



No.1 India Buildings, Victoria Street. Survey offices 1869-1879.

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The British Geological Survey in Scotland

A brief history by Dr. C.W.A. Browitt, Assistant Director Scotland. May 1997.

Gestation and Birth

The first geological map of Scotland was published in 1836, at the scale of 4 miles to one-inch following the death of its compiler, John MacCulloch, the previous year. He was killed in a carriage accident on his honeymoon at the age of 62.

The Geological Survey evolved from the Trigonometrical Survey which was established by the Board of Ordnance in 1791 when it was decided that, for the defence of the realm, an accurate map of the

Kingdom was required. MacCulloch (a chemist) was appointed to the Ordnance Trigonometrical Survey (now the OS) in 1814 as its first geologist. Three years earlier, he had been given a geological commission in Scotland to locate areas where abnormal deflections of the plumbline might be expected so that they could be avoided in the geodetic measurements to establish a meridian for the construction of the one-inch map. Subsequently, he seems to have had a commission to search the country for a mountain to supersede Schiehallion as a test site to measure the density of the Earth; Schiehallion having been used for the celebrated experiment by Maskelyne, the Astronomer Royal, in 1774. This, albeit tenuous, link between geophysics and the "official geology" of the country was then lost for more than 100 years. MacCulloch worked for the Board of Ordnance until 1826 and, during his many journeys around Scotland, noted geological details as a side interest. Up until his death, he was then paid by the Treasury to complete his geological map and, in the process, produced a number of geological papers.

The Ordnance Survey Director, Thomas Colby, thought that the collection of geological samples by his trigonometrical surveyors would, in the hands of a Headquarters' geologist, provide the opportunity to depict geological boundaries on his maps. In 1825, the first field parties sent specimens to Dublin where they must have proved inadequate as the newly appointed Superintendent of the Geological Survey of Ireland, Captain John Pringle, produced detailed instructions for geological mapping, in the field, alongside the topographic mapping; notes on the former in red and the latter in black. Rudimentary geological maps and cross-sections of parts of County Londonderry were produced before the first prior options review of a geological survey took place. The Master-General of the Ordnance despatched an Inspector to find out the cost of this "peripheral activity" and the delays it introduced into the completion of the topographic survey. The additional cost of £5,500 was deemed too high and the first systematic national geological survey was stopped at the end of 1828. The first French geological survey by the Corps Royal des Mines had also started in 1825.

By 1830, Colby had resurrected a Geological Survey Branch of the Ordnance Survey under Captain Joseph Portlock who had been responsible for the primary triangulation of Ireland and who had worked with Pringle on the geological survey. From 1832, he was able to devote most of his time to geology and in 1837 he opened a "Geological Office" in Belfast which included a museum. One of his surveyors, Thomas Oldham, went on to become the first Director of the Geological Survey of India.

In England, in a parallel endeavour, the engineer, William Smith, had been engaged in pioneering geological mapping in connection with his canal building programme in southern Britain in the period 1790-1830. He produced several maps and formulated the stratigraphical principles which underlie them. In 1832, Henry de la Beche (pronounced Beech), an amateur geologist of independent means and a vice president of the Geological Society of London, offered to produce for the Board of Ordnance, coloured detail of the geology of Devon on the recently published maps of the county. He delivered, within 3 years, at a cost of £37.10.0 per sheet for the 8 maps, and so impressed the Board of Ordnance that he was taken on as a full-time employee in 1835. With the commencement of his strategic geological mapping programme, limited at first to southern Britain by the availability of topographic maps, the British Geological Survey may be said to have been born as a one-man department of the Ordnance Survey. There followed an unbroken record of geological surveying for 160 years to the present day.

In Ireland, Portlock's Geological Office was forging ahead with a staff of 35 but at a much greater level of detail (and cost) than De la Beche. As a result, in 1840, the staff were cut and, subsequently, the office closed. Colby wanted a more rapid and applied output and commented "In truth geology has run too much into fossils - is too much made up of minute research - and has not yet a sufficient connection with reality." Colby was, however, committed to maintaining and developing a prestigious Geological Survey Branch within the Ordnance Survey but De la Beche had other ideas,

