

# The Edinburgh Geologist

Magazine of the Edinburgh Geological Society

Issue No. 43

Autumn 2004

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Incorporating the Proceedings of the Edinburgh Geological Society  
for the 170th Session 2003-2004

# **The Edinburgh Geologist**

## **Issue No. 43 Autumn 2004**

### **Cover illustration**

#### **Liathach, Torridon**

Near-horizontal beds of Torridonian sediments form the massive bulk of Liathach. The dominant peak of Spidean a' Choire Léith is the highest in the Torridon mountains.

This photograph is chosen to mark the start of the new series on Mountain Geology (see article by Suzanne Miller on page 3).

Published by kind permission of Peter Robson, Edinburgh.

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# Editorial

by Alan Fyfe

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This issue sees a minor change in format, but one which you cannot have failed to have noticed. Council has agreed that, starting with this issue, THE EDINBURGH GEOLOGIST will be published with a colour cover. We tried this for the Silver Anniversary issue and it was voted as a desirable development.

Issue number 43... what can I make of that? Well, mathematically, 43 is a prime number and, by coincidence, it was in 1743 that Leonhard Euler was chosen to be director of mathematics in the Berlin Academy when it was founded in the following year. Euler is, of course, known for his work on perfect and prime numbers.

A hundred years later, in 1843, Richard Owen, the Lancastrian palaeontologist, coined the word Dinosaur from the Greek *deinos* (fearfully great) and *sauros* (lizard). It was also in that year that Jean-Baptiste Armand Louis Léonce Elie de Beaumont, the French mathematician and geologist was awarded the Wollaston Medal by the Geological Society of London. Elie de Beaumont went on to be elected to the membership of the Berlin Academy, though too late to have met Leonhard Euler.

Probably the best service that Elie de Beaumont rendered to science was in connection with the geological map of France, in the preparation of which he had the leading share. His name is also known in connection with his theory of the origin of mountain ranges, which he published at length in his three-volume *Notice sur le système des montagnes* in 1852. According to Elie de Beaumont's view, all mountain ranges parallel to the same great circle of the earth are of strictly contemporaneous origin. The theory proved to be of more value to geological science than might be expected, for, in attempting to find facts to support what would now be considered a proposterous theory, he carried out valuable research into the structure of mountain ranges!

And here is the link to this issue of THE EDINBURGH GEOLOGIST! In the last issue, Spring 2004, I promised readers that we would be starting a new series on *Mountain Geology*. Suzanne Miller has sent me an article on Ben Nevis. In this she discusses the mountain itself, its geology and geomorphology, and its habitat and flora, which are, of course, closely related to the geology. She finishes with a history of the Observatory that operated on the summit of Britain's highest mountain at the end of the nineteenth century and of a couple of the scientists who worked there.

I was sent an article by Helen Smailes, not an article for this magazine, nor even written by Helen, but words written in 1857 for *The Scotsman*, by someone who signed themselves J.N. The article described a visit to Leadhills. I have reprinted the geological part of this and added a few editorial comments to put readers in the picture concerning geological thinking of the day.

## Editorial

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I am grateful to Peter Dryburgh for another article, a description of the excursion that he led around the streets of Edinburgh this year. Peter led Fellows of the Society on a tour of houses, public and otherwise, associated with geologists and other famous scientists and literary figures. My thoughts on first reading the article were, 'I now wish that I had managed to go along that evening,' so I am glad to have the itinerary so that I can follow it myself, even though without Peter's knowledgeable commentary.

The Scottish Stone Liaison Group (SSLG) sends me a Newsletter from time to time. There has been an interesting discussion on renewed interest in Scottish slate and I thought that readers might be interested in progress. Alan McKinney of the SSLG has brought together extracts from the Newsletters and they are published here.

The last issue of THE EDINBURGH GEOLOGIST featured Bill Baird's nineteenth *Strange Earth* article and I am pleased to be able to publish his twentieth now. It is exactly twenty years since he published *Strange Earth No 1*, so this is historic in its own right. It also concerns a walk in the Scottish mountains, which brings us full circle from Suzanne's article on Ben Nevis.

This issue's *Poet's Corner* features some verses sent to me by Gareth Peach, the great grandson of Charles William Peach. It is a poem by Robert Dick, geologist and botanist with a particular interest in fossil fish, sent to Gareth's famous ancestor.

I received an e-mail from France, from Jean-Yves Boudet, who describes himself as an 'arenophile'. The English translation is his own, not mine. Perhaps Fellows might like to answer his appeal for sand from all over the world!

Finally, there are the usual Geo-vineyards (this a label that I found), a review of Brian Upton's new book, *Volcanoes and the making of Scotland*, and the Rocksword by Angela Anderson, with answers as usual hidden near the end of the magazine.

This issue also includes the Proceedings of the Society for the 170th session, These are now to be incorporated into the autumn issues of THE EDINBURGH GEOLOGIST in order to make them rather more up-to-date.

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**The copy date for the next issue of THE EDINBURGH GEOLOGIST  
is St David's Day, Tuesday 1st March, 2005.**

# **Mountain Geology**

## **Starting at the Top - Ben Nevis**

**by Suzanne Miller**

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### **Introduction**

Ben Nevis is one of Britain's most famous natural tourist attractions, one of 284 Munros, and Britain's highest mountain, the summit standing at 1344m. It has recently been bought by The John Muir Trust and forms part of the Nevis Estate which, at 1700 ha (4158 acres), covers roughly the summit and southern slopes of Ben Nevis itself and a string of other peaks to the east with their slopes down to the Water of Nevis. The summits to the east are Carn Mor Dearg (1223 m), Aonach Beag (1234 m), and Sgurr Choinnich Beag (963 m). The area represents a huge volcanic complex, now eroded to its granite roots, that has given rise to the dramatic scenery which harbours glaciers in its north facing corries.

Ben Nevis, or 'The Ben' as it is fondly known, sits majestically at the head of Loch Linnhe, its presence dominating the landscape from all corners of Fort William and some parts of Lochaber. The dramatic effect of Ben Nevis is emphasised by the fact that it begins its rise from sea-level. From the coast, it rises like a huge whale-back shape. This ends abruptly in 2000 ft cliffs to its north-east. This two-faced form of the Ben is what makes it so popular, providing steep but straightforward walking on paths on one side and challenging climbing on the other.

In fact, Ben Nevis probably has the widest range of visitors of any mountain, from world class climbers and racers, to those who will never set foot on another hill in their lives. For most visitors it is the height (1344 m or 4406 ft) that matters. There are about 150,000 ascents every year and many industries have grown up around the fact that Ben Nevis is Britain's highest mountain.

To the south, the Water of Nevis plunges from high grass flats through the steep densely wooded Nevis gorge. This is a very different wild place with magnificently sculptured rocks and a rich native woodland containing remnants of the original Caledonian pine-forest. The gorge opens out onto the Steall flats with views across to the striking Steall Falls.

Ben Nevis, although not as high as Alpine mountains, is positioned on a more northerly latitude and the climate can be considered similar to Arctic regions. While there may be a welcoming sea breeze on the shores of Loch Linnhe, 20-30 knots of chilling wind may be evident on the summit of the Ben. Many walkers and climbers find weather conditions changing within minutes – usually for the worse – as they work

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their way up the mountain. Each year, Ben Nevis sees an average of 261 gales, and its summit is cloud-covered for approximately 355 days.

The first recorded ascent of Ben Nevis was made in 1771 by the noted botanist James Robertson, who was on an expedition to collect plant specimens for the College Museum of Edinburgh. He described what he saw on his ascent on 17th August:

I ascended Ben Nevis, which is reckoned the highest mountain in Britain. A third part of the hill from the summit towards the top is entirely naked, resembling a heap of stones thrown together confusedly. The summit far overtops the surrounding hills (*National Library of Scotland m/s 2508*, p 131-132).

A few years later, in 1774, an ascent was recorded by John Williams, who was assessing whether there were any minerals of commercial value around the summit. He discovered nothing of any great interest, but his report was the first geological account, describing the Ben rose from a base of ‘elegant red granite’.

### Geology

Ben Nevis lies within Dalradian schists of the Appin Group though the Ben itself, as stated by Williams, is granitic, intruded around 400 million years ago when it was part of a massive and very active volcano. The Dalradian structures and metamorphic features of the Central Highlands are complex and early workers had great difficulty in making sense of the geology of the area. However, as early as 1817, although the origin of the Ben Nevis Granite was controversial, it was recognised that granite had forced its way into the surrounding schists and was therefore the younger rock.

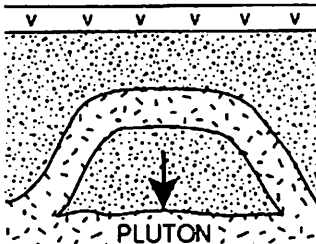
There was much debate as to whether the granite was of igneous or metamorphic origin. In his *Ancient Volcanoes of Great Britain*, Geikie (1897) did not even mention the Ben Nevis area and geological surveying only began in earnest in the late 1880s to early 1900s when James Grant Wilson of the Geological Survey was made responsible for the Loch Linnhe area. During this ground-breaking work, it was recognised that the metamorphosed sediments formed part of a spectacular recumbent fold which characterised the southern part of the Central Highlands and that these metasediments had been intruded by large volumes of magma, producing extensive metamorphic aureoles (Oldroyd & Hamilton, 2002).

There are four major intrusions - the Outer and Inner Quartz Diorites and the Outer and Inner Granites. These originated as successive and concentric ring-dykes, the product of subterranean subsidence and subsequent surface collapse. These form the Ben Nevis central ring complex (Strachan et al., 2002). It is thought that the huge granite pluton, one of the ‘Newer Granites’, was subsequently affected by the

## Mountain Geology – Ben Nevis

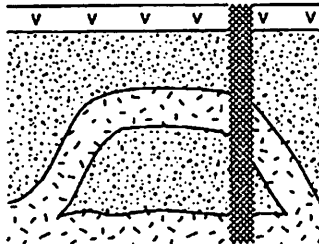
collapsed roof of a subterranean caldera (established during earlier subsidence), thus allowing the former cover of lavas and their underlying schists (part of a massive recumbent fold) to sink about 600m into the inner granite while it was still molten.

Stage 1



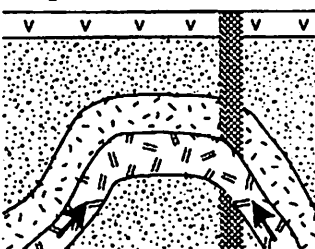
Outer granite moves up into void created by foundering block

Stage 2



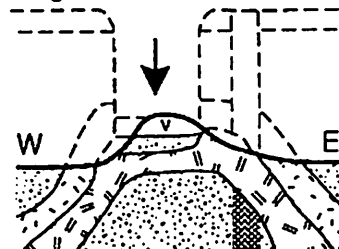
Dykes intruded

Stage 3



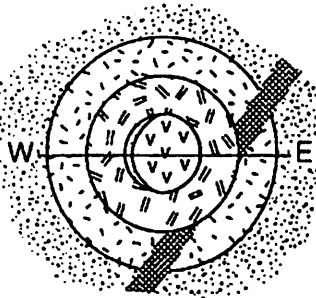
Inner granite moves into new void after further foundering

Stage 4



Surface collapse into subterranean cauldron

Stage 4  
(plan)



Denudation to present  
land surface

## Mountain Geology – Ben Nevis

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Taking what is usually described as the ‘tourist path’ up Ben Nevis, you first climb through the grey Appin Group schists that crop out on the lower slopes of Glen Nevis. As the path begins to steepen, however, the rock appears redder and more rubbly, indicating that you have crossed the junction at the edge of the pluton into the Outer Granite. Having climbed steeply around the flank of Meall an t-Suidhe, you will reach a flat grassy area, in which lies the wild Lochan Meall an t-Suidhe. This marks the junction between the Outer and Inner Granite. The latter makes up the craggy summit of Carn Mor Dearg to the northeast together with the shoulders of Ben Nevis itself. As the tourist path zig-zags steeply, you will cross over into the subsided bedded lavas and volcanic agglomerates of Lower Old Red Sandstone Age that make up the summit dome. These volcanics also form the steep north face of the Ben so loved by climbers.

