



**Providing geological
outreach materials to
schools in Ireland**



GEOSCHOL is a group comprising the

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**Funded as part of the Griffith Geoscience Research Awards by the
Department of Communications, Energy and Natural Resources.**



museum
National Museum of Ireland
Ard-Mhúsaem na hÉireann

**ulster
museum**



Programme: 1st November 2007 - 31st October 2008

Range of products:

- Classroom Posters**
- County Leaflets**
- Rock Sets**
- Activity Book**

Web Page with electronic versions of above

Testing with school children prior to launch of product.

Phased launch of products:

- (1) Rock Sets - distributed to 5,000 schools (2007)**
- (2) Posters (November 2008)**
- (3) Activity Book (November 2008)**
- (4) County Leaflets (November 2008)**
- (-) Web Page (November 2008)**

Rock Sets and explanatory booklet:

- All Primary Schools (4,000); Secondary Schools last year.



Basalt	Granite	Schist
Sandstone	Mudstone	Limestone

ROCK WORDSEARCH

Circle the names of TWELVE different rocks

P	G	R	A	N	I	T	E	E	F	W	H	P	L	J	C
F	L	I	A	H	S	U	Y	L	P	K	O	G	J	S	O
G	Z	E	N	O	T	S	D	U	M	K	B	N	K	H	N
L	G	X	M	S	K	E	D	W	S	O	G	S	T	A	O
I	T	R	I	D	T	C	C	M	G	C	O	C	V	L	L
M	S	H	T	F	S	C	K	H	A	O	W	H	I	E	O
E	C	T	B	D	T	H	R	M	K	R	Q	I	V	P	M
S	S	X	U	T	L	A	S	L	T	S	B	V	T	T	E
T	D	O	S	C	A	L	Q	A	Q	C	V	L	W	L	R
O	S	M	S	B	S	K	L	M	N	S	O	T	E	L	A
N	A	U	T	S	A	U	G	T	Q	D	L	L	W	R	T
E	O	F	D	S	B	W	S	I	L	T	S	T	O	N	E
X	B	X	L	X	M	E	T	L	O	T	D	T	P	M	L
B	D	A	S	E	M	T	V	O	A	H	M	K	O	I	K
W	H	C	H	E	W	D	O	T	Q	T	H	W	J	N	O
X	C	S	L	V	S	O	I	W	D	Q	E	M	D	N	E

IGNEOUS

BASALT
GRANITE

SEDIMENTARY

CHALK
CONGLOMERATE
LIMESTONE
MUDSTONE
SANDSTONE
SHALE
SILTSTONE

METAMORPHIC

MARBLE
SCHIST
SLATE

Information page 1: METEORITES

Meteorites are fragments of rock from space which have fallen to Earth. Many thousands enter the Earth's atmosphere each day and most are burnt up travelling through it; few reach the surface.

They give insights into the nature of the planets and the age of the solar system. Isotopic dating of the minerals in meteorites has revealed that they are as much as 4,600 million years old, probably equal to the age of the Earth. Meteorites represent early primordial planetary material and portions of small early "planets" that have broken up. Many are derived from the asteroid belt between Mars and Jupiter and have been sent to Earth by collision among themselves.

Meteorites are generally named after the location where they fell. For example in Ireland we have the Limerick or Adare Meteorite.

IRISH METEORITES

1. Pettinwood, Co. Westmeath [Jul 1779]
2. Moonraket, Co. Tipperary [August 1910] Weighed 3.5 kg
3. Adare/Limerick/Iskut, Co. Limerick [10th Sept 1813] Weighed over 40 kg
4. Killyer, Co. Tyrone [29th April 1846] Weighed over 0.1 kg
5. Dunderum, Co. Tipperary [12th August 1865] Weighed 1.66 kg
6. Crumlin, Co. Antrim [13th September 1902] Weighed 4.2 kg
7. Boreedy, Co. Kerry [25th April 1969] Weighed 5.4 kg
8. Sprucefield, Co. Antrim [25th April 1969] Weighed 0.5 kg
9. Leighlinbridge, Co. Carlow



The Dunderum Meteorite, County Tipperary, 12th August 1865 at 7:00 pm. This was seen to fall after booming and hanging in the sky. A smooth crust has formed on the surface as a result of ablation when

There are four types of meteorite:

A. CARBONACEOUS CHONDRITES (4%) are the most primitive meteorite. They have a similar bulk chemical and trace element composition as the Sun, and are thought to represent early samples of the undifferentiated solar nebula.

