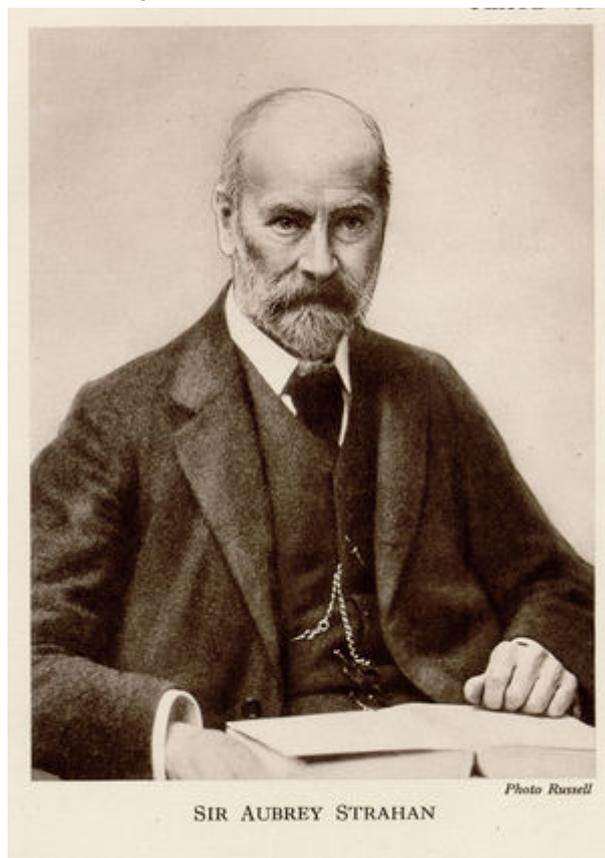


# Geological Survey under Sir Aubrey Strahan, 1914-1920

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

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Sir Aubrey Strahan (From a photograph by J. Russell & Sons, Baker Street, London.)

Plate VII.

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## Contents

- [1 VII The Geological Survey under Sir Aubrey Strahan](#)
- [2 Mapping programmes](#)
- [3 World War One — economic work](#)
- [4 Staff and the war effort](#)
- [5 Committees and the future direction of the Survey](#)
- [6 Sir Aubrey Strahan — synopsis](#)

## VII The Geological Survey under Sir Aubrey Strahan

On 6th January, 1914, Teall was succeeded as Director by Aubrey Strahan, who had been Assistant Director in charge of the English staff since Woodward retired at the end of 1908. G. W. Lamplugh

took Strahan's place as Assistant Director. The District Geologists in England in 1914 were Gibson, Barrow and Cantrill. Flett had gone to Scotland in 1911 to act as Assistant Director when Horne retired, and the Scottish District Geologists were Clough and Hinxman.

## **Mapping programmes**

Strahan had had nearly forty years' experience of field work in many districts and had proved himself competent, practical and reliable. Little change was made at this time in the programmes. At the end of 1909 field work had been dropped in Cornwall and in South Wales, and had been started in the Denbighshire coalfield under Lamplugh and in Warwickshire under Barrow. It was resumed also in the region around London and in the south-east of England, under Clement Reid. In most of these districts there had already been some six-inch revision, and this was now extended gradually into the areas that had not yet been revised.

It will be noticed that in England two-thirds of the work of the staff, approximately, was directed to revising coalfield Sheets, and in Scotland about one-half. The only previously unsurveyed districts in which mapping was being carried on were the Northern and Western Highlands. In the English coalfields a complete six-inch resurvey was in hand where the original mapping had been done on the one-inch scale; in Scotland the coalfields had been previously surveyed on the six-inch scale, but 'the maps required to be brought up-to-date. The work was now being done in North Ayrshire under Clough and in Lanarkshire, Stirlingshire and Renfrewshire (Central Coalfield) under Hinxman. Considerable progress had been made in the completion and publication of Highland maps, and both Peach and Horne after retirement had given their services in getting the Sheets published and by contributing to the memoirs. Consequently, it had proved possible to consolidate the work into two well-defined districts, viz. the Northern Highlands (Sutherland, Ross and Inverness) under Hinxman and the South-western Highlands and Islands under Clough.

