

lunched with Captain Roberts, manager of the P. and O.

' In the evening I was *interviewed* by the correspondents of some newspapers, and a couple of Americans.

March 9: On board the "Sumatra."—On coming on board I found M^rKillop Bey, who has been made a Pasha, within the last fortnight. He is a fine fellow, a jolly English sailor. I was very glad to see him, and he me; and I was pleased to have the opportunity of expressing to him, in person, my gratitude for all he had done for me with respect to the steamer, and we took a very friendly leave of each other. Yesterday some of the passengers on landing were thoroughly drenched. To-day the sea is nothing to speak of, or we should not be able to leave the port.¹

¹ "The great improvement which calls for accomplishment [as instanced by Dr. Beke at page 149] is the removal of the reef that bars the entrance to the port of Alexandria. Its existence ought no longer to be tolerated. Shipping to the amount of 1,300,000 tons enters the port every year. The exports amount in value to thirteen millions sterling. The imports come to five millions. The harbour works, which are near completion, when finished will have cost two millions and a half, and the conveniences then offered will put Alexandria next to Marseilles, Trieste, and Genoa in the rank of Mediterranean ports. Yet no ship can enter the port after nightfall, and all vessels of considerable draught cannot enter at all either by day or night in stormy weather. Alexandria Bay is five miles across; but as you near the harbour you find shoal water almost everywhere, across which for more than a mile stretches the new breakwater. The real deep-water channel, the only passage for large ships, is not 100 feet across, and has the additional drawback of being very circuitous. Its depth is only 27 feet, so that in rough

Our vessel started at 1.30 P.M. I have a cabin entirely to myself, and in this, as in everything else, the officials of the P. and O. Company have shown me every kindness and consideration, of which I cannot speak too highly, or sufficiently thank them for. Colonel Stokes tells me that, when dining at General Stanton's, some words I let drop led them to suppose I was a *German* long-settled in England; but on the way to Alexandria together, something led me to speak of my family as being an *old English* one; so Colonel Stokes tells me that, on arrival at Alexandria, he wrote to Stanton informing him of their mistake. How funny things are! My name and my German scholarship have led many others into the same mistake. It is certain I never *voluntarily* caused the error; on the contrary, I am too proud of my birth to disavow it, or to mislead any one with respect to it.

weather vessels of deep draught dare not venture in for fear of touching the rock in the trough of the sea. Barely a month ago, during a forty-eight hours' gale, the Austrian Lloyd and English mail steamers, and several merchantmen, dare not venture out of harbour; while four large vessels, tossed about outside in the offing for thirty-six hours, and the English turret-ship "Rupert," actually put back to Port Said rather than venture in. A careful survey has been recently made by a skilful English engineer of the amount of rock it would be necessary to remove in order to widen and deepen the channel sufficiently to permit entry and exit at all times and in all weathers. The work required proves by no means insurmountable. It is said that a tithe of what has been spent on the harbour would make its entrance safe, and it seems penny wise and pound foolish not to take the matter in hand at once."—See "*The Times*," Feb. 1, 1878.

March 12.—In consequence of the rough weather we shall not reach Brindisi till the evening. However, you will get this letter on Monday morning; and if I can only manage to catch the Sunday morning train from Venice to Turin, I hope I shall sleep at Turin, and start for Paris on Monday morning, so that I may possibly be with you on Tuesday night.

March 13, Brindisi.—The mails and passengers landed last night after I was gone to bed. At about midnight I got your letter: the cuttings from "The Times" of Holland, Wilson, and Palmer's letters are very amusing. What a funk they are in! *They* have not a leg to stand on, whatever may be the fate of *my* Mount Sinai. What does Wilson mean by "Ras Sufsâfeh"? Is it the same as Holland's "Jebel Musa"? I feel sure that I have been successful, if only in demolishing the traditional Mount Sinai, and setting people to look at things in a proper light. I forward this letter by one of the passengers who is going direct to Turin this afternoon, as otherwise it would not reach you till after my arrival. Now, God bless you! Have courage, and all will go well, I am confident! Thus ends the narrative of my expedition in search of the true "Mount Sinai."

"Gloria Tibi Domine!"

APPENDIX.

A.

(See pp. 305-400.)

GEOLOGICAL NOTES* ON THE PENINSULA OF PHARAN, NORTH-WESTERN ARABIA, AND 'MOUNT SINAI' (MOUNT BĀGHIR).
BY JOHN MILNE, F.G.S.

THE journey, of which the following is an account, was made in company with the late Dr. Beke in quest of the true Mount Sinai, which mountain he placed in North-Western Arabia, about 95 miles in a north-easterly direction from the district in which it has hitherto been conjecturally considered to exist.

Owing to the rapidity with which the country visited was traversed, it would be impossible to connect with accuracy the various observations which were made; and therefore, rather than attempt to construct a series of sections showing the relation of the various formations to each other, I have considered it better simply to indicate the conditions as observed at various points, leaving it for those more conversant with the geology of these districts to connect the following fragments with those already accumulated. For assistance in the determination of the rock-specimens collected, of which 77 are described (22 of which were examined microscopically), I have to thank Mr. Thomas Davies, F.G.S., of the British Museum.

District visited.—From Suez we went by sea to Aintūnah, which lies in the north-east corner of the Red Sea, and then on to Akaba, touching almost daily at some point or other along the coast. From Akaba we took camels, and journeyed some twenty miles in a north-easterly direction up Wady Ithem, in the direction of Petra and Ma'an. This was the furthest point of our journey. On again reaching Akaba, instead of returning to Suez

* The specimens referred to have been presented by the late Dr. Beke's desire to the British Museum.

by sea, as we had come, we reached it by crossing the elevated desert plateau of the Tih.

Ras Sheikh el Battan.—This place is about 50 miles south from Suez, on the coast of the [traditional] Sinaitic Peninsula. Here the hills, which are approached from the coast by about a mile of a gradually sloping sandy plain, are granitic. All the way from Suez the coast on either side is bounded by high and rugged hills, in general appearance very similar to these. Being destitute of vegetation, there has been no check to the effects of disintegration; and these mountains, which probably would have been more rounded in their outlines had they been protected by trees and herbage, now rise in bold and often almost perpendicular cliffs, contrasting strongly with the rounded granitic outlines seen in many parts of the British Isles, especially in Cornwall. Looking at these hills from a distance, they appeared as if built up of so many triangular slabs which had been laid over the surface of some pre-existing hill. The tops or apices of these slabs pointing upwards give rise to innumerable peaks, forming prominent serrations on the ridge and rough points upon the sides. The granite is of a greyish colour, and consists chiefly of quartz and a black mica, little felspar being present. These mountains are cut by numberless dykes, which are generally nearly vertical, but yet often intersect each other at small angles. Looking at these from the coast, they appear as so many well-defined broad red or dark-coloured bands. At this place, Ras Sheikh el Battan, the red bands were felsites, whilst those of a dark colour, which varied from a black to olive-green, were feldspathic porphyries. The two might easily be distinguished by blows of the hammer—the former being hard and compact, and having a clear metallic ring when struck; whilst the latter, being much decomposed, sounded dull, and readily crumbled. In places some of these dykes were filled with small cavities containing a white glassy mineral, which in several cases, having dissolved out, gave to the rock a vesicular structure.

In width these dykes vary considerably; those examined varied from 6 to 12 feet.

Lying on the sand about a quarter of a mile from the foot of the mountains, there are some curious slabs of sandstone from three to six feet square, made up of readily separable laminae of $\frac{1}{4}$ to $\frac{1}{2}$ inch in thickness. These slabs are hard, brittle, slightly calcareous, of a gritty siliceous structure and nearly white. They probably come from beds of the so-called Libyan Sandstone, of which there is an exposure somewhere near this place.

Dr. Beke tells me that, when travelling from Tor towards Suez along this coast, he passed over a surface of fine sandstone like

the one just described, on which there were numerous tracks of birds' feet apparently as fresh and perfect as if only just impressed.

Here the curious forms assumed by drifted sand could be well observed. When sailing along the coast, from high up between sloping walls of granite bounding the valleys, the sand can be seen descending like a glacier. Every gorge and valley is filled from side to side with it; and from high up, at a narrow terminus where the sides of granite approach each other, there is a sloping even surface which comes winding down until it merges in the plain below.

As at this point there was no valley, the glacier-like form did not exist, but in its place were long winding sandy ridges running from the foot of the hills and terminating abruptly in the plain some 50 or 100 yards from their origin. A section at right angles to the length of one of these, would give two sides sloping upwards at about 45° , meeting at an angle some 12 or 14 feet above the ground. Running up these two faces there are parallel lines very similar to regularly-formed ripple-marks, which give the surface a corrugated appearance. The curious point, however, is that the ripple-marks on one side of the mound alternate with those on the other; that is to say, where the crest of one ripple-mark running up the side of the mound reaches its ridge, there it meets with the hollow of a ripple-mark on the opposite side, in this way causing the ridge to be a regularly-formed waved line.

Similar structures to these mounds of sand I have seen in Iceland built up of ashes, but on a much larger scale. Those on the north-east side of Godalands Jokull, are ridges half a mile in length running from the top of the hills down to the valley below, and have a striking resemblance to some huge railway embankment.

Tor.—A short distance before reaching this place the high range of granitic hills which borders the coast gradually grows lower, and finally disappears in the sand. Many of the dykes in them are approximately parallel, and those which are not vertical dip towards the south. As this range of hills, which from the map appears to be called *Jebel Gabêlyeh*, dies out, another range rises in the rear, which as it proceeds southwards approaches the sea-board, from which at first it is some 15 or 16 miles distant. The highest of these, *Jebel Serbal*, 6734 feet, has, amongst others, a claim to be the true Mount Sinai. Between it and the sea where *Tor* is situated there is a broad and gently undulating plain. *Tor* itself, although a small village, has a striking feature in being built almost wholly of blocks of coral obtained from some large mounds about 100 yards to the north, which, when they

come down to the shore, form small cliffs from 20 to 30 feet in height. These mounds, which are made up of sand, imbedded masses of coral, and a variety of shells, are apparently a drift accumulation—an idea suggested by the imperfect condition of the shells and the irregular manner in which they appear to be thrown together.

Sherm.—At page 396 of Mr. Poulett Scrope's work on volcanoes it is stated, on the authority of Burckhardt, that there is a probability of the existence of volcanic rocks at Sherm. Burckhardt, when speaking of this district in his 'Syria' (page 522), says, "The transition-rock, which partakes of the nature of greenstone or grauwacke or hornstone and trap, presents an endless variety in every part of the peninsula; so that, even were I possessed of the requisite knowledge, to describe them accurately would try the patience of the reader. Masses of black trap much resembling basalt compose several isolated peaks and rocks;" and at page 529, he continues, "From Sherm we rode an hour and a quarter among low hills near the shore" [towards Akaba]. "Here for the first and only time I saw volcanic rocks. For a distance of about two miles the hills presented perpendicular cliffs, formed in half-circles, and some of them nearly in circles, none of them being more than from 60 to 80 feet in height; in other places there were appearances as of volcanic craters. The rock is black, with a slight reddish tinge, full of cavities, and has a rough surface; on the road lay a few stones which had separated themselves from above. The cliffs were covered by deep layers of sand; and the valleys at their foot were also overspread with it. It is possible that rocks of the same kind may be found towards Ras Abu Mohammed; and hence may have arisen the term black (*μίλανα ἄρη*), applied to the mountains by the Greeks. It should be observed that low sand hills intervene between the volcanic rocks and the sea, and that above these, towards the higher mountains, no traces of lava are found, which seems to show that the volcanic matter is confined to this spot."

Of these remains of an extinct volcano or volcanoes the only trace obtained was the picking-up of a few pieces of volcanic breccia, as will be seen from my notes on the neighbourhood, which unfortunately, from want of time, relate only to the harbour.

From this place to Ras Abu Mohammed, the most southern point of the Sinaitic Peninsula, there is an absence of the granitic rocks, which keep some 6 or 7 miles back from the coast-line, their place being supplied by low hills and cliffs of limestone and sandstone. On the east side of Sherm harbour, the cliffs, which are about 50 feet in height, are formed of sand, capped with two

horizontal beds of yellowish white limestone. These latter, which are about 14 feet thick, are full of irregular cavities, and are in fact rather a breccia of shells and coral than a compact limestone.

The beds of sand, which in places appear to dip at about 12° towards the south, although compact, are much too friable to be called a sandstone. They are of a yellowish red colour, and in places are formed of quartz grains as large as peas, giving the character of a *grit*. Intercalated with them is a band about six inches wide, of rounded and angular pieces of flint, quartz, and granite. Masses of limestone, having fallen from the beds above, form a protection against disintegrating forces, which rapidly tend to undermine them. Passing from these cliffs round the harbour in a northerly direction, across the entrance to a wady running to the north-east, steep banks of sand are met with, which continue to its south-west side. These are generally of a yellowish colour; but in one or two places they were of a fiery red. At several points there are indications which might be taken for horizontal bands of a black colour, forming a cap to these banks of sand; where these do not exist their remains are seen in taluses of black *débris*.

Want of time prevented a close examination of these; but judging from the numerous fragments of black stone lying on the beach, it would appear that they were in part, if not wholly, of volcanic origin. Generally speaking, they were compact, fine-grained, of a black colour, and even in their texture. Under the microscope, however, they were distinctly seen to be a volcanic felspathic breccia (probably doleritic particles cemented by a triclinic feldspar)—a condition which, from external appearances, would never have been suspected, unless from a slight irregularity on the weathered surfaces of the specimens. With them were a few fragments of a coarse-grained black rock, consisting of quartz and feldspar cemented by limonite, which is distinctly a breccia.

To the west, behind these banks of sand, low hills with rounded outlines run from north to south, which have a definite stratification and dip towards the north.

The cliffs of Ras Abu Mohammed, lying to the south-west, are about 90 feet in height, and are apparently composed of the same coral limestone as that forming a cap to the sand at Sherm, with which they also agree in the direction of their dip.

Inland from the cape there is a curious round hummock-shaped black hill.

From Sherm our course was close along the shore of the

Sinaitic Peninsula, along which nothing but rugged hills of granite and "dunes" of sand were visible.

At the entrance to the Gulf of Akaba we sailed due east to Ainúnah, the approach to which was for many miles guarded by innumerable coral reefs, on which the soundings were seldom over two fathoms. At Ainúnah, excepting a few palm trees and the remains of an aqueduct apparently of Roman origin, there is but little of interest. The hills, which are very high, several of them being upwards of 7000 feet, are a day's journey or more distant from the coast. About halfway towards them there is a long low white scarp, forming the flank of a range of hills or a low plateau, which is probably limestone. The remainder of the country is flat, and slightly undulating, being for the most part covered with stones and sand; notwithstanding which, relatively speaking, it is very fertile, many bushes, acacias, and small date-palms being visible.

Between this place and the entrance to the Gulf of Akaba there are many islands, all of which, judging from their similarity in appearance to those examined, are made up of a whitish limestone dipping at a low angle towards the east.

Midian [*Midian*].*—The first place landed at inside the Gulf of Akaba was Madian, up to which point both sides of the gulf are bounded by bleak and bare high hills of granite. Here there is a Beduin village, situated on the sea-board at the termination of a valley or wady coming down from the east. This valley at its mouth forms a boundary line between two sets of lithologically different rocks. On the right or south side is a granite, whilst on the left or north side there are beds of sandstone and conglomerate.

The granite, which is more or less of a reddish colour, is in such a decomposed state on its surface, that at a short distance it would be readily mistaken for a soft sandstone. Even in the more solid parts, when struck with a hammer it readily falls into angular pieces. Its texture varies considerably, being both fine and coarse; but in all parts the felspathic element predominates. The striking feature in this rock is the number of dykes by which it is traversed. These, generally speaking, have a strike from north to south, and a dip at a high angle of 80 or 85° towards the east.

In all the granite hills of these regions, there are visibly two classes of dykes, which are distinguishable from each other by their colour—black ones, which are generally dark-coloured coarse-grained porphyries, and red ones, which are for the most part pink felsites or fine-grained porphyries. Both of these are much disintegrated, but the former more so than the latter. On

* See Dr. Beke's description of Midian, p. 332.

an east and west section about a quarter of a mile in length, out of eleven of the dark-coloured dykes, only two stood up to form peaks; the remaining nine, being softer than the granite, were cut down so as to form hollows and heaps of *débris*.

About half a mile up this valley, upon its south side, a bluff about 30 feet in height rises perpendicularly from the top of a large mound. This appears to show a junction of the granite and conglomerate; but the two externally appear to be so merged into each other that it is difficult to draw a marked line between them. The top of the bluff is covered with two horizontal bands of sand and rounded stones about six feet in thickness. On its southern side, beneath this cap there is a face of decomposing felspathic granite, traversed by greenish-coloured dykes, which include within themselves small angular fragments probably derived from some earlier-formed dyke which they have traversed. Passing round to the east side, there is an apparent gradation into red earthy bands, very like a hard clay, which in their turn merge on the north side into a brecciated conglomerate, which faces the sandstone beds on the opposite side of the valley. This conglomerate varies considerably in texture, containing not only pebbles, but also large boulders. Facing this bluff, upon the opposite side of the valley, which is here considerably narrowed, there is a corresponding bluff formed wholly of conglomerate. The upper part of this, which is made up of a coarse material, the stones it contains being as large as a cocoa-nut, lies unconformably upon a bed of finer material.

This lower bed in its upper portions is a gritty sandstone, but as it descends it passes into a fine conglomerate. Being much softer than the rock which caps it, it is rapidly being undermined, and large blocks of the coarse conglomerate from above are in consequence continually falling. These blocks, although they are made up of similar, if not the same, material as the neighbouring granite rocks, form, as far as their durability is concerned, a far superior stone—under the hammer the one giving a dull hollow earthy sound, and the other a clear sharp metallic ring.

Passing this bluff to the north side of the valley, we come on a gradually sloping plane of sandstone, grit, and conglomerate, the surface of which has been worn into a series of round hummock-shaped forms, each about four feet in height. Winding in and out between these there are smooth narrow channel-shaped hollows, looking as if at times they formed courses along which water had flowed; and, in fact, down one of these a small and rapid stream of water was descending, at the time of my visit, towards a palm-grove which occupies the bottom of the valley. In places where a cutting has been made from the valley into the hummocked plane

of conglomerate and sandstone, the unconformability just spoken of is strikingly seen in several outliers, the tops of which are made up of conglomerate, which joins in an irregular line the sandstone of their lower portions.

About three quarters of a mile up the valley, on its north side there is an exposure, about 40 yards in length and from 20 to 30 feet in height, which exhibits a curious juxtaposition of sandstone, conglomerate, and breccia.

Not far from the place where this section is exhibited, and on the same side of the valley, there are the ruins of a temple called by the inhabitants the Mosque of Moses, which for the most part is built of large square blocks of a fine-grained and perfectly white alabaster. In the bed of the valley there were many large, tolerably angular blocks of this stone, which had evidently travelled down from the interior, where the inhabitants stated that at six hours' distance there was a mountain or a large hill wholly composed of this material, which, if like the samples seen, must be of an excellent quality for building-purposes.

A little further inland from this temple, where the valley forks, the sandstone crosses to the south side, and there exposes a section near 60 feet in height. On the top of this there are some two or three feet of the coarse conglomerate, which lie on sandstone beds dipping about 4° N.N.W. This sandstone is made up of some eighteen or twenty bands of a light yellow, fine-grained, quartzose material. Interstratified with these bands are one or two layers of an argillaceous shelly material, one of which contains several narrow veins of gypsum, each about half an inch in thickness, and, lower down the valley, also a decided quantity of common salt.

Rocks from Madian.

(All these, unless specially mentioned, were obtained from dykes traversing the granite. The first four were determined microscopically.)

1. Basalt, fine-grained, and of a greenish colour.
2. Diabase, fine-grained, even-textured, dense, and of a blackish green colour.
3. Diabase, only differs from No. 2 in being slightly greener and of a finer texture.
4. Diabase, slightly greener than Nos. 2 and 3.
5. Red Porphyry, compact, fine-grained, with hornblende.
6. Granite, highly felspathic, with but little mica, of a pinkish colour. A rock penetrated by dykes.
7. Granite similar to No. 6, but having small fissures containing dolemite.
8. Granite, similar to No. 6, but containing two felspars—one triclinic, and the other orthoclase.
9. Granite, greyish and much disintegrated, and thickly traversed by dykes.
10. Porphyry, a dark-coloured base, thickly covered with small white crystals of felspar.

11. Porphyry, like No. 10, but with the felspar crystals long and acicular.
12. Dolerite, with brownish yellow olivine, of a vesicular structure, the cavities being in part filled with carbonate of lime. This was obtained from a boulder, of which there are many, all probably having their origin further up the wady to the east.
13. Degraded Basalt, like No. 1, both being found in small angular fragments in the interior of a dyke on the east side of the wady.