B. STONES (90% of observed falls) are rich in silicate minerals like olivine, feldspar and pyroxene and other minerals common in terrestrial and lunar igneous rocks. They are divided into two groups: Chondrites (9%) which contain spherical silicate inclusions called chondrules. Achondrites (81%) which lack chondrules. All the Irish meteorites are Stones.

C. SIDERITES (Iron) (5%) are alloys of iron with up to 20% nickel. Two nickel-iron minerals often form a distinct pattern of intergrown lamellae at angles of 60 and 120 degrees called Widmanstätten structure. This structure was first revealed in the Krasnojarsk Meteorite when its surface was etched by nitric acid. Siderites have a composition similar to the Earth's core.



D. STONY-IRONS (1%) are composed of iron-nickel and silicate minerals in approximately equal proportions, and some show olivine engulfed in nickel-iron.

ACTIVITY BOOKLET

A4 size ideal for photocopying by teachers.

pdf for easy downloading.

b/w format for colouring by primary level children.

COUNTY GUIDES: A4

DUBLIN

AREA OF COUNTY: 921 square kilometres or 356 square miles

COUNTY TOWN: Dublin

OTHER TOWNS: Balbriggan, Dun Laoghaire, Lucan, Malahide, Rush, Skerries, Swords

GEOLOGY HIGHLIGHTS: Granite mountains, Portrane volcanic rocks, Carboniferous limestone along north Dublin coast, Killiney metamorphics

AGE OF ROCKS: Ordovician-Carboniferous



Folded Carboniferous limestone at Loughshinney, north County Dublin

KERRY

AREA OF COUNTY: 4,746 square kilometres or 1,832 square miles or 1,159,356 acres

COUNTY TOWN: Tralee

OTHER TOWNS: Caherciveen, Castleisland, Dingle, Kenmare, Killarney, Listowel, Sneem

GEOLOGY HIGHLIGHTS: Amphibian trackway, volcanic lavas, Silurian fossils, Killarney chalk, glacial deposits

AGE OF ROCKS: Ordovician to Carboniferous; Cretaceous



Storm Beach at Kilmurry Bay, Dingle Peninsula

Here boulders of Old Red sandstone from the Devonian have been piled together by the force of the waves and rounded as they bang off each other.

WEXFORD

AREA OF COUNTY: 4,746 square kilometres or 1,832 square miles or 578,597 acres

COUNTY TOWN: Wexford

OTHER TOWNS: Bunclody, Enniscorthy, Fethard, Gorey, New Ross

GEOLOGY HIGHLIGHTS: Precambrian fossils, Lower Carboniferous succession, glacial deposits

AGE OF ROCKS: Precambrian, Ordovician to Carboniferous



Lighthouse and Lower Carboniferous limestones at Hook Head



COUNTY GUIDES: A4: *County Kerry*

KERRY

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Storm Beach at Kilcurry Bay, Dingle Peninsula

Here boulders of Old Red sandstone from the Devonian have been piled together by the force of the waves and rounded as they bang off each other.

Kerry: COUNTY GEOLOGY OF IRELAND

1



Geological Map of County Kerry

Pink: Ordovician & Silurian; **Green:** Silurian; **Dark blue:** volcanic rocks of various ages; **Light blue:** Silurian & Devonian sandstones and conglomerates; **Light blue:** Lower Carboniferous limestone; **Brown:** Upper Carboniferous shales; **Yellow:** Cretaceous chalk.

Geological history

During the Ordovician period (488-444 million years ago [Ma]) Ireland was south of the equator, and the area that now makes up Kerry was under an ocean that separated two continents. This ocean closed and as it did so mud and sand was deposited into it and these eventually became the mudstones seen near Annascaul. Later during the Silurian period (430 Ma) small volcanic islands that grew above a shall sea erupted lavas and ash in the Clogher Head area. The muddy sediments deposited in the Silurian sea trapped many animals now seen as fossils near Dunquin and in Derrymore Glen, and the sandy sediments formed sandstone near Dingle and Slea Head. Eventually by the beginning of Devonian (416 Ma) the ocean closed completely and a large continent had formed which was largely desert. The Kerry area contained large areas of sanddunes which formed much of the sandy Old Red Sandstone which makes up much of the Iveragh Peninsula, and in between the

