Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Peach and Horne: the British Association excursion to Assynt September 1912

A. J. BARBER

Department of Earth Sciences, Royal Holloway University of London, Egham, Surrey TW20 0EX, UK (e-mail: 106731.1236@compuserve.com)

Abstract: At the meeting of the British Association held in Dundee in September 1912 a group of eminent European geologists, including most of the leading Alpine tectonic experts of the day, intrigued by the account of the structure of the NW Highlands given in the 1907 memoir, expressed a wish to see these structures for themselves. Peach and Horne were approached, and agreed to lead an excursion to the Assynt area following the meeting. The programme for the excursion followed an itinerary that many geological parties still follow today. On the final evening of the excursion Albert Heim (Zurich), the doyen of Alpine geologists, gave a vote of thanks to the leaders and Maurice Lugeon (Lausanne) composed *La Chanson du Moine Thrust* which the participants sung with great enthusiasm. Brief biographies are given of the participants, many of whom were already distinguished, while most of the junior participants, particularly those from the British Geological Survey, went on to pursue long and distinguished careers, making major contributions to our knowledge of Scottish geology.

Benjamin Neave Peach and John Horne demonstrated the results of the recently completed geological mapping of the Assynt area, in the NW Highlands of Scotland, to a party of eminent European, British and American geologists during a field excursion which took place 11–18 September 1912, under the auspices of the British Association for the Advancement of Science. The BA excursion included routes that have been followed by geological parties and many generations of students, ever since. Some of these routes were also followed by participants in the excursions, organized for the commemorative meeting at Ullapool in May 2007 to celebrate the centenary of the publication of the 1907 memoir on the *Geological Structure of the North-West Highlands of Scotland* (Peach *et al.* 1907).

A cyclostyled programme giving the itineraries to be followed during the excursion was presented to participants at the commencement of the excursion, but the information given here, including the programme, the list of participants and the 'vote of thanks', is taken from the pamphlet *Geological Excursion in the North-West-Highlands of Scotland Assynt-Region* prepared and by Professor Albert Heim after the excursion and published by the Geological Commission of Switzerland, Zurich (Heim 1912).

Programme

ASSYNT EXCURSION conducted by Messrs PEACH & HORNE 11th to 18th September 1912

WEDNESDAY 11th September: leave Dundee 2.45 p.m. train, Caledonian Station, reach Perth 3.50 p.m. The Highland Railway, reach Inverness 7.42 p.m.: Special 3rd Class Carriage reserved for this party. Return tickets (3rd Class) Perth to Lairg at reduced rates for Assynt Excursionists, single fare and a third = Twenty Shillings and Sevenpence. Stay overnight in the Station Hotel, Inverness, at reduced tariff. Dinner, bedroom, breakfast and attendance = Eleven Shillings and Sixpence (exclusive of spirits, wines and aerated waters) for those who wish a single bedroom each, and Ten Shillings and Sixpence for those who take double bedded rooms.

THURSDAY 12th September: Leave Inverness 9.50 a.m.; reach Lairg 12.45 p.m. Lunch at Lairg Hotel; leave Lairg for Inchnadamph at about 2.00 p.m. on the way examine sections of Moine Schists in the River Oykell, by the roadside and in Allt Ealag near the Moine Thrust.

FRIDAY 13th September: Lewisian Gneiss and undisturbed Torridonian Sandstone and Cambrian strata. Drive to Strathan beyond Lochinver and on the way back to Loch Assynt examine various types of gneiss in the Fundamental Complex, basic and ultrabasic dykes and pre-Torridonian shear lines. Unconformable junction of Torridon Sandstone and Lewisian Gneiss. Cambrian strata resting unconformably on Torridon Sandstone: undisturbed Cambrian strata up to the basal dolomites: *Olenellus* zone well exposed here.

SATURDAY 14th September: Glencoul Thrust. Drive to Kylesku, thence by boat to the head of Loch Glencoul. Examine Lochinver type of quartz pyroxene gneiss traversed by basic dykes: overlap of Cambrian strata from the Torridon Sandstone onto the Lewisian Gneiss: undisturbed

From: LAW, R. D., BUTLER, R. W. H., HOLDSWORTH, R. E., KRABBENDAM, M. & STRACHAN, R. A. (eds) *Continental Tectonics and Mountain Building: The Legacy of Peach and Horne*. Geological Society, London, Special Publications, **335**, 29–49. DOI: 10.1144/SP335.3 0305-8719/10/$15.00 © The Geological Society of London 2010.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Cambrian succession; piled up fucoid beds, serpulite grit and basal limestone (*Schuppen struktur*) beneath the Glencoul thrust on both sides of Loch Glencoul; outcrop of Glencoul thrust plane, great slice of Lewisian Gneiss over 1500 feet thick, covered unconformably by Cambrian strata.

The younger members of the party may ascend to the 1250 ft. level to examine the mylonites in connection with the Moine Thrust, at the base of the Stack of Glencoul.

SUNDAY 15th September: Rest for those that wish to do so: sections near hotel for others.

MONDAY 16th September: Ben More thrust. Drive to Ben More lodge, Loch Ailsh. Walk up the Oykell River section for three and a half miles to the outcrop of the Ben More thrust plane. Here a thick slice of Lewisian Gneiss with dykes and infolds of Torridon Sandstone are driven over Cambrian strata; ascend the stream issuing from Dubh Loch Beag, examine infolds of Torridon Sandstone with basal conglomerate in the Lewisian Gneiss; deformation of Torridonian basal conglomerate and Lewisian Gneiss by post-Cambrian movements.

On the way back to Ben More Lodge, examine thrust mass of syenite intrusive into Cambrian strata which alters Cambrian limestone and dolomite into marble.

TUESDAY 17th September: Moine Thrust. Drive to Cnoc-an-t-Sasunaich, south of Elphin. Examine undisturbed Cambrian succession: outcrop of Moine Thrust plane: lenticle of deformed Lewisian Gneiss beneath the Moine mylonites and resting on the Cambrian basal dolomite: walk eastwards to the Knockan Burn and walk along the outcrop of the Moine Thrust plane for a short distance where the Moine rocks rest on the piled up Cambrian dolomites.

Visit Borolanite mass east of Ault-na-Callagach: examine outliers (Klippen) of thrust materials above Ben More thrust plane at Beinn an Fhurain and Beinn nan Chaimh-seag where they rest on piled up Cambrian dolomites.

WEDNESDAY 18th September: Drive from Inchnadamph to Lairg Station: leave Lairg at 12.7, reach Edinburgh 9.17.

Inchnadamph Hotel reduced tariff – Nine Shillings per day for breakfast, lunch, dinner bedroom and attendance (exclusive of spirits, wines and aerated waters). Hiring charges extra.

List of participants

Prof. Ch. Barrois and Madame Barrois (Lille), Dr. E. Tietze (Vienna), Dr. Hans Reusch (Christiania–Oslo), Prof. M. Lugeon (Lausanne), Prof. E. Haug (Paris), Prof. Leith (Wisconsin), Dr. Albert Heim (Zurich), P. Pruvost (Lille), Madame Dr. E. Jérémine (St. Petersburg), A. Strahan (Geol. Surv., London), Prof. S. H. Reynolds (Bristol), Prof. W. S. Boulton (Cardiff), T. J. Jehu (St. Andrews), T. D. Falconer (Glasgow), Albert Gilligan (Leeds), W. F. P. McLintock (Edinburgh), E. M. Anderson (H. M. Surv., Edinburgh), E. B. Bailey (H. M. Surv., Edinburgh), C. B. Crampton (H. M. Surv., Edinburgh), C. H. Dinham (H. M. Surv., Edinburgh), G. V. Wilson (H. M. Surv., Edinburgh), G. W. Lee (H. M. Surv., Edinburgh), M. Macgregor (H. M. Surv., Edinburgh), J. E. Richey (H. M. Surv., Edinburgh), W. B. Wright (Geol. Surv. Ireland, Dublin), Cosmo Johns (Sheffield), A. W. R. Don (Cambridge) and T. C. Nicholas (Cambridge) (Figs 1–3).

N.B. This is a corrected version of Heim's list, evidently transcribed from a hand-written list, in which some names are misspelled or given incorrect initials.

Vote of thanks: given by Albert Heim at Inchnadamph 17.IX.1912

Ladies and Gentlemen, we are now at the end of our beautiful excursion to the Highlands of Scotland. Our predominant feeling and impulse is to thank our guides Peach and Horne!

We look at the scientific work they have done in this country with the highest respect and appreciation. They are a couple of scientists, Investigator-Twins, such as I have never seen before in my life, two men so delightfully developed in a wonderful common work of research, I think such a union in investigation was only possible because both of them are such beautiful characters and because they were both always directed by the conviction that investigation, that the finding out of truth, is the most sublime duty of the human mind.

No doubt, they had their excellent predecessors and their helpers in clearing up the 'Secret of the Highlands'. They will also have their correctors. For investigators of such a high mind a correction is always a pleasure, because it brings them nearer to the truth. I have the conviction that in this case the corrections will refer to details in observation and explanation, and not go so far as with me, for instance, by my friend Lugeon, seated at my side. The principal work done by our Twins will remain a good and solid step in the advancement of human knowledge, and their names will be attached to it for ever!

Peach told me that when he was a very young man, he once made a trip into the Alps. On approaching them and seeing them from afar, he felt that before him he had something grand, and – though

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Fig. 1. Horne (left) and Peach (right) sitting on the bench outside the Inchnadamph Hotel 1912. *Reproduced with the permission of the British Geological Survey © NERC. All rights reserved.*

he did know not yet anything of overthrusts then – he was touched by it and the tears ran over his young cheeks. 'Paidy Peach' is today still a young man, the youngest of us in his heart. Well, before my remains will be burnt, I have one great wish, that is to bring our dear twins into the Alps and to guide them there.

In the Scotch [sic] Highlands they worked in a very old land, their mountains are old, weathered down to their very roots. Our Twins have seen and investigated the roots of mountains only. In the Alps the things are otherwise. The Alps are ten or twenty millions of years younger. My dear Twins, you who have spent your strength, your work, your time, your life in finding out the structure of the earth's crust in the roots of the mountains, do come some day to see also the leaves and beautiful folded flowers which follow higher up – come to smell and enjoy these flowers! You who have studied the mountains in the form of an old man, come to see the Säntis, a young man. Born above a great thrust, in full development of splendid fresh and upright limbs and folds. Come to see the Jungfrau. She is a wonderful young Lady born deeply down under the great thrust planes in the youngest tertiary time and brought to light only in quaternary time!

What a happy day it will be in my life it will be to see Horne's eyes lightening and Peach's tears running again, both entirely carried away into their scientific heaven by seeing the grand young mountains, by seeing in reality what they will till now, only imagined to have existed above their Highland-grounds some thousands metres higher in the sky (Fig. 4). Come! You must come! It is your duty, it is your human and scientific right. It will be a reward for your excellent life-work.

Let me thank you in the name of science for your scientific work. It was difficult work, a hard work and a work which could be done only by men of your strength and devotion!

And, Ladies and Gentlemen, I am sure you will also allow me to thank our dear Investigator-Twins in the name of all the excursionists for the indefatigable devotion in bringing us to their mountains and showing us their principal features, which give us an idea of this interesting overthrusted region of the earth's crust.

We all will hold our Investigator-Twins dear in our memory. May they live long and happy and enjoy the growth of knowledge and the respect and love of everybody.

So let us thank you once more!