The volcanic sequence is mostly composed of rather homogeneous potassic trachytic lavas with phenocrysts of hornblende, plagioclase, magnetite, apatite and pyroxene pseudomorphs, with minor dacites (Trewin & Thirwall, 2002). A thin basal conglomerate rests on Dalradian metasediments, but this contact can only be seen in Coire Leis, accessed by heading north on the grassy plateau where Lochan Meall an t-Suidhe lies and then following Allt a’ Mhuilinn up past the Scottish Mountaineering Club’s Charles Inglis Clark Memorial Hut. Thin siltstones and tuffs also occur in the volcanic sequence which is metamorphosed by the Ben Nevis granitoid complex.

The monolithic scenery of this area has been carved out by the more recent action of glaciers. This ice-carved rugged landscape can be seen in the Nevis Gorge, where the Allt Coire a’ Mhail cascades some 100m as a waterfall from a spectacular example of a hanging valley. When seen from the northwest, the majestic ice-quarried cliffs are revealed, their frost-riven 600m precipices unequalled in height even by those of the Cuillin. At their base extensive snow patches survive the summer thaw in the sheltered north east facing corries, demonstrating how easily glaciers could regenerate in this marginal sub-Arctic environment.

### Habitats and flora

Although created by dramatic geological and geomorphological processes, Ben Nevis is also of great scientific interest for its flora and fauna with several rare species and many important habitats.

There is a huge range of vegetation types within the Ben Nevis Estate. They represent full altitudinal sequence of vegetation in upland Britain, from woodland to montane mossheath and snow-bed. *Carex bigelowii* heath, an eastern type of vegetation which is uncommon in the western Highlands is found, and the *Marsupella brevissima*

## Mountain Geology – Ben Nevis

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snow-bed vegetation on the summit of Aonach Beag is of an interesting high-montane type otherwise known only from the Cairngorms.

In Glen Nevis there are stunning natural woodlands of native pinewood, oak, birch and, closer to streams, alder and ash. Below the trees are primroses, wood anemones, wood sorrel and tiny purple violets. Small patches of mainly birch woodland also cling to steep craggy mountains, which are not accessible to sheep or deer.

On moving up the slopes, heather moorland and grasses dominate with peaty bogs on more gentle slopes. Blaeberry (bilberry), heather, mat grass, mosses, and thyme and milkwort flourish in the wetter areas. Bracken is abundant on some of the lower slopes. Higher up, a more montane habitat develops where plants such as dwarf willow, alpine saxifrage, moss campion, alpine lady-fern, alpine speedwell, mountain avens and starwort mouse-ear grow amongst the blaeberry, heather and grasses. Stiff sedge, three-leaved rush, heath rush and curved woodrush also occur.

On the rocky top of the mountain the habitat supports a wonderful array of lichens, mosses and mats of low growing alpine plants such as purple saxifrage, moss campion, alpine lady's mantle and the Scottish sabbaldia.

A large part of the Ben Nevis Estate is a Site of Special Scientific Interest (SSSI) because of its biological and geological importance. It is also a proposed Special Area of Conservation (SAC) due to its excellent examples of Alpine calcareous grasslands, acidic scree and plants which live in crevices on mainly acidic rocks.

### The Observatory

Weather devotees will be drawn to the story of the Mountain Top Observatory, where resolute Victorian scientists collected weather data, even in heavy gales and violent winter storms. The footpath and observatory were both constructed during the summer of 1883. The contractor was James McLean of Fort William and the last rise on to the summit is named McLean's Steep in his honour. The observatory, was built to record 'the diversity of the mountain environment' e.g. temperature, wind speed, rainfall, air pressure, etc. Nominally opened on the 17th October 1883 but actually commencing operations on November 28th that year, the Ben Nevis Observatory provided invaluable meteorological data for 21 years on a continuous hourly basis. It was Britain's first high-altitude observatory and much pioneering research was conducted there during its operation. A telegraph cable was laid to connect the Nevis Observatory with the sea level observatory in Fort William. Fragments of this cable can still be seen on the mountainside today.

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The Observatory was funded mostly from a list of private donations which included Queen Victoria and was managed by the Scottish Meteorological Society and the Royal Societies of Edinburgh and London. The building was manned by a superintendent and two assistants who were responsible for taking readings. During 1902 it became apparent that insufficient funds were available to continue the running of the observatory, and it was closed on October 1st 1904. Over the years that followed, the observatory fell into disrepair, this process being helped by a fire during 1932 and the actions of both weather and unthinking visitors.

During the long dark days of winter when it was operating, however, staff would brave gale force, icy winds and driving snow to carry out their labours. Inside, heat was provided by an open cooking stove in the kitchen and a closed one in the office, fuelled mostly by paraffin coke. A number of famous Scottish scientists worked at various times at the observatory, including William Speirs Bruce, who was stationed there as a meteorologist and later led many polar expeditions and Charles Thomson Rees Wilson, who invented the cloud chamber.

**William Speirs Bruce** (1867-1921) was a Polar explorer and oceanographer. Educated at the University of Edinburgh (where he was later the George Heriot Research Fellow 1900-01) he became the Director of the Scottish Oceanographical Laboratory. Bruce spent two winters at the observatory on Ben Nevis refining his meteorological skills before embarking on a number of polar expeditions. He was an assistant in the Challenger Expedition Commission, and a naturalist on the Scottish Antarctic Expedition 1892-93, the Jackson-Harmsworth Polar Expedition 1896 and 1897, and a number of others, and led the Scottish National Antarctic Expedition in 1902-04. His ship, *The Scotia*, brought back a vast collection of data, samples and specimens, corrected charts of Antarctica, and enabled the delineation of what became known as the Scotia Arc between South America, South Georgia and the South Sandwich Islands. All of this was achieved without the loss of life and vessels which dogged some of the higher-profile expeditions. He lectured on geography at Heriot-Watt College (now Heriot-Watt University) from 1899-1901 and from 1917 until his death, and at the Church of Scotland Training College, Edinburgh.

**Charles Thomson Rees Wilson** (1869 -1959) was a Scottish physicist and avid climber. he worked at the observatory on Ben Nevis in 1894, and his observations of optical effects caused by the interaction of sunlight and cloud led to his invention of the cloud chamber, for which he received the Nobel Prize in 1927.

When standing on the summit of Ben Nevis in the late summer of 1894, Wilson was struck by the beauty of coronas and ‘glories’ (coloured rings surrounding shadows

cast on mist and cloud), and he decided to imitate these natural phenomena in the laboratory. His sharp observation and keen intellect, however, led him to suspect (after a few months' work at the Cavendish Laboratory) that the few drops reappearing again and again each time he expanded a volume of moist, dust-free air, might be the result of condensation on nuclei - possibly the ions causing the 'residual' conductivity of the atmosphere-produced continuously. Wilson's hypothesis was supported after exposure of his primitive cloud chamber to the newly discovered X-rays. Early in 1911 he was the first person to see and photograph the tracks of individual alpha- and beta-particles and electrons (the latter were described by him as 'little wisps and threads of clouds'). The event aroused great interest as the paths of the alpha-particles were just as W. H. Bragg had drawn them in a publication some years earlier. It was not until 1923 that the cloud chamber was brought to perfection and led to his two, beautifully illustrated, classic papers on the tracks of electrons. Wilson's technique was promptly followed with startling success in all parts of the world and has led to fundamental advances in particle physics. Thus, Rutherford's remark that the cloud chamber was 'the most original and wonderful instrument in scientific history' has been fully justified. And all because of Ben Nevis!

### References

- Geikie, A., 1897. *The ancient volcanoes of Great Britain*, two volumes. Macmillan, London & New York.
- Oldroyd, D.R. & Hamilton, B.M., 2002. *Themes in the early history of Scottish geology*, in: N.H. Trewin (ed.) *The Geology of Scotland*, The Geological Society, London. pp 27-43.
- Strachan, R.A., Smith, M., Harris, A.L. & Fettes, D., 2002. *The Northern Highland and Grampian terranes*, in: N.H. Trewin (ed.) *The Geology of Scotland*, The Geological Society, London. pp 81-147.
- Trewin, N.H. & Thirwall, 2002. *Old Red Sandstone*, in: N.H. Trewin (ed.) *The Geology of Scotland*, The Geological Society, London. pp 213-249.
- Ben Nevis webcam: [www.visit-fortwilliam.co.uk](http://www.visit-fortwilliam.co.uk) and click on: Ben Nevis Cam

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*Suzanne Miller is well known to many Fellows of the Society, having lectured to the Society and led several field excursions. She works in the Department of Geology and Zoology at the National Museum of Scotland in Chambers Street and her interests in the earth sciences are wide-ranging.*

## **A visit to the Leadhills**

**a report from 1857 with comments from today**

**contributed by Helen Smailes with comments by the Editor**

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*Most of the words that make up this article were written by someone who signed themselves J.N. and were originally published in The Scotsman in May 1857. A copy was sent to the Editor by Helen Smailes who discovered it by chance while searching for exhibition reviews. The article began by bemoaning the greater interest that was paid to the Highlands rather than the Southern Uplands, which, to avoid confusion, I should tell you that J.N. referred to as the 'southern Highlands':*

We know not why the sympathies of our sentimental tourists have recently flowed so exclusively in the direction of the north Highlands. It may be that the tartan kilt is more picturesque than the grey plaids of the southern mountaineers... Be the cause what it may, the fact is undoubted that, whilst the north is inundated with peripatetic philanthropists, the shepherds of the Lammermuirs and the miners of the Lowthers are left to fight their own way in the world... But... there is much to interest both in the scenery and people of the southern Highlands, and not the less so that they are within a forenoon's drive of our own doors... It was to explore a portion of this mountain region that we started one forenoon last summer.

Our first impression of the Leadhills was not favourable. Six weeks of almost daily rain had brought the whole soil into the condition of a well-filled sponge; every bank and the thatched roofs of the cottages were constantly dropping [*sic*], all the streamlets and ditches were full of half muddy water, and the stunted trees, their stems grey with long lichens, and their leaves soft, flabby and unnaturally green, had a decaying melancholy look.

*Nothing has changed there then! J.N. continues to say that after a few days, when the sun broke through the clouds, the village had 'a more agreeable aspect' and he continued with a general description of the area, including the surrounding hills, valleys and villages, before turning to the main activity of the region:*

...all along the valley, and scattered over the sides of the hills, are seen the signs of the peculiar pursuits of the place; small openings where the search for ores has proved unsuccessful, larger heaps of grey rubbish, now half concealed by grass where the mines are exhausted, and those still active rickety-looking gins, with weary-looking horse slowly dragging up the heavy ores from the bowels of the earth, and long drains, with silver threads of water winding round the acclivities, often from a great distance, for washing the ores.

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*It continued by explaining that the chief object of visiting 'this mountain hamlet' was to examine the 'peculiar mineral characters of the formations to which it owes its existence'. It should be remembered that in 1857, much of the work on the Southern Uplands had been carried out by 'gentleman geologists'. The Geological Survey of Great Britain had been founded scarcely twenty years before the article was written and the incarnation of the Scottish Survey was still ten years in the future. J.N. also refers to Macculloch's map of Scotland. John Macculloch (1773-1835) was appointed geologist to the Trigonometrical Survey in 1814 and began to study the geology of Scotland at around that time. He worked on his geological map of the country from 1826 to 1832 and it was published in 1836, a year after his death.*

In glancing over a geological map of Scotland, a great uniformly coloured band of rocks will be observed running from side to side of the island. In one way or other we had visited most of the interesting localities in this group of rocks, from the wild headlands of crushed and contorted strata that run out into the eastern sea, between the porphyry precipices of St Abb's and the robber's nest of Fast Castle on the one side to the Mull of Galloway and Loch Ryan on the other... The dark monotonous blue, with which Macculloch indicated the "slates and greywackes," to which Sir R. I. Murchison has given the more euphonious name of the Silurian system, is here unbroken by a single trace of other rock.

