ven in the hill country of Judea there are no engineering difficulties of any consequence to surmount.

I am, Sir,
Your Obedient Servant

Consul

No. 115

Consulate of the United States,
Jerusalem, August 29. 1889.

Honorable William F. Wharton,
Assistant Secretary of State,
Washington, D.C.

Sir:

In compliance with instructions conveyed by Circular of the 2d. May, 1889, I have the honor to submit the accompanying report on "Irrigation as practised in Palestine."

Noting the information therein presented will prove to be satisfactory,

I am, Sir,
Your Obedient Servant

Consul

Enclosure
1. Report on "Irrigation as practised in Palestine"

Irrigation as practised in Palestine.

With the exception of Jaffa and its immediate neighborhood there is no part of this Consular District in which any extensive and systematic attempt at irrigation according to modern methods is made.

The Jordan Valley.

In the Valley of the Jordan, which contains from 500 to 600 square miles of some of the richest land in the world, and which is never visited by frost, being from 700 to 1,300 feet below the level of the Mediterranean Sea, and where, with its semi-tropical climate and facilities for irrigation, several successive crops may be produced annually, only the most feeble and primitive methods of conducting the necessary water to the few and ill-cultivated fields are followed.

This unique valley, capable, with proper agricultural treatment, of sustaining an immense population, has no settlement worthy of the name. The wild Bedouin Arabs range throughout its length and breadth, and in defiance of the Turkish Government, which have in vain attempted to drive them out, come and go at their own free will.

Small fields, gardens, or patches of ground are, here and there, cultivated in the neighborhood of some streamlet having its source in one of the perennial springs of the region. From such a spring the water is conveyed in shallow drains or ditches to wherever required, and is carried through the fields or gardens by still smaller channels, the water being shut off or let on simply by the action of the foot, opening the tiny inlet, or blocking it up with a few pebbles or masses of clay, as may be desired. This is a habit as old as the oldest writings, and of which mention is made in the Bible: "Where thou sowest thy seed, and waterest it with thy foot, as a garden of herbs." Deut. XI. 10.

Only the common farm crops are cultivated, but they are often especially exuberant growths.

At Nablous or Ancient Shechem or Sychar

similar method in general are followed. The comparatively few fields and gardens are well watered from the abundant streams which have their rise in the Mounts Gerizim and Ebal, making it a spot of beauty in the midst of wild and unreclaimed surroundings.

In one or two instances here, there have been made some efforts at a more enlightened system of irrigation, the water from the clear and copious springs being conducted by aqueducts of stone masonry, and more satisfactorily supplied. The result, in the luxuriant gardens, in which most of the various kinds of fruits and vegetables suitable to the climate are found, hints as to what might be accomplished were more intelligent, systematic, and thorough measures adopted.

Throughout Palestine a very little water produces a wonderful result. The soil, naturally fertile, immediately responds to the effect of the periodic rains. The bursting of the land into bloom after the first heavy showers of the "rainy season," is a sight never to be forgotten. The hillsides and valleys that, throughout the dry season, had lain burnt up and barren, like a calcined bone, are suddenly, as if by miracle, turned into a garden of the most brilliant blossoms; the scarlet Ranunculus and Anemone, the Narcissus, Tulip, Cyclamen, Almond, Pomegranate, and many other flowers and shrubs, only known to us in cultivation, "making the wilderness and solitary place rejoice and blossom as the rose."

The King's Garden, Jerusalem.

In the valley of the Kidron, on the southern side of Jerusalem, is King's Garden, which dates back to the time of Hezekiah, if not to that of Solomon. It is mentioned in Nehemiah (III. 15 where it speaks of "Siloah by the King's garden."

The few acres which are at present under

cultivation here, are irrigated in the usual simple manner. The source of the water supply is the celebrated Pool of Siloam or Siloam — a reservoir 53 feet long, 18 feet wide, and 19 feet deep, which is fed through a subterranean conduit by the overflow of the Pool of the Virgin, an intermittent spring about one quarter of a mile to the northward.

