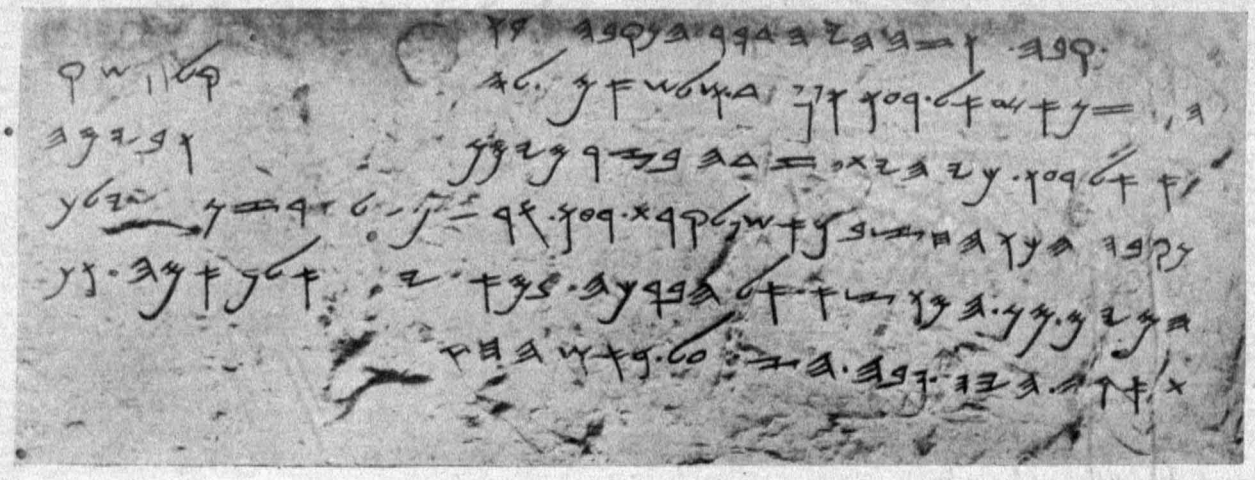
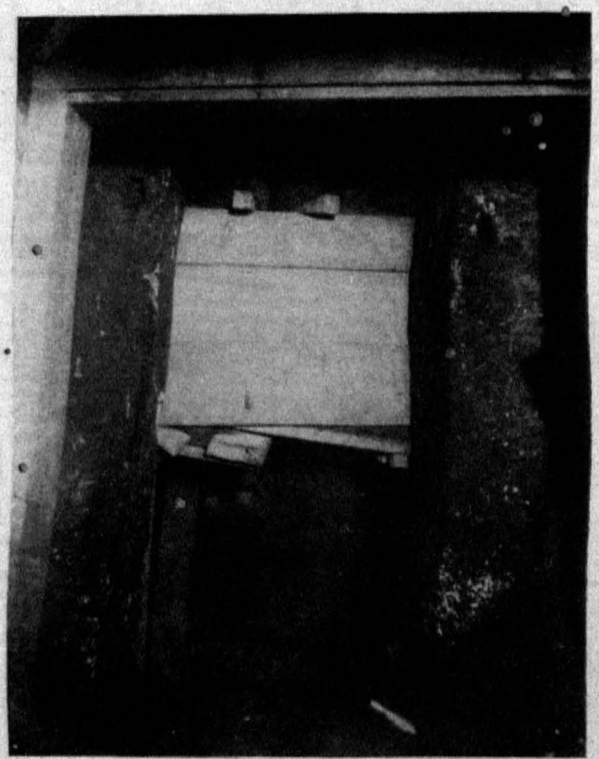
UNDERGROUND JERUSALEM.



The Inscription found in the Siloam Tunnel in 1880.

Reproduced by courtesy of the Palestine Exploration Fund.



The Most Ancient Gateway of the City of David yet discovered.

EXCAVATED BY THE EXPEDITION OF 1909-11 AND PHOTOGRAPHED FROM WITHIN THE CITY LOOKING EASTWARDS.

(The monoliths on each side are 1 mètre 82 high by 50 centimètres broad, and only 82 centimètres apart.)

Frontispiece.

UNDERGROUND JERUSALEM.

DISCOVERIES ON THE HILL OF OPHEL (1909-11).

BY

H. V.

(of the Ecole Biblique et Archéologique in Jerusalem).

SPECIALLY TRANSLATED FROM THE FRENCH FOR THE "FIELD," AND FULLY ILLUSTRATED WITH PHOTOGRAPHS, PLANS, AND COLOURED PLATES.

LONDON:

HORACE COX,

"Field" Office, Windsor House, Bream's Buildings, E.C.

1911.

PRINTED BY HORACE COX, "FIELD" OFFICE, BREAM'S BUILDINGS,
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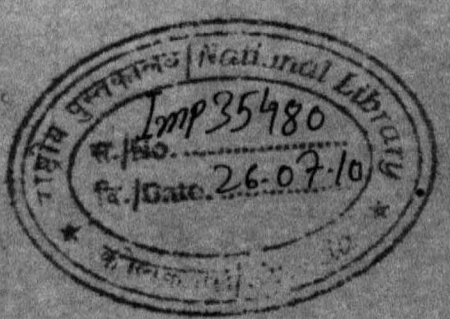
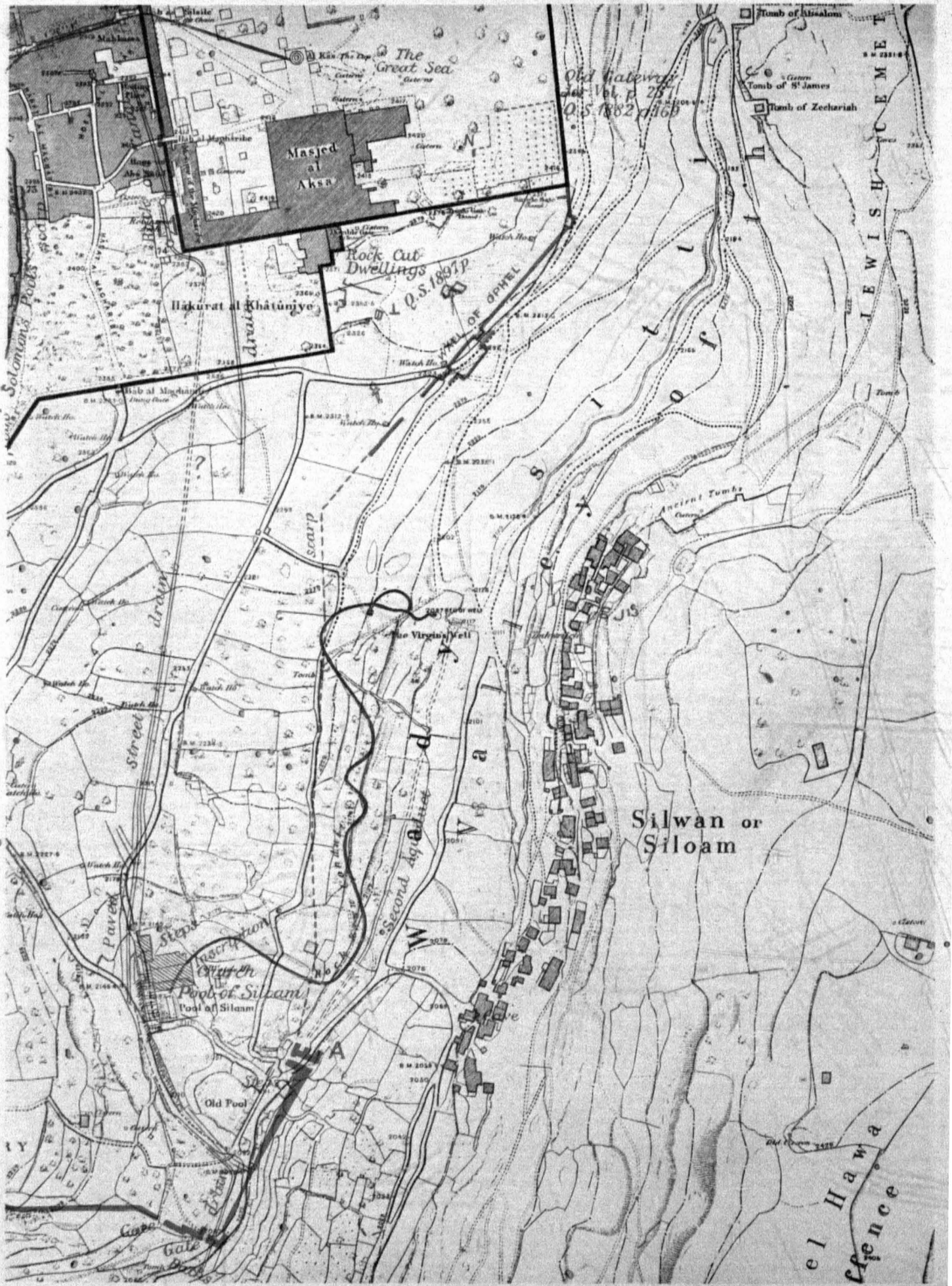




Plan of the Valley of Mount Ophel, showing discoveries up to October, 1900, from the Map published by The Palestine Exploration Fund, based on the Ordnance Plan made by Major-General Sir Charles W. Wilson.

TRANSLATOR'S PREFACE.

"Hezekiah took counsel with his princes and his mighty men to stop the waters of the fountains which were without the city, and they did help him."—II. Chron. xxxii. 3.

"And the rest of the acts of Hezekiah and all his might, and how he made a pool and a conduit, and brought water into the city, are they not written in the book of the chronicles of the Kings of Judah?"—II. Kings xx. 20.

"Behold the Excavation! Now this had been the history of the excavation. While the workmen were still lifting up the pick, each towards his neighbour, and while three cubits still remained to cut through, each heard the voice of the other who called to his neighbour, since there was an excess of rock on the right hand and on the left. And on the day of the excavation the workmen struck, each to meet his neighbour, pick against pick, and there flowed the waters from the spring to the pool for a thousand two hundred cubits, and a hundred cubits was the height of the rock over the head of the workmen."—Translation of the Siloam Inscription, published by the Palestine Exploration Fund. See their "Quarterly Statement" for July, 1881.

"And I went out by night by the gate of the valley, even before the Dragon Well."—Nehemiah ii. 13.

In June, 1880, there was accidentally discovered an ancient inscription cut upon the rocky wall of the channel leading into the Pool of Siloam. This channel was the ancient conduit, or subterranean passage, cut through the southern spur of the hill on which the Mosque of Omar stands, in order to bring the water of the Virgin's Well on the eastern side of Jerusalem to the Pool of Siloam on the eastern slope of the ancient valley of Tyropoeon. The inscription revealed that this connecting passage had been excavated from both ends by workmen who met in the middle, as was the case many centuries later beneath Mont Cenis. In the "Quarterly Statement" of the Palestine Exploration Fund for July, 1881, Professor Sayce describes what was the oldest record of the kind in Biblical Hebrew yet discovered, an early contemporary specimen of the language of the Old Testament, written in the ancient Phœnician alphabet used on the Moabite stone, but probably of an older date than that celebrated monument. With the help of Mr J. Slater, Professor Sayce took the first perfect and intelligible copy of the inscription, a photograph of which, together with a translation, has been published on a separate card by the Palestine Exploration Fund, to the committee of which we desire to express our thanks for permission to reproduce both this inscription and a portion of one of their maps of Jerusalem. At the end of the article just mentioned Professor Sayce says:

"Underground Jerusalem has been as yet but little explored, and if we may find a record of the kind in a spot which is easily accessible, and has been not infrequently visited, what discoveries may we not expect to make hereafter when the Temple area can be thoroughly investigated and the subterranean watercourses of the capital of the Jewish monarchy laid open to view?"

It is with the discovery of some of the most important of these subterranean works that the following pages will chiefly deal, and the title of this pamphlet was suggested by the first two words of the paragraph just quoted.

Professor Sayce referred the channel supplying Siloam to as remote a date as the reign of Solomon. The excavations of 1909-11, however, tend to confirm the conclusions arrived at by Isaac Taylor, who argued in favour of a more modern period about the middle of the eighth century (see P.E.F. "Quarterly Statement," July, 1881, p. 135). In the same publication for October, 1881, Lieut. Conder (on pp. 285 and 288) discusses the letters and words of the inscription; S. Beswick writes of the boring of the tunnel and the calculations of the cubit founded on the inscription; and H. Sulley discusses the meaning and use of the niches in the tunnel. The names of Warren, Wilson, Robinson, Smith, Barclay, Tobler, and others are connected with similar questions, and in *Excavations at Jerusalem*, by Messrs Bliss and Dickie, some especially interesting discoveries are mentioned in the same locality.

It will be found that the plans, measurements, and statistics here published from the excavations carried out in 1909-11 have added very considerably to our knowledge of these matters, and will enable us to carry our deductions several steps further. The pottery alone, which is one result of the latest expedition, would have almost sufficed to justify its utility and interest; but its work has made important contributions to the history of the conquest of the ancient town of Jebus, by David, to the prehistoric origins of that town itself, and to the elaborate system of subterranean waterworks beneath it.

The natural precautions taken by the expedition against mere curiosity, the constant working of gangs of men not only by day, but in relays by torchlight through the night, the mystery surrounding these operations in the bowels of the earth—all this combined at one time to produce exaggerated and erroneous impressions. The villagers, however, soon discovered the unaccustomed blessing of regular wages during long periods of the year. They found, also, that, far from desiring to rob them of their precious water supply, the explorers had doubled its volume and much increased its utility by clearing out the whole conduit from the Virgin's Well to the Pool of Siloam, and so giving a far better flow of water when the spring was once more allowed to fill its ancient channels. Unfortunately, the villagers' crude suspicions of the explorers' motives reached in the early part of 1911 a higher level of society, and for some days the Press of Europe and America was filled with alarmist rumours of desecration and other futile impossibilities. As will be seen later, the explorers rather erred on the side of superfluous caution than of reckless zeal. They were able to command the use, not only of the best machinery available, but of trained engineers of the

TRANSLATOR'S PREFACE.

highest order; and even then it was only by great skill, united to indomitable energy under the most adverse circumstances, that they realised even the successes here recorded, successes which give promise of far more wonderful discoveries in the immediate future, for the true secret of the Hill of Ophel—it has never yet been found—has never yet so nearly been revealed as by the expedition whose work down to April 15, 1911, has been so ably described in these pages. The capable and well-known archæologist, whose work is now specially translated for the *Field*, has followed every step of the explorers' work upon the spot, and no small part of the value of his contribution is to be found in the admirable plans and drawings by which it is accompanied.

For reasons which will be easily intelligible to all who are familiar with such matters, we do not for the present give publicity to the names of anyone concerned. They will appear in due course when the completion of the expedition's work at a subsequent date will be recorded in a final and complete volume to be published by Messrs Constable and Co.

But it was thought that the interest of what had been already accomplished was too great to justify any further delay in communicating to the world of travel and scientific research at least an accurate and efficient *résumé* of the present position.

In this volume (and especially in the French edition), issued from Windsor House, by Mr Horace Cox, will be found more numerous details and more extensive plans and illustrations than it was possible to publish in the pages of the *Field*, illustrations which show, among other valuable results, that civilization on Mount Ophel may be traced back for twenty-five centuries before the birth of Christ. For convenience of reference the whole of this illustrative material has been placed together at the end of the text.

AUTHOR'S PREFACE.

By visits in three successive years (1909, '10, '11), and by skilful and fatiguing work, which (in July, 1911) had consumed a total of nearly twelve months, the latest expedition to Jerusalem has achieved results which may at first prove somewhat disappointing to a public originally misled by the grossly exaggerated reports hastily telegraphed to London by various correspondents who preferred sensation to accuracy. But all serious archæologists or students of Biblical topography will be grateful to the leader of the expedition for allowing me, with as little delay as possible, and with all the advantage of his enlightened and generous assistance, to publish the important light actually thrown by his excavations upon the ancient history of Jerusalem.

I propose, therefore, to begin with a slight sketch of the aims and methods of the expedition itself, followed by a summary but accurate description of its archæological results, illustrated by technical details, measurements, maps, and plans. I shall conclude with some suggestions as to the value of the new facts now revealed, and as to their meaning and influence upon any considered judgment of the history of ancient Palestine. This last chapter is, of course, of a somewhat different character from that of the preceding pages; but my readers will have had the facts, as previously stated, before them, and my deductions are merely offered for what they may be worth, for the criticism of contemporary scholars.

Let me add that the maps, plans, and detailed drawings have been made after long-continued and constantly repeated visits to every point of the excavations, and though I assume full responsibility for every error which may possibly appear, in spite of most careful verification, I must at once admit that these drawings would have been impossible but for the courtesy and assistance of the members of the expedition and for the constant and skilful help of my comrades in the Biblical and Archæological School of Jerusalem. The proofs have also been read by the leader of the expedition. To all of these I desire to express my sincerest gratitude.

H. V.

École Biblique et Archéologique, Jerusalem, 1911.

CONTENTS.

CHAPTER I.

THE AIMS AND METHODS OF THE EXPEDITION OF 1909-11 IN JERUSALEM.

In August, 1909, great interest was aroused in the environs of Jerusalem by the visible evidence that an exploring party were beginning excavations on the eastern slope of Mount Ophel. The point selected was the old shaft opened up in 1867 by Warren, who tried to find here a subterranean passage leading to the Virgin's Well. So there was no doubt that the new enterprise was being undertaken by men who were not only well acquainted with the archæological history of the spot, but were also endeavouring to solve some of the historical and topographical problems suggested by this celebrated locality.

However, trespassing was strictly forbidden, and the works were closed to all inquisitive visitors without distinction; so the usual rumours, ever prompt to arise in these parts, soon found a fertile opportunity for flourishing. All round the mouth of the well a fairly large number of foreigners were to be seen, whose nationality was unknown, whose names were scarcely guessed. Among them might have been seen engineers, mathematicians, architects, and artists, and it was observed with some surprise that they were accompanied by two officials from the Turkish Government sent from Constantinople as Imperial delegates to watch over the mysterious explorations evidently about to begin. Night and day the squads of workmen succeeded each other in the bowels of the mountain. What were they after? The question was not long left without an answer by those journalists whose methods are less distinguished by research upon appropriate lines than by the assumption of special information conveyed directly to them by the inner councils of the gods. Since the works were closed to casual visitors, it was clear, said one of these gentlemen, that the expedition had some inauspicious and unholy task on hand. Another merely derided the unreasonable and illogical efforts of the excavators. A third ironically deplored the childlike innocence of men who were bound on a chimerical quest for non-existent objects. The explorers continued hard at work without paying any attention to such gossip.

A letter of introduction sufficed for me and my comrades to be received with a kindness and courtesy which I should like to recognise as publicly as possible. We were given free access at all hours to every part of the workings under two very just and natural conditions: (1) that the workmen should never be interfered with; (2) that nothing should be divulged of what was going on until a time fixed by the leader of the expedition, and I trust that those who may possibly have felt a trifle hurt by my continued silence will realise that an equal discretion will always be at their own service on any future occasion of a similar kind.

On Sept. 26 the leader of the expedition was so good as to guide us himself, thoroughly and systematically, through all the subterranean galleries he had by then explored, and to give me the results of his first observations. From that date I went to the workings regularly three days a week, sometimes alone, generally accompanied by a friend. We used to the full our permission to take measurements, photographs, or sketches, without accounting to anyone for our actions. A few such visits soon gave us the pleasure of a complete acquaintance with the various members of the expedition. Sympathy is a plant of rapid growth among men who are keenly interested in archæology and measurements, and who are often forced into the closest of companionships by labour in the trenches. But when that labour is carried on under conditions so abnormal as those upon Mount Ophel friendship becomes even easier and more cordial. We lived underground nearly the whole time it was daylight. The work went on at nightfall without stopping, by the light of torches and to the sound of songs chanted by the workmen, who found it necessary to take some such means to counteract the monotony of the dark, mysterious tunnels which seemed to stretch endlessly into the very entrails of the rock. Every turn in the passage revealed someone at work in the most unbelievable of costumes, his face all over smoke and mud; elsewhere one man would trip over another, who lay almost hidden in a hollow of the rocky surface, or would cheerily demand a back to mount some sudden ascent in the rough pathway. A little further on you might have to efface yourself on a precarious gang plank to permit some fellow-worker to cross the cavity above which it hung, or you and another comrade would be looking wisely at each other, like a pair of augurs, before a rope ladder dangling down a declivity beset with stones and dangerously balanced rocks, or we would all gather together round a precious candle end to discuss some detail just discovered by the excavations, to examine a bit of pottery, or to correct a sketch.

Particularly in those tunnels which were close to the Virgin's Well itself did visitors and explorers closely congregate. Before the day—far off in 1909—when these splendid examples of ancient subterranean workings had been cleared out, we used to be perpetually climbing about in mud or wading through thick pools of water. Our essential problem, when we had to take paper and measuring instruments with us, was to save them from a too prolonged immersion. The splashes of mud and huge drops of candle grease, with which every sketch and every calculation was unavoidably decorated, soon had no terrors for us. We rapidly learnt to jest at our misfortunes, to laugh over our fatigues, to dismiss from our minds our frequent errors, and to keep our spirits up in the most arduous tasks. The leaders of the expedition were certainly ably seconded by the workmen's overseers; but it was these leaders themselves, taking turn and turn about by night and day, who were always on the spot when any particularly difficult bit of work had to be done. I shall never forget their strong

and hearty handshake when I first met them at each visit to the excavations.

The first three-months' campaign in 1909 had already produced results of high value to archæological research, but the new problems it suggested were even more important, and in August, 1910, the expedition returned to try again and solve them. This time they brought expensive and perfect machinery with them, and trained and experienced engineers to work it, and they gave special attention to the tunnels round the Virgin's Well. The work had gone on for some six months when I began these notes, and already some of the most curious enigmas in the subterranean galleries of Mount Ophel had been discovered. But I should state at once that it is not my business to give the whole story of an expedition which will only be fully understood when the complete facts come to light at a later date and from another hand. I never allowed curiosity to overcome my discretion in this matter. My sole task has been to examine and check the actual results, to make sure that these results were honestly obtained, and to guarantee for them that precise method of inquiry and rational type of exposition which may prove their claim to be considered scientific facts. When the publication of the complete work of the expedition has in good time appeared, it will be abundantly evident that, so far from ignorant sacrilege or iconoclastic pillage having been their objects, these explorers have done their work not only with the most conscientious thoroughness, but with scholarly scruples that were sometimes almost excessive in every detail of their labour. Even the somewhat brief and condensed narrative, which by the kindness of the leader of the expedition I have been now able to produce, will furnish conclusive proof that the expedition has sacrificed both a great deal of money and a great deal of skilled effort to the clearing up of difficulties in Biblical archæology and topography. How carefully and admirably these efforts have been directed and maintained, only those can fully appreciate who have some first-hand knowledge of the site, of the nature, and the enormous mass of material to be excavated, and of the possibilities of the native labour. One thing I may particularly note. During the whole time the work was being carried out by nearly every capable male inhabitant of Siloam, not a single accident has occurred, and not a single labourer has been hurt. True it is that very often some sudden crisis, impossible to foresee, has necessitated tasks of the greatest delicacy and peril. But these were in every case undertaken by the members of the expedition themselves, and the inhabitants were only brought back into the tunnel after all danger had passed. Sometimes, again, we were faced by the alternative of taking a real risk for a quarter of an hour, in order to find out something which might have ordinarily needed several days of patient work. Such tasks were invariably undertaken by the members of the expedition alone, and no one is likely to reproach them for a presumption so amply justified by success.

I may, lastly, point out that M. Clermont-Ganneau has suggested certain results of the highest interest and value which might be expected from a systematic exploration of the subterranean workings in Mount Ophel, especially in the region of the southern loop of the great aqueduct between the Virgin's Well and the Pool of Siloam. But the expedition of 1909-11 preferred to attack first the various subsidiary problems connected with the aqueduct itself, to investigate its northern loop, to define the secret passage mentioned by Warren, and to pay particular attention to the south-eastern portion of the mount. These questions have delayed the expedition to some extent, and there have been certain difficulties to surmount in the extremely complicated laws which govern property in this district. But there is not much doubt that they will eventually complete the exploration of the whole of Mount Ophel, including that part so particularly emphasised by M. Clermont-Ganneau, and if, by any unfortunate chance, they should themselves be prevented from doing so, all those interested in Biblical archæology will join in the hope that the task will finally be brought to a conclusion by means as careful, as accurate, and as conscientious as those employed in 1909-11.

CHAPTER II.

ARCHÆOLOGICAL FACTS AND RESULTS OF THE EXPEDITION OF 1909-11 ON MOUNT OPHEL.

In order to state quite clearly the work done in the somewhat complicated excavations from 1909-11, I propose to divide my account of them into five headings, which will respectively describe the Virgin's Well, the canals and galleries immediately connected with it, the subterranean conduit between it and the summit of Mount Ophel, the underground aqueduct of the Pool of Siloam, and the Burial caves, series of pottery, and other objects discovered during the work.

A.—The Virgin's Well.

Numberless photographs have made common property of everything known, before the work of 1909-11, about the curious construction locally known as the Virgin's Well—the first flight of steps sinking downwards at an angle beneath a vault of masonry, a spacious landing, with a second and narrower staircase, quite out of the square, sinking still further down into an artificial cavern in the rock. These elements of the problem are by no means extraordinary, but they are far from easy to explain. Long controversies have arisen over the date of various portions of this complicated whole. Arches by some considered to be Arab or mediæval are by others attributed to Byzantine or Romanesque workmanship. Several cautious critics have suggested successive reconstructions, in the course of which very old materials have been again made use of by far more modern workmen. Nothing has been structurally altered in this part of the building, and though I may venture here and there to indicate (either in the text or plans) certain general chronological attributions, I shall scarcely find space to indicate the independent sources of information from which the results of the expediton of 1909-11 enable me to suggest them. Neither do I propose to demonstrate the various inaccuracies to be found in certain old descriptions of this well, even when these inaccuracies were evident before the latest expedition began work at all. The plan and section of the place here given record the exact position of affairs after the whole construction had been thoroughly cleaned out, and I shall, in conclusion, be able to point out exactly what changes have been necessitated by putting the well into proper working order. Some of the accompanying photographs will further illustrate this. (See Plate XVII. and Fig. 8.)

The second declivity of the modern stairway ends in vacancy at a distance of 75 centimètres from the irregularly formed entrance to the water chamber, but it is quite easy to step across from the last step on to the rocky entrance of the cavern (A). Immediately behind the entrance, to the west, an oval cavity (B), with very irregularly shaped sides, dips for 1 mètre 60 below the surface in the shape of a funnel, and at the very bottom of this may be seen the point from which the spring emerges. The western edge of this funnel is raised, like a small dam, for 25 centimètres above the level of the entrance (A), and slopes downwards for 70 centimètres towards the opposite wall at an angle which has been built up to fit the general level of the inner chamber. The curious and almost triangular excavation marked D, which makes a fresh hole in the soil beyond the dam just described, is probably only a modern attempt to find the actual point of emergence of the spring, and is merely the enlargement of a fissure which slants across the whole floor of the chamber. The nodule at the bottom of this cavity (D), plainly marked in the section, was taken off when the whole chamber was cleaned out, and from the fact that its walls were not covered with the same kind of calcareous accretion found elsewhere I expect that it was similarly cleaned out when Dr Schick examined the well ten years ago.

Apart from this cavity (D) the floor of the inner chamber is united, and fairly level, with the exception of a slight general slope towards the entrance. Slight as this slope is, it is surprising, because one would ordinarily expect it to be in the opposite direction, towards the orifice of the tunnel (F), which is clearly visible at the western end of the water chamber. But on carefully examining the ground, it becomes possible to note some peculiarities that deserve attention. Obviously the first necessity was not so much the level of the ground as the freedom for the passage of water from the origin of the spring to the mouth of the tunnel. The curious steps (marked *dd*[1]), about 45 centimètres high, and clearly visible in some of the photographs, are unintelligible if we are dealing merely with a water chamber and nothing else. They show workmanship quite different from that seen elsewhere. Instead of the careful chiselling observable in all other parts of the construction, and especially in the vaulting, they show the broad, brutal strokes of a miner's pickaxe. They have been hewn out quite hurriedly, and neither sedimentary deposits nor erosion have obscured the marks of the tool left so many centuries ago. These may seem unimportant details, but they will be found later on to furnish a most useful standard of comparison when we come to the floor and side walls of the famous aqueduct of Siloam.

We will leave the door (F) for the moment, for it leads to the network of subsidiary tunnels, and return to the water chamber (E), taking care to note the curious and even violent contrast between the irregularity of its plan and the elegant correctness of its vaulting, which rises like a cupola above the spring, in the forepart of the building. In the section drawing I have intentionally exaggerated the size of the two little cavities *b* and *c*, which are of the same

workmanship, though different in shape. The one marked *b* was used at the beginning of our work to fix a lantern during the night, and was then filled up with cement.

To the east of the threshold (A) there is another deliberate lowering of the rocky floor level by 1 mètre 65, in the form of a basin (H), which is cut out under the modern stairway. It is in the form of a rough rectangle, limited on the eastern side by the old wall, and its diagonals measure 4 mètres and 2 mètres respectively. Before the whole place was laboriously cleaned out and kept free by the action of powerful pumps, it was impossible even to guess the relatively considerable depth of this basin and its exact relation to (1) the spring, (2) the old canal bordering the bed of the Kedron, (3) the whole plan of the valley. With the spring communication is direct, owing to a natural fissure in the rock beneath the threshold (A), a fissure which extends as far towards the south-west corner of the basin as the natural cavity, which might be geologically described as a pothole (marmite). When thoroughly cleaned out this pothole (*d*) measures more than a mètre in depth below the surface of the basin, and has an average diameter of 80 centimètres at its orifice. The floor of the basin at first shows a distinct slope to the east. At about 1 mètre 50 from the dam marked (A) a projection raises the level by about 45 centimètres, with an irregular hollow against the northern wall and a deep cleft in the north-east angle of the basin. It will make the effect of these details clearer if you imagine that the large wall (I) is not there. Then you can realise how the basin is developed for nearly 2 mètres to the east and then comes sheer up against a rocky projection almost as high as the threshold (A), and crowned by a large block of rubble (J). In the section (H^1) of the basin which is thus held between two dams, the rocky soil is sensibly lower, but very much dilapidated. A canal built of masonry (K) traverses it sideways from north-west to south-west, and we shall see more of this conduit when we explore the rocky passages more thoroughly. Its head was found beneath the wall (I) in the basin (H), and the functions of this wall, in blocking the canal, reducing the size of the basin (by cutting off the section H^1), and turning the water westwards, thus become quite evident.

To the east of the block (J), which was carefully left untouched, excavation revealed a thick and extremely solid concrete (ee^1), about 1 mètre 10 higher than the level of the floor in the basin (H), and built up, in some places almost on the floor level, in the direction of the Kedron, beneath the mass of rubbish which now carries the first flight of steps. Beneath the stairway, apparently, this concrete has long ago been destroyed, and it has only been perfectly preserved in the narrow zone protected by the foot of the wall. After breaking through a portion of it, we came upon a new conduit (L), deeply cut into the living rock to a depth of 1 mètre 80. This conduit penetrates beneath the modern stairway, and disappears in a fairly small cavern (M), in which the rocky roof and fissured eastern wall show indubitable traces of the passage of water during a very long time. This little cave is near the seventh step of the external staircase, and only about 16 mètres from the actual bed of the Kedron; but the new constructions inaugurated during the winter of 1909-10 confirmed what had been previously suspected, that the whole valley at about this point has fallen some 4 mètres. We have no exact evidence as to the precise level of the primordial bed of the stream, but various details lead us to the probable conclusion that it used to be 5 or 6 mètres more to the west than it is now, and the new religious school may therefore exactly bridge the ancient course of the river. The position of the little cave (M) just at the foot of the western slope will therefore admit of a perfectly rational explanation, which will be given in its right place later on. Its walls have all the aspect we should expect in a natural cavity. Like the conduit (L) and the whole surface covered by the cement (ee^1), it was blocked up with *débris*, which might have originated in some ancient cleansing of the whole construction, for it consisted of mud, potsherds, and fragments of jars and other pottery of fairly large size. Not a fragment was intact, not a potsherd showed a trace of pattern, not one of the pieces was complete enough to suggest the outline of the vase from which it came. But I took the greatest care to go over every particle of this *débris*, because as soon as we had broken through the first layer of concrete on the top I had been surprised to observe the total absence of anything modern in what was brought to light. There was a very palpable difference between the *débris* lying above the cement and the *débris* revealed beneath it. Above, the fragments in the dry earth were clearly those of Jewish pottery mingled with Hellenistic work and even with some of the glazed red pottery called Samian. Beneath, we found blackish mud and the rough fragments of a thick earthenware with sides of uneven thickness, its paste relatively homogeneous, but crudely worked in coarse clay, red or yellowish in tint, sometimes dry, friable, and uniform in colour, with a kind of glaze on the concave walls to mark the inside of the vessel, sometimes showing those characteristically unequal zones of imperfect baking which betray the novice who does not know how to harden the walls of his vessel right through in all directions in his oven. A few fragments of handles or of patterned borders are the only pieces of any real significance which I could discover in this mass of indefinite rubbish. Yet, slight as these fragments may be considered, they furnish a practically certain proof of Israelitish origin. Some may, perhaps, be attributed to Canaanitish potters, but not one can be dated as late as the Judæo-Hellenistic period, which would be about the ninth century before Christ.

As far as I could judge from various indications revealed during the process of excavation, I believe the blocking wall (J) to be composed of large fragments of ashlar set in a compact and oily mortar of a curious yellowish tinge, which rendered the whole structure remarkably solid and entirely waterproof. The large conduit (L), with dilapidated sides, is now concealed beneath this wall, which has not been completely examined on its western side, in order to avoid harm being done to the canal of masonry (K) built across the section H^1 of the basin in the rock.

Unfortunately, the operations of 1901 were completed without any note being published on the nature of the *débris*. But the expedition of 1909-11 went much further than either the work of 1901 or that of Warren in 1867 (when he examined to a depth of 1 mètre 20 beneath the staircase). I am therefore able to state that nothing is mentioned here above a height of 5 mètres from the existing floor, a distance already probably greater than that revealed in 1901. More than this, in the 3ft. or 4ft. of untouched *débris* revealed in 1909-11 I

shall only mention what was observed on the north side of the basin over an area hitherto untouched. With these definitions carefully understood, it is possible to say that fragments of pottery are to be found here both of the Israelite period and of the more modern Judæo-Hellenic period; and the most curious anomaly—as it seems at first—is observable in the fact that the various layers exposed show no regularity of date (or succession of dates) whatever. The thick, heavy, badly baked handles of Israelite pottery were sometimes found above the far more elegant fragments of Judæo-Hellenic work. They lay together in soil that was certainly damp, but was never subject to that continuous action of water which has a peculiarly characteristic effect. The problem was rather darkened than otherwise by the discovery (about 1 mètre above bedrock) of an Israelite lamp in almost perfect condition, and certainly as old as the eleventh century before Christ. Quite close to it, beneath the wall (I) at the point where the canal of masonry (K) had been stopped up, we found some fragments of Jewish pottery that was certainly three or four centuries less ancient than the lamp. While we were making a cut into this wall (I) in order to draw off the water from the basin for a time, we found that it was fairly carefully built of squared blocks set in oily mortar of rather thin layers, and mixed with the same reddish powder observable in the pounded brick used for the coating of the cistern and of some bones found in the tombs; it also revealed on analysis some traces of wood ashes. The same kind of rough cast, though more finely mixed, was still observable on parts of the western wall, and even in 1901 it was quite clearly distinguishable from the more modern cement used for filling up cracks and holes. Beneath this rough cast here and there it was possible to pick out fragments of pottery which had been pushed into the points of the masonry in order to lessen the thickness of the outer covering and to give greater coherence to the whole. A dozen of such fragments I examined carefully, and I was able to see how different they were from the contents of the basin itself. Instead of being the fragments you would expect to have been broken off the usual heavy jars used for carrying water, they are pieces of light, homogeneous pottery, very skilfully baked, and they betray indubitable evidence of that school of pottery which was transformed in the eighth and ninth centuries B.C. by Cypriote or Rhodian influences. I must frankly confess that evidence at once so sparse and so contradictory confused me for a long while; but the incoherence observable at first was only apparent, and the key to the problem lay in the discovery of another canal, which will be described later on in its right place.