*The 'Silurian system' may have been more euphonious, but was also erroneous. The slates and greywackes are now considered to be Ordovician, though this system was only created later by Lapworth in 1879, so we have to excuse the author. He continues with some further observations and dilemmas:*

One wonders why this small region should have its strata of blue and grey slates laced with rich veins of lead and silver, and the sand of its mountain streams mingled with grains of gold. An examination of the region does not remove the difficulty. Rocks, similar in every respect, may be found from one extremity of the chain to the other. The same slates and greywackes, with the same red felspar porphyries, run away into Peeblesshire and the Lammermuirs on the east to Dumfries, Wigton, and the north of Ireland on the west. Even a special bed of flinty slate, which cuts off all the ores to the north, may, according to the miners, be followed far to the east, where, if not the same bed, assuredly others of similar character occur. There is no special mark of disturbance either in the internal or external features of the country to which we can point as the cause which has filled rocks with these metallic treasures. So far is this from being the case, that, standing on the top of the Lowthers, we see rising

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up all around mountain groups where the internal fires have been busier at work and left more legible traces of their prowess. Away to the west is the wild granite region of Cairnsmuir and Loch Doon, rivalling even Cruachan in its barren grandeur; whilst nearer at hand on the east, Saddleback, Hartfell and White Coom Edge, and their compeers, tell where Loch Skene rests in its crater-like hollow. On the north, again, we have Tinto, rising boldly up from the valley of the Clyde, and throwing out his buttressed shoulders towards the Pentlands. Still in the central valley, but far to the west, Carntable, the Wardlaw, and other lofty summits, the fastnesses of the old Douglas, are perhaps the most picturesque range in view, with far more form and character than the loftier but massive Silurian mountains to the south. In all these localities, internal fires have at one time been active, as indicated, not only by the nature of the rocks, but even by the external features of the ground. But here, in the centre of the whole, we find few traces of their power, unless the mineral veins may be taken as such— thus forming a remarkable exception to the ordinary law associating rich ores with ancient igneous action.

*I just had to include that excerpt in its entirety— it was the internal fires that did it for me! I take it that the 'flinty slate' must be the Ordovician chert. Of course, it **was** internal fires, or at least the late Caledonian magamtic activity that led to the development of the veins in the Leadhills area. And now we know that there is mineralisation, albeit to a lesser degree, associated with this activity throughout the Southern Uplands and into Ireland. But there was more confusion to come, after a description familiar to any geologist who has wandered in the Southern Uplands:*

...for the most remarkable feature of the locality is undoubtedly the thick cover of the most peculiar detritus spread over the whole mining region. Nothing disappoints a geologist more than the difficulty of getting at the rocks. He wanders over the slopes of the hills and finds nothing but grass, heather and a few loose stones even to the very highest points of the Lowthers; he searches the beds of the streams and the deep gashes they have cut in the mountain flanks, but his toil is rarely rewarded by a few square feet of exposed rock. Everywhere the thick cover of brown clay, with small angular fragments of greywacke, interposes between him and the objects of his search. It is only in some of the remoter valleys that the rocks are more fully exposed. It almost seems as if the basin of the Leadhills had at one time been a lake into which the detritus from the neighbouring mountains had been washed down...

The geological nature of the country may be given in a few words. The rocks are chiefly greywacke, a coarse bluish coloured sandstone, so very hard and

compact as to be well designated *whin* in the south of Scotland. These rocks lie in strata inclined at a high angle, and are broken through by beds of red felspar porphyry common in other parts of the southern Highlands, and in Cumberland. The strata run nearly east and west by compass as in the whole chain. The lead ore, on the other hand, fills veins intersecting the beds nearly in a north and south line, and mixed with other minerals. The arrangement of these minerals is very curious. The veins descend almost vertically into the earth and to an unknown depth, none of them ever having been explored to the bottom. They appear as if the solid crust of the earth had cracked and burst asunder during some great upheaval or convulsion, leaving rents and fissures varying in width from several feet or yards to a few inches, or even to an almost imperceptible thread. In these vertical rents the mineral ores and vein stones have been deposited, not as might have been expected in horizontal layers in the order of their specific gravity, but in thin plates parallel to the sides of the vein, and in the same order on each side. Thus if on one side we have calcspar, lead ore, quartz; on the other side there would be the same layers with the quartz in the centre... Some of the other substances extracted are however turned to use, as the heavy spar or sulphate of barytes, which is now ground down and employed as a white pigment. The principle ore of the lead is the galena or sulphuret of lead, but many other rarer compounds of this metal occur, some of them indeed peculiar to this locality, having never been found elsewhere.

*This illustrates the contemporaneous thinking that ore deposits were deposited as an alluvial formation. The Leadhills – Wanlockhead area is also known for its zinc ore, but zinc was not sought after until 1788, thirty years after the article was written. And barite, though it was used for pigment, was not as important as it became after the discovery of North Sea Oil, when it was extracted and used to provide greater density in the drilling mud. But to return to the mid nineteenth century— the article continued with a description of conditions that would have given an earlier Health and Safety Officer a headache indeed:*

One of the most singular features of the Leadhills is the smelting-houses, in which the metal is extracted from the ores. These are erected in the valley about a couple of miles below the village, and are one of the first objects to attract the notice of the visitor. The ore is generally first pounded and washed to free it from earthy impurities. It is then roasted in order to drive off the sulphur and other volatile ingredients, and melted with a little lime as a flux and run into bars. Some of the volatile products thrown out into the atmosphere

## A visit to the Leadhills

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during the smelting of the ores are of a nature highly prejudicial to animal and vegetable life, and used formerly to occasion much injury in the valley. Many domestic and wild animals were destroyed, and the health of the workmen seriously affected by the poisonous fumes. These bad effects have been greatly modified since the present furnaces were erected, with chimneys sloping up the sides of the mountains for some hundred yards. In passing through these long passages much of the volatile lead that formerly escaped into the air and was lost is thrown down and recovered when the chimneys are cleaned. The vapours that escape are still however still highly obnoxious to vegetation, and the hill side for a considerable space round the mouth of the chimney is nothing but bare earth, without even a blade of grass or solitary wild flower. Further from the mouth of the sollatarra, as we may name it, first a few detached tufts of grass, and then continuous turf ornamented with the bright yellow flowers of the dwarf cistus, the hawkweed and other hardy mountain plants appear. Though by these improvements much of the fatality among the animals has been averted, still it is found that domestic fowls will not live in the village, and even cats and dogs are rarely seen.

*The article then turned to 'the people who inhabit this out-of-the-way corner of our native valleys' and though interesting from a socio-anthropological point of view, we shall skip to the postscript, which verges upon the geological, though is mainly of industrial or technological interest:*

We also visited the village of Wanlockhead, on the other side of the ridge, lying in the basin of the Nith, and not in that of the Clyde. The lead ores in all this region contain a notable amount of silver, ranging from ten to twenty ounces in the ton. At one time it is said all the lead from the Leadhills was sent to Holland where the silver was extracted, but subsequently the expense was found to overbalance the gain, and the precious metal was allowed to remain in the baser alloy. This is still the case at Leadhills, but at Wanlockhead the Duke of Buccleuch has introduced Mr Pattinson's process for extracting the silver. This gentleman found that when a mass of molten lead began to solidify in cooling, crystals of nearly pure lead were formed, whilst the silver was left in the remaining portion. To turn this discovery to account, he arranged in a row large hemispherical iron pots, each capable of containing several tons of lead, and each with its own furnace. Into the first of these the bars of pig-lead are thrown, and after being melted and the dross removed, are left to cool. As the crystals of lead form, they are fished out by huge spoons with holes in the bottom, through which the liquid metal may run off, and are transferred to the

second pot, where they are subjected to the same process. Each huge spoon, which an ordinary man can hardly move, is suspended by a chain and managed by several brawny smelters. In the first pot, the crystals have lost perhaps half their contents of silver, in the second this is still further reduced, till in the fourth or fifth it is not worth further search, and the refined ore is run out into bars. What remains in the other pots is successively transferred into the preceding one— from the third to the second, the second to the first, till the last contains all the silver mixed with comparatively a small portion of lead. This last portion is finally got rid of by oxidating the lead, when the silver remains in the pure metallic condition. By this beautiful process a large quantity of silver is obtained – in 1855 Scotland yielded about 5000 ounces, all we suspect from these mines – which was formerly useless in the lead, whilst the quality of the latter material is not injured but improved. We could not avoid regretting that this example was not followed on the other side of the hill, where the silver is still sold with the lead.

*The article finished with a summary. The author states that 'there is no reason to believe that the mineral wealth of the mountains is nearly exhausted', which is probably still the case, though with the decrease in demand for lead and an increase in recycling of metals, we shall have to wait long into the future before mining could ever be resumed on an economic basis.*

After a few days pleasantly, and, we trust, not unprofitably spent, wandering over the mountains, visiting the mines, and hunting for the whites, reds and greens, as the miners name some of the rarer ores of lead, among heaps of rubbish, we left the Leadhills, with agreeable recollections of the kind and intelligent attention we had received from all classes of the inhabitants with whom we had had any intercourse. There is no reason to believe that the mineral wealth of the mountains is nearly exhausted, and we hope that the untoward circumstances to which the present depressed condition of the village is owing, may soon be removed, so that the expatriated miners may return to their native valley none the worse of their intercourse with the inhabitants of the lower world.

J.N.

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*Copyright on the original article in The Scotsman has lapsed. Nevertheless, we should like to acknowledge Scotsman Publications for their part. Helen Smailes is an art historian with an interest in geology. She joined the Society in 1997.*

# **An Edinburgh Walk**

**by Peter Dryburgh**

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*On the evening of the 16th June 2004, about thirty intrepid members of the Society walked around Edinburgh for two hours, during much of which the rain fell with malicious vigour. The purpose of the excursion was to visit houses associated with some famous geologists and other important figures in science and the arts.*

*Several people who attended the excursion suggested that Peter should write something about it for THE EDINBURGH GEOLOGIST and here is the result. Perhaps readers can now follow the route at their leisure and in finer weather.*

## **Introduction**

My recognition of houses associated with some famous geologists and other important figures in science and the arts began years ago but changed abruptly from a casual interest into a sort of collector's enthusiasm when I first saw the plaque outside number 15 London Street, which informed me that the musician, Sveinbjörn Sveinbjörnsson, and the poet, Matthias Jochumsson, had composed the Icelandic national anthem in the house in 1874. I started to compile a list of little-known houses of historical significance. Some years later, the Committee on the Public Understanding of Science (COPUS) produced an excellent map indicating the houses of important scientists and engineers, and my collection of slides and literature started to expand rapidly.

## **The route**

The walk started at the Royal Museum on Chambers Street and proceeded along George IV Bridge to the High Street and then across Princes Street to Hanover Street. From Hanover Street we walked along George Street to Charlotte Square and then back along Queen Street to St. Andrew Square. From there we took the road along the Bridges to Drummond Street, down past the Flodden Wall to the Hutton Memorial Garden at St. John's Hill, along the Pleasance to West Richmond Street and back to Lothian Street and the Museum, via Potter Row.

No excursion could possibly offer a comprehensive coverage of Edinburgh's historically important houses and, on this walk, we had to bypass a large number of them. However, many of the stopping places were sufficiently close to places which, even though they lay off the main route, were important enough to make them worth mentioning in passing.

We met in Chambers Street outside the Royal Museum.

