.
- Art & Design – use the exhibition to select and record from observations and experiences, and investigate the natural environment

Preparing for your visit

Before your visit it would be helpful to talk to your class about museums, what they do, what they can expect to see at this museum, and other museums and galleries they have visited before. As this exhibition explains the work of natural scientists it would be useful to explore some famous naturalists like Charles Darwin, Alfred Russel Wallace, David Attenborough, Professor Alice Roberts, Jane Goodall and Mary Anning

Why not write a class list of things you'd like to find out on your visit (you could use the 'KWL' chart in the 'Resources' section at the back of the pack).

Some words you may use on your visit

curator

collection

geology

natural history

art

observe

fieldwork

Ideas for activities in the exhibition

There are several hands on and enquiry based activities built into the exhibition. Here are some suggestions for further activities for children to do in the exhibition. These will work best if the class is split into small groups. There are worksheets and trails in the resources section of this pack too.

Orientation Space (circular area at the heart of the gallery marked by the compass on the floor)

This space acts as an introduction to the main themes of the exhibition: how scientists observed and recorded nature in the past, the techniques and methods we use today and the work scientists do in the field. There's a quiz for pupils to identify the type of explorer they are, plus appropriate props and dress up items such as lab coats and pith helmets.

Below are some ideas of things to do in the exhibition and back at school. We've taken each of the three concepts and given ideas for incorporating content from the orientation space and the display.

Past Booth

Look for the cartoon of Madame Fleur

In this section you will discover that drawings and paintings were used widely by early scientists. Drawing pictures helped scientists record and make sense of the world. There are some beautiful historic illustrations here

Ask children to compare how drawings have changed over hundreds of years and also why they think scientists drew animals with human faces.

Some of the paintings have specimens alongside them. Ask children to examine the specimens and decide how accurate they think the paintings were.

Explore the historical illustrations on display and talk about what children like/dislike about them. These pictures weren't just pictures for art's sake, they were an important way of recording scientific information. Ask children to practice their nature drawing using the specimens on display. Try a serious picture to show to other scientists or make it silly by adding a human face**.....**

Ideas for activities in the exhibition

Muffet's "Theatre of insects" was the first British book on mini-beasts. Some people think he also wrote a nursery rhyme starring his step-daughter and a spider. Can you guess which nursery rhyme it is?

Say the nursery rhyme together:

Little Miss Muffet sat on a tuffet,

Eating her curds and whey.

There came a big spider,

Who sat down beside her

And frightened Miss Muffet away!

Some of the creatures drawn in the book aren't insects, can you find any of these in the picture?

Ideas for activities in the exhibition

Spying a Whole New World panel

Have a go at recreating the botanical illustrations on display, now try drawing some of the wax models of plants.

The museum has a collection of over 7000 botanical illustrations. These works have been used to catalogue plants that could cure disease and show off wealth. This means that the paintings produced are very different from work produced by artists who paint and draw flowers.

Explore the images in the resources section of this pack and ask your children to discuss which paintings they like best and why.

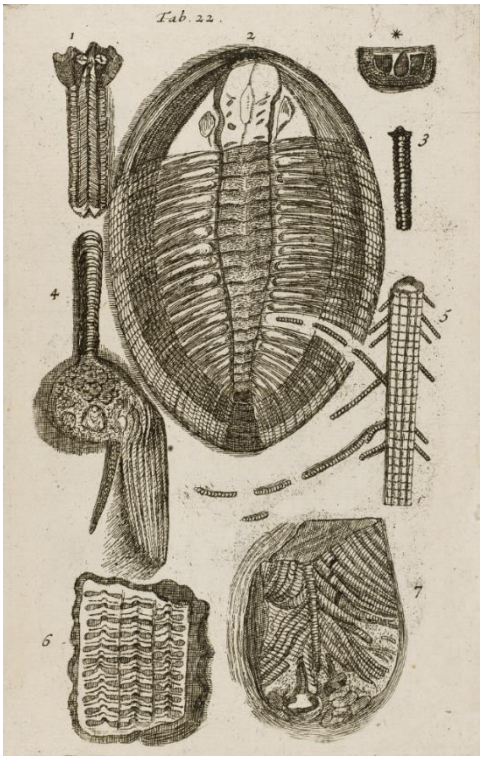
Modelling Nature Panel

For over 400 years, dead animals have been preserved by stuffing them to show what they looked like in life (Taxidermy). Scientists studying nature in distant lands also brought back animal skins to show off the new creatures they had discovered. Can you find stuffed examples of these animals in the gallery? Discover even more creatures in other parts of the museum.

