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1903.

## ORDINARY MEETING.\*

DAVID HOWARD, ESQ., D.L. (VICE-PRESIDENT), IN THE CHAIR.

The Minutes of the previous Meeting were read and confirmed, and the following elections took place :—

MEMBER :—James Christie Reid, Esq., F.R.G.S., Chislehurst.

ASSOCIATE :—J. Martin Tilby, Esq., London.

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*THE WATER SUPPLY OF JERUSALEM.* By ERNEST W. GURNEY MASTERMAN, Diploma in Public Health, Cambridge.

The SECRETARY (Professor EDWARD HULL).—As you may recollect when a paper was read on the water supply of Jerusalem, † by General Sir Charles Wilson, which gave very full details of the recent operations carried on by the Turkish Government for the supply of the city, he took great exception to the work because it did not fulfil its object, *i.e.*, of giving the people of Jerusalem a proper supply of water ; and when a copy of the paper was sent to Dr. Gurney Masterman, who was out in Jerusalem professionally, he took exception to Sir Charles Wilson's views, stating that the supply was not unsatisfactory. This being so, as he was on the spot and Sir Charles Wilson was only writing from information that he had received, I thought it would be well to ask Dr. Masterman to state, in writing, his views on the subject, and in what

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\* Monday, March 16th, 1903.

† *Trans. Vict. Inst.*, vol. xxxiv, p. 11.

manner they differed from those of Sir Charles Wilson; and, of course, when his paper arrived, it had to be submitted to Sir Charles Wilson for his comments thereon. We have both these communications here and they will be read this evening.

The following communications were then read:—

JERUSALEM,

*September 22, 1902.*

To Professor Hull, F.R.S.

My dear Sir,

Thank you for your kindly note. When I first received your suggestion to write my all-too-late remarks, I more than hesitated. I decided not to do so, because I felt a criticism in one volume of a paper which had appeared in a previous volume would be of little interest. When, however, I came to talk over the subject of Sir Charles Wilson's paper with others here who had read it, I found that the views I have now written are those generally held, and there can be little doubt but that Sir Charles Wilson is mistaken.

As the work has now continued nearly a year, and if only *completed* (many parts of the pipes are even now not properly supported, and the greater part ought to be buried), I cannot see why it should not continue for long. I venture to send you a very amateur paper of mine which was published last February in an American magazine, as it may be of interest to Sir Charles Wilson's learned address. If you think what I have written of any use, then read it and print it, but if you feel it is of no use, discard it, or, if you will, cut it down—I may be unnecessarily prolix.

With kind regards,

I remain,

Sincerely yours,

ERNEST W. GURNEY MASTERMAN.

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**S**IR CHARLES WILSON, in a learned and most interesting paper read before the Victoria Institute on May 26th, 1902, has described the water supply of Jerusalem, with a knowledge and authority which no one, I imagine, could rival. With the greater part of his paper it would be a liberty for me,

a mere amateur, to deal ; with, however, that part which treats of the new supply inaugurated last year, it is clear to me, as it is too to many of those who know Sir Charles Wilson in this city, that he has been misinformed. I do not believe any unprejudiced resident here would characterise the new supply as having "ended in a fiasco," nor say that "the sum expended may be regarded as practically thrown away." Probably few of us are judges as to how much money should have been spent on the iron piping and other expenses connected with the new aqueduct. But residents here are rather concerned with the practical results, especially as the money has not come out of any of our pockets, nor have we been called upon to pay any water rate for the new supply ; it is all a free gift, provided by certain charitable endowments connected with the city. When in England would a new water supply be given, even if a poor one, without the consumers suffering financially ? Sir Charles Wilson considers the old aqueduct might, with much greater advantage, have been repaired. This may be, but we also know, he states it himself, that whenever this has been done, it has been wilfully broken. It may be repaired, but it cannot be protected either from malign treatment or from defilement on its route. The new aqueduct can ; and is easily patrolled, long stretches being seen from the hills ; and, what is more, it is far less easily injured by ignorant *fellahin* ; and the water cannot be contaminated *en route*. There are one or two points, however, in which some local correspondent must have quite misinformed Sir Charles Wilson.

