

Ladbroke Church Science Resources for Schools

Lesson and Activities Key Stage 2

Topic: ROCKS	
<p>Connection to KS2 syllabus:</p> <p>A. Rocks <i>Pupils should be taught to compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</i></p> <p><i>Linked with work in geography, pupils should explore different kinds of rocks [and soils], including those in the local environment.</i></p> <p>Pupils will work scientifically by: observing rocks, including those used in buildings and gravestones, and exploring how and why they might have changed over time; using a hand lens to help them to identify and classify rocks according to whether they have grains or crystals, and whether they have fossils in them.</p> <p>B. Working scientifically</p> <ul style="list-style-type: none"> making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment gathering, recording, classifying and presenting data in a variety of ways to help in answering questions reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions. 	<p>Learning Objective</p> <p>Lesson 1a</p> <ul style="list-style-type: none"> To be able to identify and classify different rock samples <p>Lesson 1b</p> <ul style="list-style-type: none"> To be able to identify local and other rock types, which will be seen on the visit <p>Lesson 2</p> <ul style="list-style-type: none"> To collect and record evidence and to draw conclusions about different rocks used locally for building and other uses To recognise signs of erosion <p>Lesson 3</p> <ul style="list-style-type: none"> To recount findings and draw conclusions To be able to ask and respond to questions about why particular rocks were used for different purposes at different times. <p>Pupils undertaking the difficult differentiated activities will be able to:</p> <ul style="list-style-type: none"> set up simple practical enquiries, comparative and fair tests use straightforward scientific evidence to answer questions or to support their findings.
Key words: Geology, rocks, data, survey	
To the teacher: Visiting Ladbroke Church (or your local church) will give your pupils an opportunity to use scientific methods beyond the classroom. They will gather evidence and identify the rock types used to build the church and a variety of other rocks used for other purposes in the church and churchyard together with changes over time. They will record their findings and be able to present output beyond the school.	
Expected Prior Knowledge: The 3 types of rock (there is a recap of this in the pre-visit lesson). If the fossil option used, what fossils are and how they form (this is not included in the pre-visit lesson).	

Preparation to visit (1 -2 lessons)

- Recap about rock types- sedimentary, metamorphic & igneous
- Classification of rock samples using simple tests
- Purpose of visit
- Introduction to rocks found in Warwickshire and the main ones to be seen during visit

Visit (1.5 hours on site – full day)

- Conduct a rock survey, collecting evidence of the local bedrock and other rocks at the location
- Investigate erosion at the location
- Optionally investigate fossils and or lichens at the location

Post visit (1 lesson and optional project work)

- recount findings
- draw conclusions and reinforce learning
- Use knowledge of rocks, observations and reasoning to determine (a) why particular rocks were selected for different tasks and (b) changes with time
- share learning with others
- give feedback to the host church

Curriculum connections:

Geography: Develop knowledge about own locality by first hand observation

History: transport/technology available in different periods

Maths: processing & presenting data

Art: draw pictures & decorations for displays, make models of volcano, ammonites

English: extended writing

General note to church hosting visits

Unless those involved have studied the rocks in the church and churchyard we suggest you invite someone who has led similar activities eg at Ladbroke Church to provide some pre-visit training. You can then decide if church staff/volunteers will be involved in the educational side of the visit or just act as venue hosts.

If you do get involved in the educational aspects, do **not** give all the answers! The children will benefit most by discovering for themselves and in conversation and discussion

Information the church should provide and things to discuss when setting up a church visit

Arrival and departure time

Parking

Number of pupils & number of accompanying adults

Special needs

Toilets

Resources that the church will provide – on site the following will be needed: large samples of rock types, resource sheets for completion, clipboards, pens/pencils, rulers; also optionally: fossil samples, hand lenses.

Will there be refreshments? If so what?

Responsibilities

Risk assessment

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As numerous scientists have said before me, I have been building on the shoulders of giants. I am grateful for ideas and resources from many organisations and individuals including Hamilton Trust (an educational charity to help parents & teachers www.hamilton-trust.org.uk)

The Geological Society

Warwickshire Geological Conservation Group

Warwickshire Wildlife Trust

Harbury Heritage Centre

Great Tew Quarry

Boden & Ward Stonemasons

Davies Memorials

Philip Powell and Nina Morgan, authors of The Geology of Oxford Gravestones

Jon Radley, Curator of Natural Sciences, Heritage and Culture Warwickshire (Warwickshire County Council)

The Natural History Museum

Ladbroke villagers and local farmers

Please notify ladbrokechurch89@btinternet.com of any omissions to this list so that it may corrected.



