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## **The beginnings of Geography Teaching and Research in the University of Glasgow: The impact of J. W. Gregory**

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**ABSTRACT** J. W. Gregory arrived in Glasgow from Melbourne in 1904 to take up the post of foundation Professor of Geology in the University of Glasgow. Soon after his arrival in Glasgow he began to push for the setting up of teaching in Geography in Glasgow, which came to pass in 1909 with the appointment of a Lecturer in Geography. This lecturer was based in the Department of Geology in the University's East Quad. Gregory's active promotion of Geography in the University was matched by his extensive writing in the area, in textbooks, journal articles and popular books. His prodigious output across a wide range of subject areas is variably accepted today, with much of his geomorphological work being judged as misguided to varying degrees. His 'social science' publications – in the areas of race, migration, colonisation and economic development of Africa and Australia – espouse a viewpoint that is unacceptable in the 21<sup>st</sup> century. Nonetheless, that viewpoint sits squarely within the social and economic traditions of Gregory's era, and he was clearly a key 'Establishment' figure in natural and social sciences research in the first half of the 20<sup>th</sup> century. The establishment of Geography in the University of Glasgow remains enduring testimony of J.W. Gregory's energy, dedication and foresight.

### **Background**

Professor John Walter Gregory FRS arrived in Glasgow from Australia in November 1904 to be the first occupant of the newly established Chair of Geology (Figure 1). Before this, Geology had been taught by the Regius Professor of Natural History, a Chair founded in 1807 by George III. Gregory came straight from Melbourne where

he had been both Professor of Geology and Mineralogy in the University of Melbourne and Director of the Geological Survey of Victoria.

While in Melbourne, Gregory promoted the subject of Geography with enthusiasm, giving evening geography lectures to school teachers from 1902. These were so successful that the Director of Education in Victoria asked Gregory to write a series of Geography school texts, starting with the geography of Victoria and Australia. The only textbooks then available were based on the British Isles, which most of the pupils had never seen (Lim, 1975). Gregory responded with alacrity and enthusiasm and in little over a year produced a scheme that worked outwards from the school-room, ending with the salient features of World Geography. Five booklets for primary school pupils appeared, entitled '*The Austral Geographies*' and ranging in length from 46 to 144 pages (Gregory, 1903a); there was also an accompanying teachers' handbook '*The Teaching of Geography*' (Gregory, 1903b). These were used in the schools of Victoria for several decades after 1903 and Gregory even produced, with assistance from prominent members of the local teaching profession, a similar but larger set of six volumes ('*Imperial Geography*' – Gregory, 1905) for use in New Zealand schools.

Almost immediately after the six '*Austral Geographies*' had appeared, and still in 1903, Gregory produced a masterly summary in 290 pages, based on his 1902 Extension lectures: '*The Geography of Victoria: Historical, Physical and Political*' (Gregory, 1903c). This also went on to sell for several decades. So, apart from a string of other publications, Gregory produced seven geography textbooks in a little over a year before he came to Glasgow, indicating an enthusiasm for geographical education.

### **Implementation**

Not surprisingly, therefore, Gregory began promoting the subject of Geography in the University soon after his arrival in Glasgow. Geography was not then generally recognised as a distinct subject in Universities, most of which were medieval in foundation. But Gregory achieved little progress under the ageing Principal, The Right Reverend (Sir) Robert Herbert Story (1835-1907), a divine. Not until the new Principal, Sir Donald MacAlister (1854-1934), was appointed in 1907 was progress possible. Although primarily a physician, MacAlister had been involved in establishing Geography at Cambridge University, and he and Gregory agreed upon the need for a Chair of Geography at Glasgow, even though he fully appreciated that

Gregory was a distinguished Geographer in his own right (MacAlister, 1921). MacAlister recognised the international dimensions of Glasgow's trade and the University's expertise in subjects like Medicine and Engineering, so that foreign students from dozens of different countries continued to increase in numbers under his leadership (reaching as many as 200 by 1919).