It seemed merely chimerical to attempt any real classification of the vast mass of *débris* which filled up three-quarters of the western section of the water chamber (H^1). At any rate, I decided to take no such risks while the elements of the problem were still so obviously open to suspicion. Even in the deepest layers, which had remained untouched for a very long time indeed, there was always the possibility of disturbance by the stream from the spring or by other movements of water. The only useful distinction I found it possible to draw was that between the lower part of the walls of the water chamber (about 1 mètre 20 from the floor) and the higher part. One showed the capriciously indented surface of a natural rock face, but was highly polished as though its patina had been bestowed by centuries of rubbing; the other, on the contrary, showed just that regularity of surface which might be expected from an excavation quickly made in hard rock and never finished off in detail, and here you found no trace of patina or rubbing; the mark of the wedge or the pickaxe was still evident, and over all of it was that ribbed limestone concretion which is observable wherever the waters of this spring have passed for long. The same concretion was visible all through the tunnel from the Virgin's Well to the Pool of Siloam, from the bedrock to the highest point reached by the water.

The exact point of emergence of the spring in the Virgin's Well, often somewhat vaguely suggested, has now been exactly ascertained. It issues from the bottom of the cavity marked B through an oblong fissure from 12 to 15 centimètres in breadth. How the syphon action of the water is produced must still remain a mystery; but I am inclined to localise that action much further back within the bowels of the rock, owing to the strong pressure under which the water emerges, accompanied by a loud, echoing noise, which is heard for one or two minutes before the water rises and during the whole period of its strongest flow. Remembering the natural resonance of the cavern round the spring, you might compare this noise to the sound of a sudden gust of wind sweeping through an open doorway. The violence of the actual issue seems slightly dissipated at the orifice, as if most of the water were given a downward direction just before it emerged. After fairly boiling over the fissure the bulk of the water finds its way along the sloping floor of the cavity (B) and the fissure beneath the threshold (A), and pours into the basin (H). The current is then checked by a rise in the floor and by the wall (I), and as the water gets higher in the cavern and reaches the threshold (A) it seems to change its natural course and to spring up from behind the stairway before pouring into the chamber marked E on the plan. But it has now been shown that this apparent course is not the actual course of the water from the spring, and it will be equally impossible in future to found any erroneous conclusions on jets of water here and there in the walls which are merely the product of accidental percolation. Concerning the intermittence (or "tides") of the flow I shall have more to say later.

I should not have made such minute notes concerning the Cavern of the Spring if we had been able to leave it as we found it after we had cleaned it out. It is true that by the terms of the concession granted to the Expedition we could be compelled to restore everything exactly as it was; but, on the other hand, the regular circulation of water from the Virgin's Well to the Pool of Siloam was a priceless benefit to bestow on the villagers of Siloam, not only for their supply of drinking water, but for the irrigation of their crops and vegetables in the ancient gardens of the Jewish kings. So, as soon as my archæological notes had all been taken, section H^1 of the water chamber was thoroughly cleaned out. Beneath the wall (I) we firmly closed up the orifice of the canal (K), which was protected along its course by blocks of masonry, which were ready for use in the somewhat hypothetical case of our needing it again. We also reconstructed the basin (H) and made it thoroughly waterproof with a layer of the best cement. The entrance (A), which was narrow and slippery, was slightly enlarged, so as to

provide a small platform for the peasant women of Siloam, who are now drawing a far more clean and abundant supply of water than they have known for centuries. In order to protect the point of emergence of the spring from mud and *débris*, the basin (B) and the fissure (D) were coated with a mixture of cement and pebbles, which will facilitate the circulation of water throughout the cavern. At the point of entry (F) the conduit was barred by a block of stone of the same height as the stair at the side, in order to create within the chamber (E) a sort of filtering basin within which foreign bodies might be deposited before the full stream of water entered the actual aqueduct. Owing to this precaution the inhabitants only have to keep this "filter" fairly clean and the aqueduct will never be silted up again. But we know what the villager of the East is like. . . .

B.—The Network of Conduits and Galleries Connected with the Virgin's Well.

It has sometimes been impossible to distinguish whether an underground passage was originally meant to be a conduit for water or a passage for secret communication from one place to another. I have therefore classified these various works geographically, without reference to the probable date of their creation, in order to facilitate intelligible reference to my plans and illustrations, and the various galleries or tunnels are therefore numbered from I. to VIII.

I.—The existence of this tunnel was suspected by Canon Birch, and much argument went on between Professor Sayce and Capt. Conder as to its possibility. It is in reality the "second aqueduct" mentioned by Dr Schick, and has provided an inexhaustible theme for controversy for twenty-five years. Canon Birch prophesied its discovery two years before Dr Schick proved that Capt. Conder's somewhat hasty denials were, as a matter of fact, not justified by the facts. For various reasons considerable uncertainty has hitherto been felt as to the precise nature of this passage, and its exact connection both with the Well and the Siloam aqueduct, ever since the work undertaken in 1886, and this in spite of the valuable assistance given by the Palestine Exploration Fund, and in spite of the elegant sketch published in 1902 as the section of the Well seen in 1901. (See Fig. 12.)

The explorers of 1910, however, were fortunate enough to find the orifice of this tunnel at the bottom of the basin marked H^1 in the plan. While cleaning out, with every possible precaution, the masonry passage which cuts across the shaft, a narrow opening was straightway discovered underneath the wall (I), possibly meant for a door or a water gate, permitting to regulate the communication between reservoir (H) and canal (K). After a tortuous stretch of about 3 mètres this canal disappears underneath a heap of big stones (*e*), the *débris* of an old wall, built close to the rocks in the basin (H); they might also have fallen from the upper parts of the building. It does not seem likely, considering the position and nature of the canal, that these stones have been put there to cut off the passage. Behind the biggest of these stones the masonry passage continues, with more windings that are more pronounced and follow an outcrop of the rock, and first cuts across a small cave, from which a narrow opening—small enough to make lateral masonry superfluous—leads to a more spacious one. In this latter cave, where one can easily stand up, the canal is interrupted by a small rectangular basin about 0·48 mètres deep. The canal leaves the basin at the other end at a slightly higher level, and soon merges into a natural arcade of rocks scarcely 70 centimètres high. Owing to an accident to my notebook I cannot make out whether the basin is closed up on this side, or whether the canal has sunk in consequence of a shifting of the crevice. All along this stretch the canal is partly dug out from the rock, partly constructed with big stone blocks; in either case the walls are covered with a watertight layer that is extremely solid, and looks as fresh as if it had been laid on yesterday. A current of water (stronger than that of the Siloam tunnel) rushed through this canal whenever the fountain rose, as its level was below that of the concentrating basin (HH^1), which has for a long time been insufficiently protected, owing to the cracked dam, which was very badly repaired in 1901. It was at once clear that this section of the canal tunnel, cut anyhow into the cavernous strata of the rock, was the same as that explored ten years ago by Messrs Hornstein and Masterman. They proceeded to a point 54 mètres from the mouth of the tunnel, about 40 mètres further than the present description goes. Furthermore, there is no reason to doubt that the canal is the same which the excavations of M. Schick established up to the southernmost point of Ophel. In consequence, we did not trouble to go over the same ground again. A systematic clearing up might certainly have helped towards establishing its date; but in practice the recent disturbances and the delay encountered in removing surface rubbish in a rocky trench mostly exposed to the open air or strongly guarded by villainous flagstones had to be reckoned with. And, finally, the examination of the head of this canal had yielded the most promising elements of chronological attribution, at any rate those which clearly established the relation between this and other conduits and the source. The foremost point is to establish the level at the subterranean mouth of the canal. At this point the floor of the canal is 6 mètres 25 underneath the stairhead of the modern entrance staircase, and 0·80 mètres underneath the actual mouth of the source.

II.—On the level of about the sixth step counting from the source in the second flight of the stairs is the opening of gallery No. 2. About 0·55 mètres broad on the starting point, and running nearly exactly from south to north for about

10 mètres, the gallery turns sharply to S.S.E., broadens out at intervals to 1·50 mètres or narrows down to 0·48 mètres, runs from time to time in a practically straight line along homogeneous banks of rock, or winds snake-like just to follow some formation, in many cases apparently only directed by the way in which the rock split when the gallery first was pierced. The gallery thus stretches along the slope this way and the other, just as if it regretted to get away from the fountain. At long distances the eastern wall is cut into at about 0·50 mètres from the ground by openings always rather irregular of about the same size as those in the big gallery. Sixty-three mètres from the actual staircase, or 61·90 mètres from the entrance of the primitive rock, the axis of the gallery turns 14° S.S.W. as compared with the starting point. A sharp turning bears 9° to S.E., while at a height of 1·30 in the eastern wall a lateral gallery, II^a, branches off, bearing 22° S.W. After this lateral gallery the principal gallery continues first in numberless capricious windings (comprising on a length of 10 mètres three deviations between 11° S.E. and 21° S.W)., and then seems to take up again its general southern direction, with a less pronounced turning to the west of only 10° 35′ at the point where the clearing up has been stopped, and nearly underneath the boundary of a freeholder.

Practical reasons forbidding the opening of shafts from outside (in order to clear away rubbish and to ventilate the tunnel) made this excavation extremely laborious. Thirty mètres from the fountain the candles would not burn any longer, and we had to fall back on portable electric lanterns. In spite of a ventilator and oxygen capsules, the gangs had to be relieved every hour. At certain times I was not able to be more than a quarter of an hour in the gallery. The fact that the leader and his colleagues continued for a fortnight to superintend the gangs day and night is a proof how seriously they took their task. This continuity and the minute precautions of observation carried their own reward. Nobody would have suspected that there was a gallery there if the strange tunnel III. which I shall describe later on had not led there. The massive pieces of rock obstructing II. at the point where the two passages intersect leave no doubt that this obstruction was intentional and carefully prepared. Instead of the rocky floor, very regular and smooth in these parts, an excellent channel, composed of very fine blocks of "royal" stone (*malaky*) was first encountered. A layer of dry mud, from 8 to 10 centimètres high, covered it, and contained a good number of Israelitish potsherds, unmistakably belonging to the tenth or ninth century B.C. Above it was a rubbish heap composed of big splinters of stone, pebbles, countless fragments of pottery, and some rare traces of cinders and small bones, apparently kitchen refuse, the whole kept together by a reddish clay quite different from the canal mud, and, apart from the moisture, identical with the clay found on the surface of the hillside. This conglomeration had two specially curious qualities, its density suggesting that in front of the orifice of tunnel III. it had been pounded down, and the homogeneous general colouring of the architectural and ceramic rubbish throughout. The several dozen specimens of potsherds which I took at my first observation when a height of about 3 mètres was accessible, belonged exclusively to the lowest Israelitish period, with a very notable preponderance of Judæo-Hellenic pieces. There was at the same time an extraordinary variety of moulded fragments of pottery, which as a rule is not found in canals.

From there to the hypothesis that the banking up had been effected by one stroke in order to cover the canal was but a step. It was soon seen that gallery II. showed the same characteristics north and south, and the crest of the rock and the ceiling of the gallery was reached. This ceiling was not part of the rock, as one might have thought, nor made of flagstones, but consisted of big pieces of rock and hewn stones which had been thrown across the ditch, and piled up as their shape would allow, with a visible haste and the only idea of discouraging every trial to reopen the gallery, which so much trouble had been taken to conceal. One feels even inclined to think that the rubbish heap and what might be called the sealing down by means of heavy blocks originated at practically the same period. In some cases an enormous block had been thrown across, but was not long enough to rest on both sides, slid down nearly to the ground, and was arrested by a rather weak edge, doubtless because it reached at this point the top of the rubbish heap. At another point a block weighing at least half a ton seems to have been wedged up against the rock by the rubbish heap, which was already overflowing there. When the rubbish was cleared away the block, out of its firm position, could not support weight from above without giving way. It settled down lightly at first, then a few days later, when everything had been cleared away, a crevice appeared, and it was easy to follow its progress at various inspections following each other very closely. These various details can all be seen in the photographs at the end of this volume.

In view of these facts, every trouble has been taken to determine the nature of the gallery and to establish the development of the strange aspect of the rubbish. At a distance of 10, 16, 18·50, and 21 mètres from the source, at four different sets of observations made in front of the cleared space, it had always the same archæological aspect, except for the above-mentioned stone channel, which only appears on various points of the floor (where the rock did not lie quite open) as a watertight layer. At about 50 mètres the pile of the big blocks that form the ceiling is getting less compact and the stoppage less careful. At the same time there began to appear in the baskets of *débris* carried outside some potsherds of the low Judæo-Hellenic period; one day a workman brought even the head of a Hellenistic statuette, which he said he found a moment before in one of the baskets. The manager of the works was at this moment able to say that this unusual piece had not been seen when the rubbish was cleared away under his eyes, and the rapid circulation of the baskets in the half dark passage made this find appear a little suspicious. On a closer examination the piece occasioned even stronger doubts, and when pressed and frightened the workman confessed it might have fallen out from somebody's pocket. The matter was left there, and the man was cautioned not to do it again. The rigorous discipline of the works thus prevented the introduction of an altogether undesirable element. There remained now the more numerous *débris* of the low Judæo-Hellenic period. On inquiring from which particular part of the rubbish heap they had been taken, it was established quite clearly that they all came from the top at two or three points where the rockwork of the ceiling had been dislodged and showed

some small interstices. Otherwise everything showed the same extraordinary homogeneity.

I have no doubt that this tremendous tunnel in the rock is a water conduit; its connection with the fountain, the magnificent sections of stone channel or the coating of cement where the rock was split, the deposited mud, and the openings cut at intervals into the eastern wall downwards from the rocky terrace which supports the whole drain, all this may very easily be explained on the hypothesis of an irrigation canal, which seems, indeed, the only way to explain it. The only point which is difficult to understand is the extraordinary polish of two pillars made of rock at the entrance of the gallery. Only intense friction going on for centuries can have produced it, as the rock is a limestone mezzy of extraordinary hardness. This polish recurs in a less pronounced form on various protruding spurs of the lower walls of the gallery until the opening of tunnel No. III., where again the framework of the opening shines like marble at various places. An explanation of this fact will be attempted later on. If the average height, 2·75 mètres, seems at first scarcely suitable for a hydraulic installation of this nature, it may nevertheless be explained by the necessity to keep the water at a rather low level in the reservoir H and still keep it under sufficient pressure to ensure a current without exaggerating the slope of the gallery. A most elementary damming at any point would get a sufficient quantity of water to rise or force itself into one or the other of the lateral openings.

Without entering into a more detailed description of the gallery II., I only wish to point out the obvious likeness of the boring process by means of breaking bits off by iron wedges and without finishing off with a pickaxe. Looking from this point of view at galleries I. and II. and the whole of the reservoir HH^1, the impression of a uniform method of boring by means of similar tools suggests itself at once, in spite of various details indicating different dates.

III.—Four mètres thirty from the original starting point of gallery II. the western rock wall is hollowed out into an opening, *g*, in the shape of a reversed trapezium, 2 mètres 55 high, 0·40 mètres broad at the base, and about 1 mètre at the top. This is the entrance of a new subterranean tunnel, No. III. There is a passage 2 mètres 30 long, running 52° S.W., not without some windings, stretching behind this opening, and showing about the same profile. The ceiling is practically horizontal, but the floor sinks about 0·50 mètres on this very short distance. (A rather long section of the stone channel on the floor of gallery II. ran in front of the branching off III.; the ledge of the channel formed a kind of small dam about 0·29 mètres high.) Suddenly the ceiling bulges downward in the shape of a shell to the extent of 95 centimètres. A well-calculated protuberance at the base of one of the walls masks two-thirds of a narrow door *h*, obviously leading down to a new section of the passage, which broadens out to an average of 1 mètre 05, is nowhere higher than 1 mètre 50, and bears nearly exactly to the east—scarcely 5° to west south. The progressive lowering of the floor continues in this passage, which has tortuous walls. Three mètres from the first narrowing a second and much larger door establishes communication between the passage and a chamber 2 mètres 30 broad and nearly 3 mètres deep, with well-finished walls, but a very uneven floor. This chamber opens towards the west to its whole extent into a round chamber splendidly hollowed out from a layer of rock at least 4 to 5 mètres high. The floor of this latter chamber forms, more precisely speaking, a not quite regular oval, the axes of which measure 4 mètres 35 and 3 mètres 50 comparatively. The timber work necessary for the clearing out shaft made exact measuring impossible. Judging from the material available at present, I think the upper walls of this chamber converged originally into a vaulted conical ceiling with a small central aperture, in the manner of the antique cisterns which are seen frequently throughout Palestine. Of this original state nothing remains but the suggestion of a certain tapering of the top walls. It is long ago since that ceiling has been done away with, and the excavations made it clear that much trouble has been taken at a certain time in order to render every kind of access—whether from outside or from the lateral galleries—impossible. Passage III. has been carefully filled up with crushed soil and with the same kind of rubbish as described in gallery II. A heavy slab, supported by a spherical stone of a diameter of about 0 mètres 40, plugged the western opening of the narrow and low door *h*. In the round chamber itself was only a heap of big blocks, which evidently had been taken from a fortified structure, perhaps the walls of the town. Nearly all of them showed a well-hewn front with correct angles, although without ornaments or outline. One amongst them was a little more than a mètre broad, with a minimum height of 0·70 mètre, and nearly the same thickness, and I am not sure whether this was the biggest one. To take blocks of that weight to the surface was of course not to be thought of; they had to be split, which was by no means the least dangerous task.

Some rubbish had slipped between the interstices of these massive stones. A persevering examination during the whole time of the excavation might perhaps have made it possible to distinguish between the old layer between the blocks and the rubbish which has been deposited there by the rain. The only unassailable deduction is the total absence of potsherds of an earlier period than the Judæo-Hellenic one in the thin layer of rubbish which seems already to have covered the rocky floor of the chamber when the first stone blocks were thrown down there. On the contrary, unmistakably Israelitish fragments of pottery were not at all rare in the mass of rubbish wedged between the blocks at a higher level. This anomaly, which I could not explain for a long time, may find its explanation further on. Finally, there is also observable the wonderful polish of all corners of the rock, at the openings or uneven parts of the walls, the relatively careful levelling by means of the pickaxe, the absence of any airtight coating, of any limestone concretion, and of any kind of the mud that is usually found on the bottom of canals.

IV.—Proceeding from tunnel III. into the round chamber, one sees at once in the northern wall an opening quite similar to the orifice of No. III., apart from the measurements;

but it is only 1 mètre 70 high, and from 65 to 90 centimètres broad. Gallery IV., which begins here, describes a small sinuous curve towards N.N.E. about 9 mètres 50 long (Pl. I.). In following it up one might imagine it to be the opening passage of No. III.; the same horizontal ceiling, the same shell-shaped bulging, the same sloping floor, absolute identity of pickaxe marks, producing long flutings bent at their ends like a somewhat flat crescent. Towards the middle of the curve in the western wall tunnel V. opens, while opposite to it in the eastern wall appear two perfectly regular grooves, *j* and *k*, which have been abandoned at a maximum depth of 70 centimètres. It is possible here to understand absolutely the process of mining. The master would trace the diagram of the gallery. His tracing would be deepened with a chisel, and fixed the line up to which the digging had to be done. The wall was then attacked with the pickaxe. The workman dug standing up, always working from the top to the bottom; in consequence, the face of the opening was always a slope on which the miner was able to exercise the full strength of his arms. He then made carefully a groove into the ceiling and along the edges of his incision, and attacked more boldly the centre parts. When the digging had reached a certain stage the walls were finished off as desired. It is very easy to grasp the fact that the spontaneous tendency of such a method is to constantly raise the level of the gallery, or at least of the floor, and this fact may explain many a discrepancy in the other tunnels. I have not been able to discover any plausible reason for these two galleries, or why they have been abandoned; but I visited them many a time during the whole examination of the channels in order to get a grip of various details of the mining work.

North of these incisions the gallery gets a little larger and more tortuous in a layer of bad cavernous limestone. The ceiling alone keeps a certain regularity, because it coincides with a natural stratum; but after the floor had been freed from the very hard sediments caused by the long stagnation of the waters, it showed rugosities, cracks, and various deviations from its general level that seem in contrast to the idea of a proper canal. The mouth of gallery VI. was walled up with irregular slabs bound with mortar of the same aspect, and composed of the same ingredients as that of wall I. in the basin of the source. This walling up, which had completely concealed the gallery to all explorers, had (in spite of its thickness of nearly 0 mètre 80 and of the coat of crushed brickdust which covered it on the side of the canal of the fountain) not protected the gallery against the invasion of the water and mud, a very fine and compact mud, which did not show the least archæological trace. This mud came mostly from the pockets of clay which are situated near the cracks, through which the water oozes during the winter nearly all over the western wall. In the absence of anything suggesting the date, the following slender detail may be noted: a horizontal line firmly engraved with a pointed instrument appears in all complete parts of the eastern wall; its level varies always at right angles, following that of the ceiling. On the rocky spur at the end of the gallery the line seems to rise abruptly to the ceiling; but in reality it bends outside on the wall of the round chamber, and encloses, at a height of 1 mètre 40 from the floor a rectangular tablet of 0 mètres 48 by 0 mètres 38. There, I must confess, I had the only bitter moment during the excavation. It was in the middle of the first campaign, October, 1909. The canal, discovered at its northernmost point, had been disconnected by the gallery of the fountain, which was full of rubbish up to nearly a third of its height. This means that, in spite of all efforts to keep the water by means of a system of tubes at a low level in that lateral branch, we splashed in water whenever the fountain rose. When we hit on the round chamber and stopped the clearing up, afraid of a slide of rubbish, which we had to attack later on from outside, an inspection of the line cut in the rock led us to the base of a tablet, which was clearly visible. The whole of the upper part was concealed by a slab of moist clay, which seemed to serve as a protection against the edge of a gigantic boulder, which the excavation had already loosened. We dropped everything into the mud, barring the candle, rubbed the middle of the tablet, and tore away the clay from underneath that annoying boulder, without troubling whether it might fall or not. It was unthinkable that once the tablet was cleaned there should not appear the thin, angular letters of some old Hebraic inscription, a pendant to the inscription which had only just been found at the end of the tunnel of Siloam. The disappointment was all the bigger because the whole thing had been so unexpected, and we had been at such pains to clean up the rock, to light it up under all angles, and to search it from every position. When the evidence showed clearly that nothing had ever been engraved on the tablet, we thought that letters had only been traced by some kind of process, and that there was not any time to engrave them. A new examination was equally disappointing; more than ten such examinations were made during the first months of 1910. But the tablet and the line will nevertheless furnish useful points of comparison.

V.—Not much need be said in addition to the diagram (Pl. I.) about tunnel V., the mouth of which I have just indicated. The bank of rock is full of cracks and hollows filled with limestone concretions or adorned with small stalactites. This also explains the presence of the muddy clay which is heaped up along the whole tunnel nearly up to the ceiling, at an average height of 1 mètre 30. This gallery shows a height of 1 mètre 35 to 1 mètre 65, is broadest at the entrance (0 mètres 87), and has an average width of 0 mètres 50 (0 mètres 38 to 0 mètres 70). The trapezoidal section is nearly regular all along. The gallery rises with a surprising steadiness, the reason of which is not clear at first. After months of patient observation I got the impression that this rise is accidental, and would have been adjusted had the work been finished. The ceiling coincides mostly with the base of a geological stratum which is inclined from west to east, or, more exactly, from W.W.N. to E.E.S., at an angle of about 7°. The miners followed this layer, which saved them the continuous adjustment of the height and gave them a proper ceiling. The nearly parallel rise of the floor explains itself, and if the work had not been given up it stands to reason that the floor would have had to be lowered nearly 2 mètres 50 at the point where the gallery stops, in order to admit and circulate the water. The clear-

ing up did not furnish the least archæological document, and the singular plan of this tunnel, which is admirably executed, is not the only point demanding an explanation.

VI. is the subterranean gallery establishing a communication between the old interior passage of Ophel and the tunnel of Siloé, No. VIII. After so many and careful explorations it was thought that the gallery was known throughout, and I must own to a great deal of emotion when, on a September evening, 1909, at the beginning of my regular visits to the works, I saw a trench being dug just in front of the gallery which had just been discovered. It was in vain that the engineers urged me to find out for myself by using my eyes and hands that the digging was not done in live rock, but in a compact mass of concrete; my scepticism disturbed me during the whole time, while I saw the trench growing bigger by dint of hard work, picked up splinters from various points of the walls, went and rinsed them well at the fountain, and examined them in strong sunlight. It was concrete, without a doubt, with a greyish, greasy chalk, some calcinated ingredients, and a great deal of brick dust. The whole was so hard and compact that it could only be crushed with a great effort. Later on, the excavation of the basin and the examination of the wall of the dam (I) gave me the most exact specimen of this mortar, which was then new to me. In a short time the digging reached the floor formed by live rock, and the side walls roughly hewn and covered with very old limestone sediments. Other trials proved that this artificial raising occurred at various depths throughout the gallery, and it was decided to cut it out methodically—a hard task, which at that moment had very often to be done in water and always in mud, great care being necessary lest during the process of removing the rubbish the shape of the floor and of the old walls of the gallery should be altered. This task was not only done under the eyes of the leaders of the expedition, but to a great extent by their own hands. Thanks to this effort and these precautions, the original gallery has been reconquered. We also discovered the portion of tunnel No. VII., the real level of the tunnel aqueduct No. VIII., and the small dam erected at the mouth of this tunnel for the purpose of blocking up the extreme part of gallery No. VI. This complicated network of passages inside the rock served, indeed, as a key for the understanding of the whole. I come back to gallery VI at the point where the fountain chamber is, behind the door F, which was the last thing described. There is first a side passage (G), strangely shaped, in spite of the perfect execution of its walls; it looks as if the gallery which was hollowed out proceeding from west to east towards the fountain was at first intended to turn to the north round the water chamber before penetrating into it by means of the opening F. But the northern part of the side passage does not show clearly that slanting cutting which is so pronounced in other parts of interrupted galleries. And if the work of the pickaxe is as clear over the whole surface as it is in the upper walls of gallery VI. up to the mouth of No. VIII., the hypothesis of the touching up an already existing cavity seems permissible. It is not unlikely, either, that the idea first was to lead the canal slantwise into the water chamber, in order to prevent the too easy introduction of mud and rubbish. The small step of rock let into the floor exactly at the mouth of the gallery seems to be due to the same reason. It has now been levelled up by a layer of cement since the construction of a more efficient dam in front of entrance F made it unnecessary.

The oscillations of the axis all along the first section from east to west may be simply due to careless work. They are mostly to be observed at the base of the gallery, *i.e.*, on the plan of the surface. In the upper half, where the walls reveal far more careful work, the workmen evidently tried to correct the worst or most irrational of these deviations by means of notches rather in the nature of moulded cornices.

At a distance of 1 mètre 75 from the entrance a cutting, *l*, 0 mètres 92 wide penetrates obliquely into the northern wall to a maximum depth of 0 mètres 50. The now characteristic signs of an abandoned digging surface are again to be found there. The plan will show better than any description what it has been intended for in connection with galleries VII. and VIII., that have been dug out by the same hand.

After groping along in a most irregular way, the gallery turns at nearly a right angle, and runs from south to north between two winding walls that are necessarily roughly hewn, owing to the nature of the rock bank in this spot. Towards the middle of the passage in the same section there opens out eastward the small tunnel No. VII., and westward the big tunnel aqueduct of Siloé. After these branches gallery VI. is only a hole, roughly cut, regardless of regularity or beauty. It extends shortly afterwards into a rather roomy natural cave, the middle axes of which are 2 mètres 50 and 2 metres 30, and ends in an artificial winding, which opens into the vertical well of the big upper gallery, of which more anon.

As far as the mouth of the Siloam Tunnel, two distinct methods of workmanship were observable in gallery number VI. as soon as it had been cleaned out. At the bottom, up to a height varying from 45 centimètres to 1 mètre 20, we noticed that the work was somewhat roughly done, either with the chisel or with rude hammer strokes that not even the subsequent sedimentary deposits were able to smooth over. Higher up, there were the marks of regular work with a pickaxe, cleverly wielded, in order to give an elegant finish to the wall-surface. In the section where the rock is best, between gallery IV. and the spring, the pattern of this pickaxe work clearly indicates that it was carried out by men progressing from west to east; and this small detail will be found valuable later on.

I was unable personally to examine the *débris* found here when the excavations began, so I will say nothing of it. But I may mention the remarkable evidence produced by the conglomerate of masonry cut out in this gallery. It may be summed as (1) the analogy already suggested between the mortar used here and that found in the dam built in the Virgin's Well; (2) some charming fragments of Judæo-Hellenistic or late Israelitish pottery found among the mortar or sticking into fissures in the rock; (3) the three similar dams (p, q, t) built to seal up hermetically all tunnels IV. and VII., and half of the sixth gallery beyond the Siloam Tunnel.

When we had finished excavating, and made a few soundings, we built up the dams again, leaving only a few narrow openings near the ceiling to show the existence of blocked galleries. Nothing of this is likely to deceive subsequent explorers, any more than our new cement can mystify them, at any rate for the next few centuries.

VII.—I have nothing to say about the seventh gallery, except that its irregularities are due to a natural fault in the geological stratum of which advantage was taken, as far as possible, by the workmen. After working to a depth of 2 mètres 80 in one direction, they abandoned it, and blocked up the orifice. Nothing but the keenest examination could have discovered its existence. The only evidence it produced was the workmanship of the walls, and it was full of mud produced by percolations.

VIII.—I shall have something more special to say about this, and I will devote a fresh section of this chapter to the description of the Tunnel-Aqueduct of Siloam. For here once more we find an instance of something which was supposed to have been known before, but which the Expedition of 1909-11 has illuminated with some entirely new and curious facts.

C.—The Subterranean Passage Between the Virgin's Well and the Summit of Mount Ophel.

On Oct. 24, 1867, Capt. Warren, with a companion, carried out a dangerous series of explorations of the wells, galleries, stairways, and caverns hollowed in the mountain of Ophel between the Virgin's Well and the summit of the hill. If this audacious attempt had been made in classical times it would certainly have been celebrated by an epic poem as important as that which sang of the heroic enterprise of Diomed and Ulysses when they stole the Palladium of Troy. But, in spite of Capt. Warren's careful observations, which were completed later on by several efforts at clearing out the works, far too many points were left uncertain to give a real scientific value to his results. The structure and the exact proportions of his galleries, the nature of his caverns, even the facts about one of his wells, which was supposed to be a natural cavity—all this remained uncertain. The few objects of archæological interest discovered only complicated the problem instead of throwing light upon it, for they consisted of vases in glass or terra-cotta, most probably Jewish or Græco-Roman, and it seemed impossible to connect them in any way with the subterranean workings.

Forty-three years later some young officers came out to renew the work so excellently begun by Capt. Warren. To all his courage and skill they added far more resources and material assistance, and their work was in consequence far more methodical and thorough. No one will more warmly applaud their success than their distinguished predecessor.

Various disturbances in the soil in recent years and the building of two new houses have not even yet permitted us to trace upon the esplanade of Ophel the exact beginning of the subterranean passage to the well. It is, indeed, more than probable that this entrance was placed inside the town wall upon the actual crest of the hill. The escarpment of the eastern slope, however, is at such an angle that the entry might quite safely have been placed in front of one of the gates, a few feet below the wall, on the first rocky terrace. But, however this may be, the passage itself is now exactly known in every detail up to this rocky terrace, about 10 mètres beneath the highest point of the escarpment, and some 40 mètres above Kedron.

To start with, a stairway (A) cut in the rock extends for roughly 6 mètres in a S.W.—N.E. direction, about parallel to the line of the terrace, without dropping to any considerable depth. It finishes at (B) in a rectangular well, 3 mètres 15 by 2 mètres 35, which has a sheer drop of about 3 mètres. An arch (C), an almost perfect semicircle, is built above this well, with its walls resting on the rock; this, no doubt, formerly, not only covered the well but probably the stairway as well. The southern portion of this arch collapsed a long time ago, but on the north side of the well there is still in existence a portion of the arch about 3 mètres 50 to 4 mètres long; it ends blocked by a kind of wall. The reason of this I cannot explain, as it does not seem to have any relation to the arch at all; for all that, I do not think that the arch was ever continued beyond this wall.

Under the arch is a new and monumental stairway (D and the photo), as it were a continuation of the stairway (A), sloping downwards at an angle of 36° N.E. from the edge of the well. One would almost hesitate to call it a stairway at all at this point, the steps being very nearly obliterated. The perfect regularity of the roof of this sloping tunnel, however, clearly points out that the steps in their primeval state must have been equally regular, and a still further careful examination of this well-cut, polished, and slippery range will clearly show that it is a stairway. It descends at an angle of 33° taken from the top step to a distance of 5 mètres 45. A large landing (E) only checks its prolongation so as to provide a perpendicular drop of 2 mètres 70 a few mètres in front of a low doorway (F), whose opening diminishes to a height of 1 mètre 20. Immediately afterwards the tunnel broadens out once more, turns more to the eastward, and runs very nearly level for a distance of 10 mètres. At this point (G) it attains its maximum breadth, namely, 2 mètres 90, then it turns sharply round to the S.E. Here once more it assumes the form of a stairway of somewhat irregular steps; 17 mètres 65 from the sharp turn the tunnel once more narrows down to a breadth of 1 mètre 86, and ends on a platform gradually sloping down towards the bell-shaped orifice of a shaft (J) alongside the tunnel, cut out in a sort of recess on the north side of the tunnel. The recess measures on an average 2 mètres 32 in breadth; 0 mètres 75 further on the tunnel is blocked by an artificial scarp, 3 mètres 25 high.

The centre line of this last section of the tunnel, taken from the last curve about opposite the centre of the recess, is 20° S.W. On climbing up this scarp one comes to a thin rock partition (K), through which there is an irregular opening leading into a big natural cave (M), which has been enlarged and worked by man up to a certain extent. The longitudinal axis is nearly exactly N.S.—4° W.; the length is 13 mètres. Then a natural curve (N) turns almost at right angles, and brings the passage to the eastern edge of the hill, which no doubt was the original entrance to the cave before the *débris* of years covered it to a height of 6 to 7 mètres. The Expedition sank a shaft at (O) so as to clear out the cave without having to carry the earth right up the passage.

On entering this cave one sees at once that the connection between the big tunnel and the cave is purely accidental. For all that, as there is a connection, it is worth while to look for the reason. On commencing my investigations I at once saw that there were other caves (H) and (I) to the north, on the same level as (M), and therefore on the same geological strata. The size alone differs, (H) being nothing more than a recess on the side of the tunnel, and it shows no marks of tools at all; (I) is exactly the same. Possibly at some time or other these caves may have served for human habitations or places of concealment. It was then, probably, that the big dry stone walls were built on the extreme eastern edge of the dilapidated roof, probably dislodged by some earthquake. Possibly one or other of these walls, though one cannot be certain, was built for support, but it may be of a still older date.