Towards the close of the summer of 1914 field work was proceeding normally in all districts, when, on 4th August, war was declared. Practically all members of the staff of military age volunteered for service, and although a few were rejected from various causes, by the end of the year fifteen had joined up. For a time little alteration was made in the course of Survey work, but soon it became obvious that there were many questions on which geological information was needed. The geological maps of the seat of war in Belgium were urgently required and the set in the Library at Jermyn Street was used for the purpose of having copies made for military staffs by the Ordnance Survey. The British Museum copies were transferred to Jermyn Street. As new camps, training centres and aerodromes were created many enquiries came in regarding soils, water supplies, drainage and sewage schemes. A short guide descriptive of the best situations for wells in the various geological formations, particularly those of the South of England and the North of France, was published and proved very useful.

## **World War One — economic work**

Very soon also there sprung up a demand for information regarding British resources of raw materials that had previously been imported for industrial purposes from Germany and Belgium. Geologists were sent out to examine and report on all known native sources and to collect specimens and make estimates of available supplies. One of the first minerals to be investigated was barytes, which is extensively used for making paints and had been imported on a large scale from Germany and Belgium. A scarcity of the finest qualities of sand, which had been used for making glass and for lining steel furnaces, was also experienced at an early stage owing to the difficulty of obtaining the large supplies of pure sand previously imported from Belgium. Other mineral substances needed for metallurgical processes, such as ganister for silica bricks, and fireclays and other refractories,

became very scarce, and possible sources in the United Kingdom had to be urgently investigated.

As 1915 wore on, the pressure on the Survey became more acute. Ten more members of the staff, making twenty-five in all, were on active service at the close of the year. The programmes of field work were much reduced, and were stopped altogether in the London area and Sutherlandshire, but were continued in the English and Scottish coalfields, where rocks of economic importance were being mapped. Curiously enough, a small area was reported that year as surveyed in the volcanic rocks of the island of Mull.

The examination of sources of minerals necessary either for munitions or for other branches of industry became more intense as the War proceeded, and such metals as tungsten, copper, bismuth, iron, antimony, manganese, lead and zinc were being sought for in increased quantities. Every known British source was visited and all the records searched for information about old abandoned mines.

As the information which was being collected increased in volume it was decided to print a summary of the most important facts, and a series of 'Special Reports on the Mineral Resources of Great Britain' was put in hand. The first three Reports appeared in 1915 and were descriptive of (1) tungsten and manganese; (2) barytes and witherite; (3) gypsum, anhydrite, celestine and strontianite. These were followed by Reports on fluorspar, felspar and phosphates in 1916. As this work took up a large portion of the time of the remaining staff the publication of the ordinary Sheet memoirs was considerably reduced. Colour-printing was suspended, because the Ordnance Survey Office was busily engaged in supplying war maps.

## **Staff and the war effort**

At the close of 1916 thirty-two members of the staff were engaged on active service or other classes of work arising from the War. Field survey continued to be confined to a few districts of economic importance. The publication of memoirs still went on, but attention was concentrated on the 'Special Reports,' of which five volumes had been published and two were in a second edition. The number of enquiries both from Departments and from industry had increased enormously, and the collection of information and specimens and the preparation of replies absorbed the great part of the work of the staff.

In 1917 five officers were returned from military service, four being invalided while one was over military age. They all resumed their work on the Geological Survey. Vacancies on the staff had not been filled, but now it was being realized that there was work for geologists apart from active service in the field, or in the manufacture of munitions, and permission was obtained to enlist for temporary service geologists of sufficient training and experience to be useful in investigating problems relating to industry and commerce. Several British University professors and lecturers were giving most valuable assistance, and geologists who had been invalided out of the Army were employed on special duties as temporary members of the staff. No field work of a routine character was being done in 1917, but the search for mineral supplies was going on in every part of the country where useful minerals were known to occur. Increased demands were being made by the War Office and the Ministry of Munitions for information on an immense variety of questions. This work was often of a very interesting character, but being strictly confidential it was not suitable for publication.