Madian to Omaider.—From Madian, continuing northwards along the east side of the Gulf of Akaba, the sandstone continued for some 4 or 5 miles, but in places apparently pierced by the granite, which at one time it probably covered, and towards the flanks of which it was now approaching.

On the west side of the gulf, although the hills were 15 miles distant, the dykes by which they were penetrated were distinctly visible.

As we neared the granite on the eastern side, the sandstone gradually sloped up towards it, or, in other words, dipped to the south or south-east, suggesting the idea just stated, that at one time it wholly buried these mountains which now raise themselves so high above it. When we were opposite what ought to have been the line of junction of the two, the stratification of the sandstone became so broken, and the outline of the decomposing granite so indefinite, that the relation of the two was not distinctly visible. The next object of geological interest was a flank of Jebel Tauran, which projected as a prominent bluff, the face of which formed a high and almost perpendicular cliff, through the centre of which was a cañon-looking gulch cleaving it from top to bottom. The height of this, if any reliance can be given to a rough calculation based on its altitude as taken by our captain, must have been over 2000 feet, which would almost put the crevasse-like opening on a par with a Western-American cañon.

Bir el Mashiyah.—A few miles to the north of this is the headland of Bir el Mashiyah, at which place another opportunity was given for visiting the shore. Here there is decided evidence that the land of this gulf and, probably in connection with it, that of its neighbour the Gulf of Suez, are rapidly rising.

Running from the granite hills, which here recede some three or four miles from the shore-line, across a gently sloping plane which joins them with the sea, there are numerous regularly built mounds, like so many partially completed railway embankments, reaching from the mountains to within half a mile of the water's edge. These appear externally to be made up of materials derived from the hills from the foot of which they spring; but at several points a white rock can be seen cropping out, show-

ing this detrital matter to be only a covering. This rock is a pure soft lime-stone of coarse texture, on the surface of nearly every square foot of which the section of a coral can be seen ; but these, along with other fossils collected, remain yet to be described.

The only one of these mounds which I had an opportunity of examining was about 50 feet in height, and showed an exposure of about 30 feet of this limestone, as measured from its base, which is about 10 feet above sea-level. From this it would appear that there must have been an elevation of at least 40 feet.

From this place up to Akaba there are many of these old reefs, indicated by the numerous white patches which protrude through the heaps of dark-coloured *débris* from the granite mountains, most of which are at much higher elevations than the one just referred to, some being especially visible on the flat plain near Umaider.

In confirmation of these indications of an elevation, I may add that Captain Evans, a Commodore of the P. & O. Co.'s fleet, stated to me that in the Gulf of Suez there are reefs which twenty years ago could with impunity have been sailed over, but have now to be avoided, the two most remarkable of these being:—one at the entrance to the Gulf of Suez, where the soundings which were at one time 7 and $7\frac{1}{2}$ fathoms, are now only 3 and $3\frac{1}{2}$ fathoms ; and the other at the head of the gulf, called the Newport shoal, where there is a like decrease in depth.

I am told that indications of a shallowing of the water in these seas may be seen by comparing an old chart with one of recent construction ; the origin of it, apparently, can only be accounted for in one of two ways—by an elevation of the sea-bottom, or a piling-up of drifted materials by currents.

As an additional proof of this rising of the land, I may quote from Dr. Beke the official report of the British Consul at Jeddah, on the Arabian Coast, who says, "the sea on that coast is gradually receding, owing to the formation of coral reefs," the geological interpretation of which is evidently that the coast-line is being elevated.

That such elevations and perhaps oscillations should take place is not unnatural, considering the wonderfully volcanic nature of the adjoining peninsula of Arabia, examples of which may be seen in the Trachonitis of Wetzstein or the Hauran of Burton and Drake in the north, and the many traces of varied volcanic phenomena from the shores of the Persian Gulf in the east to Jemen in the south-west. In addition to these already known localities, it may be stated, on the authority of Yakut,

the Arabian geographer of the thirteenth century, that many, although once chronicled, now remain to be rediscovered. No less than 28 harras, or volcanic districts, are described and their position identified by him, all of which are to be found in the highlands and interior of the peninsula. The list of these is as follows:—

Harra of Autás.	Harra of Abbad.
Tabúk.	Udhra.
Takda or Nudka.	Asás.
Hakl.	Gallas.
al-Himâra.	Kuba.
Ragil.	al-Kaus.
Rahis.	Lubu.
Ragla.	Lafaf.
Rumah.	Lailâ.
Sulaim.	Másar.
al-Sarg.	Maitan.
Sauran.	Wakim.
Darig.	al-Wabana.
Dargad.	Banu Hilal.

Referring to the above list I may quote the following paragraph from Dr. Beke's pamphlet, 'Mount Sinai a Volcano':—*

"Among the numerous volcanoes found to exist within the Arabian peninsula, the only one known to have been in activity within the historic period is the Harrat el Nar ('fire-harra') situate to the north-east of Medina in the neighbourhood of Khaibur, in about $26^{\circ} 30'$ north latitude, and 40° east longitude; which, besides being traditionally said to have been in an active state six centuries before Mohammed, had actually an eruption in the time of the prophet's successor, Omar. To the north-west of this 'fire-harra' lies that known as the Harra of (the tribe of) Udhra: again, to the north of this, is the Harra of Tabuk, so called from the station of that name on the Hadj road from Damascus to Mekka, the position of which is about $28^{\circ} 15'$ north latitude and 37° east longitude; and beyond this last, further to the north, and consequently between it and the northernmost Harra of the Râdjil, or Trachonitis, is the Harra Radjilâ."

Rocks from Bir el Máshiyah.

(These are all taken from dykes. The first two have been determined microscopically.)

1. Diorite, a greenish-grey compact rock, the character of which is almost entirely disguised.

* Published by Tinsley Brothers, London, 1873, p. 12.

2. Felsite with epidote and chlorite. In general appearance this is a compact, fine-grained, light green rock, not unlike an epidosite.
3. Porphyritic micaceous granite. The base of this, through which large white crystals of felspar are disseminated, is irregular in texture, being mostly composed of small flakes of a dark-coloured mica.
4. Porphyry consisting of a compact, dark purple base, and well-defined crystals of pink orthoclase.

Omaider to Akaba.—Opposite to Omaider on the Sinaitic side, flat-topped outliers are to be seen capping the granite. These are of a yellowish colour and apparently soft, and at this place show a regular stratification, dipping 3° or 4° towards the north. In the distance, between gaps in these hills, a long flat-topped mountain or edge of a tableland is visible, apparently composed of the same material as the outliers, which afterwards proved to be a soft whitish limestone. On the west coast these outliers are more or less continuous up to the head of the gulf, whilst on the east side there is only the granite and its long heaps of *débris* stretching down towards the shore. Looking at these outliers from a distance, it is at once noticed that the granite surface on which they rest is invariably flat, showing that it had been planed down to an even surface before the deposition of the superincumbent beds, which in their turn, by the comparison of the flat tops they now cover with the adjoining serrated ridges of granite, which at one time it is probable that they also over-spread, show the immense amount of denudation that has been going on since their removal.

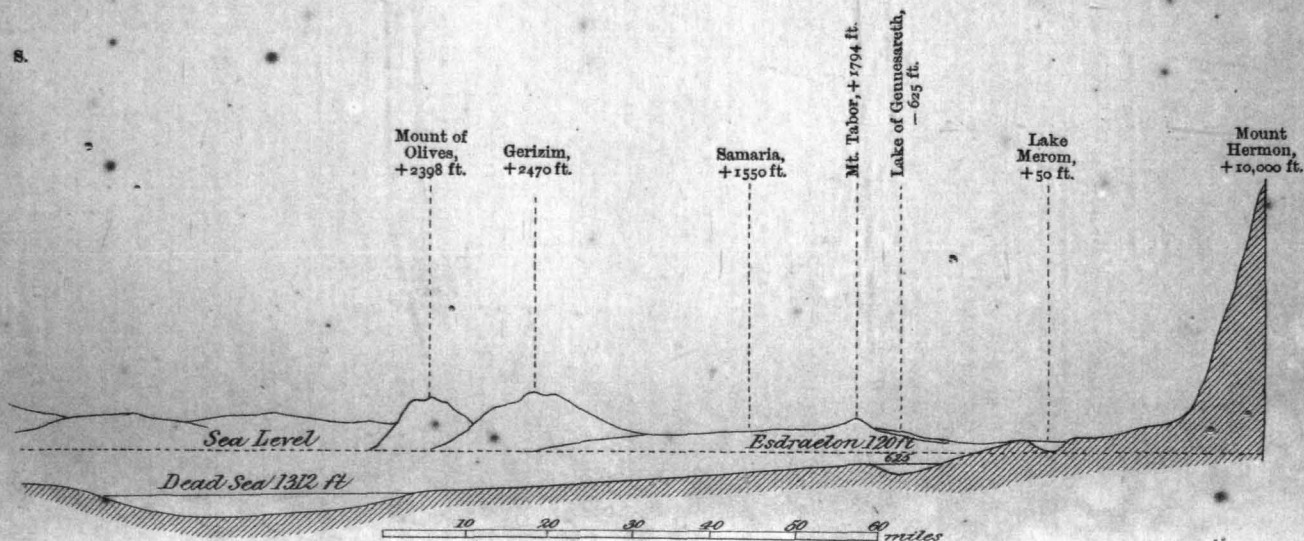
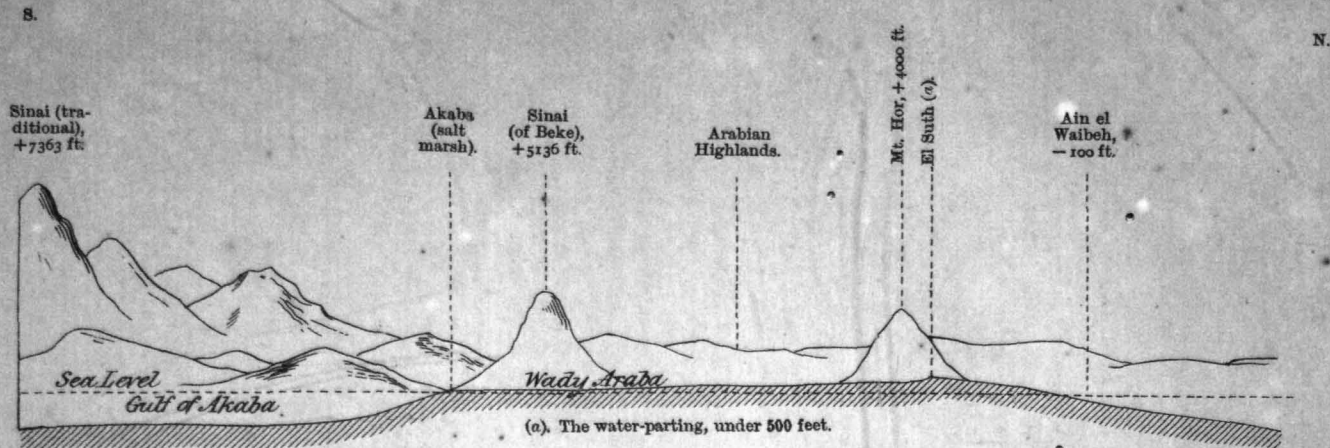
Wady Araba (see figs. 1 and 2).—When within five or six miles of Akaba, the relation of this gulf to the broad and open valley of the Araba, leading northwards towards the Dead Sea, is strikingly observable. Although upon the east and west the ground is high, before one (to the north) it is so level that it is almost impossible to indicate the point at which the sea and land meet. Looking up this trench from the south, in the distance the mountains upon the right and left appear to grow lower, until by sloping downwards they finally vanish in two points upon a line forming an horizon for earth, sea, and sky.

Looking at the map, it will be seen that the Gulf of Akaba forms one extremity of a long north-and-south hill-bound trough, the other extremity of which is beyond the Lake of Gennesareth, at the northern end of the valley of the Jordan, a distance of more than 200 miles. An east-and-west profile across this trough, taken a few miles above Akaba, is represented by the eastern end of the section (fig. 1).

When standing in it you appear to be in an almost flat valley, about five miles in width, having no perceptible rise towards the

FIG. 1.—APPROXIMATE SECTION FROM THE GULF OF AKABA TO THE VALLEY OF THE JORDAN.

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north, but to the east and west rising gently towards the flanks of precipitous granite hills, its deepest portion, which is marked by a north-and-south line of vegetation, being nearer to its western side than to its eastern, as shown in the section. By actual observation, however, it appears that the boundaries, which are apparently hills, are only the serrated edges of two tablelands, which on either side rise about 2000 feet above the sea—broadly speaking, the western one being chiefly granite capped with limestone, and the eastern one being granite capped with sandstone and conglomerate. The consequence of this is, that the high mountains, as seen from Akaba and the Araba, are from the tableland comparatively low hills.

Taking a section from south to north, from Akaba up the Araba, through the Dead Sea and up the valley of the Jordan past Gennesareth (fig. 2), it will be seen that the greater portion of the surface of this ground is below the level of the sea, and all that separates the Dead Sea, which is in a depression about 1300 feet below the neighbouring oceans, from the Gulf of Akaba is a slight rise of from 200 to 500 feet.

Therefore, should there have been an elevation of the land in operation, as appears to be indicated, it is very probable that at no very remote geological period the Gulf of Akaba extended many miles further to the north, having been bounded on its east and west sides by the before-mentioned high tablelands; and should this ancient gulf be restored (which would apparently be an engineering work far less difficult than the recently-constructed trench between Suez and Port Said), Jerusalem, Damascus, and other Syrian towns would again be in communication with the Indian Ocean, and fleets like those of Solomon might ply up and down the now entirely deserted Gulf of Akaba.

The section illustrating this depression (fig. 2), which will explain itself, is only an approximation, and is here used to add my observations to similar ones that have been made by others on this singularly interesting depression.

Akaba.—At Akaba (fig. 2), as at many other places, the granite is traversed by so many dykes that they could not but take part in the formation of peaks. Their general direction is in a parallel line towards the north-east, and at a high angle of inclination to the south-east.

Behind Akaba, two good analogous sections are to be seen on the eastern side of Wady Araba, at the entrance to a small wady called Wady Ithem [Etham]. The surface of the ground through which these sections are cut commences about half a mile from the sea, and terminates at a distance of a little over a mile, sloping at an angle of about 3° up towards the mountains. The distance apart

of these sections at their upper or eastern end, where they are about 30 feet in height, is about 100 yards, and at their lower or western end, where they merge into the sloping plane through which they are cut, about half a mile.

Looking at these generally, they consist of a mass of earth, pebbles, and boulders, lying on the denuded edges of granitic rocks and felspathic dykes. The pebbles and boulders are of the same nature as the rocks on which they lie; and at the eastern end of the sections near the mountains it would appear that the pebbles, and especially the boulders, are not only larger but also more angular than those a mile farther away.

The mode of accumulation of the upper stratum of alluvial material is strikingly shown at several points along the section. The material, starting from the mountains (which at one time probably extended a short distance westwards), through various causes, but chiefly that of gravity, gradually travelled down the slope towards the sea. On coming to a hollow it steadily filled it, the stones of each layer rolling over their predecessors until the original slope was regained, the result of which has been to give, at different points along the section, several groups of radiating bands.

The granite is of a pinkish colour, and consists chiefly of felspar and a little quartz, whilst the mica is barely visible. It contains numerous dykes, which vary from dark green to olive-green in colour. At the junction of several of these with the granite, and running through them both, are flakes of white carbonate of lime about $\frac{1}{8}$ inch in thickness, and having a glistening crystalline surface which fill up joints in the rock. All the rock containing this carbonate of lime (not only the dykes but also the granite) crumbles under the hammer like a dry clay, whilst at the distance of a yard from the dykes, where this carbonate of lime does not exist, the stone is hard and compact, and when struck gives a sharp clear ring.

Rocks from Akaba.

(The first three of these were examined microscopically.)

1. Dolerite, large-grained, containing some acicular crystals, which are probably apatite. This is an even-grained compact rock of a reddish-grey colour.
2. Dolerite similar to No. 1; but the felspar is more degraded, and the rock itself of rather a darker colour.
3. Syenite with altered hornblende, orthoclase, a little triclinic felspar, mica and quartz. In general appearance the rock is very like Nos. 1 and 2.
4. Granite, of a pinkish-white colour, and with a scarcity of mica. From the vicinity of a doleritic dyke.

5. Granite, consisting of white and pink felspar, mica, and quartz.
6. Granite, with chlorite, and fissures filled with crystalline calcite.
7. Granite with more chlorite than No. 6.

From Akaba our journey eastwards was confined to Wady Ithem [Etham] and the various wadies and plains which branch out of it.

General appearance of Mountain-Wadies.—These wadies, winding in and out between the granite hills, may be described as narrow defiles of great length. They vary in width from 100 yards to half a mile, and wind in and out between almost perpendicular walls of granite, making the approach to every turn or bend in their course appear as if it were a terminus.

Under foot are large boulders, stones of various sizes, small pebbles and sand, giving the place the appearance of a dried-up channel, which formed the bed of some large and rapid river. On inquiry it was found that no body of water ever flowed down these defiles—a fact that might have been anticipated by observing that the beds of grit and sand were cut through by small channels not 6 inches in depth, instead of being left, as would have been the case in a river, in one flat stone-covered surface. Whilst amongst these mountains, I experienced three days of continuous rain, after which I did not see anywhere more than the faintest trickling of water—from which fact, in conjunction with others, I think we may conclude that in these wadies there are conditions very analogous to those of river-beds, but that in their formation water has played but little part.

Another striking phenomenon of these wadies is the presence of perfectly perpendicular walls of *débris*, which often form boundaries upon both right and left.

These walls vary considerably in their height; sometimes they are only 1 or 2 feet in height, but generally from 6 to 10 feet, whilst in many places, by actual measurement, they were from 30 to 60 feet, and occasionally even still higher. The lower ones (which are more generally met with) are formed of greyish gritty sand and small pebbles, and, as compared with the higher walls made up of sand, stones like cocoa-nuts, and large boulders, are of a noticeably fine material—the former looking like a face of Roman cement, and the others like a conglomerate.

The most striking point, however, about these walls, especially in those about 6 or 10 feet in height, is the almost perfect and unbroken square edge they form with the plain from which they descend, these clear edges being in lengths varying from a few yards up to 100 yards. Comparing the various walls together, it is seen that these several characters depend upon the fineness or coarseness of the materials of which they are composed; and it may be generally stated that their length, their fine finish,

and the squareness of edge they form with the upper plain, vary inversely with their coarseness, whilst their height varies directly; the coarser the material, the higher the wall. In taking a section transversely to the length of one of these wadies, we may obtain a step-like outline descending from the mountains on either side; but more generally the form obtained is that of two rapid slopes from the hills, each terminating in a wall, leaving between them the level central part of the wady, described as being in some respects analogous to a river channel. This central channel, in which the boulders, which are often of great size, are found lying in heaps and lines parallel to the bounding walls, may vary from 50 to 200 yards in width. From the same characters being often seen in opposite walls, it is probable that before an initial slope was formed, down which water and materials in general would tend to travel, they were joined from side to side.

Their growth into the truly perpendicular forms which they now present, evidently arises from the materials of which they are built up being so regularly disposed that there is nothing left to produce unequal disintegration; that is to say, a disintegration commenced at any one point is at once or very rapidly carried in a perpendicular direction equally over the plain in which the commencement of the disintegration took place, the materials being so loosely placed together that for support they are mutually dependent; take one particle away and its neighbour falls. This cliff-formation is strikingly seen in the lower and more common of these walls, which are made up of pebbles, grit, and sand. On attempting to walk within a foot of the upper edge of one of these, a vertical layer separates from the top of the wall and falls to form a conical heap below, which is afterwards removed by wind and water. In nature, however, instead of an external pressure acting on the upper surface, a similar result is produced by the action of the little water which occasionally trickles down these wadies, and still more by the almost continuous working of a sand-drift along the lower portion of the face of these walls, by which they are slightly undermined. When sufficiently undermined in this way (seldom more than 6 inches), the unsupported material above, having little or no lateral attachment to the contiguous mass, of necessity falls. After a little rain this action is strikingly rapid, the slight bond between the particles being loosened by the soaking-in of the water.

As these walls are cut further back and approach the hills, the mass of material in which they are formed being thicker, they are naturally higher, in addition to which it may be noted that they are also coarser and have lost much of their smooth finish,

which latter character is apparently due to the larger masses of which they are built up having more hold upon each other, one of them not moving without disturbing its neighbour.

Had the materials of which these walls are built been inter-laminated or cemented in any way, no portion of it could have given way without disturbing that which was contiguous to it, by acting on it as a cantilever.