The water is conducted from the former pool, partly by underground drains, regulated by the most primitive of sluices, into smaller channels, in the direction required where still finer ramifications or branches distribute it to the drills or rows in which the crop is planted, much as in the other instances mentioned, and with as little regularity in system.

In these garden plots all the ordinary vegetables and many kinds of fruits are produced in good quantity and of fair quality. And up the terraced slopes, even to the very walls of Jerusalem, some of the largest cauliflowers come to perfection, and are in the market in the months of February and March. This vegetable sells at the rate of three heads for 12 cents.

There is no special regulation as to the use of the water, other than that of the most patriarchal kind, the owners of the adjacent land having free access to the pool for all requisite purposes, including household uses, and the watering of their flocks and herds. — Much of the water is also brought into Jerusalem, for sale, in goat skins.

King Solomon's Pools and Gardens.

About eight miles to the south-west of Jerusalem are the wonderful Pools of Solomon; while, below them, in the narrow Valley of Urtas, lie the ruined gardens of the wise King, — the oldest recorded gardens in the world, except the gardens of Eden, I suppose. These works are mentioned in Ecclesiastes (II. 4.6), as follows: "I made me great works; I builded me houses; I planted me vineyards; I made me gardens and orchards, and I planted in them all kinds of fruits: I made me pools of water, to water therewith the wood that bringeth forth trees." There is little doubt, too, that the

scenes depicted in that beautiful Oriental love-song — "The Song of Solomon" found here there original. Josephus also speaks of this place — "very pleasant it is in fine gardens, and abounding in rivulets of water," and tells us that Solomon was wont to visit it frequently, describing him as driving out there in the morning, sitting on high in his chariot, clothed in white, and surrounded by his handsome mounted guards, all of great stature and in the flower of manhood, arrayed in Tyrian purple and in armor, their long hair sprinkled with gold dust.

It would be difficult to overestimate the noble character of those remarkable works, especially considering the period in which they were constructed. The Pools consist of three enormous reservoirs, partly cut in the rock, partly built of massive marble masonry. Their dimensions are as follows: The Upper Pool, 380 feet long; breadth, at east end, 236 feet at west end 229 feet; depth at west end, 25 feet. The middle Pool, which is distant from the Upper Pool 150 feet, is 248 feet long; it is, at east end, 250 feet broad, and at west end, 160 feet; while the depth at east end is 39 feet. The Lower Pool, 248 feet eastward of the middle Pool, has a length of 582 feet; a breadth at east end of 207 feet, and at west end of 148 feet; and a depth at east end of 50 feet; having sufficient capacity, as Dr. Thomson has said, to "float the largest man-of-war that ever ploughed the ocean." Each pool overflows successively, by regulated sluices, into the next below it, in the order here given, the last pool emptying its superabundant water into the valley.

These venerable structures are, at the present time, in an excellent state of preservation. They are said to have been repaired by Pontius Pilate, which would be about 1855 years ago.

The source of the water supply is the Sealed Fountain of Solomon, at the foot of a hill, a short distance west of the Upper Pool. This fountain is always kept locked; hence the name. A flight of twenty steps descends from an arched doorway into an underground vaulted chamber, where four streams of pure and cool water converge.

This fountain also afforded, in former times, a constant and abundant supply of water to Jerusalem; a goodly stream being conveyed by the carefully and skillfully constructed stone aqueduct of Solomon, which demonstrates they understood, at that early day, the principle of the siphon, into the Holy Temple Enclosure. About two years ago, the less ancient Saracenic aqueduct being put in repair, the water was once more brought into the site of the Temple area, and into the so-called Fountain of the Cup, which stands between the Mosque of Omar and the Mosque Al Aksa, and doubtless marks the site of the brazen laver made by Solomon for the ablution of the priests in their sacrificial washings. But the aqueduct soon again lapsing into disrepair, the water is, at present, barely conveyed, in small quantity, as far as Bethlehem, of which town it is the principal supply.

