

MEETING OF BRITISH GEOLOGICAL SOCIETIES AND EDINBURGH GEOLOGY DEPARTMENT CENTENARY CELEBRATIONS

Edinburgh 8th–11th September 1971

Geology—Retrospect & Prospect: Edinburgh University Geology Department and the Geological Society of London, 10th September 1971.

Morning session—Chairman Professor W. A. Deer, F.R.S., President Geological Society.

Professor Craig of the Edinburgh Department introduced the first two speakers. Their visits as Edinburgh University Swiney Lecturers were made possible through a fund originally established to support medical students willing to lecture in geology!

1. The history of geology in Edinburgh: Professor D. B. McIntyre, Department of Geology, Pomona College, California.

After outlining the early history of Edinburgh University, Professor McIntyre described the brilliant circle of friends who were the contemporaries of James Hutton in late 18th century Edinburgh. Professor McIntyre's remarkable abilities as an informal Scots raconteur brought to life, for an all too brief 40 minutes, characters whose portraits in the University by Raeburn are 'better than written biographies'. They included Joseph Black 'the midwife of modern chemistry', his cousin Adam Ferguson, the brilliant lame lawyer John Clark, and Adam Smith. A meeting in the house of Adam Ferguson is commemorated in the famous painting including Scott (a friend of Ferguson's son) Burns, Hutton and Black. The closeness of the Edinburgh group was exemplified by the appointment of Hutton and Black as literary executors for Hume, and of Hutton and Ferguson as executors for Adam Smith, whose dying words were—'Gentlemen I regret the meeting will have to be adjourned to another place'.

Professor McIntyre commented that contrary to previous views Hutton's writings were not more obscure than those of most modern geologists! He stressed the need to see the development of Hutton's geological thinking in the context of the contemporary intellectual environment in

Edinburgh. He demonstrated one aspect of this in relation to two generations of the Clark family. Old John Clark (father of the lawyer) was the first man to recognise a granite vein and *he took Hutton to see it*. His son was present when Hutton recognised the first unconformity on Arran and despite Clark's lameness they climbed Goat Fell together. Geological sketches by John Clark of Eldin, including the unconformity at Siccar Point have recently been discovered. These original drawings, from which some prints for Hutton's 'Theory of the Earth' (1795) were taken, formed part of an exhibition arranged in the University Library as part of the Centenary Celebrations. Professor McIntyre concluded by pointing out that in the political climate of the late 18th century and the French Revolution, Hutton was taking a very real risk in putting forward his theory that Revolutions (albeit geological ones) are a part of the natural order.

2. Experimental geology from James Hall onwards: Professor L. Weiss, Department of Geology & Geophysics, University of California, Berkeley.

Professor Weiss spoke of developments since the early research of James Hall, 'the father of experimental geology', and described work in progress at Berkeley which follows in the same tradition. Hall was the first to experiment on folding and deformation in rocks using clay and strips of cloth held in a wooden frame and subjected to lateral pressure to simulate the suggested geological processes involved. He recognised the importance of constraint by the overlying material in the design of his experiment. Professor Weiss referred to a number of modern experiments with models and described an 'extrusion' apparatus which he hoped would be working in the near future. He outlined some of the problems arising from attempts to create valid models of natural geological processes and concluded with a short film of some work carried out recently at Berkeley.

The experiment was set up using decks of thin black and white cards stacked alternately.

The cards were held firmly above and below and subjected to gradually increasing lateral pressure. The film illustrated clearly the development of the resulting folds, and also demonstrated that in the case of the card decks the process appeared to be the same at greater and smaller pressures, the only difference being one of scale. At higher pressures (before the cards fractured under the strain) kink folds occurred on a microscopic scale in the fibres of the cards themselves. The experiment had also been carried out using annealed copper layers between blocks of cards. The copper layers initially formed box folds, but as pressure continued to be applied these also became kink folds.

3. Explosive volcanic eruptions: Dr G. P. L. Walker, Imperial College, University of London.

Dr Walker talked primarily about pyroclastic rocks and the processes producing them. The paper was illustrated by dramatic colour slides and reviewed recent work on rocks resulting from explosive volcanic eruptions. These had hitherto been virtually ignored by both sedimentologists and volcanologists. Following the development of better understanding of eruptions and deposits, prediction of explosive activity might become possible.