This may be looked at generally by considering cliffs or walls the component parts of which are so arranged that their greatest length lies in a horizontal direction. In such walls, where we get this horizontal interlamination, whether of massive bands of rock, fissile shales, or only layers of stone, on their being undermined, generally speaking, no portion of them can give way without disturbing those parts with which they are in contact, especially those lying above, which, cantilever-like, they tend to prize upwards and then cause to fall outwards, this outward tendency being aided by the material from above slipping down over that which has fallen from below. The result of this is the production of a slope, instead of a clear perpendicular wall, such as is produced by the direct fall of an uncemented fine material.

The unbroken edges of these cliffs, although in part due to the nature and arrangement of the material of which they are formed, are also in part due to a cause similar to that assigned for the unworn edges of some of the American cañons, namely, the comparative absence of rain—the little that does fall being hardly sufficient to affect those of coarse material, whilst those made of fine material are immediately soaked, and the undermined portions at once fall instead of remaining to be channelled down with gutters.

It has been observed that the great heaps and long lines of boulders, so often seen in the centre and other parts of these wadies, can hardly be thought to have assumed their rounded forms and to have come into their present positions by the agency of water (which at first sight is so suggestive both as a motive power and also as a polishing agent), the district being riverless and also, comparatively speaking, rainless.

The reason of their waterworn appearance is apparently in great part due to the cutting effect of an almost perpetual sand-blast; but the cause of the central position they so commonly occupy is not so obvious. It may have been acquired by their having simply rolled down the sides of the mountains when they extended further into the wadies than they do at present; but in many cases it is probable that the descent was far more gradual. Whilst riding along the base of some of the cliffs of sand and conglomerate just described, on looking up, long lines of boulders

were often seen waiting to be undermined and to fall below. Many could be seen that had fallen, whilst others were barely balanced and ready to topple over on the least disturbance.

Each time one of these falls it travels a certain distance forwards; and as cliffs are continually being formed in the centre of the wady to work back towards the hills, steps are continually approaching these boulders, down which they may roll and approach the central line of cliff-formation, where those from one side of the valley meet, stop, and accumulate with those coming from the opposite side.

Such modes of transit as these may be suggestive in accounting for the presence of erratic blocks so often seen not only in various parts of Arabia, but also in other countries, as, for example, in Persia, where they have been seen to have travelled distances of five and six miles—in certain cases, perhaps giving a clue to those phenomena which otherwise might have found a satisfactory solution either in a coat of glaciers or a sea of icebergs.

In the cases quoted large blocks have apparently travelled distances of a quarter of a mile by the breaking down of about a hundred feet of modern alluvium. How far, it may be asked, would blocks have travelled had the strata measured thousands instead of hundreds of feet?

With regard, therefore, to the general appearance of the beds of these mountain wadies, it may be briefly stated, in conclusion, that their characters are, in the main, rather due to a stream of sand than to water; small furrows formed in the central parts of the wady retreat towards the hills by being undermined and then falling by their weight. By this falling, boulders, often 20 feet in diameter, are rolled forward, and strewn across the plain from the hills towards a central line in which they accumulate. Whilst all this is going on, an almost continuous draft of air up or down these funnel-like defiles is in operation, carrying sand to polish the scattered *débris*, thus helping in the production of appearances not unlike those of some ancient river-bed, in which action it is aided by a slight trickling of water after the winter showers.

Sand-blast.—Having spoken of the movement of sand as an agent in the undermining of cliffs and the polishing of rocks, although, perhaps, often before observed by others, I may here mention what was seen of its other effects in these districts.

A great portion of the country lying between Nakhil and Suez is covered with a thick superficial deposit of fine reddish sand, which, like all other sand, is set in motion whenever there is the slightest movement in the air.

This, although an almost perpetual action, is only to be seen under very favourable circumstances. By placing yourself so

that the sandbank, or piece of ground you are observing, is between yourself and the sun, a slight smoke-like vapour, which from other positions would be invisible, is to be seen sweeping over the surface of the ground. The presence of this drift may also be recognised by placing the face within 10 or 12 inches of the ground, when fine particles of sand will be seen rolling along over each other; and on putting the ear near to these a slight rustling noise may often be detected.

By taking a flat piece of wood and using it as a straight-edge, I made several practically level patches of ground, on which I was enabled to see the action of the drift in the formation of ridges. Although when standing up no movement in the sand could be detected, yet on stooping down I perceived that ridges were being formed, not simultaneously over the whole surface, but commencing to windward. The crest of each of these small undulations appeared to be invariably covered with the redder particles of sand, whilst the yellow ones were left in the hollows.

In the case of larger ridges, which were about 6 inches in height, their crests were composed of the larger particles, which, as far as colour was concerned, could not be distinguished from those forming the hollows. Small movements of this description are constantly going on; but in a gale, judging from experience, the results must be considerably greater. When a moderately heavy wind is blowing, it is almost impossible to face the "blast." On your hands a tingling sensation is felt; and on lowering them towards the ground this rapidly and irregularly increases in power until they are within a foot of the ground, when it becomes unbearable, the feeling produced being not unlike that occasioned by drawing off the keeper of an electro-magnetic machine.¹

Another and more important action of the sand-drift is the cutting of the surface of all stones which are exposed upon the desert—a fact which has often before been noticed, and may be well exemplified by the Sphinx near Cairo, and two faces of Cleopatra's Needle at Alexandria.² Portions which are buried, or otherwise protected, are not cut, the consequence being that almost every stone, when picked up, presents two surfaces which differ in appearance, one being uneven and rough, whilst the other is pitted and polished. In the district especially referred to, near Nakhl, where the stones scattered in the desert are chiefly limestone, the definite character given to them by this sand is such that it could not be seen without being remarked.

¹ See Dr. Beke's description of the violent storm at Akaba on the night of February 6th, 1874, chap. viii.

² Lately brought to England, and now about to be erected on the Thames Embankment.

All have a peculiar polish, looking as if they had been smeared with grease, a lustre nearly represented in the fractured surface of some specimens of witherite.

In addition to this, they are all, more or less, pitted with small cup-shaped hollows, which apparently indicate the softer portions of the stone. Some few have cut upon their surfaces curious worm-shaped furrows; whilst others have exhibited such differences in hardness that their softer portions have been so far cut into and carried away that the remainder is as ragged in its outline as the root of a tree, for which in many instances they might readily be mistaken.

Should these stones hereafter become completely buried, as many already are, future investigators will find in them marks as clearly indicative of their origin as the rounded forms of water-worn pebbles or the angular and scratched faces in beds of glacial drift. Just as we infer from the latter the existence of former glaciers, so will they infer the former presence of deserts and sand-drifts.

Rocks from Wady Ithem (the first five of these were examined microscopically):—

1. Diabase, dark greenish in colour, compact and tough.
2. Diabase, more compact than No. 1, from which it also differs in containing a small quantity of disseminated iron pyrites.
3. Dolerite, blackish green, dense and compact.
4. Hornstone, whitish green, compact, crystalline, traversed by fine fissures containing carbonate of lime.
5. Dolerite, greenish grey and compact.
6. Granite, pinkish in colour and with little mica.
7. Felsite, pinkish in colour, containing a very little hornblende.
8. Porphyry, a pinkish base, with white crystals of felspar and a very little hornblende.
9. Porphyry, differs from No. 8 in being slightly darker in colour.
10. Granite, greyish in colour, of a coarse texture, and somewhat porphyritic.
11. Granite, pinkish in colour, with bronze-coloured mica.
12. Porphyry, of a pink colour, with hornblende.
13. Porphyry, differs from No. 12 in being of a greenish grey colour.
14. Porphyry, fine-grained and without hornblende.
15. Granite, consisting of felspar, mica, and very little quartz.
16. Granulitic granite.
17. Quartz-porphyry, of a pinkish colour.
18. Porphyry, of a bluish grey colour.
19. Syenite, of a dark-green colour, containing very little quartz, and very little hornblende.
20. Porphyry, pinkish grey and fine-grained.
21. Porphyry, with hornblende.

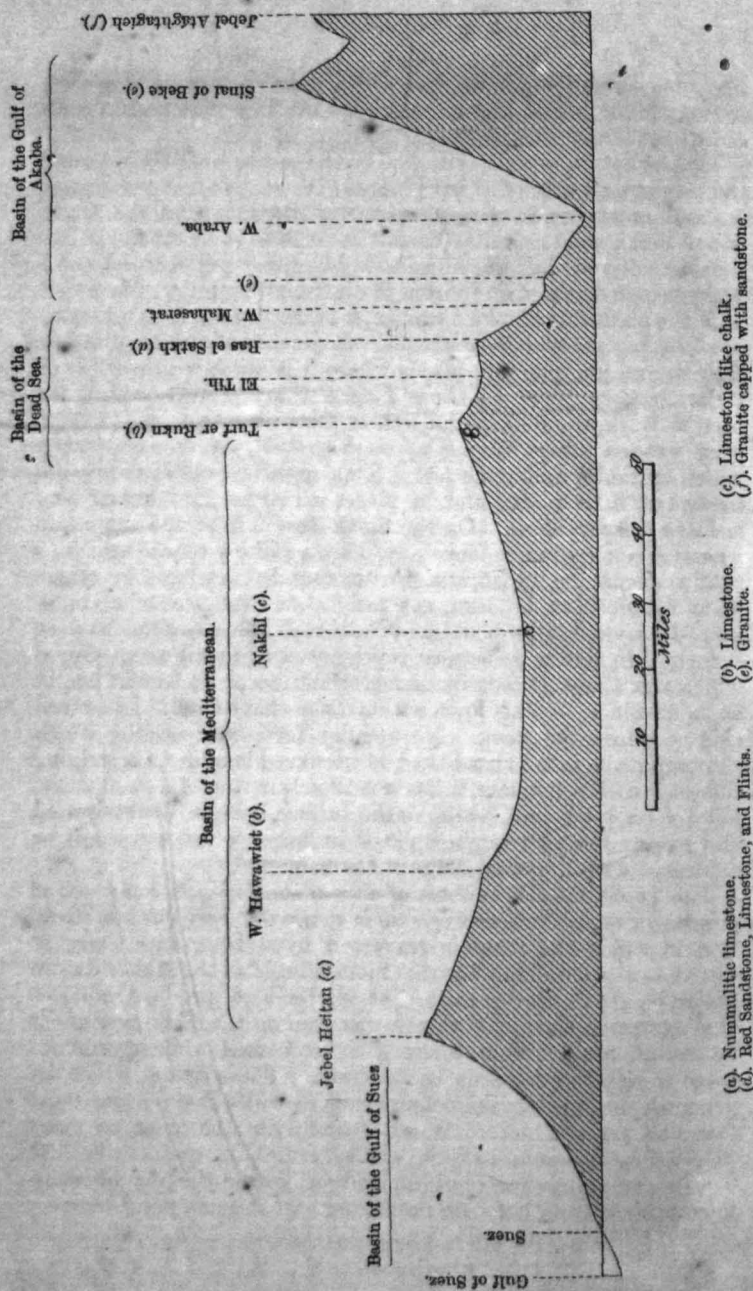
With regard to the granitic hills lying between Akaba and Petra, as they have so many points in common, a description of one of them may, in many respects, suffice for the remainder.

FIG. 2.—APPROXIMATE SECTION OF THE PLATEAU OF TIH. (Vertical scale greatly exaggerated.)

To face page 545.

E.

W.



The one selected is Mount Bāghir,¹ also known as Jebel-e'-Nūr or the "Mountain of Light," which by Dr. Beke has been identified as the True "Mount Sinai" (see fig. 2).

This mountain, which is situated on the east side of Wady Araba, and on the west side of Wady [Etham] Ithem, which it overhangs, is about 100 miles in a north-easterly direction from the traditional Sinai, and 12 miles from the fortress of Akaba. In its general outline it is bold, terminating in three well-defined small peaks, which distinguish it from the surrounding hills. Measured from the plain, out of which it rises, it is about 3000 feet in height, or about 5000 feet above sea-level. It consists of a mass of red or pinkish granite, which in places where it is much weathered is of a dark brown hue. In those places where disintegration has been at work, the felspar and lighter mica have to a great extent been washed away, leaving a rough gravelly surface of quartz, which crumbles under the feet. This granite contains comparatively but little mica; and in places it merges into quartz and massive felspar alone. On the north-west side of the mountain a portion of the granite looks at a distance like a coarse brownish yellow sandstone, weathering with rounded surface, in which many cavities can be seen, generally about the size of a coconut. In several large boulders of this rock these cavities have so increased in size as to be now represented by small caves, one of which was about 20 feet in diameter and 10 or 12 feet in height at its entrance, sloping down with a dome-shaped roof and curved sides towards the back. No angular forms are visible, which shows that the granite has flaked off in curved laminae. On striking this rock with a hammer it has not the clear ring of a solid stone, but gives a dull sound, owing to the surface being so disintegrated and having the tendency to split off in flakes, which can easily be separated with the sharp edge of the hammer.

The peaks on the summit of this mountain are composed of granite; the hollows between them mark the position and direction in which the mass is traversed by dykes; and it may be stated as a general rule for this mountain, that the dykes do not protrude above the granite, but all tend to produce hollows. One exception to this, however, was seen on the N.E. side of the mountain, near a well, where a dyke formed a clearly-defined ridge running up towards the summit. These dykes, which are generally of a dark green colour, vary in width from 1 foot to 18 feet, and perhaps more. When struck with a hammer, in many places they appear to be quite earthy, crumbling up like dry clay. The general direction of these and others in the neighbouring mountains is from between north and east to some point between

¹ See Dr. Beke's description, chap. viii., p. 380.

south and west, often striking in long parallel lines across ridges of the hills.

Rocks from Jebel Bāghir (Sinai), (the first three of these were examined microscopically) :—

1. Dolerite, much decomposed, of a dark colour, loose texture, and a greyish exterior, owing to the weathering of the felspar.
2. Dolerite, portion of a compact, hard nodule, taken from the interior of the dyke of which No. 1 formed part.
3. Diabase, passing from porphyritic to aphanitic. The rock is black and dense; no structure is observable.
4. Granulitic granite, a fine-grained mixture of quartz and felspar, with finely distributed mica.
5. Granite, fine-grained and pinkish.
6. Mica and felspar, with very little hornblende, the whole forming an irregular greenish mass.
7. Granite, of a pinkish colour.
8. Granite, nearly all felspar.

Dykes.—The prominent part taken by dykes in giving the characteristic ruggedness to these granite hills has already been partially noted, as will be seen from the following observations of Dr. Oscar Fraas, 'Aus dem Orient,' where, at page 15, he says, "When on the summit of Serbal, in a circuit of about 1000 metres, rather more than less, I counted from our pinnacle 47 peaks, or, as might be plainly seen from those which were nearest to us, so many dykes of diorite which stood above the mass of granite. In the course of the incalculable ages during which these points had been exposed to the atmosphere, they had offered a different resistance to the weathering than had the granite with its felspars; and therefore as many diorite teeth stood out from the granite bed of Serbal as you could count points on the mountain."

From the observations made on these dykes at the various localities visited, which in part are confirmed by the specimens collected, it would seem that they may be divided into two classes—those of a red colour, and those of a dark green or black.

As a general rule the former are the harder of the two, and stand up as ridges which can be seen running up the sides of the mountains, and over their crests, or else appearing only as peaks, but in all cases producing serrations; whilst, on the other hand, the latter are generally soft and form trenches and hollows where the red ones would have formed ridges and peaks. Exceptional cases are to be seen where the black dykes are hard and have resisted degradation; but in the case of the red ones no exceptions were seen.

Both classes of these dykes, like the granites they traverse, are

highly felspathic, the red ones being generally compact felsites or fine-grained porphyrites, whilst those of a darker colour are generally porphyries in which small crystals of felspar are imbedded in a dark-coloured base.

Traversing several mountains near to Jebel-e'-Nūr, and noticeably one called Jebel Atāghtagieh, there are large dykes 12, 14, and even 20 feet in width, almost wholly composed of a soft material; yet, through having hard exteriors, they stand up so as to form a well-defined wall-like ridge. Through being thus composed of a soft central part or core cased in between two slabs of a harder material, disintegration has acted more rapidly on the interior portion than on the exterior, and has cut them out into a trench.

Up one of these trenches I ascended Mount Atāghtagieh (see fig. 2). The dyke was throughout of a dark-green material, but slightly lighter in colour on its sides than in the middle. Its width was about 12 feet; 6 feet of the central part was soft and crumbled like dry clay when struck with the sharp edge of a hammer, whilst the 3 feet of casing on either side into which it graduated was hard and tough, in fact much more so than the granite through which it pierced.

The result of examinations of different portions of such dykes as these is given in the following list of rocks from Jebel Atāghtagieh, from which it would appear that the interior portions of these dykes are apparently more siliceous, contain more olivine, more magnetite, and are decidedly more calcareous than the exterior portions; but as these and other similar specimens are intended to form the subject of a future investigation, the present statement must be received provisionally.

Rocks from Jebel Atāghtagieh (the first four of these were examined microscopically):—

1. Quartziferous dolerite, from the *exterior* of a dyke, of which No. 2 is the interior. This is a dense, olive-green-coloured rock, readily scratched by a knife to a light-green streak.
2. Quartziferous dolerite from the *interior* of a dyke, of which No. 1 is the exterior. This is of a reddish colour and more granular than No. 1, from which it also differs in being decidedly calcareous and magnetic, and apparently containing more olivine and quartz.
3. Basalt from the *exterior* of a dyke, of which No. 4 is the interior. This is a compact and almost black, even-textured rock, and is slightly calcareous.
4. Dolerite, much degraded, from the *interior* of a dyke, of which No. 3 is the exterior. This is a greenish grey, loose-textured, granular rock, which is decidedly calcareous and also magnetic.
5. Pinkish granite, through which the above dykes penetrate.
6. Porphyry, red crystals in a green base.
7. Porphyry, of a greyish colour, containing acicular crystals of hornblende.

8. Porphyry like No. 7, but with large crystals of hornblende.
9. Porphyry, a compact felsitic mass.
10. Porphyry, darker-coloured than No. 9.
11. Porphyry, fine-grained and of a lavender colour.

Geological Formations.—When on the top of Mount Bāghir, on looking from the north, by the east, round to the south-east, flat-topped hills were seen which from their shape were at once suspected not to be granitic, or, if granitic, to be capped by some other material. This conjecture was confirmed by visiting the top of Mount Atāghtagieh, on the summit of which there are two large patches of sandstone, each about 100 feet in thickness, which have apparently been deposited subsequently to the formation of the granite. The beds, which are nearly horizontal, have a parallelism with the gentle undulations of what appears to be the denuded surface of the granite on which they rest. In no place does the granite appear to penetrate into the beds above, or in any way to break their even line of stratification; nor, on the other hand, does the sandstone descend into any crevices or irregularly eroded cavities in the granite. The lower beds of this sandstone, which are about 3000 feet above sea-level, are composed of a coarse quartzose material very like that which would be derived from granite after the washing away of the lighter materials. The remaining beds higher up, with the exception of a bed near the summit, which is of a perfectly white, fine-grained, soft sandstone, are composed of a yellowish gritty sandstone.

Although carefully looked for, no organic remains were to be found. Scattered over the top of the mountain were some compact dark-coloured rocks, probably the remains of a dyke cutting through some neighbouring mountain from which they have been derived.

To the east and north of this mountain there were many flat-topped hills; and the beds, which here only formed caps, appeared in the distance to form the hills themselves, the cliff-like faces of which showed curious barrel-shaped outlines. This same formation, resting on the granite, is to be seen at the head of Wady Amran, where it stretches away eastwards towards the centre of Arabia, and southwards towards the somewhat similar beds which were seen at Madiān.

It has been asserted, on very good grounds, that in this portion of Arabia there are still remaining evidences of several once active volcanoes. Should these be discovered, they will in all probability be found amongst the sandstones on the eastern side of the great Arabian watershed; for had they existed on the western side, some traces of them must have been seen in the beds of the wadies which so rapidly descend towards the Red Sea.

• *Akaba to Suez* (see fig. 2).—The northern end of the Gulf of Akaba having its shores bounded by granite hills, the consistency of which is tolerably equal throughout, the disintegration carried on by the sea has not tended to produce such an irregular outline as would have been formed had there been more variety in their character. At the north-western part of the gulf, however, between Ras el Musry (Mahaserat) and Jezîret Fir'ôn there is a slight exception to this. Here some soft limestones coming down to the coast between granite hills have been cut back to form a small bay, whilst their boundaries stand out as two small headlands. The rock composing these points is greyish in colour and granitic nature, but varies considerably both in tint and texture. Opposite to Jezîret Fir'ôn, or Pharaoh's Isle, it is somewhat pinkish, and contains well-formed plates of mica, of the size of a shilling, and even larger.

