

**THE RIFT VALLEYS &  
GEOLOGY OF  
EASTERN SINAI**

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The rift valleys & geology of Eastern Sinai by W. F. Hume

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**W. F. HUME**

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*J. L. Branner* <sup>var</sup>

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OF EASTERN SINAI.

BY  
W. F. HUME, D.Sc., A.R.S.M., F.G.S.  
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*f. c.*

READ BEFORE THE INTERNATIONAL GEOLOGICAL CONGRESS,  
PARIS, AUGUST, 1900.

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## INTRODUCTION.

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OWING to the kind permission granted me by the Egyptian Government through Sir W. Garstin, Under-Secretary of State for Public Works, and Captain H. G. Lyons, R.E., Director of the Survey Department, I am enabled to lay before you a brief statement of certain results obtained in the course of the Survey of Eastern Sinai during the season of 1898-99. The following remarks are based upon the admirable map prepared by Mr. H. G. Skill, F.R.G.S., who spared no pains to obtain as exact a picture of the country as was possible in the time at disposal. Unfortunately, this map has still to await publication, as there are many others of earlier date to be compiled and printed.

Eastern Sinai has been remarkably neglected by the many scientific writers and travellers who have visited the holy mountain, most of them contenting themselves with an examination of the western side of the peninsula, or with a rapid traverse through the region from Sinai to Akaba, this being especially the case with the south-eastern corner between Dahab and Sherm, an area of which much will be said in the present paper. The only travellers of note in this district, before 1842, appear to have been Ruppell and Burkhardt, and in 1847 Russegger published a map of Syria and Arabia Petrea, which has, at least, the merit of suggesting the mountainous character of the country, and shows one long valley running parallel to the

general outline of the Gulf of Akaba, from near Noweiba to Nebk.

In 1868 the Rev. F. W. Holland, M.A., one of the members of the Ordnance Survey, which made an excellent survey of the western side of the peninsula, under the direction of Sir C. Wilson and Captain Palmer, published a small map in the Proceedings of the Royal Geographical Society, which appears to have remained the standard since that date, and to have been adopted for the interior of the country in the Admiralty Chart of the Red Sea, the result being a curious topographical contrast between the east and west sides—the latter taken from the Ordnance Survey—which it is hoped will disappear when our own contribution is printed. Professor Hull's fault region touches our district to the north, he having crossed by the usual Akaba route.

#### TOPOGRAPHY OF EASTERN SINAI.

The traveller who enters Sinai by the quarantine port of Tor, will, when standing on the shore and looking eastward, see a prominent mountain range running roughly north-west and south-east, and extending as far as eye can reach in both directions, broken here and there by more prominent summits, among which the many-peaked Serbal in the extreme north, the dark *plateau massif* of Catherina or Zebir, and the bold peak of Um Shomer, opposite Tor, are especially conspicuous. This great range is the western edge of the region, which will be dealt with in this paper, and is itself a relic of a tectonic change of the first magnitude. Professor Fraas, in an eloquent passage (*Aus dem Orient*, p. 7), has referred to it 'as rising, since the beginning of things, out of the ocean, untouched by Silurian or Devonian, by Dyas or Trias, by Jura or Cretaceous; only

round the foot of it has the Red Sea drawn a crown of corals,' yet we now know that it represents the upthrow side of a magnificent fault—which at the western foot of Serbal has a throw of at least 1500 metres, the granite wall rising over 1250 metres above the plain of El Gaa, while uptilted Cretaceous marls and limestones form low hillocks, or white plateaux, at its foot (see Walther, J., *Korallenriffe der Sinaihalbinsel*, p. 452)—itself certainly post-Eocene in age, and, from comparison with the Red Sea Hills, probably only originating during the Pliocene. On this point, however, Mr. Barron, who studied the western side of the peninsula, will, no doubt, have much of interest to tell in the future. The main range, in reality, consists of a series of narrow crests, separated by but few high mountain passes, and only traversable, by heavily loaded camels, at two points, viz :—up Wadi Isleh and across the Tarfah Pass, into Wadi Nasb, and through Wadi Hebran to Wadi Solaf and Wadi Feiran—while it gradually descends in level from Zebir and Um Shomer, over 2500 metres, to about 1500 metres in Sahara, then rapidly dying away towards Ras Muhammed. It may be mentioned in passing, that the watershed but seldom agrees with the principal chain, lying to the east of it, north of Eth Thebt, while to the south most of the higher summits are on its eastern side.