4. Trends in applied geochemistry: Professor J. S. Webb, Imperial College, University of London.

Professor Webb described techniques of stream sediment sampling which provide maps of the distributions of selected elements or minerals over particular areas. On the basis of one sampling per square mile and using computer analysis, general geochemical maps of large areas could be built up. Using this method studies have been carried out in the search for exploitable mineral resources. However, there were many other possible applications of the technique. For example, discovery of a dearth of copper in a particular area had led to the finding of copper deficiency in the local cattle which had gone undiagnosed because there were no clinical symptoms. The introduction of copper injections at the beginning of the season had produced an average increased yield of 50 lbs per animal at the end of the season. The implications of dis-

coveries such as this for agriculture, medicine, pollution and marine resources for example were very exciting. A multi-disciplinary research group at Imperial College, London, includes five geologists and eight other scientists drawn from a wide variety of disciplines. Professor Webb saw a considerable future for groups such as this putting the results of research in applied geochemistry to a wide variety of uses.

5. Advancing palaeontology: Professor P. C. Sylvester-Bradley, Department of Geology, University of Leicester.

Professor Sylvester-Bradley reviewed the development of geology. He saw it as a new science which after 100 years of free play, followed by a phase in which specialist subjects developed, had now burst its boundaries and fathered three healthy bastards—geophysics, geochemistry and its youngest offspring geobiology. Nevertheless, geology as the subject embracing all the earth sciences was still very much alive as was evident from the figures for recruitment into University departments.

How does geobiology differ from palaeontology? Whereas geophysics is the most rigorous and the least complex of the three bastards, geobiology is the most complex and as yet the least rigorous. It comprises palaeontography, the oldest activity in the earth sciences—a descriptive and classifying task revolutionised by new techniques and equipment, together with palaeontology and the most recent developments palaeoethology and palaeoecology. The latter was referred to in papers by McKerrow and Ager in the September 1971 issue of the *Journal of the Geological Society* and it was not without significance that the *Palaeontological Association* had chosen as the subject of its meeting in Edinburgh, the ‘Palaeoecology of Reefs’.

The real problem now facing the geologist is that of ‘noise’. How can one isolate the significant factors from the raw data and how can the number of variables be controlled and reduced? New possibilities had been opened up using computer simulations employing only a few parameters and making possible studies in theoretical morphology. The picture painted by Professor Sylvester-Bradley was of a vigorous science refreshed by flourishing new ideas and techniques which aided the development of quite new areas of study.

Afternoon session—Chairman Professor G. Y. Craig, University of Edinburgh.

6. Sedimentology prospect—Priorities, means, people, ends; ‘Government v. University?’: Professor P. Allen, Department of Geology, University of Reading.

Professor Allen spoke in his inimitable stimulating manner. There was a need to put considerations of time and place back into the old definition of sedimentology as dealing only with processes. He threw out a series of largely unanswered questions: was there any sound geological basis for the decision to site the new London airport at Foulness and had detailed studies of the area yet been carried out? could a disaster similar to that at Aberfan occur again in Britain? what about the dumping of chemical wastes when so little was known about sediment transport? what were the possibilities of being able to dispose of the ever growing mass of waste products from civilisation by feeding it into the metamorphic circulation? has the acceleration due to gravity at the surface of the earth changed? and is the gravitational constant really a constant? how do changes such as the great extinctions occur so relatively quickly and why? is there perhaps in each case some sedimentological cause? do the planets each mirror a stage in geological evolution, with Mars for example ‘frozen’ in the Pre-Cambrian?

In order that answers might be found to some of these questions Professor Allen felt it essential that there should be the right intellectual environment in which the non-conformist could flourish. Sources of finance and facilities should not always be channelled through Heads of Departments. Administrative duties should be kept to a minimum and there should be more interchange between university departments and research institutes. A desire among politicians for tidiness and efficiency could be seriously counter-productive. There should be more sources of finance not fewer. There was a great danger in establishing ‘centres of excellence’ necessitating high investment in bricks and mortar with consequent influence on undergraduate teaching programmes. A system of regional centres supported by payment of travelling expenses for those who used them would be one solution to this problem. It was also very important to get more technical help to prevent lecturers becoming slaves to machines. Generous travel funds should be available to enable scientists to meet each other as well as

visit places and attend conferences overseas. Professor Allen’s message to geologists was ‘beware of red tape and of scientists turned administrators’.

7. A forward look for the Institute of Geological Sciences in Scotland: Dr K. C. Dunham & J. A. Robbie, Institute of Geological Sciences. (read by Dr Dunham).