The limestone, which dips about 15° to the north-east, is in parts quite white; but the bulk of it is of a yellowish tinge. Near the granite, against the sides of which it evidently rests, there are beds of a strikingly bright pink colour. In places on this exposure, which is about 800 feet in thickness, it shows itself like a compact chalk; whilst in other parts it is earthy, but contains interposed bands of solid stone from two to four feet in thickness.

In the cliffs near Ras el Mahaserat there are beds of irregularly shaped flints and fossil remains, of which only a fragmentary specimen of an *Echinus* was collected. The valley up which these limestones run, called Wady Mahaserat, is identified by Dr. Beke as being Pi-ha-hiroth or "the entrance to the caves," traces of which are to be seen a few miles distant from the shore.

Leaving the Gulf of Akaba at its north-west extremity, the Hadj road, on which the pilgrims to and from Mecca annually travel, rapidly rises, being bounded on its north and south sides by long narrow reddish-coloured heaps of *débris*, made up, not only of granitic rocks, but also of fragments of limestone. A short distance beyond this the termination of these mounds is found in some reddish granitic hills, which for the most part are apparently porphyritic.

At about an elevation of 1000 feet you enter the upper part of Wady Mahaserat, bounded on its western side by the continuation of the same range of limestone rocks seen between Ras el Mahaserat and Jezîret Fir'ôn, dipping in apparently the same direction as before, 15° N.E.

The rock itself is compact in appearance, very like a hard chalk, and contains many fossil remains, portions of *Echini*, *Pectines* and *Ostreæ* being common.

On the east side of this valley are much-decomposed granite rocks, of ill-defined reddish and greenish colours, which merge from one to the other. Those of a reddish tint are felsites, and are, as usual, harder than the dark-green porphyries which they occasionally traverse.

Rocks from between Akaba and the Tih Plateau :—

1. Quartz porphyry with a green felsitic base, through which crystals of porphyry are disseminated.
2. Red porphyry.
3. Brown felsitic quartz porphyry.
4. Reddish brown porphyry.
5. Light-green porphyry.
6. Reddish purple porphyry.
7. Porphyry like No. 6, but with white crystals of felspar.
8. Basalt, of a dark green colour and thoroughly degraded.
9. Red quartz porphyry.
10. Greenish grey porphyry, much decomposed.
11. Altered pyromeride, of a yellowish colour, and with a mammillated surface.

A short distance further up this wady, at an elevation of about 1200 feet, the road suddenly turns to the left through a narrow gorge of chalk cliffs, and then ascends by a steep, zigzag, artificially formed pathway to the plateau of the Tih.

Both on the right and left side of this defile good exposures of cliff-sections are to be seen, in which there are several inaccessible cave-like openings. The rock, as before, is lithologically a chalk, containing numerous bands of flint.

These bands, which can be broken out in large slabs, the upper and lower surfaces of which are gently rounded into smooth undulating surfaces, average about four inches in thickness, and occur at about the same distance apart. Although they can be detached in large flat masses, through the number of vertical cracks by which they are traversed, they split into fragments when struck.

On the surface of this chalk rock, in one or two places, a slight efflorescence of common salt can be detected—an indication, perhaps, of the existence of larger quantities in the neighbourhood.

About 80 or 100 yards up the gorge the chalk rocks suddenly terminate, and abut against the almost perpendicularly down-turned beds of a yellowish rusty-looking limestone, the juncture of the two apparently marking the line of a N.N.E. fault.

In these yellow limestones flints were seen, and fragmentary fossil remains were common. All exposed surfaces of this rock are much eroded and weathered. In several large blocks which

had fallen from some bands in the upper portion of this cliff-like exposure, small crystals of brown oxide of iron (pseudomorphs of iron pyrites in combinations of the cube and octahedron) were common.

At an elevation of 1800 feet, or 600 feet above the gorge, a bluish grey, compact, fine-grained limestone is met with, in which numerous sections of *Nerinea* are to be seen. A few small cavities, filled with minute scalenohedral forms of calcite, indicated the existence of other fossil forms.

At 2000 feet there is an exposure, about 40 feet in thickness, of yellowish earthy bands, containing narrow veins of gypsum from one to two inches in thickness, forming a cap to the *Nerinea*-limestone.

From this there is a descent of about 100 feet into a small open plain, in which there are numerous exposures of a pinkish red (or pale *maroon-coloured*) sandstone. In the portion examined this was made up of a fine-grained quartzose material, containing a small quantity of lime, probably derived by infiltration from the calcareous beds with which it is so closely associated. One exception to the colour of these beds was seen in a soft and friable yellow band. The left side of the road, which is here in part an artificial formation, is built up of blocks of red sandstone, which were obtained in large, regularly squared, oblong masses by undermining several overhanging beds upon the right. In these red beds, as might perhaps have been anticipated, no trace of organic remains could be seen.

On nearing the summit of the tableland of the Tih, which by barometrical observation is about 2000 feet above the sea-level, a view looking down into a north-and-south gorge showed the relation of the red sandstones to the limestones before described. Upon the east flat surfaces of limestone were seen dipping sharply towards the east; and from these scarps, and especially from the one forming the right-hand wall of this north-and-south gorge, it would appear as if they once covered over the nearly horizontal sandstones on the left.

Descent of the Tih.—The striking feature of this desert plateau, when approached from the Akaba side, is its wonderful evenness of surface, which, from the fineness of the material with which it is covered, gives it an appearance not unlike an immense expanse of gravel walk. This material consists in great part of white quartz pebbles, which are intermingled with fine-grained porphyries and other felspathic rocks derived from some low peaks several miles away to the north. About eighteen miles across this flat country, at Turf er Rukn, the track enters between low hills forming the southern boundary of this great tableland, the sur-

face-contour of which, at this point, is represented by the letter V, the arms of which form a shallow trough-like drainage-area, one arm trending N.W. towards the Mediterranean, and the other to the N.E., towards the southern continuation of the Dead Sea, whilst the apex of the two is to the south.

Turf er Rukn, which is continued towards the north as a low and almost imperceptible rise of ground forming the water-parting between the V-shaped arms of the Tih, further to the south, rises about 400 feet above the plain as a long scarp of yellow limestone. Near the foot of the southern end of this scarp there is a small exposure of a yellowish sandstone, and also indications of a band of siliceous hæmatite running in a direction about one point to the south of west. This ore is easily distinguished by its dark colour, which contrasts strongly with the light-coloured sand on which it lies.

Beyond this, upon the right or north side of the road, there are some low ridges consisting of bands of limestone dipping towards the north. Intercalated with these bands are layers of flint which, on their exterior, very much resemble some dark-coloured portions of the rock in which they are imbedded.

This character of country, of limestone scarps on the left, and low ridges on the right, through which occasional glimpses of the great plateau of the Tih are to be seen, continues for nearly a day's journey.

After passing Jebel Duppa, the ranges on the right, growing higher, show a more definite character as compared with those upon the left. Whilst the latter remain horizontal, the former are almost turned on end, dipping at an angle of 45° to the north. They consist of limestones which are whitish at their base and yellowish near their summit. With them there are bands of flint, which, being tilted up with the rock in which they are stratified, stand up along the ridges of the hills, forming low parallel walls to hollow troughs. Numerous angular and apparently freshly broken fragments of these flints are strewn over the plain below, apparently broken by the more or less sudden expansion and contraction occasioned by the great variations in temperature, this action being probably aided by a jointed structure in the flint at the time of its removal from the limestone. That there are such variations in temperature may be inferred from the fact that many nights when we were in the desert the thermometer sank below zero, and shrubs and other objects were in the morning covered with a thick coating of hoar frost, this low temperature being invariably followed shortly after sunrise by a heat that readily scorched and peeled the skin from the face.

In addition to this it may be mentioned that several rounded

and apparently whole flints were seen, which, on being touched, fell to pieces, showing them to have been broken by some force that had not been violent in its action, but had simply divided them and not scattered the fragments.

Materials being in this way continually supplied from a mountain, then being broken by the sun and afterwards buried in the sand, may perhaps give a clue to the origin of certain breccias.

At the western end of this range there is a large and well-defined wady stretching away to the north-west into a low undulating country of chalk-like rocks. At the entrance to this there is a small, solitary hill of chalk resembling an island, and showing the steep northern dip which characterises the rocks along the southern side of this portion of the Hadj road.

At less than a mile past this a cutting has been made through a hill composed of fine-grained and perfectly white chalk, which gives a small but clear section of this rock, showing on its walls, and also in the ground over which you walk, a great continuity of bands of flint.

Looking at the upturned edges of these bands upon the floor of the cutting, in places they are seen to have been divided and then reunited, forming cavities which are filled with a material in appearance like the surrounding rock. At several points along the walls of these cuttings numerous irregular, coral-like concretions stand out, through the weathering away of the softer material which once surrounded them.

On the left-hand side of the road, it appeared as if the upturned chalky strata just referred to abutted against the horizontal yellow limestone which forms a more or less continuous ridge from Turf er Ruku to this point.

From the summit of any of the hills upon the right an extensive view of the greater portion of the Tih plateau is to be seen. Beyond the low water-parting which separates the drainage of the Mediterranean from that of the Dead Sea, towards the north and north-west, are broken scarps of white rock, probably of the same kind as the hill on which you stand, showing numerous pyramid-like peaks and short ridges, at least 14 or 15 miles distant. These cliff-like forms are continued round to the north-east, but in this direction are apparently not only higher but much further away, being apparently 25 or 30 miles distant, and forming a terminal scarp to the southern extremity of Negeb or the South Country. The most conspicuous object is Jebel Baredj, bearing about W.N.W. With a glass several hard horizontal bands could be seen standing out, forming small scarps intermediate between the peaks of its conical summit and the sloping talus below.

In a direct line south from this mountain there is a north-and-

south section, showing an anticlinal of limestone dipping at a high angle to the N.W., and to the S.E. being completely turned over.

After passing Bir el Kureis (a large artificially formed well, holding a continuous supply of water for the use of the Hadj pilgrims, which is sunk in the bed of a shallow wady of the same name), the road gradually ascends, through the range forming the southern continuation of Jebel Baredj, into Wady Dritt. Here the low scarps which bound either side of this low valley, exhibit an extremely fine-grained white carbonate of lime, in texture much superior to the bulk of our English chalk.

From Wady Dritt to Nakhl, the halfway station between Akaba and Suez, the country, which gently descends, is generally flat, the even contour being broken only by a few white scarps upon the right and left, and some shallow wadies which cross the road at right angles. These wadies of the desert are shallow, basin-like trenches, which, although they mark the line of drainage by the few bushes they contain, are very different from the well-defined river-like wadies seen amongst the mountains.

A few miles on the Akaba side of Nakhl there are several small but bold hills of chalk, the most conspicuous of which is Jebel al Kheimatein or the "two tents," so called from its shape. The road near this mountain is crossed by several veins of crystallised carbonate of lime about 6 inches in thickness, which, being more durable than the chalk through which they pass, stand up in bold ridges.

Nakhl to Suez.—From Nakhl the road towards Suez gently rises about 150 feet through a gap in the summit of the range of hills, which are seen to run like a line of white chalk cliffs from west to north. From this point a day and a half is spent in crossing a wide and open shingly plain traversed by a few north-and-south shallow wadies, until Wady Hawawiet, descending from Jebel Hutan, is reached.

On the south side of the entrance to the wady there are horizontal bands of limestone projecting through slopes of *débris*, about 350 or 400 feet above the surrounding level. The rock has here lost its chalk-like appearance, and is a compact limestone. Near the foot of the wady many *Ostrea* and other fossil forms are observed; and at about 300 feet above the plain there are bands almost wholly made up of a small *Echinus*, varying in diameter from $\frac{3}{4}$ inch to about $1\frac{1}{2}$ inch. At about 350 feet the summit of the pass is reached, from which point there is an almost continuous descent towards Suez, the rocks dipping about 15° to the S.S.W. Mr. Etheridge considers that these bands are probably of Miocene age.

Whilst descending on the Suez side of the hills down Wady Sagarah, the *Echinus*-bed is again passed. In places the lime-

•stone, which contains irregular concretions of flinty matter, is of a deep red colour, which is due to oxide of iron.

At Ras el Gibal this wady opens out into a small and fertile plain cultivated by the Beduins, on the south-west side of which there are ranges of white rock which appear to be Nummulitic. After leaving this plain, the whole of the way to Suez is covered with hills of drift sand.

Conclusion.—On account of the hurried nature of my journey, it would not be advisable to make any definite statement as to the identification of the geological horizons which were passed over; but it will be seen that, on lithological and scanty palæontological evidence, the series of rocks mentioned in the foregoing account will bear comparison with the succession summarised by Mr. Bauerman as occurring further to the south (Quart. Journ. Geol. Soc. for 1869, vol. xxv. p. 17).

The few fossils collected are at present in the hands of Mr. Henry Woodward, F.R.S., of the British Museum, who has kindly undertaken to examine them.

With regard to the crystalline rocks, it will be seen that the prevailing feature in them is the predominance of the felspathic element in the granites and in the dykes by which they are traversed.

It will also be seen that out of the seventy-seven specimens examined, only two approximated to a syenite; nor were there any massive hornblendic rocks of this description seen in the district visited. In the Journal of the Royal Dublin Society for January 1858, there is a communication on a "Mineralogical Excursion from Cairo into Arabia Petræa," edited by Professor Haughton. Accompanying this there is a collection of rocks verifying the observations, from which it would seem that although syenite does exist in the Sinaitic Peninsula, it does not form a predominant feature; and it is also stated that "all the mountains in the neighbourhood of [the traditional] Sinai are granite." Such being the case, it seems hardly justifiable to attempt an alteration in the name of the rock, although syenite is not found at Syene on the Nile.

B.

CONTROVERSY ON THE LATE DR. BEKE'S DISCOVERY OF THE
TRUE MOUNT SINAI IN ARABIA.

My lamented husband arrived at Hastings on the morning of March 19, 1874, after an absence of three months and eleven days, during which period he performed his memorable expedition, at the age of seventy-four, in search of the true Mount Sinai, with what result has already been shown in the previous pages.

In order, however, that the public may be able to form a fair and unprejudiced opinion as to the value of Dr. Beke's discovery, and to come to some definite conclusion on the whole subject, I deem it right to place on record the controversy which took place in the public journals at the time.

In submitting this correspondence to my readers, I would ask them to bear in mind that the three first chapters of this work were written by Dr. Beke *after* the controversy was brought to a close, and that, therefore, they are the result of an impartial consideration of the whole subject.

Telegram published in the "Echo," 17th February 1874.

[The following was communicated to Reuter's Telegram Company by the Eastern Telegraph Company]:—

"CAIRO, February 16.—Dr. Beke, the English traveller, reports from the Gulf of Akaba that he has found the true Mount Sinai, one day's journey north-east of Akaba. It is called by the Arabs Jebel-el-Nur, or Mountain of Light. Its height is 5000 feet. On the summit Dr. Beke found the remains of sacrificed animals, and lower down some Sinaitic inscriptions, which he copied."

Mrs. Beke to the Editor of the "Times," published 19th February 1874.

"In answer to the very numerous kind inquiries which have been addressed to me respecting Dr. Beke, I hope you will, with your usual courtesy, permit me, through the medium of your valuable columns, to offer my sincere thanks for these expressions of sympathy

in my anxiety, which has been roused by my not having received any news of my husband since he left Suez for Akaba in the Khédive's steamer 'Erin;' and, further, for the satisfaction of many of your readers who are kindly interested in the success of his important expedition, you will, I am sure, readily give publicity to the following telegram which I am rejoiced to say I have received this morning only [18th February] from Dr. Beke, dated 'Suez, 16th inst.:'—'Arrived safely. All well. I have succeeded in discovering the true Mount Sinai beyond Akaba, and have ascended to the summit. It is a mountain called by the Arabs 'Jebel-en-Nûr,' or 'Mountain of Light,' on which the Arabs say 'God spoke to Moses,' and therefore they stop and pray towards it. I start directly for Cairo. The steamer 'Erin,' that the Khédive kindly lent me, has not yet returned!'

"The delay in the delivery of my telegram is unaccountable, especially as I see in the 'Times' of this day a Reuter's telegram of the same date from 'Cairo.' My husband's arrival in England may now be confidently looked for during the first week in March. Thanking you very much for inserting this letter, I have," &c.

*Dr. Beke to the Editor of the "Times" (16th February), published
27th February 1874.*

"On the 28th of January I wrote from Akaba announcing the discovery of 'Moses' Place of Prayer' at Madian, on the east coast of the Gulf of Akaba, which I identify with the 'Encampment by the Red Sea' of Numbers xxxiii. 10. This letter was forwarded by the 'Erin' on her return voyage from Akaba; but in consequence of the severe weather she was exposed to, she had to put in at Tor, whence she may be expected to arrive here in a day or two.

"I am now thankful to be able to report that the object of my expedition to discover the true Mount Sinai has happily been attained, very much sooner than I could have anticipated, although not altogether in the manner I had expected.

"As stated in my former letter, we reached Akaba in the steamer 'Erin' on the 27th January.

"We left Akaba under the personal escort of Sheikh Mahommed ibn Ijât, the chief of the Aluwîn tribe of Beduins, to whom I was the bearer of a *firman* from His Highness the Khédive of Egypt, and proceeded north-eastward up the Wady el-Ithem (the 'Ethem' of the Exodus), and encamped in the evening at the foot of Mount Bâghir, one of the principal masses of the chain of mountains bounding the valley of the Arabah on the east, which are marked in our maps as the Mountains of Shera, but of which the correct designation is the Mountains of Shafah; those of Shera,

as I have myself seen, being a chain extending from that of Shafeh in the direction from north-west to south-east.

"My astonishment and gratification may be better imagined than described when I learnt that this Mount Bâghir is the same as a mysterious Jebel-e-Nûr, or 'Mountain of Light,' of which I had heard vaguely in Egypt as being that whereon the Almighty spoke with Moses, and which, from its position and other circumstances, is without doubt the Sinai of Scripture; although, from its manifest physical character, it appears that my favourite hypothesis that Mount Sinai was a volcano must be abandoned as untenable.

"We encamped at the foot of the 'Mountain of Light,' and during the ensuing night we experienced a most tremendous storm, the thunder and lightning being truly terrific, some of the claps being directly over our heads. The rain fell in torrents during several hours, threatening to wash us away altogether. I do not remember to have ever witnessed a more violent tempest either in Abyssinia or elsewhere; and its effect on my mind was this—that if the words of Scripture that at the time of the Delivery of the Law on Sinai 'the mountain burned with fire into the midst of heaven, with darkness, clouds, and thick darkness' (Deut. iv. 11), with other texts which I need not here refer to, are not, as would now appear, to be understood as descriptive of a volcanic eruption, still less can they be held to describe a mere thunderstorm, however violent, as is generally but somewhat inconsiderately imagined.

"As the climbing part of my expedition necessarily devolved on my young companion, Mr. Milne, he, on the following morning, ascended the mountain on Sheikh Mahommed's horse, and accompanied by the Sheikh's son and an attendant, also mounted, and by three Beduins on foot. On his return, shortly after four o'clock in the afternoon, he made me a most valuable and interesting report, of which I now gladly publish a few heads.

"The way was at first up a narrow wady, which grows more and more narrow till it becomes a gorge. On the road they passed a stone on which some inscriptions appear to have been cut, but which are now all defaced with the exception of the words 'Ya Allah' ('O God'), in Cufic, or old Arabic characters. Within the gorge itself they stopped to inspect another large stone, about four feet long and two feet square, made of granite. It originally stood upright, about two or three feet away from the side of the gorge, on another stone, which served as a pedestal; but it has now fallen over, and rests between its pedestal and the side of the gorge. Near the stone the Beduins come to pray; and, according to the statement of Sheikh Mahommed, who had heard it from his father, and he from his father, and so on, Sidi Ali ibn 'Elim, a noted Mahomedan saint, whose tomb and mosque are between Jaffa and Haifa, came

here also to perform his devotions. What led him to do so my informant could not say, unless he was commanded by Allah.

"On reaching the gorge, the riders had to leave their horses with two of the Arabs, and perform the rest of the ascent on foot. A short way up they came to a low wall across the gorge, which latter is filled with large boulders; and close above the wall, on the right hand, is a well about three feet in diameter and about the same to the surface of the water, which may be two feet deep. From this point the ascent was a 'climb,' the face of the rock being almost perpendicular.

"On the ridge on the left side of the gorge, about 150 yards distant from the well, is a pile of large rounded boulders of granite, consisting of four stones of the material of the mountain, three standing up facing the north and one at the back to the south, and on all of them are cut inscriptions, which Mr. Milne copied as well as his cold fingers would allow him to do so. The stones, which are much weather-worn, are externally of a dark-brown colour, against which the inscriptions make themselves visible from their being of a somewhat lighter colour. The lines of these 'Sinaitic inscriptions' are about three-quarters of an inch broad and very shallow, being not more than an eighth of an inch deep. The figures on the stones are very rude, and can hardly be phonetic; neither is it easy to say what they are intended to represent.