Heim's list of participants

In Heim's account of the excursion the participants are curiously described as 'Partners', and whereas

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Fig. 2. The participants in the 1912 BA Field Excursion to Assynt outside the Inchnadamph Hotel (Photo by S. H. Reynolds). 1. John Horne, 2. Hans Reusch, 3. Hawker Dinham, 4. Albert Gilligan, 5. Cosmo Johns, 6. John Falconer, 7. James Richey, 8. Cecil Crampton, 9. Edward Bailey, 10. Tressilian Nicholas, 11. William Boulton, 12. Charles Leith, 13. Aubrey Stahan, 14. Thomas Jehu, 15. Ernest Anderson, 16. Emil Tietze, 17. Elisabeth Jérémine, 18. Emil Haug, 19. Ben Peach, 20. Albert Heim, 21. Madame Barrois, 22. Maurice Lugeon, 23. Charles Barrois, 24. Murray Macgregor, 25. Pierre Pruvost, 26. William Wright, 27. George Wilson, 28. Gabriel Lee, 29. William McLintock, 30. Archibald Don. *Reproduced with the permission of the British Geological Survey © NERC. All rights reserved.*

today they would be arranged alphabetically, Heim arranges them in a hierarchy, where Europeans rate above British, academics rate above Survey Officers and recent graduates come last! On Heim's list some of the names of the participants are misspelled, or are given incorrect initials, evidently the original list was handwritten and incorrectly transcribed. Some of the participants were well

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

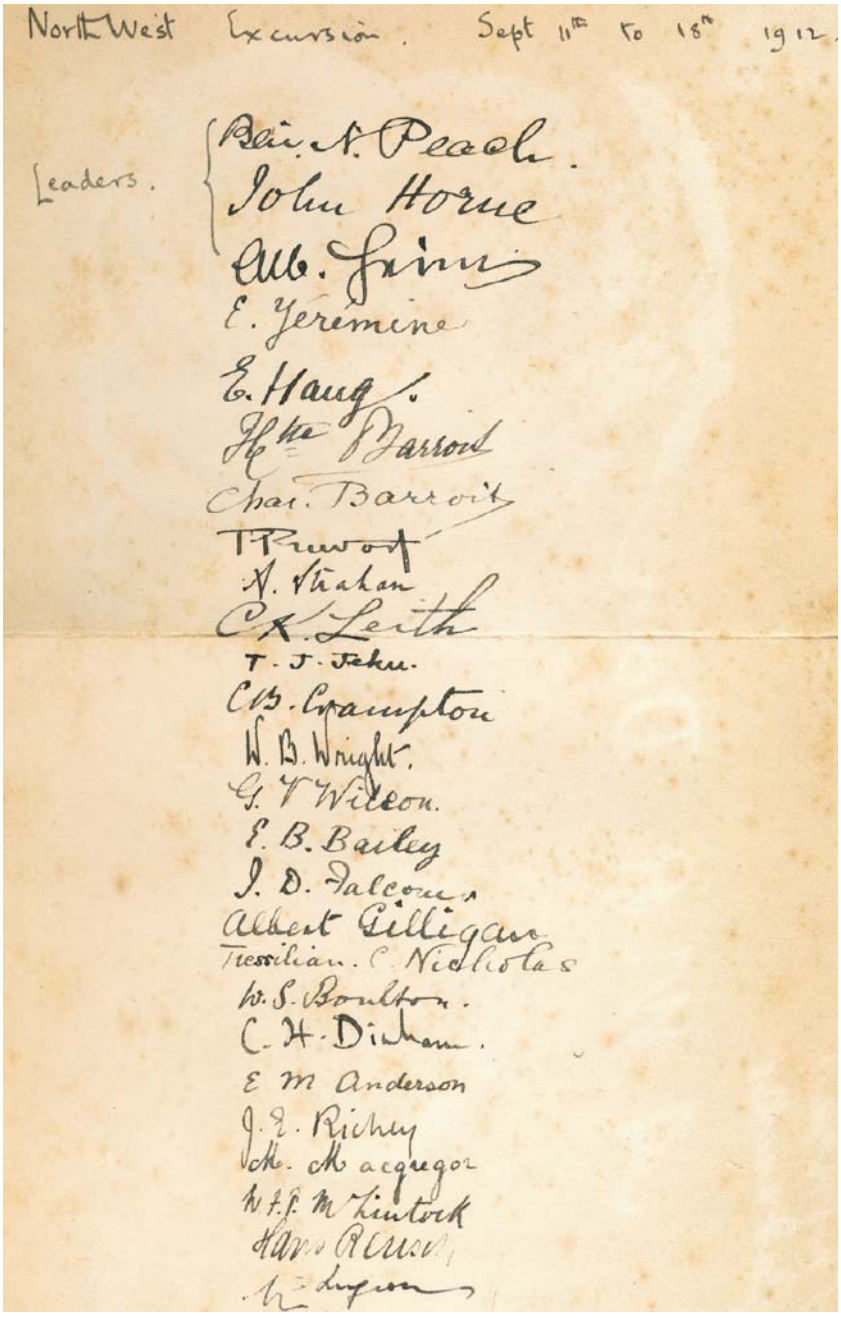


Fig. 3. Signatures (apart from Don) of the participants in the 1912 BA Field Excursion to Assynt. From a sheet mounted on the flyleaf of A. W. R. Don's copy of the 1907 NW Highlands memoir.

established in their careers as Professors (6) or Directors of museums (2), others were junior academics, who subsequently became professors (5), or officers of the Geological Survey, who later became Directors of the Survey (4). Four were elected Fellows of the Royal Society of London and seven were elected Fellows of the Royal Society of Edinburgh.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

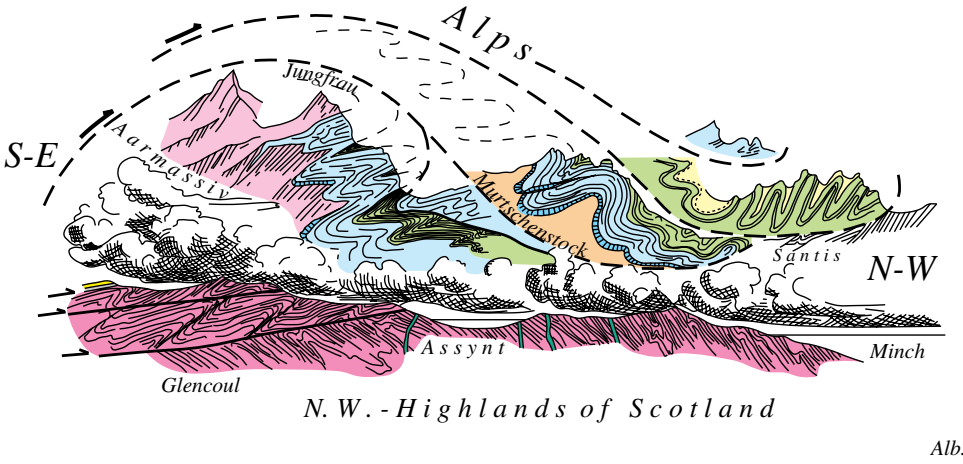


Fig. 4. Heim's concept of the relationships between a NW Highlands basement and an Alpine superstructure in a typical Mountain Chain (redrawn from Heim's 1912 black and white sketch). In this diagram Heim is suggesting that the Lewisian basement and its upthrust slices are equivalent to the Variscan basement and the crystalline massifs of the Alps, and like the Alpine basement with its overlying superstructure of overfolded and thrust nappes of Permian, Mesozoic and Cenozoic sediments, the Lewisian basement would have been covered originally by a ~30 km superstructure of overfolded and thrust Moinian/Torridonian, Dalradian (?) and Cambro-Ordovician sediments, responsible for the garnet/kyanite grade (amphibolite facies) metamorphism seen in the Moinian pelites and psammites to the east of the Moine Thrust (cf. Soper & Barber 1982, fig. 5b). The colours are those used conventionally in European geology of the period: red/pink for crystalline basement; dark green for basic dykes; yellow for Moinian; orange for Permian; blue for Jurassic; pale green for Cretaceous and pale yellow for Cenozoic flysch.

La Chanson and Lugeon's account of the excursion

During the excursion Maurice Lugeon, Professor of Geology at the University of Lausanne, Switzerland, prepared some verses of *La Chanson du Moine Thrust*, which were sung by the participants on the last evening of the excursion. Later Lugeon published a revised version (Appendix 1), together with a brief account of the excursion (Lugeon 1913) which is reproduced below.

The British Association for the Advancement of Science held its annual meeting at Dundee in 1912. On the 11th September, a party of geologists who had assembled to participate in the meeting left Dundee to visit the famous thrust phenomena in the Caledonian Mountains. The two grand Masters, Horne and Peach guided our studious and joyful party. During the day this small group inspected the outcrops of ancient nappes. In the evening accommodation was provided by Mr. Wallace at Inchnadamph (Hotel) near Loch Assynt.

Peach revealed to us the secrets of the 'pipe rock'. We were shown marvellous structures! We saw the Glencoul Nappe resting on a thrust plane on top of the 'Old Boy', then the Ben More Nappe and above all the Moine Thrust. We did not see the thrust front itself, previously it must have extended much further, to where the green sea now rolls. On the 17th September, our last night in this classic terrain, we had pleasant evening of discussions. At the head of the table, Peach told anecdotes with his usual charm. Near by Horne talked agreeably; truly he never says anything else. Barrois is talking, and one knows that whatever he says is always delightful and meaningful; Haug holds forth equally in these discussions; Heim with his stimulating ideas, generates enthusiasm. And everyone else joins in the discussions.

At last the good Doctor Horne, knowing that during the day I have prepared some poor couplets to the glory of the Moine Thrust, asks me to recite them. So was born the *Chanson du Moine Thrust.* When I returned home several of my friends asked me to publish this ditty. Some of the verses were very weak and I have replaced or revised some of the couplets. This is the second edition of this memory of our excursion. Please forgive me as you have forgiven me many other things! I have also written the music. Miss J. Pfender has helped me prepare this accompaniment.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Brief biographies of the participants in the 1912 excursion

In preparing these biographies use has been made of Sarjeant (1980) and the references therein, obituary notices included in Presidential addresses of the Geological Society of London, the Proceedings of the Geological Society of London, the *Transactions of the Royal Society*, the histories of the British (Flett 1937; Bailey 1952), Scottish (Wilson 1977) and Irish Geological Surveys (Herries Davies 1995) and Dryburgh *et al.* (1995). The biographies of the participants are given in the order in which they were listed (as above) by Heim (1912).

B. N. Peach (1842–1926)

Benjamin Neave Peach gained the attention of Murchison, Director of the Geological Survey through his father, a Coast Guard Officer stationed in Caithness, who first found fossils in the Durness Group, and set in train the Highland controversy (Bailey 1926). Murchison recommended Ben Peach to the Royal School of Mines and then to the Geological Survey which he joined in 1862. Initially Peach assisted John Salter, Survey Palaeontologist, in the identification of fossils and then traced Highland glacial erratics across the Lammermuirs (Horne 1926*a*, *b*). In 1867 Peach was joined by John Horne, who was attached to him for training, beginning a 60-year long association. It was the custom in the Scottish Survey to work in the Southern Uplands in the winter and in the Highlands in the summer, until the beginning of the stalking season. In the Southern Uplands, Peach and Horne began revision of the original mapping following Lapworth's interpretation of the structure, based on the use of graptolites as zonal indicators. Work in the NW Highlands commenced in 1883 with a field team consisting of Gunn, Clough, Cadell, Greenly and Hinxman under Peach's supervision, in an attempt to resolve the Highland controversy. Lapworth had proposed that the 'Secret of the Highlands' was the importance of thrust structures. At first Peach and Horne were sceptical, and at the end of the first field season in Durness, based on the Sangomore section, were convinced that there was a conformable succession (Greenly 1928). In the following year, mapping the Heilim section on Loch Eriboll, where Lapworth demonstrated that the Cambrian succession was repeated by large numbers of minor thrusts, they were convinced that Lapworth's interpretation was correct. With the acceptance of the importance of thrust tectonics by the 'Investigator Twins' the Highland controversy was laid to rest. According to Greenly (1928), Peach and Horne discussed their problems 'freely and disagreed vigorously'; the part that each of them played in their conclusions 'cannot be disentangled – not even by themselves'. After carrying out surveys in many areas of Scotland Peach retired from the Geological Survey in 1905 but continued his palaeontological work and joined in many publications with John Horne.