was well connected in society and had an acquaintanceship with the Prime Minister (Peel). Despite working single-handed in Cornwall for his first 4 years, in 1835 he had started negotiations for a separately-funded Museum of Economic Geology in London which he achieved in 1839. His contemporaries were aware that De la Beche was not simply pursuing science but was driven at least equally by his desire for personal prestige and was ruthless in its pursuit. In a private letter, Murchison wrote "De la Beche is a dirty dog, there is plain English and there is no mincing the matter. I know him to be a thorough jobber and a great intriguer." Ramsay noted that though he pretended to be open, frank and cordial, he was really "an artful dodger, for ever working for his own interest, heedless of that of others" and, from Jukes, "Poor Henry started the Survey very much for his own honour and glory." De la Beche was knighted in 1842 and had control of the Ireland and Great Britain geological surveys under Colby but, through his social acquaintance with Peel, he achieved in late 1844, a Prime Ministerial memorandum which observed that the combination of the topographic and geological surveys had proved inconvenient. The PM noted that the Museum of Economic Geology had been established separately. By 31 January 1845, the battle was over, Colby had lost and Sir Henry De la Beche was Director-General of the combined Geological Survey with Local Directors, James and Ramsay, under him in Ireland, England and Wales. The new arrangements were codified in an Act of Parliament on 31 July 1845. The total staff complement was 24.

In 1854, the Survey extended its activity to Scotland when Ramsay, himself, spent a few months in East Lothian mapping the geology of the Dunbar area. Although a Scot from Glasgow, Ramsay did not follow up this work but sent Howell and Geikie (then aged 20) to continue it the next year. De la Beche died in 1855 and was succeeded by Sir Roderick Impey Murchison (then aged 63) after whom the present Survey's office on the King's Buildings Campus in Edinburgh is named. Murchison was an enthusiastic geologist and an excellent Director; he had travelled extensively and was well-connected in the governing circles of London. His title became that of Director-General in 1866 with his 2 Local Directors elevated to Directors.

The mapping in Scotland was pursued vigorously by Howell and Geikie who surveyed large tracts of Berwickshire, the Lothians and Fife and, in 1859, the geological sheet of the Edinburgh district was published in a hand-coloured edition. Detailed sheets of the coalfields had been prepared and Geikie showed the main outcrops of the oil-shale in West Lothian to James 'Paraffin' Young who was the founding father of the modern oil industry which had its origins in the area. Beginning in 1851, at Bathgate, Young established refineries in the Lothians which processed cannel-coal and oil-shale years before the first American or Middle Eastern oil wells were drilled. His paraffin oil, lubricants and waxes replaced those previously derived from animal and vegetable sources which were expensive, in short supply and often of poor quality. With the expiry of Young's patent in 1864, the Scottish shale oil boom commenced and, although faced with cheaper sources from conventional oil fields, the industry survived until 1962. Our heritage is a Scottish oil industry tradition, which continues, and the famous red bings of shale waste extending westwards from Edinburgh. One of these, the "5 Sisters", at Westwood, is to be scheduled as an Ancient Monument and others are listed as Wildlife Sites.

In the early 1860s, new staff were recruited locally to the Survey team in Scotland including the younger brother of Archibald Geikie (James). In 1861, the mapping of superficial deposits, in addition to the solid geology, commenced. These drift deposits of clay, sand and gravel were laid down in recent times since the melting of the Ice Age glaciers around 10,000 years ago. This new philosophy entailed resurveying ground already covered but it added to the usefulness of the maps, especially for agricultural purposes.

Whilst the birth of geological mapping in Scotland can be traced back to MacCulloch in 1811 and, for the strategic survey, to 1854, the birth of the Survey, with a separate identity in Scotland, was in

1867. A headquarters office was established with Archibald Geikie as its first Director at the Museum in Argyle Square, and moved to 1 India Buildings, Victoria Street in 1869. In that year, the first of what were to become famous Edinburgh dinners took place, on 16th February in Dejay's Hotel, under the Chairmanship of the Scottish Director, Archibald Geikie. Events were faithfully recorded, including songs and recitals, written and performed by the geologists with, at times, superb illustrations and photographs. The records are kept in the Murchison House Library in Edinburgh and cover the 100 years to 1970 when they fizzled out with the entry "There was no entertainment." Part of the song written and performed by Archibald Geikie (during Roderick Murchison's Director-Generalship) is reproduced at the end of this paper. In 1871, in addition to this post, Geikie became the first Professor of Geology at Edinburgh University, a new Chair which was founded by Murchison who died that year. When Archibald Geikie moved to London to become the Director-General in 1882, his brother James resigned from the Survey and succeeded him as Professor at Edinburgh. Those 43 years in which the Geikies occupied the Edinburgh Chair were the start of a close Survey/University link which persists to this day.

