

Geological background

The main rock extracted from Craigleith Quarry was sandstone, but there are also exposures of siltstone, mudstone, oil-shale and shelly limestone. These rocks were laid down as horizontally layered soft sediments during the Carboniferous period over 330 million years ago. At this time, Scotland was just south of the equator and enjoyed a seasonally wet, tropical climate.

The Craigleith Trees

Between 1835 and 1865, several fossils of giant tree (*Pitys withamii*) were discovered within the quarried sandstone. The largest, known as the Craigleith Tree, is now on display in the Royal Botanical Gardens, Edinburgh. To commemorate the discovery of the fossils, on the wall by the doorway to Sainsbury's, Carboniferous tree stems and leaves have been carved. Along the pavement, are planted a row of the primitive tree, Dawn Redwood (*Metasequoia glyptostroboides*) once thought extinct and only known from fossils but found growing in China in 1941.

Earth Movements and Earthquakes

The sediments were subsequently buried under 2000 m of further sediments, and became hardened to rocks. They were later squeezed and folded by dynamic Earth forces so are now gently inclined to the east.

Craigleith Today

Of the once vast exposures of rock at Craigleith Quarry, only one or two preserved areas remain. But their fascinating features provide clues to the geological and historical past of Craigleith. Thanks to Sainsbury's sympathetic development of the site, LaBRIGS designated the face behind the store as a Regionally Important Site in 1999.



How to find Craigleith Quarry

Craigleith Quarry lies approximately 3km west of Edinburgh city centre along the Queensferry Road at its intersection with Craigleith Road and South Groathill Avenue. The quarry has now been infilled and built on, starting in 1993 when Sainsbury's opened their superstore. It has since developed into the Craigleith Retail Park. Some of the upper part of the quarry face remains and reveals evidence of Edinburgh's geological and historical past.

By bus: Craigleith can be reached by Lothian buses from Edinburgh. Currently (2005) routes 24 and 38 go into the retail park and routes 41 and 42 stop nearby, though this may change. Ask for Craigleith Retail Park.

By car: The main entrance into Craigleith Retail Park is off Craigleith Road as you approach traffic lights on the (A90) Queensferry Road. There is ample parking in the Retail Park car park.

The geological trail is located behind Sainsbury's superstore. Visitors should report to the information desk inside the store before and after visiting the trail for safety and security purposes. The trail can be accessed by a footpath which starts at the South end of the store.



Produced by Lothian and Borders RIGS ©2005

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Cover oil painting *Edinburgh from Craigleith Quarry* by John Bell and black & white photograph *Craigleith Quarry* by Thomas Begbie c1850, both courtesy of City Art Centre, Edinburgh.

Coloured lithograph *Craigleith Quarry with Edinburgh beyond* c1854 by William Leighton Leitch courtesy of Edinburgh City Library.

Quarry drawing, courtesy of Royal Society of Edinburgh.

Other photographs from Alan Ross, Lothian and Borders RIGS Group and British Geological Survey collection.