In addition, according to MacAlister (1921), the Scottish Educational Department and the Provincial Committee for the Training of Teachers had been keen to improve both the primary and secondary school teaching of Geography, and needed teachers with Geography qualifications. So by 1908 the University Court was persuaded to establish a Lectureship in Geography to undertake the dual role of teaching Geography both to University students and to pupil teachers who were not members of the University. The University therefore funded this post from 1909, and student numbers increased rapidly. This first Lecturer in Geography was (Sir) Henry George Lyons FRS (1864-1944), whom Gregory had known well as Director of the Geological Survey of Egypt (1895-1901) prior to his appointment as Director of the combined Geological & Cadastral Survey of Egypt (1901-9). Lyons's former position means that the Glasgow Department's enduring connection with surveying and geomatics dates from its earliest days. However, the University did not provide sufficient resources to establish a Chair or to provide purpose-built accommodation for Geography, which Gregory therefore had to find within the Geology Department.

This emphasis by Gregory and MacAlister on teaching Geography within the University coincided with Gregory campaigning to advance the study of Geography more generally in Glasgow, in parallel to the efforts of the Geological Society of Glasgow in promoting Geology among the Glasgow citizenry. The Royal Philosophical Society of Glasgow (RPSG) Council minutes record that less than a month after arriving in Glasgow (on November 30<sup>th</sup>), Gregory joined the RPSG as a Life Member. He was elected to the Council in 1908, and attended his first Council meeting on May 20<sup>th</sup> 1908, when he was appointed to represent the Society as a delegate to the 1908 BA meeting in Dublin. Gregory served on the RPSG Council until 1911.

Taking advantage of this position, Gregory began to revive the Geographical Section of the RPSG, and in 1909 used the threat of a new Society being formed to promote Geography in Glasgow, to achieve his aim. At a meeting held on November 25<sup>th</sup> 1909, which Gregory chaired, the decision to re-form the Geographical Section to

stimulate the study of Geography in the city and to do research was approved and supported by the President of the RPSG, who was present. Gregory was appointed convenor of the Provisional Committee. A long statement appeared in the *Glasgow Herald* (Nov. 26<sup>th</sup> 1909, p.13) detailing the views expressed at the meeting. These views included arguments in support of the University founding a Geography Department, and appointing a distinguished first head. There was voluble support for the appointment of the then Captain Henry Lyons, although he was then only a Lecturer. In fact, Captain Lyons became the first President of the revived Geographical Section of the RPSG (1910-11) while Gregory was Vice-President of the Geographical Section 1910-1917 (he was elected as President for 1929-30). Gregory's enthusiasm for Geography also led to him becoming a member of the Royal Scottish Geographical Society in 1910, and eventually one of its Vice-Presidents in 1920, a position he retained until his death (*Scottish Geographical Magazine*, 48, p.226).

Gregory did his best to raise the funds to elevate the Lectureship to a Chair. Thus in 1912, the year before the centenary of the birth of David Livingstone (1813-1873), Gregory wrote an article in the *Glasgow Herald* (May 18<sup>th</sup> 1912) praising Livingstone's geographical achievements and proposing that the centenary should be marked by the establishment of '*The Livingstone Memorial Chair in Geography*' in the University of Glasgow funded by public subscription. Unfortunately, only £400 was raised but this was invested (MacAlister, 1921) and was eventually used as part of the permanent endowment of the Chair established in 1947.

The first Lecturer in Geography at Glasgow, Captain Henry Lyons, had sent two collections of echinoids and corals from Egypt to Gregory for him to identify while Gregory was at the British Museum (Natural History) (BM (NH)) before going to Australia in January 1900. The first set Gregory described and published quickly in 1898 but the second set only arrived in September 1899 and he could not finish it before he left for Melbourne. Instead of leaving the identification to his BM (NH) successor, however, as he could have done, Gregory completed the task, presumably out of loyalty to Lyons, even though it took until 1906. Lyons went on to direct the Meteorological Office in the First World War and was then successively Director of the Science Museum, Foreign Secretary and then Treasurer of the Royal Society, being knighted in 1926. The first Geography appointment in Glasgow University was therefore filled by an eminent individual.

