

Antecedents, first hundred years of the Geological Survey of Great Britain

From Earthwise

[Jump to navigation](#) [Jump to search](#)

From: Flett, J.S. 1937. [The History of the Geological Survey of Great Britain](#). London: His Majesty's Stationery Office.



Sir Henry Thomas De la Beche (From an engraving by W. Walker after a painting by H. P. Bone, 1848.)

I. Antecedents

The closing years of the eighteenth century and the beginning of the nineteenth century saw the rise of Geology as a branch of inductive science. Before that time many illustrious men had published treatises on the history of the globe that are now forgotten or read only with amused curiosity. As an example of these we may cite the great Buffon, whose work 'Des Epoques de la Nature' was regarded as a classic in its day. He expounds how through cataclysm after cataclysm the earth attained its present state. Creation followed creation after varying periods of time, and little that took place in the earlier epochs had its parallel under present conditions. Great eruptions and floods or débâcles had ravaged the earth's surface, spreading desolation in their track and leaving unassailable evidence in the rocks of the Paris Basin and Central France. After tremendous revolutions there was peace and the earth was prepared for the appearance of man, an event which inaugurated a new epoch and closed the long record of geological catastrophes.

The inevitable reaction ensued, and a return to common sense and reasonable speculation followed

in due time.

Its herald was James Hutton, a Scottish gentleman and manufacturer with a taste for experimental farming and metaphysical philosophy. From this strange parentage was produced a treatise on the Theory of the Earth, which was at once supremely original and perfectly conclusive. Hutton argued that all the phenomena exhibited in the rocks of the earth's crust might be explained by causes operating at the present day. What was essentially necessary was a sufficiency of time. The rocks might be classified as being of igneous or of sedimentary origin. The sedimentary rocks were built up of the fragments of still older rocks, decomposed, disintegrated, transported and deposited in the same manner as at the present day. For all sedimentary rocks there must have been still older rocks from which they were derived. The process had gone on since the earliest geological times. There was no sign of a beginning or of an end. As it is now, it had been since the dawn of time.

The igneous rocks were ascribed to the action of the earth's internal heat. Some were of volcanic origin; others, such as granite, were molten masses which by their heat altered and crystallized the rocks which they invaded. Hutton was supported by his friend Sir James Hall, who proved by a long series of experiments that it was quite reasonable to believe that the rocks known as basalt, greenstone and whinstone in the neighbourhood of Edinburgh were ultimately of volcanic origin.

Of the three volumes of Hutton's 'Theory of the Earth' two only were printed; the third was found as an unfinished manuscript in the library of the Geological Society of London, and published in incomplete form under the editorial care of Sir Archibald Geikie.

But Hutton had a pupil and friend, Professor Playfair, who had that gift of exposition in which Hutton was singularly deficient. Playfair published his celebrated treatise 'Illustrations of the Huttonian Theory' expounding the views of the master. In clear, convincing and logical manner he laid down the principles on which the modern science of geology is founded. The victory was won but the results were still to be gathered.

In 1830 appeared the first volume of Lyell's 'Principles of Geology.' By his easy, liquid style, his transparent sincerity, his profound knowledge of the literature and his judicial sense of the value of evidence, Lyell takes the highest place among the expounders of geological science. His work is the greatest and most famous classic in the literature of the subject. To him also we owe the conversion of Charles Darwin, while still a young man, to the orthodox theories of geology. Before Lyell's time scientific geology was already current and widely accepted though there were still unconverted adherents of the older schools. But Lyell made the subject intelligible to all, so that he who runs may read. Darwin in his journals has recorded the profound impression made on his mind by the first reading of the 'Principles of Geology.' The science had emerged from the mists and obscurity of the cataclysmic school and the Wernerians, and was founded on the sure basis of observation interpreted in the light of the processes operating in the world around us at the present day.

The Geological Society of London

In the advancement of the knowledge of geology in Great Britain a principal part must be assigned to the Geological Society of London. Founded in 1807, its membership included practically every man in England who was taking part or who was interested in the increase of geological science. Although the Royal Society attempted to strangle it in its cradle, the Geological Society, thanks to the sturdy independence of its members, survived and prospered. Its 'Transactions' contain a series of classic memoirs which are the foundation stones of British Geology.