Lesson 1a: Preparation for visit: Introduction/recap about rocks

Suggested activities

1. Group activity: What is a rock?

Watch this clip from BBC bitesize: <https://www.bbc.co.uk/bitesize/topics/z9bbkqt/articles/zsgkdmn>

2. Small group activity (optional): Chocolate Rocks

Make sedimentary, metamorphic and igneous rock from chocolate.

Resource 1 explains what you will need and how to do this.



3. Small group Activity: What sort of rock is this?

Classify rock samples using observation & tests – bubbles in water, scratch with a coin, acid test. Conclude with class discussion of what each type of rock is and might be used for.

Resource 2 explains and provides a worksheet and the answers for the Ladbroke set of samples.. Ladbroke Church can provide

- a set of large samples to look at
- numerous sets of small samples for pupils to examine
- loupes (hand lenses)
- droppers (for the acid test).

You will also need

- rulers
- beakers with water (to immerse samples in) – these can be cut from smooth clear plastic drinks bottles



Differentiated activities

Easy: Investigate rocks with good visual/tactile differences eg rock with fossil, new vs old ironstone, polished vs unpolished granite

Draw / colour a picture or record what you found to a mobile phone.

Difficult: Devise a fair test

Devise a fair test for permeability (water absorption) or resistance to erosion (scratchability or robustness to shaking with hard objects)

Lesson 1b Preparation for Visit: Local Rocks

Suggested activities

1. Group activity: Purpose of visit

Teacher role play: "Our class has been asked to help [church contact] investigate rocks at [Ladbroke] Church as they want to have a special exhibition about rocks there/have an article in the church magazine/create a short video for their website/ tell visitors about the rocks at the church."

Note:

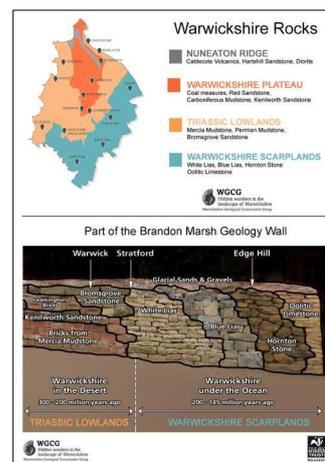
1. If possible use the regular church contact eg Rev X may take some assemblies or someone from the Open the Book Team may visit on a regular basis.
2. Agree in advance what output will be shared by the host church, if nothing specific say they want to know to be able to tell visitors

2. Group activity: Warwickshire rocks

Teacher role play "Let's do some preparation. What rocks are we likely to find? My friend who is a geologist told me about the Geology Wall at Brandon Marsh near Coventry – it's built of the different bedrocks you find in Warwickshire. From the map can we work out which ones are near [Ladbroke] church?"

Resource 3a (the map) and **Resource 3b** (annotated photo of part of the wall) shows the bedrock in this part of the county. These can be used as slides or printed out as hand-outs

"Near Ladbroke I've been told it is the Hornton ironstone, blue lias and white lias. The oolitic limestone is a bit further south. All these are sedimentary rocks formed when this area was under the sea 200-150 million years ago!"



3. Small group activity: Rock Stars Game

Gain confidence in identifying some of the different rocks to be seen during the visit. *Note ensure the bedrock and types of rock to be seen at the visit location are included in the sample sets.*

Resource 4 provides instructions for playing the game and a star and labels for printing out.

Ladbroke church can provide at least 8 sets of these rock samples: *ironstone, blue lias, white lias, sandstone, granite, slate, pebble.*



Lesson 2: At the church: Use of different rocks

Introduction to the church by the host, including putting the building and gravestones into a time-frame the children can understand, you may prefer to do this with each group as they start an activity

- **When the current building was started, what tools and facilities & transport there would have been in those times.**

Eg the oldest part of this church was built 700 years ago, there were no lorries so everything would have been brought in on carts pulled along by oxen.

There was no electricity so no power tools, everything would have been done by hand including cutting the stone in the quarry, making it into the right sized pieces [can you point out adze marks?] and lifting it up on ropes around wooden pulleys.

- **How long ago major additions and repairs were done**

Eg the oldest part is this end of the building, which is about 700 years old, then they built this part, and after that they made it higher. Over the years there have been lots of repairs – so you will find new stones among the old ones, sometimes they match well, other times they don't. The most recent repairs were doneyou can see some stones still look very new like these ones here.