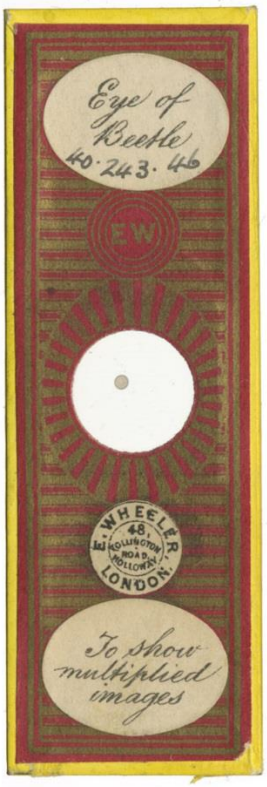
Figuring out fossils panel

Fossils, such as dinosaur bones, are formed when an animal dies and is buried in sediment. Its soft tissues rot away and only the bone remains. Over time the sediment solidifies into rock and the bones become fossilised.

The first fossil spotter's guide appeared over three hundred years ago, but many people didn't really know what fossils were. Some knew they were remains of dead creatures, but from how long ago? Explore the fossils on display and talk about what you think they are. There are many more fossils to explore in other parts of the exhibition and in the Evolution of Wales Gallery.



Ideas for activities in the exhibition



Find the Micrarium

Scientists often put specimens on slides to look at more closely under a microscope.

Challenge your pupils to spot all of the tiny plants, animals, fossils and minerals on these slides. See how many of them they can recognize without reading the labels. Use the microscopes to get really close.

Ideas for activities in the exhibition

Present Booth

Find the cartoon of Dr.Tekno

In this area you will discover how scientists use various microscopes to look even closer at nature, and make drawings of what they see. There is also a chance to see how technology is opening up new ways of looking at nature, for example we can now look inside objects using X-Rays and 3D scanners.

In the **lab area** pupils can find out more about how Museum scientists examine nature, and have a go themselves using a digital microscope and light box.

Museum scientists use microscope attachments to help them trace what they see. Have a go at tracing using the light box. Place the picture that you want to copy onto the light box, put a sheet of paper over top and trace. What details can you see?

Use the microscope (or magnifying glasses) to explore different specimens

Nature up close

Find the screen showing a slice of the Moon rock under a special microscope, watch the video and talk about the colours, shapes and textures you can see. Go and find the Moon rock in the Evolution of Wales Gallery.

The 'I saw something really big' worksheets could both be used in this area.

Ideas for activities in the exhibition

Field Zone

Here you will find out about the work scientists do 'in the field' to study nature and collect specimens. Museum scientists work in many different places in the UK and overseas. Did you know they find specimens on beaches and mountains; in quarries, rivers, fields and forests? Observing where things come from can tell us a lot about nature.

Find the cartoon of Dani Dynamo

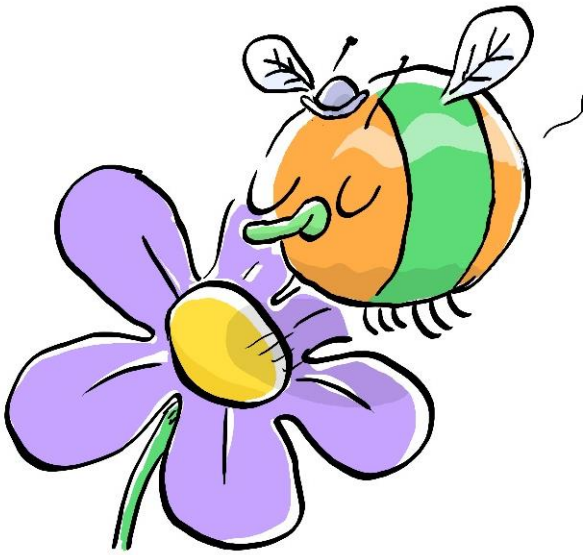
Look at the collection of objects that a scientist might take with them into the field. Discuss what the different objects are used for, then plan your own field trip. Where would you go, what would you study or collect and what equipment might you take with you?