If this range be crossed, and Sinai itself ascended, the view to the east is decidedly disappointing. To the north-east is seen the long white limestone wall of Jebel Gunneh running more or less east and west, and far to the east, breaking into isolated masses, ending with the fine truncated cone of Jebel El Ain. In front of and parallel to it extend the sandy plains and precipitous plateaux of sandstone, cut into deep ravines meandering in all directions, while still nearer is an apparently flat or



undulating granite plateau, out of which the Derawi Er Roghah ridge, the dark peak of Habshi, and a few lesser heights, rise as isolated projections.

To the south-west extends a mountain wall, which hides all the southern land from view, and constitutes the most important scenic feature in Eastern Sinai, extending across the country from the Central Range to the Gulf of Akaba, where it forms a precipitous ridge close to the sea-shore. This *Transverse Divide* claims special attention not only from the fact that it separates two different types of country, but also because, at least on the western side, these two regions are at very different levels, there being an abrupt fall to the south. In general the Transverse Watershed and Range are identical at all important points, the main characteristic being the gradual lowering in height from west to east.

Thus Fersh Sheikh El Arab, near the Central Range, is over 2000 metres, while Jebel Gnai, close to the Gulf of Akaba, is only 1000 metres high, the watershed itself being thrown into striking curvatures, due to causes which will shortly be considered. There are only five passes over this divide, two of which are easy, while the remainder can only be negotiated by lightly loaded camels, and on these special stress is here laid, because they all have one remarkable feature in common, viz. :—*That the valleys they connect form five roughly straight lines, all parallel to one another and to the Gulf of Akaba, that is running in a direction somewhat west of south.*

What then is the origin of this structure and what characters do these depressions present?

We will at first examine two which are already to some extent outlined on the existing map, and to which the names of Um Raiyig-Shelala and Melhadge rifts have been respectively applied, these, it will be easy to show,

belong to the category of Rift Valleys, of which the Gulf of Akaba itself is a well-known and striking example, and are the effects of dynamical changes whose character, extent, and possible age may be more or less accurately determined. It may be recalled that these are not necessarily single depressions, but rather a series of basins separated by barriers, which, though higher than the main valley, are of no great altitude compared with the bordering hills.

There are, as has been said, two main longitudinal valley-systems of this kind in Eastern Sinai, both crossing and extending far north and south of the Transverse Divide, and of these the Um Raiyig-Shelala rift will first be dealt with.

In descending Wadi Nasb, the scenery of the granite region is for the most part of a fine character, bold hills scored by wild gorges filled with boulders bounding the deep and narrow ravine, which in part has a flat sandy floor, grooved only by shallow dry water-courses, while at other spots groves of tamarisk and palm, or jungles of weeds and rushes give an additional touch of beauty, and the effect of contrast is therefore very striking when, at the gates of Nasb, the way is suddenly barred by dark-green hills of softer outlines, and a valley is seen running at right angles to the previous course in a T-shaped manner. This change in the geology and topography is too marked to escape the most casual observer, but another point speedily arrests attention, a small mass of yellow sandstone being seen to rest on the opposite side of the valley against the igneous hills, which rise 600 metres above it. The interest of this occurrence is enhanced when it is found that the nearest Nubian Sandstone to the north is 25 kilometres distant, and this occurs not in the valley, but capping a granite

plateau. Turning down Wadi Shelala to the south, the same sandstone first rests on the western side, and finally blocks the way, stretching across the valley as a barrier of brilliantly variegated or dazzling white colour rising as a cliff 100 metres high, and forming the watershed at this point.

A later study of the distribution of the Nubian Sandstone showed that this relic, which has all the typical features of the rock of the main plateau to the north, has been let down for at least 700 metres, the height of the igneous hills which rise above it on both sides. Crossing the ridge, the rift is seen to continue south in an almost

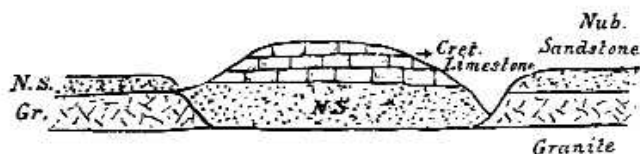


Fig. 1.

perfectly straight line, but crossed at oblique angles by transverse valleys, south of which in each case is a low pass, so that the furrow is not one continuous valley, but several, separated by low watersheds. After crossing the great drainage line of Kyd, the rift is finally cut off by Wadi El Tema, which curves round to join Wadi Kyd through Wadi El Beda.

Returning and proceeding northward from the gates of Nasb, the only striking feature at first is the steepness of the bounding walls, which rise 500 metres on each side, and it is not till the head of Um Raiyig—which continues the north trending loop of Nasb—is reached, that another point of special interest is noted, where a ridge of limestone with white sandstone at the base, almost absolutely