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Historical background: Early exploration in the East African Rift — The Gregory Rift Valley

In relation to modern lines of communication it seems surprising that the Gregory Rift Valley was the last part of the system to become known. Much of the earlier exploration had however been centred on the problem of the sources of the Nile, and in consequence the Western or Albertine Rift was explored by Samuel Baker as early as 1862/63 (Baker 1866). Additionally there was a strong tendency to use the convenient base at Zanzibar Island for journeys inland by the Arab slave trading routes from Pangani and Bagamoyo; these led to the Tanganyika Rift and Nyasaland rather than to the area of modern Kenya. The first penetrations into the Gregory Rift area were in 1883; Joseph Thomson made an extensive journey into Central Kenya which he described in his book of 1887, 'Through Masai Land' which had as a subtitle, 'a journey of exploration among the snowclad volcanic mountains and strange tribes of Eastern Equatorial Africa—being the narrative of the Royal Geographical Society's Expedition to Mount Kenya and Lake Victoria Nyanza 1883–84'.

In his classic journey Thomson practically encircled the lower slopes of Mount Kilimanjaro and reached the Gregory Rift wall near the Ngong Hills. He then went north to Lake Baringo and westwards to Lake Victoria, before returning to his starting point at Mombasa. His observations on the geology were of good standard for the time. For example he referred to 'enormous masses of porphyritic sanidine rock forming a lava cap to the underlying metamorphic rocks' on the western side of the Rift.

About the same time a German naturalist Dr Gustav Fischer visited the southern part of the Rift Valley in what is now Tanzania, reaching Naivasha and overlapping with the southern part of Thomson's traverse and completing the traverse of the southerly Gregory rift. His mapping was however of modest standard, and some of his localities were only rediscovered decades later.

The next major contribution was from Ludwig von Hohnel, who in 1894 published in English an account of 'Discovery of Lakes Rudolf and Stefanie—a narrative of Count Samuel Teleki's exploring and hunting expedition in eastern Equatorial Africa in 1887 and 1888.' This account included an excellent scientific record and maps of the Rift from Baringo northwards to Lake Rudolf,[1] and discovery of an active volcano, named after Count Teleki. The geology was recorded along the route of the expedition and former high levels of the various lakes were observed and recorded.

[1] Now renamed Lake Turkana.

A major advance came in 1896 when J. W. Gregory published 'The Great Rift Valley—being the narrative of a journey to Mount Kenya and Lake Baringo—with some account of the Geology, Natural History, Anthropology and future prospects of British East Africa.' This described a journey in 1892–3 from the Kenya coast at Mombasa to the Rift Valley, climbing Mount Kenya en route and returning to the Coast. Gregory's work marked the beginning of scientific understanding of the Rift Valley. He had already travelled extensively in other parts of the world and he recognised the Rift was a true graben (fault trough), and discussed its origin. He observed that much of the faulting was very recent, that the closely spaced block-and-trough strips were relatively shallow features, due to crustal extension. He worked out (correctly) the order of superposition of the members of the volcanic sequence, although modern ideas of chronology are somewhat different from his. Some of his observations still remain to be followed up. For example, he drew attention to 'bastions' where the Rift Valley wall was particularly abrupt and steep, separating stretches with more highly developed step faulting. (It might be suggested that the step fault sequences represent a degree of gravity collapse of the Rift wall into the relatively incompetent valley filling: in fact that this particular type of faulting is to a large degree a superficial gravity effect. This is a matter which might be further investigated).

J. W. Gregory returned to East Africa much later, in 1919, at the invitation of the Government. By then the country had been largely opened up and mapped, although there was still no road for wheeled traffic from Nairobi into the Rift Valley. He was able to draw on the work of a range of government administrators who were well aware of the importance of scientific discoveries. Notable among them was C. W. Hobley (commemorated in the name of the Miocene *Deinotherium hobleyi* Andrews), who was responsible for the first recognition of vertebrate bearing Miocene, described by F. Oswald (1913, 1914) at Karungu on the shores of Lake Victoria, and who himself made extensive contributions on the geology and archaeology of the Gregory Rift Valley from 1894 onwards. The Geological Society has a direct link with Gregory, for he was awarded the Bigsby Medal in 1905 and was President from 1928–30.

In 1919 E. J. Wayland set up the first Geological Survey in East Africa, at Entebbe in Uganda. In the subsequent fifteen years Wayland made an outstanding contribution to knowledge of rift and basin development in the region, recognising for example the late river reversals in the Lake Victoria basin, and he contributed also to the geology of areas further east including Olduvai and Kavirondo. He was deeply impressed by the straightness and structural transgressiveness of the fractures in the Western Rift, with the uplift of the Ruwenzori massif, and put forward a general theory of origin of the rift valley system by lateral compression, a theory which was strongly supported by other authors. In 1933 he was awarded the Bigsby Medal of the Geological Society for his East African work. Wayland was followed by a notable sequence of geologists of international reputation who between them made Uganda one of the geologically better known parts of Africa, and the experience of this led in due course to the setting up of corresponding bodies in Tanganyika and eventually in Kenya. Except in Uganda however geological work was concentrated on the rocks with direct economic mineral

potential; the rifts and the volcanic spreads were largely neglected. It has remained for the present generation of geologists to fill this very large gap.

Formal geophysical observations began early in Tanzania with the setting up of a series of gravity stations by Kohlshutter in 1899, but it was not until 1933 that the Gregory and Western Rift Valleys were investigated, by E. C. Bullard, who found a marked gravity deficiency in the rift and deduced that the rift floors must be held down by overthrusting of the margins (1936). In this he was following the views of Wayland, and the compressional hypothesis was endorsed in part by Bailey Willis (1936), but other explanations are now preferred.

Serious work on the archaeology and later geology of the Gregory Rift valley began in the later 1920s when L. S. B. Leakey returned to his birthplace from Cambridge, and began the long series of investigations which have made the area a classic one in relation to early man and his development. Leakey supported by Solomon and others worked on the high level 'Gamblian' lakes in the Rift valley basins, and this work was extended northwards by Fuchs around Lake Rudolf and by Nilsson in Ethiopia. The early interpretation of their 'pluvials' as the tropical equivalent of the northern ice ages is no longer accepted, but the evidence of high level lake waters and their relation to the activity of early man still remains. Leakey with his collaborators made Olduvai one of their main areas of activity, and it is now one of the world's classic areas for Pleistocene geology and the history of early man. Leakey extended his activities into the Kavirondo Rift, to the Pleistocene of Kanam and Kanjera, and to the Miocene rocks of the Legetet and Rusinga areas, with their important pre-hominid anthropoids.

At the present day the Rift system is widely regarded as a landward continuation of the mid-ocean rises, and by some theorists as belts where the crust has opened by miles or tens of miles. These concepts need careful analysis, for the link with the oceanic system looks less good on a large-scale map than it does on the map of the world; the chronology of rift development is quite complex regionally and fails to agree in detail with that of the ocean; finally the whole width of the rift is, over much of its length, floored with continental sialic basement rocks. We need more information on the dating of the different parts of the rift; more information on the dating of the broad swell of which the Gregory Rift Valley forms the crestline; more information about the floor of the rift beneath the volcanics. Fortunately there are now many competent people producing the critical geological and geophysical data as a basis for informed syntheses.

This Volume records progress in dealing with these problems, important not only in the content of the continental development but also in relation to the history, evolution and ecology of what Louis Leakey called 'Adams Ancestors'.

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