### The Royal Museum of Scotland

The geological collection of the Museum contains the huge collection of minerals amassed by M.F. Heddle (1828-1897) as well as that of Patrick Dudgeon (1817-1895), who was a close friend of Heddle and who left 3574 specimens to the Museum between 1873 & 1894. Heddle and Dudgeon were founders of the Mineralogical Society in 1876.

The route took us west along Chambers Street, at the end of which we could see over to **Greyfriars Churchyard**. In this small churchyard are buried (amongst others) James Hutton, Joseph Black, Alexander Munro, George Dunbar, Duncan Forbes of Culloden, Allan Ramsay, Colin Maclaurin and James Craig.

North along George IV Bridge is the **Central Public Library**. The land on the Cowgate, now occupied by the library, formerly belonged to the Little family. Clement Little bequeathed his personal library to the City in 1580 but, because nobody knew what to do with it, it was transferred to the custody of the 'Maister of the College' in 1584 and formed the nucleus of the library of the University of Edinburgh. Sir Thomas Hope (1580-1646), the Lord Advocate, later built his house on the site where the Central Library now stands. The library is one of the 2811 paid for by Andrew Carnegie.

Over the Royal Mile is **Deacon Brodie's Tavern**. The exploits of Deacon Brodie are well known, but what is less well known is that, in the 18th century, the site of the present tavern was occupied by **Paterson's Court**, where lived James Lind (1716-1794), who first recognised that scurvy could be prevented by the eating of citrus fruit and arranged the world's first controlled clinical trial to verify his view. It took some years for the Admiralty to act on his findings but the general issue of lemon juice to the sailors of the Royal Navy started in 1795. It has been said that lemons did as much as Nelson to defeat Napoleon. The later use of limes gave rise to the nickname 'limeys' applied to British sailors. From Deacon Brodie's Tavern, we walked a short distance up the Royal Mile to:

### 297 High Street

Hugh Miller (1802-1856) became editor of the Evangelical newspaper, *The Witness* in 1839 and edited it from 297 High Street. He started to receive international recognition of his geological work at the British Association Meeting of 1840.

As we walked down the Mound from the Royal Mile, we could see the elegant buildings of **Ramsay Garden** to the left. Sir Archibald Geikie, Director of the

## An Edinburgh Walk

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Geological Survey in Scotland from 1867 to 1882, lived in a house here for some years. The walk continued down the Mound and across Princes Street.

### 21 Hanover Street

Alexander Bain (1810-1877), originally from Caithness, invented the chemical telegraphic recorder and the forerunner of the fax machine. He devised electric fire-alarms and master-slave electric clock systems. His workshop was at 21 Hanover Street.

We walked up Hanover Street and into George Street. Several addresses along here were of particular interest.

### The Royal Society of Edinburgh, George Street

The Royal Society of Edinburgh was founded in 1773. The first volume of its *Transactions* was published in 1788 and included Hutton's *Theory of the Earth*. The Society moved to George Street from its original home on the Mound, the Royal Institution, in 1909.

### 60 George Street

The poet, Percy Bysshe Shelley, lived here after his ill-judged elopement.

### 128 George Street

Sir James Hall lived here from 1817 to 1832. He was the father of experimental geology, showed that crystals could grow from a melt and first used the word *crystallite*. He was well known in his day for his theories of architecture and was the author of *Origin, Principles, and History of Gothic Architecture*. After his death, his mansion at 128 George Street was occupied by the Mercantile Bank of India, London and China.

In walking along George Street, we crossed Castle Street, with two literary connections. Kenneth Grahame, the author of *The Wind in the Willows*, was born in **30 Castle Street** in 1859. He claimed to be a descendant of Robert I. On the other side of George Street is **North Castle Street**, in which Sir Walter Scott lived at number **39** from 1820 to 1826.

Reaching the west end of George Street, we turned to descend North Charlotte Street. There are a number of houses worthy of note that lie near here. **16 South Charlotte Street** was the birthplace of Alexander Graham Bell, the inventor of the telephone. He was also the inventor of the iron lung and became a professor of chemistry. In **Charlotte Square** itself, John Scott Haldane (1860-1936) was born at number **17**.

He studied respiration, introduced mice into mines to check for poisonous gases and discovered how divers could avoid the 'bends' by a progressive decrease in air pressure. Lord Lister, the pioneer of aseptic surgery lived at **9 Charlotte Square** between 1870 and 1877. Incidentally, because of Lord Lister's well-deserved fame, the reputation of his father, Joseph Jackson Lister, is often overlooked. Lister senior designed the earliest achromatic microscope objective, which revolutionised microscopy. He was made FRS in 1832 and was a founding member of the Royal Microscopical Society.

Nearby, between Charlotte Square and Haymarket are a number of other interesting houses. **8 Stafford Street** was the home of John Scott Russell (1808-1882), who discovered the solitary wave or 'soliton' in the Union Canal at Hermiston. The soliton has proved to be an important element in the modern theory of dynamical wave systems in such diverse areas as non-linear optics, optical fibre communication, hydrodynamics and tornadoes. He revolutionised naval architecture, started a steam carriage service between Glasgow and Paisley, made the first experimental observation of the Doppler Effect in the sound of a passing train and built Brunel's iron ship, the 'Great Eastern', to whose design he made a major contribution, helped to build Britain's first armoured warship and attempted to negotiate a peace treaty during the American Civil War. He reorganised the Royal Society of Arts, founded the institution of Naval Architects and was made FRS in 1849.

Sir David Brewster (1781- 1868) lived in the house at **10 Coates Crescent**. He was a pioneer of crystal optics, photography and lighthouse lenses, wrote 300 scientific papers and a biography of Isaac Newton, invented the kaleidoscope, studied polarized light and was the Principal of St. Andrews and Edinburgh Universities in succession. He played a major part in the setting up of the British Association.

**11 Rutland Street** is another of the houses in which Lord Lister lived. At **3 Moray Place** lived one of Edinburgh's many forgotten citizens, Robert William Thomson, who invented the pneumatic tyre in 1845 (40 years before Dunlop) and also the fountain pen. He patented the first mechanical road haulage vehicle, the steam traction engine. 'Thomson Steamers', fitted with padded rubber tyres, were used all over the world.

James Clerk Maxwell, one of the world's greatest physicists, was born at **14 India Street**. The house is now the headquarters of the James Clerk Maxwell Foundation. Nearby, in **Royal Circus** was the house of Robert Jameson (1774-1854), who was the Professor of Natural History at Edinburgh University for 50 years. He established the Wernerian Natural History Society in 1808 and was extremely influential in

## **An Edinburgh Walk**

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geological circles. Having walked down North Charlotte Street, our route then took us along Queen Street:

### **9 Albyn Place (Queen Street)**

Allan Campbell Swinton (1863-1930) proposed the idea of 'distant electric vision' using cathode rays. J.L.Baird's later system of television was never widely adopted but modern television follows some of the principles suggested by Swinton.

### **75 Queen Street**

Sir Walter Scott's mother lived here. Her maiden name was Rutherford and she was the aunt of Daniel Rutherford, the discoverer of nitrogen and inventor of an early maximum-minimum thermometer.

### **62 Queen Street**

This was the house of John Leslie, Professor of Natural Philosophy, who studied heat transfer and invented the wet & dry bulb hygrometer.

### **52 Queen Street (Simpson House)**

James Young Simpson, Professor of Midwifery and pioneer of anaesthesia, was born in Bathgate but lived for much of his professional career at 52 Queen Street and died here.

### **32 Queen Street**

Charles Wyville Thomson ran the offices of the 'Challenger' Expedition in this house. The modern science of oceanography was essentially founded by Edward Forbes, John Murray and Thomson.

### **28 Queen Street**

Francis Maitland Balfour recognised that the notochord was found in primitive organisms and in the embryos of vertebrates and helped to trace the evolutionary links between them.

At the eastern end of Queen Street, we made our way up to Princes Street and on to the Bridges – North Bridge and South Bridge. Near the route are three significant houses. Although he lived there for only the first few years of his life, **34 Dublin Street** was the birthplace of Sir Nigel Gresley, the locomotive designer who designed the A4 'Mallard', which established the international speed record of 126 m.p.h. for steam locomotives in 1938. That record still stands.

In **York Place**, Sir Henry Raeburn (1756-1823), the leading portrait painter of the age had his studio at number **32**. Geologists should visit the National Portrait Gallery and admire his portrait of James Hutton. At **47 York Place**, two generations of Nasmyths are associated with this house. Alexander, the artist, was on board one of the earliest steam-powered boats (built by Symington in 1788) and was accompanied by Robert Burns. His son, James, moved to Manchester, invented the steam hammer and built over 100 locomotives.

### North Bridge

The former premises of the pharmaceutical firm Duncan & Flockhart are marked by a plaque on the wall of the Balmoral Hotel. This firm provided the chloroform used by Simpson in his historic work on anaesthesia.

We crossed the **High Street** again. Close to John Knox's House lived the botanist Robert Brown (1773-1858), who discovered the cell nucleus and the Brownian Motion. Also close to John Knox's House lay **Trunk Close**, now disappeared. A shop on the right-hand corner was the first business of Archibald Constable, bookseller and publisher. South Bridge took us high over **The Cowgate**, off which William Cullen (1710-1790) lived in **South Gray's Close**. He was Professor of Chemistry and Medicine and discovered the cooling effect of evaporation. Just past the Old College of the University, we turned left.

### 2 Drummond Street

This was the house of Alexander Rose (1781-1868), who was the founder of the Edinburgh Geological Society in 1834. He was an ivory turner and mineral dealer and gave classes in mineralogy and geology.

### 15 Nicolson Street

Alexander Adie (1808-1879) was an instrument maker who supplied Brewster with lenses and made a polarizing microscope, which became obsolete when Nicol invented his polarizing prism. Adie's house at 15 Nicolson Street was demolished, probably in 1880, during the building of the Empire Palace, now replaced by the Festival Theatre.

### St. John's Hill

The James Hutton Memorial Garden was opened in 2002 and is situated close to the site of Hutton's house at St. John's Hill.

## An Edinburgh Walk

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Also in St. John's Hill, John James Waterston (1811-1883) lived close to the house of James Hutton. He wrote a paper on kinetic theory in 1845 which was so far ahead of its time that it was rejected by the Royal Society and not appreciated till after his death. The family stationery business was famous for the manufacture of sealing wax. We turned right into West Richmond Street, passing Davie Street on the left.

### Davie Street

In 1760, Hutton and his friend John Davie, commemorated in the name of the street, established a factory here to manufacture ammonium chloride (sal ammoniac) from soot. The works covered half an acre and were very profitable. Hutton became a partner in 1765 and derived considerable income from the company until he died.

We crossed Nicolson Street into West Nicolson Street.

### Pear Tree House

Pear Tree House was built in 1747 and was the birthplace of Andrew Usher (1826), who is often credited with being the first producer of blended whisky. (His elder brother started the Usher brewing business in 1831). In 1896, Andrew gave £100,000 to build the Usher Hall, the dome of which is said to have been modelled on the smaller dome of Pear Tree House. After years of being used as a store for whisky casks, it became a pub in 1982.

We turned north up Potter Row, and from there we could see the Medical School. This stands on the site of **Park Place**, the home of James David Forbes (1809-1868). Forbes was a geologist best known for his work on the movement of glaciers and the geomorphological effects of ice. From here, it was back to the Royal Museum, albeit the rear entrance. Nevertheless, this was also a memorable site.

### 11 Lothian Street

Charles Darwin lodged here while a medical student from 1825 to 1827. A commemorative panel was installed over the rear entrance to the Museum in November 2002, a much more visible monument than the obscure little plaque on one of the museum's galleries, which had previously been the only indication of the Darwin connection.

Also in Lothian Street, number 42 was one of the houses occupied by Thomas De Quincy, author of *Confessions of an English Opium Eater*, published in 1821.