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Craigleith Quarry



Geological Trail



Edinburgh's Historical Building Stone



Regionally Important Geological Site



Lothian and
Borders RIGS
Group

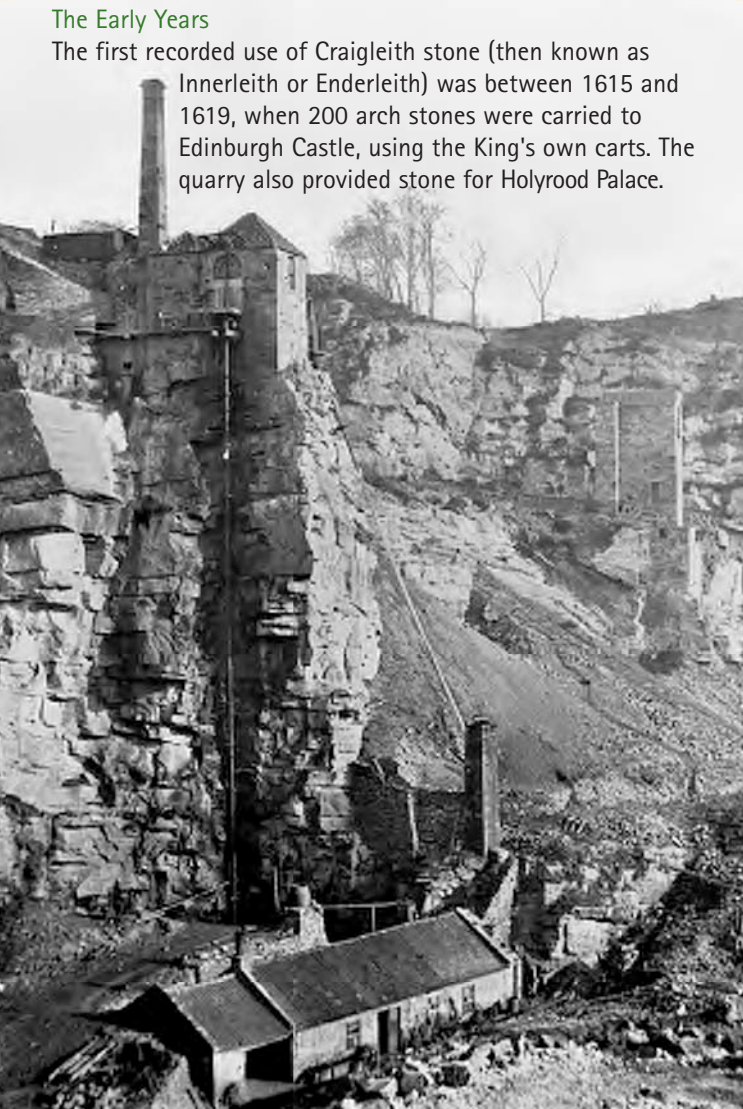


History of Craigleith Quarry

Craigleith Quarry was the largest and best known of Edinburgh's sandstone quarries, with a world-wide reputation for producing building stone of the highest quality. It provided most of the building stone for Edinburgh's New Town, and exported stone to London, Europe and the United States. The quarry was active for over 300 years the final massive hole had faces 110 metres (360 feet) high. Filled with inert waste in the 60 years after quarrying ceased. It has now become the Craigleith Retail Park opened in 1993.

The Early Years

The first recorded use of Craigleith stone (then known as Innerleith or Enderleith) was between 1615 and 1619, when 200 arch stones were carried to Edinburgh Castle, using the King's own carts. The quarry also provided stone for Holyrood Palace.



Building the City

The construction of the Edinburgh New Town in the 18th and 19th centuries saw a massive increase in demand for building stone. Craigleith stone was used for prestigious buildings such as Register House and Charlotte Square. In 1791 huge, 22 feet-long blocks were used for the 6 pillars at the entrance to Robert Adam's University of Edinburgh Old College. Each pillar weighed nine tons and required 16 horses to haul it. In 1823 a massive block weighing 1500 tons, was transported in pieces to Calton Hill to form the architrave of the National Monument.



Improvements to the Quarry

In 1835 an improved shorter route into the city was constructed enabling 60 'horse and carts' to complete five deliveries per day. A railway line was also constructed to carry waste out of the quarry a job which previously had been done by horses.

Dealing with Nature

Flooding was a continual problem during the lifetime of the quarry and water was removed by the use of a 'Horse Gin' water pump powered by a horse which was eventually superseded by a steam powered pump.

Doctors long showed concern over the health hazards of working the silica-rich sandstone. In 1852, one noted that "a Craigleith man was done at 30 and dead at 35". On his recommendation, the quarriers grew beards and moustaches to act as respirators.

