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ARTICLE VII.

THE POSSIBLE POPULATION OF PALESTINE.

BY G. FREDERICK WRIGHT.

THE intelligent modern traveler in Palestine cannot fail to be impressed with the passage in his Baedeker relating to the ancient population of the country,¹ which, while giving correctly the estimates, speaks of them as evidently exaggerated. According to Num. i. 46 and xxvi. 51, the males above twenty years of age capable of bearing arms numbered 603,550; while in the time of David (2 Sam. xxiv. 9) there were 1,300,000 men capable of bearing arms, the age-limit being presumably the same as that mentioned in Numbers. If, as is usually done, we reckon the total population to be four times the number of adult males, it would be, in round numbers, 2,500,000 at the time of Joshua's entrance into Palestine, and in the time of David, four hundred years later, 5,000,000. Reckoning the area of Palestine, including the land occupied by the tribes east of the Jordan, at 10,500 square miles, this would give a population of 240 to the square mile in the time of Joshua, and 480 to the square mile in the time of David; whereas the total population at the present time (650,000) is only about sixty-two to the square mile.

When the traveler rides over the treeless mountains from Dan to Beersheba, and witnesses the present neglected condition of the country and its consequent infertility, it is, indeed, difficult for him not to believe, with his guide-book, that the early estimates found in Numbers and Samuel are exaggerations. Especially is this the case if

¹ Baedeker's Palestine and Syria, p. 58.

he has come from the United States, where land is so plenty that high cultivation has not been a necessity, and where the average population to the square mile, excluding the Territories, is only twenty-six; that of Iowa, one of the richest agricultural States, being but forty-one. If, however, he has approached the country from some of the more densely populated regions of the world, where the conditions of life are still somewhat similar to those in the great centers of population three thousand years ago; and if, at the same time, he examines somewhat carefully the physical conditions of the country, he will be less likely to assume at once either exaggeration on the part of the sacred writer or error in the transmission of the figures.

If one has gone from Egypt to Palestine, density of population such as is involved in the census report of David's officials will not be at all staggering, when due account is taken of the natural resources of the country. The arable land of Egypt is estimated at 11,240 square miles, of which about 7,500 are included in the delta, where there is considerable waste land. Yet the population of Egypt is, at the present time, 11,000,000, or about 1,000 to the square mile; while it is expected that, by regulating the water-supply by means of the great dam nearly completed at Assuan, the productiveness of the soil may be so increased as to support a population of 14,000,000 or 15,000,000, and perhaps even more. The land of Goshen occupied the eastern portion of the delta, with a fertile strip bordering the ancient Sweet Water Canal leading to the Bitter Lakes. With the present density of population a border strip of the delta twenty-five miles wide and one hundred miles long (which seems to be about the limits which recent investigations would assign to it) would give ample support to the population of the Israelites at the time of the Exodus, when there is said to have been (Ex. xii. 37) "about 600,000 on foot that were men, besides children," which, at

the former mode of reckoning, would make a total of 2,400,000.

Nor is this anything exceptional. The Barbadoes, which are mainly agricultural islands, support a population of 192,000 on 166 square miles, which equals more than 1,156 to the square mile. But the most remarkable illustration of the capacity of land to support a population which lives in a very economical yet comfortable condition is found in Japan. Excluding Formosa, Japan has an area of 147,655 square miles, with a total population of 43,760,815, making a density of 296 to the square mile. But the islands are to such a large extent composed of mountains which are incapable of being tilled, that the population is practically limited to one-tenth of this area, that is to about 15,000 square miles. There are then really more than 3,133 inhabitants in Japan to every square mile of arable land.

If, with these figures in mind, we consider the natural resources of Palestine, we can easily believe, not only in the highest figures which are given for the population in the book of Samuel, but even in those of Josephus, who reckons 5,000,000 for Galilee alone, whose area could not have been more than 2,000 square miles. At any rate, however much we may exaggerate the proportion of waste land in Palestine which is incapable of cultivation, we can hardly reduce it so low that, with the density of the inhabitable portions of Japan, its population would not equal 5,000,000. For, as already said, the total area of Palestine is 10,500 square miles, and, leaving out the mountainous districts, the most of which are themselves capable of yielding rich agricultural returns, it is easy to find 2,000 square miles of the most fertile land in the world situated in the valleys, where they receive abundant supplies of water from perennial springs, together with the fertility that is brought with it in the wash from the mountain sides.

Nothing can be more impressive than the life-giving effect produced by the immense flow of sparkling water which pours forth from the underground channels at the base of Mount Hermon both at Banias and, three or four miles away, at the site of the ancient Dan. At various places, also, similar streams pour out along the eastern base of the mountains of Naphtali into the plains about Lake Merom. Aside, also, from the river Jordan, which is capable of watering all its valley, such live-giving springs as those above Jericho and at Engedi burst forth in numerous places along the base of the mountains, at elevations which are convenient for purposes of irrigation.