Peach was a master mapper and a master of conversation, but was not a good public speaker, except in the field, and according to Bailey (1926) could 'scarcely bring himself to write or read'. He had a youthful buoyancy of spirit, a brilliant imagination, far-sighted vision, and was a constant stimulus to everyone who worked with him. He was a rapid worker, 'arriving at conclusions almost before he had finished collecting the evidence' (Flett 1929). He was elected F. R. S. in 1892, received medals and prizes from the Geological Society, and was awarded an honorary Doctorate by the University of Edinburgh. By the time he retired in 1905 Peach had reached a dominating position in Scottish geological thought.

John Horne (1848–1928)

John Horne attended the University of Glasgow, but as was common at the time never graduated. In 1867, at the age of 19 he joined the Scottish Geological Survey where he was attached as a trainee to Ben Peach. Thus began 'the most beautiful and fruitful collaboration recorded in British Geology' (Gregory 1929). Horne was a 'neat mapper', and organized the programme of fieldwork in the NW Highlands, and on the completion of the mapping played the major part in the compilation of the NW Highlands memoir. According to Flett (1929), Horne had 'a judicial mind, who could bring into one focus converging rays of evidence from a broad field, and who arrived at no conclusions till all the facts had been given their proper weight'. Peach and Horne formed a perfect complement in which the 'imagination and profound speculations of Peach were balanced by the sound judgement and clear logical deductions of Horne'.

In 1901 Horne was appointed as Assistant Director of the Survey in Edinburgh, retiring in 1911. He presided over the Geological Section of the British Association meeting in Glasgow in 1911. He was President of the Royal Society of Edinburgh, the Royal Scottish Geographical Society and the Geological Societies of Edinburgh and Glasgow. In 1900 he was elected FRS and received honorary doctorates from three Scottish Universities. In retirement, together with Peach, he worked on a geology of Scotland which they found difficult to complete, because of differences in interpretation. After Horne's death in 1928

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

the completed chapters were published posthumously as *Chapters on the Geology of Scotland* (Peach & Horne 1930). Horne's obituarists mourned the loss of the 'leader of the Scottish geological world' (Gregory 1929), 'beloved as a man and reputed as a geologist' (Flett 1929; Campbell 1930).

Professor C. Barrois (1851–1939)

At the time of the BA Field Excursion Charles Eugène Barrois was Professor at the University of Lille, France, had broad interests in geology, with contributions to stratigraphy, structural geology, economic geology and vertebrate palaeontology. He worked on the Cretaceous stratigraphy of Northern France and the Isle of Wight and developed a zonal scheme for the Upper Cretaceous (Chalk) of France, England and Ireland. In the 1870s he worked on the stratigraphy and structure of Galicia, the Asturias and NW Spain. In 1876 he commenced his major work – the compilation of 21 geological map sheets covering Brittany and adjacent regions for the Carte Géologique de France. A major discovery was the unconformity in the Proterozoic Brioverian rocks of Brittany. In 1902 he became Director of the Institute of Geology at the University of Lille. At Lille he established a Coal Museum and worked on the coal basins of the neighbouring area and on the Palaeozoic rocks of the Boulonnais (Bailey 1940; Pruvost 1940).

Dr. E. Tietze (1845–1931)

Emil Ernst August Tietze joined the Austrian Geological Survey in 1870 and worked on primary mapping in Galicia, the Carpathians, Bosnia-Herzgovina and Montenegro, all at that time part of the Austro–Hungarian Empire. He also worked on the Elburz Mountains and wrote a treatise on the mineral deposits of Persia. He was appointed Chief Geologist of the Survey in 1885, Vice Director in 1901 and was Director from 1902 until his retirement in 1918. He was elected President of the Geographical Society of Vienna (1900–1907) and in 1903 was President of the 9th International Geological Congress held in Vienna. His published work was on Aptian ammonites and karst topography and in 1879 he strongly advocated an organic origin for petroleum. He believed in thorough field investigation and 'deplored the more speculative aspects of geology' (Garwood 1932). He was a Foreign Correspondent (1903) and a Foreign Member of the Geological Society (1907).

Dr. H. Reusch (1852–1922)

Hans Henrik Reusch graduated from the University of Oslo and in 1875 was appointed as an Assistant in the Norwegian Geological Survey. He was the first to find fossils in the schistose rocks of the Bergen District, demonstrating their Palaeozoic age. He travelled widely over the length and breadth of Norway and produced many of the maps, memoirs and yearbooks published by the Survey, becoming Director of the Survey in 1888 and retiring in 1921. In 1905 he was one of the founders of the Norwegian Geological and Geographical Societies, and founded the natural science journal *Naturen*, which was influential in popularizing science in Scandinavian countries. He was a Foreign Correspondent of the Geological Society (1889), a recipient of the Lyell Medal (1895) and was elected a Foreign Member in 1897. He was also awarded a D.Sc. by the University of Oxford. He was killed while attempting to board a moving train on his way to attend a meeting of the Norwegian Geological Society (Harker 1923).

Professor M. Lugeon (1870–1953)

Maurice Lugeon was born in France but settled in Switzerland in 1876. When he was a teenager he accompanied a surveyor who was preparing the 1:80 000 geological map of the Pre-Alps of the Chablais area and started to write papers on the geology. He graduated to carrying the rucksack of Renevier, Professor of Geology at the University of Lausanne, who was the Chief Surveyor of the Chablais area (Bailey 1954). By the time of the 1912 Excursion Lugeon was himself Professor of Geology at Lausanne. He published extensively on the stratigraphy, structural geology and geomorphology of the Alps, the Tatra Mountains and the Carpathians. He established for the first time the detailed relationships between the recumbent folds and thrusts in the nappe structures of the Alps in his memoir *Les grandes nappes de recouverement des Alpes de Chablais et de la Suisse* (Lugeon 1902), virtually founding the science of tectonics. During the 1912 BA excursion he wrote *La chanson du Moine Thrust* (see Appendix 1) which was sung by the assembled participants on the last night of the excursion.

Professor E. Haug (1861–1927)

Emil Gustave Haug was a French palaeontogist and stratigrapher who worked on the Jurassic rocks of the Bas Rhin, Alsace, and particularly on their ammonites and also on the evolution of the goniatites. He published extensively on ammonites and the geology of the French Alps. He was reputedly a superb lecturer. At the time of the 1912 excursion he was Professor of Geology in the University of Strasbourg (1885–1917) but moved to the Sorbonne, Paris in 1917. In 1902 he was President

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

of the French Geological Society. He published memoirs in palaeontology and in his *Traite de Géologie* (Haug 1907–1911) he undertook a comprehensive account, in three volumes, of the science of geology as it was understood at the time, emphasizing the control of tectonics on facies and fauna, and elaborating the then 'modern' concept of the geosyncline (Bather 1928).

Professor C. Leith (1875–1956)

Charles Kenneth Leith was an economic and structural geologist and an igneous and metamorphic petrologist. He worked initially as an assistant geologist in the US Geological Survey (1900–1905), on the Appalachian Mountains and on the Precambrian, which led to the publication of an influential work *Rock Cleavage* (Leith 1905). He joined the University of Wisconsin, Madison (1902–1956), as Assistant Professor, and then as Professor of Geology. With C. R. van Hise he published a U.S.G.S. Monograph *The Geology of the Lake Superior Region* (Van Hise & Leith 1911), which includes an account of the iron ores. The 1912 excursion was his first visit to Britain and on later visits he referred with pleasure to 'a memorable excursion with Peach and Horne to the Scottish Highlands in 1912' (Davidson 1957). He subsequently published a textbook on *Structural Geology* (Leith 1913) and then with W. J. Mead on *Metamorphic Geology* (Leith & Mead 1915). During both World Wars he acted as advisor to the Presidents of the United States on mineral resources, and in 1919 in this capacity, he accompanied President Wilson to the armistice talks at Versailles. In the Second World War he was a member of the Atomic Energy Commission, advising on uranium resources. He became President of the Geological Society of America (1933).

Dr. A. Heim (1849–1937)

Albert Heim was Professor of Geology at Zürich Polytechnic and the University of Zürich. He had been appointed to both these positions in his early twenties in succession to his teacher, Arnold Escher von der Linth, who was the first to recognize the importance of overfolds in understanding the structure of the Alps. Heim retired from both of these positions in 1911, and at the time of the Assynt Excursion was the President of the Geological Commission of Switzerland (1894–1926). His treatise *Mechanismus der Gebirgsbildung* (Heim 1878), established Heim as the leading tectonician of his age. In this work, he followed von der Linth in describing the famous Glarus fold as a 'double-fold' structure. This interpretation was later shown to be erroneous by Bertrand (1884), who interpreted it as a single northward-directed recumbent fold nappe structure. Heim was persuaded to accept this interpretation by his student, Lugeon (1902), hence the cryptic reference to Lugeon in Heim's vote of thanks to Peach and Horne at Inchnadamph. Heim's acceptance of the 'nappe' concept, and his suggestion that the underlying thrust represented the sheared-out inverted limb of the overfold, have influenced the interpretation of mountain belts throughout the world ever since. In retirement Heim published a monumental work on the *Geologie der Schweiz* (Heim 1921), 'by far the finest national geology that has yet been produced' (Collet 1938; Bailey 1939).

P. Pruvost (1890–1967)

Pierre Eugène Marie Joseph Pruvost was Assistant to Professor Barrois at the University of Lille at the time of the Assynt excursion. Subsequently he became Preparator at the University's Coal Museum. He worked on economic geology, stratigraphy, sedimentology and palaeontology in the North French Coalfield and the coal basins of eastern France, and on the origin of coal and published a classic mémoire of the *Carte Geologique de France* on Carboniferous non-marine invertebrates and fishes (Pruvost 1919). In 1922 he was appointed to the Chair of Applied Geology at Lille. He was introduced to the geology of Brittany and Normandy by Barrois, who was revising the geological sheets for the *Carte Geologique de France*. In 1926 he succeeded Barrois as Professor of Geology and Mineralogy. In 1948 he became Administrator of the Coal Basin of Lorraine until his death. In 1950 he became Professor of Geology at the Sorbonne, Paris, retiring in 1960. He was founder and President of the International Congress of Carboniferous Geology and Stratigraphy and President of the Subcommission for the Lexicon of Stratigraphy for the International Geological Congress.

He was an inspiring teacher and by the time of his death was regarded as the leader of French geology. He became President of the Geological Society of France, was a member of the French Academy of Sciences and was awarded the *Légion d'Honneur* in 1949. He was noted for his wisdom, gaiety and a winning smile. His funeral was attended by 1000 people (Stubblefield 1968)!