He states (1) "Feeble streams of water are delivered in the Haram esh-Sherif, where it is only available for Moslems." "No attempt has been made to supply water to any quarter of the city." The "feeble streams" have so far been quite sufficient to keep the great reservoirs of the Haram replenished, so that all through this long dry summer water has been supplied gratis all over the city, the people only having to pay the cost of the water carriers, an item which has been considerably less than in previous years. This supply is independent of race or creed. Further, for many months past one of the old Arabic street fountains outside the Haram has been supplied with a pipe of running water, and the poor, Jews, Christians, or Moslems, can fill their tins, etc., as they like.

(2) "The water running by day through iron pipes exposed to the direct rays of the sun arrives in such a heated state as to be unfit for drinking." If Sir Charles Wilson's informant took a cup down at mid-day to the taps above the Birket es Sultan, and

tried a draught of water, then it is possible he may have been justified in his verdict; but as the people here do not rely only on that method of quenching their thirst, they do not complain of this. On very hot days the water, if taken in the heat of the day, is a little warm, but not nearly so much as might be expected. The great reservoir is not far from the city, and the water starts from that quite cold and runs rapidly. But there are two simple remedies applied to meet this: either to take the water at night, as some I know do, or cool it down in the houses. We in our house cool our water by letting closed bottles of it down into a cistern, when it comes out as cool as any one could wish; other people cool it in porous water bottles, but the water is at all times not only fit for drinking, but far superior to the water to which the people here have been accustomed.

May I in conclusion briefly enumerate the details of the great boon which in my opinion this new supply is to people here, especially to the poor, who form our great majority. We have had two exceedingly bad "wet seasons" and the country has seldom been more dry and parched; many springs have dried up, others are much diminished; it has therefore been a time when suffering in this city at this season, *i.e.*, at end of the dry summer, would ordinarily have been acute. After far better rainfalls I have seen great distress through the actual want of water for domestic purposes, and at such a time the drinking water used by the poor is filthy to a degree.

What has been the case this season?

(1) The water sold by the water carriers has been considerably cheaper, and has been of a far superior quality, being fresh spring water, instead of being cistern water of most doubtful quality—often from cisterns not cleaned for years, and containing all kinds of horrible filth; or the brackish water of Bir Eyub.

(2) Among those who have time and patience it has been possible for any one to fetch water for nothing at all, either at the taps at the Birket es Sultan, or at the public fountain near the Haram.

(3) As good water has been more obtainable, the commoner water from doubtful cisterns has been freely used for watering the streets. Hence the greater part of the Jaffa road that has been incorporated into the town has been liberally watered night and morning, far more freely than in past years.

(4) For the more well-to-do it has been possible, without any charge except the cost of carriage, to have house cisterns re-filled

by means of water-carts, which carry the water from the supply at the Birket es Sultan to their houses.

(5) My daily life takes me among the sick belonging to the very poor inside the walls of Jerusalem, and my experience has been that while malaria and ophthalmia have been prevalent this summer, the diseases we ascribe to bad water, dysentery and typhoid, specially the former, have been less than usual; and as a medical man I have no hesitation in saying that the new supply has been greatly for the health of the community. To bring water from 'Ain Karem and other springs round Jerusalem at sixpence a small jar (such as is carried on a woman's head), or to send one's servant several miles for it, is a luxury only possible to those fairly well off. But all can now buy for about one penny a large tin of pure water from the springs of Solomon's Pools, and that has been made possible, at any rate for the present, by our iron-pipe aqueduct.

With Sir Charles Wilson's remarks of what *ought* to be done in the future, both with regard to construction of reservoirs on high ground, and even more urgently with regard to our most disgraceful drainage, I am most warmly in sympathy. Would that he were here with powers to carry out his reforms!

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REPLY BY GENERAL SIR C. W. WILSON, K.C.M.G.

I have read Mr. Masterman's remarks on my paper, and have found nothing in them that would lead me to modify the opinion which I expressed, that the work recently executed in connection with the water supply is an engineering fiasco, and that the sum expended upon it has been practically thrown away. I certainly never intended to dispute the self-evident fact that a small supply of water is better than none at all. I can readily understand that residents in Jerusalem are thankful for small mercies, but this does not prove that a bad system is a good one.