Sufficient photographs and sections are reproduced to avoid the necessity of having to describe the tunnel in detail. As regards the cutting of this tunnel, one can still follow the marks of the tools in certain places, where nature has not yet quite obliterated them. Instead of the long, thin, curved marks made by a miner's pick, one finds here almost invariably short, stumpy vertical lines, frequently chipped, and gradually losing themselves at their base in the track left by the splinters. Depending on the hardness of the rock and the resistance it offers, the tool marks expand and lengthen or diminish and shorten. Here one feels that the shock of the hammer has been harder and the bite of the chisel rougher; there, on the other hand, soft blows have been sufficient to splinter the rock easily away. When they were following the normal direction of the rock strata the mining under these conditions was far easier, and a few finishing touches to the sides and roof give the place an atmosphere of real good finish. But they had a very different task as soon as they started sinking vertically, like the shafts B and J, or constructing an inclined gallery passing through different layers like the entrance of the tunnel from D to F. It is precisely here that one realises the ingenious methods in which they tackled their job.

The engineer seems to have decided on an average height of 2 mètres 46. This at least is the height in the corner of the platform (D), the place least exposed to the wear of footsteps. It is impossible to decide if the first section a mètre long was formerly a horizontal platform, or if this actually was made on purpose to avoid the danger of the rock roof falling in, having been so reduced in thickness as to be unable to support itself. The slope had possibly another use for ventilating and lighting the stairway. The roof above this slope corresponds in a remarkable manner to the slope of the stairway. About the centre of the range it had risen about 2°, but this difference had been at once corrected by lowering the roof in proportion, which brought it back to its normal height before the damage to the steps had increased this height. And so as to ensure that this new section of the roof should be continued right to the end of the platform without any further error, they took the trouble to vary the slope so that at no time the height was ever less than 2 mètres 46, without, however, in any way spoiling the symmetry of the tunnel.

A further problem springs up before us, the outline of the roof and the huge drop in the floor of the tunnel just before the door F. Hardly 1 mètre 60 high, this door is not even level with the floor of the platform. The regular prolongation of the inclined platform up to the vertical plan of the door increased enormously the amount of rock which had to be cut out, produced also an ungraceful level, without mentioning the danger which might have resulted to its solidity. The engineer must have provided for this either by means of three notches more or less on a quarter of a circle, or perhaps more likely by little recesses superposed on a huge cornice. From F onwards the roof follows a natural strata, and there was no necessity to turn it. Six mètres from the doorway a step raises the roof 0 mètres 30; a little less regular, it now follows this level until it reaches the artificial hole, which loses itself in the big cave. Whilst the roof hardly changes its level at all from the door F and the shaft J, the floor of the tunnel, on the other hand, drops a great deal by several very irregular steps. The height of the tunnel, having been diminished to 1 mètre 60 at the doorway, increases again at once as soon as it is passed to 2 mètres. It has already reached the height of 3 metres 58 at the first step just after the turn at (G), of 5 mètres 10 at the Grotto (H), and 6 mètres at the edge of the shaft. The maximum height I registered is 6 mètres 30 between the floor of the tunnel just dug, the shaft, and the topmost crevice in the cave (I). Such a development in height without apparently any possible reason seems to be almost abnormal, and it would evidently be despising too much the technical competence of either the miners or their chief to imagine that this was pure caprice or chance. Since the old engineer knew how to design the first part of the tunnel from D to F (14 mètres long) so well, and triumphed over all the difficulties of keeping his tunnel regular in height, how could he have gone on haphazard from F to K, making a long tunnel of 32 mètres, when he could have gone there direct in 19 mètres? How could he have allowed his miners to have to cut out this huge volume of hard rock, when apparently it would have been so easy to cut down the work certainly by half, if not by two-thirds, and still have a passage fully large enough in every way? But before discussing more fully the outline and analyses of this monument, let us have a few more descriptive details.

The first section of the tunnel D—E is entirely in the superficial layer of soft "mezzy" limestone, usually full of little cavities and fissures, but here remarkably compact. At the most here and there you notice a fault, more marked in the roof than on the sides. I should not like to say for certain if any of these little holes, very rare in this section, are the

bottom of some clay pocket, cut away during the excavation, or some artificial niche. The best indication and the most decisive is that most of these cavities are about the right height to put one's hand when descending the ramp. Such cavities were also found in the famous tunnel of Gezer, *cf.* R. B., 1908, p. 400. One crevice is, however, more important than the others (X) pl. II. (and photo), on the south side of the tunnel just in front of the door F. The lower layer of fine white rock tinted with rose (malaky) commences a little above the floor of this doorway. In spite of the uniform incrustation created during centuries over the whole tunnel, one can still see quite clearly the division between the mezzy and malaky. Starting halfway up the walls, it continues like this as long as the tunnel remains level; then as the floor of the tunnel sinks it rises higher and higher. In places you still see this difference in the way the two strata were worked. Above the joint the mezzy is hard and breakable, the marks of the chisel are more numerous and the stripes more curved; below the joint, in the malaky, which is homogenous and soft, the marks are wider apart, the striations longer and more uniform. In the top layer further on the geological stratification is well mixed up. Numerous faults give the roof the aspect as though at certain points it was covered with great flagstones (as the photographs will show); in fact, you find many rough places, natural inequalities, fissures covered with crystalline concretion from the prolonged oozing of the winter rains. Nowhere is the contrast between the two strata of rock so great as at the end of the tunnel —the one vulgar, reddish limestone of a capricious texture, the lower fine, white, supple, and truly a royal rock. In the lower strata one feels that the engineer had no difficulty in mining such rock just sufficiently hard to enable it to be well cut—a pleasure to work in. In the higher layer one has the impression that he was tackling rebel material, with the chances of numerous accidents requiring all the vigilance and skill of a man of the trade to keep the correct dimensions, more especially in cutting the walls. Naturally, since we are in a rock-cut tunnel, I do not intend to convey the idea when talking of correct dimensions and walls well cut that the engineer had tried to construct a perfectly polished and smooth tunnel, free from all blemishes. One does not boast, either, of the precision of his calculation; these can in no way be compared with the work of his colleagues of to-day in the underground work in modern Western cities, or constructing tunnels under mountains. There remains, however, to this old engineer the glory of having known how to create a monument reasoned out most carefully, and executed in such a manner as to combine practical utility with a harmonious aspect, even grandeur.

Whilst sinking the shafts B and J, all idea of rectitude or finish naturally was thrown to the winds. Their one aim and object was to get to the required depth as fast as possible. They therefore followed the rock beds and worked at these as hard as their very imperfect tools would allow them to. The tools used were undoubtedly the same as used in the tunnel—chisels of iron or brass, wedges of the same metal, hammers and clubs of metal or of stone. In B the top part to start with is quadrangular. Towards the base of the soft mezzy strata a cavern at the side causes a deformation in the plan. Owing to a tendency entirely spontaneous in a mining work of this kind, the excavation gets narrower and narrower as it descends and difficulties increase. Here and there a reaction produces an enlargement, soon limited by the fatigue of the miner, his eagerness to dig further on, or else he meets a vein of rock harder than what he has been working through. As soon as one reaches lower down than the malaky, you get the formidable strata of red rock, so hard it is enough to dishearten the strongest arms, which the Palestine quarrymen have baptised by the picturesque name of "Jewish mezzy," and one cannot help here seeing the difficulties of the miner doubled, for he was badly equipped to tackle this obstinate rock, badly placed at the bottom of a hole which seems bent on gradually shutting itself up as one tries to get deeper and deeper and less broad. Eventually the tenacity of the rock defeats the tenacity of the miner. After a few attempts to find some soft rock, just a little layer of it to enable a small hole to be made, the fight is given up and the place abandoned. This huge pit finishes in the shape of a funnel, the sides badly tapered off and in the bottom rough and scanty. In spite of the dampness and concretion at the bottom, one can still see the way the rock was cut at the bottom, and the attempts to find a soft patch of rock.

Complete as the similarity may be between one rock-cut shaft and another, still, there are certain differences between the first shaft (B) and the second (Y), cut out at the end of the tunnel. This one is no longer either rectangular or round. If it was absolutely necessary to define its shape by some geometrical term or other one would say that it was an oval cylinder. It would be necessary, however, to at once correct this term cylinder, since there is a depth of 13 mètres from the highest part to the very lowest, by adding that it is crooked, between its two extremes it is very uneven, and some of the sections are yet even more irregular; one must also add further that the oval is rectilinear in no place, or at least practically no place; it narrows down and expands, now on one side, now on the other; it is adorned with protuberances or cavities, owing to whether the rock was hard or soft. From the top to the bottom the shaft is deformed by a vertical fault in the rock, very winding; you can still see the edges quite plainly. Instead of the opening of the shaft being covered by a masonry arch, the new well has its opening under a recess in the rock, 2 mètres 32 broad, 2 mètres 20 high, and an average of 1 mètre 80 in depth. The walls are cut a little on the slant, and the floor is very irregular. The opening is bell shaped, encroaching on the floor of the tunnel. In spite of the extreme wear and tear of time, on the place being carefully excavated it was quite clear that on the edge of the opening in front of the recess there used to be a small platform, or a large step, if you prefer it. Here and there in the walls there are small cavities which you can catch hold of with your hands or put your feet into them; but they were not made for that purpose. There are too few of them, too far apart, and their positions too fantastic to allow anyone to conceive that they were ever put there with the idea of being a kind of staircase. The shaft is also far too big in several places to allow one to climb up by such means. The incrustation on the sides here is exactly the same as in the shaft B, with one exception, that here and there the walls are polished to a shiny degree almost identical with certain portions of the big tunnel. In spite of the entirely different situations, and the cause probably quite different,

the same fundamental cause must be the real thing in both cases, namely, a continued and prolonged rubbing. This is to be particularly well seen in the shaft (J), where some of the projections have a really remarkable polish, not by any means on all the projections to the same extent, but usually more defined on the western side. One place only is polished all the way round uniformly, that is in the narrowest part of the shaft where the axis happens to be, and it is also the juncture of the two stratas, malaky and lower mezzy. Otherwise this well is worked in identically the same way as the other, same tools, same methods of mining, and same difficulties. Here the miner and engineer have proved the victors, and triumphed against the resistance of the rock. The "Jewish limestone" only caused a further attempt, a slight deviation. They got the shaft right down to the level they required to push on their way towards the east by a horizontal gallery. Their victory was such an excessive labour that they did not feel it necessary to finish off the shaft more carefully. Even when working their way through the royal white stone, so easy to work, this pitcher-shaped shaft has not the fulness of the shaft (B). Inconvenient as it must be to alter the centre of the shaft and the extremely narrow entrance to the rebel red limestone, they were still content to leave the shaft like this, allowing the bottom part to be broadened out a little in a sort of fantastic way, which would appear to be quite foolish if there were not some sort of justification for it.

The justification of this apparent carelessness is suggested by nothing more or less than the great vertical fault already mentioned. In following it all through the shaft this fault invariably constitutes the centre of the oval. A careful examination, facilitated by M. A.'s great kindness, who for a long time had ladders placed there, enabled me to once more examine the sinking of this shaft. The natural fissure, on account of all its crevices, offered much the best place for attacking the rock with a chisel. They broadened this fissure out, but allowed themselves to be entirely guided by it, without even taking the trouble to make it rectilinear or to alter the axis which the fault had. Lost for one moment in the strata of flint which bound the malaky to the hard mezzy, the fault once more appears underneath, and develops in a veritable cavern, all ready for the engineer to start work on; and the engineer wisely uses this cave as he used the fault. This cave will do very well indeed as a water chamber at the bottom of his shaft as soon as ever he has connected this cave with the tunnel which we already (P. I., gallery VI.) have described, and which connects direct with the Virgin's Well.

When one looks at the back of this wonderful installation its curious form arouses curiosity. Why this long, winding circuit, being almost a semicircle, instead of a straight line direct to the spring? Why this excessive height of the tunnel already mentioned? Why, again, two shafts, the inequalities of the work between the shafts and the tunnel, the apparently specially designed inconvenience in front of the doorway F? The first questions concern the logical conception of the monument, the others raise the problem of its construction. To start with, let us analyse the plan.

We have already seen, or at least conjectured, leaving criticism to higher authority, why the passage in the rock comes out just under the highest terrace, and yet so close to the ramparts as to be well covered from the enemy. It is also quite natural that the engineer preferred, instead of diving down immediately into the rock and going from there direct to the fountain, to drop slowly down and feel his way gradually, to search for the softest strata of rock which would take him most easily towards his objective. Let us for the moment put on one side the shaft (B) at the arch (C) and place the engineer in front of (B) with the intention of driving a tunnel to the spring, which rises nearly due east of his position at the foot of the scarp. If he decides to drive his gallery to the N.E., and by doing so greatly increasing the length of his tunnel, it seems almost impossible to see in this an initial mistake. It was so easy to have avoided this error, if indeed it was one, for he was then still working above ground, and could easily have got the direction of the spring by the most elementary means. But the attempt to sink a shaft at B, even if it were an older work, certainly showed him the nature of the rock beds, and he wishes now to cut a passage in the rock sufficiently solid to withstand all the necessary strain, and at the same time not to drop down too quickly into the very hard rock. If, on the other hand, the tunnel is not sunk sufficiently low to begin with, it will only come out sooner or later on the side of one of the lower terraces. Above all, he does not wish to make the descent too rapid to start with, as this passage is being constructed to allow free circulation, and the stairway must be practical for people to climb it carrying loads on their backs! This, I think, explains sufficiently the direction and tracing of the section D F.

The question of the section from F to K is not so easy to decide. Given the theory that a sharp turn was wanted in the tunnel as a kind of security against the attack of an invader, the turn, if it had been made just behind the doorway, would have been quite as efficient and have saved 10 mètres in the distance between F and J. The rock was identically the same to cut through either way. The most one can say is that possibly this prolongation was made to better the ventilation; but one does not dare suggest that it was also made to give light to the tunnel from the outside, for at this distance from the shaft, especially if the arch prevent the light from falling directly into the tunnel, it would be an impossibility. In fact, with the construction of the tunnel as it is between E and F it is very problematical indeed if any light at all would reach (G). Perhaps it is wise not to be too obstinate and try to discover in the plan of this very archaic engineer some wonderfully accurate calculation and rigorous logic, which he never attempted to do for a moment, merely satisfied to obtain from some intelligent and correct fashion a practical result.

Now let us take the question of the levels. From the floor of the doorway (F) to the mouth of the shaft (J) the difference in level is 4 mètres 25, and the length in a straight line is only 18 mètres 45. One must therefore look on this passage from three different points of view: either as a breakneck glissade with a slope of 25 centimètres per mètre, or in the form of a gentle stairway, but continuous, or lastly as a new stairway, very precipitous, like D E, finishing with a little platform in front of (J). Well, neither of these would be really convenient for a man heavily laden to walk up. Surely, then, the man skilled in this work would lengthen his passage and give it a more gradual slope. One will ask,

it is quite true, why choose the point (J) as the base of calculation? It is here that the *rôle* of the caves must come in to justify elegantly the whole argument or plan. At one time the mass of *débris* had not covered the natural relief of the hill. The east slope of Ed-Dehoura presented a cascade of scarps almost corresponding to those which one can still see on the other side of the valley, on the western slope of Betn el-Hawa. In most of these places more or less high up one can see caves gaping, some small, some big, which the violent phenomena of the last phases of earthquake have hollowed out in the soft strata of the limestone on the surface. The first inhabitants of the country had not missed profiting by these natural formations. Why should one then doubt that a skilled engineer in charge of this work should not also have profited by them? When one compares the plan of the tunnel and a map of the hill one cannot help being struck at once by the relation between the two real extremities of the tunnel and the spring. One sees then that these three points are on one line running W. to E. One notices, too, that the tunnel, in a length of 4 to 5 mètres, has a general direction N.-S., better still N.E.-S.W., quite abnormal if one takes the theoretical tracing of communication between K and D. One is astonished that the tunnel to start with seems to run as far as (N) to the south of the little opening (K), since one had finally to intercept it in front of the shaft (J) by a scarp 3 mètres high. If it was only a question of opening up the quickest way possible, the cave (I) would have been far the quickest and easiest opening to open out; but it seems, on the contrary, they did everything possible to obstruct all entry from the eastern side.

In order to conciliate two unreasonable contradictions, realise a passage absolutely secret, and create during the operation some practicable means of accelerating and attacking the mining at the two ends at the same time, the engineer chooses his entrance at (N), at the bottom of the cave (M). He rapidly traces a convenient way along the badly levelled floor of the grotto in the direction, according to the axis of the terrace, towards the caves in the proximity to the north. On looking at the plan no doubt some people will ask if the western artificial sinking of this cave (L) was not really a first attempt to drive right through between D and M, an attempt abandoned from practical motives already put forward in dealing with the analysis of the tracing D-G. Nothing is more likely in studying L, were it not that the mark of tools here is entirely different from those of the tunnel, and must be of a later date. He is most careful to protect the natural partition between M and I, preferring to enlarge a little in the shape of a door some already existing fissure at K. At the angle N.W. of (J), once more returning to his real plan, he attacks the rock in the direction foreseen to recut his way by the other extremity. They probably adopt as a provisionary floor to the tunnel the junction between the strata of higher mezzy and malaky, and they open below in the soft mezzy a gallery which already measured at least 2 mètres 40 at the very start, that is to say, practically the same height as the entrance to the tunnel at D, and also of the initial opening of the cave L, the height, too, of a fairly important section near the door F. This gallery is not constructed with the same exactitude as the one at the other end; perhaps one reason is because the rock is not so clean, easier broken, and more full of small cavities, the result being that the centre of the tunnel is continually first swaying to one side and then to the other. The sides are not nearly so well cut in this higher zone as the western section or the lower of this one.

Surely it is not chance that the angle of the curve should be approximately the middle of the tunnel, 22 mètres 45 from D to G, and 20 mètres 50 from G to the scarp in front of K. The conditions of the work not being quite the same, it would be absurd to suppose that the two gangs of miners worked equally rapidly from both ends. It is, on the contrary, quite natural to consider the point G as the intersection of the double marks laid out on the surface so as to guide the miners.

When the two galleries meet at the appointed spot, the roof of the section G K is just a little higher in the mezzy strata than the roof in the section G F. It is prolonged a few mètres further west of G, and there meets a harder and cleaner rock; the work of levelling off the roof is then stopped at the straight step already described. The walls of the two sections are brought together at the angle of intersection, and, not being quite opposite to one another, it is for this reason that the tunnel is broader here than anywhere else, namely, 2 mètres 90. Once the entire tunnel has been opened out, the next question to decide is, is it better to work gradually down in the lower slope of the hill and prolong the tunnel right to the source, or else to sink a shaft sheer down to the level of the water? The last plan, being the easiest and the most certain, is adopted. The necessity arises now to diminish as much as possible the depth of the vertical shaft, which is more difficult to mine. The engineer leaves the section F C flat; that will be an easy walk, and allow anyone to regain their breath after having climbed up or down the steep stairway D to F. At the most he only tries to gain a very few degrees and widely different from the necessary slope he will require. But, starting from G eastwards, the slope becomes more accentuated by fairly steep slopes, with isolated steps in between, really being platforms, finally by a last flight of steps, which goes 3 mètres down into the malaky strata. The engineer discovers the fault previously described, and fixes this as the place for the vertical shaft (J). The mouth is protected, being built under a cut-out recess at the side. The gallery is only carried beyond this point just sufficiently to allow of free circulation round the mouth of the shaft. Probably the passage K M is blocked, or at any rate shut up in such a way as not to allow any access to the tunnel. Big massive walls of stone and *débris* are built across the eastern mouths of the caves I and M, blocking them up to the smallest fissure, so as to guard the secret of the tunnel. Meanwhile, a canal is opened out between the bottom of the shaft and the spring. The work is done, and surely we cannot help admiring how well it has been conceived.

The object of constructing this tunnel is purely so as to have a covered way between the fortified camp on the top of Ophel and the spring in the valley of the Kedron. Without giving in any way the idea of the entire installation, M. Warren seems to have guessed the correct nature of this work when he casually writes about the ancient well of Ophel (*Recovery of Jerusalem*, p. 296). There existed in those days an even clearer testimony suggestive of its destination; an iron ring fixed in the roof of the recess

above the shaft (J), without doubt to facilitate pulling the cord up and down the shaft. Since those days, namely between 1867 to 1909, the ring has completely disappeared, and to-day it is not easy to find where it was even fixed.

To tell the truth, the irregularity of the shaft certainly does not seem to favour its being a place to pull buckets of water up. The final curve especially, which completely displaces the axis, seems to make it quite impossible to dip a bucket in the water brought here from the spring. This objection is too visible not to have been a serious point of examination from the very first days of the excavations. A few measurements soon showed us that by choosing a centre line at a more convenient point this was not impossible, and a direct drop could be obtained from the mouth of the shaft to the bottom. To accelerate the clearing out of the lower galleries, and especially the aqueduct tunnel, A, adopted two outlets: the round chamber at the end of gallery IV., the shaft (J), and the passage NO. The platform at the mouth of the shaft J was reconstructed in wood. Instead of trusting to a precarious fixing in the soft rock, a scaffolding was built over the mouth of the well, a pulley fixed; buckets at each end of the cord used to keep the work going all the time. After a few trials the right place was found to give the buckets a direct fall. They used to bang against the side of the rock, rebound, and then vanish through the narrowest part with an awful clatter. When it was a question of pulling it up again, the bucketful of mud was put on the hook below and pulled slowly up, hitting the sides all the way, making a dreadful fuss as it came through the narrow part; but, in spite of all this fuss, very little ever dropped out of the buckets. Later on, this was improved, and a plank was put halfway down the shaft, where one of the workmen sat and guided the buckets through this narrow part. But this proved, at any rate, that it was quite possible to draw water from the top of the shaft, and it must have been easier to do it with the water skins of the country than it was with buckets. If the buckets were able to descend to the water level, there can be no question that the skins could. Also, before the opening of the aqueduct tunnel the hours when the spring flushed would certainly cause the water to rise well up this shaft.

There is nothing by which one can really date this hydraulic work, if one can give it that name. The excavations have produced no piece of archæological value worthy of attention —a few big balls of metal, two or three pieces of Roman money too obliterated to be able to decipher them, a little bronze statue, probably Herodian, several human remains, *débris* of coal-wood, and a lot of fragments of broken glass, all hideously mixed up in solid bank 4 mètres high at (J). One must not forget that Warren made attempts at several different places clearing away the old *débris* and making new ones all the way up to the arch (C). One could easily see during the recent excavations what had been moved and what had not been removed in 1867.

At a period much later, when the passage to the fountain was no longer required, the shaft B got nearly entirely filled up, a temporary covering was put over the orifice (J). One could still see where the sides of the arch rested in the shaft; but these had to be knocked down while the shaft was being used, as it was too dangerous; there were only two or three stones in position at the most. The tunnel, century after century, gradually got filled up more and more, the earth oozing through the crevices in the rocks mixed with the water. There is no doubt that the tunnel and caves were still used as places of concealment long after the tunnel began filling up, even when it was two-thirds full. They had made small nooks to live in, and it was there Warren found three glass vases, which he took for lamps of a curious construction, but as M. Greville Chester, on being asked his advice about them, pointed out they were lamps from an Arab mosque or an old Egyptian convent (*Recovery*, p. 490). As regards the earth vases Warren found, it would be difficult to date them at all.

The tunnel at one time was completely blocked by a large wall; to make it still more solid, they had taken the trouble to let it into the walls. Nothing indicates at all at what period this was done. It may possibly have a very vague analogy with the wall built at the end of the arch (C); that, however, is very vague. The arch (C) has been strengthened as much as possible by the present Expedition. It is traced in a circle, with a radius of 1 mètre 45. It has sixteen key-stones in excellent state of preservation, but the feet of the arch are sadly deteriorated, owing to the very spongy texture of malaky, which is of the worse quality, and breaks at the least shock and is continually saturated with water. The original joins were extremely fine, and the circle shut on one point. The cutting was done with a large hammer, 0 mètres 06, with a single row of very fine teeth, making twenty-three striations at each blow, and an average length of 12 to 15 millimètres, and recalls the well-authenticated Jewish stone cutting (*taille*) anterior to the Exile, found in the palace of Samaria, for instance. But I should really not like to express any opinion on such a very frail base. One will, besides, come to this later on, by an indirect road it is true, but for all that more certain, and we shall then fix approximately the general date of the epoch when this wonderfully clever installation was made, which the Expedition of 1910 has revealed to the world with all the precision desirable.

D.—The Tunnel Aqueduct of Siloam.

Subterranean tunnels have always been a favourite element in Oriental romance, and their popularity in contemporary folklore has certainly shown no signs of diminution. Very few villages are unable to boast either of some secret means of communication with another village a long way off, or of a celebrated Waly, a famous Mosque, a haunted cavern. Let but a slip of a water channel be by chance discovered, a yard or two of ancient vaulting, or a fissure in a stratum of rock, and you will immediately hear the oldest inhabitant setting forth how "in his young days" there was a broad highway where now there is nothing but a fissure. At the very least this obliging link between ourselves and past tradition will have heard from an ancestor (who died at the uttermost span of human life) that "in his time" people could easily walk upright where now there is nothing but a dark hole, and that daring visitors could travel for three, seven, and sixty days, could see strange sights, and suffer mysterious tribulations.

Jerusalem has a series of subterranean constructions yielding in legendary lore to none. There is scarcely a famous site in the town, ancient or modern, which is not connected (in the popular estimation) with half a dozen other sites, at varying distances. The greater the impossibility of a statement, the more firmly, of course, is it believed, and I should not advise anyone to deny before a true Mussulman that the Haram, for example, does not possess its mysterious connecting tunnel leading straight to the patriarchal cave in Hebron, and even Mecca itself. Jerusalem, too, had its own passage straight to Gehenna, in the belief of an older generation than our own, whose faith was as ardent as their belief in their own infallibility. The entry to it, apparently, was perfectly well known, and learned men affirmed that wreaths of infernal smoke were to be seen issuing from its gloomy portals. I need hardly remind my readers, too, of the frequent mention of subterranean passages made by Josephus, or of the tragic *rôle* they so often play in the scenes of his great history.

The truth is that Jerusalem is full of passages which were originally made in the open air, and have since been filled up by centuries of accumulations from the *débris* of ruins, entirely apart from the many channels and tunnels actually cut through the living rock for various purposes of drainage, waterworks, or secret communication. On so rich a canvas it was only likely that the embroideries of legend should be thickly woven, and modern scientific exploration has demonstrated year by year that the facts alone are quite astonishing enough. Sometimes it is rather difficult to distinguish between the truth and the superimposed tissue, but in no cases of the kind would it be wise to deny the existence of any subterranean mysteries at all. When certain writers repeat the rumour that there is a direct current of water between Calvary and Siloam, more critical authors may either smile at such assertions or deny them flatly. This supposed watercourse is evidently from the same spring as that which flowed the river of the Holy of Holies in Ezekiel. Yet there is good foundation for the legend which asserted that waters were led by natural and artificial channels through the northern hills towards the famous Pool of Siloam. In any case, the legend in very early years reflected the historical fact that Siloam was not itself a spring, but borrowed its water from mysterious and unknown sources. Its very name, in the days of Jesus Christ, suggested that the waters of the well-known Pool were borrowed from some hidden source. Some centuries later an echo of the same forgotten truth may be heard in the powerfully descriptive phrase of St. Jerôme about "the fountain of Siloam, which pours with a loud sound through the hollows and caverns of very hard rock." And it is a passage in Isaiah (viii. 6) concerning the waters of Siloam, formerly so quiet, which aroused the memory of the echoing streams St. Jerôme knew. An unknown folklorist of the past has even attributed to Isaiah himself the origin of the unknown spring, which is supposed (by this authority) to have burst forth at the prayers of the prophet when parched with thirst during the preliminaries of his martyrdom.

When, at the commencement of the nineteenth century, some courageous explorers introduced more accurate and scientific methods of research and observation in examining Siloam, they do not always seem to have treated their ancient predecessors with all the indulgence or delicacy, or even the strict justice, that might perhaps have been expected, and this has been pointed out and proved by Tobler. There is perhaps little reason to believe that it would be worth while to analyse any descriptions of Siloam and its aqueducts written before the nineteenth century. Only by 1830 did our learned archæologists introduce the use of the compass and the spirit level, measure distances, and take the heights of various situations. Yet we must never forget the zeal of Father Nau, who persuaded two Capucins to enter the aqueduct and report to him; of Quaresmius, who (after his return) deplored so bitterly his omission of this very examination, and begged his friend in Palestine to do it for him; or of Father Vinhoven, who started exploring from the Virgin's Well and was obliged to withdraw, covered with mud and wet through, after being unable to get any farther, only to go in again by the other end. Let us pay a just tribute of praise to these our valiant predecessors; it was due to no lack of energy or good-will that they left no detailed studies of the aqueduct. Can we conceive the agitation of Robinson, for instance, had he but known that in the course of his careful exploration of this whole tunnel he must actually have touched, without seeing it, the long Hebrew inscription now known as the "Siloam Stone" set upon one of the walls? After so much careful work by previous hands, it may have seemed almost rash to hope that any rectifications or additions could be expected from the expedition of 1909-11; yet we can undoubtedly "report progress," and it is but just to recapitulate, as exactly as may be, the state of our previous information, in order to estimate more fairly the contributions thus recently provided.

Since the first work round the Virgin's Well began in 1909, not being able to foresee that it was proposed to clear out the tunnel at a later date, I had always taken occasion during my visits to the galleries to paddle frequently about in this tunnel, each time advancing further forward, so as to be able to check the measurements, points of the compass, and hypotheses, especially in relation to the shafts—or rather the shaft—which communicated with the central platform of Ophel. The apprehension that I had not looked carefully enough or else missed something kept me constantly returning to this task, once more begun in 1910. One fine day a gang started clearing the entrance of the tunnel out down to its original floor, and the tunnel was suddenly increased in height by 1 mètre. The next day this clearing out progressed well; soon this task was tackled at the other extremity as well; the work continued for about a fortnight, and one could well imagine what a great labour the boring of this tunnel must have been. At the head of the line a few chosen workmen continually relieved each other; their job was to pick away at this wall of mud, in places hardened almost like cement from the limestone deposits of the stagnant waters. Behind these there was a long chain of men, increasing daily in length, who handed the baskets and buckets full of mud right back to the entrance. There was much rivalry between the two gangs at either end as to who cleared out the most during their shift. Every eight hours the gangs changed, and the work went on unchecked, day or night, except now and then for a few short intervals when the smoke of candles, the damp mist, the sweat and the breath of the workmen made the atmosphere so thick one could neither breathe nor could

the candles remain alight. To start with, curiosity was much aroused during the first phases of this difficult work, in that no archæological discoveries of any sort or kind were found to recompense the work, and it looked as if the only people who would benefit by it would be the market gardeners and washerwomen of Siloam; but later this was succeeded by great interest and more than one surprise. The explorers, always more than obliging, offered to keep the tunnel open and not let the water flow through until I had made a detailed plan and section of the whole tunnel. It is thus that we were able from Sept. 26 to Oct. 8 to move all over this tunnel at our leisure, the whole place completely cleared out and dry except for a puddle here and there. The occasion was much too good not to seize this opportunity to survey the whole tunnel and make new plans, especially after checking a few of the earlier measurements made it clear that it would be a useful work. I hasten here to pay really sincere homage to the courageous energy and the well-deserved precision of all our predecessors. In comparing with their surveys and those especially of the officers of the Ordnance our new survey, you will observe that it is only in a few details and different readings that we disagree. If the sections vary more than the plan, it is not the fault of the former surveyors, but rather the merit of this new expedition, who have carried out this very big job with the object of restoring the tunnel's original proportions and character. One must also appreciate the different circumstances under which we worked and they worked, and one must take this in consideration. In the old days Capt. Warren had to read a lot of his angles while in the position of a swimmer, with a strong stream running by him, his pencil and candle in his mouth, so as to have his hands free to keep his paper with the plan on it and his compass out of the water (*Recovery*, p. 241; or Jerus. Mem, p. 355). Afterwards, we have measured these same passages with our instruments on legs; we have taken in there graduated rules, water levels, graphometers and even a dark room. Visitors walked through the tunnel whilst we were working, and wherever we met it was only a question of flattening oneself against the wall; anyone could get by, no necessity to have to get into any recess. Nearly the whole tunnel was dry. Where there were depressions in the floor, which will be described later, water had continued to ooze through the walls and fill them up since it had been cleared out; this was especially noticeable in the higher strata of limestone mezzy and in some strata of malaky. This oozing became a great deal more noticeable after a big shower at the end of October, but there was no sign at all of even the smallest spring in the whole length of the tunnel. Thinking that the tunnel would not be cleared out again so well as it is now in a hurry, we decided that it would not be out of place to give for the larger part details of measurements more fully than one might otherwise have done. The first table A is therefore a simple summary of the leaves of the survey, showing the 52 [53] stations where the fixed compass and graphometer were used. I have though it superfluous to take notice of divergences less than half a degree. In the same manner throughout half a degree is the lowest reading taken. All fractions of a degree below 20′ have been ignored; between 20′ and 40′ it has been noted throughout at 30′; about 40′ it has been read as 1°. Station II., for example, noted 50° 30′, ought really to read 50° 28′ 17″. The orientation is based on the magnetic north, without allowing for any variation. To explain the inequalities of the lengths of the different sections, I should explain to the reader that in each case we took the longest possible sight at an average height of 1 mètre 35, so as to diminish any errors as much as possible. The synoptic register of the levels B only represents two-thirds of the sides measured. On the other hand two columns of figures worked out at home have been inserted to give a more complete idea of the slope in this strange canal. In sections which are more than 10 mètres long the slope has been determined by intermediary measurements at an average interval of 5 mètres. The most practical way of determining the levels was, we found after several attempts, by prolonging a horizontal line along the wall, keeping it at a convenient height to get a really accurate measure. The length of the sections, which varied according to practical conditions, was also made a round figure so as to avoid fractions; the last one only was the exception, as only 2 mètres 45 of tunnel was left. Since opinions differ as to which is the real entrance of the tunnel or the spring, we chose as our base of operations the opening at the other end by the pool. These trifles are in no way stated by way of ingenuous ostentation; they have not even the idea of guaranteeing absolute exactitude, since all that depends on us is to apply ourselves with perseverance to the task. All we wish to do is to show the reader clearly the method adopted by us in making this new survey of a monument so often described (see Plate IV. and Fig. 29).

The measurements start at the extreme edge of the rock tunnel without allowing for the part cut away when a Byzantine church was erected across the opening. This was discovered by M. Bliss and M. Dickie (*Excavations at Jerusalem*, p. 178 ss.; *cf.* R. B. 1897, p. 302 ss.). After gradually going from N.E. to E. for 66 mètres the tunnel finds itself under the ridge of the crest of the hill (station VI.). At one time it is almost going due east (from VI. to VII.), not without, however, a slight tendency to go towards the south; the tendency accentuated itself (from VII. to XII.) sufficiently to once more bring the tunnel in a length of 65 mètres back almost on the axis E.—W. of its entrance. A sharp turn to the east during a length of 19 mètres (XII. to XIII.) passes through a bed of limestone of very bad quality, nearly to the external rockface on the eastern slope of the hill. A few mètres more and the tunnel would have come out on the side of the hill unless the level was altered. It turns gently round to the N.E. (XIII.—XV.), and in 45 mètres comes back (XV. *bis*) a little higher than the axis already reached at station VI., once more level with the rock. From XVI. to XXIV. (about 100 mètres) the direction is nearly S.—N., with certain waverings more or less clear to the west or the east. Between XXIV. and XXXV. there are several variations from both sides caused by the gangs working towards each other. One knows by the inscription, and the examination of the tunnel is quite sufficient in itself to show that the work was carried on from the two extremities at the same time. We will take this section later. Beyond XXXV. the direction of the tunnel is N.E. in the direction of the spring; this soon changes to N.W. from XXXVII.—XLII. during a length of 75 mètres, then straightens itself out 5 mètres to the north (XLIII.). An error in the plan has just doubled the length of this

section. The result is that the plan of the tunnel and all the galleries connected with it are 5 mètres too far to the north. Finally, the tunnel goes towards the spring by a circuit higher to the N.E. (XLIV.—XLVII.) than seems necessary. From the observations already put forward concerning the neighbouring tunnels of the spring one will see that for purposes of measurement we have taken the entrance of the tunnel to be at the gallery VI. It is therefore here that we finish our measurements.

