Name of Ellie Story:	Ellie and the Forensic Ecology Mystery
Target Year Groups:	Years 4, 5 & 6
Length of Story:	1710 words, 21 pages
Key Themes:	• Soil colour and texture comparison (chalk vs. clay/sand) • pH testing with universal paper • Microscope observation of soil texture and plant fragments • Dichotomous key and herbarium-like references for plant ID • Pollen analysis to identify insect-pollinated species • Field signs: disturbed soil, scratch marks, displaced plants, corer for soil layers
Story Outline:	Ellie, helps solve the mystery of her dad's missing car keys after their dog Rusty buries them. With help from their neighbour, Dr. Simpson — a forensic ecologist — Ellie learns how soil, plant fragments, and pollen can act as forensic evidence to locate where Rusty has been digging.

National Curriculum Science Themes Covered:

Plants – Years 1 - 3

- Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.
- Observe and describe how seeds and bulbs grow into mature plants (plant reproduction and growth).
- Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. discovering how seeds are formed by observing the different stages of plant life cycles over a period of time; looking for patterns in the structure of fruits that relate to how the seeds are dispersed.
- Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves, and flowers.

Rocks – Year 3

- Recognise that soils are made from rocks and organic matter. They can raise and answer questions about the way soils are formed.
- Pupils could explore different soils and identify similarities and differences between them.

Living things and their habitats - Years 4 - 6

- Identify and name a variety of plants and animals in their habitats, including micro habitats.
- Recognise that living things can be grouped in a variety of ways.
- Explore and use classification keys to help group, identify, and name a variety of living things in their local and wider environment.
- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants, and animals.

• Give reasons for classifying plants and animals based on specific characteristics. • Describe the life process of reproduction in some plants.
Specific Objectives Covered (Statutory and Non-Statutory):
• Work scientifically, reporting and presenting findings from enquiries, including conclusions, causal relationships, and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations. • Use relevant scientific language and illustrations to discuss, communicate, and justify their scientific ideas and should talk about how scientific ideas have developed over time. • Identifying scientific evidence that has been used to support or refute ideas or arguments. • Use their science experiences to explore ideas and raise different kinds of questions about what they observe and find things out using secondary sources of information (weblinks, books, museum visits, meet a real scientist etc.). • Draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out. • Develop understanding of the nature, processes, and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them. • Equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future. • Pupils should read, spell, and pronounce scientific vocabulary correctly – scientific vocabulary in book includes Forensic Ecologist, evidence, pollen, Forensic Soil Scientist, acid, alkali, acidic, alkaline, texture, microscope, magnify, sedimentary rock, investigation, Forensic Botanist, herbarium, dichotomous key, life cycle, Forensic Palynologist, pollination, leaf, petal, receptacle, stigma, style, stamen, ovary, anther, filament, aerodynamic and habitat.

Linked ABPI Resources:		
Ellie and the Stone Age Discovery	**Format:**	Online; Interactive
	Length:	15 – 20 minutes
	Themes and Objectives Covered:	

	• Living Things and their Habitats (Year 2) • History (Key Stage 2) • Properties and Changes of Materials (Year 5) • Evolution and Inheritance (Year 6)	
Ellie and the Unusual Creature	**Format:**	Online; Interactive
	Length:	15 – 20 minutes
	Themes and Objectives Covered:	
	• Animals, including Humans (Year 1) • Animals, including Humans (Year 2) • Living Things and their Habitats (Year 2) • Living Things and their Habitats (Year 4) • Living Things and their Habitats (Year 5) • Living Things and their Habitats (Year 6)	

Other Complementing Resources:

BEFORE CARRYING OUT ANY SUGGESTED EXPERIMENT, ALL TECAHERS MUST TRY THE EXPERIMENT FOR THEMSELVES FIRST AND CONDUCT A FULL HEALTH & SAFETY RISK ASSESSMENT, ENSURING THE PROPOSED EXPERIMENT MEETS THE REQUIREMENTS OF YOUR INSTITUTION AND IS SUITABLE FOR YOUR PUPILS.

Pages 4 – 6: Working as a Forensic Soil Scientist.

Ellie's first role in the story, to help find Dad's buried keys is as a Forensic Soil Scientist. She must find out what soil type is on Rusty's paws using colour, PH, and texture. Is it from the front or back garden? Click on the links below to find out more about the role of a Forensic Soil Scientist.