Madame Dr. E. Jérémine (1879–1964)

Elisabeth Jérémine (née Tschernaieff) was a Russian petrologist who graduated and worked as an Assistant in St Petersburg. She joined an expedition to the Kola Peninsula led by Loewinson–Lessing and worked on the specimens specializing in the description of rocks in thin section, initially under the guidance of Michel–Levy. She

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

then studied for her Ph.D. with Lugeon in Lausanne, publishing her thesis on the *Bassins fermés des Préalpes suisses* (Jérémine 1911). In 1917, after the Russian revolution she emigrated to France and worked with Haug at the Sorbonne and then in the Paris Museum on rocks and meteorites sent for identification from all over the world. When Pruvost moved to the Sorbonne she worked with him on descriptions of volcanic and metamorphic rocks from Normandy and Brittany for the *Carte Géologique de France* (Orcel 1965).

A. Strahan (1852–1928)

Aubrey Strahan graduated from Cambridge in 1875 and immediately joined the Geological Survey where he worked on mapping coalfields, in North and South Wales, in Nuneaton on the concealed coalfields of England, and on the geology of the Isle of Wight. At the time of the 1912 excursion he was well established in his career. He was President of the Geological Society of London (1912–1914) and became Director of the Geological Survey of Great Britain (1914–1920). During the First World War he initiated a series of reports on the mineral resources of Great Britain in response to the national need. Strahan was elected FRS and was awarded a knighthood *ab officio* in 1919, as was customary at the time, retiring in 1920 (Flett 1928; Thomas 1929).

Professor Reynolds (1867–1949)

Sidney Hugh Reynolds was a zoologist, stratigrapher and a vertebrate palaeontologist who taught geology and zoology at the University of Bristol. He started work on the igneous rocks of SW Ireland and then SW England, where he developed an interest in the Carboniferous. He is well known for his work on the Lower Carboniferous stratigraphy of the Bristol district and the Forest of Dean. He also investigated the granites of SW Scotland and wrote textbooks on zoology and Pleistocene mammals. He was appointed to the Professorship of Geology at Bristol in 1910 (Trueman 1950).

Reynolds was a keen photographer, preparing large numbers of geological prints and lantern slides for teaching purposes. He also photographed the participants on the 1912 BA Excursion to Assynt (Fig. 2). He became secretary of the BA Photograph Committee from 1910–1947, presenting large numbers of prints to the collection (Wallis 1950).

Professor W. Boulton (1867–1954)

William Savage Boulton was appointed Demonstrator and Assistant Lecturer at Birmingham University under Professor Lapworth in 1887 before he moved to the University of Wales, Cardiff in 1904 as Professor of Geology. In his teaching he emphasized the importance of field observations and geological mapping. His work on the coalfields of South Wales and the East Midlands led to the publication of a six-volume textbook on *Practical Coal Mining* (1907). He succeeded Lapworth in the Professorship at the University of Birmingham in 1913 and worked on the hydrogeology of the Trias in the Midlands and the Chalk in southern England, becoming the foremost authority on underground water. He continued consulting after retirement and advised on the siting of dams and reservoirs (Wills 1955).

T. J. Jehu (1871–1943)

Thomas John Jehu graduated in 1902 in Natural Science and Medicine at Edinburgh and then graduated in Geology at Cambridge. He was appointed to a lectureship at St. Andrew's in 1903. He was the first to find Upper Cambrian fossils in the Highland Border Series (Jehu 1912). In 1914 he was appointed to the Professorship of Geology at the University of Edinburgh. During the vacations he worked on the Torridonian and Lewisian rocks of Iona and in the Outer Hebrides, making the first detailed geological maps of these islands. A notable discovery was the 'flinty crush' rock (pseudotachylite) along the Outer Isles Thrust (Jehu & Craig 1923). He was elected to the Royal Society of Edinburgh in 1906 and was President of the Geological Society of Edinburgh (1917–1918) (Campbell 1944).

J. D. Falconer (1876–1947)

John Downie Falconer was an assistant to James Geikie, Professor of Geology at the University of Edinburgh. After graduation he was appointed by the Colonial Office as Principal of the Mineral Survey of the Northern Nigerian Protectorate (1905–1911). He published an account of the *Geology and Geography of Northern Nigeria* (Falconer 1911) and was invited to take up the Professorship in Geography at the University of Glasgow (1911–1916). During the First World War he was recalled to Nigeria as Assistant District Officer, and when the Geological Survey of Nigeria was established in 1919, he was appointed as its first Director. He worked extensively on the economic resources of Nigeria, especially on the tin fields. On his retirement in 1927 he became geologist to the Uruguayan Government until his final retirement in 1934 (Campbell 1947).

A. Gilligan (1874–1939)

Albert Gilligan was appointed as a Demonstrator in the University of Leeds in 1908, becoming an

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Assistant Lecturer in 1910, Lecturer in Economic Geology in 1917, Reader in Petrology in 1920 and Professor in Geology in 1922. He was a sedimentologist and stratigrapher working on the Carboniferous rocks of Yorkshire. He developed the techniques of heavy mineral analysis and made a study of the Millstone Grit and reconstructed the palaeogeography of Millstone Grit times. He was a great supporter of the scientific societies in Yorkshire serving on the Council of the Geological Society of Yorkshire for many years, becoming its President in 1929. He was a commanding and vivid lecturer and made field geology an exciting adventure. He was particularly popular in the mining community and gained many recruits to geology. He died shortly after his retirement in 1939 (Hudson 1940*a*, *b*).

W. F. P. McLintock (1887–1960)

William Francis Porter McLintock, after graduating from the University of Edinburgh, was successful in the examination for the post of Assistant Curator in the Museum of Practical Geology in London. In 1911 he transferred to the Royal Scottish Museum in Edinburgh as Curator of gemstones and minerals, where he worked on the zeolites in the Cenozoic volcanics on Mull and the Strathmore meteorite. In 1921 he moved back to the Museum of Practical Geology in London as Curator, where among other duties, he assessed the developing techniques of gravity and magnetic surveying. After 1930 he was much involved in planning the move of the Museum from Jermyn Street to South Kensington, ready for the opening in 1935. He became Acting Director of the Survey in 1936, pending the appointment of E. B. Bailey. During the Second World War he worked in the Atomic Energy Division of the Survey (1939–1945) and after the war in 1946, he was appointed Director of the Geological Survey, retiring in 1950 (Phemister 1960).

E. M. Anderson (1877–1960)

Ernest Masson Anderson joined the Geological Survey in 1903. In 1916 he volunteered for the Highland Light Infantry, was transferred to the Royal Engineers and was wounded in France, rejoining the Survey in 1917 (MacGregor 1961). He worked on the Lewisian, Moinian, Torridonian, Old Red Sandstone, Carboniferous and Cenozoic rocks of Ross, Inverness, Iona, Caithness and the Midland Valley of Scotland. He was much influenced by C. T. Clough, recording lineations in metamorphic rocks which he interpreted as indicating the shear direction, contrary to the orthodoxy of the time. He became a Senior Geologist in 1922, and in the same year was elected a Fellow of the Royal Society of Edinburgh and was awarded a D.Sc. by the University of Edinburgh. He retired on health grounds in 1928 but continued to do useful indoor work on a part-time basis. He is best known for his dynamic explanations for the origin of ring dykes and cone sheets and for the analysis of faults, as explained in his book *The Dynamics of Faulting and Dyke Formation* (Anderson 1942).

E. B. Bailey (1881–1965)

Edward Battersby Bailey joined the Scottish Geological Survey in 1902 and worked on the igneous and metamorphic rocks of the Scottish Highlands and Islands. In 1915 he volunteered for service with the Royal Engineers, was twice wounded in France, with the loss of an eye. He was mentioned in despatches and was awarded the Military Cross for bravery. Later he was awarded the *Croix-de Guerre* with palm and the *Légion d'Honneur* by the French Government. Returning to the Survey after the war he was the main contributor to the memoir on the *Tertiary Igneous Complexes of Mull* (Bailey *et al.* 1924). He is best known for his work on the Dalradian in the Fort William area, where he first applied 'way-up' evidence to elucidate the stratigraphy and structure. He later became Professor of Geology at the University of Glasgow (1929–1939). Together with his colleagues he published the well regarded *Introduction to Geology* (Bailey *et al*. 1939) and an influential account of the Ankara Mélange in Turkey (Bailey & McCallien 1953). He was appointed to the Directorship of the Geological Survey in 1937 and was awarded a knighthood on his retirement in 1945. In retirement he wrote a history of the Geological Survey (Bailey 1952), *James Hutton – the Founder of Geology* (Bailey 1967), and *Tectonic Essays mainly Alpine* (Bailey 1935, 1968). He was the subject of obituaries by Richey & Watson (1965) and Stubblefield (1965).

C. B. Crampton (1871–1920)

Cecil Burleigh Crampton was appointed to the Geological Survey in Edinburgh in 1900 as a Temporary Assistant Geologist and was promoted to Geologist 1901. He had a particular interest in palaeontology and the relationships between geology and floras. He worked in the Midland Valley of Scotland, in the Glasgow area and in Caithness. In 1910 he reported the discovery of the Carn Chuinnneag-Inchbae hornfelses which have become important in dating the metamorphic and structural history of the Moine Schists (Peach *et al.* 1912). In 1914 he published *The Geology of Caithness* (Crampton & Carruthers 1914). He retired from the Survey in 1914.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

C. H. Dinham (1883–1955)

Charles Hawker Dinham, stratigrapher, structural and economic geologist and hydrogeologist, joined the Geological Survey in Edinburgh in 1910. He worked on the metamorphic rocks of Sutherland and on the coalfields of the Midland Valley of Scotland. He was noted for his meticulous 6-inch geological mapping, being considered second only to C. T. Clough. During the First World War he worked on mineral resources. In 1920 he was transferred to the Newcastle Office of the Survey, working in NE England for a few years. In 1922 he returned to Scotland as District Geologist responsible for the Fife and Kinross coalfield. In 1927 he was transferred to England to take charge of the Midland and Cambridge Unit. During the Second World War (1939–1945) he worked on the water supply of East Anglia. He continued working at the Geological Survey until 1953, when at 'the age of 70 . . . Civil Service Regulations no longer allowed him to draw a salary' (Eyles 1955). He continued to come to the Survey offices until the day of his death (Peter Sabine, pers. comm. 2008).

G. V. Wilson (1886–1960)

George Victor Wilson joined the Geological Survey in England as a Geologist in 1911, worked on mineral resources in the First World War, and was promoted to Senior Geologist in 1922. In 1926 he was transferred to the Scottish Survey and worked on the Carboniferous rocks of Ayrshire, the igneous ring complexes of Mull, together with J. E. Richey, E. B. Bailey and E. M. Anderson, and on completing the mapping of Sutherland. In 1928 he was appointed District Geologist responsible for the work in the Orkneys and the Shetlands, publishing *The Geology of the Orkneys* (Wilson *et al.* 1935). Later survey work on North Skye was interrupted when he returned to work on mineral resources during the Second World War. He retired early due to poor health (Wilson 1977).