In the late 1860s, staffing levels in Scotland increased with an emphasis on the north Britain coalfields. One notable recruit was J. Croll, the son of a Perthshire crofter, who was self-educated but had written books and papers on science, philosophy and religion. One of these, on the causes of climate change during geological history, caught the attention of Geikie who offered him a post in the Edinburgh office. Although failing the necessary entrance examination in arithmetic, he was accepted when Lord Kelvin acknowledged that his calculations of the precession of the equinoxes over the last 10 million years qualified him as being sufficiently competent in the subject. His intellectual ability was recognised by his colleagues and learned bodies at home and abroad; he was elected FRS.

In the first 20 years of surveying in Scotland, most of the southern and central parts had been surveyed and maps and memoirs of the main coalfield areas were published, together with many of the 1" sheets in non-coalfield areas. Under constant pressure to cover more square miles, as nowadays, not all the background science to the maps was written up. The Government envisaged mapping as a simple, progressive operation which only needed to be done once then it was finished for good. Under similar pressure at the beginning of the Survey, De la Beche had responded to a Treasury question, in 1835, on how long it would take to map Britain. He said, "I consider the Geological map will keep pace with the Geographical map and consequently that both maps will be completed at the same time." When pressed for a number, he ventured 10 years.

In 1875, when the southern one-third of the country had been mapped, attention turned to the Highlands which proved to be even more time-consuming. Additional staff were recruited to Scotland but it was not possible to achieve the rate of progress of the Lowlands and the primary survey of the Highlands has only, recently, been completed with some of the structural problems not yet fully solved. Access to higher ground was restricted by bad weather, the short summers and the shooting season. The health of tough campaigners suffered; in 1887 Peach and Horne suffered from sciatica and "inflammation", respectively and, in 1889, Skae died aged 42, Dakyns suffered blindness from exposure and Miller was ill most of the year. Farther south, mining operations for coal and oil-shale were bringing to light new data which showed that the original maps of Central Scotland were inaccurate and revisions were necessary.

On appointment to Director-General in 1882, Geikie moved to London but, with an arrogance well known to his Edinburgh staff, he declared he would continue to supervise Scotland from there and no local Director was appointed. The next year, an appointment was made, H.H. Howell, but Geikie retained personal control of the Highland mapping programme and gave Howell a frustrating time by severely limiting his freedom of operations. Geikie was energetic in his touring and his literary output although his staff regarded much of this as plagiarism. Even his brother James, resenting

Archibald's dictatorial style, reputedly did not tell him about his monumental work on "The Great Ice Age" until he was able to place the published volume on his desk in 1874. Following Howell's retirement in 1899, the number of senior posts in the Survey was reduced further with only 2 remaining out of the 7 Geikie had started with. Some Assistant Geologists had been "Temporary" for as long as 25 years with no assurance of a pension or continuing employment. This phenomenon re-emerged in the Survey some 80 years later and persisted into 1997. The high level of dissatisfaction among the staff influenced the President of the Board of Education to appoint a Committee of Inquiry. In 1900, the Committee reported, accepting the grievances of the staff and recommending a package of reforms. This included establishing the number of senior posts and a substantial increase in pay and allowances. There were few tears at the humiliation of Archibald Geikie after years of his dictatorial and autocratic style of management, nor at his retirement in 1901. In retirement, he contributed as editor to the historic memoir of Peach and Home describing the NW Highlands, which was published in 1907.

Jethro Teall, who followed Geikie as Director (the title Director-General being abolished), had a clear view of how to remedy the problems caused by his predecessor. His reorganised Survey with an Assistant Director in England and in Scotland, together with an end to field men living throughout the whole year in isolated localities, set the organisational shape of the Survey for the next half a century. Teall's long-term contribution extended forwards to a present-day Scottish debate through his collection of sandstone grains brushed off the surface of The Stone of Destiny in 1898. These were made into a thin section and examined by C.F. Davidson in 1951 when he deduced that the Stone was probably derived from the Lower Old Red Sandstone of central Scotland. That one, at least, did not have its origins in Egypt, as legend would have it, nor in Dunstaffnage as deduced by MacCulloch 118 years earlier. Both Geikie and Ramsay had examined the Stone before Teall and, in 1935, the Geological Survey made a thin section of it which is held in Murchison House, Edinburgh, as part of the national archive.