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Kerry: COUNTY GEOLOGY OF IRELAND



Trackway made by a tetrapod (inset) at Valentia Island



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Kerry: COUNTY GEOLOGY OF IRELAND



Trackway made by a tetrapod (inset) at Valentia Island



dunes occasionally flowed rivers or flash floods. These produced pebbly coarser rocks called conglomerates which may contain white quartz or red jasper. A good example of a conglomerate is found at Inch. By the end of the Devonian the land in Kerry was flooded by warm shallow tropical seas in which corals, crinoids, brachiopods, squids and even sharks lived and these are now found as fossils in the Carboniferous limestones (350 Ma). Later the ocean became deeper and muds were carried into it by rivers from the east and north and these became the shales now found in east Kerry and the Steeple Mountains (310 Ma). Much later during the Cretaceous (146-65 Ma) the whole area was covered by water and chalk, and a pure limestone was deposited. A small patch of chalk can be found near Killarney.

During parts of the last million years Ireland has been covered in ice when glaciers formed on mountainsides and in valleys and spread over the lowlands. In Kerry many corries were formed when ice collected on the mountainsides and these now often contain lakes such as Mangerton Lake near Killarney and Pedler's Lake near the Connor Pass. When the ice melted it left behind boulder clay containing many different rock types. Good examples can be seen at Fenit near Tralee.

Kerry: COUNTY GEOLOGY OF IRELAND

Kerry fossils

The oldest fossils from Kerry are those found on the Dingle Peninsula near Annascaul. Some geologists think these are Ordovician in age while others argue that they are Silurian. Silurian brachiopods (pictured right), trilobites, corals and other marine animals are found at Fenit's Cove near Dunquin. Fossil fish of Devonian age are present on the Iveragh Peninsula, and an important trackway of one of the first land animals, a salamander-like animal also from the Devonian was discovered on Valentia Island in 1992. Early plants from the Devonian-Carboniferous are found in sandstones near Ballybegue. During the Carboniferous the sea contained many animals and fossils of these are plentiful in limestones in the Tralee and Fenit districts.



Mining & Building Stones

Copper was used by early settlers in Ireland to make bronze weapons. Kerry was an important site for copper mining during the Bronze Age 4000 years ago, and mines were opened on Boss Island near Killarney and at Coad Mountain near Coherdaniel. Between 1650 and 1900 these mines reopened at times as well as at Ardully near Kenmare.

Various rock types have been used for building. Devonian Old Red Sandstone was used to build Sraige Fort near Sneem and Rattoo Round Tower in north Kerry. Carboniferous limestone (which often contains fossils) was used for many ancient churches such as Anfert Cathedral and for some eighteenth century buildings. Slate from Valentia was exported across the world for use on roofs, for shelves and snooker tables.

Suggested reading

- Patrick Wyse Jackson: *The Geology of Kerry* (1994) Kerry County Museum, Trinity College, Dublin 6 ENF-Q.
- Matthew Parkes: *Valentia Trackway* (2002) Geological Survey of Ireland.

Text by Patrick Wyse Jackson



Rattoo Round Tower

POSTERS

A2

Where does it come from?

WHERE DOES IT COME FROM?

You may be surprised how much geological resources contribute to our every day lives, both inside and outside the house. Look around you - where does it come from?

Clay
There are many types of bricks, some are produced from CLAY, which becomes hard and turn red or yellow when they are fired in a kiln, depending on their mineral content.

Red brick
Other bricks and building stones are shaped from quarried LIMESTONE.

Yellow brick

Limestone

Coal
COAL is a type of fossil fuel, it is used in the home for burning in the fireplace.

Iron ore
IRON ORES such as hematite contain metallic iron, which can be extracted to make pipes and all sorts of metal household objects, like pots and pans.

Basalt
Aggregate is composed of BASALT and QUARTZ for use in road construction and building foundations.

Quartz aggregate

Copper ore
Copper is extracted from COPPER ORE such as malachite to be used in electrical wire and water pipes.

Slate
SLATE is a rock made up of many thin layers, this rock has traditionally been cut and used as roof tiles.