G. W. Lee (1880–1928)

Gabriel Warton Lee was educated in Geneva and in 1905 joined the staff of Sir John Murray working on material which had been recovered from the oceans during the Challenger Expedition. In 1907 he was invited to join the Geological Survey of Scotland as Senior Geologist in charge of the Palaeontology Department, where he determined fossils collected from natural sections and boreholes. He also contributed to the Edinburgh, Glasgow, East Lothian, North Ayrshire, Mull, Golspie and Ardnamurchan memoirs. As the result of this work he gained an unrivalled knowledge of the Cambrian, Carboniferous and Mesozoic faunas of Scotland. In 1911 Lee was seconded to the Irish Geological Survey to assist in the identification of the base of the Carboniferous in Ireland at Bundoran. During the First World War he worked on the Jurassic ironstones of Raasay. He also mapped in Mull, Applecross, Skye, Mull, Loch Aline and Oban and contributed to accounts of the Mesozoic rocks in the memoirs for these areas. In addition to his official work he described and determined fossil faunas brought back from expeditions to the Arctic (Anon 1929).

M. Macgregor (1884–1966)

Murray Macgregor joined the Geological Survey in 1909 and worked in Sutherland, Perthshire and in the Central Coalfield of Scotland until 1914. He was found unfit for military service and devoted his energies entirely to the study of economic mineral deposits. He became District Geologist for both Highland and Lowland work in Scotland in 1919. He was elected to the Fellowship of the Royal Society of Edinburgh in 1922. In 1925 he was appointed Assistant Director responsible for Scotland and the Newcastle District. During his career he became 'the acknowledged expert on the Carboniferous stratigraphy of Scotland' (Wilson 1977), reviewed in his Presidential Address to the Geological Society of Glasgow (Macgregor 1931). He was also President of the Geological Society of Edinburgh (1936–1938) and Vice President of the Geological Society of London (1945–1946). He was Editor of the *Transactions of the Geological Society of Glasgow* from 1937 to 1958. The 1912 excursion to Assynt evidently made a lasting impression on him as many years later he published *A Geological Guide to the Assynt District* (Macgregor & Phemister 1937). During the Second World War (1939–1945) he again concentrated on Scottish mineral resources. In 1947 he was President of Section C of the BA Meeting in Glasgow. In 1944 he was awarded the Clough Medal. In 1948 he was appointed Divisional Geologist to the Scottish National Coal Board, retiring in 1957. After his death he was described as 'Scotland's most eminent coal geologist', 'greatly loved and respected in Scottish mining and geological circles (MacGregor 1967).

J. E. Richey (1886–1968)

James Ernest Richey graduated from Trinity College Dublin in 1908 and was briefly a Demonstrator at Oxford before joining the Geological Survey in 1911. Initially he worked in the Midland Valley of Scotland and the Southern Uplands on the control of faulting on sedimentation. He also

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

worked on the igneous rocks of Mull including the Loch Ba ring complex. He joined the Royal Engineers in France in 1914, with the Guards Division, where he was wounded and awarded the Military Cross. After the war he mapped Ardnamurchan (1920–1930), delineating three overlapping ring complexes and describing the construction of a major shield volcano He became District Geologist in 1925, and from 1925 to 1935, during his annual leave, he worked in Ireland on the Mourne Mountains and Slieve Gullion, which he interpreted as due to cauldron subsidence, ring intrusion and roof intrusions. Between 1930 and 1932 he worked on the Cuillins in the island of Skye. He was elected a Fellow of the Royal Society of Edinburgh in 1927 and a Fellow of the Royal Society in 1938. By the time of his retirement in 1946 he had become the 'foremost authority on igneous ring complexes of Scotland and Ireland'. After retirement he acted as a Consultant, was a part-time lecturer in Dundee and General Secretary of the Royal Society of Edinburgh (1946–1956). With W. Q. Kennedy he worked on the Moine Schists and the Lewisian inlier of Morar establishing the first stratigraphic sequence in the Moines using way-up criteria (1939) and with A. G. MacGregor and E. M. Anderson, published the regional guide to *The Tertiary Volcanic Districts* (Richey *et al*. 1961), see also obituary for Richey by MacGregor (1969). He became President of the Geological Societies of both Glasgow (1929–1932) and Edinburgh (1946–1948). He was President of Section C at the BA meeting in Glasgow in 1952 and was awarded the Clough Medal in 1964 (MacGregor 1969).

W. B. Wright (1876–1939)

William Bourke Wright graduated from Trinity College, Dublin and joined the Irish Geological Survey, transferring to the Geological Survey of England and Wales in 1904 and then to the Geological Survey of Scotland in 1906 where he worked on the Mull ring complexes with E. B. Bailey under the direction of C. T. Clough (Jones 1940). In 1910 he returned to the Irish Geological Survey, where he worked closely with the part-time Director, Grenville Cole who was also a Professor at the Royal College of Science for Ireland. From 1911 to 1913 he was engaged in a drift-mapping survey of the Killarney and Kenmare districts (Herries Davies 1995). From this work on drift deposits he developed an interest in glaciation and published *The Quaternary Ice Age* (Wright 1914). In 1914 he was promoted to Senior Geologist. He commenced a revision of the map of the Ballycastle Coalfield, carried out the first geophysical survey in Ireland on iron ores to the SW of Wicklow, and developed a project for the exploration of concealed coalfields. After Ireland gained its independence in 1921 he returned to the British Geological Survey as District Geologist in the Manchester office, responsible for the South Lancashire Coalfield. Wright was one of the few British supporters of Wegener's theory of continental drift.

C. Johns (1866–1951)

Cosmo Johns was educated at the Royal Institution of South Wales, Swansea and was apprenticed to Sir William Siemens in the workshops and drawing offices of the Landore Steel Works, Swansea. He held positions of responsibility in the melting shop and rolling mills before becoming Works Manager at the Albion Steel works Briton Ferry. In 1897 he joined Vickers as Melting Shop Manager in Sheffield. On behalf of the company he travelled widely to India, Spain, Japan and Romania. He became an enthusiastic amateur geologist, serving on the Council of the Geological Survey of Yorkshire and studying the Carboniferous rocks of the Malham and Skipton areas of Yorkshire. At the time of the 1912 BA Excursion he was a Lecturer in Mechanical Engineering at Sheffield. After the First World War in 1918 he was sent as the representative from Sheffield to report on the state of the iron and steel industry in the Allied occupied territories in Germany. He acted as a consultant, reorganizing an ordnance factory in Spain and advising on steel forgings for naval guns in Hokkaido, Japan. He was a founder Fellow of the Institute of Physics and a Fellow of the Geological Society (Anon. 1952).

A. W. R. Don (1890–1916)

Archibald William Robertson Don graduated with a First Class degree in the Natural Science Tripos, including geology, from Trinity College Cambridge, in June 1912. He attended the BA meeting in Dundee, where he presented a paper on the problematical Old Red Sandstone fossil *Parka decipiens*. He also arranged a field excursion to Hugh Miller's classic Devonian fish locality at Dura Den, hiring workmen to re-excavate the quarry. According to Tressilian Nicholas, a fellow graduate from Trinity, he was a 'live wire' and responded to the wishes expressed by foreign delegates at the meeting to visit the classic localities on the Moine Thrust in Assynt under the guidance of Peach and Horne, by organizing the field excursion and accommodation at the Inchnadamph Hotel (Ross 2002). Subsequently he undertook courses in medicine and on the outbreak of war manned a field dressing station in Flanders. Dissatisfied with the long periods of inactivity, he volunteered for active

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

service and was commissioned in the Black Watch. After a few months in the trenches in Flanders his unit was transferred to the Bulgarian Front, to the north of Salonika. Here he contracted malaria and died in hospital in September 1916 (Appendix 2).

T. C. Nicholas (1888–1989)

Tressilian Charles Nicholas was an invertebrate palaeontologist and stratigrapher who worked on the Cambrian rocks of St. Tudwal's Peninsula in North Wales and on Cambrian and Ordovician trilobites. In 1912 he was elected a Fellow of Trinity College, University of Cambridge. In 1914 he volunteered for the Royal Engineers and served as a surveyor in Gallipoli, Egypt, Belgium and France being awarded an O.B.E. and a Military Cross. In 1919 he was re-elected to a Fellowship at Trinity and appointed to a Lectureship at Cambridge, where he gave lectures on Mesozoic and Cenozoic stratigraphy and on the structure of the Alps. He continued research on the Lower Palaeozoic of North Wales and the Lake District and was made responsible for the Sedgwick Museum. In 1929 he was appointed Senior Bursar at Trinity, where he continued as an administrator until his retirement in 1956 (Arber 1990).

Appendix 1

La Chanson du Moine Thrust

La Chanson du Moine Thrust (Fig. 5a–c), with words and music by Professor Maurice Lugeon, was written during the BA Field Excursion to Assynt and was sung by the participants in the Inchnadamph Hotel on the last evening of the excursion. It was revised and published in Lausanne in the following year (Lugeon 1913). The *Chanson* can be read as a European protest against British 19th century imperialism!

The translation given here is by Anne Burgess and Dorothy Forrester (slightly modified) published in the *The Edinburgh Geologist* (Ross 2002)

1

If the Moine Thrust, when it rose from its roots,
Would you believe it?
Had wanted to sail over the sea
Or leap over the land,
What horst could have hindered it?
It would have filled the Atlantic,
If the Moine Thrust had wanted,
Would you believe it?
It could have smothered America!

2

If the Moine Thrust had wanted
Would you believe it?
To turn Britanny into a tectonic window,
And cover the mountains of France,
Barrois would have been baffled
And Haug would have been delighted
If the Moine Thrust had wanted,
Would you believe it?
So thrilling a story.

3

If the Moine Thrust had wanted
Would you believe it?
To cover the Glaron nappes
And so put Heim at his ease,
We would have seen fold upon fold
What a mechanism, my friends!
Then continuing on its arrogant way
If the Moine Thrust had wanted,
Would you believe it?
It would cover the whole of the Earth.

4

If the Moine Thrust had wanted,
Would you believe it?
To pursue its march with fury
To pounce upon Austria and Bosnia,
It would lie on the black Balkans,
And Tietze would be exhausted,
His K.K. would have had too much to do,
If the Moine Thrust had wanted
To seize Austria from behind!

5

If the Moine Thrust had wanted,
Would you believe it?
To flatten everything in its path,
To carry Sweden to the banks of the Tagus,
Switzerland to the banks of the Neva.
Russia to the Himalayas,
And put China in Germany's place.
If the Moine Thrust had wanted,
Would you believe it?
Great Britain would have been everywhere.

6

If the Moine Thrust had wanted,
Would you believe it?
It could have climbed up to the stars
For, accompanied by the sails
Of every British Ship.
Who then would have dared to stop this
Vast eruption of the Earth?
If the Moine Thrust had wanted,
Would you believe it?
The moon would be Scottish.

7

But the Moine did not want,
Would you believe it?