"On the very summit of the mountain they found numerous sheep skulls and horns, with a few bones, it being the custom of the Beduins to come up here to pray and to sacrifice a lamb, which is eaten on the spot; but none of the remains appear to be very recent. It is here, as I was told, that the Almighty is said to have spoken with Moses.

"Before reaching the summit, snow was found in the crevices of the mountain, and while Mr. Milne was at the top it hailed and snowed, and was so bitterly cold that it was as much as he could do to take a few angles with the azimuth compass, and even this he could not have done had not his attendants kindled a fire by which he might warm his fingers. The elevation of the spot is estimated at 5000 feet, but it will be known more accurately when our observations on the journey come to be calculated. Though so far distant, Akaba seemed just under his feet, but on so diminutive a scale that he failed to detect the castle among the date-palm trees, the general outline of which alone was visible. In other directions the landscape was blocked out by banks of cloud, fog and rain.

"Mount Bāghir—the Mountain of Light—is one of the loftiest peaks of the range of mountains on the east side of the Wady-el-Arabah and the west side of the Wady-el-Ithem, overhanging the latter.

"Without dwelling on the geological features of the mountain, of which Mr. John Milne's report will treat very fully in my book, it will be sufficient to say here that it consists of a mass of pink or reddish granite, which, in places where it is weathered, assumes a dark-brown hue, and that the granite is traversed by numerous dykes, generally of a dark-green colour, and apparently dioretic.

"On the side of the mountain are many large boulders, several of which are so much decomposed on their under sides as to form small caverns. One of these was as much as 20 feet, or thereabouts, each way across, with a height of 10 feet or 12 feet at the entrance, sloping down towards the back. As the existence of a cave or caves on Mount Sinai is essential in order to meet the requirements of the texts, Exodus xxxiii. 22, and 1 Kings xix. 9, the fact that such caves do actually exist on the Mountain of Light is most pertinent and important.

"Not less significant is the fact that this majestic mountain is visible in all directions, and that round its base towards the east and south there is camping-ground for hundreds of thousands of persons.

"It would be out of place to dwell here on the importance of this discovery of the Mountain of Light as regards the elucidation of the Sacred History. Its identification with the mountain on which the Law was delivered is scarcely open to a doubt. I had imagined that mountain to be a volcano. I have publicly declared my conviction that such must be the fact, and the journey from which I am now returning was undertaken with the express object of establishing this assumed fact. I am now bound to admit that this discovery, though in strict accordance with the principles enunciated in my 'Origines Biblicæ' forty years ago, proves me to have been egregiously mistaken with respect to the volcanic character of Mount Sinai. I make this admission without any reservation, because my desire is, as it always has been, to adduce evidence of the historical truth of the Scripture narrative of the Exodus, in contradiction to the erroneous interpretation put upon that narrative which has caused its truth to be called in question; and I should be a traitor to the cause I have so much at heart were I to attempt to bolster up my own opinions when found to be unsupported by facts. 'Great is truth, and mighty above all things.'"

"The Standard," 28th February 1874.

"If unlimited self-confidence on the part of a discoverer could inspire the public with a general belief in his theories, there would be no doubt whatever about the discovery of the true Mount Sinai by Dr. Beke. But Dr. Beke's very manly and

straightforward letter on the subject supplies us with reasons for doubting his conclusions. Says he—"I had imagined that mountain to be a volcano. I have publicly declared my conviction that such must be the fact, and the journey from which I am now returning was undertaken with the express object of establishing this assumed fact. I am now bound to admit that this discovery, though in strict accordance with the principles enunciated in my 'Origines Biblicæ' forty years ago, proves me to have been egregiously mistaken with respect to the volcanic character of Mount Sinai. I make this admission without any reservation, because my desire is, as it always has been, to adduce evidence of the historical truth of the Scripture narrative of the Exodus, in contradiction to the erroneous interpretation put upon that narrative which has caused its truth to be called in question." Of the honesty of this recantation there can be no manner of doubt, but when he tells us that the identification of the 'Mountain of Light' with the mountain on which the Law was delivered is 'scarcely open to doubt,' he is liable to be awkwardly confronted with the fact that he was formerly just as convinced that the mountain 'must have been' a volcano. Unless he can bring more proofs than his letter indicates, the most that can be said to be shown is, that there is no insuperable obstacle to the reception of his theory."

*The "True Mount Sinai," published in the "Standard,"
28th February 1874.*

"The 'Daily News' says:—The 'discovery of the true Mount Sinai by Dr. Beke, as announced by himself, may disquiet the minds of a good many people who have been accustomed to regard the question as finally and comfortably settled.' They may reassure themselves. Dr. Beke's discovery amounts in reality to very little. He has found in that little-known country east of the Gulf of Akaba, which he, almost alone among men, regards as the scene of the forty years' wandering, a hill called the Mountain of Light, which is regarded by the natives of the place as that on which the Law was given. There were already two other mountains to which the same tradition attaches, just as there are two islands on which St. Paul was wrecked; so that what Dr. Beke has actually discovered is only a third traditional site. It has long been regarded as a canon in criticism that all Arabic traditions should be regarded with suspicion, and especially those which relate to Moses and Pharaoh.

"What remains for Dr. Beke to do is to adjust his site to the details of history. It will be strange indeed if there turn out to be two places, each of which exactly fulfils in its surroundings, as

well as in itself, the required conditions, these being at once minute and clear. Until this has been done, and not before, we may begin to reconsider the established geography."

*The Rev. F. W. Holland to the Editor of the "Times," published
3d March 1874.*

"I was not aware till to-day that Dr. Beke had done me the honour to make special mention of me in a pamphlet which he published before he started for the East, as his 'opponent.' But, since he has done so, will you allow me to state that his discovery of Jebel-en-Nar has not in the least shaken my faith in Jebel Mûsa as the true Mount Sinai, and that I am quite ready to bring forward arguments to disprove his theory? But it would be neither fair nor wise to attempt to do so until I know further particulars of his discoveries than his short telegram conveys."

*Major C. W. Wilson, R.E., to the Editor of the "Times," published
3d March 1874.*

"When Dr. Beke left England last year with the avowed intention of finding Mount Sinai in the vicinity of Akaba, it was not to be expected that he would return empty-handed, and I presume few of your readers were taken by surprise when publicity was given to his discovery in the rather sensational telegram from Suez which appeared in your columns of the 18th. I had not intended raising a discussion on the result of Dr. Beke's journey until his return to this country, nor do I wish to do so now; your paper is hardly a fitting place for a long discussion which must necessarily enter into many minute details, and I will only say now that the members of the late Ordnance Survey of Sinai are fully prepared to maintain the opinion they have expressed as to the position of Mount Sinai in the peninsula of the same name. All the conditions required by the Bible narrative are fully met by the identification of Mount Sinai with the well-known Ras Sufsafeh, while it remains to be seen whether Dr. Beke can say the same of his new discovery; he has still to prove his case, but every one must be glad that he has abandoned his 'fire and smoke' theory, and I must do him full justice for the frank manner in which he has cast it to the winds.

"In his letter published on Friday morning Dr. Beke attaches undue importance to the presence of sacrificial remains, a tradition relating to Moses, and the existence of Sinaitic inscriptions: had he known the country a little better, he would have been aware that from Ras Muhammed to Petra there are scarcely twenty square miles

in which a place of sacrifice and tradition of Moses cannot be found ; and as to Sinaitic inscriptions, they are sown broadcast over the country. I will only add that I have the greatest admiration for the energy and faith which led the veteran explorer to go one day's journey into the wilderness and find Mount Sinai, and only regret that he had not leisure to complete his tour by a visit to the rival mountain in the Peninsula."

Dr. Beke to the Editor of the "Times," dated Akaba, 28th January, and Mrs. Beke to the Editor of the "Times," published 5th March 1874.

"In Dr. Beke's letter from Suez of the 16th ultimo, which you kindly published in the 'Times' of the 27th ultimo, by which he announced his discovery of the 'true Mount Sinai,' he mentioned that he had written to you on the 28th of January from Akaba, describing 'Moses place of prayer' at Madiān, on the east coast of the Gulf of Akaba, which also he has been so fortunate as to discover. On his return to Egypt, Dr. Beke found that the little steamer 'Erin' had not returned to Suez, she having been delayed by stress of weather and want of coals, so that his letter to you of the 28th of January, which he intrusted to the captain, has only now reached me, and I hasten to forward it to you for publication:—

"Sir,—His Highness the Khédive having been pleased to place the Egyptian steamer 'Erin' at my disposal for the conveyance of myself and party to the head of the Gulf of Akaba, we left Suez in that vessel on the morning of January 18th, and arrived here in safety in the afternoon of yesterday, the 27th, after a pleasant, and, from my point of view, most interesting and successful voyage of ten days.

"The run down the Gulf of Suez was without the occurrence of anything of moment, but on our passing Ras Mohammed—the southern extremity of the Peninsula of Tor, the traditional 'Mount Sinai'—we encountered the northerly winds almost constantly blowing down the Gulf of Akaba, which during three days and more raged with great violence. Fortunately I was desirous of visiting Aiyūnah, Burckhardt's Ayoun el Kassab, the Hadj station on the sea-shore a little way east of the entrance of the Gulf, which I imagined to be the 'Encampment by the Red Sea' of the Israelites, mentioned in Numbers xxxiii. 10; and by going thither we escaped the violence of the storm; otherwise I fear it might have fared badly with our frail bark of only sixty-four tons.

"On our return into the Gulf, as the tempest had not entirely

abated, we anchored on the 24th close to the shore at Magna or Madian, in $28^{\circ} 23'$ N. lat., behind a point of land and a reef, which, though not a fit anchorage for a large vessel, afforded shelter to the little 'Erin,' though we lost here one of our anchors. At Madian we had to remain a day, which afforded us an opportunity of going on shore and inspecting the place, a camping-ground of the Beni Ughba Arabs, numbering about 400 souls. The Sheikh, with the main body of the tribe, was away in the interior, a few persons only remaining here to attend to the fructification of their numerous date palms—it is no exaggeration to estimate them at 1000 or more—growing near the beach and along a valley coming from the east, in which there is a perennial stream of water. With the date trees we saw also several dōm palms, lime, nebbuk, and fig trees; and there were even a few patches of barley carefully protected by hedges of palm leaves.

"We were on the point of returning to the ship, when we were informed of the existence in the vicinity of a holy spot, where it is said the Prophet Moses prayed, and over which a 'mosque' had been erected. This was stated to be at one hour's distance from the shore; and as with these people's vague estimate of distances, it might possibly be much more, and I did not feel myself competent to go so far on foot, we went on board to lunch, after which Mr. Milne returned on shore, and walked inland with a servant and a native guide.

"He proceeded eastward up the valley, along the side of the palm grove, gradually ascending over a sandstone slope, in places worn into hummocks by the water, which during the rainy season finds its way down to the sea, and when about half a mile from the coast he came to a small stream some three feet wide, running in a channel which it has cut in the solid rock. At the point where he struck the stream the water runs prettily over the inclined but irregular surface of the rock, with a fall, or succession of falls, of about twelve feet in all, winding and losing itself among the palm trees. The surface of the rock, which is sandstone, in places merging into a conglomerate of granite, diorite, and quartz, in stones, some as large as cocoa-nuts, cemented by coarse sand, is here quite clear, so that one walks upon the bare rock; but at a couple of hundred yards further up the valley the rock is covered with sand, which appears to be making rapid inroads. So great, indeed, is its encroachment on the date plantations that the Arabs have made hedges round these to protect them from the sand, which hedges, however, are being overwhelmed, and others have, consequently, to be erected further in.

"On reaching the end of the palm groves, a mound is seen half as high as the tops of the trees, with numerous blocks of white stone

lying among the sand, and beyond this there is a good view further up the valley, along which date palms are seen growing in patches. There are also a few dōm palms, one noticeable one overhanging the white stones.

“These remains, which, instead of being an hour’s journey or more from the sea, are at the utmost one mile from the beach, were found on examination to consist of blocks of alabaster, so white and pure as at first sight to be mistaken for marble, and only proved to be sulphate of lime by its scratching with a knife and by its non-effervescence with muriatic acid. The blocks are each about three feet long and one foot six inches square, and appear to have been worked with the tool, though the edges are now much rounded by the weather. One of them seems to form a portion of a column. Together with the blocks of alabaster are some of granite, likewise much weathered. As far as a brief and hasty inspection would allow an opinion to be formed, these stones appear to lie in two parallelograms, ranging from north to south, the one within the other, the south end of the inner one being semicircular, and there even seem to be indications of a third range of stones further to the north. But it is difficult to speak with certainty on account of the sand which covers these stones in part and threatens soon to hide them entirely. There are several mounds of sand round about, which may probably contain other remains.

“This most interesting spot, which requires to be more closely examined, is especially important to me, because I now see that here, at Madian, and not at Ayūnah, must have been the ‘Encampment by the Red Sea’ of the Israelites. Its proximity (half a day’s journey) to Maghara Sho’eib, or Jethro’s Cave, which I identify with the Elim of the Exodus, and the fact that the stream of running water must have some of its sources at or near that spot, explain why it should not have been mentioned in Exodus xv. 27, xvi. 1, as a separate station, much more satisfactorily than I attempted in page 38 of my pamphlet, *Mount Sinai a Volcano*, to explain the apparent discrepancy in the two statements of Scripture. The ‘Encampment by the Red Sea’ was simply a continuation of that at Elim, with its ‘twelve wells of water and threescore and ten palm trees,’ the two together stretching down the valley, with its living water, from Maghara Sho’eib, or ‘Jethro’s Cave,’ to this ‘Praying-place of Moses’ at Madian.

“As one of my main arguments against the correctness of the vulgar identification of Mount Sinai and other places connected with the Exodus of the Israelites is based on the insufficiency of local traditions to establish the authenticity of any such identifications, it would be inconsistent on my part were I to insist on the intrinsic and absolute value of the traditions attached to ‘Jethro’s

Cave,' 'Moses' Praying-place,' &c. Nevertheless these traditions are, at the least, as valuable as any of the others, and their existence here on the distant and almost unknown shores of the Gulf of Akaba, as well as that of 'Pharaoh's Island,' within sight from where I am now writing, and 'Wady Ithem,' the entrance to the desert of Nedjid, which I identify with 'Etham in the edge of the wilderness' of Exodus xiii. 20, within two hours' journey from this spot, all serve to show that there is sufficient reason for my hypothesis that this, the Gulf of Akaba, and not the Gulf of Suez, is the Red Sea through which the Israelites passed in the flight from Pharaoh king of Mizraim. A few days more will, I trust, suffice to demonstrate the absolute truth of this hypothesis.—I am, sir, your very obedient servant,

CHARLES BEKE.

"Akaba, January 28th."

"In your impression of to-day I see a letter from Mr. F. W. Holland, and one from our friend Major Wilson. The former gentleman, although he says he is quite ready to bring forth arguments to disprove Dr. Beke's theory, very rightly and kindly adds that it would be neither fair nor wise to attempt to do so until he knows further particulars of Dr. Beke's discoveries. Major Wilson also says, 'I had not intended raising a discussion on the result of Dr. Beke's journey until his return to this country, nor do I wish to do so now.'

"I trust I may be pardoned for remarking that the contents of the Major's letter can scarcely be said to be in accordance with the intention this expressed.

"Dr. Beke will, I trust, be home in the course of a fortnight, and in the meantime I venture to ask the public to withhold their judgment until he arrives with the proofs which I am persuaded he will bring with him of his discovery of the true Mount Sinai. I ask this because I am, like Major Wilson, delighted to see that my husband does not intend his discovery of the true Mount Sinai to end in smoke, but in truth.

"In Dr. Beke's letter to me from Akaba, he tells me he is deeply indebted to the 'patriotic and obliging' spirit of the Peninsular and Oriental Company for their kindness in supplying his little steamer 'Erin' with the British flag, and for every assistance in his preparations for his journey from Suez.

"I learn that Colonel Gordon left Cairo for Gondokoro on the 20th of last month, with the intention of proceeding as quickly as possible as far as the Albert Nyanza, and, with his Bible for his companion and guide, to succeed, or to leave, if necessary, his bones in Africa!"

*Major H. S. Palmer, R.E., to the Editor of the "Times,"
published 7th March.*

"I fully concur with Major Wilson and Mr. Holland, my late colleagues on the Sinai Survey, in their remarks in the 'Times' of yesterday on Dr. Beke's alleged discovery of 'the true Mount Sinai.'

"In Dr. Beke's recently published work he confessed himself content to stake his 'reputation as a scholar and a traveller of some experience,' on the hypothesis that Mount Sinai was an extinct volcano in the Arabian desert east of the Ghor. Having now, to the surprise of no one, abandoned this hypothesis, after but one day's march in the desert, and acknowledged himself 'egregiously mistaken,' he cannot expect his reputation any longer to stand him in much stead; for his new theory he will have to rely only upon arguments and facts.

"It may be well to remind him that he will need, in the first place, to disprove the conclusions to which not alone the late Ordnance Survey party have come, but the great majority of travellers, both ancient and modern, among our own countrymen, as well as foreigners; and that then, having so far cleared his ground, he must produce very different reasons in favour of the new mountain from those which appeared in his letter from Suez in the 'Times' of the 27th ultimo, or in anything we have yet seen from him.

"In the meantime the public will withhold their judgment."

Professor E. H. Palmer to the "Academy," published 7th March.

"Dr. Beke's sensational announcement by telegraph of the 'discovery of the true Mount Sinai' may have startled some people into acquiescence in his theory, but I can scarcely believe that any one who has really considered the question can have regarded the 'discovery' *au sérieux*. Still, an assertion so positively and unequivocally made seemed to imply some cogent and decisive arguments in the background; and I must confess that I looked forward with some interest to the further detailed explanations promised by the learned traveller. These have at length appeared in his letter to the 'Times' of February 27, but, strange to say, we, the advocates of Jebel Mûsa, the old orthodox Sinai, do not feel ourselves so utterly annihilated as we perhaps ought to do. It would be unjust to attack Dr. Beke's theories before he is himself upon the spot to state his case and answer our arguments; but while I am, like my fellow-travellers, willing to wait until that time, I cannot let such an assertion pass

entirely unchallenged. Dr. Beke starts with the assumption that Mount Sinai is a volcano, and is situated to the east of the Ghor, instead of to the west of the Gulf of 'Akaba. Arrived at 'Akaba, he selects the first prominent mountain to which some traditional sanctity appears to attach, and at once adopts it as his Sinai, with the statement that 'its identification with the mountain on which the Law was delivered is scarcely open to a doubt.' It is not a volcano, it is true, but on that point the Doctor naïvely owns that he was 'egregiously mistaken.' The reasons which carried this conviction to his mind are strangely inadequate. They are: 1. That he had heard the mountain in question 'vaguely spoken of in Egypt as being that whereon the Almighty spake with Moses;' 2. That there are traces of sacrificial remains on the summit; 3. That 'Sinaitic inscriptions' are found there. He appears also to attach considerable importance to the alternative name of the mountain—Jebel en-Nûr.

"Now, as Major Wilson has pointed out in his letter to the 'Times' of the 3d instant, the country on either side of the Gulf of 'Akaba absolutely teems with traditions of Moses, the name of the lawgiver being associated with nearly every striking natural phenomenon which occurs. With regard to the sacrificial remains, there is scarcely a 'high place' in the desert where the Bedawin do *not* offer up sacrifices. As for the 'Sinaitic inscriptions,' those which have hitherto reached the hands of European scholars are either in Nabathean or Greek, and in no case of an earlier date than the first few centuries of the Christian era. These again are scattered throughout the length and breadth of the desert. However, until Mr. Milne's copies are brought home, it would be premature to pronounce upon them. The name 'the Mountain of Light' surely points rather to Sabæanism than Mosaism, and would in that case satisfactorily account for the sacrifices. So much, then, for the importance of these alleged proofs of identification; but Dr. Beke says that 'from its position and other circumstances the mountain is undoubtedly the Sinai of Scripture.' It is here that the crucial test of the soundness of the theory may be applied; for one of two things must be assumed—either that the sacred penman gave an incomplete account of the itinerary of the Israelites, for some half dozen or more stations must be added to the lists in Exodus and Numbers to take them to a Sinai situated within a day's journey of 'Akaba; or else the hitherto unquestioned identification of the Egypt of the Pharaohs with the Mitzraim of the Bible must be abandoned. This latter view has been more than once advocated in the face of the testimony of history and of hieroglyphic monuments, and of the entire absence of any trace of such civilisation as that mentioned in the Bible narrative of the Exodus east of the Nile valley.