During the decade 1830 to 1840 which saw the initiation of the Geological Survey of Great Britain, the Geological Society of London had on its list of members probably the most brilliant assemblage

of distinguished geologists that has ever participated in its activities. The Presidents included Murchison, Sedgwick, Lyell, Greenough, Whewell and Buckland. Among the Secretaries were De la Beche and Darwin. The members of the Society included many whose names are still held in reverence among British geologists. The Society's 'Transactions,' which were the chief vehicle for the issue of important geological papers, showed that great activity characterized this epoch and many classical researches were being carried on. The Secondary rocks of England were already classified and named, largely through the labours of William Smith, Fitton, Mantell, Godwin-Austen, Conybeare and Phillips. In the Tertiary rocks investigation was being carried on by Edward Forbes, Lyell, Prestwich and many others. Sedgwick was busy on the Cambrian and Murchison on the Silurian. With Lonsdale, these two were about to solve the mystery of the Devonian. Macculloch had already explored the geology of the Western Highlands of Scotland and De la Beche was at work on Cornwall, Devon and Somerset. Poulett Scrope and Darwin had contributed descriptions of regions of active vulcanicity and, finally, a great amount of useful work had been done in describing and cataloguing the fossils characteristic of the various geological formations in England.

The growth of geological knowledge during the years immediately preceding 1835 had been so rapid that the subject had taken on an entirely modern aspect and the remaining convulsionists and diluvialists were already regarded as survivals of a bygone epoch. All the principal geological formations from the Cambrian to the Tertiary had already been established and their boundaries defined, though not in all cases as yet with finality and precision. The dispute between Sedgwick and Murchison on the boundary of the Cambrian had not yet developed; the Permian was after only a few years to be given a local habitation and a name by Murchison. Lyell had still to create a classification of the Tertiary rocks. But from the volumes of the 'Transactions' of the Geological Society and still better from such books as 'The Outlines of the Geology of England and Wales,' by Conybeare and Phillips, it can be seen that an immense amount of work had been done in deciphering the geological record and in ascertaining the distribution of the principal rock-formations in Great Britain. De la Beche's work, 'The Geological Observer,' published in 1830, shows that the methods of investigation in the field and the study of the structure of rock-masses had reached a high stage of development. Sowerby, the author of the 'Mineral Conchology of Great Britain,' had done and was doing great work in the description of British fossils. The study of minerals actually preceded the investigation of organic remains and of rocks, or was at any rate more clearly established on a scientific basis about the beginning of the nineteenth century. The great event, however, of the period we are considering was the appearance of the first volume of Lyell's 'Principles of Geology' in 1830. It was in a real sense 'epoch-making' and, though subject to much revision in subsequent years, it has maintained its position as a fundamental achievement. Geology, as we understand it today, was now on a firm basis and its principles had been established and expounded in the clearest possible manner.

Geological cartography

The production of geological maps went hand in hand with the publication of memoirs and the description and illustration of fossil remains. At first the maps were of a kind more properly described as 'geognostical': they showed the distribution of different types of rock which might or might not be of the same geological age. Many of the hand-coloured maps published before 1830 to illustrate the 'Transactions' of the Geological Society of London have considerable merit: some of them, indeed, have not yet lost their utility. It was not, however, till William Smith enunciated the true principles of the stratigraphical classification of the rocks of the earth's crust that it became possible to prepare a geological map that will bear criticism in the light of the present day. This great work was first published in 1815, and in 1819 to 1824 he issued certain 'County Maps' on an enlarged scale. Greenough, who was President of the Geological Society of London from 1818 to 1820, had started the preparation of a geological map of England with the Society's financial

support in 1808, and in 1812 presented it to the Society; but the map was not published till 1819. Greenough had the assistance of many distinguished members of the Society, such as Buckland, Conybeare, Warburton and De la Beche. He seems to have availed himself to some extent of the work of William Smith and his map is the more complete in certain respects. A second edition of this map was published in 1839 with a descriptive pamphlet.

Nothing, however, can deprive William Smith of the merit of having been the first to prepare a geological map on truly scientific lines. As a matter of fact, he had already made a geological map of the neighbourhood of Bath (1799) and published a 'Tabular View of the Order of Strata in the Vicinity of Bath.' In 1801 he had actually coloured a map to show the geology of England and Wales. The original edition of Smith's map (1815) is on the scale of five miles to 1 inch and measures 8 feet 9 inches by 6 feet 2 inches. In 1817 Smith published his 'Stratigraphical System of Organized Fossils'; in 1819 to 1824 his 'New Geological Atlas of England and Wales' (incomplete), and in 1820 his 'New Geological Map of England and Wales' on the scale of fifteen miles to 1 inch.