Lyons left in 1911 and John Downie Falconer (1876-1947), a Glasgow graduate (1897), replaced him. Falconer had worked on the geology of Northern Nigeria, and its tin deposits, and he remained at Glasgow until called back to Nigeria in 1916 as part of the war effort, becoming Director of the Geological and Geographical Survey of Nigeria (1918-27). Alexander Stevens (1887-1966), an old student of Gregory's, was appointed next, from 1919, and eventually, in 1947, became the first Professor of Geography in the University of Glasgow.

Stevens and James Mann Wordie (1889-1962), who graduated in 1910 under Gregory, were both taken by Shackleton on his ill-fated 1914-17 Antarctic expedition following Gregory's recommendations to Shackleton. Wordie was among those who were stranded on Elephant Island after the breaking up and sinking of the *Endurance*, while Stevens was in the Ross Sea party which had the responsibility of laying depots. Wordie went on nine Polar expeditions, was instrumental in setting up the Scott Polar Research Institute in Cambridge, became a President of the Royal Geographical Society, and was knighted in 1959.

Gregory himself continued undiminished until his death in 1932, pouring out publications in both Geology and Geography, effectively acting as if occupying two Chairs, and producing more in each subject than most Professors achieve in one. This is not the place to list the dozens of geographical articles he produced on topics ranging from glacial studies, sea-level variations, and the origin of fiords to reports of expeditions in Australia, Libya, Kenya, Tibet, and Angola. He also wrote books dealing with Australia, the origin of SE English rivers and other topics. One highly successful book, *Geography, Structural, Physical and Comparative* (Gregory, 1908) deserves particular mention, as it went on to be reprinted many times, and was written at just the time when Gregory was pushing for better recognition of Geography in Glasgow. His important contributions to 'Geographical Science' (as the citation declared) was recognised by the award of the coveted Victoria Medal of the Royal Geographical Society in 1919.

### **A brief review of some of Gregory's geomorphological work**

Viewed from today, the quality of Gregory's geomorphological contributions may be considered, at best, uneven. He undoubtedly had valuable insights into the interactions between tectonics and Earth surface morphology, a point developed below, but in other areas his contributions have stood the test of time less well. For example, his

interpretation of drumlins as essentially post-glacial sub-aerial forms, created largely by aeolian processes (Gregory, 1926), was never widely supported (Evans, D.J.A., 2008).

### *The Great Rift Valley*

In 1892 and 1893, when he was in his late 20s, Gregory undertook the expedition to East Africa reported in *The Great Rift Valley* (Gregory, 1896). The book's sub-title is "Being the Narrative of a Journey to Mount Kenya and Lake Baringo", and the first half (200 pages of 400) is travelogue. The remainder is devoted to "a general account of the natural history of the country visited" (p. vii), covering physical geography and geology (~25 pages) and flora and fauna (~60 pages), and concluding with almost 100 pages on ethnography and politics. Clearly, Gregory, a polymath with a deep interest in matters of society, was in full flight even at this relatively early stage of his career.

In interpreting the geology and physical geography of East Africa, Gregory reiterated the insight of Suess that a great depression or trough begins at the Dead Sea, extends through the Red Sea and terminates in Tanganyika (modern Tanzania and Mozambique) (Figure 2). Gregory noted that the lakes in this depression are elongate – "like fiords" (p.3; see below) – and are bounded by the steep sides of the trough. Gregory's key insight was that the great trough is bounded by normal faults and that the overall structure was what he termed – and we still use this terminology – a rift valley (Figure 3). It is not clear whether Gregory actually observed in the field the faults that he illustrated (Figure 3) or he inferred them from the "parallel and almost vertical sides" of the straight valley (p. 219); however, it seems more likely from the text of *The Great Rift Valley* that they were inferred. Nonetheless, this contribution is important and enduring, and, somewhat ironically, given Gregory's antipathy towards continental drift (see below), it forms an important element in contemporary plate tectonic interpretations of the Great Rift valley.