Look at the specimens in the field display and complete some field notes using the worksheet at the back of this pack.

Use digital cameras to photograph the wildlife too.

I Spy… you zone

In this area you will find out how nature sees you, using three cameras with different filters



Find the cartoons of Bryn the bug

Ideas for activities in the classroom

If your pupils have any questions about the exhibition or the work of our museum scientists please e mail Dr.Tekno@museumwales.ac.uk

You can also follow museum staff and scientists on twitter:

@CardiffCurator

@NatHistConserve

@MuseumCdf_Learn

Inspired by the paintings of James Cosmo Melvill or Franz Regenfuss make your own beautiful shell paintings. Photograph images in the exhibition or use the examples from the resources section at the back of this pack. Alternatively shells can be purchased online from suppliers who adhere to conservation guidelines, for example:

http://www.eatonsseashells.co.uk/index.html

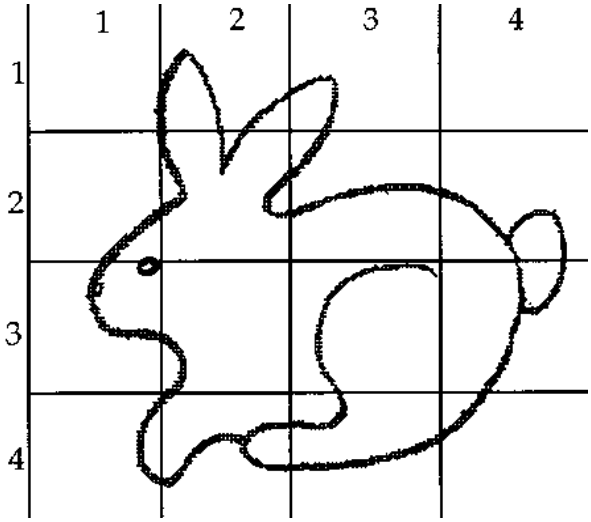
Ideas for activities in the classroom

Creative writing – scientists like Melvill shared their ideas and findings in letters. Imagine you are a scientist who has just made an amazing new discovery, perhaps you've seen a new species of plant or animal on your latest expedition, or discovered a rare fossil, or weird marine worm. Write a letter to your scientist best friend describing your new find.

Learn more about **botanical illustration** and explore the museum's online collection of botanical illustrations: http://www.museumwales.ac.uk/rhagor/galleries/botanical/.

Use the 'Drawing Plants' sheets in the 'Resources' section of this pack to create your own illustrations in school.

Make your own microscope using water droplet technique (use the instruction sheet at the back of this pack).



Use ratios to practice scaled drawings.

Ideas for activities in the classroom

Have a go at making fossils in the classroom. Collect natural objects that will make a good imprint in plasticine (try twigs, shells, pine cones etc.). Squish some plasticine into the bottom of a small paper cup (about 2cm deep) and then push the natural object into the plasticine so an imprint is made. Then fill your cup with liquid plaster of paris (don't overfill, a couple of centimetres is fine). Once it's set, remove from the cup to reveal your fossil. You could paint it to make it look more realistic.

Why not go on a fossil hunt (Llantwit Major, Penarth beach, Ogmore-by-the-sea).

Use the internet, magazines or your own photos to copy and create your own wildlife paintings in the style of Thomas Pennant.

Try different modelling techniques to make models of the plants and animals you've seen at the Museum. Can you recreate wax plant models using plasticine, or maybe make a Papier Mâché jellyfish?

Guess the object – ask children to draw a small part of something they have seen in the classroom or playground really close up then challenge each other to work out what they've drawn.

Creative writing – imagine you were shrunk to the size of a mouse or even an ant, write a story about your experiences in your strange new giant world.

Research - pick one of the scientific techniques that you learnt about (e.g. DNA, X-Rays, and Chromatography) and use the internet to find out more about it. Turn your research into a poster.

Creative writing – think about all of the technologies you saw in the exhibition. Write a story about a scientist in the future, and the technology they might use to spy Nature.

Ideas for activities in the classroom

Experiment – lichens contain many different chemical compounds. The same compounds can be found in lichens of the same species. Using a liquid to separate the different compounds (chromatography) gives a unique pattern of coloured bands, a colourful 'fingerprint' for each lichen. Comparing the fingerprints can help us to identify the lichen.