The Teenage Decades

During World War I, the Survey demonstrated its ability to react quickly to a national need with a new series of outputs: Special Reports on the Mineral Resources of Great Britain. The Raasay ironstone was assessed and worked by German prisoners of war. In 1920, John Flett became Director after 9 years as Assistant Director in charge of the Edinburgh office. He had been recruited to the Survey from Edinburgh University, as the Petrographer, in 1901. In the early 1920s, after the transfer of the Survey to DSIR and the report of the Coal Conservation Committee, there was a major increase of staff. Flett established district offices in Newcastle, Whitehaven, Manchester and York to speed up revision of maps of the English coalfields. Much against the wishes of the Edinburgh staff, he instituted an annual attachment of English field men to work in the Scottish Highlands during the brief field seasons. Flett ran the Survey as an autocrat but was respected, particularly for getting the new Exhibition Road Museum constructed in London, revitalising the Water Supply Memoirs and initiating work on geophysics. No explanation has been uncovered for one of Flett's early orders to London Office staff in 1921:

"Officers of the Survey are forbidden to receive young women in their private rooms after office hours and when the offices are otherwise vacant. Officers' wives, sisters and daughters are exempt."

In 1928, following occupation of unsatisfactory accommodation in the city centre, the Edinburgh

office moved to Southpark, 19 Grange Terrace, a large Victorian mansion in the southern suburbs, where the Survey's presence remained until 1994. Flett retired after opening the new London Museum and the centenary celebrations in 1935.

The next larger-than-life Director, appointed in 1937, was Edward Bailey who had been in the Scottish office for 30 years before taking up the Chair of Geology at Glasgow University in 1930. He was eccentric to the point of dressing down into field gear when visiting London (including shorts) and for jumping into the first stream he came across on field work to avoid any reluctance to get his feet wet later in the day. Bailey had disagreed with much of Flett's approach to directing the Survey (which provoked his move to Glasgow) and, on succeeding him, started to close regional offices and stopped the practice of English field staff being moved to the Highlands in the summer.

World War II affected the mapping programme throughout the UK with geological work being concentrated on indigenous raw materials such as iron ore, bauxite, glass sand, feldspar, mica and increased efforts in groundwater and coal. In 1941, the Survey performed its first investigations into sources of uranium following a secret request for a world-wide study of resources. In 1945, Bailey was succeeded by the dour Scot, William McLintock, who was able to keep DSIR in check and retain the autonomy of the Directorship when an independent Survey was at risk. He had promoted James Phemister to Assistant Director much to the dismay of English staff who commented bitterly about the "Law of Scottish Succession". In fact, in Edinburgh, the Englishman T. Whitehead had succeeded Murray Macgregor to the loud public protests of Archie Lamont, a well-known Scottish nationalist and geologist. Against expectations, the Scottish succession was broken in 1950 with the appointment of a Welshman and has not been retrieved, save for a brief period in 1985-1987 when Innes Lumsden moved from his charge of the Edinburgh office to the new headquarters in Keyworth.

In the period immediately after the War, there were great changes in Edinburgh with many retirements and resignations for moves to other posts. By 1949, only 4 of the pre-war staff remained and there was a vigorous recruitment round in the 1950s to restore the strength of the office. The National Coal Board sank a large number of deep exploratory boreholes in the Lowlands and Survey staff examined most of the cores obtained. The information led to revised maps and descriptions being published and the first boreholes commissioned by the Survey were drilled in critical areas for better understanding the rock succession. In the Highlands, the many miles of tunnels excavated for hydroelectric schemes were studied.

In 1965, a major administrative change took place with the newly formed Natural Environment Research Council (NERC) taking over the function of the DSIR as the parent body of the Survey. The Survey was amalgamated with the Overseas Geological Surveys to form the Institute of Geological Sciences (in 1966). Kingsley Dunham became Director at this time when the "White heat of technical innovation", propounded by Prime Minister Harold Wilson, was at its peak and Government funding allowed an increase in scientific research. At this time, NERC also assumed responsibility for geomagnetism and global seismology. The former had been under the control of the Royal Greenwich Observatory at Herstmonceux and Hartland Point, and at Eskdalemuir and Lerwick where it was administered by the Meteorological Office. Seismology was also based at Eskdalemuir and in Edinburgh where it was operated with the cooperation of the Royal Observatory Edinburgh and the University. The transfers were completed by 1969 with the Global Seismology Unit firmly housed with the Survey in Edinburgh and the Geomagnetism Unit split between Herstmonceux and Edinburgh (eventually amalgamating there in 1977). In fact, systematic geomagnetic observations precede those of the Geological Survey having started under the Astronomer Royal, John Pond, in 1818. Other geophysical survey work had been strengthened in the London Office with the merging of the home and Overseas Surveys, the latter having operated a well-equipped group since 1955. The Geophysical Division formed by these groups, together with the addition of engineering and marine geophysics capabilities, was led by Bill Bullerwell who had pioneered the gravity and

aeromagnetics coverage of the UK land mass. He became a lynch-pin in the BGS hierarchy until his untimely death in 1977.