### *The Nature and Origin of Fiords*

This book by Gregory was published in 1913 and he revisited the topic in a late paper (Gregory, 1927a). In the 1913 book, Gregory argued against a glacial origin for fiords: "Many fiords were no doubt once occupied by ice, and were influenced by it; but they were not made by it. ... It is therefore necessary to find an explanation of

these complex valley-systems independent of the ice-action which has given them some of their most consistent features” (Gregory, 1913a, pp. 13 and 15). In effect, he argued that the glacial element in fiord morphology constituted a relatively minor modification of a pre-existing morphology, and that morphology he attributed to tectonics: “All the fiord systems of the world are related to earth-movements” (Gregory, 1913a, p. 15). Gregory went so far as to argue that the truncated spurs of the “fiords in Dalmatia” (p.15) represent faceted spurs (what are now termed ‘flat-irons’) due to recent faulting.

Of course, Gregory did not argue that the morphology of all fiords simply reflects the formation of deep fractures, acknowledging that “the gaping cracks [that he argued are a reflection of tectonic activity] were not of the full width of the fiord-valleys” (p. 19). The tectonically-formed

“narrow clefts ... have been widened by denudation; water and air enter them and cause the decay of the rocks. Streams remove the weakened rock-material and the clefts are gradually widened into river valleys, and if the country be subsequently glaciated the ice enters the previously formed valleys and completes their formation.” (Gregory, 1913a, p.19).

That full explanation seems, in fact, quite reasonable: structural influences control the alignment of rivers, which exploit areas of shattered and/or weathered rock along faults, fractures and joints, to erode deep valleys that become the focus of glacial erosion during subsequent glaciations. Such an interpretation was well-known in Gregory’s time: towards the end of the nineteenth century, Archibald Geikie pointed to the importance of jointing and weathering along joints in controlling river valley location and clearly stated that “though the ice abraded the valleys, it did not make them” (Geikie, 1887, p.243). And yet, the over-riding impression is that Gregory argued that ice plays a very minor role in the formation of fiords. This impression is confirmed in his later discussion of the same topic (Gregory, 1927a), where he reiterated many of the opening points of the 1913 book, and then stated:

“It may be urged that the fiord valleys are due to rivers and ice having enlarged the tectonic rifts by the removal of material which had been weakened by weathering along fractures. The ultimate problem [of explaining the origin of fiords] would nevertheless remain...” (Gregory, 1927a, p.98-99).



That is, Gregory (1927a) did not advocate an interpretation of fiords based on fluvial and glacial erosion of weathered structural zones (joints, fractures and faults). Rather, in his view fiords are *primarily* due to “diagonal and meridional fractures with fresh faulting” (p.210) and “the fiords of the Hebrides, like the sea-lochs and fresh-water lochs of western Scotland, may therefore be included among the indirect effects of the Alpine upheavals and Atlantic subsidences” (p.211).

Gregory’s (1927a) paper was derived from a presentation to the Royal Geographical Society; the report of the discussion following the presentation (published in the pages following the published paper) highlights the contentious nature of Gregory’s interpretation. Sir John Flett, the Director-General of the Geological Survey of Great Britain, pointedly noted that “Professor Gregory is an English geologist resident in Scotland. I am a Scottish geologist resident in London.” Having thus put Gregory in his place, Flett went on to note that Gregory emphasised the pre-eminence of tectonism in explaining fiords, whereas he, Flett, preferred a more moderate view:

“while admitting the importance of Earth-movements and lines of dislocation, to insist upon the immense importance of recent glacial erosion, so that the features of Scottish fiords are ascribed largely to the gnawing action of flowing glacial ice along lines of valleys which must have been pre-existent and which had an origin in the nature of the rocks in which they occur : to say that without ice you will not get fiords, and that the essential features of fiords are due to ice-action plus tectonic features” (*The Geographical Journal*, March 1927, Vol. 69, No.3, p.212).

Gregory seemed always at pains to present his view on the origin of fiords as intermediate between a fully structural interpretation and one based on glacial processes (“he thus hedges his bets”, as I.S. Evans (2008, p.429) expressed it), but in truth Gregory firmly advocated a structural / tectonic origin for fiords. The strength and pointedness of Flett’s responses to the 1927 presentation is evidence enough of that. The more usual and generally accepted explanation is (and evidently has been for a long time) one very similar to that of Flett and based on glacial erosion, although the major ice streams during a glacial period may follow a pre-existing fluvial drainage

network. If that fluvial network is structurally controlled, then it should be expected that fiords will coincide with major structures.