Would you like to have a go at being a Forensic Soil Scientist? Can you use the colour of soil to identify what soil type is on Rusty's paws? Go to the activity on P. to find out more.

1. Find out how important soil is – it's not just used to solve crimes!
   https://youtu.be/OiLITHMVcRw?si=RSzDbxAwKBidDjcm

2. Find out more about the role of Forensic Soil Scientists in solving criminal cases.
   https://youtu.be/6wigfuvRPBc?si=4cNHP11flNNR4YsC

3. Find out how soil scientists use the Munsell colour chart to use colour to identify soil type.
   https://youtu.be/N6doCSP8T7I?si=OdtTav6YidS3Zlem

4. Why not have a go at testing the pH of some soils using universal pH papers, just like Ellie. Watch this video to see how!
   https://youtu.be/xIz2YPBXuZU?si=gPjqUJcEyxh6cOf3

5. What is the soil type where you live? Forensic geologists use this map to identify the locations for particular soils.
   LandIS - Land Information System - Soilscapes soil types viewer

6. Try this fun activity, using a red cabbage to find out whether different chemicals in your kitchen are acids or alkalis.
   Kitchen Science: Cabbage Chemistry | Birmingham Museums

7. Why not use this "jar test" to work out how much clay, silt and sand is in your soil. Maybe, compare soils from different areas? Could you use this to solve a crime?
   https://youtu.be/PvN_oWoechg?si=4UKxT5eQVbdMBIYF
   How To Build Healthy Soil for Your Best-Ever Veggies - Milkwood (scroll down this document to read about the jar test and how to work out what soil type you have).

8. Use this dichotomous key to work out what type of soil you have.
   Hand-Texturing-Leaflet_final.pdf

Page 7 – Finding out more about soils created by glaciers and different rock types including sedimentary rock.

In this part of the story, Ellie finds out how the soil was formed in her front and back garden. Click on the links to find out more.

1. This is a great video which uses chocolate to demonstrate how glaciers move rocks and eroded material.
   https://youtu.be/wK-SQD3fhrI?si=lYD84QSb-inJbEBW

2. Sand, silt and clay carried by glaciers is called "Glacial Till". Watch this video to get an idea of what the soil looks like in Ellie's garden. I wonder if there are any erratic's (large rocks carried by the glacier, which don't match the surrounding bedrock)?
   https://youtu.be/KuXrpE-E7ig?si=jsJXkl5sK1b1S1lM

3. This video shows how the three different rock forms, sedimentary, metamorphic, and igneous rocks are created.
   https://youtu.be/Vp_S3BDiR-I?si=liRTkLQy5Qo44n7L

4. Find out more about the coccoliths which make up chalk rock formations by watching this video and clicking on the article below.
   https://youtu.be/EMNuYOEBOWI?si=ehGX4CfzVaXUtKe0
   DISCOVERING FOSSILS | What is chalk and how does it form?

5. Try some of these fun activities to find out more about the formation of different rock types.
   investigating_rocks_activities.pdf
   | Resource Collection

Page 9 & 10: Find out more about working as a Forensic Botanist and Classification of plants.

In this part of the story Ellie has a go at being a Forensic Botanist, to try and identify the plant fragments in the soil from Rusty's collar and paws. She uses a dichotomous key, to help her identify the plants.

1. Watch this video to find out about all the different studies a Forensic Botanist might do, to link a suspect with a crime scene.
   (1) Video | Facebook

2. Find out how we can classify different plants!
   https://youtu.be/cgVlrtGnG6s?si=cSBTKfN5gSqL2V4G

3. Find out how to create a dichotomous key for monsters!
   https://youtu.be/2f_jBMRluF4?si=4aEqXbFc94kK9vvH

4. Find out about different habitats where plants live.
   https://youtu.be/PyO8XbFrde4?si=IUO5moODUW5hYf4s

5. Find out more about the life cycle of a plant.
   https://youtu.be/7a0u5jMYviM?si=MPlsuYPDzt87ASLW

6. Use this map to find out where you find different species of plant in the UK. Try typing in "Meadow Saxifrage." Does it grow near you? Forensic botanists use this map to identify locations where particular plants grow.
   BSBI maps

Page 11-14: Finding out more about working as a Forensic Palynologist and how pollen can be used to solve crimes.

In this part of the story Ellie works as a Forensic Palynologist. She helps Dr. Simpson dissect and label the parts of a plant, learns about plant reproduction and pollination and tries to identify pollen in the different samples of soil taken from Rusty and the gardens.