RL Stevenson

In Robert Louis Stevenson: *The Collected Shorter Fiction* edited by Peter Stoneley, Robinson Publishing, 1991, is a description of the misadventures of John Nicholson "Christmas Day and frozen...hiding place in Craigleith Quarry."



Leith Docks – The Last of the Stone

The last major project for which Craigleith stone was used was for Leith Docks in 1895. Then, more than 90 men were employed; the work force was down to 40 by 1900 and to 25 in 1905, when the last good quality building stone was produced.

A New Use for the Quarry

During the First World War the deserted quarry was thought remote enough to safely manufacture TNT, previously manufactured at the Lothian Chemical Company.

Last Days of Craigleith Quarry

Quarrying recommenced in 1922, with 12 men employed, but by 1942 all work had stopped. After the Second World War, Craigleith Quarry was gradually filled in. However, in 1995 100 tonnes of loose blocks were removed to make the Chinese Garden pathways in the Royal Botanic Garden, Edinburgh.



Building Stone Today

Although sitting in Edinburgh's most famous sandstone quarry, Sainsbury's had to go to Stainton in Northumberland for stone for the entrance to the Store. Stainton stone was also used for the Stone Alphabet façade, a major feature at the carpark entrance.

Scottish sandstone is still available from a few quarries, such as Clashach in Moray and Cullaloe in Fife, an excellent match for Craigleith stone.

Geological Trail

The trail is along the cliff, the remains of the quarry face, situated immediately behind Sainsbury's Superstore.

Caution: Visitors should take care for their own safety, whether from the cliff, from any fallen material, or from operations within the retail park.

Note: particularly that the trail does not extend to the part of the cliff past the bushes, which is the loading bay of the adjacent unit.

This part of Craigleith Quarry is conserved as a RIGS. The use of hammers here is not permitted.

First Impressions

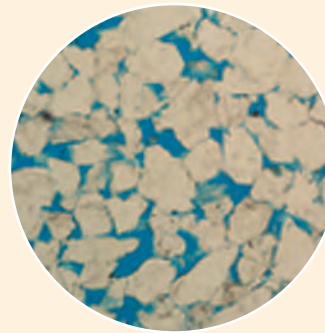
- The quarry face shows layers (beds) of sedimentary rock gently dipping down to the right (south-east).
- The variation in colour and thickness of the beds suggests different rock types. The rock type is dependent on the environmental conditions which existed at the time the sediment was deposited.
- The original soft sediments were laid down horizontally, but the hardened rocks were later tilted by dynamic Earth forces and are now inclined at 25° to the south-east (right).
- The oldest beds are located to the left, the overlying beds become progressively younger to the right.



1 Craigleith Sandstone

The rough sandy feel of this pale brown to grey rock and the individual grains of sand visible reveal the true nature of this sandstone.

Under the microscope, almost all the sand grains are of the colourless mineral quartz. The quartz grains, about 0.25mm in size, are white in photo: the blue is a dye added to show spaces. Quartz is a strong and unreactive mineral, so the sandstone is very hard and durable, ideal properties for a building stone.



The sandstone is made up of thick layers (beds) and contains natural vertical fractures (joints). The quarry men used these features to remove large blocks of building stone with simple tools.

2 Fossil trees and sun-cracks

Vertical cylindrical channels in the rock are Drill Marks cut to aid stone extraction. Within the sandstone beds traces of trees may be seen.



Some fossil tree trunks excavated from Craigleith Quarry can still be found, as this one in the Royal Botanic Gardens, Edinburgh.

On the underside of an overhanging ledge of sandstone a network of thin ribs represent sun-cracks. These cracks formed as a result of the drying out of muddy puddles on lake shores, just as they do today. The cracks were later infilled by sand giving this polygonal network. The underlying mud hardened into mudstone, a dark grey crumbly rock.