The total length is 512 mètres 50. This is checked once more by the new measurements taken whilst working out the levels, and is certainly strongly confirmed. If one adds the 20 mètres 60 which is the length of the older galleries which give direct communication with the spring, the total length will then be 533 mètres 10. The anxiety with which the scholars have continually worried themselves to try and utilise the length of this aqueduct in theoretical determination of the Jewish cubit gave some opportunity to a careful verification of its length (V.g. Beswick Q.S. 1881, p. 295; 1884, p. 255; Conder Q.S. 1182, p. 127; Perrot-Chipiez, *Hist. de l'Art. Judée*, p. 420, n. 1). The figure obtained corresponds so very nearly with the best former measures that one can call the tunnel either 533 or 534 mètres long as a round figure. Robinson's measurement was 533 mètres 75; M. Clermont-Ganneau made it a round figure, 533 mètres; Warren and Conder made it 536 mètres 20.

Careful examination of Plate V. will show the different heights of the tunnel, and will not cause much surprise once one knows all about the recent excavations. In fact, all the way along one finds more or less the heights already familiar only of a uniform average of 1 mètre. With the level it is an entirely different thing, and the calculations, once fully described, introduce quite a new element in the technical explanation. If there was one fact about which one was until now quite certain it was the lack of slope in the canal. The maps of the survey put the same figure, 2087ft., at the plan of the spring and also where the tunnel begins in the pool. The same thing in the special plans which M. Clermont-Ganneau borrows from M. Warren (*Mission in Palestine in* 1881; fifth report, pl. VII., and note p. 135, No. 124). Mr Conder is more precise, and indicates just the suspicion of a fall in the level of the tunnel between the two extremities; but he points out its extraordinary insignificance, 1ft. in its whole length, which is now known. It is, however, no longer 1ft., but 7ft. 2in., or, better still, 2 mètres 18—that is to say, if our measurements are correct and we have taken the level of the floor all the way as carefully as I think we have; this is clearly shown between the two extremities in the section. This would work out at 4 millimètres in a mètre, not at all a bad slope. In practice one can see that the old engineer had not worked out his plan on this basis; either he had not the faculty or else his natural ability was lacking, or yet again the execution of the work upset his original plan. The most likely sclution is that the workmen failed to carry out his plan. One takes this view in preference, after a careful examination, always kept within certain limits. Before accusing the miners of carelessness or the engineer of incapacity it is necessary to consider these different slopes and see if we can find any reason for them at all. One fact is at once apparent on even the most superficial examination of the calculations—the regularity of the normal slope on the whole in a length of 299 mètres, although there are variations in this section A—S, that is, from the pool to the point of junction where the two gangs met. This regularity is perfect between the opening and the station M, where the floor attains a height of 1 mètre 39 in a length of 160 mètres, theoretically a rise of 8 millimètres per mètre, but in reality a very different matter, since from H to G we find there is only a rise of 3 millimètres per mètre; then, again, between the opening and A it rises to 17 millimètres per mètre. From M to S the variations are relatively smaller ,although peculiar—drop of 0 mètre 08 (st. n), continual rise from 1 mètre 31 to 1 mètre 77 between N and Q, to drop once more to 1 mètre 66 at the point of junction. It is evident that the grade of two centimètres in 20 mètres from W to X must be the fault of the miners; they were estimating at the least to work horizontally. Perhaps, moreover, it is due to some erosion near the point X. The aspect changes in the northern section. It is at first regularly ascending from S to Z, rising from 1 mètre 66 to 2 mètres 18 in 128 mètres long; the ruling grade would be therefore 4 millimètres per mètre, reduced in practice sometimes to 2 millimètres ½ (at T), or raised to 7 millimètres per mètre (at Z). Beyond that we have a sharp inverse slope of 8 millimètres per mètre between Z and A, where the level drops to 2 mètres 10. In the next 73 mètres, the level depends very much on what kind of rock bed there is, and it is quite easy to understand that the very small variations which take place here are purely accidental, especially in a horizontal level of an average of 2 mètres 07. At the entrance the floor literally falls into gallery VI., where the level has already been explained. Is it worth while to point out that an engineer capable of making a slope for 160 mètres and nearly 300 mètres would not immediately afterwards finish the rest of the tunnel blindly?

Another point worthy of notice is the relation between the height of the tunnel, which is very variable, and the slopes. We find the maximum heights at the two extremities of the tunnel, the lengths, however, being very unequal. One would expect that a tunnel commenced with such spacious grandeur would gradually get smaller as it penetrated further into the heart of the rock; but here it is quite the contrary. At the northern extremity we begin with a height of 1 mètre 94, and at a distance of 50 mètres from the entrance, in spite of the floor rising slightly the whole way, the height of the roof is 3 mètres 10, and does not come down to its original height again until it reaches the point where the normal grade of the aqueduct commences (Z). As far as the point of junction (S) no section is higher than 1 mètre 80. More striking still is the connection between the height and the slope at the extreme end of the southern section. The Byzantines so cut about the entrance that it is impossible to guess what the exact height was. One thing, I think, however, is quite clear, that the roof was gradually coming lower and lower towards the entrance. In fact, at the first point where one can still measure the height is only 3 mètres 96, soon rising to 4 mètres, then to 5 mètres, and to a maximum of 5 mètres 08. Surely very peculiar in an aqueduct whose average height is less than 2 mètres, in round figures 1 mètre 80 for the whole central part of the tunnel, at least 300 mètres long. This average height in the southern section begins where the grade of the floor becomes once more regular. Beyond that one finds no places 2 mètres high except just

before approaching the point of junction from the station R. It is clear with regard to some sections that the cause of this exaggerated height was due to a sinking of the floor, since such is one of the evident causes of the increasing height for 29 mètres just south of the junction—one cause only, for one must suppose that there must be a further explanation for the roof to rise in the opposite direction to the normal slope of the floor.

One last observation to determine the problem of this structure concerns the cutting of the walls. It is fine in a variety of ways, according to the kind of rock, but the top part is always most correctly cut, while at times the lower part, especialy right at the bottom, is far from well finished off. You observe this very clearly in the same sections A—M, Q—S, Y—V; these sections were certainly touched up after the tunnel was first open. The cutting was done with a wedge and miner's pick, and is exactly the same character as the marks already carefully observed in galleries IV. and V., and, as if this characteristic aspect was not sufficient to show that these galleries and the big tunnel were part of the same system and worked in identically the same style by the same workmen, here is another proof: in three or four different sections, almost from one end of the tunnel to the other, a horizontal line is to be found, just like that curious line leading to the empty tablet in the round chamber, and leading along one of the sides in gallery IV.

With all these explanations the boring of this canal, once so peculiar, seems now quite intelligible. For the moment let us put on one side the question of the plan, the question also of the real point of departure for the northern gang, so as to start with the miners at the branching off of gallery VI. and at Siloam. The walls are attacked here with spirit; the height is 1 mètre 80 on an average, and the breadth varies from 0 mètre 58 to 0 mètre 65, without alluding to the entrances, which measure about 0 mètre 75, nor to the enlargements caused accidentally by driving the tunnel in a wrong direction, which had to be abandoned. In the first ardour of their work, the miners, all fresh, go pegging ahead, without noticing that they are yielding too much to the normal tendency in their process of mining of rapidly raising the gallery. Perhaps, too, at the beginning they allowed themselves to be attracted by the soft rock higher up, where naturally the work proceeded faster. Once the first rush of enthusiasm is over, the work having been rectified by the intervention of an engineer, from Z in the south and S in the north the gangs proceed with their work with the most remarkable regularity, always keeping to the average height. The northern gang make their roof a little lower, but much more even, as they were working in a harder rock. The southern gang make a slightly higher gallery, but a much less regular roof, on account of fissures and natural cavities, which caused frequent variations in the surface. Towards the junction nervous haste once more causes the two galleries to rise up a bit, more noticeable to-day in the southern section, but evident as well for 4 to 5 mètres to the north of S. As soon as the miners felt they were quite close to one another they no longer took the trouble to keep level or to rectify their errors; all they cared for was to dig on ahead faster and faster so as to meet one another. At once the galleries start rising. Finally, they break through one into the other. The southern gallery is at a higher level than the northern one.

In the last 10 mètres before and after the point of junction, the haste of the workmen is not only shown by the changes they have inflicted on the axis of the tunnel, but it is also very clearly shown on the walls, where one looks in vain for the finishing touches, and in places almost elegant polish, of certain sections finished more leisurely, or at any rate with patience; here one reads quite another story, which the diagram Fig. 19 shows in such a concrete form. The line r′ s′ represents the actual floor for a length of 10 mètres with the point of junction S in the middle. The shaded line, s′-x-x′, establishes a line of demarcation as nearly as possible between the two zones whose walls have such a completely different aspect. Above the vigorous but usually correct cutting, nearly the whole length of the canal can easily be observed, at any rate in its entire height, a little to the south of r′ and immediately to the north of s′. Below, the work is very violent; you can see the great gashes whose duplicates you meet with—(1) In the face of the unfinished galleries V. and VII.; (2) in the abandoned cuttings on the side of gallery IV.; (3) in the beginning of the passage near the extremity of gallery VI. near the spring; (4) in the canal which crosses the floor of the water chamber; but above all (5) in the tunnel itself at a variable height at the bottom of the walls at each end. The solution seems to jump at one; the broken and unfinished zone represents the work which had to be redone owing to the workmen carelessly allowing the gallery to rise instead of fall; the floor had, therefore, to be lowered so as to get the required slope. The northern gang appears to be in the greatest hurry, and swing their picks to the right and left, arriving at the junction with the floor 30 centimètres below that of the southern gang, who work on much more calmly and sedately. As soon as the last partition has been broken down, and the two gangs have met through some small hole or other at the point x the task is quite simple; there can be no difficulty to correct this error; but they put more speed into their work than care; it is very coarse work, for in their hurry to open up the way for the water, they cut down the floor 2 centimètres lower than is necessary.

At the northern end the condition of things is not the same; true, there is a rising roof in the direction they were working, but only for 6 to 7 mètres between γ-λ. For the next 35 mètres its level is only disturbed by a change of strata. Suddenly, a few mètres in front of δ, the roof slopes sharply down, and diminishes the height of the gallery to 1 mètre 28. Here also the original floor of the tunnel has been lowered, but not with the same energy as at the other extremity. The rock here is much harder, and not only was it not necessary to exaggerate the height here by making a well pronounced slope to Siloam; on the contrary, one had to combine, with the required height to assure an easy flow towards the pool, the level of the water running across an already existing gallery VI., built at a lower level. Instead of correcting the original floor, the engineer was satisfied by filling in the bottom of the gallery VI. with concrete to such a height as to make the water flow in the direction required. The irregularity offered yet another advantage in having at the beginning of the aqueduct quite a long space where there would always be a certain volume of water; 10 to 12 centimètres deep at least; each time the spring rose this water

was renewed, and the fresh rush of water, flowing slowly over this depression, had time to get clear before arriving at the point z to precipitate itself forward with a greater rush towards Siloam, without, however, risking the tunnel being filled with mud too quickly. From this point of view, in spite of the first impression of caprice and a happy-go-lucky method in the construction of this tunnel, I think we must admit that it is a cleverly-thought-out work, and fairly well carried through.

The analysis of the outline itself is far from easy. This curious S hidden under the hill between the Pool of Siloam and the Virgin's Well has for a long time remained an irritating enigma; for it is impossible to put forward as a solution Capt. Conder's theory that it is owing to the carelessness of the old engineers (Q.S. 1882, p. 128, Mem. Jerus., p. 362). M. Clermont-Ganneau on his side tries to prove that this was not the case. (*Receuil d'Archeol. Orient* II., p. 269, 275, &c.).

Allowing for certain errors in this work, there is no question at all that these two curves were intentionally made, even though they increased the length of the tunnel in the rock by nearly a third. The piercing sagacity of this French scholar discovers a solution to the riddle, which one could not resist feeling was a happy one. This is his solution in short: 1. The southern curve was made to avoid the royal tombs which lay between the Pool of Siloam and the Virgin's Well; 2. the northern curve was made to a well or some wells under the town, so as to allow the people to draw their water in security, possibly hoping also to strike some fresh spring in this direction. It was impossible for us to find any sign of an opening to a well in the whole length of the aqueduct, and if any opening does exist in this section of the tunnel it must be wonderfully well sealed to have hidden itself from our search. One thing is quite certain, and that we can be absolutely sure about, there is no spring at all. The fissure (L in the section pl. IV.) where, at one time, we thought there was a slight flow of water, remained open in the middle of the part cleared out for over three weeks. This fissure has not the least sign of a spring. The old explorers never had the facility of making such a careful examination as we were able to do, even before the place had been cleared out, and there is no question whatever that this is one of the innumerable cavities covered over with a limestone concretion, formed by the water oozing through the rock, such as one is continually finding all over the hill. This crevice was, besides, higher than the level of the mud in the canal, was full of a very fine mud forced in the back part of the crevice by the whirl of the current which afterwards slowly drained out at low water. Surely it is quite clear now that the slightest rush of water would have at once forced this mud out into the canal? The sound of running water, which several observers have heard there, is quite easily explained if it has been heard whilst the Virgin's Well is active. The noise produced there in the water chamber is like noisy boiling, whose sonority increases in sound right through the tunnel, and the current gradually flows through; the noise is far out of proportion to the volume of water moving. This sonorous wave and flow of water come hurling themselves against a neighbouring turning close to the fissure, and then go swirling by. When the spring is quite quiet, and also the atmosphere outside the tunnel, one hears no more noise in front of this one place than you do before a hundred others in the gallery. But if there is any wind, on the contrary, a current of air more or less strong is rushing through the tunnel, and once more you hear the sound of flowing water behind this dry crevice.

The solution as regards the southern loop still remains intact. The examination of the tunnel has furnished a very minute detail, which no doubt M. Clermont-Ganneau would have used to support his argument had he known of it. There are two cavities, described insufficiently in the past, but of importance to this matter now one can put forward the hypothesis of practical boring by the old engineer of the tunnel with the idea of making certain that he was in no way encroaching on the security and peace of the royal tombs, although passing very close to them. These cavities have not been methodically excavated yet, and their precise development is still unknown. But in their actual state it is impossible to see anything else there but natural caves at the bottom of a geological strata of soft mezzy. Some caves very similar to these and very nearly the same dimensions were met with in the centre of the tunnel, making irregular holes in the roof of the tunnel, which have been erroneously taken for wells or means of communication with the surface. In practice the examination of these caves, lightly touched by the tunnel as it passed them, furnished the engineer with information almost equal to what he could have got by putting down borings.

I must point out the existence of two tablets well roughed out in this part of the tunnel, precisely where M. Clermont-Ganneau points out the dangerous zone. Roughed out only; let me hasten to insist on this, so as not to allow any idea that any writing was discovered there, for we examined them most carefully, and there was not a sign of any writing at all. The tablets had only been lightly cut out, and had not been polished, not even prepared with the usual care so as to allow an inscription to be engraved on it. But the panel is there very clearly outlined, and quite different from the rest of the walls. The clear relation between one tablet—accidentally deformed by an angle—and the last section to be observed of the primitive levelling line, does it not suggest some intention of commemorating the success of the levelling by a text? Obviously, the text would have kept quiet about all the difficulties they had to get the proper level and the errors they made. It is quite impossible to suggest what the text would have been on the other tablet, which is larger and of a different shape. The levelling was to be recorded on the first; possibly on the second they wanted to boast how well they had avoided the royal tombs—who knows? Nowhere else in the whole tunnel did we find anything like this. Although we used to live in the hopes that we should find some commemorative tablet at the point of junction, nothing was found, not even a tablet prepared for an inscription, and if we reflect at all it is quite natural. Close to the opening, where the tunnel is sufficiently high to allow of free circulation, surely that is the place for inscriptions, better situated than either of those mentioned, and far more accessible. In the centre of the tunnel, in an inconvenient and dark passage, what is the good of writing anything to commemorate this great triumph, where no one

would ever dare go and read it, unless it was an inspector of the canal during his visits of inspection? How much better chosen was the place where the inscription called the Siloam Stone was eventually put, away from all chance of mutilation, yet sufficiently near the entrance of the tunnel to allow visitors to go and see it? And no doubt it was always shown to record the wonderful mining work this tunnel was.

It does not seem necessary to me to discuss in detail the problem which Conder and Manteñ studied with such care a short time ago (Q.S., 1882, pp. 127 and 131, Mem. Jerus., p. 362, 365), namely, the one about the little artificial caves or single pockets, triangular or square, and the value which they might have with reference to the measurements calculated by the engineer of the tunnel. One notices very quickly not only that capricious distribution excludes all idea of symmetry but that their intervals upset even the most patient attempts to reduce them, even summarily, to old or modern numerical systems. Their shape is not exactly the one which would suggest the idea of marks for measuring. Why such hollow triangles, instead of the simple arrow head usually employed for this purpose nowadays? If even the depth given to the triangular notch could give some semblance of explication, why are there also squares three and a half to four centimètres long, consequently the most inconvenient mark possible to measure precisely from, when a simple line would have been so much better. The fantastic succession of squares and triangles upsets altogether all chances of classification, and their situation, at one time in a turning, at another in a section fairly straight, but always fairly close to the roof, does not exactly add to the possibility of their being there for measurement marks. Their usual situation near the roof, it is true, might point to something of a totally different nature. In certain high sections where one sees these niches away up just under the roof, while the bottom of the walls are coarsely and irregularly cut, it might be that their presence would confirm the idea that a primitive gallery of a moderate height was cut first of all, and the floor was later on cut down to a level which, at times, makes these notches appear even stranger, in raising them higher than the hand can reach.

At first sight the triangular cavities give one the idea of being places to put lamps in, such as the caverns of the most varied periods have in a great number. It is quite sufficient in this case just to look at the smallness and little depth of these holes to see at once that no useful lamp could possibly be placed in them. Chance furnished me with what I believe to be the real explanation of these holes. I had often remarked in other tunnels the dexterity with which the workmen fixed their lights and made little pegs on which to hang some of his clothes. With a blow of the hammer a bit of rock is cut away, and a candle placed in this crevice with a lump of mud on the end of it to make it stand; in another place, a blow of the pick opens up the lips of a fissure, the first bit of wood found is forced into it, and used as a peg for clothes, or to hang the precious jar of fresh water. While the aqueduct was being cleaned out, it was lighted with lanterns hung from bits of wood fixed under the roof. An accident pulled down one of these bits of wood one day; I saw the nearest workman to the fallen lamp pick it up, put two bits of wood into one of these triangular niches, and fix the lantern once more in position, with a few blows of a wedge. No doubt the skilled workman finished off the holes with a certain amount of skill; not being content, like the modern workman of Siloam, to leave a coarse hole in the wall.

Finally, let us now follow both the gangs as they worked out this wonderful tunnel. Taking first of all the gang which started at the Virgin's Well. To avoid a muddle, I will call this gang A and the other B. To start with, they have to face great difficulties; to prevent any chance of the water invading the tunnel, and also to provide good air to work in as they get further and further into the hill. They avoided the difficulty of the water very cleverly, choosing simply another place to start off from, although in very close proximity; the place we call the round chamber and tunnel V. Without a doubt, when this first theoretically excellent direction was abandoned, there was the risk of being swamped by the water flowing through this gallery to the vertical shaft of Ophel. But it certainly was not a difficult thing to block up the entrance at the water chamber, to dry up this tunnel and turn the water of the spring into the external canals I. and II. There remained the momentary danger of the water oozing through the rock and filling the tunnel. One could guard against this on this side by an artificial kind of pump, and perhaps they added to this resource by accentuating the rising of the new gallery at a convenient point after the old tunnel. It is really here that the northern section of the tunnel-aqueducts starts. Thanks to the new communication established between the round chamber and the vertical shaft of Ophel, a strong and constant current of air is circulating in front of the opening of the new tunnel, and can easily be forced down the tunnel if necessary by just placing a screen across Gallery VI. The ventilation is, therefore, well assured as long as the north gang keep working in a more or less straight line. After the big loop which turns the tunnel towards the south (Plate XLIV), the tunnel gets smaller and smaller and twists about still more, and there can be no question that the difficulty of ventilation must have got more and more severe. Up to what point it would become insufficient or nil, perhaps some clever mining engineer might be able to approximately determine, in taking into consideration the real situation of this gallery in the rock. And who, to-day, can say with any certainty whether the miners who made this tunnel did not know of some means, more or less rudimentary, of forcing back the air to a certain distance. If some day or other a luckier explorer were to find the existence of a shaft in this section all would be simplified.

From the point where gang A is told to commence a gradual inclination towards the south, they find the rock very hard to work—this tends to reduce the size of the tunnel, which is only 1 mètre 65 here. It may be the haste to finish the work, or else emulation between the two gangs caused the tunnel to reach its lowest, 1 mètre 52. Conder (Q.S., 1882, p. 128) puts forward a theory that the tunnel was so small on account of the smallness in size of the miners of that day in Palestine, but this much clearly be absurd. When one examines very carefully the lowest section, one can exonerate the miners of any idea of deception, a very inoffensive form of deception, too; since the minimum height, viz., 1 mètre 58 (s), 1 mètre 52 (x) is quite a useful size to allow an average man to work in. It seems to me that in all these places they have allowed the roof to follow a

regular geological strata for better or worse, and as it was impossible for them to alter the level of the floor, the tunnel became in places rather low; but as soon as they had the chance, thanks to natural rising of the strata, our honest miners once more increased the size of the tunnel. Let us leave this gang at station XXXV, and go and join the southern one.

This gang has got on very well, the tunnel progresses rapidly, for the rock they have got to cut through is much softer; it is full of natural caves, all this facilitates its speedy construction, it is far easier to keep the right direction in this tunnel, thanks to the shaft between stations XIII and XIV. They more than probably know perfectly well that the floor is too high, but they keep on for a long time; it will be ever so much easier to correct the level after the tunnel is open, than it would be to calculate before and to keep that level all through the work. Past the shaft the gallery goes in the direction of where gang A are working. If, as a whole, the tunnel is slightly higher, the roof more full of faults, this is all entirely due to its being in a bed of rock less compact than the northern section. Meanwhile the fissures get rarer, the last one which has left any mark has made a kind of rough dome in the roof, which even overflows on to the walls. Seen by four explorers forced to hasten on, and with a bad light, this cavity was reported as being a second shaft. Conder (Q.S., 1882, p. 130, and Mem. Jerus., p. 364) reported this shaft had a rock roof. Ignorant, too, of the real height of the tunnel, he thought this was a kind of refuge place where the miner, having been in a cramped position, could come and stretch himself at intervals, or take refuge from a sudden flush of water, though where the water was going to come from whilst the tunnel was being cut I do not know. The passage, as soon as it comes to the hard mezzy becomes decidedly smaller, but the work goes on well and regularly, and they have hardly begun to hesitate about the direction of the tunnel at station XXII. They are no more than 50 mètres apart in a straight line; by checking the measurement inside and outside the tunnel the nearness would be clearly shown, perhaps even exaggerated. No anxiety as yet has shown itself as regards the direction of each section. They have only modified the direction a little. From XXXV to XXIV gang A stops going to the south, which was a very good direction, and turns sharply to the west; gang B makes a turn to the east, which, in any case, must be wrong. They reach the point XXII when the other gang are at XXXIII. Only 30 mètres separate them now; in a hard sounding rock like malaky, they must have been able to hear each other quite plainly, and make signals already agreed upon. Their first attempt to meet by the sound was bad, and the miners were wandering off towards the west; the northern gang with a disconcerting resolution from XXXIII to XXXII, those of the south more ponderously according to their usual habit from XXIII to XXIV. That they hasten to make good this fault is clearly shown by the false cuts in both sections.

The gang B does not hesitate to go back a good mètre, and there charge the direction of the tunnel, turning it sharply to the east, whilst gang A prolongs its attempt to the south from XXXII to XXXI. The heads of both tunnels are therefore going in different directions, and they must have been able to find this out very soon. At XXV the southern gang once more have the courage to alter their direction completely, whilst the northern gang change their direction in such a manner that they are both now heading in the right way. At the stations XXVI and XXX the distance between the two is only about 5 to 6 mètres, but the danger becomes more imminent that they may pass each other without touching. They watch the work with ever greater care, and at last the two tunnels are converging one on the other. At XXVII for B and XXIX for A, instead of continuing in the same direction, which is excellent, they allow themselves to be misled by some false echo, and B suddenly turns off to the west, and threatens to upset the whole thing if the other gang had not deviated to the south. Gradually they approach one another, but gang A evidently betrays great nervousness, and cuts up the walls of their gallery, pushing them at one time to the right, then to the left, following where they think the sounds of blows are coming from. They are only three arms' length apart now, and can now clearly hear each other calling, as we find it inscribed on the inscription. At XXIX at last the great meeting takes place. A very humble success if we try and compare it with the work of the present day, but for those days very wonderful, indeed; they knew nothing about tunnelling under mountains, nor had they the modern tools and appliances, which facilitate these works nowadays. They had driven a tunnel under a hill, a very small hill, but still a hill, and they had changed the place of the spring. In spite of what the inscription may say, the water did not flow through at once; the point of the junction had to be finished and levelled; but the water was going to run through very soon, merely a matter of a few days, and what is that in comparison with the enormous task just finished. I have made a very careful calculation, too detailed to put here, but taking 650 cubic mètres as being the amount of stone cut out, I estimate it would have taken 250 days. Already they have started feverishly to work once more, without caring to give any finishing touches; they cut down the floor to whatever level is required; in other places they rectify small errors, such as exaggerated turnings, knock off any big projections that may have been left in the tunnel either on the floor or walls, to a certain extent tidy up their past work. They fill the floor of Gallery VI. with cement, so as to make it level with the floor of the water chamber. All the tunnels branching off from the aqueduct are blocked with the same kind of cement; and the walls are covered for two-thirds of their height, especially in the zone where the rock is full of fissures, with a watertight lining. At last the waters flow from their natural point of issue to the Pool of Siloam, 1200 cubits away. Critics ever ready to damp enthusiasm, and ever prompt to disparage, have found yet more faults in the truth of this poor official text. Why "100 cubits" when for three-quarters of its length it is only forty to fifty cubits below the surface? This, of course, is brutally true, but is this commemorative table after all such a liar to have dared to generalise concerning the whole tunnel what was merely a true fact concerning only one-thirtieth of its length?

Let us put all this on one side and look at it from the point of view of the engineers of the present day, namely, that this aqueduct was the work of primitive engineers,

with no knowledge of any precise instruments, or methods of measuring (Condor, Mem. Jerus., p. 364). The photograph will show more clearly than I can explain the way the two gangs met. As soon as the levels were correct, the workmen cemented up the fissures in haste, and on October 11, 1910, we turned the water once more down the tunnel; its volume has been doubled since we cleaned out the Virgin's Well. In a few moments the water had filled up all the depressions in the floor; the flow of water gradually passed through to the Pool of Siloam; the shouts of acclamation, and the noise of the feast to celebrate this occasion will long sound in my ears like an echo of the first and more ardent acclamations on the day, many years ago, when the two gangs met.

E.—The Burial Caves, Series of Pottery, and other Objects Discovered on Mount Ophel, by the Expedition of 1909-11.

As I write these lines, and the campaign of April, 1911, has ended, the explorers are among the traces of the old lines of fortification along the crest of the hill, and have already found characteristic remnants of ancient Canaanite civilisation, most of them in an immense burial-cave, of which a methodical examination has only just begun. They have also discovered a most remarkable Egyptian-looking tomb containing wonderfully well preserved pottery, with specimens as fine as any yet found in Palestine, which enable us to date the origins of ancient Jebus at least a thousand years before Abdkhiba. We have been unable as yet to give that precise and meticulous examination to these treasures which they deserve, and will certainly obtain before long. But the interest of the discovery is so great that I have thought it right just to state the facts quite shortly here, in spite of being unable to accompany them with the full technical and detailed description they so richly merit.

The plan on Plate III. (*a*), drawn to a fairly large scale, shows the site and development of the principal tunnels revealed in these excavations, and enables the reader to localise exactly the various archæological details to be briefly reviewed. Here will be seen—(1) a plain black line showing the path along the eastern summit of Ophel, in the centre of the hill, at about the height of the Virgin's Well, with the new houses near this path, and the slope to the well itself; (2) the subterranean galleries dug through the floor of rubbish and *débris* are shown in yellow; (3) the old natural caves and the rock workings cleaned out by this Expedition are coloured in bistre; (4) Israelitish work is shown in blue; (5) red is used to distinguish all constructions anterior to the conquest of Jebus by David, whether they should be entitled Jebusite or Canaanite, or any other name; (6) the vertical shaft in Ophel is also shown, because its nature and position are valuable indications of the meaning of works elsewhere, and its site alone affords a valuable suggestion of its actual origin.

In order to avoid filling up the drawing with too many details, the section of Hezekiah's tunnel, which should be shown in this part of the hill, has been omitted. A fuller and more detailed plan will be prepared for the final publication which is to record the completion of this Expedition's work, and to this future volume the reader must be referred for more careful sections of the burial-caves, for profiles of the various layers of *débris* in which objects were unearthed, and for an exact relief map of the hill at what is certainly its most important part for studying the relation between the Virgin's Well and the prehistoric city of Jebus.

I will now take, in due order, (1) the burial caves, (2) the pottery, and (3) other objects excavated.

(1) The Burial Caves.

The subterranean gallery numbered I. was made somewhat late in the course of the various workings in this section, but it chiefly follows a rock-fissure caused by erosion of very ancient date indeed. Owing to the curious differences in geological formation in this particular stratum of calcareous limestone (mezzy), the rock, formerly exposed to the open air, before it was covered with accumulated rubbish, looked like a long cave, with holes of varying depth, proceeding in a direction roughly parallel to the modern footpath. In each of these holes or cavities there was originally, in all probability, a tomb, and some of these tombs still survive in a state sufficiently intact to provide the most valuable archæological indications. The most important group occupies a spacious lateral cavity (1) spreading beneath the platform of Ophel itself, and communicated with the esplanade outside by means of a sort of chimney-shaft. There are no signs of this mortuary chamber ever having been intentionally disturbed, but its somewhat modest sepultures have been almost fatally ruined by rock falls from the roof, by centuries of dropping from the winter rains, and by the still more pernicious effects of the infiltration of drainage. Cleaning it out was obviously a very delicate and difficult task, involving a complete digging away of all *débris* and the opening of a trench in front of the cavity. The only tombs which were sufficiently intact for us to be able to observe their contents with any precision were those which were guarded by some large boulders, roughly lined up against the cavern's walls. They reminded me very much of those sepultures in the Cave of Gezer, which are of the age immediately following that when cremation was usual. But we were unable to find any fragments of pottery or furniture, and there were too few traces of human remains to indicate the position in which the corpse had originally been placed.

One tomb, near the entrance of this first gallery, revealed a few traces of rough handworked pottery, and a portion of a femur which soon crumbled into dust. In the same place, a little higher in the layer of *débris*, were other human remains, lying somewhat at random in a little framework of rough stones, which can hardly be called a tomb, though they were certainly arranged by the hand of man. Several bodies had been placed here, with some fragments of early Canaanitish pottery, some bullets for slinging, a small, shapeless bit of bronze, and a few bones of animals, which may have been

the relics of offerings to the dead. The most noteworthy detail is that when these human bones were discovered, we observed upon them a dark colouring of red ochre, which was not visible on any of the pottery, nor on any of the animal remains mixed up with them. This is certainly not likely to appease the controversy which has for so long been waged concerning the meaning of the red colouring seen on human bones in so many parts of the world, and of so many different ages. But it may, perhaps, tend to corroborate the theory, hitherto perhaps too much decried, that this colouration was intentional, and evidently symbolical in its nature, implying that the flesh had been deliberately taken off the bones beforehand. In this case, on Mount Ophel, I was absolutely unable to trace the slightest tint of red coloured infiltrations; and, indeed, if the colouring was due to such natural causes, how can we explain that it existed only on the human bones, and not upon the others mingled with them?

Quite close to the first, but outside the entrance of the lateral cavity just described, the second tomb had been rather better preserved, owing to its sheltered position beneath an overhanging slab of rock. No sooner was its edge made visible by the workmen's progress, than my friend and I stopped them and proceeded ourselves to complete the excavation, so that no possible detail might escape us. We passed the whole sad heap of ashes and *débris* through sieves with our own hands, and made note of everything saved the moment it was seen. The little rock-hewn ledge on which the corpse had long ago been laid had been somewhat carefully levelled by the use of a curious concrete made of beaten clay. Its length was 1 mètre 70, and its breadth varied from 80 to 90 centimètres. Upon its surface there had apparently been spread a thin layer of ashes and calcined *débris*, and in this layer we found the few small fragments of bones, a piece of the skull, four or five vertebræ from the spine, two morsels of ribs, a few finger-bones, the top of a thighbone, and other remnants which my rudimentary knowledge of anatomy did not permit me to classify precisely. The piece of skull had been overturned, probably by the falling-in of earth or stones from above, and it lay near the bottom of a jar, which must have been originally placed there in the fragmentary condition in which we found it, for not a vestige of the same jar was visible anywhere else.

With so few facts to guide us, it might seem rash to speculate too precisely upon the position of the corpse. Still, I incline to the belief that it was stretched upon its left side, with the head pointing south-west, and the knees slightly bent. A natural cavity in the rock wall had evidently performed the function of a niche for offerings to the dead. Within it, smothered in the fine earth which had slowly filtered in and packed together, we found half a dozen small and rudely shaped fragments of pottery, a few bones of birds and lambs, a delicate little tooth that might have been a lamb's, and some quite large chips of eggshell. All the pieces of pottery are coloured dark red, nearly black, strongly intermingled with chalky deposit, and bearing the vague traces of hand-modelling. No baking could have been used, but some fragments showed traces of a black and greasy coating, or possibly of rough efforts at polishing. All these slight details unite in proving that this sepulture was one of the earliest Semitic period.

In the absence of relics of a more distinct character, it would no doubt have been difficult to advance any actual proof of so remote a date; but most fortunately the details lacking in tomb number two had been discovered a few days earlier in tomb number three, which I have not chosen as the typical one for my description because I was not personally present when it was discovered. As far as I can judge from the full information given me by the leader of the Expedition, who was himself present, its details lead to the same conclusions I reached in my examination of the second tomb. It is true that it was practically impossible to guess the position of bones, which had almost completely fallen into dust; but, as a compensation, some miraculous chance had preserved an admirable series of vases hidden at the edge of the tomb, beneath a rock cornice, and protected by the falling forward of the little wall of stones which formed the boundary of the sepulture. Scarcely one of these vases had been badly broken; but where they were, the fragments were most carefully gathered and pieced together with admirable patience. They will be more fully described later on, and will give accurate indications for dating the sepulture.

This extraordinary case of preservation admits of being explained. In order to close the cavern, and partly, also, perhaps, to hold up its roof, the early inhabitants of this hillside had built up their underground cave with a strong pier of ashlar and rubble. Many years after that, a later race of men changed the use of the cave, or, at any rate, altered its arrangement. They cleaned out both the long corridor to the north of the second tomb, and the south extremity of the cave where the third tomb had by that time become entirely hidden. To strengthen still more the rock-hewn roof, very possibly with a view to building a house above and outside it, they set up a wall of solid blocks of masonry (part of which survives) to take the place of the old Canaanitish rubble. We first made a narrow opening (4) in it, and then enlarged this in order to study the structure of the wall, and make it the entrance to an exploring tunnel (II.).

