

G.W. Tyrrell: an underrated geologist

Professor Brian Bluck

*Department of Geographical & Earth Sciences, University of Glasgow, Gregory Building,
Lilybank Gardens, Glasgow G12 8QQ*

After leaving Watford Grammar School, G. W. Tyrrell left the Royal College of Science, now Imperial College, London in 1904, without a degree. He had studied under Professor Judd, a very prominent igneous petrologist, who was clearly impressed with him. He came to Glasgow as an assistant to Professor J. W. Gregory in 1906 and then became a lecturer in 1913. He became President of the Geological Society of Glasgow from 1923 – 1926, succeeding Peter Macnair and succeeded by Murray Macgregor. In 1909 he had already set out work which he thought ought to be done around or near to Glasgow. Tyrrell, a shy and diffident man, was an excellent teacher and extra-mural lecturer and became, largely through a masterful book on petrology, an internationally renowned igneous petrographer. His book was reprinted 21 times and translated into ‘most of the languages of the scientific world’ (Bailey 1958).

The status of igneous petrology at the time was growing very fast in Britain and much of that was centred on the west of Scotland where the bulk of the range of igneous rocks was to be found. Sorby (1858) had already described crystallites from the pitchstone on Arran and this brought attention to the Tertiary rocks of the west of Scotland and Arran in particular. Zirkel (1867), Allport (1872) and Judd (1874) had published studies of the Tertiary Volcanic rocks of the Western Isles. With the appearance of Teall’s book *British Petrography* in 1888, Geikie’s book *The Ancient Volcanoes of Great Britain* (1897) and Harker’s *The Natural History of Igneous rocks* (1909) it was clear that a great deal of knowledge was accumulating on these varied igneous rocks. Whilst the descriptive, field part of igneous rocks was well covered by British and Continental workers, (including the work on ring dykes and ring fractures in the development of calderas) much work, and particularly the experimental side, was to be done at the Carnegie Institute Washington.

In 1906 Tyrrell came to Glasgow with igneous rocks foremost in his mind. Working with Gregory he built up the Department from a one room unit into a Department with microscopes, thin sectioning equipment and a strong foothold in the Hunterian Museum.



G. W. Tyrrell

Photograph courtesy of Professor Don Bowes who was given the original by G. W. Tyrrell’s daughter.

His early paper on the Kilpatrick Hills (1909) sets out the work he was going to do for the rest of his life. He pointed out that whilst others had worked on the Tertiary rocks of the Western Isles he had his eye on the Carboniferous rocks of the Midland Valley, the intrusive rocks in Ayrshire, the Old Red Sandstone rocks of the Ochils and Sidlaws and the nearby rocks on Arran. Unable to pay his fees at Imperial College and living off a small salary from Gregory he was able to examine the rocks around Glasgow, which he could access with comparative ease and at minimum expense. As we all know, he was indeed fortunate, as they are amongst the most varied rocks in the world, and possibly no more so than on Arran.

As time went on, and with his publications becoming more voluminous, his reputation soon spread and investigators and explorers all round the world began to send their collections of igneous rocks to Tyrrell in Glasgow. So rocks collected from the Himalayas, South Africa, India, Antarctica and Canada arrived here for identification and comments which he freely gave. Although he did not have the money to get out to many of these places, such a situation, where he was examining the rocks collected by others, gave him a very wide range of knowledge of their distribution and content. Later, he visited some of the places he had received rocks from.

In 1926, revised in 1929, he published his book *The Principles of Petrology* which was reprinted 21 times and reached a very large audience, particularly in the (then) British empire. It was translated into “all the languages of the scientific world” - Bailey (1958) - and resulted in the financially strapped Tyrrell being given a free trip to Russia including the Kola Peninsula. This book was an instant success and showed Tyrrell to have an enormous grasp of the significance of all rocks but particularly the igneous group. His classification of igneous rocks is now the accepted one and compared with those proposed by his contemporaries is both clear and concise. This book showed him to be very well aware of the conditions of formation of all rocks and from his Carboniferous experience he was able to draw out many of the generalizations. If this book is a reflection of his teaching here then it is no wonder that he was regarded as a brilliant teacher and extra-mural lecturer.

It would be difficult to summarize his contribution generally as, when it is researched, is clearly going to show how varied and considerable it is. However, to illustrate just one of his contributions, we take the association of igneous rocks. In his book of 1926 and picked up later in his final paper to the Geological Society of America (1955) he approached the subject of Petrographic Provinces. Many people, and particularly in Britain, were beginning to define the rock associations with which they were dealing. Judd (1886) defined a Petrographic Province as “rocks erupted during any particular geological period present certain well-marked peculiarities in mineral composition” – distinguishing them from other provinces. Tyrrell, in his review of *Igneous Action and Earth Movements (Principals of Petrology, 2nd Edition 1929, p143 – 146)*, classifies igneous rocks in terms of their distribution on the earth’s surface. He correlated igneous activity with periods of strong earth movement some of which are slow vertical movements of large blocks of the earth’s crust and others with short lateral movements which produced mountains.

Mountains he saw as associated with the distribution of granodiorite-andesites. The granodiorites are deeper within the crust and the andesites occur as higher level volcanoes. Deeper parts of mountain chains such as the Caledonian in Norway and the Archaean crust generally are noted for their anorthosite-Charnockite association suggesting a provenance in drier parts of the crust. This plateau basalt kindred seems to be associated with the opening of oceans. The Thulean province, made up of plateau basalts “appear to be connected to the crustal inbreak that initiated the North Atlantic”. In his last paper Tyrrell (1955) revised his

classification and saw four associations (kindreds): 1. Ophiolites, 2. Andesites & granodiorites, 3. Trachybasalts and 4. Quartz-dolerites. Ophiolites he saw as associated with geosynclines; granodiorites and andesites associated with mountains and both basalts and quartz-dolerites associated with post-orogenic phase. He showed at least three examples of these rock associations in Scotland, along the Atlantic margin in N America, the Hercynian and the Mediterranean.

In terms of what we know today, these associations lead us directly to plate tectonics (which Tyrrell did not believe in) and it is probably because of the terms used in his classification that they were not really investigated to any degree. Tyrrell died of a stroke which he may have developed after an invitation by the Geological Society of America to visit and tour North America and Canada. He was not particularly interested in his career; he did geology because he enthusiastically enjoyed the subject. He was a brilliant teacher and taught extra-mural classes at Glasgow, keeping the Geological Society topped up with members. He also led great field trips, particularly to Arran where he also wrote a Memoir on the Island (a very unusual thing to do by someone who had no experience of the Geological Survey).

Tyrrell was probably amongst the most brilliant researchers to have been produced by Glasgow. In spite of his diffidence he was invited to both Russia and North America as a world expert on igneous rocks and travelled widely. He was well known in Britain, friendly with most of the igneous petrographers, including H. H. Read and yet he did not become a fellow of the Royal Society of London and his work was not widely quoted. He was regarded as a 'safe pair of hands' and as such was used by his peers. What they failed to recognise was that he was also a profound thinker and often a far better thinker than they were themselves, and so much of what he wrote on igneous rocks bears that out.

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This paper was published in *Proceedings of the Geological Society of Glasgow*, 150th Anniversary Special Edition, Session 150 (2007-2008), pages 28-31.