1. Why not have a go at preparing your sample and looking down a microscope with this interactive tool
   Virtual Labs (nmsu.edu)

2. What does pollen look like under the microscope?
   https://youtu.be/lsx8GKbMGoo?si=ffKdjbYRRPuq5npl
3. Find out more about pollination.
   https://youtu.be/qWc8X6YeTv8?si=HRwAvcoGSNW23NLR
   https://youtu.be/vaM3buQ--kM?si=tKRS_lQ3oYZ_OWTt
   https://youtu.be/REPzg_ty9YI?si=OZ7g3Y3U6oAripUN

4. Learn about some incredible methods of seed dispersal.
   https://youtu.be/eHQXBCJhuZ0?si=0Ii6X_26DsSPQyIH

Laboratory tests - Become a Forensic Soil Scientist just like Ellie!

Just like Ellie, your class can become Forensic Soil Scientists! They will test unknown samples of soil taken from the front and back garden and compare this with soil taken from Rusty's paws. They will compare the samples to known reference samples of clay, peat, sand, and chalk and try and work out which garden Dad's keys are buried in.

Decide whether you will use the same results (i.e. soils) as in the story, or a different combination.

Materials/Equipment:

Divide the children into groups.

You will need –

- **Pen**
- **Petri dishes**
- **Reference soils (1 set per group)** in labelled petri dishes e.g. chalk, clay, peat, and sand
- Use the reference soils (1 set per group) to create **test samples** in petri dishes labelled: back garden (e.g. clay/sand), front garden (chalk) and Rusty's paws (clay/sand)
- Universal pH paper (3 papers per group)
- Beakers (fill with about 2cm depth of water using water in a jug), you will need three beakers per group)
- Spoons (1 per group)
- Handheld lenses or microscopes (1 or more per group)
- 1 x "Soil Analysis Report" sheet per group

Testing the soil: Working like a Forensic Soil Scientist.

Colour

1. Get the children to write their names and the date on their "Soil Analysis Report."

2. Take the petri dishes with the soil from the front and back garden, compare it to the reference samples. Which colour is the best match? Can they exclude certain soils because of their colour?

3. Record the results on the "Soil Analysis Report."

pH

1. Ask the children to add two teaspoons of soil, to the water in the beaker and stir.

2. Get them to dip the universal pH paper into the beaker and hold it for 30 seconds.

3. Remove the paper and compare the colour of the paper to the pH chart on the "Soil Analysis Report." Determine the pH of the soil from the front and back garden.

4. Record the results on the "Soil Analysis Report."

Texture

1. Use a hand lens or microscope to look at the texture of the soil. Compare it to the reference soils. Is it lumpy? Gritty? Does it contain lots of roots? Use the table on the "Soil Analysis Report" to identify which type of soil it is.

2. Record the results on the "Soil Analysis Report." What type of soil is it in the back garden? Front garden? Repeat the tests with the soil from Rusty's paws.

3. What is your conclusion? What is the soil type in the front garden? Back garden? Rusty's paws? Are Dad's keys buried in the front or back garden?

Become a Forensic Botanist just like Ellie!

Just like Ellie, your class can become Forensic Botanists! They will try to identify unknown plant fragments in soil taken from Rusty's paws. They know from testing the soil in the previous activity which garden, Dad's keys are buried in. They now need to identify the plants in the sample to find out exactly where the keys are buried. You could bury some keys in a location with these plants on the school field. If the children have correctly identified the plants, they will find the keys!

Decide whether you will use the same results as Ellie in the story, or if you use fragments of different plants.

Materials/Equipment:

Divide the children into groups.

You will need –

- Petri dishes labelled with a question mark (1 per group). Fill each petri dish with "soil from Rusty's paws" (use reference soil from above activity) and fragments from two different plants – this could be moss and dandelion leaves as in the story, or something else. Tear up the leaf and use a little bit of moss. This makes the sample more realistic to that seen in a real case.
- Forceps (2 per group)
- Handheld lenses or microscopes (1 or more per group)
- 1 x "Dichotomous Key"

Plant identification: Working like a Forensic Botanist.

1. Ask the children to use the dichotomous key to help them identify the unknown plants. They can use the microscopes and handheld lenses to observe the distinctive features of the plants. Do they have a root? Stem? Flowers? What shape are the leaves? Do they have hairs?

2. What plants have they identified? What kind of habitat would you find these plants growing in? Could they find a location on their school field with this combination of plants?