The Museum had been closed to the public in March 1916, but the Library and Survey Offices remained open to enquirers. On 1st April, 1919, the Museum was again opened on weekdays and on the evenings of Thursdays and Saturdays. By the end of 1918 three more members of the staff had been returned from military service and the remainder were discharged at various stages in 1920.

A list of the twenty-nine members of the staff who served in the Great War was printed by Sir Aubrey Strahan in the 'Summary of Progress for 1918.' It is a remarkable fact that not one of them was killed on active service; nine were wounded; one was invalided out of the army and died seven months thereafter. None of the wounded was permanently disabled. Two of the geologists had an arm severely injured, but none was wounded in the legs; one draughtsman had his leg very severely injured. All members of the staff who served in the War were able to resume their posts within a longer or shorter period after their discharge.

It was recognized in the later years of the War that trained geologists might be of much use in the Intelligence Service. Captain W. B. R. King (now Professor of Geology in University College, London) was attached to W.C.H.Q. in this capacity, and received the O.B.E. and was mentioned in despatches. Cunnington, Whitehead and Pocock were detailed to report on the water-supply of Gallipoli. The draughtsmen who enlisted were mostly absorbed into the geographical and map drawing staffs. E. B. Bailey (now Professor of Geology in Glasgow University) was twice severely wounded and was awarded the Military Cross, Croix de Guerre with Palm and Legion of Honour. J. E. Richey also received the Military Cross.

In addition to the twenty-nine members of the staff who went on active service several others were engaged for prolonged periods in the manufacture of munitions.

In the 'Summary of Progress' quoted above a list is also given of some of the principal enquiries which absorbed the work of the Survey during the War years. The great majority of these were connected with the supply of minerals for industry and munitions, the provision of water for camps and forts and the geology of different parts of the seat of war both in France and in the rest of Europe. But some of the enquiries were of an unusual nature, such as sources of radium, quartz crystals for submarine detectors, sapphires for pivots for aeroplane compasses, fluorite and Iceland spar for optical apparatus, selenium for detection of dark rays and the origin of materials used in German concrete.

A certain part of the information that was gathered during the years of the War was considered to be of sufficient value to be placed on permanent record. The series of 'Special Reports on the Mineral Resources of Great Britain' that was initiated by Strahan consisted of seven volumes at the end of 1918. Of these, five were in a second edition. Two more were in the press and several others in preparation. Three volumes on 'British Iron Ores' appeared in 1919. Strahan's work was continued by his successor and the series as now published consists of thirty-one volumes. They give a very useful and complete presentation of the sources and reserves of the principal economic minerals of Great Britain, so far as these were known in the years that immediately followed the close of the War. In one respect they are especially valuable as, apart from the historical summaries, they are based on information obtained during visits to the mines and mineral localities by expert geologists commissioned to draw up full and unbiased reports. Hence, although very condensed, they are authoritative and constitute the most reliable sources of information which exist on these very important matters. Unfortunately, after the War the demand for raw materials dropped, and foreign supplies arrived in great abundance. Many mines that were working in 1918 are now closed down and may never be reopened. It is important, at the same time, to remember that these reports were drawn up at a time when these mines were working, or shortly after they ceased, and thus information was secured that might have been lost if the opportunity had been allowed to slip.

In the same way many engineering and structural problems that were of great and urgent importance during the War ceased to be of interest when peace was declared. Others, however, continued to be of interest and the investigation was carried on for a time. As an example we may cite the Mid-Scotland Canal. It evoked much discussion, and a full geological study was made of all the proposed lines of route with particulars of all borings, mines and water supplies in the adjoining

ground.

Another question that received careful study was the resources of water in Scotland for the production of electric power, and the best sites for tunnels, dams and reservoirs. Ultimately many of the proposed schemes were carried out and the geological investigations proved very useful. Work was also done on the geology of the proposed Channel tunnel and on the scheme for making a barrage on the Severn, but neither of these projects has yet materialized. Less important propositions were the making of new roads, bridges, improvement of harbours and sites for small holdings.