Ancient
sun-cracks



Modern
sun-cracks



1

2

3

4

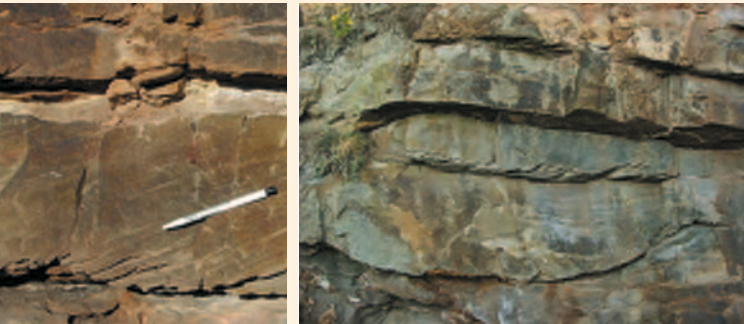
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6

7

3 River channels and cross-bedding

The sandstone has small beds at a steeper angle to the main bedding. This is cross-bedding, formed as sand moved across the bed of a river channel. This structure shows the direction the sediment was moving, here flowing towards the north.



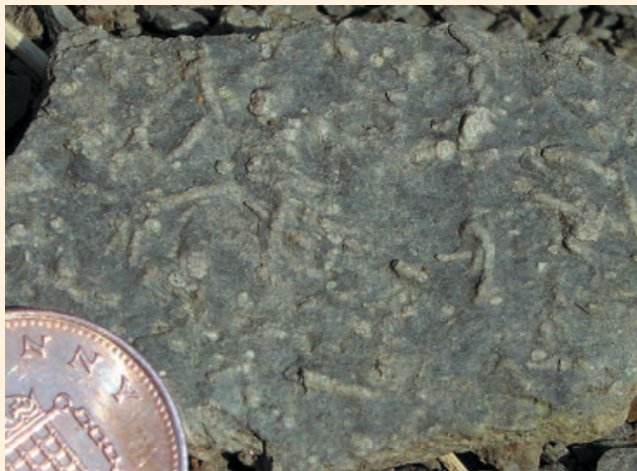
5 Shelly marine limestone

Here the hard, crusty brown weathered limestone contains many marine shells visible in cross-section and in the round. The smooth-shelled, 1cm-across *Schizodus*, illustrated below, is most common. These deposits are evidence of flooding by the sea.



4 Fossil burrows and plant material

The fine-grained mudstones and siltstones here are noticeably thinly bedded and much darker in colour, due to the presence of organic matter such as plant fragments. Black coaly traces of fossil plants can be seen in the face and on fallen blocks. Other fossils found here are freshwater mussel shells, *Naiadites*, and feeding burrows known as Chondrites, pictured below, produced by worms living in the soft silty sediment. These suggest an environment of calmer water perhaps in a lake.



6 Large-scale soft sedimentary deformation

Within the pale sandstone beds pillow-like structures are seen. Most are several tens of cms to a metre in size, and are associated with dramatic folds and distortion. The underlying and overlying beds are not folded, so deformation likely occurred when the sediments were still soft and wet, possibly triggered by an earthquake. Shaking the wet sediment also forced water upwards creating small sand volcanoes.



7 Oil-shale

Overlying the limestone (at 5) is a thick bed of black tough and papery mudstone.

A brown streak when these mudstones are scratched with a knife indicates an unusually high organic content. Microscopic algae were abundant in the original muds resulting in algal rich mudstones known as oil-shales. Oil products extracted from the shales formed the basis of the West Lothian oil industry which flourished during the late 19th and early 20th centuries.



Changing environments

Throughout the sedimentary sequence the variety of rock types and structures provide evidence for changing environments during the Carboniferous period. The area around Craigeith changed from one of large river systems and deltas with tropical swamps, to lakes and a shallow sea. Each of these environments has left its own geological signature in the rock record. It is important that RIGS sites like Craigeith are looked after and preserved for others to enjoy and learn from.