

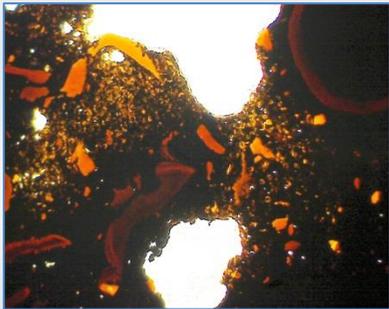


Things to look at with microscopes: Rocks and Minerals

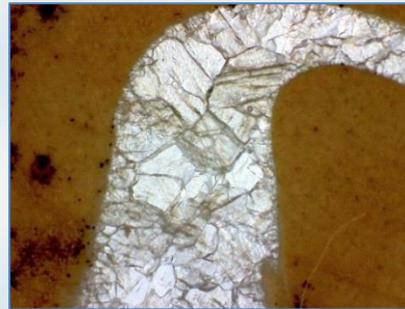
Britain has a very varied geology and interesting stones and pieces of rocks can be found around our coasts and in the countryside. Although they can show interesting features when seen under a simple hand lens, much more detail is visible when samples are viewed using a microscope. With some simple preparation techniques we can explore the structures in many types of rocks.

The next steps.

By refining the polishing technique it is possible to make a thin section of an interesting fossil remnant in a soft rock. When one surface of a small fragment of a rock has been polished flat it is glued to a glass slide. Wilko Glass Glue™ works well. Let it cure properly, then holding the slide use the grinding plates to polish the exposed rock surface. Choose the fragment carefully so it is quite thin to start with. This needs time and care to try and make sure the surface does not become curved or wedge shaped. If an area with a fossil was selected, eventually it should be possible to see the structures that formed the fossil. This can be made into a permanent slide by coating a cover slip with glass glue and carefully placing it on the polished surface, trying to make sure no air bubbles are left.



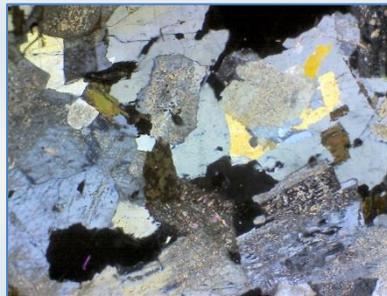
This was a small black pebble from the beach at Robin Hoods Bay, Yorkshire. It was soft and could be polished to a thin section to show structures which suggest it originated from organic material.



This was a piece of limestone from the ground near crags at Dry Sandford Pit in Oxfordshire. There are remnants of fossils in the rock and here they appear to have been replaced by crystals.

Examining thin sections of rocks

Professionally made thin sections of rocks are available in sets from geological suppliers and from sites on the Internet where old slides are sold. A stereo microscope can be modified so a slide is supported above a light source which is transmitted through the slide. A compound microscope will usually have a built-in transmitted light source. A polarising filter on the light source and a small piece of polarising film on one of the eyepieces shows the polarisation colours used to identify minerals.



To learn more about microscopes, find links to useful websites and see great images, visit www.quekett.org

The British Geological Survey provides a lot of information on their website – www.bgs.ac.uk – Discovering Geology. Descriptions of the types of rocks at specific locations helps identify the things you see.

Presented by The Quekett Microscopical Club – Registered Charity No. 232476

The Microscopes



A stereo microscope (left) gives a stereoscopic image; that means we see depth in an image and this is useful for examining a rough piece of rock as the sample can be tilted in different orientations to show the surfaces. The illumination can also be directed to show up specific features.

A simple compound microscope (right) can also be used to examine pieces of rock. It needs a low power objective, x4-x10, and a light source which can shine onto the rock. A small LED light on a flexible arm can direct light onto a sample on the stage of the microscope.