You can carry out chromatography on pen ink (black felt tip pen works well, but try other colours for comparison)

Place a dot of ink about 2cm from the bottom of a strip of filter paper, use a straw and a paper clip to suspend it in a cup (leave it a couple of centimetres from the bottom of the cup.

Then pour some water in the cup until it's just touching the paper. Leave the cups for 5 minutes then come back and observe what has happened.

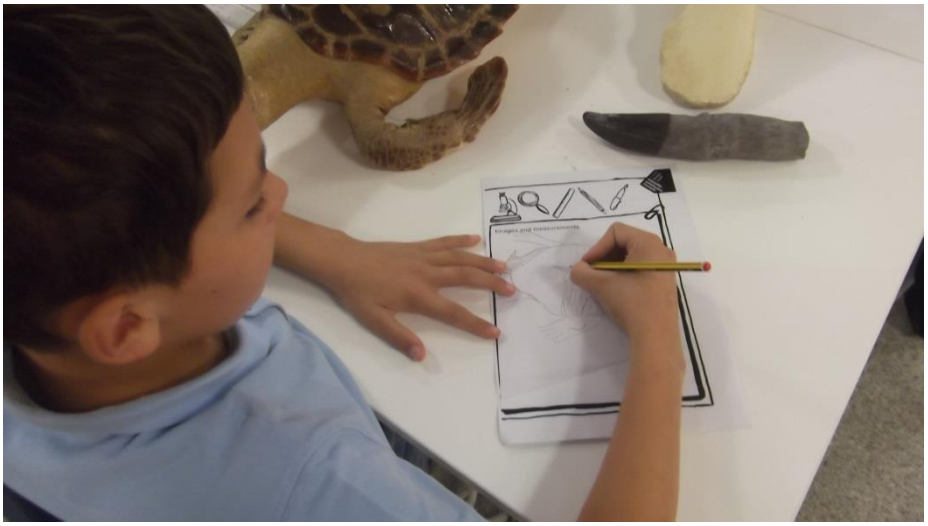
Try predicting the sorts of chromatography effects you will see with different colour pens.

Ideas for activities in the classroom

Next time you're outside have a go at being a nature detective too. Why not draw a map of the area you are exploring and mark the wildlife you have spotted on to it. Record your findings in a classroom display, take photos, make pictures, and count how many birds, insects or plants you see.

To encourage more wildlife into your school's ground have a go at making bird feeders, log piles for mini beasts or bee hotels.

Set up a nature table in the classroom, how does it change as the seasons change?



Join the Open Air Laboratories (OPAL) with Amgueddfa Cymru

Amgueddfa Cymru's Community Scientist can come to your school and lead a science investigation about your school grounds. Your class can study air quality by looking at lichens, soil quality by surveying earthworms and biodiversity by hunting for bugs, or studying hedgerows.

Sessions are suitable for KS2 to A level and address the interdependence of organisms.

Field guides and supporting resources are available and the sessions are free in Wales as OPAL is funded by the National Lottery. For further information:

opalnatureexplore.org

Contact: barbara.brown@museumwales.ac.uk

02920 573 233

Trails and resources

The following trails can be used in the exhibition:

kwl chart (page 19)

I saw something really big (page 20)

Specimen log (page 21)

You may wish to use these resources back at school:

Botanical illustration (pages 22-23)

Make a microscope (page 24)

Images

Images to compare with botanical illustrations (page 25-26)

Melvill's shells (p27 – 31)

For more resources related to the museum's collections see www.museumwales.ac.uk/learning/cardiff/resources

kwl chart

You may like to prepare the children for their visit to the museum by completing a KWL chart.