The question from an engineering and financial point of view is a simple one. Water was conveyed from "Solomon's Pools" to Jerusalem by an ancient aqueduct which, in regard to design and construction, shows a high degree of engineering skill. This aqueduct, when in working order, brought a good stream of water to the Harâm esh-Sherif. It has been repaired several times, and could have been restored again *at small cost*; or it might have been replaced by earthenware or iron pipes. My experience in Turkey

would lead me to characterize the suggestion that a Turkish Governor could not protect such an aqueduct from injury when it was either his interest or desire to do so, as simple nonsense. What I said with regard to damage to the old aqueduct on previous occasions has been misunderstood.

Instead of utilizing the old conduit, the engineer entrusted with the improvement of the water supply, laid down iron pipes up hill and down dale *at great cost*, and delivered water at the same place with a *considerable loss of volume and pressure*. Surely in no other part of the world could such a fantastic scheme have been sanctioned, or have met, when carried out, with the approval not only of the municipal authorities, but of a gentleman who is unconnected with the local government. It is no excuse to say that the squandered money was taken from a charitable bequest and not from the pockets of the residents; and the fact that the Turkish Governor and the British Consul have been able to fill their cisterns, by having water carried up to them on donkeys, from the Birket es-Sultân, is no proof that the new system is a good one.

It is said that with the new works the water cannot be contaminated *en route*; but the aqueduct between "Solomon's Pools" and Bethlehem is open, and through the whole of that important section the water is exposed to contamination before it enters the iron pipes. The expression "feeble streams" in my paper is, as most readers would see, used in contrast to the strong stream that would have been obtained by the repair of the old aqueduct. I am glad to hear that one of the old fountains has been restored, but it would appear that many have still to purchase water from the Harâm esh-Sherif. Mr. Masterman, apparently, sees no objection to the delivery of warm water; but, in the name of common sense, why should Jerusalem be supplied with warm water when it could much more easily, and at far less cost, have been supplied with cold? What would be said in this country of an engineer who, at an exorbitant cost, supplied water to a town by means of iron pipes laid on the surface of the ground with the least possible regard to its inequalities? Why Mr. Masterman should attempt to defend an engineering blunder, which will long delay the construction of properly designed works, is a mystery. It almost makes one despair of any effort to improve the condition of Jerusalem.

C. W. W.



## DISCUSSION.

The CHAIRMAN.—I do not know if anyone is here who can bring personal knowledge to bear. An engineering controversy is rather difficult for one who is not an expert to decide.

The chief thing which impresses one is the marvellous engineering skill of the old Jewish engineers, who could plan an aqueduct which fulfils so well its purpose, and it strikes me that we are not so superior, as we are apt to think, to those who have gone before us in these matters. The question now at issue is whether the arrangement was the best that could be done at the price, or whether it would not have been better to make another one. That is a very nice point for engineers.

Mr. MARTIN ROUSE.—I thought certainly they would have made another one, for several offers were made to them, first by the Baroness Burdett Coutts, and then Sir Henry Lechmere, and they were asked to carry it out; but the Turkish Government did not accept it, as appeared on several occasions, because the governors themselves were not to be the executors of the scheme.

We all know something of the principle on which the Turkish Pashas go to work, to secure as much as they can for themselves.

We read that they have an average rainfall of about 25 inches, whereas in London it is 27 inches, with a much less degree of sunshine, and therefore they must be surely in need of water in the hot season.

Mrs. FINN.—It so happens that it fell to my lot to repair this very aqueduct of which Sir Charles Wilson speaks. When I was living in Jerusalem I had the pleasure of helping in some operations in connection with Solomon's Gardens, where the tenure of the land was practically on condition that we kept that aqueduct in repair; and therefore from year to year I had to see that that small aqueduct from Solomon's Palace to the Temple in Jerusalem was kept in repair. The portion the Secretary alluded to between Bethlehem and Solomon's Pools is generally in excellent repair. It is just after it leaves Bethlehem that it is likely to be broken; but when we were all living there the Governor did twice think it worth while to repair it. Once in 1858 the then Governor put it into

complete repair, and we had the pleasure of taking Sir Moses Montefiore and Lady Montefiore to see the Temple area, and the Governor handed us, with pleasure, a cup of water from that aqueduct;—but it was broken afterwards, and left broken. But I think, with Sir Charles Wilson, that it could easily be kept in repair.