- **The approximate age of the oldest and newest gravestones, including the areas where these are.**

Eg For many hundreds of years when people died in this village they were buried here in the churchyard. Each grave was probably marked with a wooden cross but this would disintegrate after 50 or 100 years. About 400 years ago they started to use stones to mark the graves.

The oldest stones are usually to the south of the building, we think the oldest here is from 1667 (more than 350 years ago) and the newest stones are mainly in the area near the field.

- **Fossils (if included)** The stone quarried locally has fossils in it. About 200-150 million years ago when these creatures were alive this area was underwater so they are fossils of things that lived in the sea or lakes. We have some large samples on display here and if you look very carefully you'll find some small fossils in the rock used to build the church.

Circus of activities, working in pairs or threes. All pupils to do activities A and B, then one or more of the others depending on time available for the visit.

A. What type of rock is the church made from?

Using **Resource 5** (diagram & survey sheet) go round the church & churchyard and work out the different types of rock used. Fill in the table. Some areas may have more than 1 type of rock. Outside, be careful that you are looking at the rock itself not at lichen (micro plants) growing on it.



B. Erosion

Erosion is where rocks wear away or break up, it can be caused by weather, water, animals or other reasons. Using **Resource 6** (survey sheet) find signs of erosion or other features, write where they are, the type of rock if you know and what you think might have caused it.

C. What rocks have been used for gravestones?

Find stones made of different looking rock and fill in the survey sheet (**Resource 7 and loupes if available**). Old gravestones stones usually have lichens (micro plants) growing on them and you can't see much of the actual stone. Write that down, don't damage the lichen it is a lot older than you – some grow less than 1mm a year.



D Local Fossils

D1 First look at the large samples of fossils then using **Resource 8** (pictures) see if you can find and identify ones in the rock used to build the church itself.

D2 Draw one of the fossils on **Resource 9**. it can be one you found in the building or one of the large samples on display. Measure how big the fossil is across and write this on your drawing sheet.



ADDITIONAL / DIFFERENTIATED ACTIVITIES IN THE CHURCHYARD

E. Study the lichens (additional)

The colour of rocks is often hidden by lichens. They grow on most surfaces outside, not just gravestones but also walls, pavements, trees and bushes.

Lichens are living things (a bit like plants). There are lots of different types but each one is quite fussy – so you find different ones in different places – wood vs stone, limestone vs granite, in the sun or in the shade, where it's wetter or drier etc.

Lichens on rocks grow **very** slowly, typically 1-2mm a year, so old gravestones and old buildings are a good place to see them and it is important we don't damage them.

Using **Resource 10** (worksheet) and a **loupe** (hand lens) can you find these, don't just look on the gravestones look on walls and trees too. Use the loupe to see them close up. Write or draw what they look like close up and measure the distance (in cm) across the biggest one.



F. Hunt the symbol (easy)

Using **Resource 11** (pictures), can you find these symbols on the stones. Do you have a favourite?

G. Observation (easy)

Sit, stand or slowly walk around and create an "I can see" or "I can hear list", if you are not good at writing ask someone to write it for you or record it on a mobile phone. What did you like best? Why?

H. Test a hypothesis (difficult)

Choose a hypothesis from the list (or create your own) and create a fair test to see if it is true. What do you think is the reason?

- There are more men than women with gravestones here
- Most women married older men
- Most women died younger than their husband
- Polished (shiny) stones have more lichens than unpolished
- The [average] age of people when they died is increasing
- The [average] age of people when they died is less than in [compare results with another school studying a different graveyard]

Lesson 3: Post Visit: Using information gathered

Suggested activities

Gather everyone together in pairs or 3s so they can see their survey sheets.

“Welcome back. I think between us we have some really interesting results from the surveys for [church contact] Let’s share our findings.

Do you remember from the Geology Wall at Brandon Marsh what the local bedrocks are?” (write this up on the whiteboard)

A. WHAT TYPE OF ROCK IS THE CHURCH MADE FROM?

Let’s look first at the oldest parts of the church (1-2)

If the pupils are not sure what it is, discuss and note the features of the rock they observed and come to a conclusion (old churches and other very old buildings or structures are likely to be Grade 1 or 2 listed and information will be in the listing, see <https://historicengland.org.uk/listing/the-list/>)

Is that the local rock? Why would such an old part of the building be made of local rock?

Before lorries and trains it was hard move rocks around the country.

Encourage them to look out over the next week for old buildings nearby of the same stone and report back.