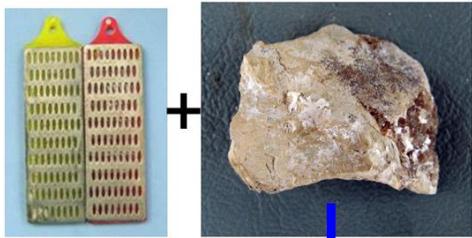
Look for rocks with interesting crystals

This stone was picked up from a path on Lundy Island. The geological information for that part of the island is a granite which can have garnet inclusions. With the microscope purple glassy crystals are clearly visible. Garnets are often used in jewellery so this is an exciting find.

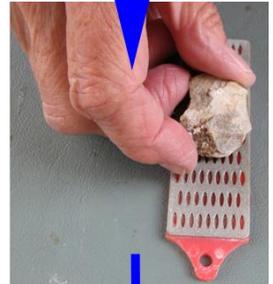


A piece of rock in the debris beneath the crumbly cliffs in Runswick Bay in Yorkshire seemed to show some crystals with a hand lens. With a microscope a mass of fine crystals show a distinctive crystal shape.

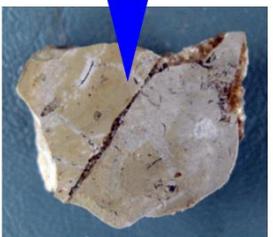




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Simple surface preparation for softer rocks

To see the detail within many rocks it is necessary to have a flat, smooth surface which can be examined using a stereo microscope or a low power compound microscope. There are many locations around our coast, and inland, where there are limestone deposits. This is a softer rock and it often contains fossils. With a microscope we can see the remnants of smaller fossils in a polished surface.

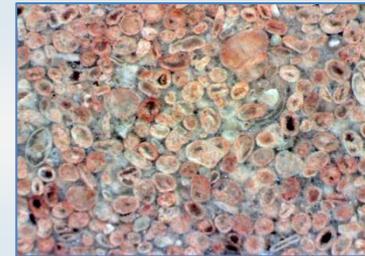
Start by breaking the rock into a small piece about 2cms in diameter. A surface needs to be ground down flat. If the surface is very rough, start by wetting a piece of 120 grade wet-and-dry abrasive paper. This is widely available in DIY shops. Rub the stone on the paper in a circular motion until there is a flat surface across the stone. Finer grade abrasive papers can be used, but a good alternative are small diamond impregnated plates which are used to sharpen knives. Grades 200 and 400 are used then a very fine paper 1200. Examine the surface at intervals whilst doing this to see if interesting features are becoming visible. The surface then needs to be polished— a good approach is to use a small amount of the car paint scratch remover T-cut™. Put a small amount on a small piece of soft firm fabric like felt, or a thick slightly porous paper, and polish the surface using a circular action.

Hint – if the surface polish is not very good when viewed with the microscope, it can often be improved by putting a thin layer of water on the surface.

Examine the freshly polished rock with either a stereo or compound microscope.

Support the piece of rock to examine the flat surface at different magnifications to see both the larger inclusions and detail in small features. Support the rock on a piece of plasticine or Blutac™. Try adjusting the illumination at different angles to see features more clearly.

This is a polished surface of an oolitic limestone from Kirtlington Quarry near Oxford, viewed using a stereo microscope with light reflected from the surface. It shows the way the ooliths (spherical structures) are formed by layers from a central initiation point. There are also fossil remnants in the sample.



Width of image about 5mm



Length about 4mm



< 1mm across

Limestone building stones were quarried from many areas in the country and small stones were often left as spoil heaps. It is usually permitted to take a few small stones to examine. This stone was from an old quarry at St. Albans Head in Dorset.

The Jurassic limestone polished very well and some of the microfossils from the time of the dinosaurs can be seen. Here a gastropod and probably the remnants of foraminifera.



Fossil about 1mm diameter

This is also a limestone, but from Youlgrave in the Peak District dating from Carboniferous times. A small stone was picked up from just below a small outcrop of rock. When polished the remnants of a multi-chambered fossil are clearly visible. This microfossil is probably a foraminifera.

All of these images were taken using a simple eyepiece camera with the stereo microscope shown overleaf. A mobile phone can also photograph through the eyepiece.