The cause of these springs is so permanent that we can count upon their always having been in existence, and upon their never having failed, except in periods of extremest drought. The mountains of Palestine consist of limestone, which, in the southern part, is of such a porous nature (in many places being real chalk) as to absorb a vast amount of water, and hold it in a permanent reservoir at a considerable elevation, from which it is gradually imparted to lower levels; and, even where the rock itself is not porous, it is eroded so irregularly by atmospheric agencies that the soil is collected and retained in innumerable depressions, which open into underground watercourses, and keep them constantly supplied with a steady stream of water. These upper limestones, also, contain all the elements necessary for the support of plant life, and disintegrate under atmospheric agencies at a rate which keeps the soil constantly fertile.

It has often been assumed that the rainfall of Palestine was greater three thousand years ago than it is now. This, however, is not capable of proof, and seems to be contradicted by many well-established facts. The occurrence of droughts for example, especially the one in the time of Elijah, would indicate conditions very similar to those ex-

isting at the present time. But the clearest evidence is to be found in the size of the Dead Sea, which, so far as we can learn, occupies nearly the same dimensions now that it did in the time of Joshua, when the children of Israel crossed the Jordan near Jericho.

There is, indeed, abundant evidence that, at a comparatively recent geological date, the valley of the Jordan was filled with water to about 750 feet above the present level of the Dead Sea, or even to 1,200 feet, according to Professor Hull. Instead of the limited area of the Dead Sea, we then should have had a lake extending, from a considerable distance south of the present shores, northward to Lake Galilee, or, if Professor Hull's inferences are correct, beyond Lake Merom to the fountains of Dan. The evidence of the extension of this lake to the 750-foot level is too clear to admit of doubt. This is found in the fine sediment, showing signs of stratification by water up to this level, which extends all around the basin, and fills the valley of the Jordan to an unknown depth. It is through this sediment that the present river Jordan has cut its deep, tortuous, narrow channel, with its characteristic clayey banks, rendering its passage in general very difficult.

That these events are of recent date is evident enough from the small amount of erosion which has taken place since the water fell to its present level in the Dead Sea. Without doubt, also, they point to great climatic changes during recent geological time, but they evidently so far preceded the historical knowledge which we have of the region, that they are most likely connected with an earlier class of events belonging to the glacial period.

In order to appreciate the evidence, we must take into account the causes which secure the present water level of the Dead Sea. This is now dependent upon the equilibrium which is established between the precipitation over the basin and the evaporation. The evaporation now just

equals the precipitation. With these elements constant the water cannot change its level; for, if the Dead Sea should fall, that would diminish the evaporating surface, so that, if the precipitation is the same, it would speedily regain its level; while the surface cannot appreciably rise without increasing the evaporating surface. Hence, unless the rainfall were increased, the higher level could not be maintained. It is evident, therefore, that when the water level in the basin was high enough to distribute the silt which reaches the 750-foot level, either the precipitation must have been immensely greater than now or the evaporation proportionately less; for the expanse of water was then eight or ten times greater than at the present time.

One theory to account for this great increase of water in the Jordan basin connects it with the glacial period. Professor Hull and others had supposed, that during that epoch glaciers covered the Lebanon and Anti-Lebanon Mountains, and, as a consequence, so clouded the sky and lowered the temperature that the evaporation was checked, and that this, combined with an increased precipitation of moisture over the region, produced the results observed. But, as I failed to find evidences of a glacial period in the Lebanon Mountains (except possibly far to the north over the limited elevated area containing the last remnant of the cedars of Lebanon), that theory commends itself less to me than it did at one time. If the facts are in any way connected with the glacial period, it must be indirectly through a general lowering of the temperature and an increased precipitation which characterized a belt of indefinite extent south of the glaciated regions, which is altogether theoretical.

At present I am more inclined to connect this increase of water with facts which I have published elsewhere (but which I will more fully set forth in a future number of the *BIBLIOTHECA SACRA*), going to show that since man

came into the world there has been an extensive but comparatively brief subsidence of all Northern, Central, and Western Asia, which may possibly be correlated with the Noachian deluge. If this subsidence were even less than we now know it to have been upon the shores of the Black Sea, it would have admitted the waters of the ocean into the Jordan Valley, and furnished the conditions which might readily explain the sediment there to which we have referred; while, upon the emergence of the land, evaporation would rapidly reduce the area of water exposed until an equilibrium was established. For a time this may well have been at the 750-foot line spoken of, when the precipitation was still greatly in excess of what it is now. While it is true, therefore, that the precipitation over Central Asia has been, within the last few thousand years, greatly in excess of what it is now, this must have preceded the occupation of Palestine by the children of Israel by a considerable lapse of time, and so will not help us in explaining the productiveness of the land during the early historic period.

But it is not needed. The rainfall in Palestine is still sufficient to meet all the requirements of a vastly increased productivity, if certain other conditions were supplied. The annual rainfall at Jerusalem is twenty-three inches, occurring on fifty-two different days, beginning with one and a half inches in October, and ending with one and a half in May; June, July, August, and September being rainless months. This rainfall is so distributed as to be ample for all purposes, and favors both winter and spring crops. There are, on the average, five and a half rainy days in November, nine in December, ten in January, ten and a half in February, eight and a half in March, and five and a half in April. The prevailing winds are from the west, bringing the moisture collected over the Mediterranean Sea. These winds occur, on the average, 210 days in the

year. The conditions, therefore, are so nearly uniform that nothing which man can do is likely to affect the actual amount of precipitation.

