

Collecting Fossils

Fact Sheet



Richmond Pliosaur. Image: QM.



Ichtyosaur. Image: QM.

The study of fossils is called palaeontology. Amateur palaeontologists can make just as many exciting discoveries as professionals.

Fossils are a non-renewable resource, but they are abundant and quite easy to find when you know where to go and what to look for. In many cases, if they are not collected they simply weather away and are lost forever.

Fossils are interesting to look at and fun to find. They tell us much about life that occurred before the present day, including past climates, sea-level changes and the course of evolution.

How are fossils formed?

After a plant or animal dies the soft parts usually rot away, leaving behind the hard elements such as shells, bone, teeth and wood. Sometimes these become buried by sediments such as mud or silt at the bottom lakes, creeks or oceans, or by settling volcanic ash. Although appearing solid, bone, shell and wood actually contain tiny cavities.

In the right conditions, ground water carrying dissolved minerals percolates into these holes leaving deposits such as quartz or calcite. The remains are preserved as either the original bone or shell material, or this may dissolve to form moulds or natural casts.

Other types of fossils include traces (e.g. footprints and worm burrows), insects trapped in amber, and mummified animals.

Fossil hunting

Information about fossil sites can be obtained from: geological maps (a useful set are the 1:250 000 Geological Series with explanatory notes, available at most geological libraries or from The Department of Minerals and Energy); fossil societies; museums and universities, and such literature as guidebooks, hobby magazines and scientific papers.

The best places to look for fossils are in sedimentary rocks. These are rocks formed by the accumulation and binding of rock particles or sediments, such as sand, mud or bits of shells.



Triassic fern (*Cladophlebis*), Ipswich Coal measures

The main sedimentary rocks containing fossils are shale, mudstone, siltstone, sandstone and limestone.

Generally, the finer the size of the sedimentary particles or grains the better the preservation of the fossil.

It is even possible to find poorly preserved fossils in slightly metamorphosed rock (i.e. pre-existing sedimentary rocks that have been subjected to extreme heat and pressure). Such rocks include marble (metamorphosed limestone) and slate (metamorphosed shale).

Once in a fossil-bearing area, search out active erosional sites; natural or human-made places where fossils are continually being revealed. Natural exposures include river and creek banks, coastlines, caves and hillsides, while human-made exposures include quarries, road and rail cuttings, mines and other excavations. Most of these sites can be found on topographic maps. Take care in these areas.

Looking for fossils just after heavy rain is fruitful as the rain speeds up the erosional process and exposes them. Three dimensional fossils can sometimes be found in concretions. These are rounded nodules of rock consisting of many layers, usually arranged concentrically around a nucleus (similar to an onion). The nucleus can be anything from a sand grain to a fossil. If you see one, try your luck and crack it open. You may find a fossil.

Collecting in the field

It helps to have the correct equipment, and safety comes first. Protect your eyes against flying rock splinters with safety goggles, and your legs against spear grass and prickly bushes with gaiters. You should also have gloves and a first aid kit.

Field equipment should include:

- Geological hammer
- Chisel
- Wrapping paper – newspaper
- Permanent marker
- Sticky tape
- Boxes
- Strong rucksack
- Notebook and pen
- Maps
- Sieves
- Shovel
- Paint brushes
- Pen Knife
- Hand lens

You will need a current Fossicker's Licence from the Department of Minerals and Energy, or the District Mining Registrar.

Before entering private property you must have written permission of land-owners. For safety reasons, never collect from cliffs or quarry walls – only from fallen blocks and waste tips. Be extremely careful collecting at old mine sites. Watch out for holes and never enter a site without permission. Be aware of the tide and waves if collecting along the coast, and always tell someone where you are going. Remember not to be greedy: leave some for others.

Extracting, labelling and packing fossils

If you are lucky you will find fossils lying loose in the sediment and collecting them will be no problem. However, most fossils are encased in rock, requiring quite a bit of work to free them. Those embedded in water-soluble rock, such as loose chalk or mud, can be released using a series of sieves with different sized meshes. These are stacked, grading from coarse at the top to fine at the bottom. The rock is added to the top and washed. As the running water breaks up the rock, small fossils are collected in the sieves below.

For those encased in hard rock you will need to use a geological hammer, or chisel and hammer. Be careful to angle the chisel away from the fossil to avoid damage. It is better to collect the fossil encased in rock and remove it from the matrix at home rather than attempt this in the field.

Fossils preserved as thin films (such as leaves) are collected by splitting the rock along its bedding planes; the layers formed when sediments were laid down. Sedimentary rocks normally cleave naturally along these planes.

It is extremely important to number each specimen as you collect it, using a permanent marker. Enter this number, along with its locality, date and other important information into a notebook.

Many fossils have been destroyed or damaged in transit so the importance of proper packing cannot be overemphasised. Newspaper is the best, cheapest and most readily available packing material. Avoid cotton wool as it catches on fine or delicate parts of fossils. Seal the newspaper with tape and place the specimens in a box.

Back at home

Finding and collecting fossils is only the beginning. Most need some form of preparation and the state of the fossil will determine the work needed. Sometimes a simple clean is sufficient.

To remove loose dirt, wash in water and detergent and scrub gently with various sized brushes, dental probes and old toothbrushes. If this does not work try using an ultrasonic bath to dislodge dirt. Do not place soft shales in water: they will swell and fall apart. Clean shales with alcohol on a cloth.

For a hard, resistant matrix, large areas of rock can be broken off with a hammer and chisel. For finer work, closer to the fossil, a vibrating-point engraving tool can be used. Sandbags are excellent to support pieces of fossil-bearing rock while preparing them.

If a fossil is embedded in very soft rock it may be extracted by sandblasting using an 'airbrasive machine' if available.

Dilute acids can be used on fossils embedded in some types of limestone. The limestone is dissolved away by acid more quickly than the fossil. This is a dangerous operation and you should contact the Queensland Museum for more information on this, or when dealing with chemically unstable or extremely fragile material requiring expert preparation.

To strengthen and repair fossils, soluble plastic is recommended. It is supplied as solid acrylic beads, to be dissolved in acetone or methanol when used. The liquid can be painted on, the specimen can be soaked, or broken pieces can be stuck back together. The advantage of using this substance is that it can be dissolved and removed later if necessary using acetone. Soluble acrylic beads are available from most art shops.

Our fossil heritage

Many people have an appreciation of living plants and animals, but our geological heritage is often taken for granted. Fossils are an important part of this heritage. They are windows through which scientists can see and understand our past. For this reason there are laws to preserve this fossil wealth.

You can help the Queensland Museum to protect our fossil heritage while still enjoying collecting for yourself by not collecting more specimens than you can safely store. Make known and available to the Museum any unique or scientifically important specimens and their localities so they can be studied.

We are lucky to have these amazing links with the past. Responsible attitudes by collectors – both professional and amateur – will help protect this precious asset. Happy fossil hunting!

Further Information

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Cretaceous crab (*Homolopsis etheridgei*), Central Queensland.