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

(a)

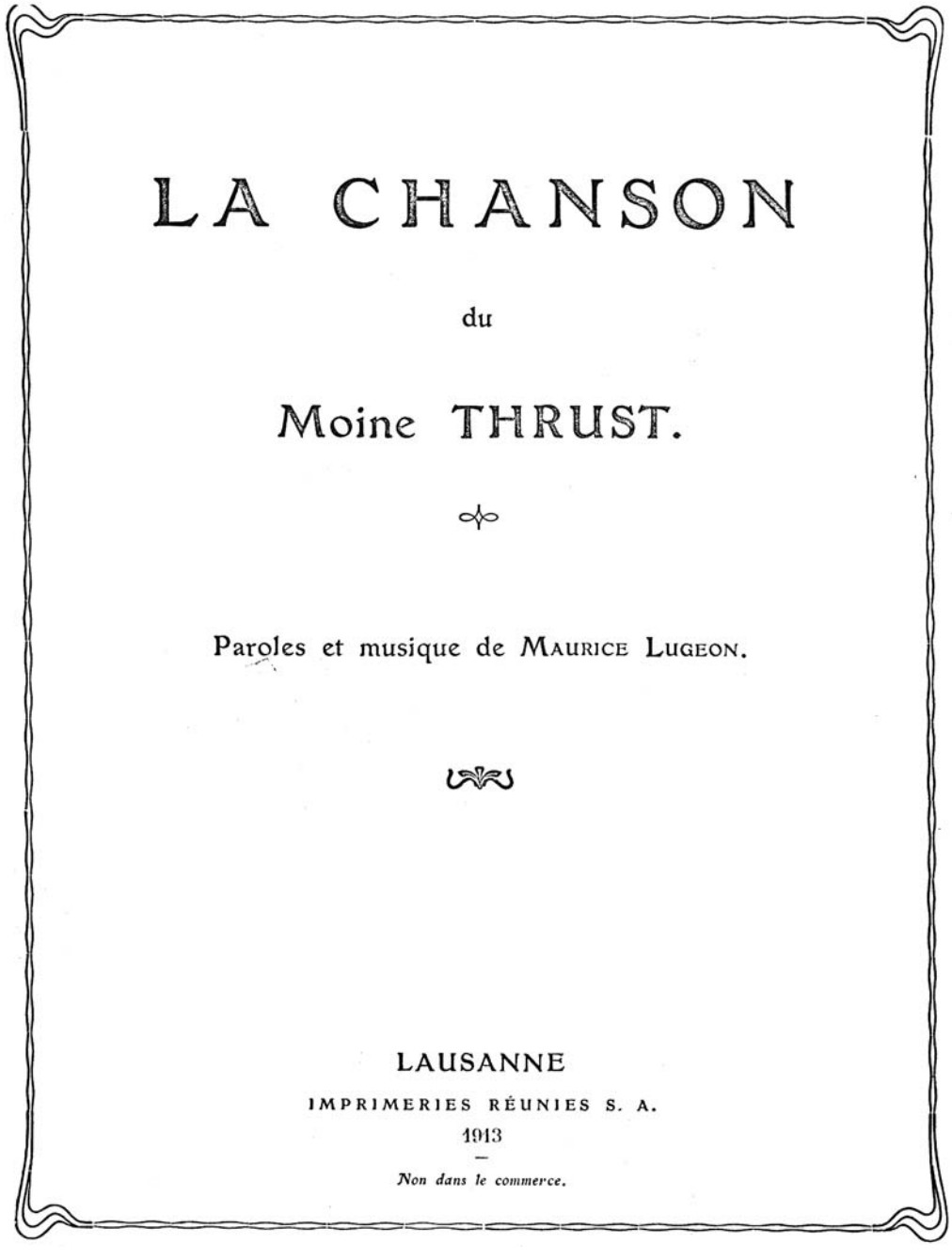


Fig. 5. (**a**), (**b**) and (**c**). *La Chanson du Moine Thrust* by Maurice Lugeon (1913).

To embark on such a distant journey
For Peach with his bulk
Was a little too heavy to carry.
The Moine preferred to stop,
Not wanting to pass its limits
And the Moine did not want,
Would you believe it?
To upset the good Doctor Horne.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

(b)

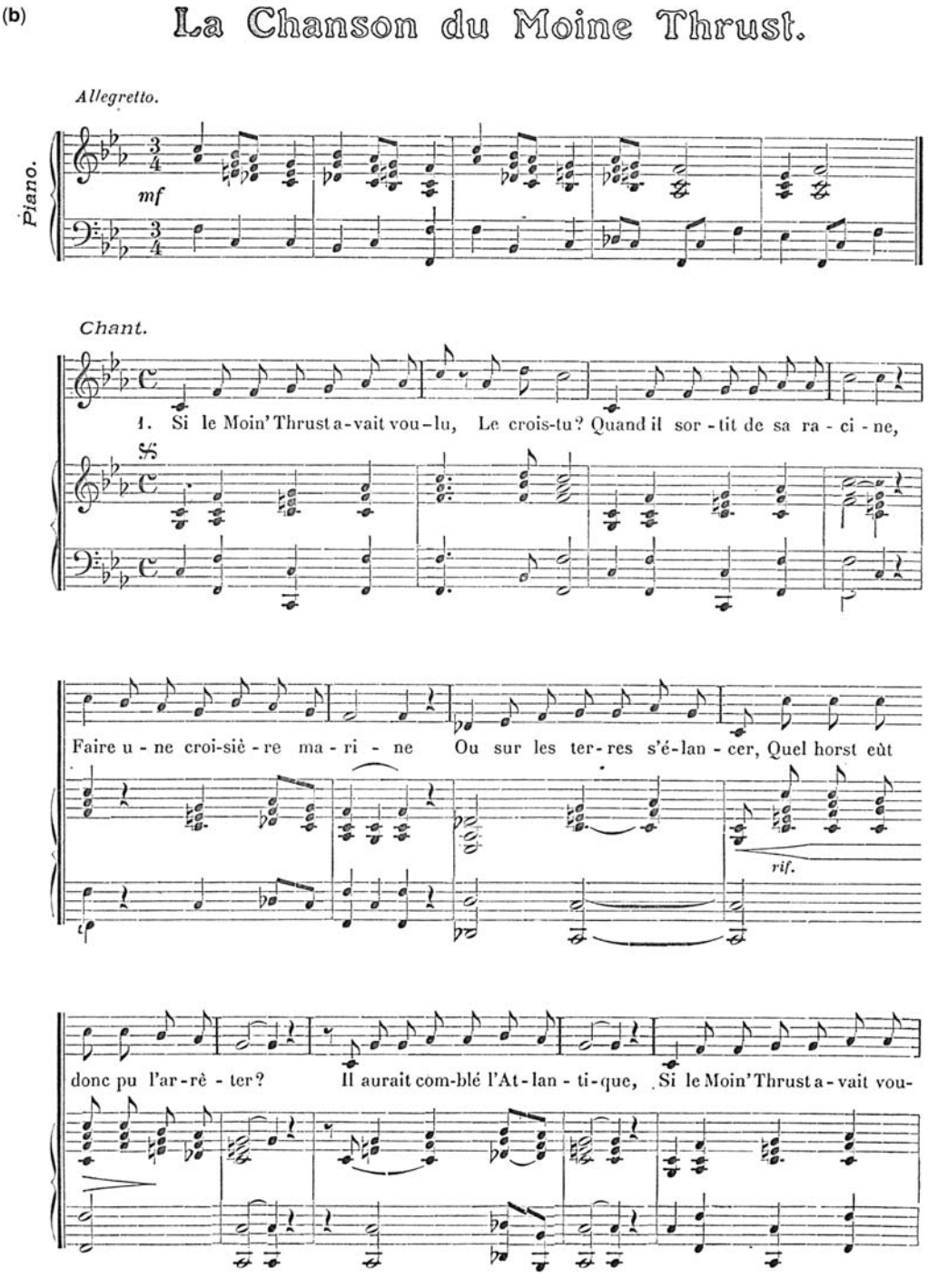
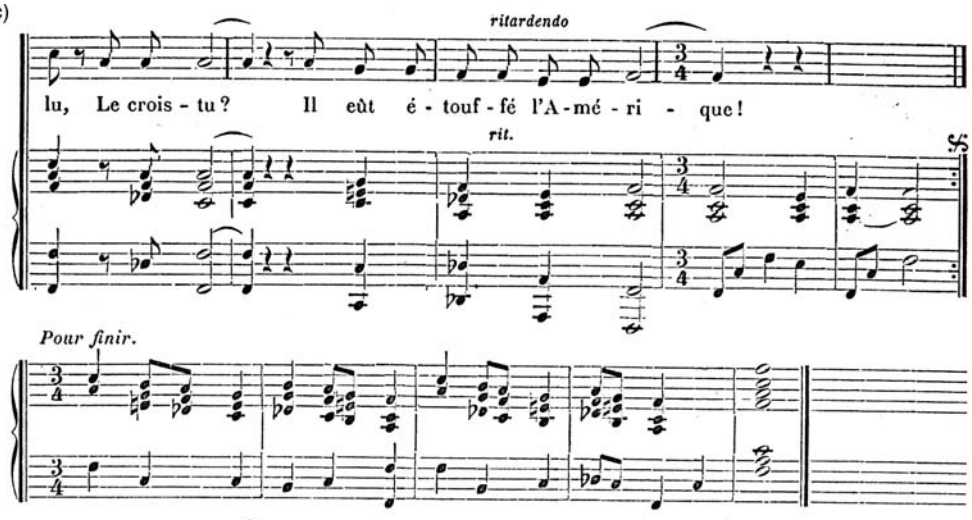


Fig. 5. *Continued.*

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

(c)



2

Si le Moin' Thrust avait voulu,
Le crois-tu ?
Mettre en fenêtre la Bretagne,
Couvrir en France les montagnes,
Barrois n'y eût plus rien compris
Et Haug aurait été ravi
De nous conter dans ses grimoires,
Si le Moin' Thrust avait voulu,
Le crois-tu ?
Une aussi palpitante histoire.

3

Si le Moin' Thrust avait voulu,
Le crois-tu ?
Couvrir les nappes glaronnaises
Et mettre donc Heim à son aise,
On eût ainsi vu pli sur pli,
Quel mécanisme ! mes amis.
Puis poursuivant sa route altière,
Si le Moin' Thrust avait voulu,
Le crois-tu ?
Il couvrirait la terre entière.

4

Si le Moin' Thrust avait voulu,
Le crois-tu ?
Pousser sa marche avec furie,
Bondir sur l'Autriche et Bosnie,
Il serait sur les noirs Balkans,
Et Tietze serait sur les dents,
Son K. K. aurait trop à faire,
Si le Moin' Thrust avait voulu,
Le crois-tu ?
Saisir l'Autriche par derrière !

5

Si le Moin' Thrust avait voulu,
Le crois-tu ?
Tout laminer sur son passage,
Porter la Suède au bord du Tage,
La Suisse au bord de la Néva,
La Russie en l'Himalaya,
La Chine au lieu de l'Allemagne,
Si le Moin' Thrust avait voulu,
Le crois-tu ?
Partout serait la Grand'-Bretagne.

6

Si le Moin' Thrust avait voulu,
Le crois-tu ?
Il monterait jusqu'aux étoiles,
Car accompagné par les voiles
De tous les vaisseaux des Anglais,
Qui donc arrêter l'oserait ?
De la Terre, vaste cymaise,
Si le Moin' Thrust avait voulu,
Le crois-tu ?
La Lune serait écossaise.

7

Non, le Moine n'a pas voulu,
Le crois-tu ?
Poursuivre sa route lointaine,
Car Peach avec sa panse pleine
Etait un peu lourd à porter,
Le Moine aima mieux s'arrêter,
Ne voulant dépasser ses bornes.
Non, le Moine n'a pas voulu,
Le crois-tu ?
Attrister le bon docteur Horne.

8

Non, le Moine n'a pas voulu,
Le crois-tu ?
Quitter son beau pays d'Ecosse
Pour aller chercher plaies et bosses
Sur de trop vieux horsts inconnus,
Il y serait arrivé nu,
Perdant toutes ses « pipes » en route.
Non, le Moine n'a pas voulu,
Le crois-tu ?
Du bon whisky perdre une goutte.