Glass sand
Glass is made from the silica in quartz. The most suitable source is GLASS SAND.

CRUDE OIL or PETROLEUM is used for fueling vehicles. Crude oil is also used as a source of chemicals for producing plastics. Oil is a fossil fuel, it originates from dead organisms.

Fossil fern

Marble
MARBLE is often colourful and attractive so it is widely used for decorative features such as columns and fireplaces.

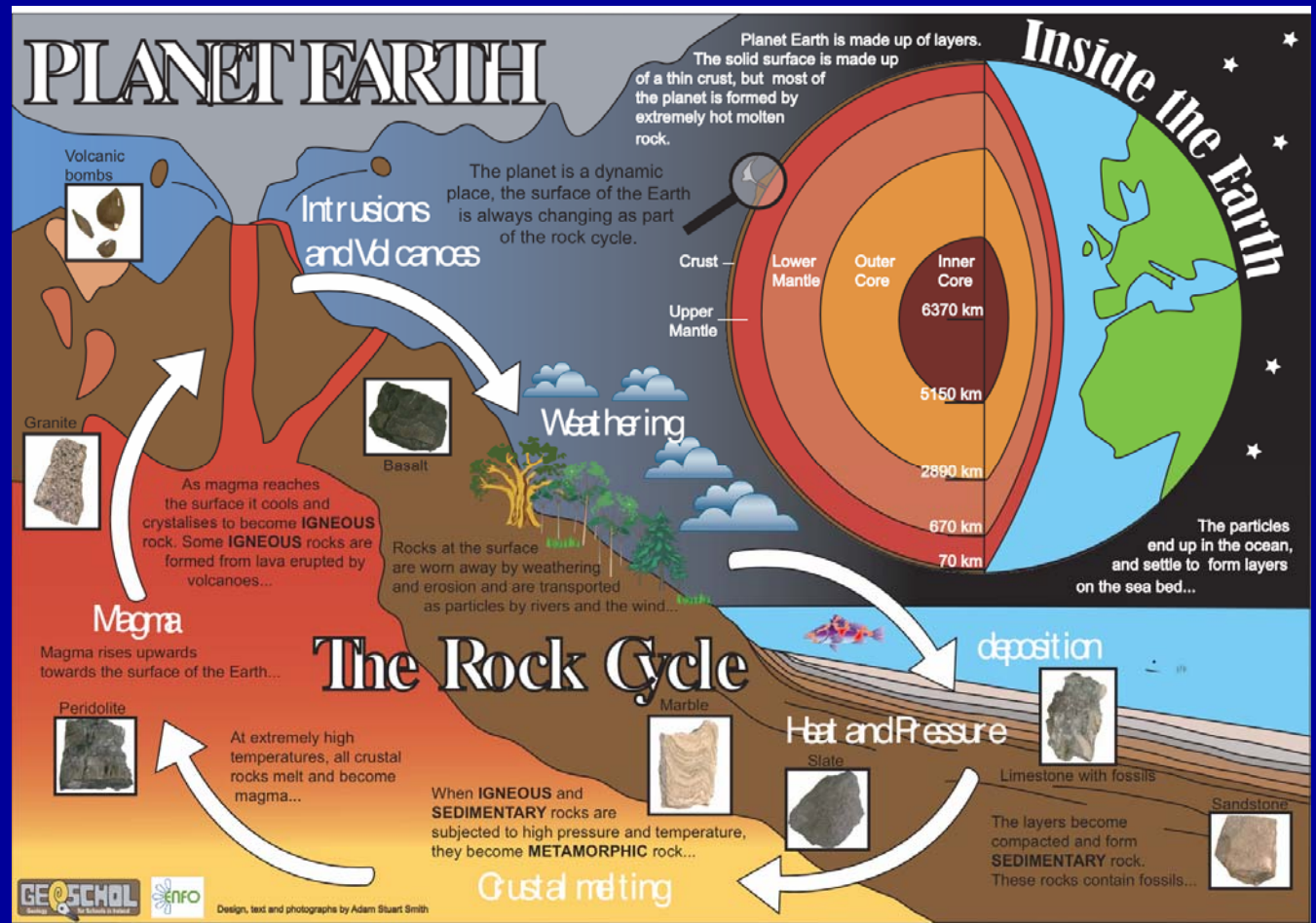
Silica
The element silica is a vital material used in the production of electronics such as computer chips.