Dr Dunham began by answering some of Professor Allen’s points and by refuting the suggestion that he or I.G.S. represented the ‘Establishment’. The Establishment was in Whitehall. There had been co-operation with the National Coal Board to investigate colliery tips in an attempt to prevent other disasters similar to that at Aberfan. An additional geological survey had already begun at Foulness, although the original decision had not been based upon geological considerations.

Dr Dunham then outlined the history of the IGS in Scotland and the considerable progress made recently, culminating in the proposal to erect new premises on the West Mains Road site in Edinburgh adjacent to the University Grant Institute of Geology. These would house the Geological Survey of Scotland and a number of specialist groups such as the Continental Shelf Group, the Marine Geophysics Group and the Global Seismology Unit together with computing and other facilities. The informal turf-cutting ceremony on the new site that evening would mark an historic moment in keeping with the theme of the meeting.

(The complete text of this paper was published in J.G.S. Vol. 127 Pt. 5, September 1971.)

8. The place of geology in Government scientific research: Professor F. H. Stewart, Department of Geology, University of Edinburgh.

Professor Stewart raised the problem of the inevitable fall in the expansion rate for research. Two questions were posed: what was the right amount to spend on research? and was the right kind of research being done? He outlined the present sources of government support for research and ended with the hope that the new working parties set up by NERC to consider the state of research in the various branches of geology would aid policy-making in the future.

(The complete text of this paper was published in J.G.S. Vol. 127 Pt. 5, September 1971.)

Professor Allen, Dr Dunham and Professor Stewart then took the platform for a brief discussion of some of the ideas raised at the afternoon session. They were asked how cuts could be made in research expenditure. Professor Allen would not accept that cuts should be made. He felt that there was now international concern about the environment and that industry could contribute much more. Dr Dunham saw problems in paying staff if the cut back was too great, and was afraid that this might result in attempts to increase teaching loads. Professor Stewart said that 'sharing the cake' fairly among the sciences was a considerable problem.

Professor Sylvester-Bradley asked Professor Stewart to answer a question in two capacities—as head of the Edinburgh department and as Chairman-elect of NERC. How would he resolve the conflict of interests between NERC and other bodies, between the Universities and I.G.S.,

and between geology and the other sciences in the university? Professor Stewart said that he would continue to argue the case for geology in the universities but he could not comment on the NERC position because he did not yet know enough about it.

Dr W. W. Bishop took the opportunity to congratulate the organisers on the success not only of the day's discussions but of the whole conference. He hoped that the event would be repeated every two years. He asked whether there was an adequate feed-back from such successful conferences where new ideas might be put forward. Professor Stewart astutely suggested that the best evidence he could offer was that Professor Allen was to become a member of the NERC Council in October. The meeting, which had been lightly but firmly chaired by Professor Craig, closed amid laughter.

The success of the whole co-ordinated gathering can be judged from the fact that over 500 geologists of different shades of specialisation attended during the four formal days of meetings. The healthy spectrum of representation is reflected in the estimated numbers of those present at the different sessions:

Wednesday 8th Sept.—Edinburgh & Glasgow Societies, *Dating events in the metamorphic Caledonides*—over 200.

Thursday 9th Sept.—Edinburgh & Glasgow Societies (topic as Wednesday)—over 200; Institution of Mining & Metallurgy, *Development of mineral resources in Great Britain & Ireland*—250 morning; Palaeontological Association, *Palaeoecology of reefs*—about 100; International Association for Mathematical Geology, *Graphics and data*—25.

Friday 10th Sept.—Geological Society, *Geology retrospect and prospect*—250; Mineralogical Society, *Scottish igneous petrology*—150; British Sedimentological Research Group, *Global topics in sedimentology*—90. Field excursions were held by the Sedimentological Research Group on Saturday

11th and by the Volcanic Studies Group on Sunday 12th and Monday 13th September. There were excellent displays of books and apparatus in the conference centre throughout the meeting.

The total of 500 participants emphasises the active interest in all branches of Earth Science at present. This total was achieved despite overlap with the British Association meeting at Swansea. Attendances at Section C of the Association and at Edinburgh were presumably both affected. The meeting of the Association of Teachers of Geology commenced in Cardiff on September 10th and clashed with the last day of the Edinburgh meeting. In addition the Engineering Group of the Geological Society held their meeting in Leeds from 20th to 23rd September rather than in Edinburgh. It is to be hoped that they will all take part in future co-ordinated meetings.

The members of the organising committee (irreverently known as the 'Duff committee') who undertook the task of planning the joint venture are to be congratulated on the success of their activities. Future meetings seem assured of success if the organisers are able to rival the efficiency and enthusiasm of our Edinburgh hosts.