In 1815 Griffith exhibited a Geological Map of Ireland, which is said to have had considerable merit. This map, however, does not seem to have been printed or published. He continued to collect information and to improve his map. In a revised form it was exhibited to the British Association in 1835. In 1837 Griffith furnished an 'Outline of the Geology of Ireland' which appeared as a supplement to the 'Second Report of the Commissioners appointed to enquire into the railway communications in Ireland.' The map of the geology of Ireland to illustrate this Report was on the scale of ten miles to 1 inch and was published in 1838. Sir Archibald Geikie speaks very highly of the merits of Griffith's map. Of its improved form, published in 1839 in four sheets on the scale of four miles to 1 inch, he says: 'This work must be admitted to be the most remarkable map of a whole country ever constructed by a single individual.' Griffith's map of the Coalfield of the Leinster District, published in 1814, and his map of the Connaught Coalfield, dated 1817 and published in 1818, are also worthy of mention.

In Scotland geological mapping had also made great progress. In this field the most active worker was John Macculloch, who had published in 1819 his 'Description of the Western Isles of Scotland.' This indefatigable Scotch doctor had spent several years in the investigation of the Western Isles and had visited many of the most remote islands. His work is full of detail, both geological and topographical, and though verbose and discursive it contains much that is still of interest to the geologist. Geological maps of several islands were published in the third volume. The author, however, subsequently extended his researches to other parts of Scotland and prepared a Geological Map of Scotland on the scale of four miles to 1 inch. Macculloch died in 1835, and his map was not published till 1836, when it appeared under the authority of the Parliamentary Commissioners for making roads and bridges in the Highlands of Scotland.

It may also be noted that a geological map of Scotland on a very small scale (about fifty miles to an inch) had been issued by Ami Boué to illustrate his 'Essai Géologique sur l'Ecosse.' The date of publication of this book is doubtful, but according to Sir A. Geikie it was probably 1820. Internal evidence shows that it was composed about that time, but some copies contain additional notes which cannot have been compiled before 1831.

In addition to these general maps of England, Scotland and Ireland, many small geological maps of local districts had appeared in various books and transactions of learned societies. Macculloch's maps of some of the Western Isles were published in 1819; they are very sketchy and lacking in detail. In the Geological Society's 'Transactions' De la Beche had illustrated his geological papers by maps of Jamaica and of Pembrokeshire; and Buckland, Lyell, Sedgwick, Murchison, Phillips and others had presented coloured maps to the Geological Society which appear in the volumes of the 'Transactions' between 1820 and 1830. A map of part of the Monmouthshire coalfield (1830) by

Taylor shows the outcrops of the principal coal seams and has quite a modern appearance. It was accompanied by two models and a series of sections. A good map of the Forest of Dean coalfield accompanied a descriptive paper by Maclauchlan in 1833, and Prestwich's elaborate paper on Coalbrookdale has a coloured map (1840) on the scale of one mile to 1 inch which is still of interest.

It is obvious, then, that the need for accurate geological maps was widely realized and that the art of preparing such maps had made considerable progress. No less noteworthy is the fact that financial assistance in publishing Macculloch's 'Map of Scotland' and Griffith's 'Map of Ireland' was obtained from the Government. Probably, however, the best map as yet issued in England was that of Greenough, which had been financed by the author with the support of subscribers and the backing of the Geological Society of London.

One great difficulty which was generally experienced about this time was the necessity of securing an adequate topographical basis for geological maps. If specially prepared, the topographical map was exceedingly expensive, and on most of the smaller geological maps the topography was given merely in outline. For the larger maps, on the other hand, the authors made use of topographical sheets which were published by various commercial firms such as Cary, Arrowsmith and Crutchley. If special copper plates had to be cut, as seems to have been done for Macculloch's map (in which the geological lines are engraved), the cost was very high. Possibly, however, the geological lines, index, etc., were printed from a special plate on impressions which already bore the topographical details. It was at first intended to publish Greenough's map on the topographical basis of Arrowsmith's map, but ultimately the topography was specially drawn and engraved at a considerably increased expenditure. It was published by Longmans in six sheets at a price of six guineas.

In his 'Memoirs to His Majesty's Treasury,' published posthumously (1836), Macculloch makes some very bitter criticisms on the accuracy of the topography in Arrowsmith's map, which he was obliged to use as a basis for his work. He asserts that it was very much out of date: new roads had been made and villages had been built since the map was constructed; and some of the mountains were out of place or were represented as possessing incorrect shapes. On such a map, as he points out, it was impossible to show the geological boundaries accurately.

From Macculloch's 'Memoirs to His Majesty's Treasury' (1836, p. 18), it seems clear that his geological work in Scotland was commissioned by the Board of Ordnance, though he does not explain the reason for this commission. In 1814 he was appointed Geologist to the Trigonometrical Survey of Great Britain. 'The first journeys which I undertook in Scotland were for a partial purpose required by the Ordnance, of a very limited practical nature. But as it thus became necessary to traverse many tracts of country, though somewhat widely dispersed, I felt that I might without any diversion of time or additional expense to the Government, note other geological facts which fell in my way, and thus produce some sort of partial surveys of the country in general.'