### Further reading

For those interested in locating other historic houses in Edinburgh, there is a wealth of literature and the following small selection may provide some helpful starting points.

Harrison, W., 1898. *Memorable Edinburgh Houses*, Oliphant, Anderson & Ferrier, Edinburgh.

Hamilton, A., 1978. *Essential Edinburgh*, André Deutsch, London.

Pennycook, A., 1973. *Literary & Artistic Landmarks of Edinburgh*, Albyn Press, Edinburgh

Mitchell, A., 1993. *The People of Calton Hill*, The Mercat Press, Edinburgh.

Dick, D., 1997. *Who Was Who in the Royal Mile*, Clerkington Publishing Co., Haddington.

Scotland, A.W., Taylor A.J. & Park, W.G., Eds., 1984. *The Streets of Edinburgh*, Edinburgh Impressions.

McKee, A. et al. (COPUS), 1993. *The Edinburgh Science Map*, Fisk Productions, Edinburgh.

Butcher, N., 2002. *SP2 Scientific History of Edinburgh Excursion Map*, 18th I.M.A. Conference, Edinburgh.

Keay, J. & Keay, J., Eds., 1994. *The Collins Encyclopaedia of Scotland*, Harper Collins, London.

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*Peter Dryburgh is a physical chemist by profession but has always had an interest in earth science and in its history. He retired from the University of Edinburgh, where he was a lecturer in the Electrical Engineering Department a couple of years ago and was President of the Edinburgh Geological Society from 2001 to 2003.*

# **Scottish Slate**

**by Alan McKinney**

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In the year 2000, the Scottish Stone Liaison Group (SSLG) was founded. Its remit is enhance availability, promote utilisation and advance knowledge and skills in design, specification and use of indigenous Scottish stone in existing and new build projects.

One of its first decisions, working from the Historic Scotland Technical Advice Note No 21 entitled 'Scottish Slate Quarries', was to look at the old Scottish slate quarries and to propose the carrying out of tests to determine the quality of the slate reserves still available.

Within seven months, SSLG secured permission of all parties that had an interest in their proposal: Ballachulish and Glencoe Community Council, the mineral rights holder, the landowner, Highlands Council, SEPA and SNH. Financial support from Lochaber Enterprise and the Highland Council underpinned finance made available from Historic Scotland which enabled the test to proceed.

Scottish slate, also found on the island of Easdale, south of Oban, and at the Hill of Foundland, Aberdeenshire, where test extractions were also undertaken, is of Dalradian age. The Ballachulish slate is part of a Middle Dalradian marine sequence and stratigraphically overlies the Ballachulish Limestone. The slate beds are widespread and suggest long periods of quiet sedimentation over a wide area, providing little input of silt and sand. In the Ballachulish area, the whole succession is inverted as part of one of the famous Dalradian nappes.

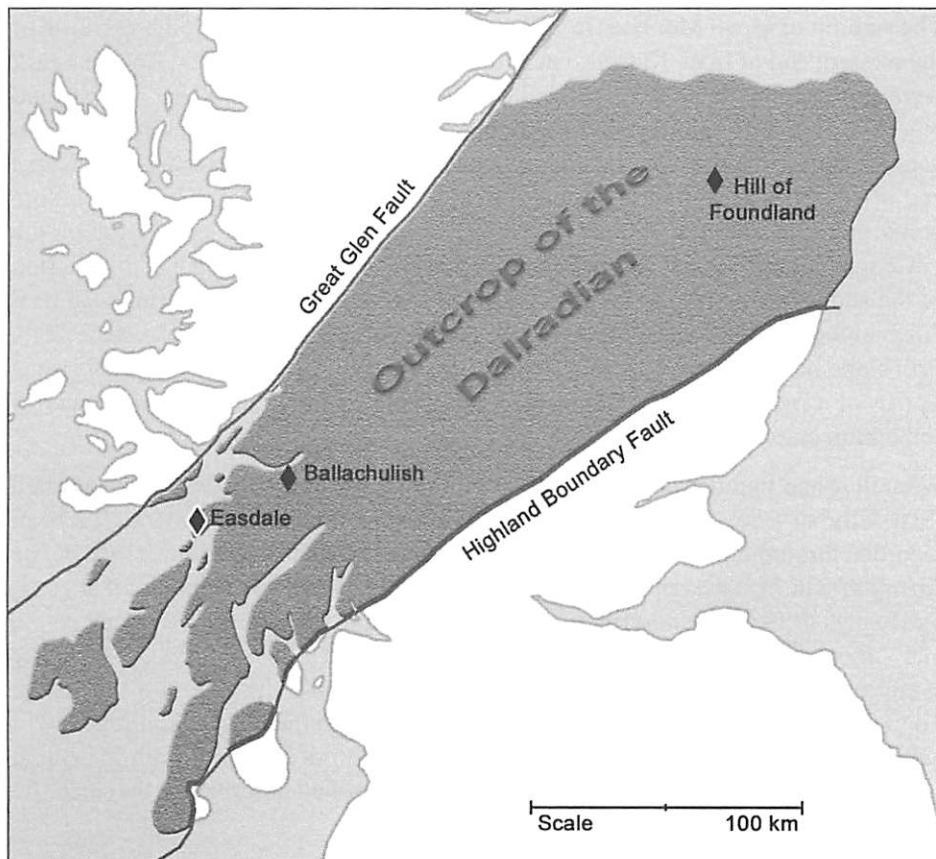
The planned extraction of slate at Ballachulish was scheduled for the Spring of 2001 but the outbreak of the Foot and Mouth Disease resulted in the entire project being placed on hold, and it was only resurrected later in the following year. During the week beginning the 19th September 2002 the first blocks of Scottish slate for some 50 years were extracted from the Khartoum Quarry, Ballachulish. The work was undertaken by a slate producing company using pneumatic drills, diamond saw cutting and finally freeing the blocks by the use of black powder charges. The blocks were then transported to the company's production sheds to be riven into slate. From there, the samples were forwarded to the University of Paisley for analysis.

The local Ballachulish & Glencoe Community Council, having agreed to the test extraction, was naturally concerned at the possible outcome of these tests. A delegation, lead by its then Convener Mr I Brown, paid two visits to the site towards the end of the week to view the work undertaken.

A Report of the University of Paisley which contained an analysis of the slate block was prepared and sent initially to the funding bodies. This report indicated that the slate was of a very good quality with a life expectancy exceeding standard slate by 200%, though the samples available did not split very well.

On the 18th August 2003, the SSLG Chief Executive met with the Ballachulish Community Council and the Councillors present were advised of the results and it was subsequently agreed to enable a coring exercise to be undertaken. In the summer of 2004 this was completed, coring some 40 metres into the hillside, and the University of Paisley is again analysing the material secured.

It is anticipated that the results of both exercises will be published by Historic Scotland in due course.



## Strange Earth No 20

### Pwdre Ser or 'Star Jelly'

by Bill Baird & Ronnie Leask

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*It is twenty years ago this autumn that Bill Baird wrote his first Strange Earth article for THE EDINBURGH GEOLOGIST. He has visited nearly every continent in his series and brought us some strange tales indeed—rather reminiscent of the early explorers reporting their bizarre finds to the Geographical Society in London. I am thinking of Professor Challenger and the Lost World, but these are all true stories, which makes them all the more weird and wonderful.*

*For Bill's latest, he comes nearer to home and tells of a personal experience.*

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The summit of Meall Mor rises to 747 metres approximately two kilometres north of the western end of Loch Katrine. On 29th March 2004, Bill Baird and Ronnie Leask were approaching the 600 metre level just before midday. The weather was dry and breezy with a fairly cloudy sky. Temperature at that level was probably just a few degrees above freezing. On the higher slopes could be seen the remnants or wreaths and drifts of snow from a previous snowfall. As they both took a breather before going on to the summit, Ronnie poked one of several pieces of snow lying on the grass and remarked that it was the first they had come to. Bill noticed that the reaction of the snow fragment to a poke with Ronnie's walking pole was unusual. He bent down and picked the piece of 'snow' up and found that it had the consistency of a firm blancmange. The appearance even at arm's length was still absolutely the same as that of a piece of settled fragmented snow bank but the tactile message was of something entirely different.

What they had found was that most mysterious of substances, *Pwdre Ser*, also called 'Star Jelly' or a gelatinous meteorite. Although uncommon, such material has been recorded throughout the centuries, and in fact Scott refers to such a substance in *The Talisman*. The best description of the material found by Bill and Ronnie is that given by Hughes in 1910. He describes it as 'a mass of white translucent jelly lying on the turf – these masses were about as large as a man's fist'. The description fitted the samples on Meall Mor although they were perhaps more the size of a half brick. Their shape was sub-angular and fragmentary as though they had been broken off a larger whole. Although this substance has a long recorded history, both in general and historic literature, its source and substance are less well described in the scientific literature.

It is interesting that the best visual descriptions of this substance are by geologists. However, those scientific studies which have been carried out on the material that makes up *Pwdre Ser* have been inconclusive, although they generally suggest a bacterial origin. There have also been comparisons drawn with slime moulds and reference to the material having a strong smell (though that was not noticed in this instance). It has also been described as being luminous by some writers but as it was found during broad daylight, Bill and Ronnie were unable to test this assertion.

Throughout the varied literature concerning *Pwdre Ser* is a strong connection, real or imagined, with meteorites and shooting stars. In fact, one reported occurrence from the United States became the basis for the Steve McQueen horror movie *The Blob*. The simplest explanation for this connection is that when people are out looking for parts of a meteorite fall, they are looking carefully at the ground. This would also explain why geologists seem to report such occurrences more than others.

Perhaps we should have tipped our coffee from our flasks, stuffed them full of the unknown blancmange, and rushed it back to Edinburgh University Microbiology Department for urgent laboratory tests. On the other hand, at the top of Meall Mor with a cup of coffee in your hand and the snow-streaked hills stretching away to the far horizon, what is one mystery solved when there are so many more to discover?

If you want to read further, can we suggest:

Hughes, T McKenny, 1910. *Pwdre Ser*, *Nature* vol. 83, pp. 492-494.

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*Bill Baird is a long-time member and past President of the Edinburgh Geological Society. For nearly forty years, he was on the staff of the Royal Scottish Museum (now National Museums of Scotland). He has an interest in volcanoes, landscape, fossils, and holes in the ground in general.*

*A list of Bill's earlier Strange Earth articles was given in the Spring 2004 issue of THE EDINBURGH GEOLOGIST. They are all now on the web site.*

# Poet's Corner

## Song of a Geologist

Hammers an' chisels an' a',  
Chisels an' fossils an' a';  
Sir Rory's the boy o' the right sort o' stuff,  
Hurrah! for the hammers sae braw.

It's good to be breakin' a stone,  
The work now is lucky an' braw;  
It's grand to be findin' a bone—  
A fish-bone the grandest of a'.

Hammers an' chisels an' a',  
Chisels an' fossils an' a';  
Resurrection's our trade; by raising the dead  
We've grandeur an' honour an' a'.

May labour be crown'd wi' success—  
May prudence promulgate the story—  
May scoffers grow every day less,  
Till the rocks are a mountain o' glory.

Hammers an' chisels an' a',  
Chisels an' fossils an' a';  
The deeper we go, the more we shall know  
Of the past an' the recent an' a'.

Here's freedom to dig and to learn—  
Here's freedom to think an' to speak;  
There's nane ever grumbled to look at a stone,  
Aye but creatures 'baith stupid an' weak.

Hammers an' chisels an' a',  
Chisels an' fossils an' a';  
In spite of the devil we'll dig as we're able—  
Hurrah! for the hammers sae braw.

Amygdaloid

The poem in this issue of THE EDINBURGH GEOLOGIST was sent to us by Gareth Peach, the great grandson of Charles William Peach. Gareth was commenting upon the article by Michael Taylor in issue of THE EDINBURGH GEOLOGIST of Autumn 2002...