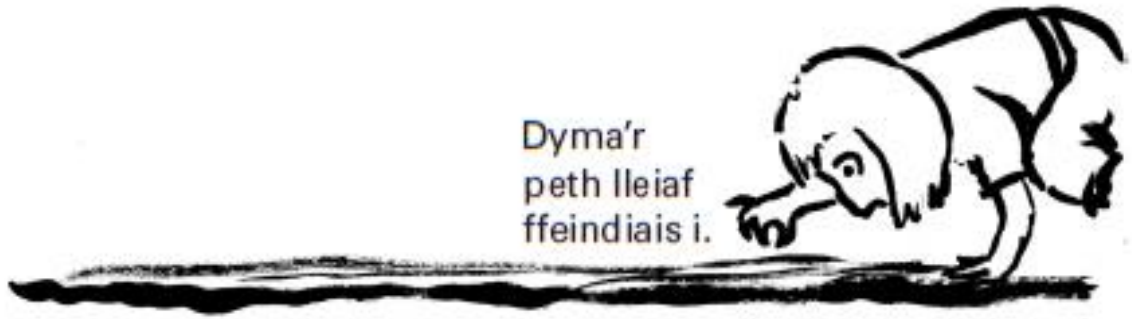
Discuss with the children what they already know and what they want to know before they visit. After the visit, the column *What have I learned* may be completed.

The chart may be prepared by each individual child, a group of children or just one KWL chart for the whole class.

What do I Know?	What do I Want to know?	What have I Learned?

I saw something really big!
Gwelais rywbeth mawr iawn!

This is the smallest thing I found.
Dyma'r peth lleiaf ffeindiais i.



This is really strange.
Mae hwn yn rhyfedd iawn.

Here is the prettiest thing I saw.
Dyma'r peth pertaf welais i.

Specimen log

Specimen name

Discovered by

Object details

Drawings

Botanical Illustration

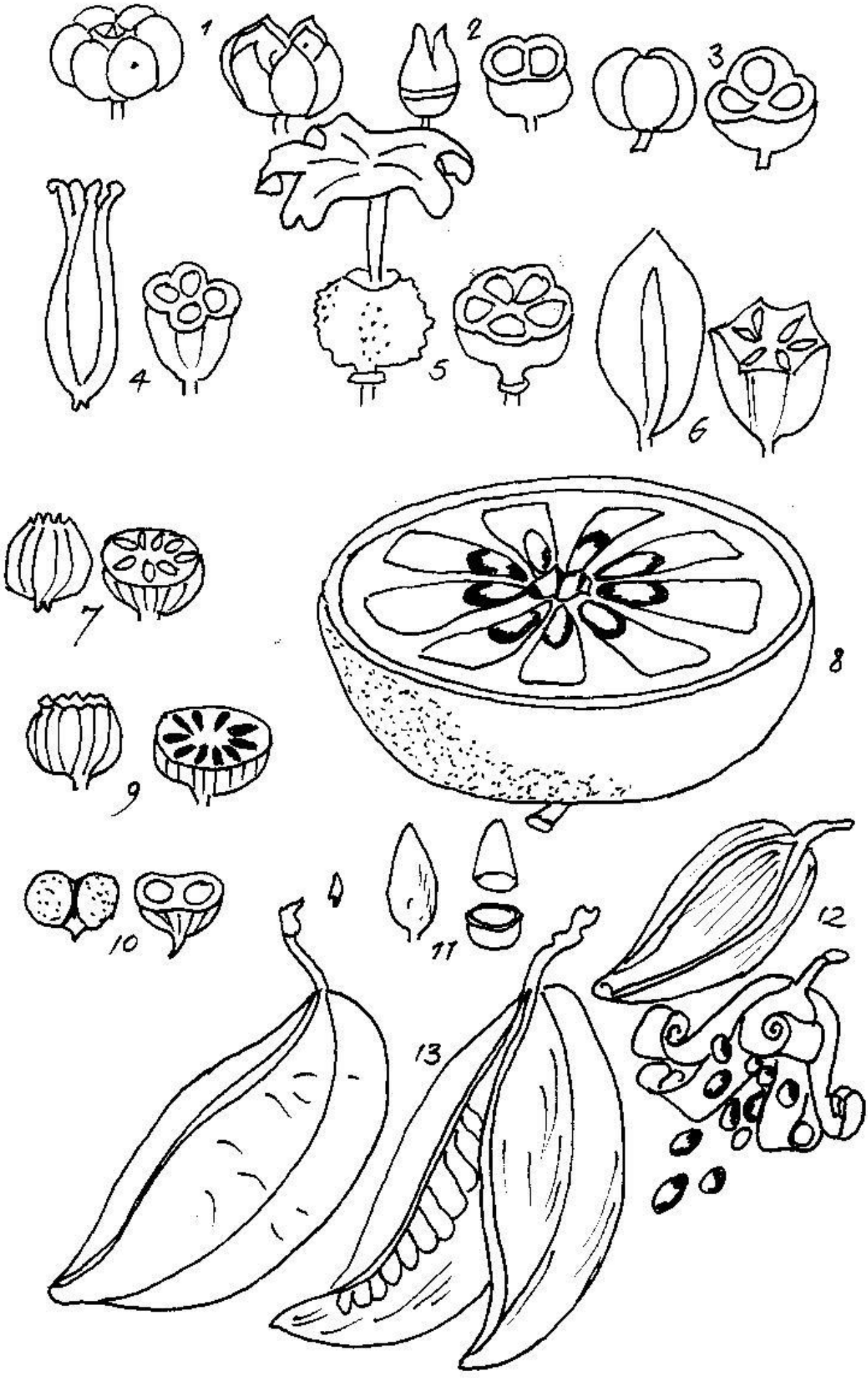
Botanical Illustration means making accurate lifelike drawings of plants.
Illustrations are still used in many books instead of photos because an illustration can show what can be seen with the naked eye (like the correct number of petals and stamens in a flower) as well as what we cannot easily see (like the root structure, or different stages of development).