Without pausing to describe all the tombs of various epochs here and there in these different galleries, I may at least say something of the double series of natural and artificial caverns on the scarp of the hillside. When, from the top of Mount Ophel, you look over the eastern slope of the Kedron Valley, on part of which the modern village of Siloam has been built, you can see at every stage of the rocky terraces a large number of quadrangular openings which are the entrances of caverns. Here and there is the larger orifice of a more spacious natural cave. It was a simple geological deduction to argue that the other (or Ophel) slope of the same valley shows the same cavern formation. The work of the Expeditions of 1909-11 has proved the existence of these caverns, and has added to our knowledge of them some most useful and interesting details of archæology.

About halfway up the slope a break of a rocky formation, which had been hidden beneath thick layers of *débris*, was revealed by our eighteenth gallery, and partly explored by our nineteenth. A fairly large number of tombs were localised, the only ones which were completely empty being G, H. and I, at the intersection of the two galleries, and it seems to me that these had never been completely finished by their original builders. The dressing of the stones and

the masonry of the walls is quite comparable to the best work on the opposite slope, and it may now be taken as proved that these are almost exactly contemporaneous with the palmy days of the Israelitish kings.

In front of the chamber G a certain portion of the rock surface had been somewhat summarily levelled, and the masons' handiwork had left some recognisably characteristic marks upon the stone. Against the south wall of chamber G a little pilaster (12) interrupted about 40 centimètres from the ground, and surmounted by a fairly deep cavity, had been left when the rock was cut away. The chamber measures 3 mètres by 2 mètres 50, in round numbers. In the south-west corner a door (11) was cut to give communication with chambers which had been planned to penetrate still further into the bowels of the mountain. But by some error of an architect who was evidently unaware of the nature and contents of the site in which he was working, his tunnel suddenly opened out into a conduit (10) cut in the rock; so his excavation was abandoned, the little tunnel passage was blocked up, and in order to use all the space available for the tomb the small lateral enlargement H was taken into the ground plan. The use of the curious niche (I) against the outer wall, with its circular cavity (14), must remain an enigma, unless it had some ritual significance in the final arrangement of the chamber.

The whole group of these particular tombs was probably pillaged before the workmen of the later Israelite period had begun to clean them out at all. Nothing that can certainly be described as a relic of burial was discovered, with the exception of two of those vases with a long neck and a single handle which are so often found in Israelite burials of the eighth and ninth centuries, and a lamp with details of construction indicating the same period. A wall (13) constructed of a mixture of huge, rough boulders and dressed blocks of older masonry, closed the entrance, and probably continued still further to the south, for it is certainly too massive and too well built to have been erected simply for the purpose of blocking up an old tomb that had been abandoned, and it probably served as the foundation for some building to be constructed upon the terrace above. We have yet to clean out the cavern indicated at the point numbered 16.

The development of the eighteenth gallery gave the exact height of the lower terrace of Mount Ophel, and this was certainly considerable enough to escape total concealment beneath very large masses of *débris* and landslip. In this magnificent terrace, which is at least 7 mètres high where nature has been left alone, the tombs follow one another in almost uninterrupted lines at varying levels. The natural caves on the highest level have been left fairly untouched by those who used them as provisional habitations in the far-off days of the foundation of the city; but no trace is left of that archaic civilisation; too many accidents have happened in the course of centuries for such troglodytic abodes to preserve traces of furniture, which was always scanty and generally fragile. On this same level are the caves E, F, Q (which are called K, L, M in our third plate), used in the perforation of the secret passage between the outer ridge of Ophel and the Virgin's Well.

A little lower down the rocky formation known as malaky is far easier for working, and within several spacious subterranean chambers have been excavated. Nearly all of them are of the type which is usual in the burial places of Jerusalem, viz., an open-air entrance court and an inner chamber with earthen arches (*arcosolia*), covering flat shelves, beneath which again are often dug out the "kokim" or furnaces in which dead bodies were burnt. Occasionally a chamber cut still further into the rock is substituted for one of the *arcosolia*—for instance, at No. 21 in tomb K.

Until now it has been the custom to date all these composite monuments at a fairly modern era; it is certainly beyond doubt that their use continued until the days of Jesus Christ, and some subterranean chambers of the same character—on the Mount of Olives, for instance—contain inscriptions in square Hebrew characters. But in the cases we are now examining it is quite evident that the first use was made of these chambers in the sixth or seventh century before the Christian era. As was only to be expected, when tombs were left quite visible and open before any *débris* had had time to accumulate, these have been all thoroughly pillaged. We noticed at first, in the abundant traces of pottery discovered, the curious anomaly that a few late vases of the Herodian epoch were found side by side with fragments of Israelite pottery and lamps which were invariably broken. Beside the broken pottery, in the altered tombs, there were also some stone spouts, some weights, some pedestals for vases, fragments of metal, and, in fact, those traces of a family hearth which are naturally connected with human habitation. The discovery of the subterranean chambers L and M finally removed all doubts as to the alteration of these tombs into living places for the early inhabitants. In order to get more room the new occupants had broken down the partitions of the *arcosolia*, shortened or removed entirely the shelves used for burial purposes, and joined several rooms into one larger apartment, risking the possibility of buttressing any dangerous piece of rocky roof by means of somewhat haphazard attempts at masonry. They cared little to conceal their efforts at reconstruction, and the brutal iconoclasm of their new arrangements is in strong contrast to the careful and finished workmanship of the original constructions.

Here we found round-shaped lamps, earthen cooking pots, shards of glazed pottery, and an infinity of fragments with moulded borders, handles, and spouts of Hellenistic ware or late Israelite work. Most of them were discovered near the eastern opening (26) of the cave marked M, and all along the rocky wall to the entry of gallery XXII. The discovery of the long passage N gave the key to this little problem, for it showed that this place had been frequently used as a passage to the canal O (number II. in the general plan II.). The beginning of this passage is at the door marked 26 in the cave M. In spite of its transformation and of the refacing of the masonry, it is still quite easy to see that this entrance was originally very like the one in the neighbouring cave, 23, which has remained intact. Two walls of solid blocks of stone, fairly well cut, have first been set against the rock face, and as this rock soon turns E.E.S. the walls become thicker, rise higher in order to keep the slope more level, and diverge fairly regularly from each other. On meeting the canal (O) the passage is 4 mètres wide. The southern wall bends inward about a mètre to lessen the opening. The abundance of broken pottery and the clear traces of constant rubbing on the walls show that this curious passage down to the water was once very frequently used, and the only suggestions of the date of its construction are its masonry and the potsherds it contains. Of these latter there was naturally a thoroughly mixed lot, those of Herodian workmanship predominating. But the fact that

we found some Greek fragments, some Seleucid lamps, and a few pieces thoroughly typical of the Judæo-Hellenistic period, authorises the belief that this passage was certainly used in the sixth or seventh centuries before Christ, and probably in the eighth. The nature of the walls corroborated other evidence. With the exception of the cement coating (which was not necessary here to keep the water out), they are almost exactly similar in construction to the wall I which was built as a dam in the basin H of the Virgin's Well. All kinds of material were built into them, including rough blocks of stone scarcely worked at all. The date of the dam I will be a subject for future consideration; but we may say at once that the passage N, probably built at the same period to utilise the water circulating in the Second Canal before the Siloam tunnel had quite used up the Virgin's Well, was most likely in constant use for many centuries afterwards. It is indeed a practical hypothesis that when the spring in the Virgin's Well was discharging at its full power there was a certain overflow beyond the dam built in the initial section of the Second Canal (O). On the other hand, it may be that both the passage N and the southern section of this canal were used as a kind of secret passage. We shall be able to judge better when the excavations have proceeded further.

(2) The Pottery.

I have grouped together in the illustrations a few typical specimens of the most important pottery or the oldest make, and specialists in this matter will at once realise that the Expedition of 1909-11 has literally revealed the existence of some of these types for the first time. No other records of excavation in Jerusalem can show any equivalent to the types now illustrated here. Indeed, I may go farther and say that the series represented in plates IX. and XI. are without parallel in any excavations in Palestine.

For the moment I shall confine myself to two periods, which I may call Canaanite and Jebusite—in other words, to periods which may be considered as archæologically contemporaneous with the last period of the Neolithic era and the whole period of the age of Bronze.

Nos. 1 to 9 on Plate VII., of ancient Jebusite pottery, gives typical examples of modelling and ornament. The first comes from the large burial cave shown on Plate VI., 1. It is the base of a somewhat heavy vase in grey clay containing large fragments of mica. The cloth on which it was placed to harden it in the sun has left a perfect impression of the tissues of the fabric. Just enough fragments were left to give some idea of its general form, that of a small amphora of the types shown in Plate IX., 1 or Plate X., 3 and 4. A piece very like it (Plate VII., 3) shows a rather different fabric in the tissue of the cloth. A somewhat similar impression was found on a fragment in the primitive basin of the Virgin's Well. Plate VII., 2, shows the marks of a pointed flint on a hand-modelled surface, and was found in the fourth gallery. The same process is observable on No. 6, but the workmanship is much more regular and delicate in its ornamentation of a projecting band on the rim of the vase, and pieces of this make were found in the first four galleries and the fourteenth, and the basin (H) of the Virgin's Well. Nos. 4 and 7 (Plate VII.) seemed to be marked with the aid of a twig or reed, and are typical of other fragments found in the first tomb, the third tomb, and the first and third galleries. Though found in the first gallery, the fifth example on Plate VII. can only with some hesitation be classed in the same period as the rest, for it was found on a rather higher level than the ancient burials. Though it is very like Nos. 4 and 7 in colour and texture, it shows a more finished polish, and a rudimentary attempt at ornamented moulding which may be compared to that in No. 6. I cannot explain the mark deeply cut into the fresh clay, for "mark" it is, rather than ornament. No. 8 shows fingermarks on a striated surface which has been polished with flint. Nos. 10 to 15 show various primitive efforts to attach a handle. Nos. 10, 11, 14 come from the first gallery, and others like 10 and 14 were found in the basin of the spring, in gallery XV., and in the burial cave. No. 11 is practically unique, for the ring forming the handle has been set on to the wet clay after the jar itself had been finished. Other examples of the same type have been pinched out of the substance of the clay itself, and are therefore stronger; they were found in the first cave, the first four galleries round the Virgin's Well, and in the well itself. No. 12, found near the second tomb, is a very practical development of the waved handle, strongly curved, with a rim to make it easier to hold. No. 13 (from the third gallery) is not so practical as it looks, and its elegance is somewhat affected. No. 15 (found near the burial cave) almost suggests a shell, and similar fragments have been found elsewhere.

In Plate VIII. I have drawn each vase both in elevation and in section, so as to give a better idea of their construction, and some are shown from above, with the same object. These are typical examples of autochthonous Canaanitish work. The first is a bowl of yellowish clay, correctly made, but heavily modelled. It comes from the third tomb near the beautiful examples shown on Plates IX. and X. No. 2 (Plate VIII.), a tiny cup in badly dried earth of a greyish tint, shows a handle affixed, fairly thin sides, and an attempt at a spout. There is something rather touching in this primitive attempt to realise an aim so simple. It was probably part of some very humble burial furniture, for it lay in the first gallery near the third tomb among the *débris*. No. 3 was found (with 5 and 9) near the entrance of the burial cave, and is like No. 1, but in better clay, of a finer model, and both stronger and more correct in outline. No. 4 is part of a bowl found (with Nos. 8 and 10) in the first gallery. The clay is yellow ochre in tint, of fairly close consistency, with thin sides and a solid base.

The outside is a whitish colour, and the decoration within is painted in burnt sienna with metallic reflections. Another piece, almost exactly alike, was found in the third tomb, which was certainly richer than the others, but was evidently not the only one provided with pottery a trifle more tasteful and luxurious than the usual furniture left with the dead. No. 5 we called a ewer, because we found it with the bowl No. 3; but its outline is very bad, though the sides are fairly thin and the spout is fairly well modelled. No. 6 is a little amphora with a flat base and two massive, squat handles perforated for a cord. Its orifice is large (a "hole-mouth" Professor Flinders Petrie would call it), and there is no neck. This was in the third tomb. No. 7 (from the first gallery) is quite an elegant little flagon in fine clay the colour of brickdust, and its outline is really good, considering the fatal inaccuracies that were inevitable in hand-made pottery baked at a fire that was not properly managed. At the top of the well-designed handle is a button which admirably assists the finger in holding it steady. This type lasted a very long time, and a larger specimen (with very different workmanship, of course) was found among the Hellenistic and Judæo-Roman remains of Gallery XXII. Number 8, found quite close to the last, has a firm and finely moulded spout, thin sides, and a well-attached handle. No. 9, of red clay, shows some attempts at good polish. No. 10 is of well-mixed black clay, with a delicate lustrous glaze inside. The handle is awkward and probably weak, for it was fastened on after the rest had been made. Nos. 11 and 12 come from the third. They are of light clay burnished a dull red, and both have interesting handles, which are here restored from a perfect specimen found close by. They are double and have formed part of the original moulding of the jar.

Technical critics will at once see parallels to most of what I have described in other series of Palestinian pottery, especially Mr MacAlister's finds at Gezer. But such comparisons may well be left to the final volume, to be published later, on the Expedition of 1909-11.

Plates IX. and X. show the painted pottery found in the third tomb. The first is a little amphora of rounded outline and a slightly concave base, of homogeneous but slightly spongy texture. The colouring is Indian yellow in two shades on a ground of dull white. It is perfectly preserved, with the exception of a few unimportant cracks. No. 2 shows twin vases with the single handle in the middle. They are of fine clay, coloured yellow. The pattern is dark red on a pink surface, and the top of one vase is broken off. No. 3 is a thick and badly baked amphora with a flat base, on which there is a clear impression of some woven material. The painting is red, heightened here and there with black, on a cream-coloured background with occasional black marks. This black may possibly be caused by the accidental decomposition of the original red ochre, or perhaps it is the result of two shades of red, one of which has changed colour. This was in pieces, but has been cleverly restored. No. 4 is a bowl of light and finely baked clay. Outside and inside it was originally cream-coloured, but has been somewhat reddened in the furnace. Near one edge two little holes have been drilled for a string or thong. The pattern is done in reddish-brown of two tints. No. 5 is a thick, round cooking pot, with flat base and horizontal handles. The pattern is deep red, almost a wine-coloured purple, on a light yellow background, with some shades of pink in it. I have given two views of this specimen. No. 6 is simple and elegant, and was coloured reddish purple before being polished.

On Plate X. we first have four round amphoræ, each (except No. 4) having pierced handles. The chief differences in them are those inevitably caused by hand modelling, but the ornamentation differs in each case, though it has been obviously inspired by the same style. No. 5 is very like No. 6 on Plate IX., but has a brownish-red body colour, which was laid on before any polish was applied. All these specimens have been perfectly preserved. Plate XI., 1, shows a continuation of this same series, and is probably the most important of all, for it gives something like an accurate basis for dating the whole. Its outline, the lustrous and water-tight glaze on its interior, the dark orange shading into red of the outside pattern, which shows a black border line round the lip—all these characteristics are entirely different from anything yet found in Palestine, and they undoubtedly suggest a rich and typical specimen of Egyptian art. Red vases with black borders like this have been excavated from nearly all the burial places of Egypt, and those best known, thanks to the exquisite paintings of Mr J. de Morgan, are the specimens from the royal tomb at Negadah, which are not only typical, but can be fairly accurately dated. No doubt the exact period of this Negadah art is still to be precisely fixed by the historians and archæologists of ancient Egypt. But whether it was before the Pharaohs or whether it coincides with the earliest known dynasties, there is no shadow of doubt that the style had totally disappeared by the time of the sixth dynasty, at a period, in fact, some 2500 or 3000 years before Christ. The bowl found on Mount Ophel is so exactly like the work at Negadah that the only satisfactory hypothesis is direct importation, and I was even for some time inclined to suppose that the whole series found in the third tomb had been brought here from Egypt.* I went so far as to imagine the sudden death of some distinguished Egyptian visitor to the ancient city of Jebus, and his burial there with his household gods around him. But this opinion has been modified by a more rigorously careful examination of the facts. The tomb on Mount Ophel contained none other of those precious and familiar objects which were found, for instance, at Gezer under circumstances very similar to those I had imagined here. Nor was it likely that in the tomb of a rich Egyptian such humble specimens of native ware would have been mixed up with his own far more sumptuous pottery. In fact, I began to realise that, in spite of the extraordinarily suggestive parallels between the specimen from Mount Ophel and the early Egyptian work, there were certain independent and original characteristics about the Palestinian pottery

* *[It may, however, be remembered that ceramics of much the same class as this have been found extensively in Asia Minor, from Troy to Cyprus, under circumstances which can have little or no relation to Egypt, so far as is known.*—Ed.]

which relieved me from the absolute necessity of any theory concerning purely Egyptian importation, except in a very few instances. The rest showed undoubted points of contact with Assyrian, Trojan, and early Cretan work, and it must be remembered that a red bowl with a black border had been found elsewhere on Mount Ophel under conditions which seem to preclude anything but Canaanitish origins.

We must therefore acknowledge that this third tomb was, as a matter of fact, Canaanitish, and we may perhaps explain what has been found there on the following hypothesis: At a time when the curious Egyptian vases from Negadah were fashionable in Palestine, one of the prominent citizens of Jebus had a few specimens on the shelves of his house. At his death he was buried after the custom of his country, but his friends gave some special care to the place and manner of his sepulture, and set among the more modest articles of domestic manufacture those rarer foreign specimens which were the chief proof of the dead man's distinction. Interpreted after this manner, the singular and precious tomb I have described becomes a perfectly intelligible whole, placed beneath the protection of a special rocky ledge, and built after a more solid and pretentious manner, which lends its own value to the contrasts between opulence and poverty which it contains. It is, in fact, not the chance burial place of an Egyptian, but the Canaanite tomb of one who must have been a well-known townsman of the Jebus of three thousand years before Christ, and who either introduced or fostered those fashions for Egyptian art which undoubtedly existed.

Since the Egyptian vessels which were to be bought in Jebus included bowls which were certainly familiar in the days before the Pharaohs, and equally certainly disappeared by the fourth (or, at any rate, the sixth) Egyptian dynasty, we can only place the date of the third tomb as between 2500 B.C. and 3000 B.C., which would also have to be accepted as the date of the second tomb and of the earliest burial arrangements made in the first burial chamber. The exceptional importance of this fact in the history of Jerusalem would alone have largely recompensed the efforts of the Expedition of 1909-11.

On Plate XI. are shown a few fragments of painted pottery which were selected as good examples of autochthonous Canaanite workmanship. No. 7 came from the first gallery beyond the fourth wall and almost immediately in front of the entry to the first cave, and was placed here chiefly owing to this position and to the level at which it was discovered. Its clay is thick, clumsily made, and hand-modelled, and the ornament is cut on to the dried surface after it has been polished. These are certainly characteristics of this early work; but other points observable in it are quite new to me in primitive pottery of the kind: the outline, for instance, the whitish glaze with traces of faint yellow in it, and the use of purplish violet in the colouring of the upper moulding.

3. Other Objects Excavated (1909-11).

Under this heading I have grouped only a few typical examples of the various curious discoveries which lent so much interest to our excavations. Archæologists will have already observed the importance of the constructions outlined on Plate VI. The double line of massive walls, cut by the third gallery on the crest of the hill, are evidently part of the primitive fortifications, and would form the object of a most minute description if it had not by now become certain that the developments of our further exploration will reveal other portions of these same ramparts, and it will therefore be better to postpone their description until we have returned to work. Of all that has been hitherto unearthed, the most enticing problem has been furnished by the huge block of Cyclopean masonry (17) at the bottom of Gallery XIX. There is a very striking resemblance between this and the lower caverns, especially the vertical well at the end of the Ophel tunnel; and to the elucidation of this point the Expedition will no doubt devote its first efforts on its return.

More easily intelligible is the huge gateway at the entrance of the third gallery, with its splendid monoliths, 1 mètre 82 high, 50 centimètres board, and only 82 centimètres apart. They probably formed the entrance to a gate which projected eastwards from the outer line of fortifications. They might be the result of a later reconstruction, but they certainly retain the characteristics of the oldest Israelitish work; and if you observe the relation between this door and the angle of the staircase (8) in the fourteenth gallery, it is difficult to refuse the conclusion that this was a postern-gate leading to the secret passage towards the fountain.

On the other hand, I should not like at present to make any definite pronouncement on the excellent masonry of more modern Israelite work (eighth or ninth century) which was brought to light by the excavation of the ninth and twelfth galleries; for a modern Arab house, which had to be supported on piles during our work underneath, has probably destroyed or altered the features of the ancient substructures.

In neighbouring galleries we found the rubbish of a great deal of well-wrought masonry; and not far from the intersection of the fourth and fifth galleries the peasants of Siloam laid bare, a few years ago, a perfect quarry full of dressed blocks of stone which were all ready to be used in their more modern buildings. Among them were some attractive pieces of architectural design, including an Ionic capital of archaic workmanship but quite correct design. The strangest specimen we found here, beneath the *débris* just mentioned and close to the bedrock itself, was a magnificent chair of "royal" stone, which was at once saluted by our village workmen as "the throne of Solomon." I fear its actual destination was at once more private and more naturally necessary, but its workmanship was in all respects similar to the stonework revealed by M. Reisner when he excavated the palace of Ahab in Samaria.

Equally beautiful in execution were certain blocks of stone we discovered which probably formed the bases of columns or of candelabras; the lower portion of a porphyry table; various mouldings cut in rare marbles; the remains of a splendid bronze flower-pot. All were found at about the same place, and all confirmed the impression that we were among the remains of a magnificent and luxurious household. We also found a mark like an arrow-head cut in the rock of the natural escarpment of the fifteenth gallery. A mark of exactly the same kind has been reported

by Mr Bliss and Mr MacAlister in their excavations of Tell-es-Safy, and I have myself found another near the Waly of Sheik Ambar, on the eastern slope of the Mount of Olives. I am inclined to think that these curious marks were made by master masons to indicate the limit or the plan of various constructions.

The reader may be astonished that he has hitherto found no mention of worked flints or of the instruments usually found towards the end of the Stone Age; and it is true that we found very few indeed, only just enough to be able to add their evidence to that of other objects in classifying our archæological discoveries. Two fragmentary knife-blades may be mentioned, which were found under the rampart in the third gallery. On one is engraved the representation of a deer or antelope in just the style which induced Mr MacAlister to consider that in similar carvings found at Gizer he had discovered the Totem of the tribe. The head and neck are broken off.

There are also a few fragments of carved animals—dogs, rams, oxen—represented with a certain innocent frankness which has often proved successful in the early Canaanite pottery. The earliest representation we found of the human form was the mutilated fragment of a female torso without a head on its long neck, and with only one arm. Two other heads of the "Astarte" type were also found, of much better workmanship, which were more probably amulets than actual idols, and may be dated towards the end of the period of idol-worship in Canaan. They may well be contemporary with the reign of Abdkhiba.

The mention of this name at once evokes the memory of cuneiform inscriptions. But we found nothing of the kind. The only letters we discovered were in the form of stamps or marks on the handles of vases. There is an oval example (Plate XIV. b) containing the name of Antinomus, and an oblong (*ib.* c) with the well-known name of the magistrate Archilaidas, and the month "Agrianios."

Among the thousands of Israelitish jars we examined, barely half a dozen retained a trace of the famous "royal marks," and only one of these was legible after it had been studied and cleaned most carefully for eight days. It was found near the door (6) of the upper part of the third gallery, and sufficient clay still adhered to the handle to indicate something of the size of the jar to which the stamp had been affixed. The details of the lettering are more fully described in the French edition of this pamphlet. It will here be sufficient to say that I cannot accept the interpretation given by Warren to a somewhat similar stamp: [Le Me] LekSHaT, or the later suggestion: Memshat. A careful study of my two drawings, the first life-size (Plate XIV. d) and the second enlarged by the help of a magnifying glass (Plate XIII. a) will perhaps convince my readers that MoReSHeT is the correct word. At any rate, the piece now discovered, being somewhat better preserved than those previously illustrated by other explorers, may be a very valuable indication as to the form and size of the vases which have been found to bear this mark, especially when it is considered in connection with the specimen found not far off at the foot of the Temple, which suggests that the Royal Treasury in which local contributions were stored was not far off from the small platform on the crest of Ophel. Moreshet was a little town on the south-west borders of Judæa, towards Philistia; and the discovery of jars containing its contributions in kind to the royal exchequer is but one indication out of several that the ground in which we were working could not have been far distant from the buildings of the royal palace in primitive Jerusalem.

CHAPTER III.

SOME ARCHÆOLOGICAL AND HISTORICAL CONCLUSIONS WHICH MAY BE DRAWN FROM THE DISCOVERIES OF 1909-11 ON MOUNT OPHEL.

ONLY a few badly traced letters, and not a single object of great artistic value worthy to be incorporated in public or private collections, may seem—on a careless perusal of these lines—a very poor reward for ten to twelve months of laborious digging, dangerous at times, and entailing heavy pecuniary sacrifices.

Canals full of mud, rock tunnels obstructed by rubbish, subterranean chambers where nothing but stone splinters or potsherds are to be found, and all this in a vast tangle, of a uniform appearance, and not giving any clue whatsoever, like a collection of riddles that the energetic work of the diggers has unearthed for the benefit of the archæologist—such may be the verdict of the patient but bored reader after he has examined the details which have apparently failed to give him any basis of archæological comparison, any chronological or historical factor.

I considered it necessary, in consequence, to sum up the results of the diggings, such as they were, and to relate quite frankly what I observed from day to day, because nothing seemed clear in itself until subsequent reflections, approximations, and literary research suggested a theory. This latter part of the task is now being approached for the exclusive benefit of the reader who has not formed a theory yet, who has not got the leisure to grind out this shapeless material, and who above everything has not had a chance to see and to handle these newly discovered things. From this personal contact, on the contrary, I came to the well-founded conviction that the work of the leader and his distinguished colleagues of the Expedition 1909-11 are of first rate interest for the history of antique Jerusalem.

The prominent point established by the recent excavations is the extreme importance of the 'Aïn Oumm-ed-Daradj fountain. Since the very remote geological period when it first issued from underneath the lowest step in the rocks of Ophel and ran into Kedron without being regularly utilised, it had to undergo at least three, if not four, artificial transformations. Four canals or systems of galleries, more or less independent of each other, are now known in the environments of the source, and each of them seems to correspond quite palpably with a famous historical situation, with a topographical formation suggested by some allusion in the Bible—in short, with some period in the long evolution of human life in these hills. However delicate such an attempt at classifying those events may seem, there are, nevertheless, precise elements in it capable of supporting any reasonable argument. Proceeding from the better to the less known points, I should like to recall to my readers firstly the exact relation between the fountain and the various hydraulic systems, starting with the tunnel of Siloam, on which the discussion may best be founded, thanks to the famous inscription. If we remember the details of its installation, there seems scarcely any doubt that this tunnel is the last which has been constructed, since it implies the total annihilation of the exterior canals I. and II. and must have clearly impeded the utilisation of the secret passage in the hill. Judged by all distinguishing points of its execution, it appears to belong to the same period as the covered-up galleries IV., V., and VII. and the reconstructed part of gallery VI. But the raising of the floor of this gallery necessitated between the fountain and the mouth of the tunnel strongly suggests—not to say more at this moment—that the gallery was in existence beforehand.

Its connection with the secret passage of Ophel, which communicated with the fountain by means of this gallery, is also evident. To find the most striking parallel to all the distinguishing points of execution of the section of this gallery which was not re-touched, north of the tunnel aqueduct, it suffices to examine the profile of the gallery where it lies open, or of the big canal rather (marked L on Plate I.), which has been uncovered east of the actual basin of the fountain, underneath the stairs and the first flight of steps. From this first point already we conclude that there was a primitive and immediate communication between the natural cavity of the fountain (M on Plan I.) and the great secret passage in the hillside, but it is preferable that we should establish this point later on by more precise elements. As soon as we arrive at the basin of the fountain, it is easy to see that gallery I., canal, passage, or whatever we may call it for the moment, was in existence before the tunnel aqueduct, because it opens at a lower level and had to be barred very carefully when it was intended to make the water flow back to the Pool of Siloam. At the same time, it will be clear that this gallery—as having done away with any *raison d'être* of the old canal L—must have been constructed later than this canal, and in consequence later than the secret passage of Ophel—a point which is only probable at the moment, but which will be proved later on.

There remains now gallery II., which on account of its higher level we have to consider as anterior to the canal aqueduct; besides, all its technical details bring out this difference as clearly as possible. These same details would entitle us to compare gallery II. with I., but the differences of their level would not admit of their absolutely simultaneous utilisation, and the barrage erected between the two would necessarily imply the possibility of different periods.

The mere consideration, then, of the levels and the functions of the galleries with regard to the fountain leads to this first classification in chronological order: (1) The

natural spring of the fountain from the small cavity M; (2) the secret passage opening into the fountain by means of the canal which has been laid open at L; (3) the galleries I. and II., which are in such a position to each other that they may possibly belong to the same period, but which modify the primitive installation; (4) the creation of the tunnel aqueduct of Siloam, which again transforms the ancient communication between the top of the hill and the fountain, implies the covering up of gallery I. and does away with the use of II. This classification, based on a mere marshalling of plain facts, and not on tricky points or the theory of some chimerical old hydraulic mechanism, is corroborated by archæological observation. It is now opportune to make use of the facts which we have just established bit by bit: the various processes of boring, the traces of repair, the type and shades of the *débris*, the quite primitive marks on the pottery which has been found plentifully in most of the galleries. I want to repeat explicitly only the general and most certain result of this last series of observations—(1) the exclusive presence of Canaanitish and archaic Israelitic potsherds in gallery L and cavity M; (2) the preponderance of Israelitic and early Judæo-Hellenic potsherds in section H of the basin and gallery II., which do not show any traces of late Judæo-Hellenic or Hellenistic pottery; (3) the perfect homogeneousness of the ceramic rubbish used in the concrete employed for raising the floor of gallery VI. to the level of the tunnel of Siloam and that gathered from the material used for blocking up gallery II. Once more we have the same order of things—(1) fountain in the valley, in secret communication with the top of the hill; (2) creation and abandonment of galleries I. and II. and of section H of the basin; (3) opening of the great tunnel, dating from the same time as the galleries III. and IV., which have been dug out and reconstructed contemporaneously. This last stage in the circulation of the waters is still in existence. I will now try to establish the initial date, which will give the extreme limit of the archæological evolution which we are studying.

Everybody remembers the extrinsic elements of this particular discussion: the Biblical story which attributes to King Hezekiah the boring of the Siloam tunnel during the construction of defences which he executes in order to protect the capital against the Assyrian invaders: the inscription in archaic Hebrew which records with a somewhat childlike emphasis the enormous undertaking and the success of the boring: an altogether clear harmony between the topographical localisations resulting from this identification and the general topography of the old town. All these arguments do not, of course, pretend to be absolute and mathematical; but, on the other hand, I am not discussing the point with stubborn opponents animated rather by the wish to prove their theory than by an anxious care not to overlook any particle of the modest and subtle information which monuments alone can yield. The tunnel aqueduct could undeniably be established as the work of Hezekiah if the fountain of Gihon, which the tunnel was intended to control for the purpose of storing the waters "west of the city of David" by guiding them underneath the mountain, could be absolutely identified as the fountain of the Virgin; but amongst those occupied with the quesion are some who do not admit even the possibility of this identity. The inscription does not mention Hezekiah nor any of his contemporaries, and it is quite easy for any opponents of this theory to prove that the epigraphists have no case; they do not realise that they are not on level terms with them, and conclude, as it suits their own argument, that this inscription dates from a period before or after Hezekiah. But, with regard to the famous inscription, our readers have certainly heard of the wonderful discovery which Dr. G. Reisner made during his excavations in Samaria, a discovery which provides the epigraphists with a most unexpected and exact basis of palæographic comparison, which enables them to establish the Hebrew lettering of Siloam as of Hezekiah's times. When the *Revue Biblique* some time ago asked for practical proofs why this date should be adhered to, in spite of certain cursive signs in the text engraved in the wall of the aqueduct (R.B., 1909, p. 226s; 1910, p. 159), they little thought of the practical proofs furnished by the documents which the learned and lucky explorer of the Israelite capital had found during the last months.

But there is, besides, such a spontaneous agreement between the Biblical documents and the most palpable realities of topography and archæology that—if it were not a case of a general topographical theory, which has to be kept up at any cost—nobody would hesitate to state them quite frankly. The Bible wants to sink it insistently into the mind of posterity that Hezekiah, amongst other great achievements, has driven a wonderful canal right through the rock underneath a mountain in order to suppress a visible fountain in the east and outside David's city, and to guide the waters to the west of this city of David, which is now inclosed by far more extensive fortifications; a monumental tunnel is discovered in the rock constructed in such a way as to assure an independent control of the only fountain of Jerusalem, the well of the Virgin, on the eastern slope of Mount Ophel, and to deflect it west of the same hills into the great basins constructed along the valley of Tyropœon. The Bible speaks with a visible enthusiasm of this gigantic work; an inscription in the same language is to be found on the wall of the tunnel, expressing the same enthusiasm and using the same technical expression (מוצא, meaning the issue of waters at the source, is used both in II. Chron. xxxii. 30, and the text of the tunnel inscription, l. 5). The Bible mentions the careful and prudent blocking up of the old runs of the water; we have now discovered round the source galleries and chambers walled up, blocked, and buried with great trouble at the same time to such an extent that for many centuries even the memory of their existence has been wiped out. At this point we come back to the excavations and the really splendid results achieved by the able and energetic leader of our expedition and his collaborators.

The attribution of the tunnel aqueduct to Hezekiah sheds light even on the smallest details, however chaotic their aspect, which have been enumerated in the description of the discovered monuments. If the gallery II., which has been filled up so laboriously with rubbish and as it were sealed down by bits of rock worthy of the heroic arm of Polyphemus, contains at the basis only potsherds of the ninth and eighth century before the Christian era, whereas it has yielded some *débris* from the twelfth to the ninth century much higher up in the rubbish, cannot this be explained by that "brook that ran through the midst of the

land" (II. Chron. xxxii., 4; see below the notes on this בחל), and which was stopped in great haste against the threatened invasion of Sennacherib. It is the same thing with the apparent incongruity of the stratification of the rubbish in basin H^1; we can now understand the barrage doing away with gallery I. and narrowing nearly by half the basin of the fountain, and by these means it is easy to understand the precaution of blocking up from inside the narrow gates of gallery III. and of discouraging, by piling up blocks which could not be moved from the bottom of this hole, any attempt to reopen the round chamber, a work requiring leisure, tools, and unlimited freedom of action, all of which are not as a rule at the disposal of invaders.

The origin of the galleries IV., V., VII., and the upper part of VI. has evidently to be sought in connection with the same enterprise, but we ought to try to grasp their meaning, and in order to render this task a little less difficult we shall try to establish first the character and period of the other excavations in the rock. The most important one, after Hezekiah's tunnel, is the secret passage in the hill between the upland and the fountain. If it will be possible to form an approximately correct idea of it by means of my description, there will scarcely be any doubt that we have to do with a hydraulic installation, absolutely similar to those discovered by modern explorers time after time in old Canaanite towns. Nearly every visible element of archæological determination is missing here, because the deplorably sterile rubbish accumulated inside had been exposed to so many chances of disturbance that it is scarcely safe to make use of the spare information furnished by it. There are certainly the specific peculiarities of the boring. I have tried to make them prominent not without some misgivings as to the more or less tangible alterations brought about by possible reconstructions, and certainly by decomposition or erosion; but these peculiarities would not be sufficient here to establish a period—they simply indicate a change in the metal tools.