The Royal Physical Society of Edinburgh seems to have been where Auld Reekie's scientists met most easily - people such as Hugh Miller, Charles Peach, and Edward Forbes, and youngsters such as Archibald Geikie. Chambers's Presidential address in November 1856 stressed the importance of the Society as a place to encourage learners and novices, and the exclusion of selfish and controversial motives (Chambers [1857], p. 175):

... I consider myself here chiefly in the capacity of a learner. I come here because I love science, and, from sympathy, like to be among its cultivators; also with the view of communicating any novelty in nature that may occur to my observation; but even in a greater degree, because I feel myself to be but slightly informed on most subjects, and wish to be more largely and more accurately informed on all.

I should have liked to be the proverbial fly on the wall!

Gareth suggested that Mike's attention should be drawn to the existence of the Red Lion Club. This was established in November 1844 as an offshoot of the British Association for the Advancement of Science and met to discuss science, literature and art. The Club's membership was restricted to twelve and Sir Roderick Murchison was amongst their number. In his travels to the north of Scotland, Sir Roderick and Charles Peach met Robert Dick, a 'baker of Thurso', and a geologist and botanist. Dick was a great fossil hunter and collector and wrote extensively on the fossil fish in the Old Red Sandstone.

The verses opposite were sent by Robert Dick to Charles Peach and were later published in the *John o' Groats Journal*. It is said that 'these verses so pleased Sir Roderick and the eminent band of geologists belonging to the Red Lion Club that they were inserted into their records and sung at their annual meetings.'

## **Appeal from an Arenophile**

### **a letter to the Editor from Jean-Yves Boudet**

---

*Madame, Monsieur,*

*Je suis ARENOPHILE, collectionneur de sables, et c'est la raison pour laquelle je vous écris... [I am a sand collector, and it's the reason why I write to you...]*

*Je m'adresse à vous car je recherche de nouveaux sables pour développer ma collection. Si vous trouvez ma demande originale, c'est peut-être que ma collection l'est aussi, et il m'est difficile en fait de la compléter, alors un petit geste chez vous serait ici pour moi une grande satisfaction... [I ask you because I am searching for new sands in order to expand my collection. If you find my request original, it's probably that my collection is too, and for me it's difficult to complete it, so a little gesture from you will be here to me a great satisfaction...]*

*Tous les types de sables m'intéressent : terreux, fins, grossiers, ou morceaux de roches... de tout aspect et toutes couleurs. Une petite quantité de 5 ml me convient, ou plus pour échange (une boîte de pellicule photo). [All type of sand are interesting me : earthy, fine, coarse, or pieces of rocks... of all appearance and all colours. A little quantity ( 5 ml ) will be sufficient to me, or more in order to do exchanges ( a photo canister ).]*

*Tous les lieux m'intéressent : plages, rivières, lacs, dunes, montagnes, glaciers, buttes, carrières, sites sous-marins ou souterrains, sites remarquables touristiques ou isolés... ( à m'indiquer le plus précisément possible, avec une commune voisine pour la localisation, si nécessaire points GPS )... [All places are interesting me : beaches, rivers, lakes, dunes, mountains, glaciers, knolls, quarries, submarine sites or underground, tourist attractions or isolated remarkable sites... ( indicate to me as good as you can, with town or GPS points )...]*

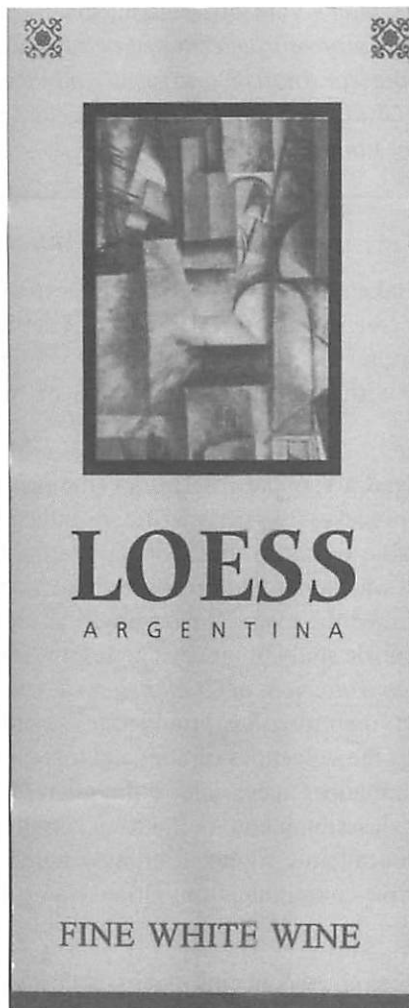
*Alors, pensez à moi lors de contacts ou de déplacements, de vous, vos amis ou votre personnel. D'avance merci à tous ceux qui contribueront au développement de ma collection. [So, think about me at the moment of contacts or travels, from you, your friends, or your staff. Thanks, in advance, for all those who will contribute to the development of my collection. ]*

*Veuillez agréer, Madame, Monsieur, l'expression de mes sentiments les meilleurs. [Would you agree, Lady, Sir, the expression of my better feelings.]*

*Mes coordonnées postales [My postal address]:*

**M. Jean-Yves BOUDET, 21, rue JP. Rameau, 85500 LES HERBIERS, FRANCE**

# Geo-vineyards



## Information

I am getting something of a reputation for myself in social circles in the Borders... I was at a lunch party in Peebles recently and noticed a bottle with the label opposite. "Wow!" I said, and the hostess followed my gaze. "Can I have that bottle, please," I asked, hastily adding that I wanted it after it had been opened and the contents consumed! I was asked whether this was a particularly interesting wine and I said that I had no idea, but that loess was a fine-grained aeolian sediment. The hostess thereupon pulled the cork and we tasted it, no doubt thinking that the sooner this nut was appeased, the better!

The label tells us that the wine is young, fresh and fruity (and we would agree). It continues that it is ideal to drink by itself (which we did) or as a complement to white meats, Asian combinations or any kind of fish or seafood.

I am afraid I have no idea why this Argentinian wine is called 'Loess'!

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*Thanks to Lesley Morrison of Peebles for being so understanding .*

*I now have labels with a geological slant lined up for the next two issues, but I am happy to receive any at any time... if only to save my reputation.*

# BOOK REVIEWS



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*There is one book reviewed in this issue, Brian Upton's *Volcanoes and the making of Scotland*. Brian is a Fellow of the Society and is professor emeritus of petrology at the Grant Institute. His book is reviewed by Professor Angus Duncan, also a Fellow of the Society, who is the head of the Research Graduate School at Luton. Angus has studied modern volcanoes, in particular Mount Etna in Italy.*

---

## **Volcanoes and the making of Scotland**

**review by Angus Duncan**

I can remember as a boy in Edinburgh being taken to the top of Arthur's Seat and being disappointed to find that there was no crater at the top. However, it set an interest in motion and I have had the good fortune to spend more than thirty years working on active volcanoes. I look back with gratitude to the birth of my volcanological interest in Scotland.

The landscape and scientists of Scotland played a seminal role in developing an understanding of igneous rocks and magmatic processes. As early as the seventeenth century, George Sinclair recognised that basaltic dykes in the Scottish coalfields were emplaced hot and set coal seams on fire. It was James Hutton and his associates at the end of the eighteenth century who described the magmatic origin of basaltic rocks setting the foundation of the modern scientific study of igneous petrology. It is not for nothing that Sir Archibald Geikie's *Ancient Volcanoes of Great Britain* devotes most of its coverage to Scotland. Brian Upton, therefore, has provided a valuable contribution in writing a single book that brings the volcanoes of Scotland together. The book is aimed at presenting the topic in a manner accessible to the interested public. It is difficult to maintain the balance of describing and interpreting complex phenomena with simplification and yet retain academic rigour. I strongly believe that this is a critical goal of effective scientific communication. Brian Upton is successful in achieving this.

The book begins by introducing the reader to geological concepts placing volcanoes and Scotland within a planetary context. This is followed by a brief overview of igneous and volcanic processes and a survival pack of terminology. The story begins at the end by considering Scotland's youngest volcanoes first and then working progressively backwards in time to the early Precambrian. Initially I felt slightly ill at ease with this as it ran counter to my way of thinking, but in fact it is a sensible approach as the picture becomes harder to put together as you move back in time.

## BOOK REVIEWS

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Not surprisingly the coverage of early Cainozoic Palaeogene volcanism, the British Tertiary Volcanic Province, dominates the book with 75 pages. This is followed by Permian and Carboniferous volcanism with 48 pages and then volcanoes in the Old Red Sandstone Continent with 33 pages. There is a chapter on volcanoes and the Iapetus Ocean and finally a brief look at the evidence for some of the earliest records of volcanism in what is now Scotland, as it is put 'Volcanoes seen as through a glass darkly: the earlier Precambrian record'.

The style is not descriptive; solid information is provided typically supported with maps and photographs and then an interpretation is put forward. This is a complex task, to derive a coherent explanation based on eroded remnants of the original feature. The interpretation is delivered as if the author is seated on a boulder looking out over the landscape or at an exposure and the reader is sharing the view. The arguments are explained in non-technical but rigorous language with uncertainties made clear. This is helped by reference to modern examples. The author succeeds in bringing the landscape to life. This is well illustrated by the discussion on the origin of the Sgùrr of Eigg pitchstone. It outlines how the glassy flow deposit of the Sgùrr infilled a valley at the time. This hard material was resistant to erosion leading to inverted topography with the Sgùrr now a prominent upstanding feature. The possibility is suggested that this deposit was emplaced by a pyroclastic flow and may in fact be a welded ignimbrite. (I prefer pyroclastic flow to the American term, ash flow, used in the book – much of the particulate material in the flow is coarser than ash).

The book is well presented and is an enjoyable read. The text is well supported with photographs, diagrams and maps. My one slight criticism is that not all the sources quoted for diagrams are listed in the Select Bibliography. I recognise the need for a book like this not to be burdened with an extensive list of reference. However, I do feel that readers who wish to follow up any of the maps or diagrams would have found this helpful. I recommend this book to all who are fascinated by the volcanic heritage of Scotland. It is a book that will be a welcome addition to all those with an interest in Scottish geology.