"Here, then, is the initial difficulty. If we can believe the inspired writer ignorant of the number of stations between Egypt and Sinai, or if we can believe in a second Egypt east of the Isthmus of Suez which has passed away without leaving a trace of its existence behind, then we may reject the traditions of ages, local and historical, the evidence of physical facts, as reported by the Ordnance Survey and a long series of travellers, in favour of the mere hypothesis of a gentleman who acknowledges himself to be 'egregiously mistaken' upon the main point which he undertook his journey to prove.

"In the meantime, I feel sure that the public will at least suspend its judgment until Dr. Beke's return has given the supporters of the traditional Sinai an opportunity of hearing and discussing his arguments *in extenso*."

N.B.—Dr. Beke's reply to the foregoing letter was duly forwarded to the Editor of the "Academy;" but was refused insertion, in spite of Dr. Beke's urgent remonstrance with the Editor against the unfairness of allowing such a letter to appear in its columns, and not the reply.

*A. G. P.*¹ to the Editor of the "Standard," 7th March, published 12th March.

"The opposition shown in the present day to Scripture, not only in the efforts made to abolish it altogether from our schools, but in the attempts made to explain away its truths, may possibly throw some light upon the above controversy. Dr. Beke, some time back, staked his reputation, as a scholar and a traveller of some experience, on the fact that the real Mount Sinai was an extinct volcano. On comparing this preconceived notion with the account in Exodus, the animus is apparent. 'There were thunders and lightnings and a thick cloud upon the Mount, . . . and the smoke thereof ascended as the smoke of a furnace, and the whole Mount quaked greatly.' According to Dr. Beke's recent letter, however, his volcano theory has failed, and he now appears jubilant over a thunderstorm theory. Are we wrong in classing as 'oppositions of science, falsely so called,' these attempts to explain away all that is miraculous in that book which is handed down by the nation whose very existence is itself a standing miracle?"

Mr. J. N. Lee to the Editor of the "Standard," published 14th March.

"'A. G. P.' has unwittingly misrepresented Dr. Beke on the subject of the thunderstorm. I subjoin Dr. Beke's own words:—

¹ Supposed to be Captain H. S. Palmer.

“ ‘We encamped at the foot of the ‘Mountain of Light,’ and during the ensuing night we experienced a most tremendous storm, the thunder and lightning being truly terrific, some of the claps being directly over our heads. The rain fell in torrents during several hours, threatening to wash us away altogether. I do not remember to have ever witnessed a more violent tempest either in Abyssinia or elsewhere; and its effect on my mind was this—that if the words of Scripture, that at the time of the Delivery of the Law on Sinai, ‘the mountain burned with fire into the midst of heaven, with darkness, clouds and thick darkness’ (Deut. iv. 11), with other texts which I need not here refer to, are not, as would now appear, to be understood as descriptive of a volcanic eruption, still less can they be held to describe a mere thunderstorm, however violent, as is generally but somewhat inconsiderately imagined.’ ”

ON THE EXODUS OF THE ISRAELITES.

Dr. Beke to the “Athenæum,” published 28th March 1874.

“On my return to England from the visit I have just made to the ‘Mountain of Light,’ situate north-east of Akaba, which I deem to be the true Mount Sinai, I wish to say a few words respecting the flight of the children of Israel from Rameses to the Red Sea, as recorded in Exodus xii. 37, xiii. 20, xiv. 1, which is generally imagined to have occupied them only three days, because ‘the journeys of the Israelites,’ enumerated in the thirty-third chapter of Numbers, are assumed to be each of a single day only.

“The fact is, however, that the Scripture says nothing whatever about days’ journey, but simply records the names of the principal places through or by which the Israelites passed. To conclude that the distance from Rameses to the Red Sea is only three days’ journey, because the intermediate stations of Succoth and Etham alone are named, is much the same as if it were argued that the journey I have just gone from Alexandria to Venice, from Venice to Paris, and from Paris to England, has been of only three days’ duration, because no mention is made of any of its intermediate stages.

“That the journey of the Israelites from Rameses to the Red Sea was in reality of six days’ duration, and not of three days only, is established by the following simple argument. The days during which the people ate unleavened bread were seven, commencing on the fifteenth and ending on the twenty-first day of the month; the first day of the seven being a day of holy convocation or feast, and the seventh day being in like manner a day of holy convocation or feast (see Exod. xiii. 16; Levit. xxiii. 7, 8). These days of unleavened bread were necessarily coincident with those of their flight,

which commenced at midnight of (preceding) the fifteenth day of the month, and continued till the night of (preceding) the twenty-first day of the month, when they passed through the Red Sea. They ate unleavened bread on the night of the feast of the Passover, because, as we are expressly told (Exod. xii. 34), their bread was not yet leavened, and they still continued to eat unleavened bread on the seventh day, although a feast, because during the preceding night their passage through the Red Sea took place, and there was neither time nor opportunity for them to leaven their bread.

"This construction of the Scripture narrative is so simple and natural that it scarcely stands in need of corroborative evidence. Nevertheless, that evidence is afforded by the fact that to the present day the Jews regard the twenty-first day of the month as the anniversary of the passage of their ancestors through the Red Sea, and accordingly on that day they recite in their synagogues the fifteenth chapter of Exodus, containing the magnificent song of triumph and thanksgiving sung by Moses and the Children of Israel. Besides which, it has to be remarked that, had the passage through the Red Sea taken place after only three days' journey, the Israelites would have been guilty of the inconsistency and even the absurdity of continuing to eat 'the bread of affliction,' as it is emphatically called in Deuteronomy xvi. 3, three days after their affliction had come to an end, and there was no longer any necessity for them to refrain from leavening their bread as they had been in the habit of doing.

"It is true that the Jews no longer regard their unleavened bread as the bread of affliction, but rather as the bread of rejoicing, and instead of keeping only the first and seventh days of unleavened bread as feasts or days of holy convocation, as is ordained in the Pentateuch, they keep the whole seven days as if they were feasts. This, however, is a variation of long standing; for in 2 Chron. xxx. 21, xxxiii. 17; Ezra iv. 22, we read that 'they kept the feast of unleavened bread seven days.' So easy, and indeed so natural, has it been with them, as with all other people, to change their holy days into holidays.

"The Feast of the Passover is now near at hand. If any of your readers desire to satisfy themselves as to the custom of the Jews in this respect, they have only to visit one of their synagogues on the twenty-first day of the month—the 8th of April, if I calculate rightly—when they will hear the fifteenth chapter of Exodus read, because that day is the anniversary of the passage of the Children of Israel through the Red Sea, and the destruction therein of Pharaoh and his host.

"Sufficient has been said, I trust, to show that the flight of the Israelites from Rameses to the Red Sea occupied them six days,

and not three days only as is generally imagined. And as that flight was a precipitous one, and taken in great part during the night by the light of the moon, between the full and the third quarter, it may reasonably be inferred that the distance travelled by the fugitives between Rameses and the Red Sea was much more than an ordinary six days' journey. Hence it is manifest how futile all attempts to trace the route of the Israelites must be, that are based on the assumption that that distance was of three days' journey only."

THE TRUE MOUNT SINAI.

*Dr. Beke to the Editor of the "Times" on his arrival in England,
published 30th March 1874.*

"I have only, since I arrived in England, seen my friend Major Wilson's letter and those of the Rev. F. W. Holland and Major Palmer in the 'Times' of the 3d and 7th inst., and notwithstanding the time which has elapsed since the appearance of those letters, I rely on your impartiality and kindness to give equal publicity to my reply to them. Those gentlemen having all been connected with the recent Ordnance Survey of the Peninsula between the Gulf of Suez and Akaba, in which Mount Sinai is traditionally placed, are unwilling, not unnaturally, to have the faith in that traditional mountain shaken. But I feel persuaded that none of those gentlemen, like myself, desire otherwise than that the truth upon so important a Biblical question should be ascertained, and that, therefore, in the cause of that truth, they will readily lay aside the personal feelings they must so naturally entertain on the subject.

"As it appears to me, Major Palmer is begging the whole question when he says that I have 'in the first place, to disprove the conclusions to which not alone the late Ordnance Survey party have come, but the great majority of travellers, both ancient and modern, among our own countrymen, as well as foreigners.' Does that officer mean that questions like this are to be decided by a *plébiscite*? And are the 'conclusions' which I am thus called on to disprove anything but foregone conclusions? All that the Ordnance Surveying party were intended or professed to do was to 'explore the whole Peninsula,' and to 'estimate fairly the claims of the several rival Mounts Sinai' within that Peninsula, it being assumed by them that some one of those rivals must necessarily be the true Mountain of the Law. Of their having performed their task most ably and efficiently there can be no doubt whatever. It is only to be regretted that before undertaking a work of such magnitude, which, however admirably executed, is likely to prove

valueless as illustrative of the narrative of the Exodus, they should not have considered the previous question as to whether any one at all of those 'rival Mounts Sinai' could be the true one, and whether, indeed, the fact of such rivalry was not destructive of the tradition which places that mountain within the Peninsula.

"And, in the result, has the Ordnance Survey really effected its professed object? To say nothing of Um Shaumur and Jebel Katherin, have Mr. Holland and his companions disproved the pretensions of Jebel Serbal as advocated by Professor Lepsius, Mr. Bartlett, Dr. Stewart, and others, or of Jebel Sena with its suggestive name,* on which Dean Stanley dwells? Are they even agreed among themselves as to which is the real Sinai? Mr. Holland has still 'faith in Jebel Musa,' although I was informed in Egypt (evidently in error) that his faith had of late been seriously shaken; while Major Wilson declares that 'all the conditions required by the Bible narrative are fully met by the identification of Mount Sinai with the well-known Ras Sufsafeh,' which, instead of being the Jebel Musa in which Mr. Holland has faith, is a separate peak further to the north.

"As far as I can judge—and I have heard the like opinion expressed by several well-informed persons—the result of the Ordnance Survey has been to unsettle things more than ever; so that the assertion of Mr. Holland in the 'Athenæum' of the 26th of September 1878, that 'all attempts to lay down the probable line of march of the Children of Israel are mere guesswork,' remains just as true to-day as it was when made five and a half years ago.

"The only issue out of the 'many difficulties which have perplexed earnest and anxious minds,' and the only sure way to 'solve questions which have thrown discredit upon the truth of a portion of the Bible history,' is to reopen the whole question and to consider impartially and reasonably the likely position of the Mountain of the Law upon the basis of my theory that the Yam-Suph or Red Sea, through which the Israelites passed in their Exodus is the same 'Red Sea in the land of Edom' (1 Kings ix. 26) that was navigated by the Israelitish and Tyrian fleets five centuries later—namely, the Gulf of Akaba, whence I have just returned, the Gulf of Suez having been as little known to Moses as it was to Solomon and Hiram.

"Though Major Palmer appears to be unacquainted with this theory of mine, inasmuch as he calls it 'new,' whereas it was enunciated forty years ago in my 'Origines Biblicæ,' it is nevertheless well known to Mr. Holland, who has combated it (though without naming me as its author), in his appendix to Major Wilson's work, the 'Recovery of Jerusalem,' saying that the Red Sea, where crossed by the Israelites, was distant only three days' journey from their

starting point, 'a distance,' he says, 'which exactly agrees with that of the head of the Gulf of Suez, but which does not agree at all with the distance of the head of the Gulf of Akaba.'

"But this supposed agreement is based upon the erroneous assumption that the Israelites were only three days on their journey to the Red Sea, whereas I have shown in my recently-published pamphlet ('Mount Sinai a Volcano') they were no less than six days on their march—their passage through the sea having been made during the night of (preceding) the seventh day of unleavened bread, and accordingly their descendants celebrate on that day the anniversary of that passage.

"The Ordnance Surveyors may be content to adopt the tradition of the monks of the convent on Jebel Musa, backed by the 'conclusions' to which Major Palmer refers. For my own part, I prefer the testimony of the Scripture History, in perfect unison with which is the unbroken tradition of the Israelitish people, who during the entire period of their national history have eaten during seven days what at the institution of the Passover was 'the bread of affliction,' but which after their deliverance became the bread of rejoicing, as it continues to be to this day. If any of your readers feel inclined to satisfy themselves as to the fact, they have only to enter a Jewish synagogue on the 21st day of the present month of Nissan, which will be (if I mistake not) on the 8th of April, and they will hear read the fifteenth chapter of the Book of Exodus, containing the magnificent song of Thanksgiving and Triumph sung by Moses and the Children of Israel after their safe passage through the Yam-Suph—the 'Red Sea in the Land of Edom' of 1 Kings ix. 26, as I have so long contended—and the destruction therein of Pharaoh and his host.

"As my friend Major Wilson justly observes, the 'Times' is hardly a fitting place for a long discussion of this sort. I will, therefore, merely remark that my present discovery of the 'Mountain of Light,' and my identification of it with the Mount Sinai of Scripture, is a fact which I confidently adduce as an additional proof of the correctness of the theory enunciated by me in 'Origines Biblicæ' in 1834, and since then supported by arguments and facts recorded in various publications, the last of these being my little work the 'Idol in Horeb,' published in 1871. While on this subject I may mention, as not without bearing on the general subject, that when at Cairo a few days ago I was informed by the chief of the little community of Samaritans at Nablous (Shechem), Yakúb Shelaby, who is well known to Dean Stanley, Dr. Pusey, the Rev. George Williams, and other travellers in the Holy Land, that he and his people consider the molten image made by Aaron for the children of Israel to worship (Exod. xxxii. 4), as well as the two

Idols set up by Jeroboam in Bethel and Dan at the time of the secession of the Ten Tribes (1 Kings xii. 28), to have been simply unwrought lumps of gold; thus corroborating the opinion expressed in my last named work that 'the golden image at Mount Sinai was a cone and not a calf.'

"In conclusion it is necessary that I should correct an error which my friend Major Wilson appears to have fallen into when imagining me to have 'abandoned my fire and smoke theory,' and to have 'cast it to the winds.' The 'Mountain of Light'—my Mount Sinai—as I was told, derives its appellation from the light, which appeared at night on its summit and served as a guide to Moses and the Israelites in their flight; that is to say, the 'pillar of fire' by night and the 'pillar of cloud' by day, of Exodus xiii. 21. If this appearance was not volcanic—and an eminent scientific friend of mine contends that it was so even on the summit of the traditional Mount Sinai—it must have had its origin in some cause which is at present inexplicable, and which in vulgar parlance would be styled a miracle.

"It will thus be seen that the question between the Ordnance Surveyors and myself is of a very different character from what it would appear to be from their letters in the 'Times,' to which I trust I have now fully replied."

*Letter from Major C. W. Wilson, R.E., to the Editor of the
"Times," published 3d April.*

"Would you allow me space to suggest to my friend Dr. Beke, that when he next addresses a long letter to the 'Times' criticising the views of other travellers he should make himself acquainted with the subject on which he writes?

"Your readers will probably be surprised to learn that Dr. Beke does not appear to have consulted the published account of the Ordnance Survey of Sinai before writing his letter. Had he done so he would have been aware that the members of the Surveying Expedition are perfectly agreed among themselves as to the position of Mount Sinai and the route followed by the Israelites in their journey to it; he would also have seen from those safe guides, maps, and photographs, as well as from the letterpress, that neither Serbal, Catherine, Umm Shomer, or Sena could have been the Mountain of the Law.

"I would venture to express a hope that, though Dr. Beke did not consider it worth his while to visit the Peninsula of Sinai, he may, before publishing the results of his journey in search of a volcano, take the trouble to read what has been written by those whose views he has criticised in the 'Times' of Monday morning.

"It would hardly be fair to make any remarks on Dr. Beke's peculiar theories until the appearance of his promised work, 'Sinai Regained;' meanwhile I may add that all the published documents connected with the Ordnance Survey are very much at his service, if he wishes to avail himself of them."

Letter from "One Who has Been There" to the Editor of the "Times," published 3d April.

"I have read—I cannot say with surprise, but with a certain amount of wonder—Dr. Beke's letter, published in the 'Times' of Monday morning, relative to his alleged discovery of the true Mount Sinai. Dr. Beke's theory may not be 'new' so far as he himself is concerned, for, as he says, it was published in an incomplete work issued a good many years ago; but it is quite new so far as the public is concerned, inasmuch as it attempts to upset the conclusions arrived at, and almost universally accepted, by ancient and modern authorities for hundreds of years.

"The fact is that Dr. Beke had a theory, and in order to establish that theory it was necessary to find a mountain—and this he has done, with the smallest amount of trouble to himself—within a few hours' journey of Akabah, the site of the ancient Ezion-geber.

"Now, to prove the utter absurdity of such a theory it is only necessary to state that the Sinai of the Israelites was the ninth station named in the wanderings of the children of Israel (see Numbers xxxiii.), and that Ezion-geber is the twenty-ninth; and to place 'the true Mount Sinai' within half a day's journey of the latter place would be to throw the whole itinerary into utter confusion. The reference given by Dr. Beke to 1 Kings ix. 26 is also entirely misleading; for any one can see for himself that this verse alludes exclusively to Ezion-geber, which was situated, as every one admits, on the eastern fork of the Red Sea—that is, on the Gulph of Akabah.

"But Dr. Beke has another theory, and that a still more astounding one—viz., that the Israelites never were in Egypt at all—that is, in the country known to us as Egypt, but in some undiscovered region lying to the eastward, where all the phenomena and peculiarities of the country known to us as Egypt, including a new river Nile, have to be reproduced if his theory be correct. It will require a vastly larger amount of persuasion to accept this idea as true than it needs of faith to believe in the story as we have hitherto received it, involving, as it does, the necessity of believing also that the Israelites themselves, who were the nearest neighbours of, and in closest intercourse with, the Egyptians did not know where they came from.

• "The Jebel-en-Nur which Dr. Beke has 'discovered' is a large flat-topped mountain, visible to every one ascending or descending the pass leading from the plain of Akabah to the plateau of the Tih. The only real discovery he has made is in the name, and knowing, as all travellers do, the readiness with which all Orientals, and especially dragomans, adopt the slightest hint given to them by their employers, I cannot help suspecting that the name, like the theory, originated with the Doctor; at all events, it proves nothing, and I do not suppose that Dr. Beke means to affirm that the bones found on the top were left there by the Israelites.

"The country to the eastward of the spot which Dr. Beke reached, and to the mountain, which he did not ascend, is not unknown to us. It has been described, I think, by Burckhardt, and is, at all events, traversed only a short distance inland by the great Haj route from Damascus to Mecca and Medinah, so that if any region answering at all to the Egypt we know of had existed thereabouts, it is pretty certain that we should have heard of it before this. The existence of a second Nile could not have been kept a secret for so long a time. On the other hand, I think that on the question of time Dr. Beke may be right, and it is much more probable that the Israelites, encumbered as they were, took six days than three to reach the Red Sea; but, on the same showing, this Red Sea must be the Gulf of Suez and none other, for it is utterly impossible that they could have got to the Gulf of Akabah in that time. Hence the necessity of another Egypt.

"If Dr. Beke had ever been at the traditional Mount Sinai he would not have committed the error of describing Jebel Musa and Ras-el-Sufsafah as two distinct mountains. The latter is simply one of the buttresses of the great mountain known as a whole as Jebel Musa, and any one who has stood on that wondrous cliff, as I have, ~~and looked~~ down on the great plain of Er Rahah stretched out at his feet, and rising gradually, as it recedes from the base, like the pit of a theatre, cannot fail, with the Bible narrative in his hands, to recognise it as the undoubted spot where the Israelitish encampment stood.

"As for the claims of Jebel Serbal, &c., Dr. Beke ought to know by this time that these have long since yielded to the unquestionable results of recent scientific investigation, and never had any other foundation than the fact that, like his Jebel-en-Nur, they were places of sacrifice and devotion."

*Major H. S. Palmer, R.E., to the Editor of the "Times,"
published 3d April.*

"After having looked forward with some curiosity to Dr. Beke's promised 'proofs' in favour of his, 'true Mount Sinai,' I was disappointed, though I own not much surprised, to see that, in his

letter in the 'Times' of Monday, instead of trying to prove his own point (or to disprove ours), he adopts the tactics, so common in weak and doubtful causes, of running down the opposite side. His attempts to criticise and depreciate the Ordinance Survey of Sinai, and to discuss the topography of the Sinaitic Peninsula, are, nevertheless, singularly unhappy; indeed, the only conclusion to be drawn from them is, that he knows very little of the whole matter. Dr. Beke fancies, for example, that he detects a discordance between Major Wilson's adhesion to the Ras Sufsafeh and Mr. Holland's to Jebel Musa, whereas the slightest knowledge of the local features would have told him that there is no such discordance, the Ras Sufsafeh being simply a part of Jebel Musa. Dr. Beke asks whether we have disproved the pretensions of Jebel Serbal, Jebel Umm Shomer, and Jebel Katharina, or Jebel Sena (*sic*). Had he but examined our official reports and illustrations, which your reviewer was good enough to characterise as models of their kind, he could never have put this question. He speaks of our having adopted the monkish traditions; it can hardly be said that we have adopted so much as one of them. From these few specimens of our critic's accuracy and knowledge, your readers may estimate how much value can be attached to the assertion of himself, and of those 'well-informed persons' who agree with him, that the result of the Ordinance Survey has been to 'unsettle things more than ever.'

