

HEIGHTS OF ONE HUNDRED AND FIFTY POINTS TO THE EAST OF JORDAN.

THE very valuable set of bench marks cut by Captain Wilson on his line of levelling from the Mediterranean to the Dead Sea, furnish a series of data without which the heights deduced from the readings of the aneroid barometer would be uncertain in the extreme.

In the present instance, each bench mark on the western side of the Jordan, coming down from Jerusalem, has given an efficient check to the observations taken on the eastern side.

These observations consist of readings of three aneroid barometers at the principal points met with during a month's surveying, and were there no other disturbing influences than those which affect the standard barometer, the heights obtained ought to be accurate to a very few feet. I noticed, however, with regret that, either owing to eccentricities in the make of the instruments, to the extreme heat, or perhaps to the rapid transition from one altitude to another, there was greater variation in the readings than is due to the diurnal range or other alteration in pressure of the atmosphere, as obtained from readings of the mercurial barometer at Jerusalem, and this was the more apparent because where our barometers were stationary for a day or two in camp, the oscillation corresponded to that at Jerusalem.

The barometers did not even keep relatively together well, perhaps because one was more sluggish in its movements than another.

As an extreme instance of the difficulty met with, I may mention that in passing rapidly from the Pilgrim's Ford to the Dead Sea, the barometer stood 30.95 at the ford, 30.9 at mouth of the Jordan, and 30.86 at about two miles to west, on level with Dead Sea, making more difference in about two hours than is due to the greatest daily range, and at the same time we had descended about 50ft.

I therefore think that any of the heights (except 'Ain as Sultân) may be out to as much as a 100ft., but not more, and if so they are (thanks to the O.S. bench marks) as near as, or nearer, than those averages on the western side published in Van de Velde's very useful memoir of 1858.

ITINERARY ON EAST SIDE OF JORDAN. 1867.

Altitude in Feet above Mean Sea Level of Mediterranean.

	Feet.	Feet.
18th July, 1867.		
6.30 a.m. Left 'Ain As Sul-	Feet.	12.30 p.m. } Mound of Nimrin - 630
tân.....	- 730	3.0 " } Mound of Kafraïn - 530
9.20 ,, } Jordan ford of an		
10.50 ,, } Nwâimeh.....	- 1160	19th July.
11.15 ,, Upper plain	- 1020	7.8 a.m. Left, near bottom
12.0 noon Irrigated ground ..		of Mound - 650

	Feet.		Feet.	
7.40 a.m.	{ Warm Spring near	8.30 a.m.	On plateau, Belka 2400	
8.30	{ Wady Al Mash- âideh -580	8.55 "	Ruin al Kafir 2680	
8.42 "	Point B -440	9.10 "	Christian (?) ruins 2600	
8.56 "	Wady umm 'Adsîs	9.50 "	Al Turkmaniyeih (footprint)	
9.30 "	Point C -120	10.50 "	Point D, Madiyaba on left 2680	
9.50 "	Point E, Wady Sûr 250	10.27 "	{ Rock, al Siât 2730	
10.36 "	Point F, on Water- shed 800	10.40 "		
11.2 "	{ Khirbet Sûr 1040	11.15 "	{ Mââin 2785	
11.20 "		1.30 p.m.		
12.15 p.m.	Top of ridge 1690	2.40 "	Footprint	
12.20 "	Arak al Emîr, ruins 1400	2.50 "	Christian ruins ...	
	Top of hill, S.W. of ruins 1940	3.25 "	{ Jebi Neba 2650	
		3.36 "		
			Highest point of Jebi Neba 2770	
	20th July.			
8.15 a.m.	Left Arak al Emîr		24th July.	
8.40 "	{ Point A 1700	6.50 a.m.	Left camp	
9.0 "		7.50 "	Watershed 2450	
9.38 "	Point B, crossed bed W. Bahâr ... 1010	8.0 "	Plain of the Belka 2350	
10.10 "	Top of Ninf 1760	8.5 "	{ Jebi Mushkar 2610	
10.45 "	{ Point C, Jebi Jabûs 2700	8.12 "		
11.10 "		Near 'Ain Hesban 2300	8.50 "	{ Jebi as Sawwâneh 2790
12.5 p.m.	Ruins of Hesban ... 2950	9.5 "	{ Al 'Aâl 2960	
	Bed of Wady near Shunet 1920	10.10 "	Ten minutes delay.	
		11.25 "	Beit Zarn 2920	
	22nd July.			
7.30 a.m.	Left 'Ain Hesban	11.30 "	{ Umm al Khanafish 2690	
7.45 "	Shunet Sakk 2200	12.0 noon		
7.58 "	{ W. Ahfdheil 2150	12.45 p.m.	{ Abu Nukleh 2940	
8.7 "		2.30 "		
8.30 "	Bend in W. Hesban	2.35 "	K. Balâith	
8.35 "	{ 'Ain Bûwarideh. 17200	3.5 "	Watershed 3080	
8.40 "		'Ain of same name	3.25 "	'Ain Nâûr 2430
8.45 "	{ Point 1770		25th July.	
8.56 "		7.5 a.m.	Left 'Ain Nâûr ...	
9.10 "	{ Left our horses ... 1090	7.35 "	{ Al Awâly 2990	
9.20 "		9.7 "		
9.45 "	Kulat umm abu'l Hussein 1070	9.22 "	{ Umm as Samâk ...	
9.55 "	{ Point F 1640	9.47 "		
10.30 "		Crossed W. Mûsa 1440	10.5 "	{ Bannayet 2940
11.0 "	{ Camp near Ayûn Mûsa 1570	10.20 "	{ Point A	
11.20 p.m.		Lower head of Ayûn 1590		10.40 "
12.27 "	Left camp	10.52 "	{ Camp at Bir of Amâry 2740	
	Lower head of Ayûn 1590	11.12 "		
3.55 "	Town of Neba (ruins) 2300	1.30 p.m.	Left camp	
4.17 "	Hill to South 2300	2.0 "	Rajm Moyis 2870	
	23rd July.			
8.0 a.m.	Left camp	7.20 a.m.	Left camp, Amâry	
		7.53 "	{ Al Yadûla 2760	
		8.10 "		
		9.5 "	{ Um al Amûd 2660	
		9.55 "		