### **VOLCANOES AND THE MAKING OF SCOTLAND**

**by Brian Upton**

**published by Dunedin Academic Press, Edinburgh: £16.95 (hardback)**

**ISBN 1-903765-40-4**

# Rocksword Puzzle No. 12

compiled by Angela Anderson

## Clues across

1. Do enrich me over phylum of starfish, sea urchins, etc. (10 letters)
7. Make mistake in an erratic (3)
8. Rubble piles over us on castle (5, 5)
10. Italian river in poem (2)
11. Gan back a horse (3)
13. To be third person, singular (2)
14. O richly set a form of asbestos (10)
15. Negative (2)

17. Initially the Natural Environment Research Council (4)

20. Corrode in a poem (3)
22. A riser over a Spanish mountain ridge (6)
24. Some of these clues might seem like this (8)

## Clues down

1. Over in ten toxic events (10)
2. Less than a whole rift valley (4 - 6)
3. Loch of legends (4)
4. A Middle-earth ogre (3)

5. Responds to sinking rocks (10)

6. Clam curses over a mark of attachment (6, 4)

9. In another negative (2)

12. Exclamation (2)

13. Charged particle (3)

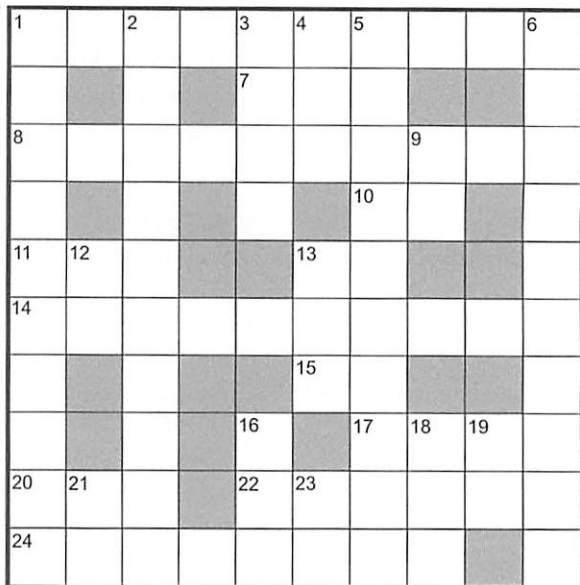
16. Employ (3)

18. We're in before (3)

19. Initially a car found in terrestrial sediments (2)

21. Much ado less a letter (2)

23. Not out (2)



*This is Angela's twelfth Rocksword puzzle – quite a remarkable feat in itself.*

*For those who can't manage to solve all the clues, the answers to this puzzle are inside the back cover of this issue.*

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# Proceedings of the Edinburgh Geological Society for the 170th Session 2003-2004 No. 34

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## Membership

The total membership of the Society at 30th September 2004 was (with last year's figures in brackets) 543 (565) comprising:

|                       |           |                    |         |
|-----------------------|-----------|--------------------|---------|
| Honorary Fellows      | 5 (6)     | Senior Fellows     | 47 (43) |
| Corresponding Fellows | 9 (11)    | Family Fellows     | 39 (40) |
| Distinguished Fellows | 2 (2)     | Glasgow Associates | 11 (10) |
| Life Fellows          | 14 (17)   | Junior Associates  | 8 (12)  |
| Ordinary Fellows      | 408 (424) |                    |         |

Changes in membership from session 2003-2004 are summarised here: 8 Ordinary Fellows were elected during the year while 16 resigned, were removed from the membership list or moved away. 7 Ordinary Fellows were transferred to Senior Fellowship. 1 Family Fellow resigned during the year and 1 Corresponding Fellow (Dr H H Schmitt) moved away. Fellows deceased during the year are listed below.

## Deaths

It is with regret that we record the deaths of Honorary Fellow Alwyn Williams, Life Fellows Brian Harland, Bill Read and Mona Wattison, Senior Fellow Elizabeth Linn and Ordinary Fellows Nigel Fannin and Jake Hancock. Corresponding Fellow Hatten S Yoder Jr and Senior Fellow Allan Aitken died towards the end of the session 2003-2004 but their passing was not recorded in the Proceedings.

Allan Aitken joined the Society in 1973. He was an architect by profession and an amateur member. He died in September 2003 at the age of 87.

Elizabeth Linn, sister of William Harper, joined the Society in 1975. She was an active participant on many of the field excursions in the 1980s. She died in February 2004, at the age of 84.

### Obituaries

#### Dr Nigel Fannin

Nigel joined the British Geological Survey in 1969 shortly after completing his PhD on the Old Red Sandstone in Orkney. He became one of the pioneers of marine geology in the UK, and had an exciting time designing and implementing a programme of research and discovery. He saw the first phase of the marine programme through to its end in the early nineties, at which time the UK was the only country to have mapped the geology of its continental shelf. Ever ready for a new challenge, he turned his attention to a European research project investigating the southern North Sea. In 1992, Nigel was given a new role to develop projects with the oil industry and as a consequence, was commissioned by the Falklands Islands Government to establish exploration. He was remarkably successful, managing to entice fourteen companies to explore in the region. Nigel had a tremendous influence in creating successful collaboration between BGS and oil companies exploring in the UK, leading major projects on the Atlantic Margin. He was a great ambassador for Geological Survey. He could be relied on to provide some good advice in times of personal difficulty, and would always provide encouragement. As a colleague from Lithuania put it 'This is really a big loss for marine geology and science in general. He was an excellent man, and memory of him will live in our hearts'. All who knew Nigel will remember him in different ways; for me, it is as a geologist, explorer and friend.

Robert Gatliff

#### Dr Jake Hancock

There are two things by which Jake Hancock will perhaps best be remembered: his pioneering work on sequence stratigraphy and his enthusiastic research into the relationship between geology and wine. In 1949, he went up to Queen's College, Cambridge, graduating BSc in 1952 and PhD in 1955, when he was appointed to the staff of King's College, London. His early stratigraphic work on the Cretaceous took him, amongst other places, across the Channel to France. Here, he visited and studied the main chalk outcrops in areas such as Bordeaux, Champagne and the Loire, discovering much about both of the rocks and the vines whose roots tapped them. In 1986, he accepted a chair at Imperial College, London, from where he retired in 1993, staying on as an emeritus professor and teaching not only classes in stratigraphy in the Department of Geosciences but also giving lectures on the professional Master of Wine course. He died in March of this year at the age of 75.

Editor

### **Brian Harland**

North Yorkshire's spectacular coast helped greatly to give Brian Harland, born in Scarborough, an early interest in geology: at the age of 13, he discovered on the coast parts of the spine and limbs of *Steneosaurus*, a huge Jurassic crocodile. In 1935 he went up to Cambridge, where he graduated with double first in Natural Sciences (Geology). Immediately on graduation in 1938, before embarking on a PhD, he joined a geographical expedition to Spitsbergen, on which he was the geologist. During his undergraduate years, he had become a Quaker, and when the Second World War broke out he worked as a Conscientious Objector on a farm. In 1942 he travelled to Chengdu to join the teaching staff at West China University, where he was later joined by his wife, Elisabeth, whom he had married earlier that year. They returned to Cambridge in 1946, where Brian had been offered a teaching post in the Department of Geology. At this time, he revisited Spitsbergen, and started to develop a programme that eventually resulted in no less than 43 summer seasons of expeditionary field work, of which he personally led 29. His teaching work was always of paramount importance to him and during his career at Cambridge, from 1946 to 1984, he was Demonstrator, Lecturer and then Reader. In the 1950s he was an advocate of the theory of continental drift at a time when support for the idea was limited to geologists from South Africa and Australasia, and most scientists in the northern hemisphere dismissed it as ridiculous. He was perhaps best known for his contributions towards *The Phanerozoic Timescale* (1964), *The Fossil Record* (1967), and *Mesozoic and Cenozoic Orogenic Belts* (1974). He was awarded the London Geological Society's Lyell Medal. He died in November 2003 at the age of 86.

Peter Friend

### **Dr Bill Read**

Bill Read, who died on 10th June 2004, spent his early years in east London, the son of a Thames lighterman. When war broke out in 1939, Bill, together with his entire school, was evacuated from London to Weston-Super-Mare, where he stayed with a Welsh family for three years. According to Bill it was on the tidal flats here that he first developed his interest in sedimentology. After graduating with first class honours in Geology at University College London in 1949, he joined the British Geological Survey's Edinburgh office, where he quickly became renowned for his great sense of humour. He spent many years field mapping and coalfield borehole logging in Stirlingshire, and it was this experience that formed the basis for his academic interests: Carboniferous sedimentology, the mechanisms of basin subsidence, and the structure

of the Scottish Midland Valley. Inspired by George Goodlet's work in central Scotland, he started to apply mathematical techniques to the Stirlingshire borehole data. These methods allowed him to delve deeper into the workings of sedimentary basins and to understand better the mechanisms of cyclical sedimentation. In 1972 his Survey career took a decisive turn, with promotion to District Geologist for the south-east of England and a transfer to the London office and later to Keyworth. He retired in 1985. Throughout his period in the BGS management, and in retirement, his research continued to be centred on the Midland Valley of Scotland. In the 1990s he began to apply sequence-stratigraphic models to the Scottish Carboniferous, again a ground-breaking application of new ideas. He also produced several overview papers on aspects of the Scottish Carboniferous, the most recent being a large contribution to the fourth edition of *The Geology of Scotland*, published in 2002. We shall miss him as an entertaining raconteur – and we shall miss his hearty laugh.

Ian Chisholm

### **Mrs Mona Wattison**

Mona Wattison, a life member of the Society, died on 22nd February 2004, aged 93. She joined the Society in 1957-58, following her husband, Dr Alec Wattison, who had joined two years before. Mona and Alec first met when they were pupils at Dollar Academy and both went on to Edinburgh University, where Mona graduated with MA and Alec with MB ChB. They married in 1940 when Alec was serving as an army medic. Mona taught in a number of schools in England but when Alec entered general practice in Fife, she assumed the responsibilities of a doctor's wife and mother in Leven and Crail, before they moved to Anstruther. For many years, they regularly travelled to attend the Society's meetings and in the summer months the field excursions, and so were well known to many older Fellows. After Alec's retirement, they became keen travellers. Mona retained her love of golf and was still playing nine holes at Elie at the age of 89.

Charles Waterstone

### **Sir Alwyn Williams**

Sir Alwyn Williams, who died on 4 April 2004 at the age of 82, was born in Aberdare, South Wales in 1921. He attended Aberdare Boys' Grammar School and from there was awarded a science scholarship to University College Wales, Aberystwyth. While recovering from tuberculosis in 1939, he was advised to pursue studies in agriculture to ensure a working environment in the open air. When the Dean of Science at objected

to a science scholarship being used in the Faculty of Agriculture, Alwyn transferred to geology and there began his passion for the subject. He was awarded first class honours in 1943 and, after completing his PhD at Aberystwyth, spent two years as a Harkness Fellow in Washington working on the brachiopod collection of the Smithsonian Institution. From 1950-1954, he was lecturer in Geology at the University of Glasgow until, at the age of 32, he was appointed to the Chair of Geology at Queen's University Belfast where he remained until 1974, when he was appointed Lapworth Professor of Geology at Birmingham University. In 1976, he took up the post of Regius Principal of the University of Glasgow and in the same year was elected an Honorary Fellow of the Edinburgh Geological Society. His knighthood was conferred in 1983. As if the role of Principal and Vice Chancellor in a large University in the 1970s and 1980s was not demanding enough, Alwyn managed to combine it with the continuation of his personal research. His dual workload was achieved by very early morning starts in the lab before switching to the Principal's role for the rest of the day. After retiring as Principal in 1988, Alwyn continued to make major scientific contributions, including the brachiopod volumes of the *Treatise on Invertebrate Paleontology*. Alwyn was awarded the Society's Clough Medal in 1976 in recognition of his work on the Ordovician of the Southern Uplands.

Professor Sir Laurence Hunter, Professor Andrew Skinner  
and Dr Maggie Cusack

### **Professor Hatten S. Yoder Jr.**

Hatten S Yoder Jr., a Corresponding Fellow of the Society, died in August 2003 at the age of 82. An extract from a letter of his, published in the Spring 2003 issue of *The Edinburgh Geologist*, attests to a still-agile mind and keen sense of humour. He was born in Cleveland, Ohio, graduated from the University of Chicago, carried out postgraduate research in the University of Minnesota and received a doctorate from the Massachusetts Institute of Technology. His main area of interest was in volcanic basalt and he made significant contributions in the field of experimental petrology, which he carried out at the Carnegie Institution's Geophysical Laboratory. Having joined the Laboratory in 1948, he became their director in 1971 and retired from the post in 1986. Since then, he was an emeritus professor there and continued his research until near the time of his death. His name will live on — the ferro-magnesian aluminium silicate, yoderite, was named after him after he synthesised it during research into high-pressure behaviour of basaltic magma. It also occurs naturally in both green and purple forms in the whiteschists of Mautia Hill, Tanzania.