Botanical illustration has been practiced for centuries, even the Romans did it, and by the Medieval period we find some wonderful, lifelike pictures of plants in illuminated manuscripts. It began because people used the plants for medicine and needed to recognise the correct plant. This art form really came into its own when people started exploring and wanted to record details of plants that would not survive a long voyage home.

Many people still enjoy botanical illustration today because it allows us to study a plant in detail whilst exercising our artistic abilities. It's great for developing concentration too because most botanical
illustrations are very detailed and take quite a long time.

We're going to practice our botanical illustration skills by making a lifelike drawing of a flower with stem and leaves.

1. **STUDY**: Choose a flower and look at it closely. Is it easy to see how the petals join the base of the flower or what shape the stem is? Are any of the parts more than one colour? Keep these details in mind as you make your drawing.
2. **PRACTICE**: Make a rough sketch of your plant at life size and at the angle at which you want to draw it. This is a quick practice to help you get the size and shape right and should only take a minute or two to do. If you are lucky you might even be able to trace roughly round your plant. This just gives you something to refer to if you get confused later on.
3. **SKETCH**: On a fresh sheet of paper, make a very light sketch of your plant at life size to get the flower, leaves and stem in exactly the right position. Don't worry about detail yet.
4. **DETAILS**: When you think the sketch is right, you can start drawing in the detail of your plant. Make sure you get all the petals that you can see in the flower, and show if they bend or curl at all. Look at the shape of the stem, is it round or square? Does it have hairs or lumps that you can add to your drawing? (Keep your pencil sharp for fine details!) Are the leaves smooth or frilly, and are there veins or any damaged parts that you want to record. Rub out lines that are no longer needed as you go.
5. **COLOUR**: Once you have a pencil drawing that looks just like the plant you are looking at, you can decide whether to colour it or not. Coloured pencils work really well for this, and paint is fine but you will need to use very delicate layers of paint to get all the detail. Colour can help you show details that your pencil can't easily record, like shiny areas or different colours in the same leaf.
6. **EXTRAS**: If you finish early, you could do a larger than life or close up view of one part of the plant, a leaf or bud might be good.
7. Don't forget to **sign your work**!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Activity 1 Make a magnifier (lens)

- A microscope works by bending light.
  - Have you ever noticed how things appear to be magnified when you look at them through a glass of water or juice?
  - Try using the dropper to drop a big drop of water into the centre of the plastic dish. Try to keep the droplet together so that it has a curved surface-not spread out
  - Now lift it carefully and look at some printed newspaper through it-does it look bigger?
  - The light has been bent by the curve on the drop of water. You have made your own magnifier!

This is how a microscope bends light to magnify things. This is how a microscope bends light to magnify things. This is how a microscope bends light to magnify things. This is how a microscope bends light to magnify things. This is how a microscope bends light to magnify things. This is how a microscope bends light to

A Vase of Flowers – Simone Hardine

On loan from the Derek Williams Trust

Helen's Pot – Cedric Morris

Shell illustrations by J. C. Melvill

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