Of the 75 acres of land below the Pools, in the valley of Urtas, 25 are under cultivation, and are irrigated. Independently of the Pools, the garden lands of the valley are also largely watered from a separate copious spring which has its rise in the side of the mountain, and at the foot of the village of Urtas. The soil is a red clay, exceedingly fertile; and, to this day, the finest fruits and vegetables in the Jerusalem market come from those gardens. Of the fruits produced may be mentioned Apricots, Peaches, Nectarines, Apples, Prunes, Plums, Citrons, Lemons, Pomegranates, Mulberries, Figs and grapes. The vegetables are Shell Peas, Beans, Beets, Okra, Egg-plant, Onions, Leeks, Garlic, Potatoes, Turnips, Cabbage, Cauliflower, Carrots, Cucumbers, Pumpkins, Vegetable-marrow, Tomatos, and Radishes. About two-fifths

of the land belong to three Europeans, and the remainder is owned by the native Syrian Fellahin (Peasants).

The distribution of the water is regulated by the old custom or system of "fassels" a night and a day forming a "fassel." Each family owning land there knows, from time immemorial, its respective rights and share in the "fassel" of water. Some have an entire "fassel"; and, again, the same is divided among the different members of a family, to irrigate their respective shares of land. The water is carried from one plat to another by drains, in the usual simple manner already described. The Europeans who own land there make, however, a cemented conduit to convey their share of water into their grounds. No statistics are obtainable, none ever having been kept, as to the duty of water per acre.

No special rent or fee is paid for the water used; nor are there any charges on the land in connection therewith, the only payment made being the usual Government taxes — the Werko (land-taxes), and Usbur (tithes).

Solomon's Pools, the Sealed Fountain, and the aqueduct are public property, and are under the control of the Turkish Government.

Jaffa and its Orange-groves.

The town of Jaffa, looking down from its pleasant elevation, on the one side on the deep blue Mediterranean and, on the other, on its multitudinous palms and odorous orange-groves, may well be considered entitled to its name, which, softened in the Arabic pronunciation to Yaffa, means "Beautiful." The orange-groves and gardens and their system of irrigation, though they have been greatly extended within comparatively recent times, have, unquestionably, an origin of quite respectable antiquity.

1. The area of land under irrigation at Jaffa would exactly include the space occupied by its orange-groves, being nearly one-third of the cultivable ground belonging to the community: that is, of 9000 acres of cultivable lands, about 3000 acres are under irrigation. The orange and the lemon are the chief crops: but other fruits, such as citrons, limes, peaches, apricots, grapes, pomegranates and melons, and all the ordinary garden vegetables are also produced in abundance and of fine quality. The vine, especially, is, of late, receiving much attention; and within the last few years extensive vineyards have been planted. Neither the vine nor the olive, of the latter of which there are many groves, require any water other than the usual rain-fall. The superiority of the Jaffa orange is world-renowned, whether its size, juiciness or flavor is considered. In an average season, oranges and lemons together with other fruits and vegetables to the amount of $335,000 have been exported from Jaffa. Besides this, is the immense home consumption, of which there is no record.

2. The sources of the water supply are wells which are fed by underground springs.

3. The engine in use for raising the water is, in every case, without exception, the so-called bajara or bajara; a wooden machine of the most simple construction, driven by horse or mule. Its principal parts are a swin beam or capstan with horizontal wheel attached, moving a vertical wheel connected by shaft with a third wheel which carries on its circumference a chain of pendent reversible buckets. A pole inserted in the swin beam is fastened to the horse or mule, with the monotonous circuit of which animal the entire is set in motion; the wheel with buckets revolving in the well, dipping up the water, and emptying it into the conduit or tank. The tanks are usually close to the wells, and are cemented basins, built of stone. They are filled during the day; the water being distributed from them, through the various

channels, during the night, in order that the loss by evaporation may be reduced to the minimum. There are about 700 of these bajaras at work at Jaffa.