The junction of this complicated tunnel with the oldest artificial installation round the fountain—the widening of cavity M, the creation of canal L, and of the whole lower part of gallery VI.—enable us already to be more precise at various points, because the nature of the *débris*, so distinctly Canaanite and archaic Israelitic, excluding all later materials, makes it possible to locate the abandonment and the blocking up of the cavity and of the canal, which must have taken place at least in the very first centuries of the Israelitic monarchy, the eleventh or tenth before our era. The following points have convinced me gradually that such a junction existed: (1) The identity of the boring method in the lower part of gallery VI., canal L, and the vertical shafts of the great passage; (2) the impossibility of getting the utilisation of these first constructions near the fountain to tally with any of the other systems of galleries and canals; (3) the necessity to let the secret passage end into a deflection of water from the fountain. This last-named motive will naturally appear to be self-understood, and as such of no great value. In my research proper it played only a subsidiary part after the excavation on this point had been finished, the archæological observations classified, and the fact proved that the construction of the galleries I. and II. and of Hezekiah's tunnel rendered any utilisation of the primordial installation impossible and necessitated its blocking up. At this point only, and while engaged in a reasoned survey of the plans, I conceived the idea of connecting L, M, and lower VI. with the Ophel passage. A reference to the plan will very promptly explain the reason for such an interpretation. I have, indeed, indicated already that the tunnel aqueduct, erected at the same time as the upper part of gallery V., dated from a later period than the first boring, for this boring would not have been undertaken, with quite different tools, only to fill it laboriously up again with stonework. It has also certainly been constructed later than the secret Ophel passage, since care has been taken partly to block up the mouth of this passage, before the opening of the tunnel aqueduct, at the same moment when the influx of water was assured by raising the floor of the gallery coming from the fountain; it will be remembered that this half barrage had been constructed by the same hand and with the same material as the concrete of gallery VI. In its first state this gallery was linked to the vertical system inside Ophel, and procured an issue towards the fountain.

We have seen in the water chamber that the entrance to gallery VI. had evidently been transformed by the same workmen who dug out the Siloam tunnel. The small by-place inside the chamber was probably then constructed or reconstructed. It is also probable that in the floor of living rock in this chamber a gutter was constructed, barried by a step near the orifice of the gallery. The water chamber must have therefore existed beforehand, and was already linked up—although very likely in a more simplified manner—with the ancient installation of Ophel. As a matter of fact, the directly archæological suggestions scarcely permit us to go farther and to link up, above the actual basin, the Ophel galleries with the oldest canal and the primitive cave of the fountain. Technical indications of workmanship only may be adduced here, and I consider them not sufficient to alter the conviction of anyone who would assume about the same period for the secret system of Ophel and the installations I. and II.

I have considered it only my honest duty to accentuate strongly the character of the observations which lead me to believe in the junction between the primordial cave M and the crest of the hill, and to accentuate above all the archæological gap, however small, which appears in this interpretation. Were these notes of a controversial nature, I should have to accumulate in detail the smallest observations suggesting that the reservoir HH^1 was primarily in a state compatible with the utilisation of LM; thus I should be able to fill the gap which I indicated just now. But open-minded readers wishing only for solid facts and their frank analysis will excuse my not producing proof, but relating what I have seen, how much I have understood of it, and how much remained obscure for me.

Let us now examine whether the Scriptural texts do not supply an explanation which archæology has not furnished. Is there any allusion in the Bible to a monument similar to ours, a secret passage between the upland of the hill and the fountain flowing at its eastern foot, nearly on the steep ground of Kedron? Everybody will at once think of the story of the conquest of Jerusalem in David's time and of that mysterious passage which led a bold and gallant soldier

right into the middle of the impregnable Jebusite fortress. Well, then, why should not the *sinnôr* which led Joab into Sion, the *sinnôr* which puzzled so many commentators and exercised the ingeniousness of so many topographs, be this scientifically constructed, wonderful path so perfectly hidden in the rocks? Many years ago we had come to that conviction, thanks to the information procured by the first and plucky exploration of Captain Warren, although this information was by no means complete (Canaan, p. 27, and Q.S., 1908, p. 215, or R.B., 1908, p. 402). The recent excavations have furnished new and much more precise foundations for this conviction. But in order to avoid even the semblance of giving a mere theoretical demonstration let us rather discuss shortly the following points:

1. Does the tunnel as a whole respond to the description of the *sinnôr?*
2. The possible adaptation of the Biblical story to this monument.
3. The possible harmony between the date implied by the *sinnôr* and that determined by the archæological character of the monument.

1. The only meaning that would be even justifiable when attributed to the Biblical expression צבור is "passage in connection with water." Until a lucky philological discovery determines definitely the meaning of the radical צבר and the primal meaning of the derived nominal צבור the given meaning is the only one resulting from the later Biblical usage and the interpretation of the official versions. "Canal" in the limited neo-Hebrew meaning would scarcely be suitable in Psalm xlii. 8. The waterspouts mentioned there are something too well defined to harmonise without violence with the *domarum fistulas* of St. Jerome, or with the κρουνισμοσ of Aquila in Samuel. If the Hebrew word may have been shaped with regard to some onomatopœic idea, an imitation of the murmur of running water or the noise of subterranean water, would that not meet the point very satisfactorily in the present installation, which, indeed, responds to all that may be contained in the word צבור according to the present stage of our knowledge? Whoever has watched while water was drawn from a Palestine well would certainly see in the Ophel installation a particularly topical realisation of the idea. The water is mostly drawn up by means of a copper bucket suspended from a cord drawn up by hand or mounted on a pulley. When the bucket, filled up to the top, is drawn up it revolves, and large splashes of water fall back to the bottom of the well. Even at the top, during the filling up of jars and skins, plenty of water runs down with a noise that increases with the depth of the well or the capacity of the broken jar or the clumsily upset skin. Now imagine in the vertical well at the end of gallery VI. a group of Jebusite men or women about to draw water secretly while David and his people watch in front of the fountain. Not the greatest care on the part of those who draw the water can prevent noisy splashing. Even if the water is lower in the gallery, owing to a somewhat prolonged intermission, the noise is swelled by the whole sonority of the rock and the chimney in the rock. From the actual entrance to the water chamber I have heard distinctly at various times the noise of the buckets in the great well during the last clearing out. It is true iron buckets, liable to produce much noise when knocking against the rock walls, were used; it is also true that the entrance to the water chamber brought me a few mètres nearer; but then the opening of all the new galleries diminished the resonance, and to this weakening of the sound is to be added the strange and disturbing noise coming from ten different points where the excavations were in full swing. There is nothing surprising about David suspecting, in consequence of some similar observation, the existence of the secret passage.

2. The legitimacy of the theoretical approximation has now to undergo the test of exegesis and it is but natural that this approximation will fall to the ground if it goes against our Biblical information or can only be forcibly adapted to it. But it is itself confirmed in the same degree as the Biblical story is made clearer and livelier by it. Instead of an obscure expression, as many of the critics found it, and, moreover, instead of some vulgar expression which might have to be substituted for it, *sinnôr* is exactly the term which David applies to the secret passage of Ophel. To the simple fact which, as I pointed out, might have revealed its existence to him, many more may be added without any effort: the lowering of the water level at the fountain without a visible outlet, the discovery of the mouth of the canal at the moment when a prolonged intermittence had left the basin nearly empty, and other possibilities of the same nature—not to mention a theory not less spontaneous in an Oriental country, a traitor giving away the secret. Once the passage was suspected and its entrance explored when the water stood low, it may be conceived that this would not make the Jebusite watch much more careful, as they trusted it would be impossible for an assailant to climb up the walls. In any case, this gave a chance to get unexpectedly into the fortress, even if it could only be done with the idea of creating a false alarm, which would be made use of by a simultaneous attack on other points. Lacking an easier access, the King thought of using this one. He admits implicitly himself the difficulty and the danger by the unstinted reward which he holds out if the daring attempt is successful. He who will get the better of the insolent Jebusites and manage to get inside their walls through the tunnel opening on the source will be made a prince. (The reward is actually mentioned only in I. Chron. ii., 6, where the word *sinnôr* does not appear.) All Joab had to do before getting into the tunnel was to wait for a propitious moment; his task was, as a matter of fact, far less difficult than the recent exploration of the 1910 expedition. Some planks of wood, properly arranged by the help of one or two plucky companions, were enough to hoist Joab to the top of the vertical chimney. From there he had only to cross cautiously the tunnel and to keep himself ready against attack or any other impediment.

It is clear that any positive and detailed reconstruction of the adventure is worthless, since the text keeps an absolute silence after mentioning the extraordinary method by which the town was conquered. But if anybody should think it unlikely that a fortress should be taken in such a way, it will be only a small trouble to produce very explicit analogies from antique history. Is it necessary to remind anybody of the Palladium of the Trojans, that was carried away by Ulysses and Diomedes, who enter by night, stealthily, right in the middle of well-guarded Troy, through the sewers? They get into the temple, load the august but cumbersome goddess on their shoulders, and get out again without being noticed (*cf.* Virgil, Æneid II., 166 ss., and the commentary of Servius). Whoever considers the story a pretty legend can easily substitute the serious report of an historian relating the conquest of a town thanks to the cleverness and pluck of a soldier, or the disturbing alarm raised in an impregnable fortress by a handful of determined men favoured by good luck. (The *Revue* has already quoted the analogy given by Ammianus Marcellinus with regard to the fortress of Amida attacked by the Persians.) In the third book of Frontin's *Stratagems* numerous classical instances will be found. Have I to remind Bible readers of the famous case of Jonathan, who held back, aided only by his squire, the whole detachment of the Philistines stationed on the steep pass of Michmâs (I. Sam. xiv., 1 ff.). As Joab found the passage free, he was able to get some reinforcement, and the sudden appearance of a small, plucky detachment at night right in the middle of the town was in those days quite enough, in my opinion, to raise a tumultuous and lasting panic. David and his troops had only to make use of it by delivering an attack, which nobody thought of repelling at the moment. There need not be anything extraordinary about the fortress, the defence, or the attack. Joab may have come to a gate, which he opened, after having strangled, by himself and without any great effort, a drowsy or even sleeping sentinel.

We might easily imagine other things that probably happened; the point is not to make unsuccessful efforts to guess those details which are not mentioned in the Bible, but to grasp as far as possible the importance of the details which are given there. Applied to the secret installation of Ophel, the valuable and too much neglected detail of the *sinnôr* gives a sense to the story, and life and local colour, instead of the meaningless character entailed by the suppression of the word or the substitution of any other word, as, for instance, ברא־עובת, as the dull imagination of some otiose scribe will have it (see I. Chron. ii., 6). The Jebusite fortress, or Sion, it has been recognised, could not be taken under any circumstances by the means at the disposal of David. The besieged inhabitants, feeling quite secure, pour insolent scorn over the Israelitic army. The *sinnôr* is found; it is an unlikely way, but it is tried, and fortune favours the attempt. The Jebusites, unnerved by an unexpected attack from the point where they least thought it could come from, are driven from the town, and David is master of Sion.

The history of Jerusalem provides in support of this interpretation of the fact a truly striking analogy, and it is surprising that this analogy has never been utilised in this connection. In 1834 the victorious troops of Mehemet Ali had taken possession of the town. A safe garrison, quartered in the citadel, defied by means of a few miserable cannon the fierce but disorderly attacks of the Arab hordes. Some vigorous Bethlehemites thought of a way of getting inside the walls. The great sewer of the town opened then, as to-day, towards the gate of Maugrebin. They slipped inside, mounted, after many efforts and dangers, as may be imagined, some lateral branch towards the north-west, and emerged suddenly in the middle of a house a few steps away from the citadel. Before the garrison could be roused the sewer had enabled such a number of the enemy to come in that for a moment the town was thought to be in their power.

The bold invaders were, however, unable to hold out long against the garrison's fire. In spite of their numerical inferiority, their despairing courage might perhaps have given them the victory against equal arms; but they were exterminated by the cannon of the citadel. Is this invasion by means of a sewer not a curious replica of the attack through the *sinnôr* thirty centuries ago? The memory of this attack through the sewer is still being kept alive by the story tellers.

It might perhaps be thought that I treat at length an approximation which is in itself quite natural and quite probable. But the never-ending arguments about the *sinnôr* made it, nevertheless, desirable that I should go into details about this explanation to destroy all doubts.

3. Not much need now be said about the possible harmony between the historical date of the *sinnôr* and the origin of a subterranean installation in the live rock, as at Ophel. The time of the conquest of Sion by David is, roughly speaking, the extreme end of the eleventh century before our era, or the earliest beginning of the tenth. The *sinnôr*, which was then in use, and the creation of which took undoubtedly a long time, goes back more or less to the eleventh century, but may probably date from much earlier times still. Amongst all the analogies already known in the Canaanite towns, the nearest and most useful, thanks to very precise and competent observations by M. MacAlister, is that of the canal of Gézer. It is for the same purpose: a descent of 30 mètres right into the middle of the hill in order to reach secretly a live fountain inside the walls. This tunnel of Gézer, showing perhaps a still more scientific construction and being generally more impressive than the canal at Jerusalem, goes, as can be very satisfactorily determined, back to the first days of Semitic Palestine. It may, indeed, be concluded from its situation and the traces of the tools on the walls that the excavation was done at a period when metal tools were not yet in general use. Besides, the ceramic finds and the little objects picked up from the clearing out define the time of its utilisation in quite an unexpected manner as that of the arrival of the Hebrews in Canaan. The period between these two terms just about corresponds to the Canaanitish era as a whole.

It follows from these facts that probably from the twentieth century before our era onward there were among the industrious populations of the Canaanæan tribes some engineers capable of planning and executing such works as the tunnel of Gézer in order to make fortified towns—as they were built in those days—quite secure. And if there is any

doubt about the probable time of its beginning, whether it is the twentieth, nineteenth, or eighteenth century, all specialists agree at least that the Gézer tunnel was in use in the fifteenth century, four centuries at least before the time when David watched the *sinnôr* of Jerusalem. Why could not the Jebusites at Jerusalem have been able to accomplish in the walls of their narrow but strong acropolis what had been done by their fellow tribes very much earlier? Whichever the century when the subterranean passage down to the fountain was created as an adjunct to the defence of Sion, it is quite clear that it fits in best with the declining eleventh century. Further proof of this date thus established is furnished by archæological points, not strong enough to determine it by themselves, but lending themselves very easily to corroborate it—(1) the process of hewing with a chisel or a sharp instrument driven by a hammer, instead of the easier and more practical pickaxe, which would have been used had it been right in the middle of the iron age from about the twelfth to eleventh century onward; (2) the distinctly Canaanitish and primitive Israelitic ceramic potsherds in the short initial section of the passage near the fountain, which, owing to having been filled up in an archaic period, had very fortunately been kept intact; (3) the first transformation of this old Canaanitish installation by other hydraulic constructions round the fountain probably created during the prosperous times of the glorious kings at the beginning of the Israelitic monarchy at Jerusalem. The two intermediary canals, the date of which we have to examine still, may best be linked up with the period of the first embellishments of the new capital. We may now call them canals, as, following their description, we have only to glance at the plan to recognise them as works destined for the irrigation of the hillside. By principle their origin might be ascribed to the Jebusites, who knew very well how to execute such works. But if one realises that the creation of these canals was harmful to the secret communication with the fountain, we shall feel less inclined to attribute them to the same source. This hypothesis is further proved by very pronounced details of workmanship, and it has already previously been suggested that the first centuries of the Israelitic monarchy are the date of the origin, which is, moreover, affirmed by archæological facts. Instead of the patient and careful work executed by workmen who have some idea of line and of a harmoniously worked surface, as can be seen in the old Jebusite tunnel, we have a mere hole, done in a hurry, with walls ragged with the strokes of clubs, leaving traces of iron in the smallest natural corner or in smaller marks made with the chisel. There is no proper tracing of the lines; every effort tending towards beauty is scorned, and it is worse when the unexpectedly deep bursting of the stone leaves a gaping hole in the wall side by side with a protuberance equally ugly for opposite reasons. The work stands out by the determination put into it; it is impressive thanks to its proportions and difficulties; but there is no trace of artistic execution about it, and even from a technical point of view it is frankly ugly. It consists of ditches through which the water circulates in some way or the other at various levels of the hillside and then runs off the sides. But it could nevertheless not be disputed that the most inexperienced modern engineer in charge of such an installation would have to consider himself disqualified if he carried it out in such a manner. The engineers at the time of David or his successors were less ambitious. As soon as the construction of canal I. and II. is attributed to them, it will be understood that no Canaanitish *débris* could have been found there, and that the whole with the filled-up parts dates from between the tenth and eighth century before our era.

Nothing, finally, is better fitted than such a work at this period to correspond with the exact data of the Biblical text. Jerusalem is no longer the fortified acropolis of a Canaanite tribe, and is changed in the shortest possible time into the capital of the united Israelite kingdom. A magnificent temple takes the place of the humble altar, a palace takes the place of the sombre fortress, and it was fit that plantations and gardens should adorn the stern outlook on the Kedron valley. The fountain is there in a favourable spot to assure the town's prosperity, if the waters are only properly conducted. Later on we shall hear about those "royal gardens" (I. Kings, xxv., 4; Neh. iii., 15), in a spot which is defined with some accuracy, towards the southern point of the hill, where the various ravines unite, which, far from excluding a northern prolongation through the Kedron and the eastern wall of Ophel, rather implies it. Biblical tradition has kept the memory of these embellishments, and did not hesitate to ascribe to Solomon these gardens, these orchards, and their reservoirs intended for the irrigation of those shrubberies (Eccl. ii., 5), which were later to become the odious theatre of the most revolting idolatry. Naturally, all this was not accomplished in a day by a stroke of a magic wand. It took, without a doubt, years to complete the installation, with all its different systems to gather the water, with its basins and barrages. A special discussion of this point would necessitate the introduction of elements other than those brought forward in these notes, and does not come within the scope of our recent research. Nevertheless, thanks are due to our leader and his helpers of 1910-11 for having furnished a key of interpretation which could not have been thought of before. The mechanism of the fountain itself has been, if not altogether explained, at least considerably cleared up, thanks to the precise observations about the geological constitution of the hillside, and also thanks to some prudent and ably directed researches near the point of issue now clearly defined. This special part of the work done by the Expedition could furnish material for an interesting technical monograph. From the more general point of view by which we have to abide, the result of the observations is as follows: After accounting for a variable layer of rubbish of a historical period, the hillside of Ed Dehoura or Ophel belongs altogether to the upper strata of the chalky system which marks the end of the tertiary formations. It is composed of three calcareous strata inclined nearly regularly from N. and lightly N.W. to S.S.E., and eastwards cut obliquely by the antique erosion in the Kedron ravine. The most opportune geological shaft, easy to study after the rubbish had been cleared away, was the open well under the stonework vault in the secret passage. Beginning from the top, a calcareous stratum of reddish yellow colour is first observed, about 12 mètres thick, but without any homogeneousness, full of cavities and clefts, where concretions and small real stalactites prove the constant dripping of water saturated with mineral elements. A second stratum which is stronger still—about 15 mètres—follows, consisting of a far more compact rock, white with yellowish

veins or of faint pink. This stratum is subdivided in layers of unequal size but regular shape, between which thin ribbons of fuller's earth are inserted; no more or scarcely any cavities with stalactites occur, but rather numerous cracks, and some even more important faults where the traces of infiltration are more pronounced. Underneath, finally, is a third stratum of a red hue, of an extremely compact texture, where no more traces of capillary filtering of water appear, because there are neither cavities nor cracks and the dislocations are very rare. The progress of water in ground of a similar composition has been described many a time by masters of geology. In the upper stratum, which is easy to permeate, the infiltration is effected at innumerable points equal to the pores of an animal's skin, and the rapidity and intensity with which the water circulates is in proportion to the cracks which establish communication between one cavity and the other. These natural canals, endlessly cut and cut again, entangled and tortuous, let only a very minute quantity of water pass at a time, and force it through the most fantastic, roundabout ways and over frequent obstacles. The far less frequent crevices of the intermediary layer make the passage of the water more complicated still, so that it scarcely finds any way to filter through to the inferior strata, and accumulates in some natural basin until there is a sufficient quantity to drive it to the outer surface at a point of issue which may be far higher than the last basin in which it had accumulated. The well-known principle of the equilibrium maintained by water in various communicating vessels will therefore provide quite sufficient explanation of those curious intermittent tides in the Pool of Siloam, which have aroused so many hypotheses and called forth so much legendary folklore.

At a certain period of our work I felt sure that we were close to one of these original basins or sources of supply. Our largest galleries had been cleaned out, and we were taking soundings in the main water chamber, when suddenly the movements of the spring changed in a very curious way. Instead of flooding the chamber every nine or ten hours and running full for about forty minutes, as it had regularly been accustomed to do for several weeks previously, the water rushed out unexpectedly every two or three hours, running for twelve or fifteen minutes at a time. It once started no less than seven times in twelve hours, and it usually gave twice as much water each time as it had done in the old days. This exceptional industry lasted for about a month, and as we were in the dry season of September, without having had a drop of rain since May, we were at first somewhat surprised. On the other hand, the care we had taken in all our work near the spring precluded the natural explanation that we had caused some modification in the pressure of the internal syphon in the mountain. On the whole I am inclined to think that the explanation (and a very simple one) is to be found in the fact that we had thoroughly cleaned out the point where the spring itself had formerly had to struggle through masses of rubbish before the water got clear, and that when once the spring worked easily the rush of water created a current near its orifice, and so affected the stream further and further back, through the chain of various reservoirs, until it reached the innermost. Besides this, we have to take into consideration that the water, being no longer baffled in its course and therefore laying down sedimentary deposit while it waited, was now able to operate in exactly the reverse manner, and to erode the channels through which it was able to gush with freedom and even violence. I should like to have had time to observe these phenomena for longer, but by the end of September we had to put the whole apparatus into working order again for the benefit of the inhabitants of Siloam. Almost as soon as we had done so the emissions of the spring became slower, until they reached a period of about four hours, though the volume of water remained quite double what it had been before. Subsequent observations enable me to say that three or four emissions became usual between five o'clock in the morning and 8 p.m.; but the spring evidently took some time to become quite regular again, for one day it never ran at all between 6 a.m. and 4 p.m., and then it suddenly rose with an extraordinary noise and poured out an abnormal quantity of water for three-quarters of an hour. I need hardly enlarge upon the gratitude of Siloam, or upon the picturesque and touching way in which they bestowed their thanks upon the leaders of the Expedition.

We, too, may thank the Expedition of 1900-11 almost as heartily for work which has not only given water to a thirsty land, but has thrown much light upon the dark places of ancient history, both in Siloam and in Jerusalem itself. For it was undoubtedly round this spring that the life of the earliest inhabitants of the Jebus, that was to be Jerusalem, most vitally centred. For centuries that centre has been remembered. For centuries nearly the whole of the practicable soil of Jerusalem has been searched, yet near this centre only have undoubted and considerable remains of the aboriginal Canaanite civilisation been discovered. The more we compare the data provided by these remains with the records of the Bible, the more confirmation shall we discover of the accuracy of Holy Writ. Let us briefly resume, then, the history of early Jerusalem, with both these sources at our disposal.

In those far-off days when the Jebusite tribe of Canaanites chose the hill we now call Ophel as the site of their small acropolis, they were no doubt attracted by the exceptional situation of this rocky spur boldly jutting out among its scarped ravines, by the ease with which it could be defended, by the agreeable site it offered for human habitation, and by the spring of clear water which issued from its eastern slope. That spring was perhaps still fruitful in the mineral riches of an earlier age; it had never been harnessed to the use of man, and it flowed, free and unrestrained, from its cavern in the mountain side along the valley where the vanished stream of Kedron once carved its impetuous way amid the rocks. In the happy carelessness of those first days of settlement, when the chief anxiety of the new citizens was expended on their new houses and their rough rampart of defence, men were content to send down the slope for water by the same path which their successors use to-day. We can imagine those Jebusite women walking up and down in the

morning and the evening, their shoulders back, their hips swinging, beneath the weight of their jars, or their backs bent beneath the burden of the waterskins. Their successors may be seen in almost exactly the same attitudes to-day, on their way to and from Siloam, and there is probably very little difference in the women themselves.

But as the city grew, and it became necessary either to complete its military defences against burglarious attacks or to make sure of being able to withstand the rigours of a siege, the need for a sure, a safe, a plenteous water supply became essential. In those days sieges did not last very long, and the question of water—on one side or the other—often settled the issue. Later on, as civilisation became more complex and detailed, private wells or cisterns solved the problem in a different way; but at the time of the first Jebusite settlement life was still a question for the community; individual resources were comparatively small; the benefit of the commonweal was practically in the hands of the chieftain or patriarch and his immediate advisers, and the governing power (if the phrase be not still too pretentious) was much as we find it among the half nomad tribes which rove in Palestine to-day. Even if a few spirited citizens had been able to provide themselves with private reservoirs of one kind or another, it became necessary to make certain of some well or spring sufficient for the needs of the whole armed community in case of a blockade from without. There are numberless authenticated cases of the skill and hardihood with which the primitive inhabitants of ancient Palestine built themselves secret ways to their best water supply, and the Jebusites were as enterprising as any of their contemporaries. They first built a staircase in the rock (probably hidden beneath a rough arch of masonry) from the inside of their ramparts to the first ledge of limestone outside, leaving its end open quite safely, because it was still too high up the slope to enable an invader to reach it without grave risks, and, even if he got there, he would be under a direct and plunging fire from the arrows of the sentinels upon the walls. They then decided to sink a shaft straight into the hill from the end of their stairway, with the double motive of either striking a new spring on the way or of working horizontally towards the original spring as soon as their first shaft had penetrated deep enough.

For the first two stages of work through the rock their labour was fairly easy, and the shaft was fairly regular; but the lower stratum at once produced serious difficulties. In spite of having begun their shaft with an ample diameter, the inevitable result of boring deeper through recalcitrant material was to diminish the calibre of the hole, and this again tended to diminish the ease with which they used their tools at the very moment when the arduous nature of their task increased. They seem to have tried to enlarge the shaft as soon as these difficulties became more apparent, and by this means they got at least 3 mètres into the worst of the rock, but only at the cost of an irregularity in plan and progression which is in strong contrast to the certainty of their beginnings. The work of their tools is still visible on the rock face, and even at this depth it remains (beneath the accretions and the dust of ages) as strong and regular as ever; but the shaft itself does not progress in anything like a straight line downwards; its axis continually shifts to and fro instead of going on perpendicularly, and finally the hole becomes an inverted cone, with its apex downwards, slanting hopelessly towards a fissure which seemed to promise better hopes of progress, and at last giving up the struggle against impenetrable obstacles. They were only a few mètres above the level of the spring, but they could get no deeper. The way to the water had to be found in some other direction. An examination of the reddish marble-like formation through which they tried to pierce will show that it would be no easy task even for modern engineers with perfected appliances of finely tempered steel. The rude tools of bronze or soft metal known to the early Jebusites must have been almost entirely useless.

Well, the Master of the Work had to devise a different plan. He looked about on the hillside until he found on one of the lower slopes a natural cavern, from which it would be a comparatively easy task not only to establish vertical communication with his upper works, but also to begin the excavation of that horizontal gallery which was essential to his plan; for if that gallery was now to be slightly higher up the hillside than had been originally intended, it would always be possible to sink another and shorter shaft out of it close to the actual source. It would also be perfectly simple so to wall up the natural cavern as to conceal all traces outside of the subterranean system of water conduits within the rock. If this was his theory, we have a simple and masterly explanation of the large tunnel I have described in previous pages.[o] We see it no longer as a queer kind of intestinal passage which winds to and fro without a plan. We realise that it is a passage designed both to necessitate the minimum of labour in attaining its object and to ensure the maximum of secrecy from hostile observation. At the end of it a vertical "fault" in the geological formation offered precisely the natural conditions suitable to the idea; it only had to be enlarged. It met, it is true, the same formidable stratum of hard, reddish rock, but, being a geological "fault," it passed through. It was diminished perhaps; it was half strangled indeed; but still it passed downwards and on into a little natural cavern that would do admirably as a cistern. This little cavern was actually at a lower level than the spring itself. Nothing more was needed than the excavation of a horizontal channel from the spring upon the slope outside into the hidden cavern, which thus was assured of permanent supplies. The passage between the spring and the cavern was certainly not large enough to give an enemy any idea of its real importance. It was imagined also that it was far too small to give any enemy the idea of climbing up it.

But the foresight of David and the venturesome audacity of Joab checkmated the plans of that primitive Jebusite engineer, whose triumphant scheme for waterworks, originally the chief pride of an impregnable fortress, now became the direct cause of her downfall. Let us quote the Bible's words:

"And David" (I. Chron. xi., 4-7) "and all Israel went to Jerusalem, which is Jebus, where the Jebusites were the inhabitants of the land. And the inhabitants of Jebus said to David, Thou shalt not come hither. Nevertheless, David took the castle of Zion which is the city of David. And David said, Whoever smiteth the Jebusites first shall be chief and captain. So Joab the son of Zeruiah went first up and was chief. And David dwelt in the castle; therefore they called it the city of David."

In another passage (II. Sam. v., 7-9) the capture is described in greater detail: "Nevertheless, David took the stronghold of Zion, the same is the city of David. And David said on that day, Whosoever *getteth up into the gutter* and smiteth the Jebusites . . . he shall be chief and captain. . . . So David dwelt in the fort and called it the city of David."

Once more we find that the subterranean waterworks of ancient Jebus, round which so much of its primitive history had centred, became in turn the crucial phenomenon of the rise of the Israelite dynasty. The best of the Israelites never forgot its ancient traditions. "Ye made also a ditch between the two walls," writes Isaiah (xxii., 9-11), "for the water of the old pool; but ye have not looked to the maker thereof, neither had respect unto him that fashioned it long ago."

The first enemy to capture Jebus fully appreciated the benefits of its water system, and their own experience had taught them how to guard against the only weakness which its creator had not taken sufficiently into account. They, at any rate, exhibited none of the disrespect which later on called forth the protests of Isaiah. To them the spring and even all its subsidiary channels was already that miraculous spring of legendary and even divine powers which it remained for so many centuries, until the Christ Himself healed in its cleansing waters the man born blind (St. John ix., 7), in a century when "Siloam, which is by interpretation Sent," preserved still fresh the memories of that marvellous aqueduct by which the healing streams were *sent* to it from the ancient spring of Jebus, the "Virgin's Well" of later and not less appreciative years.

In the reign of David, then, this spring, which was called Gihon, had already become the appointed place for all ceremonial ablutions before any great act of religious solemnity. When David himself grows weary of the burden of the crown it is to this spring he sends Solomon to receive beside its sacred waters the royal unction that is to prepare him for the throne. From a point easily found upon the southern slopes of Ophel you may realise to-day, with the first chapter of the Book of Kings in your mind, the whole of that scene in the drama of ancient Israelite royalty upon the slopes of the Jerusalem of David. The landscape around you can still arouse the keenest sensation of actuality as you recall the details of that palace intrigue so long ago—the appeal of Bathsheba to the aged sovereign that he should keep his promise to her son; the fruitless conspiracy of Adonijah, assisted by that very Joab who had once won Jebus for a better master; the solemn ride of Solomon "upon King David's mule" to the spring Gihon; and Zadok the priest, who "took an horn of oil out of the tabernacle and anointed Solomon, and they blew the trumpet, and all the people said, God save King Solomon." In the year 1911 no English reader can fail to be stirred by the memories of that first coronation by the Virgin's Well. The very words just quoted have scarce died away in the echoes of their own more splendid shrine of Westminster.

The greatness and the wealth of Solomon were soon reflected in the material splendours with which his glorious reign over Jerusalem will ever be associated. He was not slow to recognise that the surplus of water from the plenteous spring of Gihon, after the city had taken all it needed, spread almost uselessly over the sterile valley of the Kedron. Upon those lower slopes there were perhaps already a few slips of cultivated ground for grain or fruit or vegetables. Indeed, the whole of the eastern escarpment of Mount Ophel presented a series of terraces that seemed the natural home of orchards and kitchen gardens if only some system of regular irrigation could be provided for them. A plan was soon hit upon by the royal engineers. The waters of the spring should be gathered into a convenient cistern and led through open galleries in the various terraces to lateral branches, which would spread as far and as high as possible the benefit of its refreshing streams. The first and second tunnels I have already described in detail were the result, and no doubt their gradual improvement went on long after the time of Solomon. The one curious and outstanding problem they present is that we now find them carefully blocked up by masonry and concrete of an age which cannot be later than the seventh century B.C., and is certainly not older than the eighth century B.C. The lower of these two canals has been blocked up at its very entrance into the cavern of the spring. The other, left open at this point, has later on been laboriously and completely choked up with enormous blocks of stone. Almost at the same time as this process was being carried on a new network of canals and galleries in various directions was being excavated, some only to be given up at once, others to be radically altered, but all evidently designed to bring the water of Gihon from one side of the mountain to the other. How are we to explain this? The key to the enigma is to be found in the events of the reign of Hezekiah, whose prowess as a builder of waterworks is celebrated in several passages of the Bible. Two of them have been placed at the beginning of this translation—"how he made a pool and a conduit and brought water into the city" (II. Kings xx., 20); or, again, how he "stopped the upper watercourse of Gihon and brought it straight down to the west side of the city of David" (II. Chron. xxxii., 30); and in Ecclesiasticus xlviii., 17, we read how "Ezekias fortified his city and brought in water into the midst thereof; he digged the hard rock with iron, and made wells for water."

Let us see how these texts may be understood by the light of the new facts revealed by the expedition of 1909-11. My reader will remember the connection established by our excavations between galleries III. to VII. and the aqueduct from the Virgin's Well (which is Gihon) to Siloam. It will be recalled that the one really practical objection against the theory that this aqueduct was built by Hezekiah was that it would have taken too long to make it on the very eve of the threatened investment of the city by Sennacherib the Assyrian. I endeavoured, without any reference to these arguments whatever, to fix the exact time the workmen must have taken to excavate this tunnel. I am sure it could not have been less than six months. The extreme limit would be about eleven. But we need not imagine that Hezekiah was obliged to build it even in the longer of these two periods; for a study of Biblical history in connection with the Assyrian records will reveal the patent fact that there was actually no necessity for such urgent haste. Sennacherib's first campaign was in 701 B.C., according to our best authority, Dhorme, and then Jerusalem was saved by paying tribute. His second invasion was in 691 B.C., when "the king of Assyria sent Rabshakeh from Lachish to

Jerusalem unto King Hezekiah with a great army, and he stood by the conduit of the upper pool in the highway of the fuller's field" (Isaiah xxxvi., 2). That invasion failed, too. I think we shall now begin to understand why. The Israelites had their water supply safe; the Assyrians had none.

The dates I have quoted show very clearly that long before Sennacherib made a direct attack upon Jerusalem itself there had been years of intervening danger. Ten years, at any rate, elapsed between his first campaign and his second. There was ample time between the two for the planning and completion of the aqueduct from the Virgin's Well to the Pool of Siloam. But how much more keenly can we now sympathise with the almost pathetically triumphant phrases of the Siloam Stone! The workmen had not only pierced their way through more than a thousand cubits underground; they had saved Jerusalem from the invader!

The detailed discoveries of the expedition of 1909-11 throw the most poignant light upon the feelings both of those who worked upon this vitally important aqueduct and of those who celebrated their successful labours for so many centuries to come. I have already tried to reconstitute that scene on the last day of the excavation, when the men from the northern end, hewing furiously at the rock, worked their way towards the gang from the south side, whose excitement led them into aberrations almost fatal at the crisis. The cheering that was heard as the two parties struck "pick against pick" and broke through the last barrier in that rocky passage, black as pitch within the bowels of Mount Ophel, still echoes in the sympathetic heart of all who have perused these pages with indulgence or enthusiasm. The network of other water-conduits and secret passages with which that same historic slope is honeycombed will now give a new meaning to the passage in Nehemiah (iii., 15): "The gate of the fountain repaired Shallun, the son of Colhozeh, the ruler of part of Mizpah; he built it and covered it and set up the doors thereof and the locks thereof, and the bars thereof, and the wall of the pool of Siloah by the King's Garden and unto the stairs that go down by the City of David. After him repaired Nehemiah the son of Azbuk, the ruler of the half part of Beth-Zur, with the place over against the sepulchres of David and to the pool that was made and to the House of the Mighty."