	Feet.		Feet.	
10.20 a.m.	} Aljabāyahāt 2340	8.50 a.m.	} Maisch 3020	
10.53 ..				9.15 ..
11.40 ..		Sāmāk 2880		9.25 ..
		9.30 ..	} An Nawabliyyeh 2960	
		9.55 ..		
27th July.				
7.55 a.m.	} Ruin Hamām 2900		} Khirbet Sār 3040	
8.5 ..				Al Kursey 3100
8.45 ..	Tahīn 3010		'Ain Seir 2230	
11.5 ..	Al Kawassimeh (10 minutes) 2870	3rd August.		
12.0 noon	Al Mūntar (15 minutes) 2810	7.30 a.m.	Left 'Ain	
12.20 p.m.	Camp Amman Theatre 2500	8.20 ..	} Shajaret Dharāa... 2780	
	Greek church 2750	8.30 ..		
29th July.				
7.45 a.m.	Left camp	9.10 ..	Point 2730	
8.20 ..	} Mūrmūr 2600	9.40 ..	Near Kal Fahs ... 2330	
8.35 ..			9.56 ..	} Near Dajājeh 2470
8.45 ..			11.20 ..	
8.57 ..	Merkab 2920		Birket al Amūd... 3090	
9.10 ..	} Top of hill 3140		Dabūk 3200	
9.30 ..			On hill near 'Ain Hemar 3400	
9.55 ..	Top of hill 3240	5th August.		
10.10 ..	Ruins 3370	7.35 a.m.	Left 'Ain Hemar... 3000	
10.45 ..	} Al Kāf 3200	8.20 ..	} Ar Rāha 3170	
10.50 ..				8.35 ..
1.30 p.m.	Rajm Muttāba ...	9.0 ..	Safūt 2700	
2.35 ..	} Rajm Mansiyeh ... 2090	9.10 ..	Safūt Wady 2400	
2.40 ..			9.50 ..	} Al Bashā 2200
2.45 ..			10.5 ..	
3.0 ..	Camp at Theatre	10.50 ..	Al Mūmin 2000	
1st August.				
7.15 a.m.	Left Theatre	11.25 ..	} Thogret um Gha-freh	
7.50 ..	Point A 2500	12.5 p.m.		
8.5 ..	} K. Hadādeh 2790	1.0 ..	Wady Rūmān 1630	
8.15 ..			1.50 ..	'Ain Rubia 1730
8.40 ..	} K. Urjān 3060	2.20 ..	} Near Mustāba 1930	
9.5 ..				2.35 ..
9.20 ..	Jaranin 2990	2.50 ..	} Ford, Wady ay Zarka 770	
9.40 ..	Rawāk	4.20 ..		
9.45 ..	} Birkeh 3260	6th August.		
10.10 ..			7.15 a.m.	Left Wady az Zarka
10.30 ..	} Ask Shamasāni ... 3270	7.27 ..	} Ruin, point A ... 1070	
11.20 ..				7.32 ..
1.15 p.m.	Rajm Shibba 3220	7.45 ..	Al Ghazāl 1000	
1.20 ..	} Abdūn 3010	8.15 ..	} Hill of Ghazāl ... 1680	
2.15 ..				8.30 ..
2.40 ..	R. abu M'awaideh 2990	9.30 ..	Jarash, bath house 1900	
3.0 ..	} Camp		Mezār 2430	
4.15 ..			9th August.	
2nd August.				
6.50 a.m.	Left Theatre	12.40 p.m.	Gateway, Jerash... 1870	
		1.3 ..	} Point on ridge ... 2040	
		1.12 ..		
		1.30 ..	} K. Najib 2265	
		1.40 ..		
		2.20 ..	W. Nakleh 1950	