4. The system of water distribution, being entirely under private control, is governed by neither law nor regulation. The quantity of water used per acre during the season of 23 weeks or 161 days, is 2,300 cubic meters, at a cost of from 20 to 25 cents per diem. Thus, for instance, the average expense for irrigating an orange-garden with an area of five acres would be, for 160 days at 20 cents, $160. The value of the crops might be estimated at from $500 to $700.

5. Owing to the peculiarity of the Climate, the orange-groves are obliged to be watered during the summer months, or rather during the "dry season", when no rain falls; that is from May till October or November. The rain-fall in the winter months, or, say, from November till May, varies from 17 to 30 inches. The average temperature is, in the day time, from 70° to 75° Far.; during the night, from 55° to 55° Far.

The soil, in the orange-groves is of mixed clay and sand, with rather more of the latter than of the former. It is exceedingly fertile; and is particularly well suited to the orange.

6. As to the antiquity of the system of irrigation, the close resemblance of the bajara to the Spanish "Noria" has induced many persons to imagine its being introduced here, at some early period, from Spain. But as the family likeness of these wheels to the ancient Persian wooden water-wheel is equally great, and as the Crusaders, in the 12th Century, are reported to have found the orange-tree (Citrus aurantium) already in Palestine, the actual system of irrigation may as well belong originally to this country, or to the East, and may have been introduced from Persia.

General remarks on the Climate.

In addition to the facts already given respecting the climate of Palestine, I add the following remarks: It is evident from the statements of history, both sacred and profane, as well as from other testimony, that this country, in former ages, was not only under a more general and thorough state of cultivation as regards its agricultural districts, but also that it possessed extensive tracts of forest which have long disappeared. Consequently its rain-fall was more favorably regulated, being more equable in its distribution. The result would naturally be not only the temporary advantage of the improved growing crops, but the increment of the soil, and the permanent benefit of the land. At present, seasons of almost tropical rain are followed by the long dry period in which not a drop of rain falls, and nearly every green herb perishes and burns up for lack of moisture. Swept by the resistless torrent of the "rainy season", the higher lands are stripped of their soil, and entire districts are seen in which the bare and barren ridges of rock crop out like the bones in the skeleton of some gigantic animal.

The phenomenon of the "air-cushion" is seen here to perfection. Before a rain sets in, it generally takes several days of incubatory preparation before the result comes. Great clouds roll up, and cover the entire heavens with their dense masses; but in vain they attempt to discharge their contents, or if they succeed in doing so, the thirsty atmosphere drinks up the moisture before ever it reaches the earth. And this must continue, till the intervening strata composing the "air-cushion" are sufficiently saturated to permit the rain to fall through, which then comes in a violent and often injurious downpour. Deprived of the mediation of the growing crops, and especially of the forest, which would have established the proper relations and a just equilibrium, through their continual evaporation, the parched ground languishes for the rain that is denied it, or that, when given, comes in almost an unwelcome shape.

During the serious drought of 1887, '88, this phenomenon was seen in an intense degree; weeks and even months passing without adequate rain, though the greater part of the time the heavens were dark with clouds. The intervening unsaturated "air-cushion" drank up the contents of the clouds, as already described, so that little or no rain could pass through it.

It is thought that the agricultural colonies establishing here within recent years have already begun to produce a perceptibly beneficial effect in this direction. But probably it is too soon yet to look for any decided change.

(Signed) Henry Gollman,
Consul.

United States Consulate,
Jerusalem, August 29, 1889.

No. 117

Consulate of the United States,
Jerusalem, August 31st 1889.

Honorable William F. Wharton,
Assistant Secretary of State,
Washington, D. C.