9

Non, le Moine n'a pas voulu,
Le crois-tu ?
Quitter son pays de tourbières,
Porter trop loin ses belles pierres,
Et nous avons pu l'admirer,
Et nous pouvons nous en aller
Avec une démarche fière.
Non, le Moine n'a pas voulu,
Le crois-tu ?
Laisser à d'autres ses bruyères.

Fig. 5. *Continued.*

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

8

No the Moine did not want,
Would you believe it?
To leave the fair land of Scotland,
To seek confrontation
With ancient unknown horsts.
It would have arrived naked,
Having lost all its 'pipes' on the way
No the Moine did not want,
Would you believe it?
To lose a drop of its good whisky.

9

No the Moine did not want,
To leave its land of peat bogs,
And carry its fine rocks far away,
And we were able to admire it,
And can depart
With pride in our step.
No the Moine did not want
Would you believe it?
To leave its heather moors.

Appendix 2

Archibald Don and the 1907 memoir

A copy of the 1907 memoir on the *Geological Structure of the North-West Highlands of Scotland* (Peach *et al.* 1907) which had belonged to Professor R. A. Howie was passed to me by Dr. Nick Walsh (Royal Holloway). The signature of A. W. R. Don was on the inside cover. As has been described above, Archibald Don had attended the BA Excursion to Assynt conducted by Peach and Horne in September 1912. In addition the volume contains a complete set of signatures of the participants in the 1912 Excursion (except Don), mounted on the flyleaf (Fig. 3), presumably collected by Don on the excursion.

I was intrigued to know more about the original owner of this copy of the 1907 memoir. There were a number of clues to his identity and history in the volume. Pasted inside the front cover is a brown paper envelope, sent by 'Heim' with a Swiss 'William Tell' postage stamp franked '28.XI.12' at Zürich, addressed to Archibald Don B. A. at Trinity College, Cambridge. In response to my e-mailed enquiry, Jonathan Smith, the archivist at Trinity College Library replied that Archie Don 'was one of the best-loved students of his generation' and that he 'made such an impression on those that knew him', that a substantial memoir of his life was published in 1918. I was able to borrow a copy of the memoir from the British Library, and this forms the basis for the present account. Also on the inside of the flyleaf of the 1907 memoir is the bookplate of Winchester College Natural History Society. Suzanne Foster, archivist at Winchester, confirmed that Don had been a pupil at Winchester, and also referred me to the memoir of his life. I subsequently found from this memoir that Don had bequeathed 'Selected Scientific Books to the Moberly Library, Winchester'. The flyleaf is also marked in pencil with 10/6, crossed out and replaced by 7/6! Evidently the Librarian at Winchester decided, sometime in the 1940s or 1950s, that a book published as long ago as 1907 must be obsolete, and passed the NW Highlands memoir into the second-hand book market. Since it was slow in selling, the bookseller marked it down, little realizing how valuable this volume would become.

The brown paper envelope contains a cyclostyled programme of the 1912 BA Excursion to Assynt, presented to each participant, a printed version of the 'vote of thanks' to the leaders of the excursion by Albert Heim, delivered on the 17th September at Inchnadamph, signed by Heim 'in remembrance of Sept 1912', a letter from Heim to Don urging him to visit Switzerland; this was evidently enclosed in the envelope, a sketch by Heim, on Inchnadamph Hotel notepaper, showing his interpretation of the profile of the Lauterbrunnen valley as the result of alternating fluvial and glacial deepening and proving multiple glaciation, drawn for Don's benefit during the excursion, and verses from the *La Chanson du Moine Thrust* by Professor Lugeon, handwritten in French, at Inchnadamph on 17 September.

As mentioned above the original owner of my copy of the 1907 memoir, Archibald Don was so esteemed by his contemporaries that after his death at the age of 25, a biography, the memoir referred to above, was compiled by his teachers, colleagues and friends: *Archibald Don. A Memoir* (205 pages), edited by Charles Sayle and published by John Murray (Sayle 1918).

Archie Don was born the fourth of five sons at Broughty Ferry, Forfarshire, on 11th December 1890. From his earliest years he took a keen interest in natural history and made collections of shells and stones. In 1900 he attended a Preparatory School in Newbury, Berkshire, where he made and carefully mounted a collection of the local fossils. In 1904 he went on to Winchester College, where he joined the school's Natural History Society. While there he received the Headmaster's Prize for Natural History for his collection of Chalk fossils, described as 'admirable'. He also collected fossils for the school museum on visits to Kent's Cavern, Torquay and Paris. In the school holidays he visited quarries to collect samples from the Old Red Sandstone near his home in Forfarshire and presented fragments of *Pterygotus anglicus* from Arbroath to the British Museum.

In 1909 Archie Don went up to Trinity College, Cambridge, where he was admitted as a Pensioner, received an Exhibition in 1911 and was elected a Senior Scholar in 1912. He studied Geology, Zoology and Botany for the Natural Science Tripos. In his first year he was elected a member of the Sedgwick Club, an unusual honour for a freshman. At Cambridge he was taught by Dr. J. E. Marr, later Woodwardian Professor of Geology, who was impressed by his abilities on a field excursion to the Lake District and in walks to examine superficial deposits around Cambridge. Don graduated First Class as Bachelor of Arts in June 1912. Also in 1912 he attended the meeting

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

of the British Association held in September in Dundee, where he led an excursion to Dera Dun, one of Hugh Miller's classic Old Red Sandstone fish localities, having hired quarrymen to re-excavate the site. At the meeting he presented a paper on *Parka decipiens*, a problematical fossil from the Old Red Sandstone of Forfarshire. This paper was published posthumously with George Hickling in the *Quarterly Journal of the Geological Society* (Don & Hickling 1915). The Peach and Horne excursion to Assynt was associated with this BA meeting. He was elected a Fellow of the Geological Society in December 1912, sponsored by T. McKenny Hughes, John Edward Marr, E. A. Newell Arber, C. Griffith, Alfred Harker, Herbert H. Thomas, H. A. Allen, T. G. Bonney, J. W. Evans and W. S. Boulton.

Curiously there is no reference to Don's attendance at the Assynt Excursion in his biography. However, according to 'Tress' Nicholas (Arber 1990) during the BA Meeting in Dundee several foreign geologists had expressed the wish to visit the NW Highlands to see the structure of the Assynt District under the guidance of Peach and Horne and Archie Don organized the excursion. This was considered to be impossible during the stalking season, but Archie Don was able to arrange accommodation for the party at the Inchnadamph Hotel. As impecunious students Nicholas and Don camped in a bell tent in the Hotel paddock.

Evidently, the excursion did leave some impression on Don, as in November 1912 he lectured to the Cambridge Natural Science Club on 'Thrusts and Overfolds', based on his experience in Assynt. In a letter to his father he wrote 'I never doubted that I was to be some sort of a geologist'. But in his final year at Trinity he reviewed the options open to him for a career in geology: Commercial geology; Government Survey in Britain or abroad; Teaching at University (Cambridge or other); Teaching at a school. He did not fancy hunting for 'oil or gold in South Siam or Burma'. The 'miserable pay' did not deter him from Survey geology but he becomes 'bored with my own company' in the field. Do 'I ... really wish to collect stones all my life and to die leaving a few monographs behind and little else'. 'I have met and picked the brains of several Survey men' – though excellent training and a glorious way of spending the holidays, but 'to do it for nine months every year and not be your own master, but the Government's, is not good enough'. University teaching appealed to him up to a point, 'it would mean a pleasant life, with long vacs to go to do Geology etc.' but 'even for a geologist it is a cramping life'. In the event he decided that a career in medicine would be of greater benefit to mankind and commenced the study of the relevant subjects at Cambridge before transferring to St Bartholemew's Hospital (Barts) in 1913.

As for all of his generation Archie's studies were overtaken in 1914 by the First World War. He, with several of his fellow medical students, immediately volunteered as a Red Cross 'dresser' and was sent to Flanders behind the Western Front. This involved long periods of inactivity, and after a few months he began to feel that he should play a more active part in the war and volunteered for active service. On Christmas Day 1914 he was commissioned into the Black Watch, 10th Battalion, as a Second Lieutenant. Most of 1915 was spent training in England, but in September his unit was posted to the front in Flanders. After two months in the trenches, they were transferred by train to Marseilles, where the battalion boarded a ship to Alexandria and then to Salonika in northern Greece to occupy a position on the Bulgarian front.

After the Second Balkan War of 1913, what is now Macedonia was divided between Serbia and Bulgaria. Bulgaria then extended to the shores of the Aegean to the east of Salonika (now Thessalonika). In the First World War Greece and Serbia were allied with the Allied Powers (Britain, France and Russia), while Bulgaria and Turkey were allied with the Central Powers (Germany and Austro-Hungary). Archie and his battalion of the Black Watch were set to build a defensive line to the north of Salonika against a possible attack from Bulgaria. Nothing much happened on the Bulgarian front while Archie was there. The troops played games in front of the barbed wire entanglements, in the area which was intended to be 'no man's land'. The only excitement was the capture of some German prisoners and the sighting of German aeroplanes and a Zeppelin, harassed by anti-aircraft fire. However, excavations for entrenchments yielded flint implements, a 9ft Mammoth tusk and some rhinoceros bones, which Archie sent back to the Sedgwick Museum in Cambridge. From the commencement of the war, and throughout 1915 and 1916, Archie continually received news of the deaths of his friends and contemporaries from his preparatory school, Winchester and from Cambridge. In July 1916 Archie contracted malaria and was sent to Malta to recuperate. At the end of August he returned to his unit, now near the Serbian border well to the north of Salonika. On the 1st and 2nd of September he went on a reconnaissance to the front line. On the 3rd and 4th he complained of diarrhoea; on the 9th he was sent to a casualty clearing station at the railhead, and on the 10th was sent by train to a hospital which had been set up in Kalamaria, outside Salonika. The train journey took eleven hours, by the time he arrived he was very weak, and in spite of the best efforts of the doctors, he died on the afternoon of the 11th September 1916. Examination of his blood showed that it was full of the malaria bacillus and that he died of malignant malaria, rather than of dysentery, as had been supposed.

The author is indebted to W. Cawthorne (Assistant Librarian) and the staff of the Library of the Geological Society of London for tracking down the references which have been consulted. D. Laming was kind enough to send me a draft of his biography of Albert Heim intended for publication in a volume on eminent geologists. R. McIntosh, Librarian of the British Geological Survey in Edinburgh facilitated the publication of photographs in the Survey's copyright and of the translation of *La Chanson du Moine Thrust* in the copyright of the Geological Society of

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

Edinburgh. J. Smith, archivist at Trinity College Cambridge, and S. Foster, archivist at Winchester College, kindly provided information concerning Archibald Don. P. Sabine, the Society's Editor, R. Law and the reviewers D. Oldroyd and P. Smith corrected my errors and misunderstandings.

References

ANDERSON, E. M. 1942. *The Dynamics of Faulting and Dyke Formation*. Oliver & Boyd, Edinburgh.

ANON., 1929. Dr. G. W. Lee. *Nature, London*, **123**, 172.

ANON., 1952. Cosmo Johns. *Proceedings of the Institution of Mechanical Engineers*, **166**, 383.

ARBER, M. A. 1990. Obituary: Tressilian Charles Nicholas. *Proceedings of the Geologists' Association*, **101**, 351–352.

BAILEY, E. B. 1926. Benjamin Neeve Peach. *Geological Magazine*, **63**, 187–190.

BAILEY, E. B. 1935. *Tectonic Essays: Mainly Alpine* (first edition). Clarendon Press, Oxford.