In 1969, a new unit was established in Edinburgh to study the geology of the continental shelf following pioneering work by Robert Eden a few years before. The first offshore geology publication by the Survey had resulted from a traverse of Carboniferous rocks conducted by Eden off St Abb's Head, underwater, with the aid of a wet suit and those traditional geologist's tools, a hammer and tape measure. Eden became Assistant Director in charge of the Edinburgh office in 1975, the year that most of the Survey's dispersed groups in Edinburgh were brought into the one building, Murchison House, on the King's Buildings Campus. The Marine Geophysics Unit had transferred to Edinburgh from London in 1973.

With large-scale support from Department of Energy (now DTI), the Continental Shelf, Marine Geophysics and Hydrocarbons Units in Edinburgh were substantially expanded. By 1990, the primary survey of the UK Continental Shelf was completed except for the vast western designated area beyond the Outer Hebrides. The Hydrocarbons Unit, with a staff of 65 at its peak, acted as the geological arm of Government throughout the expansion of the UK's North Sea oil interest, the licensing rounds and regulations.

At present, all Survey staff except a small group of petroleum specialists are accommodated in Murchison House. They have responsibility for offshore petroleum geology and marine surveys for the whole of the UK, for the land survey of northern Britain from the Lake District northwards, and for the UK-wide earthquake and geomagnetic monitoring. Small sections, with their parent groups in England, are concerned with the groundwater resources of Scotland and with geophysical surveys. Most of the core activities of Edinburgh-based groups are co-funded by industry, with oil companies being prominent but not the only supporters. International and contract work is conducted to exploit the expertise and databases within Murchison House, to continuously demonstrate the relevance of our science and to ensure the survival and prosperity of the British Geological Survey in Scotland.

[2019 note: The Survey relocated in 2016 and joined with Heriot Watt University to form the [The Lyell Centre](#)].

Further reading

[The first hundred years of the Geological Survey of Great Britain](#) by Sir John Flett, 1937.

Geological Survey of Great Britain by Sir Edward Bailey, 1952.

[A history of the Geological Survey in Scotland.](#) by R B Wilson, 1977.

Down to Earth (150 years of the British Geological Survey) by H E Wilson, 1985.

'Song by Archibald Geikie, first Director of the Survey in Scotland (1867-1881) on the occasion of the first Edinburgh Annual Dinner,'

16th February 1869

Song

By the Chairman

A Survey Gathering Song - 16 February 1869

Pibroch of Roderick Dhu!

Peal of our clansmen!

Raise thy loud notes anew

Gather our kinsmen.

Come away; Come away.

Hark to the warning.

Come every man today,

Wind and wave scorning.

Come from your western hills

Faulted and trappy

Flooded by wintry sills,

Soaking and sappy.

Come from your Southern heights,

Groundless and dreary

Cease to be eremites

Woful and weary.

Come from your boulder clay,

Clansmen so trusty.

Quit your Coal -fields today

And pitmen dusty.

Come from Silurian ground,

Old Red and felstone,

Raised beach and moraine mound,

Grit of the Millstone.

Leave off your working gear

With all its rumpus;

*Hammer, clinometer,
Notebook and Compass;
Map case and register,
Red-tape and drivel;
Bid them be off with them
Straight to the Devil.*

*Yonder's our chieftain 's flag,
Point of our muster;
High over glen and crag,
Round it we cluster:Flag that for many a day,
Through strife and fury,
Sternly hath held its sway
Over Silurie*

*After a year again,
Once more we gather;
Injury, grief and pain
Buried together:
Bitterness cannot last
With the leal-hearted
'Tis in oblivion cast
Soon as departed.*

*Strife of all clamourers, -
Sparing us never
Here are we hammerers
Stronger than ever!
Health to the new men,*

Both here and landward.

May they be true men,

And stick to our standard!

Where 'er our path may be,

Whether on land or

Over the boundless sea

We may yet wander,

True to our cause, and as

True to each other

May we for aye stand as

Brother to brother!

Pibroch of Roderick Dhu!

Peal of our Clansmen!

Waken they notes anew

Summon they kinsmen.

So may a lustre proud

Ever surround thee.

Long may our Survey crowd

Yearly around thee.

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