"Dr. Beke then urges that the whole question of the topography of the Exodus be reconsidered, on the basis of his theory that the sea which the children of Israel crossed is the Gulf of Akabah, and not the Gulf of Suez. Will it not be well, before assenting to so sweeping a proposal, to examine briefly what this theory demands, and also what it leads to?

"There is, to begin with, the very great difficulty that the distance from the generally-received site of Rameses (the starting-point of the Israelites) to the head of the Gulf of Akabah is fully 200 miles; whereas two stations only, Succoth and Etham, are mentioned in the narrative as intervening between that starting-point and the station from which the passage of the sea was effected. For disposing of this preliminary difficulty, Dr. Beke has recourse to two expedients. Firstly, in defiance of the testimony of history and of hieroglyphic monuments, and of the opinion of all comparative geographers and critics, he transfers the flourishing kingdom in which the Israelites were in bondage, the Mitzraim of Scripture—hitherto identified, without any question, with the Egypt of the Pharaohs—to the blank wilderness plateau east of the Isthmus of Suez, where there is neither vestige nor tradition of its existence. Having by this trifling feat brought Mitzraim to within a moderate distance of Akabah, Dr. Beke, for his second expedient,

argues that the journey from Rameses to the sea—hitherto believed to have occupied but three days, three stages only being mentioned in the Scripture itinerary—must have extended to no fewer than six days; and he adduces some ingenious, but by no means conclusive, reasons in favour of this hypothesis. Thus, by first moving Rameses perhaps eighty or a hundred miles to the eastward, at the bidding of his theory, and then galloping the Israelites—men, women, and children, flocks and herds and very much cattle—over some twenty miles daily, for six successive days, he brings them to the head of the Gulf of Akabah, and so across the sea.

“Thence, according to the Scripture narrative, there were at least ten days’ journey (seventeen Dr. Beke ought to say, doubling the last seven stages) before Mount Sinai was reached. To be consistent, therefore, we should look for a Mount Sinai at from ten to seventeen days’ journey, or at all events at a considerable distance, in some direction or other from Akabah. But Dr. Beke’s ‘true Mount Sinai’ is within a day’s walk of it, say fifteen miles; and in order to dispose of the intervening stages, he is driven to the desperate manœuvre of making the host first turn their backs upon their destination, march for five days (this time without any multiplication), to an encampment by the sea eighty miles down the east side of the Gulf of Akabah—which encampment, by the way, he now places at between thirty and forty miles from the position he last assigned to it—and then face about and retrace their steps to Sinai. Can Dr. Beke seriously suppose that Moses, who knew perfectly well where Sinai was, could have acted in this purposeless manner?

“It is difficult to write gravely upon this truly marvellous hypothesis. It is much as though, on learning that a pedestrian, some years ago, had walked from the Marble Arch to Charing Cross in half an hour, passing a post-office at about one-fourth of the way, one were to assume that Charing Cross really meant the Bank of England, and that the post-office must have been the General Post Office; and that, as there might be a little difficulty in maintaining that the distance from the Marble Arch to St. Martin’s-le-Grand could be accomplished in some seven minutes on foot, it would only be right to assume that the seven minutes must have been fourteen minutes, thus increasing the half-hour to thirty-seven minutes; and that the Marble Arch, in defiance of all testimony to the contrary, must then have stood at the bottom of Tottenham Court Road, from which point an active man might possibly do it in the time. Then there would be twenty-three minutes left; so the pedestrian, instead of going on at once to the Bank, which he would reach much too soon, must be supposed to have wandered as far as the bottom of Ludgate Hill and back, in order to keep him walking all the time.

"This, sir, is the kind of theory, with its concomitant demands and results, which, so far as I can gather from his public writings, Dr. Beke would have us accept in the 'cause of truth.' It is needless to defend the Ordnance Survey against it, or to anticipate the verdict of the public. If the Biblical itinerary is to be manipulated in this fashion; if journeys are to be stretched to the breaking point at one end, compressed and looped-up at the other; if a well-identified ancient kingdom is to be moved about like a piece upon a chess-board, and the simple inferences from Scripture are to be multiplied, just when convenient, by two,—all to suit the fancies of a single theorist, who undertakes to settle a difficult question like this at the end of his first afternoon in the desert, and who has failed in the very matter which he set out to prove, and on which he had staked his reputation—then, surely, there is an end to the study of sacred or any other geography—an end, indeed, to all topographical inquiry. It were time for the Palestine Exploration Fund to wind up its affairs, and for the Royal Geographical Society to close its doors.

"I do not think that the points regarding myself in Dr. Beke's letter call for any remark. It may be as well, however, to assure him that when I wrote my last letter I was acquainted with his previous opinions, and that, in styling his present hypothesis 'new,' I did so because his 'true Mount Sinai' turns out to be not within fifty miles of the position he formerly suggested, to say nothing of the sudden abandonment of his 'volcano' theory—that *ignis fatuus* which led him to the desert.

"I will only add that, if Dr. Beke will give us an opportunity of breaking a friendly lance with him at the Geographical Society or elsewhere, my late colleagues and I shall be but too happy to encounter him, without the least 'personal feeling,' and simply in the interests of geography and truth. Nor would his present 'hallucinations' cause us to forget his justly earned eminence as a geographer and a scholar.

"Apologising for the length of this letter, and promising not to trouble you on the subject again."

[Dr. Beke had no opportunity afforded him of doing this, as, although he was frequently at the offices of the Royal Geographical Society, he was never asked to read a paper.]

Dr. Beke to the Editor of the "Times," published 9th April 1874.

Dr. Charles Beke writes to us in reply to the various correspondents who have disputed his claim to be the discoverer of the true Mount Sinai:—

"Were you to afford me ten times the space that I almost hesitate to ask you to grant me in the valuable columns of the 'Times,' it would hardly suffice for a complete answer to all the various matters

brought up against me in the letters of the members of the late Ordnance Survey published in the 'Times' of the 3d inst. The writers of those letters have put their foot down on my Mount Sinai, and seem determined, by every means in their power, to stamp out my theory, after the example of the late Dean Milman in the 'Quarterly Review.' This time, however, the attempt to crush me is, fortunately, made in the 'Times,' and as the maxim of your influential journal is '*Audi alteram partem*,' I fear not the result, let the odds against me be what they may.

"In the discussion of this most important question, which ought to be above party considerations of every kind. I regret to observe that my entreaty that all personal feelings might be laid aside has been disregarded. Major Palmer so far forgets himself as to speak of my 'hallucinations,' while the anonymous writer who has taken Mr. Holland's place expresses his suspicion that the name of *Jebel-en-Nur*—the 'Mountain of Light'—originated with myself! I will not notice what is virtually an imputation of fraud and imposture further than to say, that I think 'One who has been there' would have been ashamed to make it in his own name.

"Leaving these miserable personalities, I turn to the serious consideration of some of the main points in dispute. First, I am accused of having wrongfully charged the Ordnance Surveyors with unsettling, rather than settling, matters, and of differing among themselves as to the identification of the Mountain of the Law, and I am told that *Jebel Musa* and *Ras Sufsafah* are the same. To this I reply, that I have before me a copy of the Ordnance Survey map, on which I see marked the two separate and distinct peaks of *Jebel Musa* with an elevation of 7363 feet, and *Ras Sufsafah* with an elevation of 6541 feet, the former of those peaks being considered to be ~~Mount Sinai~~, and the latter *Mount Horeb*; and, without raising a question as to whether the *Horeb* of Scripture was or was not a different mountain from *Sinai*, I would ask which of the two peaks shown on the map is deemed to be the Mountain of the Law? Tradition says the former, and Mr. Holland asserts his 'faith in *Jebel Musa*.' On the other hand, Major Wilson affirms that 'all the conditions required by the Bible narrative are fully met by the identification of *Mount Sinai* with the well-known *Ras Sufsafah*,' and 'One who has been there' first charges me with 'error in describing *Jebel Musa* and *Ras el Sufsafah* as two distinct mountains'—whereas what I said was that the latter 'is a separate peak further to the north' than *Jebel Musa*, as, in fact, the Ordnance Survey map shows it to be,—and then he speaks of 'that wondrous cliff,' from which he 'looked down on the great plain of *El Rabah*,' &c., that cliff being the 'separate peak' of *Ras Sufsafah*, for from the summit of *Jebel Musa* the plain of *El Rabah* is not visible.

"Now, as the Mountain of the Law, whether called Sinai or Horeb, or both, cannot have been the two separate peaks in question, the members of the Surveying Expedition are bound to state categorically which of the two it is that they are 'perfectly agreed among themselves' is the one which was ascended by Moses in the sight of the children of Israel.

"Further, I would ask whether Professor Lepsius, Dr. Stewart, and the other learned travellers and scholars who have advocated the pretensions of Jebel Serbal, have signified their assent to the unqualified assertion that those pretensions 'have long yielded to the unquestionable results of recent scientific investigation'? If so, then it is desirable to know whether it is in favour of Jebel Musa or of the separate peak of Ras Sufsafeh that Jebel Serbal has so abdicated. Unless the advocates of the last-named mountain have done this, the result of the Ordnance Survey, as it appears to me, has been to unsettle matters more than ever by bringing forward the wondrous cliff of Ras Sufsafeh as a competitor for the honour of being the Mountain of the Law, in addition to the two rival peaks of Jebel Musa and Jebel Serbal.

"The use made of my incontrovertible proof that the Israelites were six days, and not three days, in reaching the Red Sea is quite characteristic. Mr. Holland asserted that the distance of three days 'exactly agrees with that of the head of the Gulf of Suez' from Ismailia, which place he makes to be the starting-point of the Israelites. His substitute now admits that it is 'more probable' the fugitives 'took six days than three' to travel this self-same distance. With such facile manipulations of the Bible itinerary, is it not true, as Mr. Holland himself avowed only a few years since, that 'all attempts to lay down the probable line of march of the children of Israel are mere guesswork'?

"But I must not confine myself to pointing out the inconsistencies of my opponents, lest I should really render myself amenable to Major Palmer's accusation, that, instead of trying to prove my own point, I adopt the tactics, so common in weak and doubtful causes, of attacking the opposite side, merely remarking that what is thus said reminds one of the fable of the wolf and the lamb, inasmuch as, instead of being the attacking party, I am the object of a systematic attack, begun without even waiting for my arrival in England to defend myself.

"The assertion that Jebel-en-Nur is 'a large flat-topped mountain' will be disproved when Mr. Milne's sketches of it shall appear in the 'Illustrated London News.' The further assertion that I place a 'region answering to the Egypt we know of' and 'a second Nile' somewhere within 'the country to the east of the spot which I reached,' displays what I am willing to believe is nothing more

than sheer ignorance. What I did say in my '*Origines Biblicæ*' was that Mitzraim, the Land of Bondage of the Israelites, formed no portion of Egypt proper, but lay to the north-east, between it and the country of the Philistines, a people of cognate origin with the Mitzrites. Major Palmer is pleased to call this a hallucination. Sane and dispassionately will I endeavour not only to prove it to be a sober truth, but likewise to show that since this theory of mine was enunciated, scholars generally have been coming to adopt substantially my views on the subject. At that time, now forty years ago, it was regarded as an indisputable fact that the Israelites were in bondage in the very heart of Egypt, where they built the Pyramids, and I know not what besides, and that their exodus was from Memphis, the capital, on the west side of the Nile, above Cairo. By degrees their starting-point has been shifted north-eastwards, so that in the map of 'Sinai and the Desert of the Wanderings,' in Dr. William Smith's '*Ancient Atlas*,' Rameses is placed at or near Tell-el-Abbassiyeh, on the fresh-water canal, while Mr. Holland goes yet further, and places it at Ismailia, some thirty miles more to the east, and as much as seventy miles north-east of Memphis. I may here notice that on the same map I see marked three different spots, at distances of thirty miles or more apart, all with the name 'Kadesh-Barnea,' which affords an additional proof of the truth of Mr. Holland's assertion, that 'all attempts to lay down the probable line of march of the children of Israel are mere guesswork.'

"But to go back to the Land of Bondage. Ismailia being now recognised as the starting-point of the Israelites, it is manifest that the '*Bible itinerary*' has been '*manipulated*' to such an extent during the last forty years—not by me, but by others—as to come half-way to meet me. Nevertheless, it is asserted that my theory is 'in defiance of the testimony of history and of hieroglyphic monuments, and of the opinion of all comparative geographers and critics.' This is anything but the fact. Many years ago an Egyptologist of some repute, now deceased, asserted unequivocally that neither in the history nor on the hieroglyphic monuments of Egypt is there any evidence whatever of the presence of the Israelites in Egypt, and that, so far as history and those monuments are concerned, the Bible history might be a myth. I am grieved to say that of late years, and more especially within the last month, when I was in Egypt, I have heard the story of the Exodus denounced as a mere fable, and this by men of high standing in the scientific world. And yet, in fact, it is a fable, not in itself, but in the manner and form in which it is represented by the Septuagint translators and traditionists.

"The most recent investigations have, however, so modified the

history of the Israelites with reference to their sojourn in the Land of Bondage as to render the difference between the views of the most enlightened scholars and those entertained by myself little more than nominal, whereby the stigma attached to that history in its traditional form is fast being removed. The distinguished Egyptologist, M. Mariette, the founder and director of the Museum of Egyptian Antiquities at Boulak, thus writes in his able little work, '*Aperçu de l'Histoire d'Égypte*' (2nd edit., 1872), p. 41:—

"'Strong presumptions tend to make us believe that the Patriarch Joseph came into Egypt under the Shepherds, and that the scene of the touching story related in the Book of Genesis was the court of one of those foreign kings. Joseph was therefore not the Minister of a Pharaoh of national extraction. It was a Shepherd king—that is to say, a Shemite like himself, whom Joseph served, and the elevation of the Hebrew Minister becomes the more intelligible on the assumption that he was patronised by a sovereign of the same race as himself.'

"Thus, according to Mr. Holland, the Land of Bondage was at or near Ismailia, on, if not beyond, the confines of Egypt proper, and according to M. Mariette (*loc. cit.*), the people among whom the Israelites dwelt were not Egyptians at all, but a race of foreign shepherds whose descendants and representatives are 'those foreigners with robust limbs, harsh features, and oval faces, who to this day inhabit the shores of Lake Menzaleh'—foreigners to whom, as Professor Owen truly states in the '*Times*' of May 25, 1869, 'Egypt was indebted for the horse as a beast of draught. Previous to this Philistine or Arabian invasion, the manifold frescoes in the tombs of Egyptian worthies show no other soliped than the ass. The dromedary was a still later introduction.'

"And what is the ungarbled evidence of the Hebrew Scriptures themselves? In that inestimable canon of ethnology and geography handed down to us in the tenth chapter of Genesis, it is recorded, under the head of the Children of Ham, that 'Mitzraim begat . . . Pathrusim and Casluhim, out of whom came Philistim; showing that the Mitzrites or Shepherds and the Philistines were nations of cognate origin, with which fact the conclusions of M. Mariette, Professor Owen, and myself are in perfect harmony.

Had the translators of the Septuagint Greek version but stuck to their text, and retained the Hebrew name 'Mitzraim' in the subsequent portions of their work, as they have done in the passage just cited, the prevailing error against which I have so long contended might never have arisen, or at all events could not have become so deeply rooted as it is. But only two chapters further on, when the migrations of the Patriarch Abram are narrated, it is

said that, as he 'journeyed, going on still towards the south, there was a famine in the land, and Abram went down into Egypt to sojourn there' (Gen. xii. 9, 10)—the identical word 'Mitzraim' of the tenth chapter being thus, in the very next page, unwarrantably altered to 'Egypt.'

"Mitzraim, then, was a country lying to the north-east of Egypt proper, towards Philistia, possessing in the earliest ages both horses and dromedaries ('camels'), which Egypt did not till subsequently; and being, like Philistia, famous for its vast corn-fields, which during ages furnished to the Israelites a resource in periods of famine. This is instanced in the story of the Shunamite widow, who, having been forewarned by Elisha of the approaching famine, 'went with her household into the land of the Philistines seven years' (2 Kings viii. 1, 2), precisely as, eight centuries previously, her ancestor the Patriarch Jacob and his household had, under a similar seven years' famine, migrated into the neighbouring corn-growing country of the Mitzrites.

"How so gross an error as that of confounding Egypt with Mitzraim should have arisen is a story too long to be repeated in the 'Times,' besides, it is already narrated in 'Origines Biblicæ.' But one of the consequences of this error, which is not noticed in my work, may be briefly stated here. When the Patriarch Joseph introduced his father and brethren to Pharaoh he directed them to say, 'Thy servants are shepherds,' for the reason, as is alleged in all the versions of the Scriptures that follow the Greek Septuagint, though not in the Targum of Onkelos, that 'every shepherd is an abomination to the Egyptians' (Gen. xli. 34). Now this assertion, taken by itself and apart from the context, is no doubt literally true, for the Shepherds, or Hyksos, that is to say the Mitzrites, were held in intense hatred by the Egyptians, though even then it would not be intelligible why Joseph should have so specially directed his kinsmen to say their occupation was that of this accursed race. But, taken in connection with the context and with the facts of the history as now beginning to be understood, it would be the height of absurdity to imagine Joseph to have told his father that every shepherd was an abomination to a people who were themselves shepherds.

"The fact is, however, that the word *to'ebah* of the Hebrew text, which is so wrongly translated 'abomination,' has, like the Greek *ἀνάθημα* and the Latin *sacer*, a double meaning. It cannot well be rendered into English so as to preserve the ambiguity, though Milton has 'But to destruction sacred and devote.' But in French it may be said *tout pasteur est sacré*, which may be understood as signifying either *un homme sacré* or *un sacré homme*, and the Septuagint translators, in their ignorance, adopted the latter meaning. There can, however, be no doubt that the true inter-

pretation of what Joseph said to his father is, 'Every shepherd is sacred (or an object of respect or veneration) to the Mitzrites.' The same error is committed with respect to the sheep, the sacred animal of the Mitzrites, which Moses told Pharaoh it was not meet for him to sacrifice in the land; for, said he, 'so shall we sacrifice the *to'ebah*'—that is, *l'anāmal sacré*, and not *le sacré animal*—'of the Mitzrites before their eyes, and will they not stone us?' (Exod. viii. 26).

"In the 'Times' of March 30th I adduced a further instance of the ignorance displayed by the Greek translators in supposing the golden image made by Aaron for the children of Israel to worship at Sinai to have been in the form of a calf, as representing an Egyptian deity, instead of a cone, the emblem of fire, in which form alone the Almighty had been manifested to Moses and the people.

"Under such circumstances there is not, after all, anything extraordinary in the fact that those translators imagined Mitzraim, in which country shepherds and their flocks were venerated and respected, to be Egypt, where the foreign Hyksos, Shepherds, or Mitzrites were truly 'an abomination.'

"The bearing of this general question on the particular subject now under discussion with the members of the Ordnance Survey is this:—At the time when the Israelites were still in bondage under the Mitzritish shepherds Moses 'fled from the face of Pharaoh, and dwelt in the land of Midian' (Exod. ii. 15), which land is a portion of the 'east country' (Gen. xxv. 6), that is to say, the country east of Jordan. While there, 'Moses kept the flock of his father-in-law Jethro, and he led the flock to the back'—in Hebrew *akkhor*, meaning 'west'—'side of the desert, and came to the mountain of God, even to Horeb' (Exod. iii. 1).

"Now, it may well seem incomprehensible that the traditional Mount Sinai, instead of being at the west side of the land of Midian in the 'east country,' should have been placed within the peninsula between the two Gulfs of Suez and Akaba, in a region far away to the south of the 'south country' (Gen. xx. 1); and not less so must be the idea that Moses should have fled from the face of Pharaoh into a district in which there was a colony of Egyptians, with copper mines worked by them, as the hieroglyphics there show. But what seems the most incomprehensible of all is that it should have come to be imagined that the Israelites, who were constantly in a state of insubordination and even rebellion, and anxiously longing to return into Mitzraim ('Egypt'), should have been led by Moses into the *cul-de-sac* between the two Gulfs, where they were almost within sight of Egypt, and whence at any moment they would not have had the slightest difficulty in re-

turning. The key to the whole of these inconsistencies and absurdities is this :—At some remote period, probably in the early ages of Christianity, it was found convenient to have the Mountain of God near at hand for pilgrims to visit, and therefore it was removed into its present traditional position from its true place on the west side of the desert of Midian, in the east country, beyond the Valley of the Jordan and the Sea of Edom, where, following the indications of Scripture, I declared forty years ago it was to be sought for, and now, *before I die*, I have been enabled to discover it ; in like manner as, at a later age of the Christian era, it became necessary for the accommodation of pilgrims to transport the ‘Holy House’ from Nazareth, first into Dalmatia, and then to Loreto, where it is believed to stand by those multitudes who look on tradition and ‘authority’ as of greater weight than the dictates of truth and common sense.