Design, text and photographs by Adam Stuart Smith

POSTERS

A2

Planet Earth



POSTERS

A2

Building Stones of Ireland

The Building Stones of Ireland

1 Ben Bulbin, Co. Sligo: Limestone

2 Giant's Causeway, Co. Antrim: Basalt

3 Holy Trinity Church, Portrush, Co. Antrim: Basalt walls and limestone around windows

4 Christ Church Cathedral, Dublin: Limestone from Dublin & Meath with pale limestone and green slate from England

5 Cashel Palace, Co. Tipperary: Red brick

6 Staigue Fort, Co. Kerry: Old Red Sandstone (Devonian)

7

8 Lynch's Castle, Galway: Limestone

9 Cork Red Limestone, Little Island

10 Connemara Marble, Co. Galway

11 Leinster Granite, Co. Wicklow

12 Liscannor Flagstone, Co. Clare

Field boundary, Burren, Co. Clare: Limestone

Legend:

- Basalt (youngest)
- Upper Carboniferous shales and coal
- Lower Carboniferous limestone
- Granite
- Cambrian to Devonian sandstones and shales
- Precambrian metamorphic rocks (oldest)

Stone has been used in Ireland for building for over 4,000 years - the early builders used local stone, while nowadays, stone from all around the world is imported. Stone is usually hard wearing and is quarried in large blocks. These are then cut by huge saws into smaller pieces and may be carved into various shapes. Limestone is a common building material as it is found in many parts of Ireland. Today it is made into cement or shaped into blocks, or polished for use on buildings. Granite was also used in many places. Slates are flattened metamorphic rocks that are easily split for use on roofs. They were once quarried at Killaloe and Valentia Island. Bricks are made from clay that was formed as granite weathered and broke down. In the past different types of stone such as Connemara Marble were polished and used for decoration. Most buildings today are made of concrete on to which a thin layer of polished stone such as granite or limestone is attached to make them look more attractive.

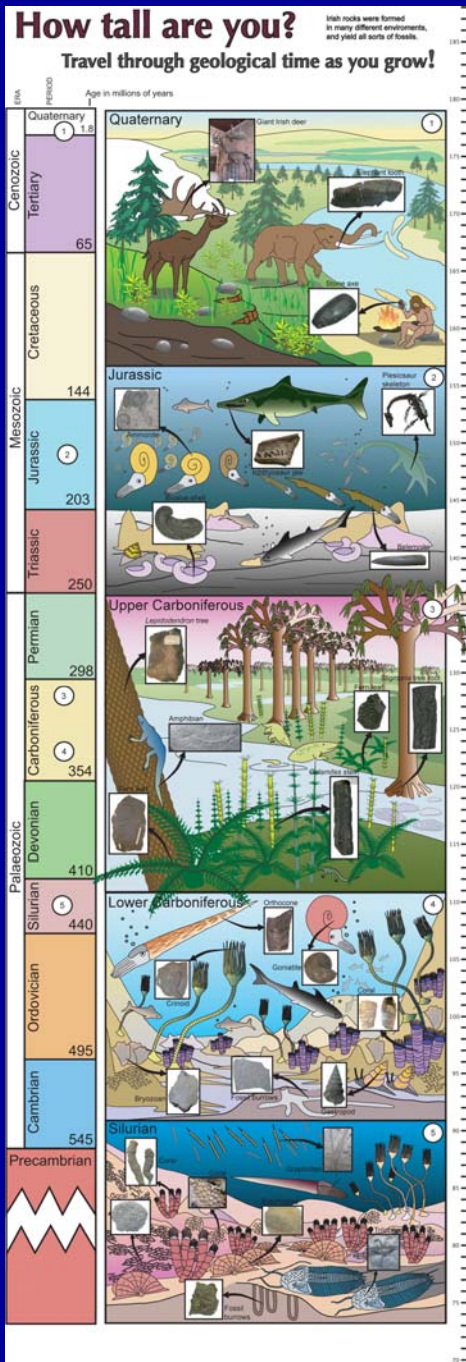
GEO SCHOL info
Text & Images: Patrick Wynn Jackson
www.geoschol.ie



POSTERS

A0

How tall are you?





POSTERS

A0

How tall are you?

An interactive height chart