But it is not upon this thought alone that I would close this preliminary account of our work during these last years. I would emphasise the valuable contribution it has made to the history of primitive Jerusalem in other ways as well. No longer need the story of civilisation on Mount Ophel begin with the Jebusites of the fifteenth century under Abdkhiba. The splendid series of specimens of pottery now discovered in the burial caves on the summit of the plateau afford indubitable proof that the beginning of its story can be traced back for three thousand years before the birth of Christ.

TUNNEL-AQUEDUC DE SILOÉ.

REGISTRE DU LEVER. *(See Plate IV.)*

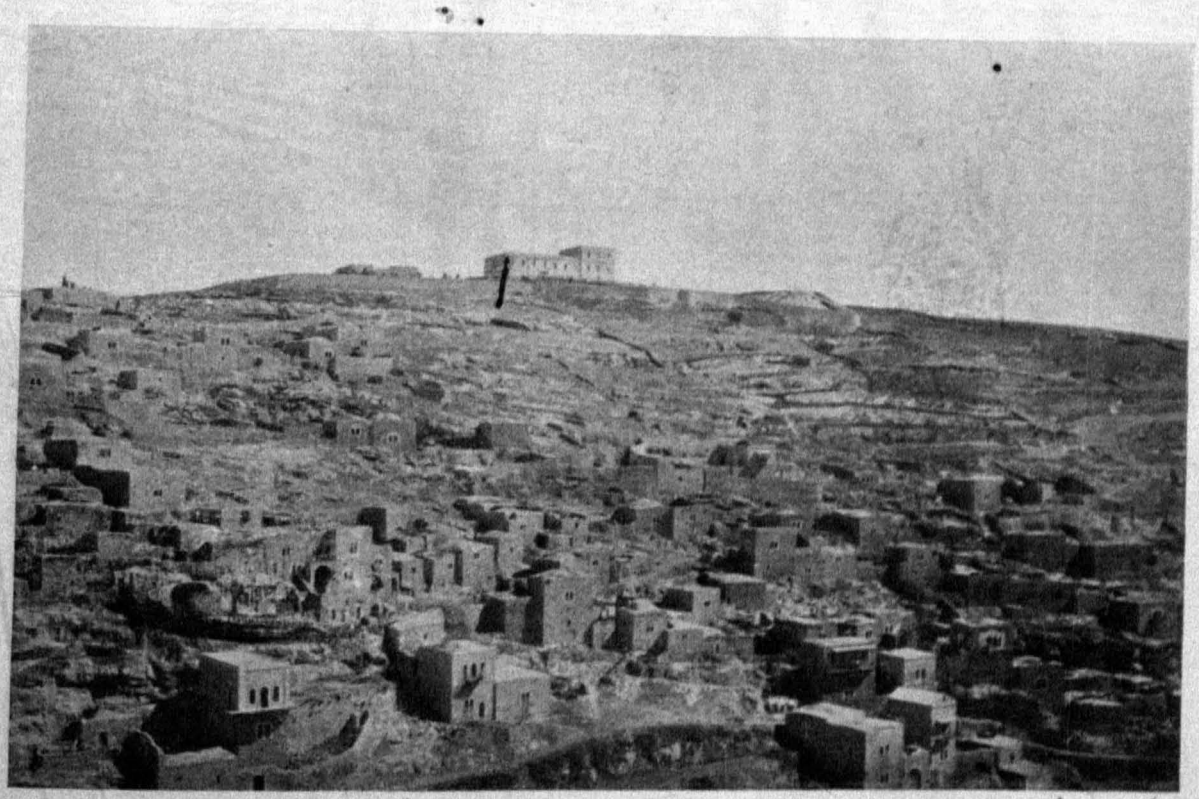
No. des stations.	Longueur axiale.	Orientement.	Observations générales.
0			
I	20		
II	5·40	53° 30′	Mire à 0m. 08 de la paroi E. Larg. du can. 0m. 58 à hautr. de la visée.
III	10	44°	,, 0m. 08 ,, ,, O. ,, ,, 0m. 57.
IV	12·50	67°	,, 0m. 02 ,, ,, O. ,, ,, 0m. 58.
V	7·70	76°	,, 0m. 08 ,, ,, N. Sur le tournant.
VI	10	93° 30′	,, 0m. 08 ,, ,, N. Larg. du can. 0m. 545
VII	10	107°	,, 0m. 10 ,, ,, N.
VIII	10	118°	,, 0m. 08 ,, ,, N.
IX	20	119°	Mire au centre du canal, large de 0m. 58.
X	10	123°	Mire à 0m. 15 de la paroi N.
XI	10	De 1 à 5 : 114° De 5 à 10 : 123° 30′	,, 0m. 08 ,, ,, N. ,, 0m. 05 ,, ,, S.
XII	15	89°	,, 0m. 08 ,, ,, S.
XIII	3	46°	,, 0m. 10 ,, ,, E. après le coude, sous le puits.
XIV	10	47° 30′	,, 0m. 08 ,, ,, O.
XV + XV bis	32·25	De 1 à 20 : 32° De 20 à 32·50 : 31°	,, 0m. 20 ,, ,, O. Mire au centre exact.
XVI	2	+ 0°	,, ,, ,,
XVII	18	338°	Mire à 0m. 08 de la paroi O.
XVIII	20	352°	,, 0m. 08 ,, ,, E.
XIX	10	351°	,, 0m. 20 ,, ,, O.
XX	15	± 0°	Mire au centre exact. Largeur du canal, 0m. 57.
XXI	9	[illegible]	Mire à 0m. 08 de la paroi O.
XXII	14	29°	,, 0m. 15 ,, ,, E.
XXIII	2·50	12° 30′	Mire au centre exact. Axe de la fausse coupe.
XXIV	9·65	44°	Mire à 0m. 20 de la paroi O. Axe de la fausse coupe : 84°.
XXV	5·30	18°	,, 0m. 08 ,, ,, O.
XXVI	4	336°	,, 0m. 02 ,, ,, E.
XXVII	3·30	276°	Mire au centre.
XXVIII	3	328°	,, ,,
XXIX	3	273°	,, ,,
XXX	8	319°	,, ,,
XXXI	4	8°	Mire à 0m. 25 de la paroi O., devant une fausse coupe.
XXXII	4	77°	Mire au centre.
XXXIII	6	31°	,, ,,
XXXIV	12·50	49°	Mire à 0m. 08 de la paroi E.
XXXV	10	7°	Mire au centre.
XXXVI	10	8° 30′	,, ,,
XXXVII	10	333°	,, ,,
XXXVIII	10	332°	,, ,,
XXXIX	15	325°	Mire à 0m. 08 de la paroi E.
XL	18	324°	Mire au centre.
XLI	12	313°	Mire à 0m. 08 de la paroi O.
XLII	10	331°	Mire au centre.
XLIII	5	356°	Mire à 0m. 08 de la paroi O., sur le tournant.
XLIV	8	41°	Mire au centre. Sur 1m. 50 environ l'axe est d'abord presque S.-N. exact.
XLV	7	53°	Mire à 0m. 08 de la paroi N.
XLVI	13	64°	,, 0m. 08 ,, ,, N.
XLVII	12	92°	Mire au centre.
XLVIII	6	94°	Mire à 0m. 10 de la paroi N.
XLIX	6	126°	,, 0m. 08 ,, ,, S.
L	2	104°	,, 0m. 08 ,, ,, S.
LI	8	110°	Mire au centre.
LII	11·40	± 90°	,, ,, à 1m. 30 du radier. Quatre autres mesures en sens différ. sur 10m. de long., à 1m. 50 de ht. moyenne.
	512·50		Lect. exactes : I, 90° 50′ ; II, 91° 10′ ; III, 89° 46′ ; IV, 90° 50′ ; V, 90° 35′.

TUNNEL-AQUEDUC DE SILOÉ.

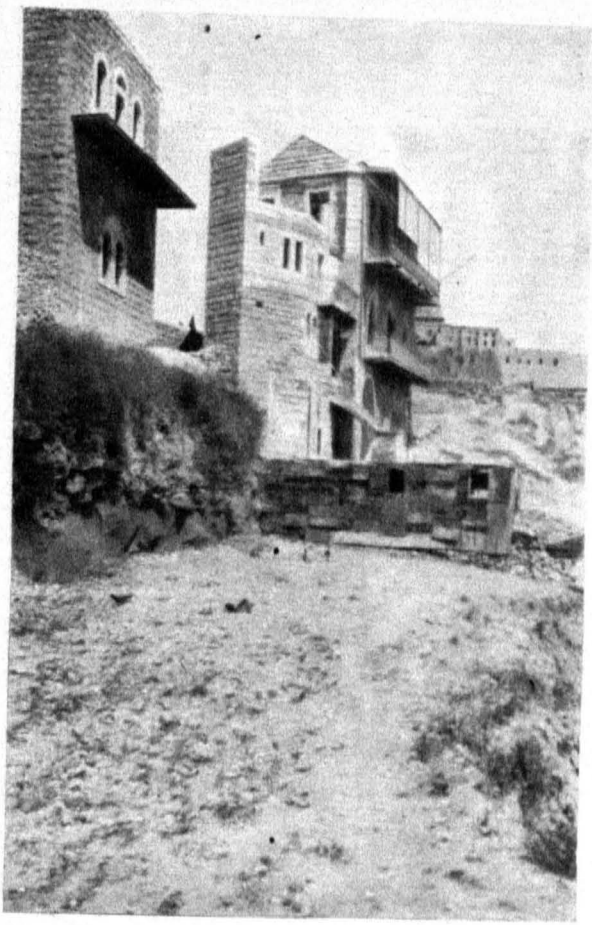
REGISTRE DU NIVELLEMENT. *(See Plate IV.)*

Hauteur totale du tunnel.	Repère de station.	Longr. jùsqu'à la stat. suiv.	Cote de nivellemt.	Différence en ± av. stat. précéd.	Pente théorique par mètre.	Observations générales.
3m·96	—	00	00	00	00	Plaf. et radier assez réguliers—parois passablemt. droites dans une roche franche—malaky (?). Qqs petites failles.
			m. cent.	m. cent.	m. et. et mm.	
4·58	a	10	0·17	0·17	0·017	Plaf. régul.; radier mal niv.; par. très ondulées. A 4m. de *a* fausse coupe très accentuée de la paroi Est.
5·08	b	10	0·26	0·09	0·009	Rad. très inégal. Parois très ondulées. Plaf. excellent à cause d'un lit de stratification géologique.
5·08	c	10	0·30	0·04	0·004	Plaf. et rad. excellents. Parois sinueuses avec faille assez accentuée, à 4 m. de *c*. Base plus *brute*.
5·04	d	10	0·36	0·06	0·006	Comme section précéd. A 16 m. de *d* l'horizontalité du plaf. fait place à une inclin. très régul. et accentuée.
3·80	e	20	0·68	0·32	0·016	Plaf. et rad. régul.; parois assez frustes et sinueuses. Ebauche d'un cartouche de 0m. 90 × 0·60 en moy. paroi Ouest.
3·35	f	10	0·77	0·09	0·009	Parois plus régul. et de bonne exécution. Assez longue section de *la ligne* à 1m. 10 au dessus du radier, paroi O.
2·05	g	10	0·86	0·09	0·009	Trou naturel et irrég. ds le plaf., prof. env. 0m. 30. Failles plus grde. en haut de par. O. à 3m. de *g*; autre trou à 7m. et 2me. cartouche.
2·04	h	10	0·89	0·03	0·003	Plaf. et parois relativemt. régul.; radier très mal nivelé, avec quelques poches de 10 à 15 centim.
2·05	i	10	1·00	0·11	0·011	Faille ds le plaf. à 3m. de *i*, plaf. régul. ensuite grâce à un nouv. lit d'assise. Cavité latér. natur. à 9m. de *i*, prof. indéterm.
1·88	j	10	1·13	0·13	0·013	Plaf. et par. frustes et dégrad., meilleurs dans la 2me. moitié de la section—Rad. assez régulier.
1·85	k	10	1·20	0·07	0·007	Plaf. très irrégul. dans un joint géolog.; paroi hautes relativemt. bonnes; faille verticale à 10m. de *k*; parois infér. très frustes.
2·03	l	20	1·29	0·09	0·0045	A 2m. de *l* orifice très évasé du puits ds le plaf. Ht. du roc accessible sous la maçonn. ou blocs éboulés, 5m. 20. Plaf. irrég. ensuite et petite caverne à 9m. de *l*.
1·73	m	20	1·39	0·10	0·005	Plaf. irrég. à travers des failles de l'assise rocheuse. Parois passablt dressées; rad. normal.
1·76	n	25	1·31	− 0·08	− 0·0032	*La ligne* sur la paroi O. sur 1m. 50 env. de long., à 1m. 58 au dessus du radier. Parois infér. beaucoup plus frustes.
2·02	o	15	1·34	+ 0·03	+ 0·002	Travail à peu près rég. ds tout le tunnel. Cavité natur. au plaf. à 11m. de *o*. A 30m. on passe ds le banc *mezzy* et le trav. devient + fruste.
1·54	p	50	1·46	0·12	0·0024	Trouée fort régul. mais très fruste, et rétrecissemt. prononcé à cause de résistance du mezzy. A 5m. de *p* ht. tot. 1m. 41 minim. du tunnel.
1·45	q	20	1·77	0·31	0·0155	Trav. plus soigné; régularité normale. A 7m. de *q* fausse coupe très prononcée à l'Ouest. A 16m. *it.* ds la paroi Est.
2·30	r	28 [29]	1·68	− 0·09	− 0·00321	Même caract. d'exécution. Fausse coupe prononcée à l'Ouest, mais graduellemt. abandonnée.
2·00	s	1	1·66	− 0·02	− 0·02	Jonction au moyen d'un brusque dénivellt. du plaf. Radier manifestemt. ravalé mais régulier. A 10m. de *s* ht. tot. 1m.53.
1·76	t	15	1·70	+ 0·04	+ 0·0266	Travail régulier mais relativt. fruste ds mezzy très dur. Très nombreuses fausses coupes, vers la jonction surtout.
1·69	u	25	1·82	0·12	0·0048	Plaf. et rad. réguliers; parois assez mal dressées et frustes, dans le bas en particulier. Larges stries au pic.
1·72	v	6	1·84	0·02	0·00333	Même caract. que ds la section précédente.
1·59	w	20	1·93	0·09	0·0045	,, ,, ,, Abaissement graduel du tunnel qui atteint son minimum à la station *x* dans cette partie N.
1·52	x	20	1.91	− 0·02	− 0·001	Trouée très régulière; dressage un peu fruste à cause de la nature du mezzy resistant et fort compact.
1·64	y	20	2·02	+ 0·11	+ 0·0055	*It.* En face 16 à partir de *y* le tunnel a éventré dans le haut une petite cavité naturelle.
1·59	z	22 [23]	2·18	0·16	0·00727	Exécution régulière, excepté à la partie inférieure des parois sur une ht. moy. de 95 cm. à 1m., très fruste.
1·80	α	10	2·10	− 0·08	− 0·008	Decrochements assez nombreux dans le plafond entre deux assises géologiques. Beaucp de sinuosités ds les parois.
1.82	ζ	10	2·00	0·01	0·001	Plaf. sensiblement régulier; quelques poches dans le radier; parois très franches mais peu planes.
1·58	γ	8	2·05	0·04	0·005	Petite faille dans le plaf. qui est formé ensuite par un lit d'assise naturel non aplani. Faille sur δ.
1·81	δ	10	2·06	+ 0·01	+ 0·001	A partir de δ, plaf. relevé en plan incliné. A 8m. faille latérale, mais aucune trace spéciale de ruissellemt. d'eau.
3·10	ε	10	2·05	− 0·01	− 0·001	A peu près en face de *ε la ligne* est visible—paroi Sud—à 1m. 28 du rad., env. 2m. long.
2·47	ζ	10	2·08	+ 0·03	+ 0·003	Exécution très régulière. Fause coupe assez accentuée vers le milieu de la paroi N. Parois infér. très frustes.
2·35	η	6	2·09	0·01	0·00166	Plaf. très dégradé, dans un large lit d'assise. Petite faille vers le milieu de la section, dans la paroi N.
2·60	θ	5	2·08	− 0·01	− 0·002	Travail plus soigné dans une roche mezzy assez franche. Rad. mal nivelé; base des parois très fruste.
2·53	ι	4	2·07	0·01	0·0025	Plaf. très soigneusement aplani. Parois plus finement dressées à partir de 1m. 10 du rad.; en faille en "gorge" ds paroi N.
2·79	κ	3	2·07	± 0	± 0	*La ligne* ds paroi N. sur env. 1m. de long. à peu près exactement sans un relèvement du plaf. Voir le tracé.
2·53	λ	4	2·03	− 0·04	− 0·001	Abaissemt. graduel du plaf. Excellentes parois. Qqs petits godets irregul. dans le rad. Banc de roche très compact.
2·05	μ	3	2·07	+ 0·04	+ 0·01333	Petite faille dans le plafond. Bonnes parois non sans qqs légères ondulations; très frustes à la base; traces d'enduit.
1·94	ν	2·50 [2·45]	1·88	− 0·19	− 0·076	Denivellement très brusque de 0m. 30 sur 1m. à l'entrée.
		512·50 514·45				

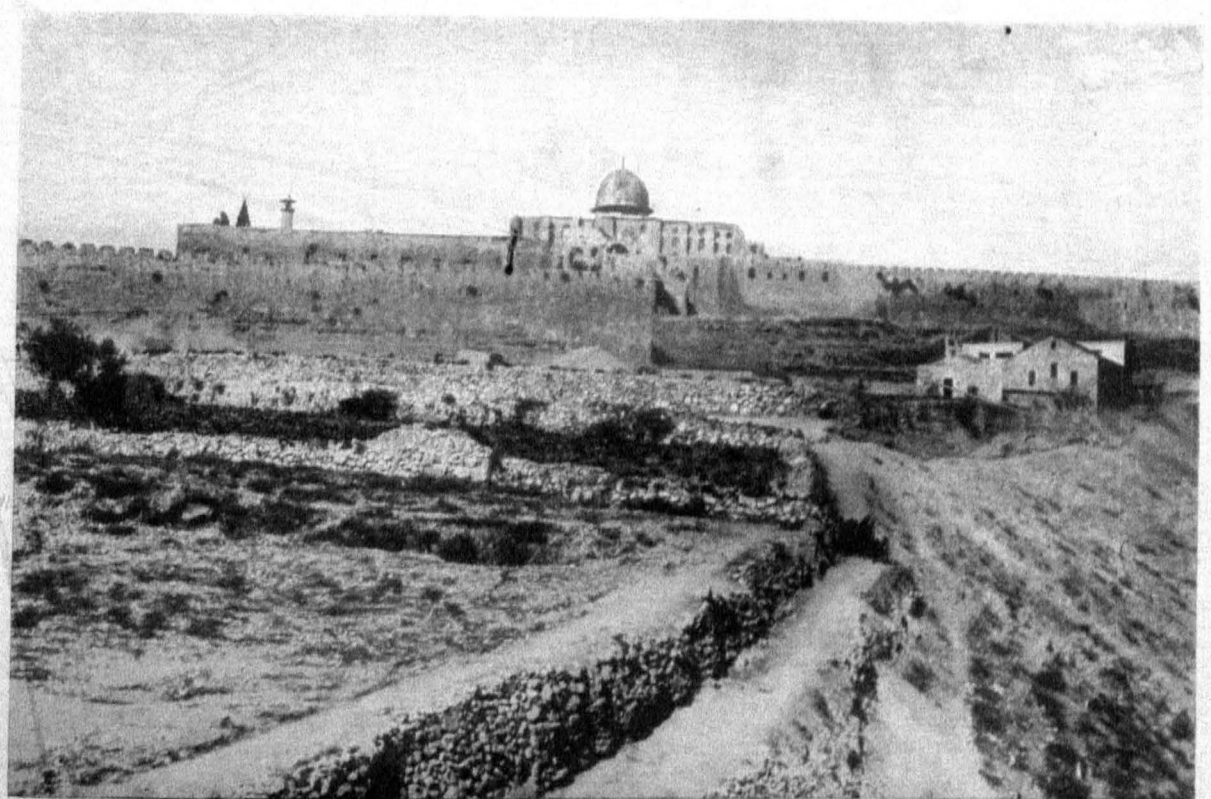
1. Looking up the Kedron Valley from the Excavations of 1909-11.



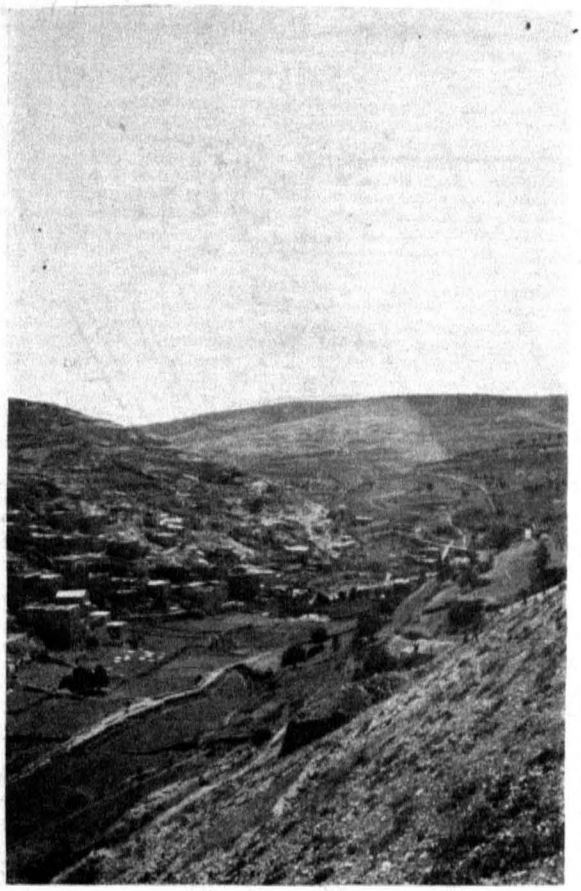
2. The Village of Siloam, which Provided Workmen for the Expedition of 1909-11.



3. House (overlooking the Works at Siloam) in which the Leaders of the Expedition lived.



4. The Mosque of Omar, from the House shown in No. 3.

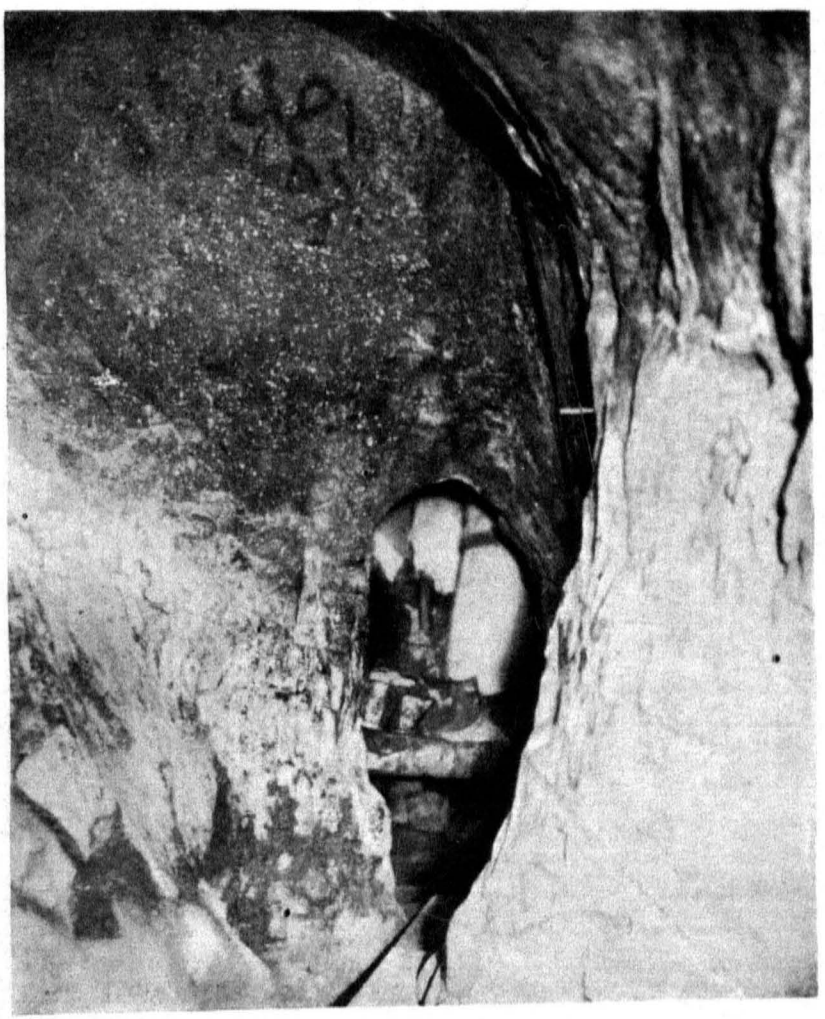


5. The Valley of the Kedron. On the right near the mound of earth is the Head of the Shaft sunk by the Expedition of 1909-11.

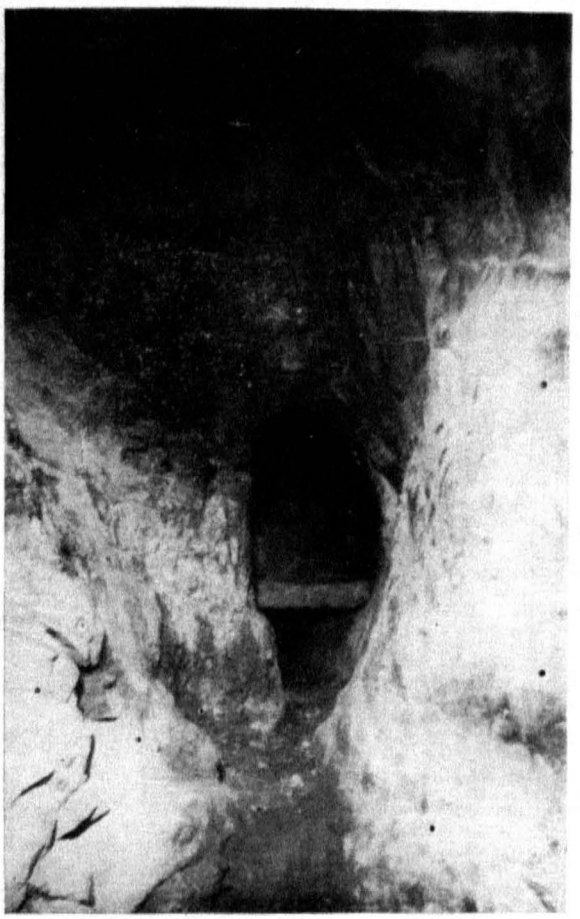
6. In the top left-hand corner is seen the Tent and Shaft sunk by the Expedition of 1909-11, about 200 ft. from the Virgin's Well.

7. Entrance to the Virgin's Well.

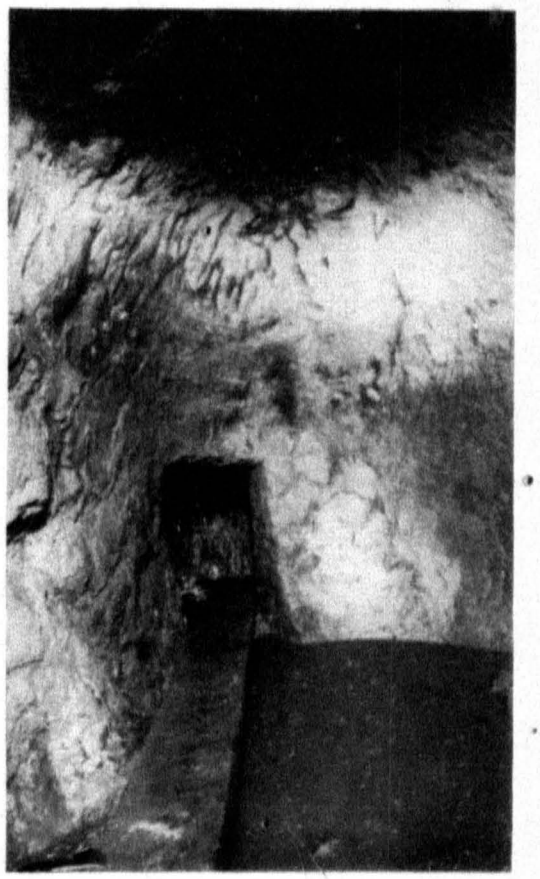
8. The Virgin's Well after it had been Cleaned Out and the Water Diverted while the Siloam Tunnel (the Entrance of which is shown on the left) was being Excavated.



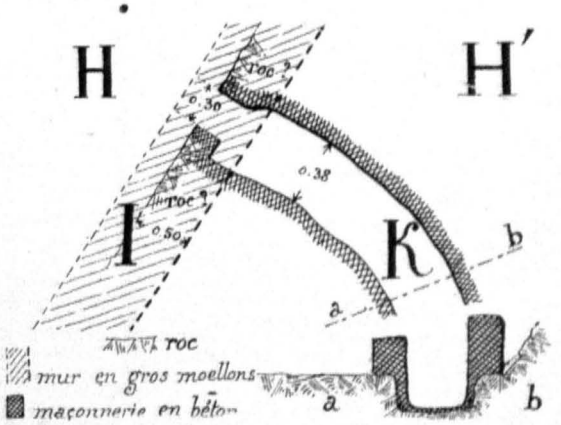
9. The Virgin's Well. View taken from within, looking outwards. A Man can just be seen standing on the last step of the Staircase down to the Well.



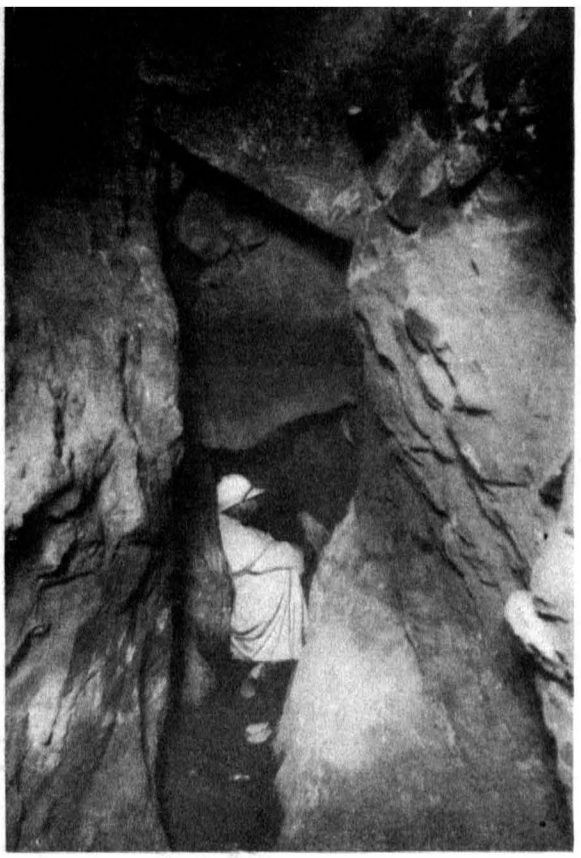
10. Another View of the Virgin's Well from within, showing the Stairway.



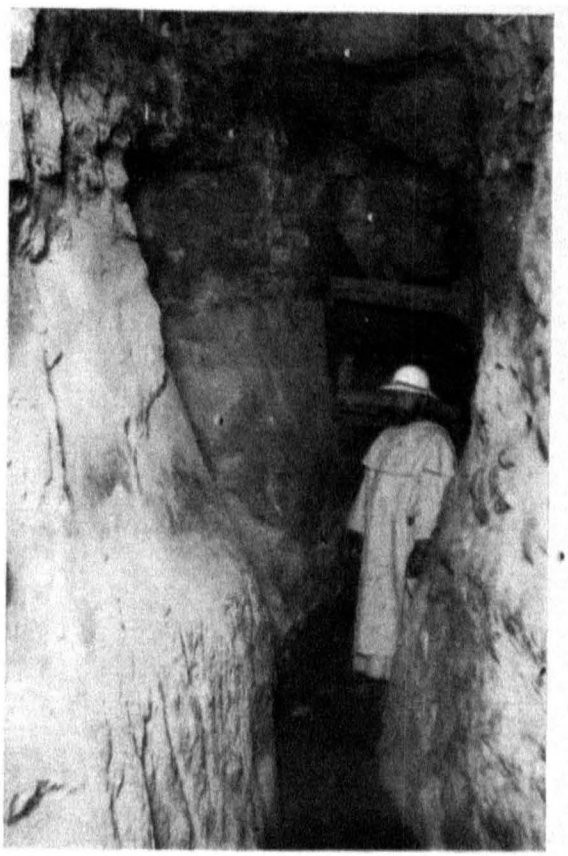
11. Entrance to the Siloam Tunnel in the Virgin's Well.



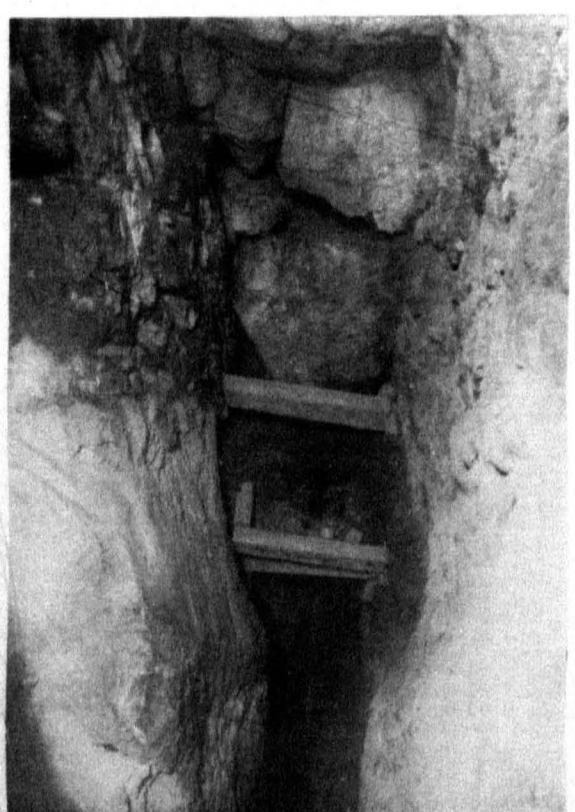
12. See Text, p. 6. Plan of Tunnel No. 1.



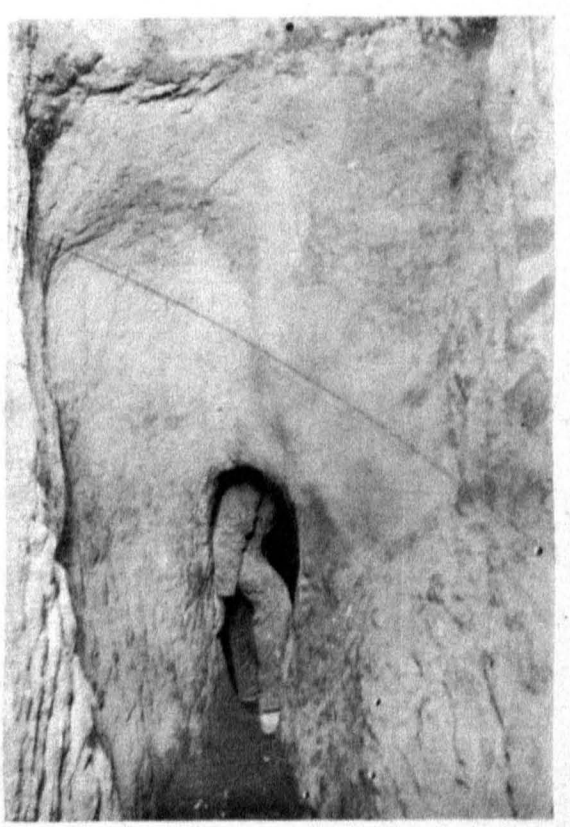
13. A Narrow Part of the Crossways Heading: name given to the Tunnel (discovered 1909-11) leading from above the Virgin's Well, along the Kedron Valley to the South.