	Feet.		Feet.		
3.0 p.m.	Dabin	2450	8.30 a.m.	'Ain Jazir	2050
3.20 "	} Jebel Hakât (?) ...	3560	10.20 "	} 'Ain Mahis	2600
3.35 "			10.40 "		
4.45 "	'Ain Jazâzeh	2460	11.15 "	Ber as Sabîl	2500
			11.30 "	Point C	2660
	10th August.		12.15 p.m.	} Fulheis	1940
8.15 a.m.	Left 'Ain Kajâzeh		1.20 "		
	(10 minutes) ...	2150	2.50 "	Thoghret as Sujûr	1440
9.0 "	Point B (10 min.)	2150			
9.55 "	'Ain	1250		14th August.	
10.0 "	} Point C	975	6.30 a.m.	'Ain Jaryah	400
10.30 "				7.30 "	Near Kaferein
10.55 "	} Bed of Wady Az		10.0 "	Passed W. Kaferein	580
12.50 p.m.		Zerka	80		Ar Râm
1.10 "	} First Terrace	1190	11.15 "	Wady al Aadham	760
1.40 "				11.45 "	'Ain Suweimeh
2.25 "	Jalûd	1660			
3.8 "	'Alan	1900		15th August.	
3.50 "	Third Terrace, J.			'Ain Hajla	1200
	Dzi	2850		Dead Sea (O.S.)	1292
	Hill near Hûsha	3410			
4.50 "	Fourth Plateau (top			Tel Hammeh	600
	of range)	3500		Beisan	750
5.5 "	Camp Neby Hûsha	3270		Jisr Mejamieh	730
				Fahil (Pella)	250
	12th August.			'Ain Salahat	150
8.43 a.m.	Left Neby Hûsha			Wady Callirhoe	400
9.25 "	Point A	3440		'Ain of hot water,	
11.0 "	Point C	3000		Wady Callirhoe	300
11.45 "	'Ain	2000		Tekoa	2400
12.10 p.m.	Camp near 'Ain			'Ain Jidy	640
	Jadûr	2280		Masada	200
	Castle of as Salt	2900		Sheikh Mahmout	1750
				Bir, near	1900
	13th August.			Kurmel	2730
8.0 a.m.	Left as Salt			Zif	2830

The work undertaken was the survey of the country passed over, and the photographing of objects of interest.

Observations for latitude and time were taken from fourteen places; these as yet are only roughly calculated.

Rounds of angles with the theodolite were taken from twenty-three places, thirteen of which were combined with observations of a *polaris* for a true meridian.

Angles with prismatic compass were taken from 135 points.

With regard to the list of names: there are 350; of these 84 agree nearly with those in Robinson's list. In his list there are 135 names, but it includes nearly double the country that was passed over, and therefore we should have about 80 agreeing with his.

This is to a certain extent a guarantee that the other names are somewhat near what they should be. I state this because our means of obtaining them were at second hand, as follows:—When a name was

given I put it down from sound (by Eli Smith's alphabet), and made Edward (who knows Arabic) do the same, and at the same time I made the dragoman write it down in Arabic on the spot. Each evening these lists were compared and an Arabic list made out, and on our return Dr. Sandreczky very kindly undertook to revise it; the results of his labour have already been sent home.

Many of the words no doubt are somewhat in error, but I believe with this list it would be very easy to get a correct list of the whole country from the Bedouins on the other side, who now often come to Jerusalem.

It was not an easy job to keep the reconnaissance connected in a country where some of the most important points were inaccessible, and where now and then we had to be careful of showing our instruments, on account of the prejudices of the Bedouins.

I may observe that on the east side, as on the west, it is not the ruins, or the 'ains, or the hills which have names generally, but a whole district; thus in one tract there may be nothing particular to mark it, while in another you may have two or three conspicuous hills, an 'ain, and several ruins, all of one name, and this fact, until it is recognised, is very perplexing.

From the pointed arches lying so frequently on older work, it is apparent that domesticated races lived on this eastern side long after the fall of the Roman Empire, and that it is comparatively but a short time since the Bedouins have held sway there. The population at one time on the Belka appears to have been dense.

The country now is cultivated by the black Bedouins and runaway fellahin from the western side, working under the Adwân.

LETTERS FROM MR. E. H. PALMER.

JERUSALEM, *March 7th*, 1870.

III.

Having found it expedient to divide our journey, and being unable to obtain camels for the second part without going up to Hebron, we have run up to Jerusalem for a few days to refit before starting again southwards, and I take the opportunity of writing you a short account of our progress.

I am glad to say that our investigations thus far have been eminently successful, and that we have made some discoveries of great importance. The outline and features of the mountain range forming the edge of the Tih plateau were examined by us from the south, and while still in Sinai. This will be duly explained in the maps and route sketches, which we have made, and which we hope to be able to forward as soon as our work is complete. From the Naôb el Mirad the pass in Jebel el 'Ejmeh, by which we entered the scene of our explorations, we crossed to

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