Gregory continued to stress the importance of tectonics in landscape evolution long after 1913 and this subject was one of the objectives of his last expedition in 1932 across the Andes. In 1927, Gregory emphasised that, although subaerial denudation is a powerful modifying agent of landform, the basic cause of the positive topography of mountains and plateaux and the negative topography of basins was tectonic uplift by faulting and folding, not denudation (Gregory, 1927b). This viewpoint has proved to be correct in many situations and faulting is particularly significant in explaining the surprisingly rapid exhumation of Ultra-High-Pressure rocks from depths of well over 100 km with consequent preservation of some of their high-pressure minerals. Exhumation by even rapid erosion would be far too slow to preserve such minerals and the term ‘tectonic denudation’ is now well understood (e.g., Reinhardt *et al.*, 2007; Clark & Dempster, 2009). Gregory’s emphasis on the pre-eminence of tectonic processes is certainly not correct in all situations but such an emphasis is well-placed in the case of tectonic denudation.

### **Gregory and Social Science**

More than half of Gregory’s *The Great Rift Valley* of 1896 is devoted to ethnography and politics, as opposed to physical geography, geology, flora and fauna, and such an enthusiasm for contributions in what would now be thought of as human geography (or more broadly, social science), continued throughout his life. His exclusively sociological writings include *The Menace Of Colour : A Study Of The Difficulties Due To The Association Of White And Coloured Races* (1925), *Human Migration & The Future : A Study Of The Causes, Effects & Control Of Emigration* (1928), and *Race as a Political Factor* (1931). The latter was the annual Conway Memorial Lecture instituted in memory of Dr Conway by the South Place Ethical Society, whose Objects were “the study and dissemination of ethical principles and the cultivation of a rational religious sentiment”. The Foreword to the published version of Gregory’s Conway Lecture is by Sir Keith Wood who noted that during fossil hunting in North America, Gregory “became as much interested in the racial as in the geological problems of North America. What was the white American to do with his black brother? What was America to do with the immigrant flood which the diverse nations

of Europe poured on her shores?” (Gregory, 1931, p. 6). In Australia, Gregory “had the opportunity of studying primitive humanity living under primitive conditions” (p. 7), and “Glasgow gave him opportunities of studying the friction evoked by racial contact and the difficulties which attend the process of amalgamation of diverse nationalities” (p. 8). Presumably Wood was referring here to the mix of Irish and Scottish in Glasgow.

Gregory also delivered an ‘Appreciation’, at the University of Glasgow, of David Livingstone on the occasion of the Centenary of Livingstone’s death (Gregory, 1913b). In that address, Gregory noted, with obvious approval, Stanley’s statement: “I am charged to open and keep open ... all such districts and countries [of Africa] as I may explore, for the benefit of the commercial world” (Gregory, 1913b, p.37). Gregory then concluded that “the success of the undertaking which was begun [by Livingstone and Stanley] with these motives led to the rapid growth of a keener European interest in Africa, and the sub-division of the continent among the States of Europe. ... [T]here can be no doubt that the Africans are immeasurably safer and happier today than they were forty years ago” (Gregory, 1913b, p. 38).

These contributions may now be best interpreted against the background of the role played by Geography in the imperial enterprise. They clearly, explicitly and energetically espouse separation of ethnic groups (‘races’) and are patronising: Gregory (1913b) noted “that we are our black brothers’ keepers”. But it is clear that Gregory had anthropological interests throughout his life and in most of his social science writings he was largely a conservative man of his times. Gregory’s views were not at all out of step with those of the “Establishment”, as is confirmed by the award of his Honorary LL.D within three years of publication of *Menace of Race* and in the same year as *Human Migration*. In short, his style of analysis of human affairs was entirely consistent with that prevalent in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries (e.g., Livingstone, 1992). That style of analysis had a strongly utilitarian motive of serving empire, be that via analyses of race and the adaptability (or not) of the ‘white’ races to the Tropics or via stressing the importance of geography for military campaigns. As Livingstone (1992) has noted: “That geography should be made to subserve social purposes was not only typical of the era, it was a shared assumption that remained inviolate across the ideological reaches of the tradition” (p. 259). The

very extensive body of Gregory's social science writing awaits analysis, but that is outside our remit here.

