

SUMMARY OF THE OBSERVATIONS ON THE RISE AND  
FALL OF THE LEVEL OF THE DEAD SEA, 1900-1913.

By DR. E. W. G. MASTERMAN.

As the odd notes appearing from time to time in the *Quarterly Statement* can convey no information to the chance reader, and in

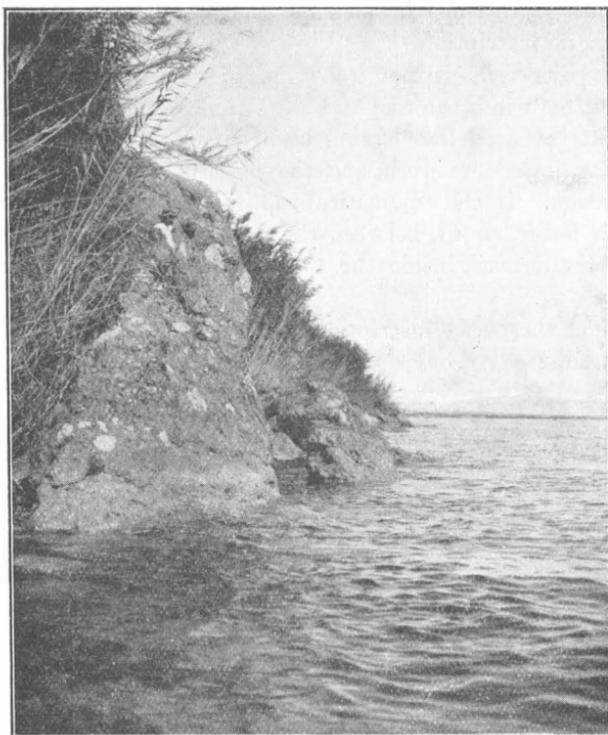


FIG. 1. The Rock at 'Ain Feshkhah.

their present form must be a source of much trouble to any student wishing to gain an idea of the general results, I append a Chart showing the results of the observations made on the varying level of the Dead Sea from 1900 to the current year. Unfortunately,



their completeness is marred by the absence of observations during the year 1909.

Two views are given of the rock at 'Ain Feshkhah from which the measurements are taken for the *P.E.F.* Fig. 1 is the view looking north; in Fig. 2 Mr. Hornstein is holding the tape. The photographs were taken in Nov., 1911.

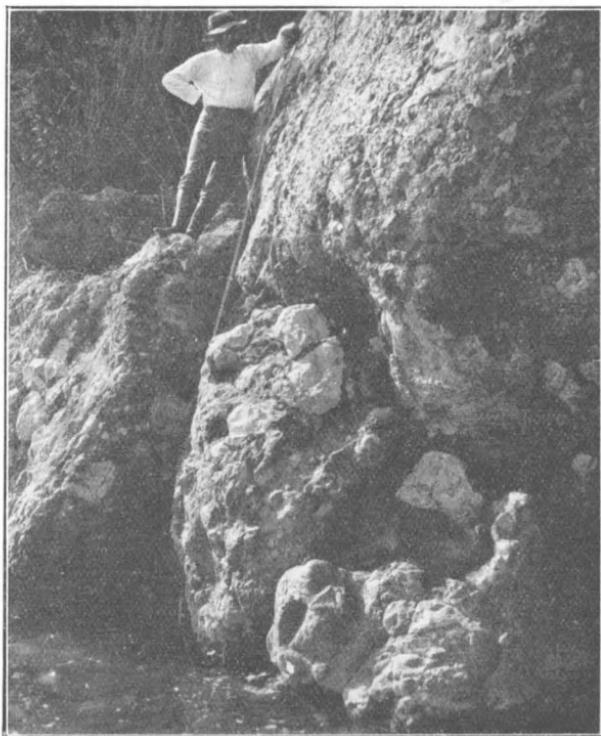


Fig. 2. The Rock at 'Ain Feshkhah.

It may be mentioned, for the sake of those who have not followed these observations, that the measurements are taken at a large rock near 'Ain Feshkhah. In 1900, Prof. Macalister and I selected<sup>1</sup> this point, and we had a mark cut upon the rock 14 feet above the then Dead Sea level—this height being chosen because it was a convenient one for dropping the yard measure to

<sup>1</sup> See *Quarterly Statement*, 1901, pp. 4-5; also 1902, pp. 155-160.

the surface of the sea. During the years 1901-4 the level in the dry season continued to fall until, on October 26th, 1904, the level was actually 3 feet 4 inches below the base line. These four years had an annual rainfall (in Jerusalem) much below the mean. In the season 1904-5 there was a heavy rainfall (37.32 inches) and the fall commenced to be checked; in 1905-6 the rainfall was still greater (38.94 inches), and in consequence there was a rise of nearly 3 feet in the sea level—the largest rise yet observed. The rise on the whole continued until 1912, when the Spring observation showed 2 feet 6½ inches *above* the base line, and the Autumn observation 9½ inches above the base line—the highest Autumn level observed. The total difference in level from the lowest (Autumn) measurement in 1904 and the highest (Spring) measurement in 1911 and 1912 is 5 feet 10½ inches.