BAILEY, E. B. 1939. Professor Albert Heim 1849–1937. *Obituary Notices of the Royal Society of London*, **2**, 471–474.

BAILEY, E. B. 1940. Charles Eugène Barrois. *Proceedings of the Royal Society of Edinburgh,* **60**, 376–378.

BAILEY, E. B. 1952. *Geological Survey of Great Britain.* Thomas Murby, London.

BAILEY, E. B. 1954. Maurice Lugeon 1870–1953. *Obituary Notices of Fellows of the Royal Society*, **9**, 165–73.

BAILEY, E. B. 1967. *James Hutton – the Founder of Geology.* Elsevier, Amsterdam & London.

BAILEY, E. B. 1968. *Tectonic Essays Mainly Alpine.* Clarendon Press, Oxford.

BAILEY, E. B. & MCCALLIEN, W. J. 1953. Serpentine lavas, the Ankara Mélange and the Anatolian Thrust. *Transactions of the Royal Society of Edinburgh*, **62**, 403–442.

BAILEY, E. B., CLOUGH, C. T., WRIGHT, W. B., RICHEY, J. E. & WILSON, G. V. 1924. Tertiary and post-Tertiary Geology of Mull, Loch Aline and Oban. *Memoir of the Geological Survey of Great Britain*. HMSO, Edinburgh.

BAILEY, E. B., WEIR, J. & MCCALLIEN, W. J. 1939. *Introduction to Geology*. Macmillan, London.

BATHER, E. A. 1928. Emil Gustave Haug. Anniversary address of the President. *Quarterly Journal of the Geological Society, London*, **84**, liii.

BERTRAND, M. 1884. Rapports de structure des Alps de Glaris et du basin houiller du nord. *Bulletin de la Société Geologique, Paris*, **12**, 318–330.

BOULTON, M. S. 1907. *Practical Coal-Mining*. 6 Volumes. Gresham Publishing, London.

COLLET, L. W. 1938. Albert Heim. *Quarterly Journal of the Geological Society, London*, **94**, cxi–cxiii.

CAMPBELL, R. 1930. John Horne and his contributions to Geological Science. *Transactions of the Edinburgh Geological Society*, **12**, 267–279.

CAMPBELL, R. 1944. Thomas John Jehu. *Quarterly Journal of the Geological Society, London*, **100**, lxxi–lxxii.

CAMPBELL, R. 1947. Dr John Downie Falconer. *Quarterly Journal of the Geological Society, London*, **103**, l–li.

CRAMPTON, C. B. & CARRUTHERS, R. E. 1914. *The Geology of Caithness*. Memoir of the Geological Survey of Scotland. HMSO, Edinburgh.

DAVIDSON, C. F. 1957. Charles Kenneth Leith. *Proceedings of the Geological Society of London*, **1554**, 133–134.

DON, A. W. R. & HICKLING, G. 1915. On Parka Decipiens. *Quarterly Journal of the Geological Society*, **71**, 648–665.

DRYBURGH, P. M., MACGREGOR, A. R., ROSS, S. M. & THOMPSON, C. L. 1995. *Assynt the Geologists' Mecca.* Edinburgh Geological Society, Edinburgh.

EYLES, V. A. 1955. Charles Hawker Dinham. *Proceedings of the Geological Society of London*, **1527**, 136–137.

FALCONER, J. D. 1911. *The Geology and Geography of Northern Nigeria.* Macmillan & Co, London.

FLETT, J. S. 1928. Sir Aubrey Strahan. *Proceedings of the Royal Society of London*, **B103**, xvi–xx.

FLETT, J. S. 1929. John Horne, 1848–1928. *Proceedings of the Royal Society of London*, **B104**, –viii.

FLETT, J. S. 1937. *The First Hundred Years of the Geological Survey of Great Britain.* H.M.S.O., London.

GARWOOD, E. J. 1932. Emil Ernst Tietze. Anniversary Address of the President. *Quarterly Journal of the Geological Society, London*, **88**, lxxiii–lxxvi.

GREENLY, E. 1928. Benjamin Neave Peach: A Study. *Transactions of the Edinburgh Geological Society*, **12**, 1–11.

GREGORY, J. W. 1929. John Horne. Anniversary Address of the President. *Proceedings of the Geological Society, London*, **85**, lx–lxii.

HARKER, A. 1923. Hans Henrick Reusch. Anniversary Address of the President. *Quarterly Journal of the Geological Society, London*, **79**, lvi–lvii.

HAUG, E. G. 1907–1911. *Traite de Géologie.* Librairie Amand Colin, Paris.

HEIM, A. 1878. *Mechanismus der Gebirgsbildung.* Springer, Berlin.

HEIM, A. 1912. *Geological Excursion in the North–West-Highlands of Scotland Assynt-Region.* Geological Commission of Switzerland, Zurich.

HEIM, A. 1921. *Geologie der Schweiz*. Chr. H. Tauchnitz, Leipzig.

HERRIES DAVIES, G. L. 1995. *North from the Hook*. Geological Survey of Ireland, Dublin.

HORNE, J. 1926*a*. Benjamin Neeve Peach. Anniversary Address of the President, *Quarterly Journal of the Geological Society of London*, **82**, xlvi–xlix.

HORNE, J. S. 1926*b*. B. N. Peach, F.R.S. 1842–1926. *Proceedings of the Royal Society, London*, **B100**, xi–xiii.

HUDSON, R. G. S. 1940*a*. Albert Gilligan. *Quarterly Journal of the Geological Society, London*, **96**, lxviii–lxix.

HUDSON, R. G. S. 1940*b*. Albert Gilligan. *Transactions of the Leeds Geological Association*, **5**, 255–256.

JÉRÉMINE, E. 1911. *Bassins fermés des Préalpes suisses.* Thése Université de Lausanne: Imprimeries Réunies.

JONES, R. C. B. 1940. William Bourke Wright. *Quarterly Journal of the Geological Society, London*, **96**, lxxiii–lxxv.

JEHU, T. J. 1912. Discovery of fossils in the Boundary Fault Series. *Geological Magazine*, **49**, 469–470.

Downloaded from http://sp.lyellcollection.org/ at University of St Andrews on March 6, 2015

JEHU, T. J. & CRAIG, R. M. 1923. Geology of the Outer Hebrides. Part I – The Barra Isles. *Transactions of the Royal Society of Edinburgh*, **53**, 419–441.

LEITH, C. K. 1905. *Rock Cleavage*. U.S. Geological Survey Bulletin.

LEITH, C. K. 1913. *Structural Geology*. Henry Holt & Co., New York.

LEITH, C. K. & MEAD, W. J. 1915. *Metamorphic Geology*. Henry Holt & Co., New York.

LUGEON, M. 1902. Sur la coupe géologique massif du Simplon. *Bulletin de la Société Vaudoise, Sciences Naturelles*, **38**, xxxix–xli.

LUGEON, M. 1913. *La Chanson du Moine Thrust*. Imprimeries Réunies S.A., Lausanne.

MACGREGOR, A. G. 1961. Ernest Masson Anderson. *Proceedings of the Geological Society of London*, **1529**, 137–138.

MACGREGOR, A. G. 1967. Murray Macgregor. *Proceedings of the Geological Society of London*, **1636**, 204–206.

MACGREGOR, A. G. 1969. James Ernest Richey (1886–1968). *Proceedings of the Geological Society of London*, **1655**, 129–132.

MACGREGOR, M. 1931. Scottish Carboniferous stratigraphy: an introduction to the study of the Carboniferous rocks of Scotland. *Transactions of the Geological Society of Glasgow*, **15**, 442–558.

MACGREGOR, M. & PHEMISTER, J. 1937. *Geological Excursion Guide to the Assynt District of Sutherland.* Edinburgh Geological Society, Edinburgh.

ORCEL, J. 1965. Elisabeth Jérémine (1876–1964). *Bulletin Société géologique de France, Serie 7*, **7**, 608–614.

PEACH, B. N. & HORNE, J. 1930. *Chapters on the Geology of Scotland.* Oxford University Press, London.

PEACH, B. N., HORNE, J., GUNN, W., CLOUGH, C. T. & HINXMAN, L. W. 1907. *The Geological Structure of the North–West Highlands of Scotland.* Memoirs of the Geological Survey of Great Britain. HMSO, Glasgow.

PEACH, B. N., GUNN, W., CLOUGH, C. T., HINXMAN, L. W., CRAMPTON, C. B., ANDERSON, E. M. & FLETT, J. S. 1912. *The Geology of Ben Wyvis, Caren Chuinneag, Inchbae and the Surrounding Country.* Memoirs of the Geological Survey of Great Britain. HMSO, Edinburgh.

PHEMISTER, J. 1960. William Francis Porter McLintock. *Proceedings of the Geological Society of London*, **1581**, 141–142.

PRUVOST, P. 1919. *La faune continentale du terrain houiller du Nord de la France*. Paris, Ministere des Travaux publics, Memoires pour servir a l'explication de la carte geologique detaillee de la France.

PRUVOST, P. 1940. Charles Barrois (1851–1939). *Proceedings of the Geologists' Association*, **51**, 108–109.

RICHEY, J. E., MACGREGOR, A. G. & ANDERSON, F. W. 1961. *Scotland: The Tertiary Volcanic Districts.* British Regional Geology. HMSO, London.

RICHEY, J. E. & WATSON, J. 1965. Obituary notice of Sir Edward Battersby Bailey. *Proceedings of the Geological Society of London*, **1628**, 197–198.

ROSS, S. 2002. La Chanson du Moine Thrust a detective story. *The Edinburgh Geologist*, **39**, 18–22.

SAYLE, C. 1918. *Archibald Don – A Memoir*. J. Murray, London.

SARJEANT, W. A. S. 1980. *Geologists and the History of Geology to 1987.* Arno Press, New York.

SOPER, N. J. & BARBER, A. J. 1982. A model for the deep structure of the Moine thrust zone. *The Journal of the Geological Society, London*, **139**, 127–138.

STUBBLEFIELD, C. J. 1965. Edward Battersby Bailey, 1881–1965. *Biographical Memoirs of Fellows of the Royal Society*, **11**, 1–21.

STUBBLEFIELD, C. J. 1968. Pierre Eugène Pruvost (1890–1967). *Proceedings of the Geological Society of London*, **1645**, 338–344.

TRUEMAN, A. E. 1950. Professor Sidney Hugh Reynolds. *Quarterly Journal of the Geological Society, London*, **106**, lxix–lxxi.

THOMAS, H. H. 1929. Sir Aubrey Strahan. Anniversary Address of the President. *Quarterly Journal of the Geological Society of London*, **85**, lviii–lix.

VAN HISE, C. R. & LEITH, C. K. 1911. *The Geology of the Lake Superior Region*. U.S. Geological Survey Monograph, **52**.

WALLIS, F. S. 1950. Sidney Hugh Reynolds. *Proceedings of the Geologists' Association*, **61**, 117–118.

WILLS, L. J. 1955. William Savage Boulton. *Proceedings of the Geological Society of London*, **1529**, 134–136.

WILSON, G. V., EDWARDS, W., KNOX, J., JONES, R. C. B. & STEPHENS, J. V. 1935. *The Geology of the Orkneys*. Memoirs of the Geological Survey of Great Britain. HMSO, London.

WILSON, R. B. 1977. *A History of the Geological Survey in Scotland*. Institute of Geological Sciences, N.E.R.C., London.

WRIGHT, W. B. 1914. *The Quaternary Ice Age.* First edition. Macmillan, London.