Gregory's conservatism in social analysis was paralleled by his intellectual conservatism. He was, for example, a staunch opponent of the continental drift proposed by Wegener (1922), as the Minutes of a 1928 meeting of the Glasgow Geological Society clearly show (Geological Society of Glasgow, 1931, p. 614; Marvin, 1925; Bishop, 2008); many others at this time, including prominent geographers such as Steers (1932), were strongly advocating the validity of continental drift. Gregory's opposition to continental drift is explored in detail in Leake's forthcoming biography of Gregory (Leake, In review). Indeed, it is ironic that this opposition to large-scale global tectonism should coincide with such a frequent appeal to tectonic influences on surface morphology at a more local scale.

## **Conclusion**

J. W. Gregory was the key driver in the introduction of Geography at the University of Glasgow, and his support for the discipline reflected his archetypical late-19<sup>th</sup> / early 20<sup>th</sup> century embodied combination of Geography and Geology. As John Lovering expressed it in the *Australian Dictionary of Biography*: Gregory was “an exceptional scientist whose greatest achievements straddled the shadow line between geology and geography” (Lovering, 1983, p. 101). He pursued an enormous range of research in his lifetime, which was prematurely shortened when he drowned on fieldwork in South America in 1932 (see Leake, In review). Much of what Gregory thought and wrote, in both the natural and the social sciences, can now be seen to be flawed. However, that judgement cannot diminish his wonderfully fertile mind and his immense capacity for work and for writing. He was an inspirational figure who “represents a type which becomes ever more uncommon among men of science : the man who takes the whole earth and its inhabitants as his province – a master of living knowledge” (Sir Arthur Keith, in Gregory, 1931, p. 9).

Gregory's energy and application were key to his vigorous pursuit of establishing Geography in Glasgow. Many of Gregory's ideas now seem superseded and even inappropriate, but his vigour and enthusiasm for – and comfort in – operating across the two 'geo' disciplines is noteworthy, for that is a very modern viewpoint. Gregory was like other pioneers in the geosciences, such as William

Morris Davis, who operated within and between both geology and geography. Davis was President at different times of both the principal geographical and geological professional associations in America. That attempt to bridge between the disciplines is also a very modern approach as it is increasingly realised that surface processes can strongly influence tectonics, as well as there being an obvious dependency of surface processes on tectonics (Bishop, 2007). The research objectives stimulated and enabled by J. W. Gregory in Glasgow continue to the present.

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### Figure captions

**Figure 1.** J. W. Gregory in the early 20<sup>th</sup> century in Melbourne, just prior to coming to Glasgow in 1904 to take up the foundation Chair of Geology at the University.

**Figure 2.** FIG. 1 in Gregory's (1896) *The Great Rift Valley*, highlighting the linear nature of the structure from the Dead Sea to Lake Nyasa (now Lake Malawi). This major structure is now interpreted in plate-tectonic terms as a continental extensional and rift system, which has gone to full continental breakup and sea-floor spreading in the Red Sea (e.g., Balestrieri *et al.*, 2005).