Subsequently, however, he seems to have had instructions to search the country for a mountain which was suitable for a test of the specific gravity of the earth. Schiehallion had been used for this purpose by Maskelyne, but there had been many criticisms of his results. Playfair had suggested a correction depending on a modification of the interpretation of the geology of the mountain, and it was generally recognized that further experiments were desirable. In search of a mountain possessing the required qualifications Macculloch was commissioned 'to make a general examination of the mountains of Scotland' and in course of his travels he obtained the information which was subsequently embodied in his geological map. Although his mission was not to make a geological survey of Scotland, he used his opportunities well, and after his death (1835) his map was issued at Government expense.

Hence we may regard his labours as the first attempt in Great Britain to make a general geological survey that was supported (though not definitely commanded) by the British Government.

Meanwhile great advances were being made in British cartography by the operations of the Ordnance Survey. Instituted in 1791, it began in the South of England and was publishing a series of maps in continuous Sheets on the scale of one mile to 1 inch. The officer in charge was Colonel Colby, and he was desirous of encouraging the use of the maps not only for topographical but also for archaeological and geological purposes. Several members of the Ordnance Survey staff had acquired some geological knowledge. Of these we may mention Maclauchlan in Pembroke and Still in Cornwall, who coloured up some of the Ordnance maps they were making, and presented copies to the Geological Society. Macculloch's appointment in 1814 seems to show that it was considered necessary under certain circumstances to attach a geologist to the Ordnance and Trigonometrical Survey. Similarly, in 1832 Joseph Ellison Portlock, a captain of the Royal Engineers, was appointed geologist to the Ordnance Survey in Ireland, though no corresponding appointment seems to have been made in England. There was a general feeling, however, that the time was ripe for the creation of an official geological survey to publish maps based on the new Sheets of the Ordnance Survey, and in 1831 Murchison had approached the authorities with the suggestion that William Smith should be appointed Geological Colourer of the Ordnance Maps. This proposal, however, was not successful, possibly because Smith was too old for such duties. He died in 1839 in his seventieth year. In 1832 he was awarded a pension of £100 a year in recognition of his great services to geological science.

Meanwhile De la Beche was actively engaged in colouring up geological maps of the West of England, using the Ordnance Survey's one-inch Sheets. He seems to have begun this work in 1832 and he differed from the other contemporaneous workers in that he coloured up the whole extent of an Ordnance Sheet, while they, apparently, only did small areas in which they were engaged on official duties.

In 1834 in his Presidential Address Greenough informed the Geological Society that

Mr. De la Beche, one of our Vice-Presidents, acting under the Direction of the Board of Ordnance, has produced a geological map of the county of Devon, which, for extent and minuteness of information and beauty of execution, has a very high claim to regard. Let us rejoice in the complete success which has attended this first attempt of that honourable Board to exalt the character of English topography by rendering it at once more scientific and very much more useful to the country at large.

In 1835 Greenough was again President of the Geological Society and in his Presidential Address made the following announcement.

The researches of your Vice-President (De la Beche) in the counties of Devon and Somerset have been carried on this year with increased energy. Of the eight Sheets of the Ordnance Map upon which he has been engaged, four were published last spring, three others are complete, the eighth is nearly complete, and an explanatory memoir with sheets of sections applying to the whole are to be published before our next anniversary. Let us hope that the work so admirably begun may not be suffered to terminate here.

Retrieved from

http://earthwise.bgs.ac.uk/index.php?title=Antecedents,_first_hundred_years_of_the_Geological_Survey_of_Great_Britain&oldid=42613

[Category:](#)

- [History of the British Geological Survey](#)

Navigation menu

Personal tools

- Not logged in
- [Talk](#)
- [Contributions](#)
- [Log in](#)
- [Request account](#)

Namespaces

- [Page](#)
- [Discussion](#)

Variants

Views

- [Read](#)
- [Edit](#)
- [View history](#)
- [PDF Export](#)

More

Search

Navigation

- [Main page](#)
- [Recent changes](#)
- [Random page](#)
- [Help about MediaWiki](#)

Tools

- [What links here](#)

- [Related changes](#)
- [Special pages](#)
- [Permanent link](#)
- [Page information](#)
- [Cite this page](#)
- [Browse properties](#)

• This page was last modified on 21 September 2019, at 23:05.

- [Privacy policy](#)
- [About Earthwise](#)
- [Disclaimers](#)