## **Committees and the future direction of the Survey**

Among the numerous committees that sprang into being during the War and enquired into all sorts of matters, administrative, financial and industrial, was one which was known as the Reconstruction Committee. In due course it became the Ministry of Reconstruction, with Dr. Addison as Minister, and presented a report on the Machinery of Government in 1918. In this report it recommended that the Geological Survey 'should be transferred from the Board of Education to the Committee of the Privy Council for Scientific and Industrial Research. The results of the work would' then form part of the growing body of knowledge and information which it is the special function of that Department to create, coordinate, and place at the disposal of all other Departments. The procedure required to enable the Geological Museum to perform effectively its dual function as a centre of research, and also as an educational institution would need special consideration.'

This recommendation was in accordance with the Report of the Coal Conservation Committee, one of a group of committees which enquired into special subjects under the aegis of the Ministry of Reconstruction. This Committee in turn had appointed a Geological Sub-Committee which had considered the whole of the aspects of the Geological Survey's work in relation to the special question which had been remitted to them. Their report is an interesting and impartial document which shows that they were fully cognizant of the state of matters. They found that the mapping of the British coalfields was in a very unsatisfactory condition. Of a few small coalfields in the west of England there were no six-inch maps. Of many important coalfields the original six-inch maps had never been revised, and as most of them were fifty years old they were so much out of date as to have little practical value. Revision was in progress in the Midlands of England and in Scotland; the South Wales coalfield had been recently mapped for the first time on the six-inch scale, also North Staffordshire, Nottinghamshire and Derby. The Irish coalfields had been mapped on the six-inch scale between 1855 and 1884, but very little revision had been attempted. This Sub-Committee was so much impressed with the backward state of the revision that they submitted an Interim Report to the Prime Minister to direct his attention to the facts.

The recommendations of this Sub-Committee (in addition to the transfer to the Department of Scientific and Industrial Research) were:

(1) The completion of the primary six-inch survey of all coalfields and of the areas into which their concealed parts may extend, and the revision of coalfields originally surveyed on the six-inch scale but not revised during the last thirty years, at as early a date as possible.

The decennial revision of the six-inch geological maps of all areas where coal-mining is in progress.

(2) Compulsory notification of all borings and sinkings expected to reach one hundred feet in depth, with free access to all borings and shafts.

(3) That powers to put down boreholes should be conferred upon some Department of the State.

The first of these recommendations obviously required a considerable increase of staff in order to accelerate progress. In 1914 when War broke out the six-inch survey of South Wales was finished. The field work had taken fifteen years, and the results were not yet completely published. The decennial revision of coalfield maps has never been seriously attempted, and would require a much larger staff than the Geological Survey has ever possessed.

Compulsory notification of borings for minerals was enacted nine years later (1926), but, except the Petroleum Department, no Government Office has had power to put down borings in search of minerals.

In January 1918 the Coal Conservation Committee sent in its Final Report and the Geological Survey was transferred to the Department of Scientific and Industrial Research on 1st November, 1919. The staff absent with the military forces was now being released and many changes were made. Bailey, Carruthers and Macgregor became District Geologists in place of Clough, Barrow and Hinxman, and the subordinate or technical staff was regraded and increased. Field work was started again with about half a normal staff, and colour-printing of the maps was resumed. The Museum was again open to the public.

## **Sir Aubrey Strahan – synopsis**

Sir Aubrey Strahan had conducted the Geological Survey with great success through one of the most difficult periods of its history. The demands on its services after the outbreak of war were most insistent and urgent. With a much diminished staff Strahan met all the calls on his activities, and as time went on it was proved that valuable information could be given both to the fighting forces and to industry and commerce by the Geological Survey. It was a period of strenuous activity in which the Director was loyally supported by all his staff in England and in Scotland. The close contact which was obtained with engineers, manufacturers and merchants was of great value to the Geological Survey, and has resulted in a much clearer realization of the practical importance of the Survey's work. Sir Aubrey Strahan served on a great number of committees during the War and subsequently, and, as he had a very extensive knowledge of the economic applications of geology, his services were very highly appreciated.

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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](#)

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