



John Muir's Birthplace Fact Sheet

Number 3.12 – Dunbar Geology



Dunbar from the air with Castle Rock and Lamer Island (top), two igneous features © ELMS

If he had only known it as a child, John Muir spent his first years in a geologist's paradise. It was only when he visited Dunbar much later in life that this became apparent to him. By then, of course, he was an experienced glaciologist and geologist. Dunbar and its vicinity are still a draw for rock enthusiasts. The opening of the John Muir Way allows easy access to the history written along John Muir's native coast.

Dunbar is built on a coastal headland or promontory with a complicated geology. Small volcanic necks, igneous dykes and beds of volcanic tuff (now cut into cliffs by wave action) cut through sedimentary deposits that become more obvious to the east and west of the town. A lot of the stone was exploited in Muir's time. The Castle Rock was quarried for walls and buildings as a new harbour was created. The marls and mudstones to the west were burnt for cement and deposits of clay



Detail of Columnular Basalt © ELMS

at nearby Belhaven were being worked for brick and tile manufacture. To the east many tons of fossiliferous limestones and shales were burnt every year for lime (used as mortar and field dressing).

The overlying landscape has been heavily glaciated leaving a deep and fertile red clay-rich soil and with characteristic sculpting of the landscape. The intrusion of igneous features has led to some interesting features, like the basaltic columns of Lamer Island.

The coastal exposures allow easy exploration of the succession of sediments. Evidence of the landscape and environment at the time the sediments were deposited can often be teased from the nature of the existing rock. For example, at Catcraig, a couple of miles to the east of Dunbar, the shales and limestones are interspersed with a few thin seams of coal and on the foreshore the surface is marked in a dimpled pattern both indicating vanished forests.



Sandstone Cliffs near Dunbar © D Anderson

The variety and richness shown along the coastline helped stimulate advances in geological thinking taking place in Edinburgh during the Enlightenment of the 18th century. James Hutton, John Playfair and those that followed them used newly developed techniques of scientific observation and reasoning to develop their

theories. John Muir was later taught these same techniques at

the University of Wisconsin. He used them to develop his theory of the glacial formation of Yosemite and other Sierra Nevada valleys. Others may have been less welcoming of methods that led to answers that contradicted Biblical teaching. When John's father arrived in Dunbar, the local publisher had recently reinterpreted Hutton and other researchers for a lay audience. It can be assumed that in the light of John's later struggles with his father that George Miller's 'Book of Nature' would not have been welcome to the sight of Daniel Muir.

More information

Further reading

Friends of John Muir's Birthplace, *John Muir Clifftop Trail*, FJMB, Dunbar, 2002

McAdam, AD and Clarkson, ENK (editors), *Lothian Geology: An Excursion Guide*, Scottish Academic Press, Edinburgh, 1986

Miller, George, *Popular Philosophy or the Book of Nature laid Bare*, Miller, Dunbar, 1826

Websites

- More on Scottish Geology: www.scottishgeology.com/index.html
- More on James Hutton:
www.scottishgeology.com/geology/scottish_geologists/people/james_hutton.html