What other rocks did you see and what were they used for? (see answers in Resource 5) eg sandstone columns & around windows, slate roof tiles, granite & marble on monuments, marble step (TBC), gravel paths. Discuss why they used different types:

- sandstone columns and around windows and doorways - easy to cut and carve in large pieces
- slate roof tiles - can be made thin (not too heavy for the roof) & doesn’t absorb water,
- marble / granite used for monuments - people that buy them are rich and want to impress, not as old as the building, so used at a time when easier to transport over long distances.
- pebbles on kerb monument (and gravel path) – drains water away quickly, don’t have to cut it like grass, cheaper than solid stone and easier to transport (in bags)

If pupils are not sure what any rocks are, did others find it and know what it was? If not say that from the description and position the people at the church can ask a geologist to identify it.

If man-made rocks eg bricks, clay tiles, concrete slabs are mentioned remind pupils that these are not true rocks and ask why man-made rocks might have been used – eg cheaper, boiler house is at the back so doesn’t need to look nice.

If metals are listed eg brass plaques, lead roof, explain these aren’t rocks but do come from them, the rock is melted so the metal separates out.

B. EROSION

Did you find these?

What do you think caused it? (see answer table in Resource 6)

For erosion where was it and what sort of rock was it, think back to the hardness test – sedimentary rocks like sandstone and limestone are much softer and more likely to get worn down.

C. GRAVESTONES

What type of rocks were used for gravestones?

If not sure describe and ask others/come to a conclusion.

Note: *Ladbroke Gravestone Geology booklet has more information.*

What is the oldest date for that type of stone?

Ask one group and then ask if anyone else has an earlier date.

Then put them in date order eg 1717 limestone/ironstone, 1876 pink granite, 1950 black granite

So, in the graveyard, where the ordinary people had gravestones the older ones used local rock, rocks from further started to be used more recently.

D. WHAT FOSSILS DID YOU SEE?

Ask them to hold up their pictures. The fossils in this area are of sea creatures because this area was under the sea 200 million years ago. Ask if they remember what they are fossils of. At Ladbroke church/ Ladbroke samples the pictures are likely to be:

- ammonites
- belemnites
- brachiopods
- burrows
- shell fragments
- crinoid

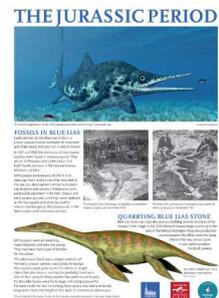
Some of you have drawn ammonites or belemnites. Only the hard shell of the ammonite or hard centre of the belemnites is fossilised. If you drew an ammonite how big was it across (and if the fossil is only of part of a shell how big would a whole one be)?

Go round and write up all the ammonite sizes on the whiteboard. Circle the smallest and largest. Yes ammonites could be very small or very large but they weren't the biggest fossils found around here.

About 100 years ago when they were digging rock from a quarry between Bishops Itchington and Harbury about [X] miles away they found plesiosaur and ichthyosaur fossils just like the fossils that Mary Anning had found at Lyme Regis 100 years earlier.

The Harbury ones went to the Natural History museum in London.

Show the JURASSIC display board (borrow A1 size from Ladbroke Church) with photos of the fossils found in the quarry and what it's thought the animals looked like alive.



E. LICHENS

Go round and find out what they found and the largest of each type, writing up the sizes on the whiteboard. Ask "If we assume they all grew at 2mm/year how old was the oldest one?"

Note: sizes should have been recorded in cm so multiply by 10 then divide by 2 (or work out that 2mm goes into 1cm 5 times and multiply size in cm by 5)

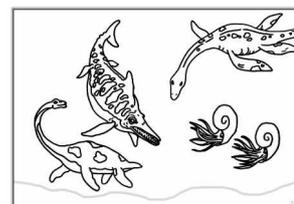
ADDITIONAL SUGGESTIONS post visit (optional)

Write letters

- **Write a letter to [church contact] about the information you learnt** during your surveys. The church may be able to get the best +/- art work published in their local village magazine.
- **Write a thank you letter** to the church saying what you liked best about the visit

Use Colouring sheet Resource 12

Colour in or use it to inspire a drawing of a Jurassic scene.



Make a salt dough ammonite

<https://www.nhm.ac.uk/discover/how-to-make-a-salt-dough-ammonite-fossil.html>

These could be put on display or taken home or buried in sand for younger children to find.

Create a display / exhibition

Make a display of artwork, photos, things made and explanations.

The church may agree to put this up for an afternoon/day/weekend so children can bring their families to see it and show them what they found during their visit.