Sir:

In compliance with circular of June 8th, 1889, I have the honor to submit for the use of the Agricultural Department the accompanying report on the Agriculture and Horticulture of Palestine for the months of July and August, 1889.

I am, Sir,
Your Obedient Servant
Consul.

Enclosure:
1. Report on the Agriculture and Horticulture of Palestine for the months of July and August, 1889.

Report of the Agriculture and Horticulture of Palestine, for the months of July and August 1889.

The past harvest of wheat and barley was, on the whole, a good one for Palestine, although for Jaffa and its immediate neighborhood only a medium one.

The prospects for the crops of Doura and Sesame, which will be soon brought in, are very good indeed.

Oranges and lemons do not give as favorable a promise as they did last year. The crop will be hardly an average one. The winter gales and, later on, the sirocco winds have proved hurtful to the trees.

An unusually abundant crop of olives is promised this year. Peaches, apricots, plums, melons, and figs have yielded excellently, both as regards quality and quantity, while pomegranates and grapes are coming into market in fine condition and in exceptional plenty.

Vegetables have never been more plentiful than they have been this summer, and the prices have been correspondingly cheap.

August is the vintage month for the grapes growing in the Plain of Sharon; but the grapes of the Mountains of Judaea are not in perfection till two months later.

The vine is at home in Palestine since the time of the Patriarchs, and grows almost without cultivation, means very little expense for planting, and is nearly unfailing in its annual crop. Phylloxera has not yet found its way here; although in every year single plants may here and there be found to be diseased by the Dactylopius vitis.

The area of vineyards around Jaffa is steadily extending, and comprises, to day, about 2000 acres, being an increase of fully 1000 acres in the last 15 years. The reason is that the cultivation of the grape here proves easier work

and more lucrative than the culture of wheat. This business has received a great impulse through the German settlers at Sarona, who in the course of fifteen years have alone planted 500 acres of vineyard, and introduced several sorts of grapes new to the country, among them the American "Isabella", which is quite a success in this soil and climate. —

As already mentioned, the grape crop is a good one this year; and it may be estimated at 36,000 cwts. for the district of Jaffa alone. About one-half of this quantity is exported to Egypt; the rest is eaten here, or turned into wine. It is difficult to estimate the production of the vineyards scattered scattered over the Judaean Hills and northern Palestine; and ancient Esshol.

The wine-making is almost entirely in the hands of Europeans; but the exports of the article, owing to the keen competition of Greek, Italian, French and Spanish wines, is still very insignificant; scarcely more than 400 hectolitres of wine per annum being shipped from Jaffa to Egypt and Europe.

The average yield of an acre of land planted with the vine is 25 cwts. of grapes, which would sell for about $20. in the market.

(Signed) Henry Gillman,
Consul.

United States Consulate,
Jerusalem, August 31. 1889.

Consulate of the United States,
Jerusalem, September 3. 1889.

Honorable William F. Wharton,
Assistant Secretary of State,
Washington D. C.

Sir:

In compliance with "Harbor Circular", dated July 15, 1889, I have the honor to submit the accompanying "Harbor Report" for this Consular District.

I regret I am unable to obtain any report of the Government or other publication upon the subject.

I am, Sir,
Your Obedient Servant,

Consul.

Enclosure:
1. "Harbor Report for Palestine".

Harbor Report for Palestine.

At the port of this Consular District is Jaffa. All the replies given in this report to the interrogatories of the "Harbor Circular" of the Department, dated July 15. 1889, have reference to Jaffa.

Pilotage

There being needed no pilotage at this port, consequently there exist no pilot charges.

Light Dues.

The light dues on steam and sail vessels, laden or in ballast are: For vessels from 1 to 800 Tons, 20 Paras per Ton = 0.0625 cents and £. 1250. For vessels upwards of 800 Tons, 10 Paras per Ton at every port = 0.0312½ Light dues have to be paid in Turkey during the same