Editor

## Proceedings 2003-2004

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**Council** elected 25th November 2003

**President:** Douglas Fettes

**Vice-Presidents:** John Mendum, Bob Reekie

**Honorary Secretary:** Mike Dean

**Honorary Treasurer:** David Gould

**Membership Secretary:** Christine Thompson

**Excursions Secretary:** Con Gillen

**Lectures Secretary:** Don Mallick

**Assistant Secretary (Billet):** Caroline Paterson

**Assistant Secretary (Web site):** Diane Mitchell

**Proceedings Editor:** Alan Fyfe

**Librarian:** Bob McIntosh

**Publication Sales Officer:** Ian Jackson

**Scientific Editors:** Emrys Phillips, Phil Stone

**Ordinary Members of Council:** Sarah Arkley, Stuart Clarke, Ian Gray,  
Angus MacPherson, Suzanne Miller, Charlotte Vye

**Trustees:** William Harper, Ian Hogarth, Ian Rolfe

**Independent Examiner:** L H Stewart, Dalglish & Tullo, Chartered Accountants

**Business** Council held six meetings during the session, discussing a number of issues including:

- the need for an increase in membership subscriptions
- insurance for Society excursions and RIGS activities
- revitalisation of the Planning Committee
- publications sales policy, including trade discounts
- participation of the Society in future Scottish Geology weeks
- Society representation at BGS Open Days
- replacement of the Clough plaque at Birkhill Station (Kinneil Steam Railway)

## Proceedings 2003-2004

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**Lecture Meetings** were held as follows:

- 15th October 2003 **Dr T Bradwell:** Glacier fluctuations in Iceland - a valuable record of North Atlantic climate change
- 29th October **Prof K Pye:** *The James Wright Memorial Lecture* – Forensic geoscience and the fight against crime
- 12th November **Dr I McDonald:** Platinum group metal deposits in South Africa (joint meeting with IMMM)
- 26th November **Dr J Copley:** Ocean-floor hydrothermal vents (followed by the Annual General Meeting)
- 10th December **Dr J Imber:** Metamorphism and heat flow along the Outer Hebrides Fault Zone
- 14th January 2004 **Dr R Butler:** Drying out of the Mediterranean: a 6 million year old story of climate and tectonics
- 28th January **Dr G Fitton:** Origin of the submarine Ontong Java Plateau – the world's largest igneous province
- 11th February **Dr D Siveter:** Soft-bodied sensations from the Silurian of the Welsh borderland
- 25th February **Fellows Night**
- 10th March **Dr T Lenton:** Gaia and geology
- 24th March **Dr I Dalziel:** Understanding mountains and ice sheets: neotectonic studies in the southernmost Andes, the Scotia arc and West Antarctica (Dr Dalziel was awarded with the Clough Medal at this meeting)

The **Clough Medal** was awarded to Dr I Dalziel of the University of Texas at Austin in recognition of his outstanding work on the Scotia Arc and on Late Proterozoic plate tectonics, as well as earlier work in Scotland and the USA.

The **Clough Award**, awarded every two years to a geologist under 35 years of age, was awarded to Dr J Imber of the University of Durham, for his structural geological work on the Outer Hebrides Fault Zone.

## Proceedings 2003-2004

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### Publications

The *Scottish Journal of Geology* vol 39 part 2 and vol 40 part 1, and *The Edinburgh Geologist* nos 41 and 42 were published this year. No new field guides were published this year, though several are in preparation.

**Field Meetings** were held as follows:

|                                                     |                                                                     |
|-----------------------------------------------------|---------------------------------------------------------------------|
| 12th May 2004                                       | <b>Ewan Hislop:</b> Edinburgh New Town                              |
| 15th-22nd May                                       | <b>Henry Emeleus &amp; Brian Upton:</b> Ardnamurchan                |
| 29th May                                            | <b>Jim MacDonald:</b> Dumbarton Rock                                |
| 2nd June                                            | <b>Angus Miller:</b> Arthur's Seat                                  |
| 16th June                                           | <b>Peter Dryburgh:</b> Edinburgh scientists walk                    |
| 26th June                                           | <b>Graham Leslie:</b> Bridge of Orchy                               |
| 9th-11th July                                       | <b>David Lawrence &amp; Charlotte Vye:</b> Durham weekend           |
| 14th July                                           | <b>Andrew McMillan &amp; Richard Gillanders:</b> Edinburgh Old Town |
| 24th July                                           | <b>Ewan Hislop &amp; Rosalind Garton:</b> Cullalo                   |
| 14th August                                         | <b>Tom Bradwell &amp; Andrew McMillan:</b> Moffat Hills             |
| 18th September                                      | <b>David McAdam:</b> Yellowcraig to Cheese Bay                      |
| 25th September                                      | <b>Murchison House (British Geological Survey) Open Day</b>         |
| Average attendance at field meetings was in the 20s |                                                                     |

### Lothian and Borders RIGS Group

One new *Regionally Important Geological Site* has been designated this year: Barns Ness, in East Lothian. Work has continued with the production of interpretive posters and site information leaflets; one leaflet (*North Berwick*) was published during the year. The group was represented at the 7th UK RIGS annual conference at Dudley. The RIGS Group officers were Mike Browne (chairman), David McAdam (secretary) and Angus Macpherson (treasurer).

### Accounts

A summary of the accounts for the year ending 30th September 2004 follows:

# REVENUE ACCOUNTS FOR THE YEAR ENDED 30th SEPTEMBER 2004

|                                            | General Publications Clough Mykura |                |                |             | Total          |                |
|--------------------------------------------|------------------------------------|----------------|----------------|-------------|----------------|----------------|
|                                            |                                    |                |                |             | 2004           | 2003           |
|                                            | £                                  | £              | £              | £           | £              | £              |
| <b>INCOME</b>                              |                                    |                |                |             |                |                |
| Gross income from investments              | 1,415                              | 561            | 458            | 124         | 2,558          | 2,906          |
| Net gain (loss) on disposal of investments | (127)                              | (50)           | (41)           | (11)        | (229)          | (477)          |
| Bank interest                              | 111                                | 44             | 36             | 10          | 201            | 199            |
| Subscriptions                              | 7,237                              | -              | -              | -           | 7,237          | 7,420          |
| Tax recoverable on Gift Aid                | 946                                | -              | -              | -           | 946            | 920            |
| Legacies and donations                     | 502                                | -              | -              | -           | 502            | 527            |
| Social evening                             | 92                                 | -              | -              | -           | 92             | 76             |
| Sales of publications                      | -                                  | 3,799          | -              | -           | 3,799          | 3,902          |
| <b>TOTAL INCOME</b>                        | <b>11,382</b>                      | <b>4,545</b>   | <b>471</b>     | <b>127</b>  | <b>16,312</b>  | <b>15,473</b>  |
| <b>EXPENDITURE</b>                         |                                    |                |                |             |                |                |
| <u>Administrative Costs</u>                |                                    |                |                |             |                |                |
| Printing, Stationery, Postage              | 283                                | (26)           | -              | -           | 257            | 501            |
| Insurance                                  | 494                                | -              | -              | -           | 494            | 329            |
| Fund management charges                    | 470                                | -              | -              | -           | 470            | 470            |
| Miscellaneous                              | 188                                | -              | -              | -           | 188            | 99             |
| Printing publicity sheet & certificates    | -                                  | -              | -              | -           | -              | 325            |
| Independent Examiner's fee                 | 646                                | -              | -              | -           | 646            | 670            |
|                                            | <b>2,081</b>                       | <b>(26)</b>    | <b>-</b>       | <b>-</b>    | <b>2,081</b>   | <b>2,394</b>   |
| <u>Direct Charitable Activities</u>        |                                    |                |                |             |                |                |
| Lecture costs                              | 1,777                              | -              | -              | -           | 1,777          | 1,905          |
| Printing of billets                        | 1,810                              | -              | -              | -           | 1,810          | 1,950          |
| Postage of billets and Ed' Geologist       | 861                                | 547            | -              | -           | 1,408          | 997            |
| Award and Medal expenses                   | -                                  | -              | 1,051          | -           | 1,051          | 368            |
| Excursions                                 | 961                                | -              | -              | -           | 961            | 1,297          |
| The Edinburgh Geologist                    | -                                  | 1,481          | -              | -           | 1,481          | 1,858          |
| Special Publications                       | -                                  | -              | -              | -           | -              | 171            |
| Scottish Journal of Geology Vol 40         | -                                  | 4,500          | -              | -           | 4,500          | 2,750          |
| Grants made                                | -                                  | -              | 800            | 150         | 950            | 1,075          |
|                                            | <b>5,409</b>                       | <b>6,528</b>   | <b>1,851</b>   | <b>150</b>  | <b>13,938</b>  | <b>12,371</b>  |
| <u>Cost of Publications sold</u>           | <b>-</b>                           | <b>2,660</b>   | <b>-</b>       | <b>-</b>    | <b>2,660</b>   | <b>2,606</b>   |
| <b>TOTAL EXPENDITURE</b>                   | <b>7,490</b>                       | <b>9,162</b>   | <b>1,851</b>   | <b>150</b>  | <b>18,653</b>  | <b>17,371</b>  |
| <b>SURPLUS (DEFICIT) for year</b>          | <b>3,892</b>                       | <b>(4,808)</b> | <b>(1,398)</b> | <b>(27)</b> | <b>(2,341)</b> | <b>(1,747)</b> |

# **BALANCE SHEET AT 30th SEPTEMBER 2004**

|                                    | 2004          |               | 2003          |               |
|------------------------------------|---------------|---------------|---------------|---------------|
|                                    | £             | £             | £             | £             |
| <b><u>FIXED ASSETS</u></b>         |               |               |               |               |
| Investments at Market Value        |               | 61,068        |               | 50,230        |
| Tangible assets                    |               | -             |               | -             |
|                                    |               | <u>61,068</u> |               | <u>50,230</u> |
| <b><u>CURRENT ASSETS</u></b>       |               |               |               |               |
| Stock of publications              | 31,871        |               | 34,206        |               |
| Other stocks                       | 465           |               | 543           |               |
| Debtors and prepayments            | 1,994         |               | 631           |               |
| Taxation recoverable               | -             |               | 42            |               |
| Bank accounts                      | 10,955        |               | 16,415        |               |
|                                    | <u>45,285</u> |               | <u>51,837</u> |               |
| Less                               |               |               |               |               |
| <b><u>CREDITORS REPAYABLE</u></b>  |               |               |               |               |
| <b><u>WITHIN ONE YEAR</u></b>      |               |               |               |               |
| Sundry                             | 2,441         |               | 1,410         |               |
| Scottish Journal of Geology Vol 40 | 4,500         |               | 2,250         |               |
|                                    | <u>6,941</u>  |               | <u>3,660</u>  |               |
| <b><u>NET CURRENT ASSETS</u></b>   |               | <u>38,344</u> |               | <u>48,177</u> |
| <b><u>NET ASSETS</u></b>           |               | <u>99,412</u> |               | <u>98,407</u> |
| <b><u>REPRESENTING</u></b>         |               |               |               |               |
| <b><u>FUNDS</u></b>                |               |               |               |               |
| Permanent Endowment                |               | 39,253        |               | 43,990        |
| Unrestricted                       |               | 60,159        |               | 54,417        |
|                                    |               | <u>99,412</u> |               | <u>98,407</u> |

prepared by David Gould, Honorary Treasurer  
approved by Dalglish and Tullo, Chartered Accountants  
adopted on behalf of Council on 24th November 2004

## **Solution to Rockword Puzzle No. 12**

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### **Clues across**

- 1. ECHINODERM
- 7. ERR
- 8. TALUS CONES
- 10. PO
- 11. NAG
- 13. IS
- 14. CHRYSOTILE
- 15. NO
- 17. NERC
- 20. ODE
- 22. SIERRA
- 24. NONSENSE

### **Clues down**

- 1. EXTINCTION
- 2. HALF-GRABEN
- 3. NESS
- 4. ORC
- 5. DROPSTONES
- 6. MUSCLE SCAR
- 9. NO
- 12. OH
- 13. ION
- 16. USE
- 18. ERE
- 19. RR
- 21. DO
- 23. IN

# **The Edinburgh Geologist**

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