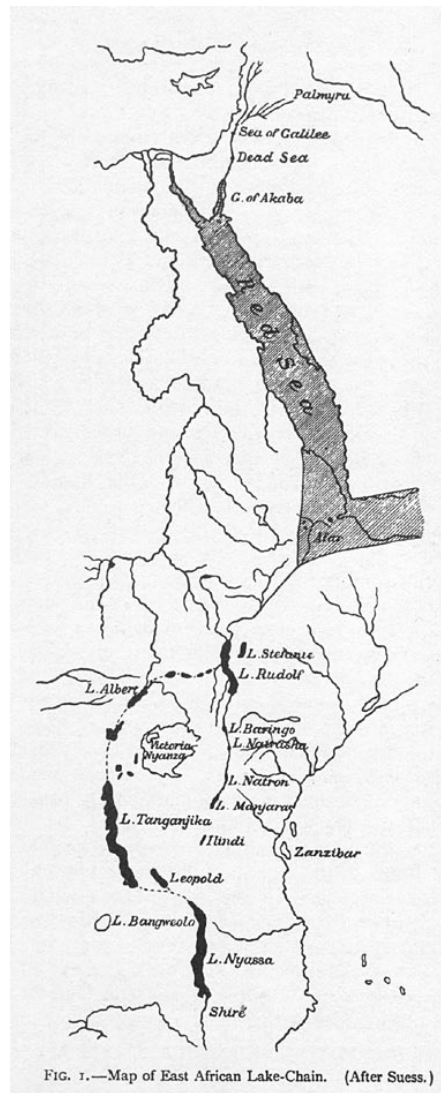
**Figure 3.** Gregory's diagrammatic cross-section of the Rift valley, illustrating the normal faults that bound the valley (FIG. 9 in Gregory's (1896) *The Great Rift Valley*).



## Figures



**Figure 1.** J. W. Gregory in the early 20<sup>th</sup> century in Melbourne, just prior to coming to Glasgow in 1904 to take up the foundation Chair of Geology at the University.



**Figure 2.** FIG. 1 in Gregory's (1896) *The Great Rift Valley*, highlighting the linear nature of the structure from the Dead Sea to Lake Nyasa (now Lake Malawi). This major structure is now interpreted in plate-tectonic terms as a continental extensional and rift system, which has gone to full continental breakup and sea-floor spreading in the Red Sea (e.g., Balestrieri *et al.*, 2005).

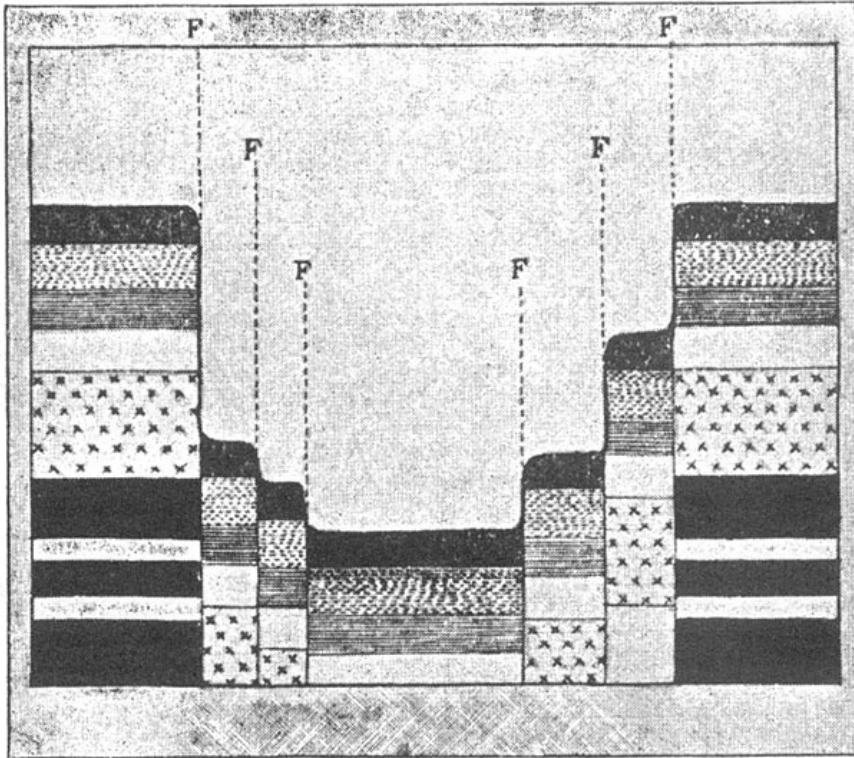


FIG. 9.—Section across Rift Valley. (F = Faults.)

**Figure 3.** Gregory's diagrammatic cross-section of the Rift valley, illustrating the normal faults that bound the valley (FIG. 9 in Gregory's (1896) *The Great Rift Valley*).