It is true that some have suggested that the greater extent of forests which covered the mountains in early times may have increased the rainfall. This, however, is not supported by facts. The mountains themselves are the great condensers of moisture, and they have been permanent factors for the last three thousand years.

But the forests would have a beneficial influence in many respects: First, the roots of the trees would prevent the soil from being washed away during the heavy storms; secondly, they would greatly enrich the soil by the decomposition of their foliage; thirdly, they would, by their shade, and by their effect in retaining the soil, hold in the moisture which would find its way to the lower levels during a longer portion of the season. When, therefore, agriculture was first introduced into Palestine, and the forests were gradually cleared away, the productiveness must have been far in excess of what it is now; and, under proper treatment, especially by terracing the hillsides to prevent the soil from being washed away, their productiveness might have been kept up for an indefinite period.

That forests were actually abundant all over this region in the early historic period is evident, among other things, from the extensive mining operations which were carried on in the Sinaitic Peninsula long before the Exodus. But the successful working of the mines was dependent upon obtaining an abundant supply of charcoal in the vicinity, which implies the existence of forests to a considerable extent; while even in the time of Christ ship-building was an important industry on Lake Galilee,—the town of Tarichæa being specially noted for this industry. Josephus tells of collecting, for one of his military expeditions on the shores of Galilee, "two hundred and thirty ships from

the vicinity of Tarichæa alone"; while the Romans, against whom he led his fleet, evidently possessed an equal number. In former times, also, as now, the vine and the olive grew luxuriantly wherever in Palestine their roots could get access to the limestone soil which characterizes the whole country. But the oil produced from the olive was then out of all proportion to what it is now; two hundred thousand gallons being sent annually by Solomon to Hiram, King of Tyre. It need not be said that these vineyards and olive orchards in protecting the mountain sides would go far to supply the place of the native forests after they were removed.

Altogether, therefore, when we closely examine the situation, there is not the least difficulty in believing that 10,500 square miles of Palestine supported in the time of David a population of 5,000,000, or about 500 to the square mile; this being a density considerably less than that of Belgium, which is 593 to the square mile, and only half that of Brabant and Holland, one-third that of Malta, and one-sixth that of the populated area of Japan.

There is more difficulty, however, in understanding how the population of 2,500,000 Israelites who crossed the Red Sea were able to maintain themselves during the forty years of wandering. It is true that for a portion of the time they were miraculously fed, but it would seem scarcely in the line of the ordinary economy of miracles as revealed in the Bible, to suppose that this great multitude were wholly or principally fed by miracles during that entire time, and we are led to inquire, What natural means of support might they have found in the "wilderness of wandering"? And here it is a fact worthy of notice, that the population at the end of the forty years was almost precisely the same as that at the beginning, there being at both periods about 600,000 adult males. This would seem to indicate that the conditions of life to which they had

been subjected were more than ordinarily severe, for the population would naturally have doubled in that length of time. We may well believe, therefore, that even the miraculous intervention did not lift them altogether above want, but left them to endure as best they could the hardships of untried conditions of life.

At the same time we can obtain some light upon the subject by considering, first, that the children of Israel, from being mere nomads upon their entrance into Egypt, had become familiarized with the agricultural methods of the most highly civilized nation of antiquity; while we know, from their later life in Palestine, that they to a great extent carried this art and many of the common-law practices of Egypt with them to the promised land. In particular they knew the value to agriculture of water, and presumably may have put their knowledge to practice over the wide territory through which they were probably scattered, storing it for irrigation. Nor, secondly, is this country by any means a barren waste. The land of Midian, including about 3,000 square miles, at a later period sent 135,000 swordsmen into the field at once. Thirdly, we must remember that the conditions of life in that semi-tropical region are very simple,—the cost of clothing and of houses being reduced to their lowest point.

It is, therefore, by no means improbable that 2,500,000 Israelites could, for the most part, have found natural means of support in the vast region to the south, south-east, and east of Palestine, which is even now in the line of the great caravan routes connecting Arabia with both the east and the west. In endeavoring to picture the condition of the Israelites during their wanderings in the Wilderness, it is well, also, to keep in mind that Moses was familiar with the country and could direct them to the best advantage.

Throughout this comprehensive survey, it appears that

the *prima facie* objections raised against the historical statements of the Old Testament often disappear upon a careful examination of the subject. It is evident that the present economical conditions of the Orient are no true measure of the past, and that the present physical conditions of any particular section cannot be understood without a full knowledge of the broader circle of facts both past and present with which they are connected. Here, therefore, as is so often the case, where a cursory glance leads to erroneous conclusions and unwarranted doubts, scientific scrutiny supplies that true understanding of the conditions which can effectually remove the doubts and reëstablish faith.