It is clear, as has been suggested above, that the rainfall has much to do with the varying level. Thus, the greatest rise in 1906 followed a rainfall (38.94 inches) much above the mean. Also, the considerable rise in 1908 followed a rainfall of 27½ inches, and the third greatest rise, in 1911, followed a rainfall of 26½ inches, but these figures by no means explain all. For one thing the effect of a series of dry seasons in the diminution of the springs is not at once changed by a single season of increased rain, witness the rise in 1905, nor will a single year under the mean, in the midst of some years of plenty, materially affect a rise—witness the year 1907. It must also be noted, firstly, that to have a really correct view of the influence of the rainfall on the level of the Dead Sea we ought to know the mean precipitation all over the land; secondly, that the influence of the fall of snow upon Hermon must be very great, and that when, for example, in a cold Spring the melting of the snow is retarded, the amount of water poured into the Dead Sea from the Jordan *late in the season* must be considerably greater than when the snow melts very early. This late flooding of the Jordan must delay the onset of shrinkage of the volume of the Dead Sea by some weeks. Then thirdly, the height of the Summer temperature and the prevalence, or otherwise, of dry desert (S.E.) winds must have considerable bearing upon the level. In other words, there are other factors to be considered besides the mere amount of rain in the preceding rainy season—and particularly the amount at simply one observation point—Jerusalem. A heavy rainfall late in the season, *e.g.*, in March or April, an unusually cold Spring,

followed by a short dry season of moderate heat and westerly, rather than easterly, winds are, it seems to me, the conditions favouring a rise in level. The reversed conditions lead to a fall.

There is an accumulation of evidence that the level of the Dead Sea rose considerably during the nineteenth century. The most striking points are:—

(1) The disappearance of the small island *Rejum el-Bahr*. In the early part of the last century it was a peninsula joined to the shore by a dry passage.

In 1850 we find de Saulcy (Vol. II, p. 53, *The Dead Sea, etc.*) describing the "islet" as joined to the mainland by an isthmus a hundred yards long with "very shallow water which our horses cross without difficulty and obtain a footing upon the island itself."

In 1874 (*Q.S.*) Mr. T. Drake writes: "The causeway which connects the *Rejum el-Bahr* with the mainland has, according to the Arabs, been submerged for twelve or fifteen years, though before that time it was frequently dry." In the "eighties" it was necessary to swim out to the island, while in 1892, after a heavy rainy season, it disappeared altogether, and it is now too deep for any evidence of its presence to appear on the surface. Were this an isolated phenomenon it might be argued that the island had itself subsided and not the level arisen. There are, however, other facts.

(2) We have the evidence of Seitzen (1806) and of Irby and Mangles (1818) (*Travels*, p. 454) that it was possible at the beginning of the last century for caravans to cross by means of a ford from the southern point of the *Lisan* to the opposite shore, at any rate, in the summer months. Burckhardt (*Travels*, p. 394) also mentions such a ford. Mr. Forder (*Q.S.*, 1912, pp. 110-114) shows that a tradition of such a ford still lingers with the inhabitants of the *Ghor es-Sāfieh*, although it has not been used within living memory.

(3) That there was till recent years a regular road between *Jebal Usdum* and the sea is so well known to living witnesses that it is hardly worth while quoting travellers; de Saulcy, for example, speaks of it. For several years now this road has been flooded, the water now reaching the foot of the salt-cliffs.

(4) As further confirmation of the rise in the latter half of the last century we can see at very many points along the shore dead trees, still rising from their roots, from some feet of water,

Robinson, in 1838, thought there was clear evidence of a rise in level since the beginning of the century (*Researches*, Vol. I, p. 519); we have indubitable evidence of a considerable rise between 1850 and 1892; and it is interesting to notice that, since the regular observations of the level have been begun, the rise, with fluctuations, has continued.

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## DEAD SEA OBSERVATIONS.

## SPRING VISIT, 1913.

By DR. E. W. G. MASTERMAN.

AS, at the last moment—to my great disappointment—I had to abandon going myself to *'Ain Feshkhal*, Mr. Hornstein kindly, once again, went for me, taking the lead of a party of four, including Mr. Hough, the Acting H.B.M. Consul. They went to Jericho, May 12th. Bar., 1 p.m., Jerusalem, 27·35; lower khan of Jericho road, 4.55 p.m., 29·4; Jericho, 8.30 p.m., 30·75. Thermometer (8.30 p.m.), 83·3° F.

*May 13th.*—Left Jericho at 4.45 a.m., and went viâ *'Ain Jehayar*, reached *'Ain Feshkhal* at 8 a.m. Wind N.E. in early morning, South after 10 a.m. Sky cloudless. Temp. at *'Ain Feshkhal* at 8.10 a.m., 82·2° F. Temp. of water of spring, 77·8° F. Bar. 31·5.

*Measurements.*—At P.E.F. rock, 11 feet 7 inches, a rise of 1 foot 7½ inches since the Autumn measurement. At pool 2 feet 4 inches above the mark.

*Animal Life, etc.*—On the road. Pintail sand-grouse, partridges, wood-pigeons, and some (doubtful) wild geese, seen.

The crops at Jericho are exceptionally fine this year, and many of the old residents say they never saw the fruit-trees and vines so laden with fine fruit.

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