“But I have been led to dilate far more than I intended.” At the outset of this controversy, Major Wilson truly said that your paper is hardly fitting for a long discussion of this sort. I only lament that I should be under the necessity of occupying so much of your valuable space in answering strictures on what was meant by me to be a simple statement, for the information of your readers and the public at large, of what I had done and seen on the journey from which I have just returned, without imagining it would have been subjected to such animadversions, at all events not until the full particulars had been published of what I believe will be admitted to be a most important discovery by all except those who are interested in upholding the traditional identifications. I must further explain, that in making that statement in the ‘Times’ I had no possible motive for alluding to the Ordnance Survey of the peninsula, inasmuch as it relates to a totally different region from that visited by me ; and for the same reason I have now no need to avail myself of Major Wilson’s friendly offer to produce to me all the published documents connected with that survey. Such an offer, however well meant, is much the same (he will permit me to say) as if, now that the Astronomer Royal has shown that when Cæsar invaded Britain his fleet on leaving Dover sailed with the tide down Channel instead of up, the Lord Warden of the Cinque Ports (I must beg Earl Granville’s pardon for the absurd proposition) were to offer to place at my disposal charts of the Downs and the east coast of Kent, with a map of Deal and the vicinity, and even a plan with sections and elevations of Walmer Castle, in order to illustrate Cæsar’s landing on the south coast.

“I must thank you for your impartiality and great consideration in thus allowing me to defend myself from what I cannot but regard as a most uncalled-for attack on the part of the members of the Ordnance Survey.”

ON THE EXODUS OF THE ISRAELITES.

Dr. Beke to the "Athenæum," published 16th May 1874.

"When I was at Cairo in the beginning of last March, on my way back from *Jebel-en-Nur*, which I identify with Mount Sinai, I was informed by Professor Brugsch, the distinguished Egyptologist, that it was radically erroneous to imagine the Children of Israel, in their Exodus, to have crossed the Red Sea, whether this be the Gulf of Suez as is generally supposed, or the Gulf of Akaba as I contend; for that the sea through which the fugitives passed was the Serbonian Lake near Mount Casius, in the north-east of Egypt. Upon this point he told me there was no possible room for doubt. Egyptian hieroglyphical inscriptions identify Rameses, whence the Israelites commenced their flight, with Tanis, now represented by San, and they likewise establish the position of the several stations on the route from Rameses to the Red Sea. He added, that, after the passage through the sea, the only localities he had found mentioned were 'Marah' and the 'land of Sina,' of which the positions were not yet determinable.

"The coolness with which the erudite Professor expounded all these matters to me was quite refreshing. Repeatedly did he assure me that he was not expressing any opinion of his own: it is no matter of opinion; the inscriptions speak for themselves. And he was so obliging as to look them up from the immense collection of materials he is amassing for a Geographical Dictionary, on which he has long been engaged, in order that, as he said, I might read them myself. As my knowledge of hieroglyphics, however, is almost limited to what I learned from Dr. Thomas Young's discovery before M. Champollion's system was invented, I was content to take Professor Brugsch's word for everything being as he stated; though, at the same time, I could have no difficulty in recognising the bridge over which the Israelites crossed the Pelusiac arm of the Nile, with the crocodiles in the river, as depicted in one of the pieces shown to me.

"I was given to understand that it would be some considerable time before the particulars of this interesting discovery would be made known to the world; but from a letter from Cairo, published in the 'Times' of the 28th ultimo, I perceive that Professor Brugsch, stimulated apparently by my visit to him, has just read a paper before a society in that city, in which he has publicly enunciated what he had so kindly imparted to me privately.

"From the printed report of that paper I gather that its author repudiates altogether the expression 'Yam Suf,' or 'Red Sea' of

the Scriptures, for the reason that it occurs only in Moses' Song in the fifteenth chapter of Exodus, which was 'composed a long time after the occurrence;' whereas 'in the true historical narrative there is only mention made in a general way of *'the sea,'* which was the Mediterranean.' My impression however is, though of course I may be mistaken, that Professor Brugsch showed me some characters, which he read 'Yam Sufa,' as being the name of the body of water through which the Israelites passed. It may be expedient to explain that the expression in the original Hebrew text translated 'Red Sea,' is 'Yam Suf,' that is to say, the 'Sea of Suf,' this being the denomination of the sea 'in the land of Edom' of 1 Kings ix. 26, on the shore of which was Ezion-Geber, where Solomon, king of Israel, in conjunction with Hiram, king of Tyre, made a navy of ships to go to Ophir. And as the Hebrew word 'Edom' means 'red,' the name of this 'Edom' Sea was, in accordance with the custom of the Tyrians or Phœnicians, and, after their example, of the Greeks, translated 'Erythræan' or 'Red' Sea; and this term, though in the first instance belonging to the Gulf of Akaba alone, became applied to the entire Arabian Gulf, and thence was eventually extended to the seas washing the whole coast of Arabia, and even to the Indian Ocean; just as, in later ages, the names of 'Atlantic' and 'Pacific,' which belonged in the first instance to the seas on the west coasts of Africa and America respectively, have been extended to the entire oceans of the two hemispheres.

"Professor Brugsch says, however, that the 'Red Sea' is named only in Moses' Song, and that in the historical narrative of the Exodus mention is made in a general way of *'the sea'* alone. But on this I feel myself called on to remark that the expression 'Yam Suf' occurs in more than one place besides Moses' Song in connection with the passage of the Israelites through the sea. For instance, in Exodus xiii. 16, 17, it is said that 'God led the Israelites, not by the way of the land of the Philistines, although that was near, . . . but God led the people about by the way of the wilderness of the *Yam Suf*;' and in Exodus xv. 22, after Moses' Song is ended and the historical narrative is resumed, it is said, 'And (wrongly translated 'so') Moses brought Israel from the *Yam Suf*, and they went into the wilderness of Shur.' Further, in Numbers xxxiii. 8, after it has been said that 'they departed from before Pihahiroth, and passed through the midst of *the sea* into the wilderness,' it is stated, in verse 10, that 'they removed from Elim, and encamped by the *Yam Suf*.'

"The report in the 'Times' adds that Mariette Bey has given his adherence to the conclusions of Professor Brugsch, whom he considers to have adduced arguments 'short and few, but irresistibly solid,' in support of his theory; which theory, he says,

'explains all difficulties hitherto experienced, and takes away every stumbling-block.'

"It remains to be seen what the members of the Ordnance Survey of the peninsula of the traditional Mount Sinai will say to these novel views, they having, in their recent controversy with me (see the 'Times' of 3d and 9th April), appealed to 'the testimony of history and of hieroglyphic monuments.'

"For my part, as I have not the same faith as they have in the hieroglyphic monuments as hitherto interpreted, I am not made at all uneasy by Professor Brugsch's reading from them of the Scripture history. At the same time, I may remark, that, assuming for the sake of argument the correctness of his theory, there might be a means of reconciling it with mine, which places Mount Sinai in the 'east country' beyond the land of Edom and its sea—the Red (Edom) Sea, or Gulf of Akaba; whereas Professor Brugsch's views appear to be utterly irreconcilable with those of the Ordnance Surveyors and the traditionists, who place that mountain in the Peninsula between the Gulfs of Akaba and Suez, far away to the south of the 'south country.'"

C.

METEOROLOGICAL OBSERVATIONS MADE ON A JOURNEY TO
MOUNT SINAI (JEBEL BÂGHIR).

By DR. CHARLES T. BEKE, Ph.D., F.S.A., F.R.G.S., &c.

Date.	Station.	Temp of Air.	Aneroids.		Hypo- meter.		Elevation above Sea.
			B.	M.	17454	17449	
1874.		Deg.			Deg.	Deg.	Feet.
Jan. 31, 8 A.M.	Foot of Mount Sinai (Bâghir).	...	28.21	27.25	...	...	...
" " noon.	Summit.	...	24.92	...	...	...	5136. An- roid probably shaken 1876.
" " 4½ P.M.	Foot of mountain.	...	28.05	27.25	...	...	Hypsometer doubtful.
Feb. 1, 8 A.M.	Do.	44	28.17	27.25	209	...	2403
" " noon.	Wady Hesma.	...	27.62	26.70	...	...	3417
" " 2 P.M.	Mount Atâghtagieh	...	...	25.67	...	...	2463*
" " 4 "	Wady Hesma.	...	...	26.65	...	...	...
" " 2, 7½ A.M.	Do.	...	27.61	26.63	...	...	...
" " 8 "	Do.	50	...	...	207.8	207.8	...
" " 3, 7 "	Do.	50	27.70	26.73	...	...	...
" " 3 P.M.	Wady Ithem, a little above station of Jan. 31st.	53	27.97	27.02	...	...	2032
" " 4, 7 A.M.	Do.	53	28.02	27.10	...	...	...
" " noon.	Wady Amran.	51	28.23	27.32	...	...	1751
" " 5, 7 A.M.	Do.	38.5	28.32	27.32	...	...	...
" " 3 P.M.	{ Sea-shore, north }	72	30.07	29.35	...	...	...
" " 9 "	{ of Akaba. }	...	30.16	29.45	...	...	...
" " 6, 10 A.M.	Do.	63	30.18	...	212.2	...	...
" " 1½ P.M.	Do.	70	30.10	...	...	...	...
" " 7, 8 A.M.	Do.	56	30.22	29.42	...	...	...
" " 3½ P.M.	Wady Satkh.	54	29.00	28.06	...	...	1010
" " 8, 7 A.M.	Do.	48	29.10	28.12	...	...	...
" " 10 A.M.	Ras es Satkh.	...	28.02	27.07	...	...	2006
" " 4 P.M.	{ Et Tih, below }	47.5	28.15	27.16	...	...	1839
" " 6½ A.M.	{ Tarf-el-Rukn. }	32	28.19	27.19	...	...	...
" " 4½ P.M.	Et Tih.	...	28.01	27.10	...	...	2012
" " 10, 7 A.M.	Do.	48	28.02	27.00	...	...	...
" " 6 P.M.	Wady Rith.	49	28.62	27.62	...	...	1384
" " 11, 6½ A.M.	Do.	42	28.67	27.68	...	...	...
" " 9 P.M.	Kallaat en Nakhl.	48	29.01	28.14	...	...	1044 by Aneroid B; 919 by Aneroid M.
" " 12, 7 A.M.	Do.	34	...	...	...	...	...
" " 8 "	Do.	36	...	...	210.9	210.8	713
" " 6½ P.M.	Wady Nethilah.	51	28.92	27.95	...	...	1101
" " 13, 7 A.M.	Do.	45	28.97	28.01	...	...	...
" " 6 P.M.	Wady-el-Hawawiet.	47	28.65	27.74	...	...	1371
" " 14, 7 A.M.	Do.	38.5	28.67	27.75	...	...	...
" " 9½ "	Jebel Heitan.	...	28.37	...	...	...	1659
" " 6 P.M.	Ras el Gibab.	48	29.02	28.14	...	...	1013
" " 15, 7 A.M.	Do.	...	29.07	28.17	...	...	...
" " 6 P.M.	Plain of Nowatir.	57	30.05	29.22	...	...	91
" " 16, 7 A.M.	Do.	40	30.02	29.14	...	...	...
" " 7 P.M.	Suez.	62.5	30.27	...	212.6	212.4	...

Remarks.—The hypsometers were certified at Kew Observatory in April 1873 to have minus errors varying from .05 to .20 of a degree.

Aneroid B was found to have a plus error of 0.21 at outset, and 0.23 on return. Nothing appears to be known of its behaviour under great change of pressure and temperature.

Aneroid M indicated nearly one inch too low.

When the hypsometer observations are corrected for the errors found nine months previously, and the corresponding pressures taken from Regnault's Tables of Tension, these pressures do not agree, as they should do, with the readings of aneroid B corrected for its said error.

It may safely be assumed that the bulbs of the hypsometers have contracted sufficiently to eradicate the minus errors. Still, even assuming the hypsometers to be correct, it does not reconcile their indications with those of aneroid B unless it be also assumed that the error assigned to it is not satisfactory, although the discordance is then not so great. Accordingly, the hypsometers have to be considered correct, and used to check aneroid B, and B has been used to check M. Thus, on

Feb. 1,	hypsometer 209°	= pressure 28.18 ;	aneroid 29.17,	cor. +.01
" 2,	"	207.8 =	" 27.51	" 27.61 " -.10
" 6,	"	212.2 =	" 30.04	" 30.18 " -.14
" 12,	"	210.85 =	" 29.25	" ?
" 16,	"	212.5 =	" 30.22	" 30.27 " -.05

Rejecting the first, which is marked doubtful, the mean is $-.10$, and this correction has been used throughout for aneroid B.

Dove's Thermal Charts show the mean temperature to be 60° in February in the peninsula of Sinai; and Buchan's Memoir on Atmospheric Pressure gives for

Suez, in January	30.095,	and in February	30.127
Ismailia, "	30.062	"	30.079
Port Said, "	30.080	"	30.103
Cairo, "	30.000	"	30.036

The mean of these is 30.07, which corrected for latitude, as the formula for finding heights requires, is 30.03 inches; and this agrees very closely with the actual observations at the sea level.

R. STRACHAN.

May 12, 1874.

D.

COPY OF PROFESSOR OLIVER'S DETERMINATION OF PLANTS COLLECTED NEAR AKABA BY MR. JOHN MILNE, F.G.S., ON DR. BEKE'S EXPEDITION TO SINAI IN ARABIA, JANUARY AND FEBRUARY 1874.¹

Diploaxis (*Moricandia*) *hesperidiflora*, DC. Between Akaba and Suez.

Erucaria aleppica, Gaert. Between Akaba and Suez.

Zilla myagroides, Forsk. Madiān.

Malcolmia pulchella, Boiss. Between Akaba and Suez.

Crucifer in fl. and young pod only. I have not yet determined this (*Petala florida purpureo vinosa*). Between Akaba and Suez.

Cleome droserifolia, Del. Madiān.

Capparis spinosa, L. ? (leaves). Jebel Bāghir.

Reseda canescens, L. Wady Etham.

Polycarpaea prostrata, Decaisne. Akaba.

Fagonia cretica (*Arabica* and vars.). Wady Etham, Madiān, and between Akaba and Suez ?

Erodium pulverulentum ? Cav. or *E. laciniatum* Cav. ? (minute specimen). Between Akaba and Suez.

Erodium sp. ? indeterminable. Between Akaba and Suez.

Sageretia brandrethiana,² Aitch. ? (very near *S. theezans*). Jebel Bāghir.

Zizyphus Spina-Christi (leafy specimen only). Jebel Bāghir.

Ononis.³ A monstrous state of *O. Natrix* ? (calyx lobes dentatis). Jebel Bāghir.

Cassia acutifolia, Del. Between Akaba and Suez.

Acacia (minute fragment). Madiān.

Trigonella sp. ? Insufficient. Wady Etham.

Genista monosperma (*Retama Roetam*). Between Akaba and Suez.

Colutea haleppica, Lam. ? Jebel Bāghir.

Onobrychis ? (leaf only). Between Akaba and Suez.

Astragalus ? (leaves). Akaba.

Calendula arvensis ? Between Akaba and Suez.

Conyza,⁴ an sp. nov. ? Can this be a glabrous variety of *C. ægyptiaca* ? Madiān.

Artemisia, an *A. maritima*. Akaba.

¹ See "Notes on the Flora of the Desert of Sinai," by Richard Milne Redhead, F.L.S., in "Journal of Linnean Society," vol. ix., 1867, in illustration of the present list.

² Had not been found east of the Muscat region of Arabia.

³ If normal, is curious.

⁴ Appears to be a new species.

Scorzonera ? (leafy specimen). Eaten by Beduins ; called by them
Sasel. Not determinable.

Senecio coronopifolius. Between Akaba and Suez.

Salvia ægyptiaca, L. Wady Etham and Akaba.

Salvia deserti, Decaisne. Akaba.

Lavandula, an *L. pubescens*, *L. multifida*, and a few additional
indeterminable *Labiata*æ. Jebel Bághir.

Anchusa ? (imperfect specimen). Akaba.

Phelipæa, probably *P. lutea*, Desf. Madiān (with drawing).

Forskolea tenacissima, L. Akaba.

Mercurialis annua, L. Jebel Bághir.

Merendera caucasica, M.B. Jebel Bághir.

Muscari botryoides, Mill. Jebel Bághir.

Muscari frons (leaf ?)

Notholaena lanuginosa. Wady Etham.

Cheilanthes odorata. Jebel Bághir.

E.

LIST OF SHELLS COLLECTED ON DR. BEKE'S EXPEDITION TO
SINAI IN ARABIA IN 1874, BY MR. JOHN MILNE, F.G.S.

First List.

- | | |
|--------------------------------|----------------------------------|
| 1. <i>Conus arenatus.</i> | 9. <i>Conus nussatella.</i> |
| 2. <i>Cassis vibex.</i> | 10. <i>Cerithium nodulosum.</i> |
| 3. <i>Nerita polita.</i> | 11. <i>Conus tessellatus.</i> |
| 4. <i>Turbinella polygona.</i> | 12. <i>Terebellum subulatum.</i> |
| 5. <i>Psammobia rugosa.</i> | 13. <i>Modulus tectum.</i> |
| 6. <i>Malea pomum.</i> | 14. <i>Nassa arcularia.</i> |
| 7. <i>Triton pulearis.</i> | 15. <i>Strombus urcens.</i> |
| 8. <i>Strombus gibberulus.</i> | 16. <i>Clanculus pharaonis.</i> |

Second List.

- | | |
|--------------------------------|-------------------------------------|
| 1. <i>Amphidesma.</i> | 26. <i>Cypræa globulus.</i> |
| 2. <i>Triton rubecula.</i> | 27. <i>Pecten ziezeae.</i> |
| 3. <i>Harpa solida.</i> | 28. <i>Cerithium sp.</i> |
| 4. <i>Young Cypræa.</i> | 29. <i>Turbo margaritaceus.</i> |
| 5. <i>Polia sp.</i> | 30. <i>Chama ruppellii.</i> |
| 6. <i>Haliotis.</i> | 31. <i>Nerita arabica.</i> |
| 7. <i>Mactra decora.</i> | 32. <i>Cypræa.</i> |
| 8. <i>Cardita angisulcata.</i> | 33. <i>Fusus sp.</i> |
| 9. <i>Purpura intermedia.</i> | 34. <i>Cytherea blanda.</i> |
| 10. <i>Arca.</i> | 35. <i>Tridacna elongata.</i> |
| 11. <i>Conus quercinus.</i> | 36. <i>Pectunculus paucipictus.</i> |
| 12. <i>Pecten senatorius.</i> | 37. <i>Terebra nubeculata.</i> |
| 13. <i>Arca decussata.</i> | 38. <i>Strombus fusiformis.</i> |
| 14. <i>Natica mammilla.</i> | 39. <i>Pecten pes-felis.</i> |
| 15. <i>Nassa sp.</i> | 40. <i>Arca hanleyana.</i> |
| 16. <i>Phasianella.</i> | 41. <i>Strombus floridus.</i> |
| 17. <i>Nassa.</i> | 42. <i>Nerita haustrum.</i> |
| 18. <i>Venus.</i> | 43. <i>Trochus sanguinolentus.</i> |
| 19. <i>Conus textile.</i> | 44. <i>Cypræa turdus.</i> |
| 20. <i>Lima squamosa.</i> | 45. <i>Conus monile.</i> |
| 21. <i>Ricinula morio.</i> | 46. <i>Pteria young.</i> |
| 22. <i>Trochus virgatus.</i> | 47. <i>Lucina divaricata.</i> |
| 23. <i>Circe arabica.</i> | 48. <i>Conus pennacens.</i> |
| 24. <i>Conus virgo.</i> | 49. <i>Natica albula.</i> |
| 25. <i>Venus crispata.</i> | 50. <i>Acra antiquata?</i> |

- | | |
|--------------------------------------|----------------------------------|
| 51. <i>Lucina pila</i> . | 57. <i>Tellina rugosa</i> . |
| 52. Operculum of <i>Turbo</i> . | 58. <i>Natica</i> . |
| 53. <i>Tellina scobiculta</i> . | 59. <i>Clanculus pharaonis</i> . |
| 54. <i>Cerithium</i> . | 60. <i>Pectunculus lividus</i> . |
| 55. <i>Lucina tumida</i> . | 61. <i>Ricinula elongata</i> . |
| 56. <i>Strombus gibberulus</i> , &c. | |

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