The SECRETARY.—Mr. Vice-President, ladies and gentlemen, I think, on the whole, we may satisfy ourselves that things are better now in the way of water supply in Jerusalem than they were when Mrs. Finn lived there, and when I passed through it in 1884. We had then to depend on one single supply for drinking water. That was a spring down at the foot of the wall in the valley of the Kedron, but now I think it is a great encouragement to those who contemplate, as I hope many people do, a visit to the shrine of Jerusalem (Christians as well as Jews), that they will now have an opportunity of drinking pure water. You may not be able to get such a supply as you have in London for your “Turkish bath,” sponge, or English bath, but at any rate you get a supply of pure water, and you would be less liable to maladies from the water supply than you would have been a few years ago.

No doubt Sir Charles Wilson is perfectly right—that this reconstruction of the old aqueduct by some engineer, whose name I do not know, but who was employed by the Turkish Governor, did not carry out his work as it would have been done by an English engineer, or the English Government. But if it gives half the supply of pure water that was formerly delivered to the inhabitants, they may consider themselves fairly well off. I should only regret if, as Sir Charles Wilson seems to think, this infinitesimal improvement should have the result of delaying to a distant date a more complete reconstruction of the wonderful aqueduct and supply that was made in the time of Solomon from Solomon’s Pools.

I do not think anyone has satisfactorily answered the question—Where does this water come from that supplies Solomon’s Pools? It is really a most remarkable spot. There are two or three Pools, I think, Mrs. Finn?

Mrs. FINN.—Three pools, and they all have a different supply. They are not all supplied from one source.

The SECRETARY.—I thought they were all supplied from the head.

Mrs. FINN.—Not at all. The one that supplies the aqueduct does not supply the Pools at all.

The SECRETARY.—Then I am quite mistaken ; but I suppose that those supplying the Pools issue from a fissure in the solid limestone rock. Of course the whole of that country is made up of beds of cretaceous limestone. You go down a few steps and come to an underground channel through which flows a stream of beautiful cold water into the uppermost of the three Pools. I thought that was the Pool that gave the supply to the aqueduct at Bethlehem.

Mrs. FINN.—The old fountain is at the corner of a steep place, and the water from that runs into Bethlehem and on to Jerusalem.

The SECRETARY.—I am glad of it, for I do not think the water coming out of the Pools would be pure ; but it may have been very useful for irrigating the Gardens of Bethlehem.

Mrs. FINN.—They were evidently intended for an aqueduct for irrigation.

Mr. MARTIN ROUSE.—Are they used at the present day ?

Mrs. FINN.—No. I was unfortunate enough to suffer very badly at one time. We were cultivating gardens there, and a Greek was ordered to destroy our work. Perhaps I may be allowed to say what I ought to have said before. It is not quite fair to lay all the blame on the Turkish Government. The Baroness Burdett Coutts did get leave to repair the old great aqueduct—not this one, but a much larger and finer one—and I am sorry to say that an Englishman told me in London how he was the means of stopping carrying out the scheme.

Mrs. Finn then narrated the occurrence that terminated so unfortunately for the inhabitants of Jerusalem.

The CHAIRMAN.—Really this paper has afforded us exceedingly interesting information. Anything that adds to our knowledge of Jerusalem, as it was and as it is, is always interesting. It is certainly one of the most pitiable spectacles there can be to see a country as badly governed as can be, with these miserable jealousies and these miserable under-currents of motive that have nothing to do with the benefit of humanity, and which are certainly spoiling one of the most beautiful parts of the earth. I often think when one reads that sort of question about the water supply of Jerusalem, how little we realize the advantages we have in England. We take it as a matter of course that we are to be supplied with water,

even though we waste most of what we get. In London the waste is inconceivable. What becomes of the 36 gallons a day per head (babies included) I cannot conceive, but so it is. Contrast with that a state of affairs where water has to be fetched miles, and we ought then to be able to realize the advantages under which we live.

We owe our thanks to the Secretary for reading the papers, and we owe both the writers thanks for giving us two opposite views. I confess I am in sympathy with the original paper as to what would have been the right thing to do, if it were possible to have the old aqueduct repaired; but it is always interesting to hear the other side, even if one does not wholly agree with it.

The Meeting then terminated.