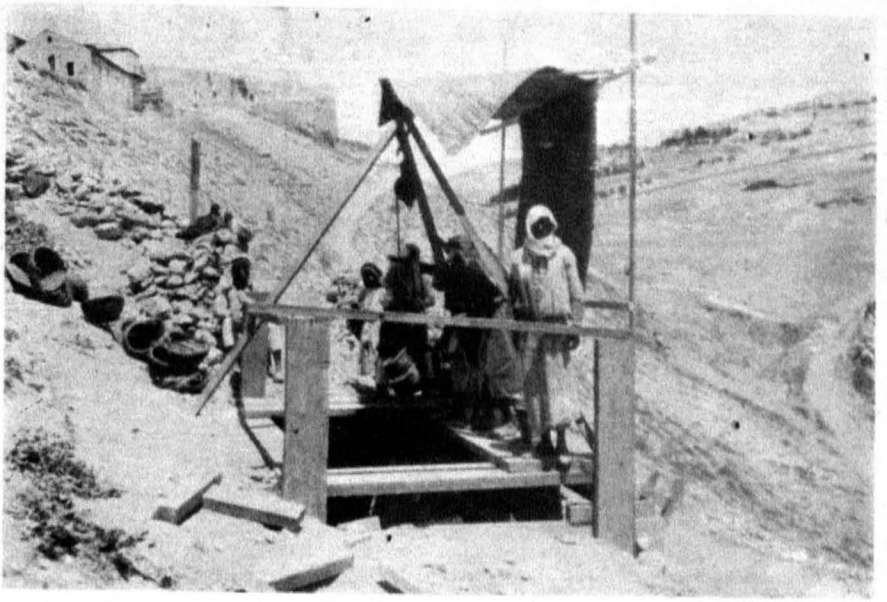
14. View of Crossways Heading, showing (on the left) Opening of Another Tunnel to a Circular Chamber connected with the Siloam Tunnel.



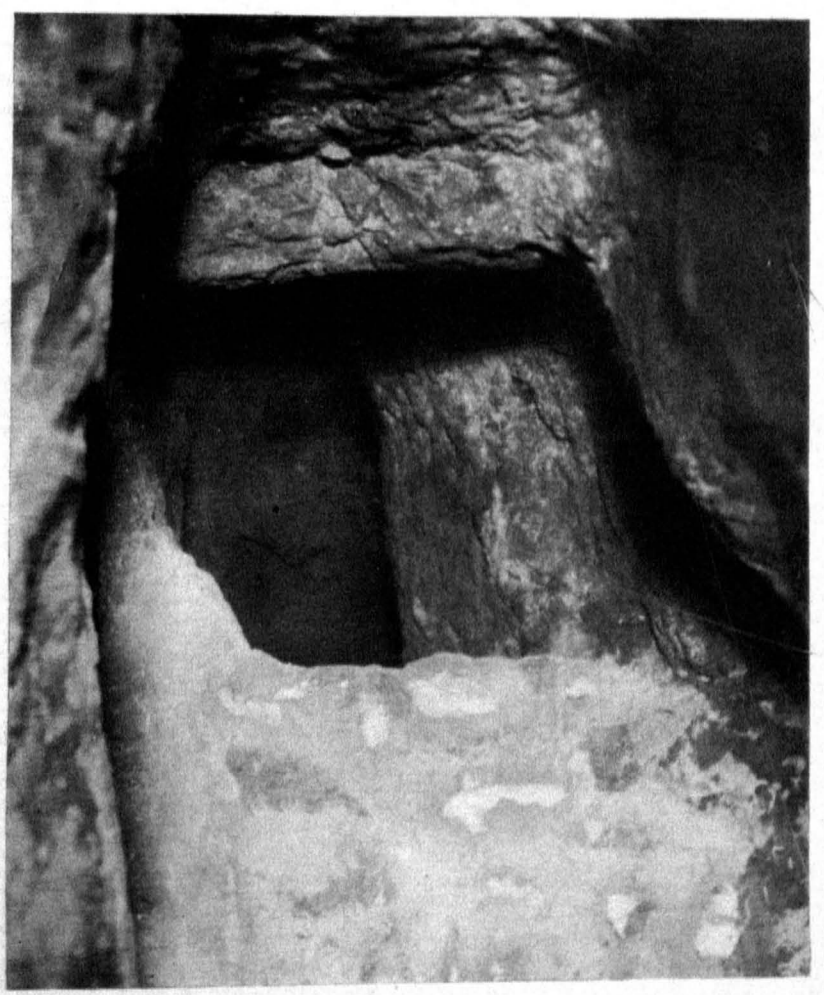
15. The Top of the Crossways Heading.



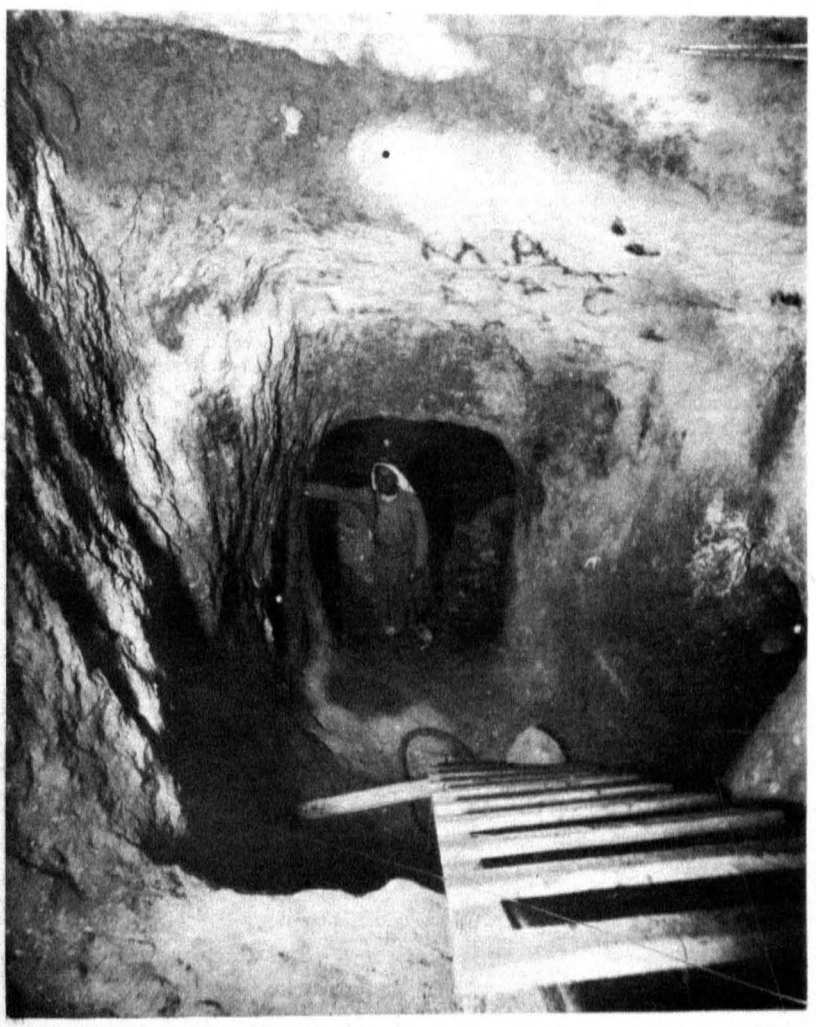
16. Passage connecting the Crossways Heading with the Circular Chamber, showing Entrance to Circular Chamber.



17. The Original Shaft sunk by the Expedition of 1909-11 leading to the Dragon Passage.

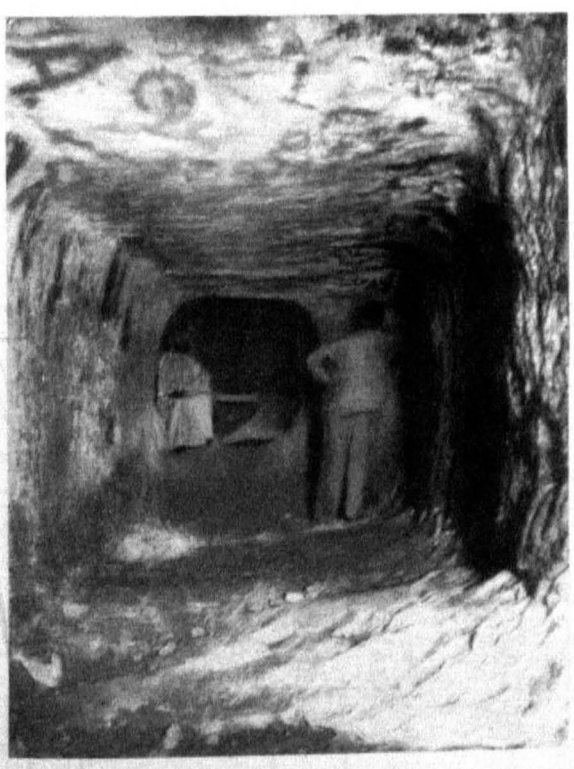


18. View down the Dragon Shaft from beneath the Arch discovered by Sir Charles Warren.

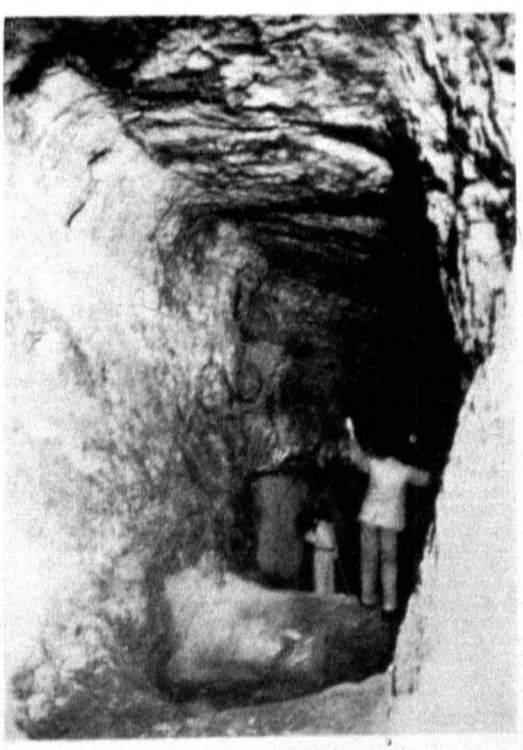


19. Another View of the Dragon Shaft. (The Steps lead down from Warren's Arch.)

20. Another View of the Dragon Shaft.

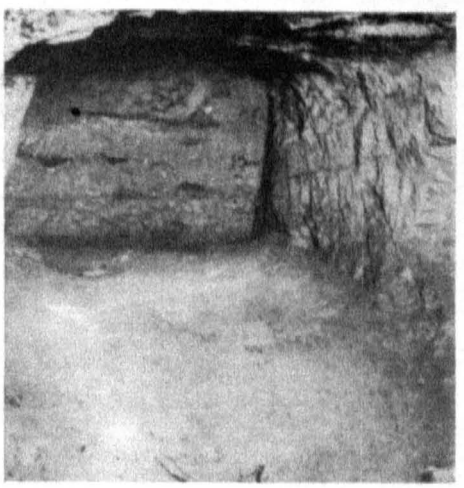


21. The Dragon Shaft in process of Excavation.

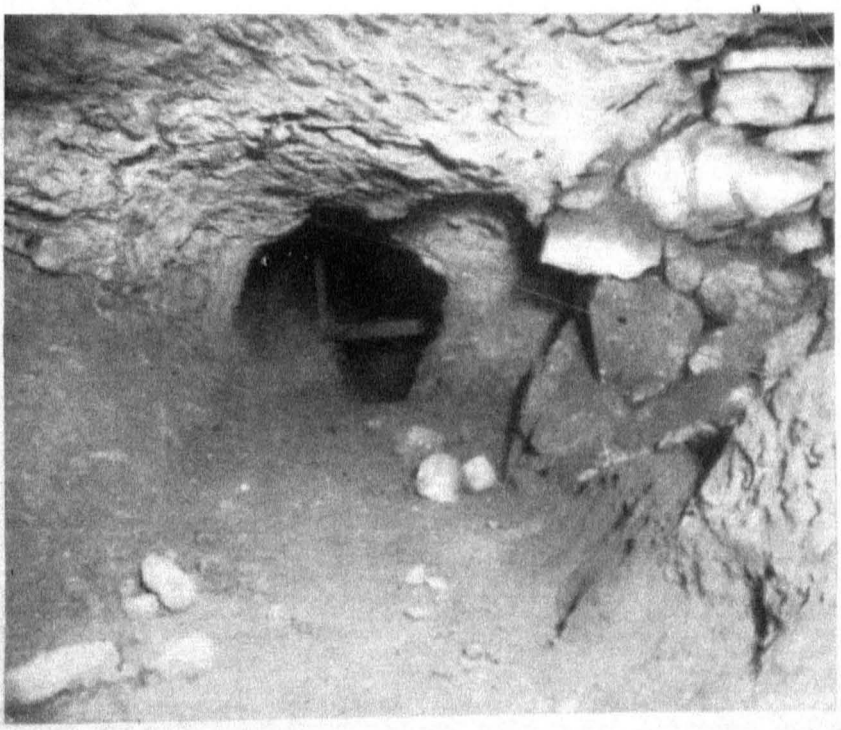


22. At Work in the Dragon Shaft.

23. View (from the Dragon Shaft) of the Top of Warren's Shaft showing the Rope and Pulley.

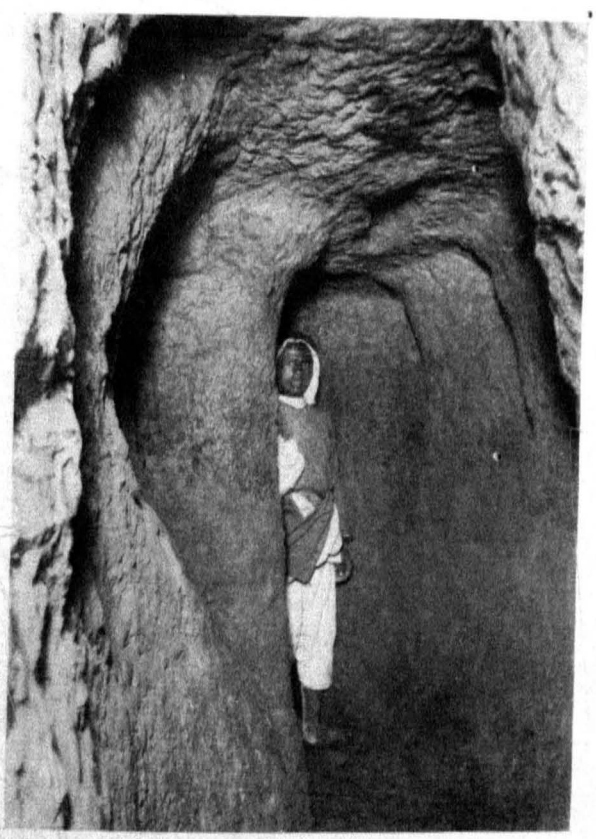


25. Rock-cut Alcove in the Grotto connected with the Dragon Shaft.

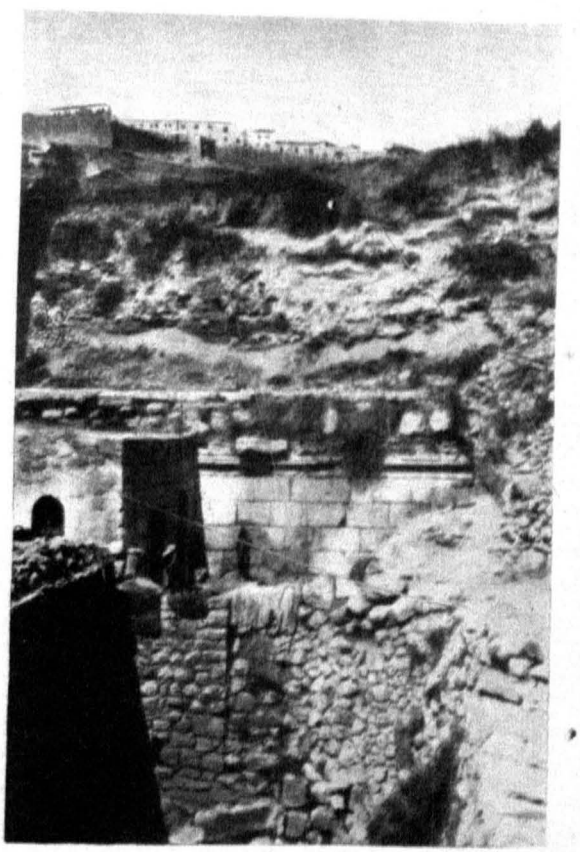


24. View of the Dragon Shaft from the Grotto.

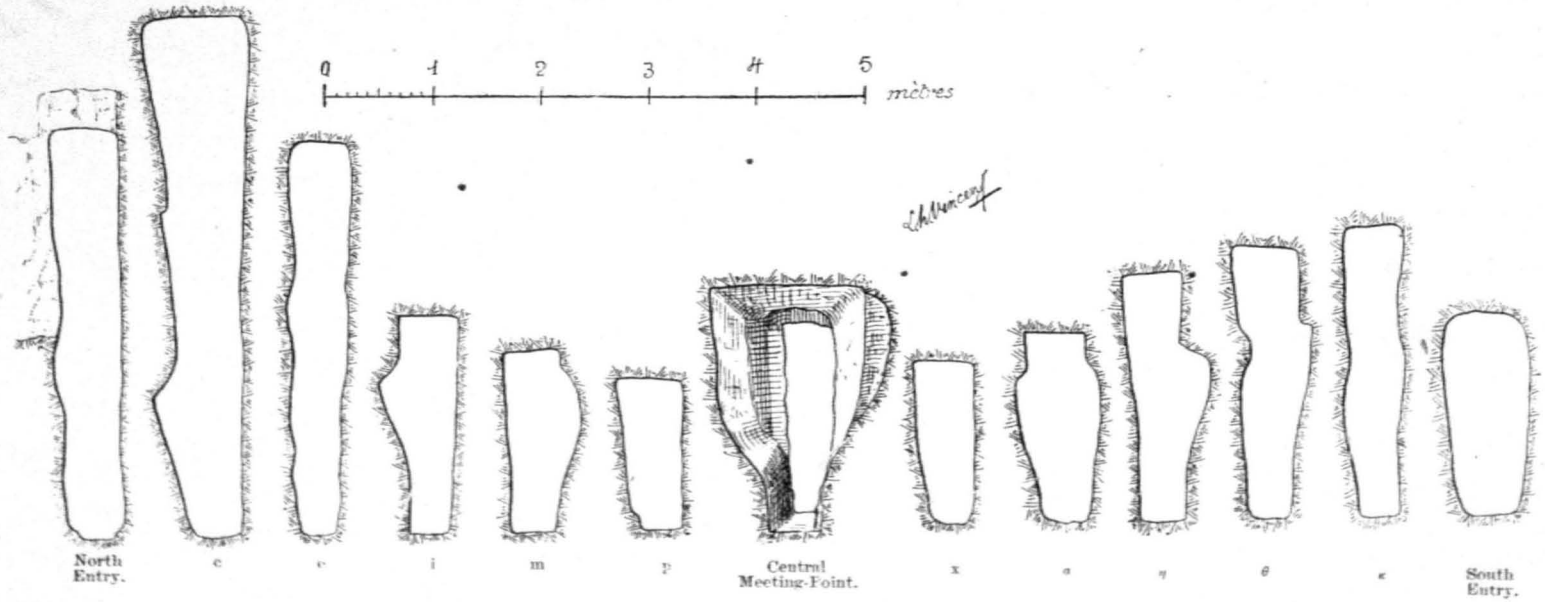
26. Shaft above the Grotto close to the Deagon Shaft.



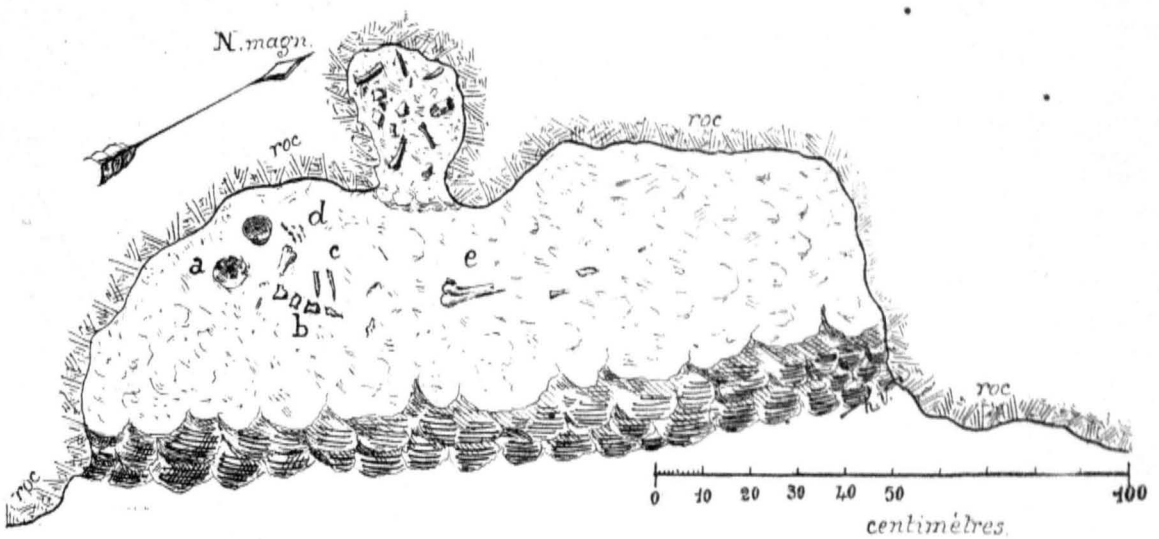
27. The Point in the Siloam Tunnel where the Parties working from each end met in the middle. (Total length of Tunnel, 1770 ft.)



28. The Pool of Siloam before it had been repaired by the Villagers during the Expedition of 1909-11.



29. Sections of Various Parts of the Siloam Tunnel.



30. One of the Rock-Cut Tombs (Plan).

31. Transverse Section of Rock-Cut Tomb.

VIRGIN'S FOUNTAIN

Scale in mètres: 0 1 2 3 4 5 6 7 8 9 10

" " feet: 0 5 10 15 20 25 30 35

Plan

New Building (School)

Masonry of various periods from byzantine to modern arabic.
Very old Masonry.
Works in living Rock.
Earth and Rubbish.

terrace with vegetables

not excavated

Section gh - looking westward

Section ab - looking northward

Cemented Floor

Top of the Rock

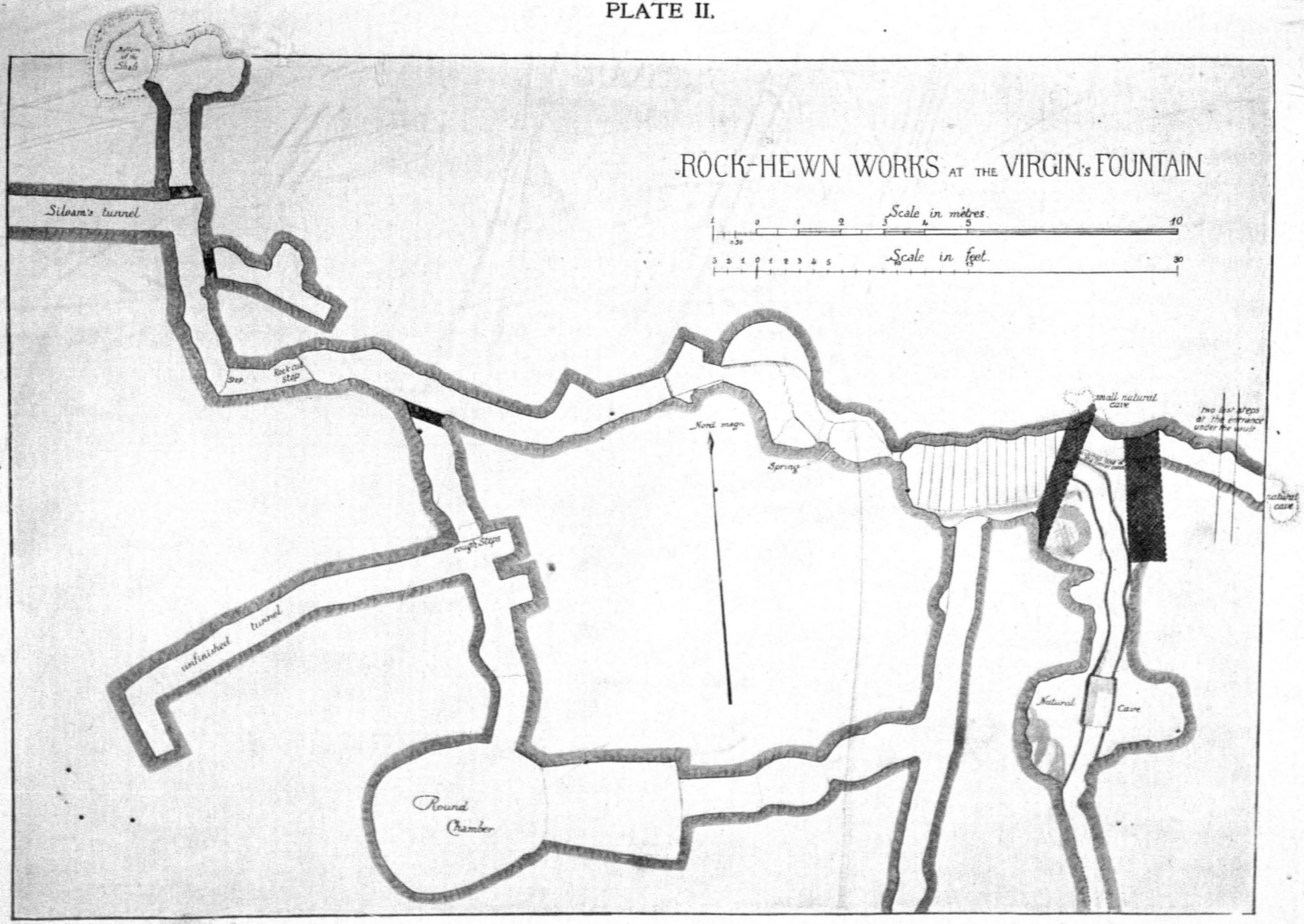
Spring

Sections ef & cd - looking westward

H.V.

Drawing to scale of Discoveries made by the Expedition of 1909-11 round the Virgin's Well on Mount Ophel.

PLATE II.



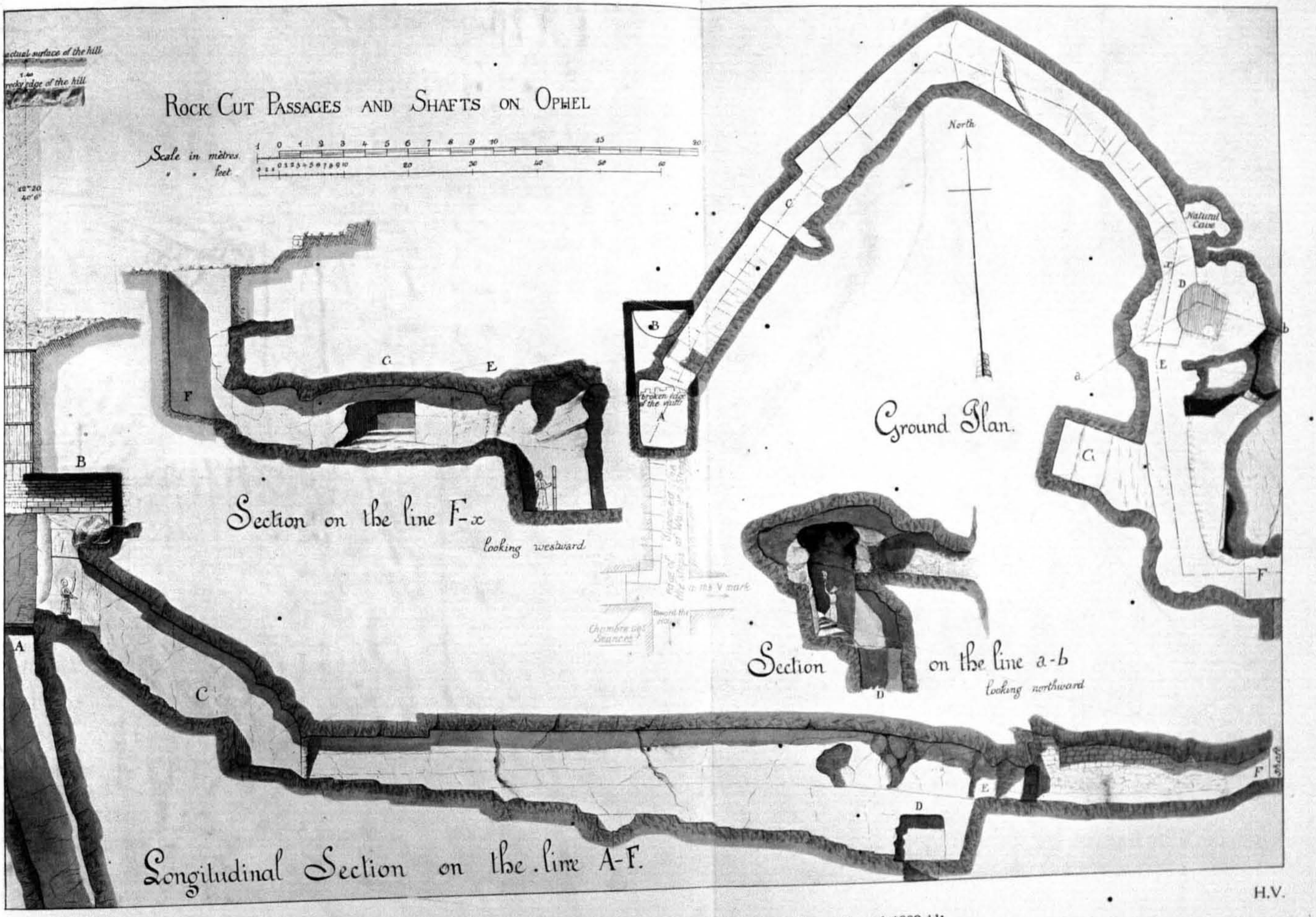
PLAN OF SUBTERRANEAN PASSAGES DISCOVERED ROUND THE VIRGIN'S WELL BY THE EXPEDITION OF 1909-11.

THE BLOCKS OF PLAIN BLACK ARE DAMS. THE CROSSHATCHED BLACK BLOCKS ARE ANCIENT MASONRY.

Rock Cut Passages and Shafts on Ophel

Scale in mètres. 1 0 1 2 3 4 5 6 7 8 9 10 15 20

" " feet 1 0 1 2 3 4 5 6 7 8 9 10 20 30 40 50 60



Drawing to scale of the Discoveries made near Warren's Shaft by the Expedition of 1909-11:

PLATE III. (b).

DRAGON SHAFT OPHEL HILL.

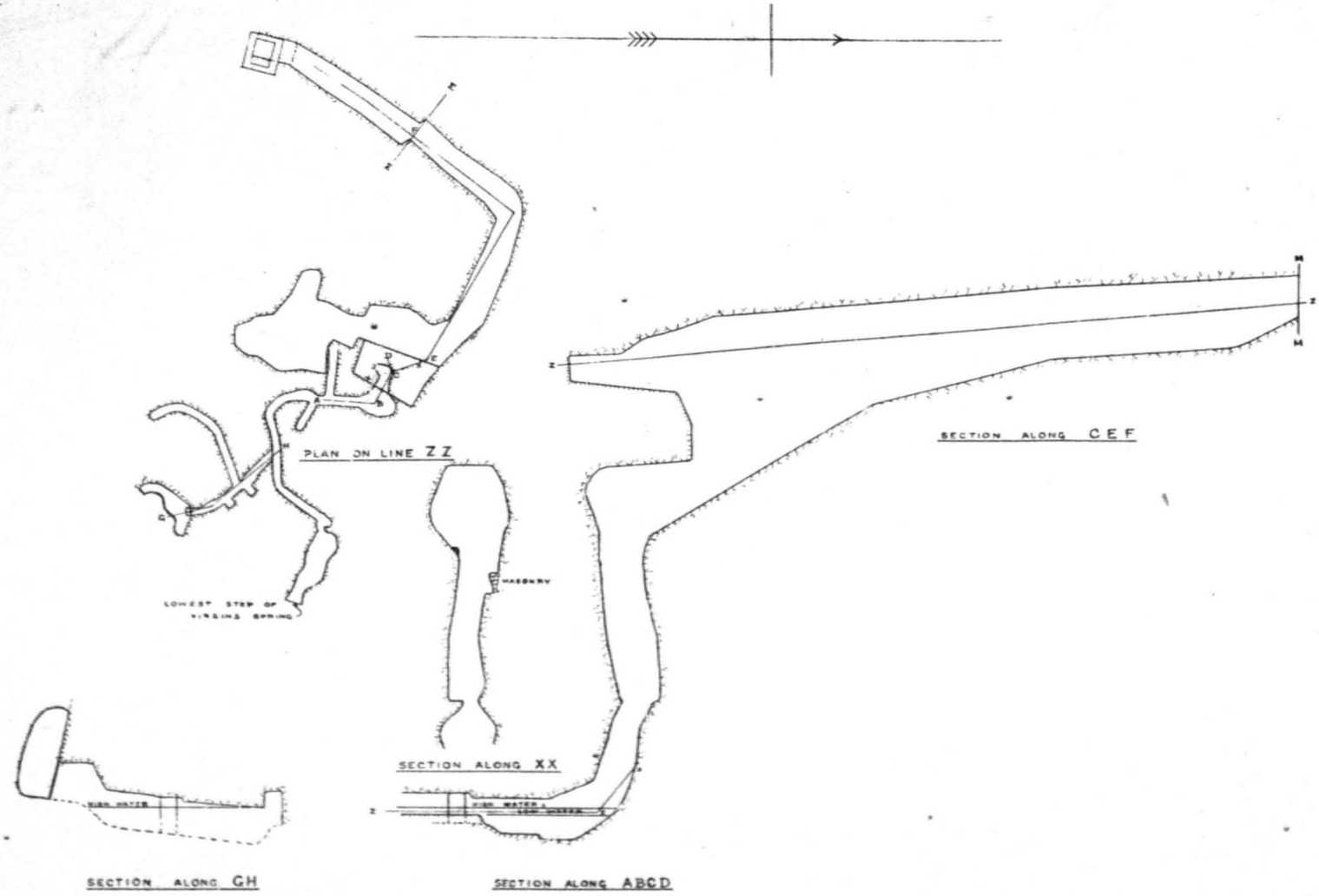
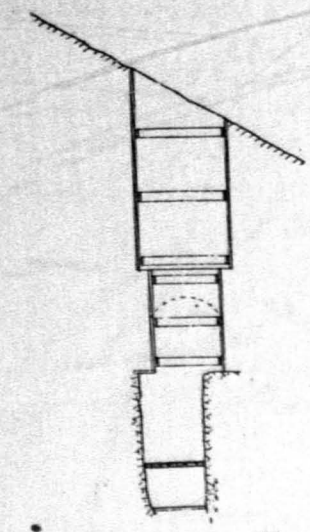


PLATE III. (c)

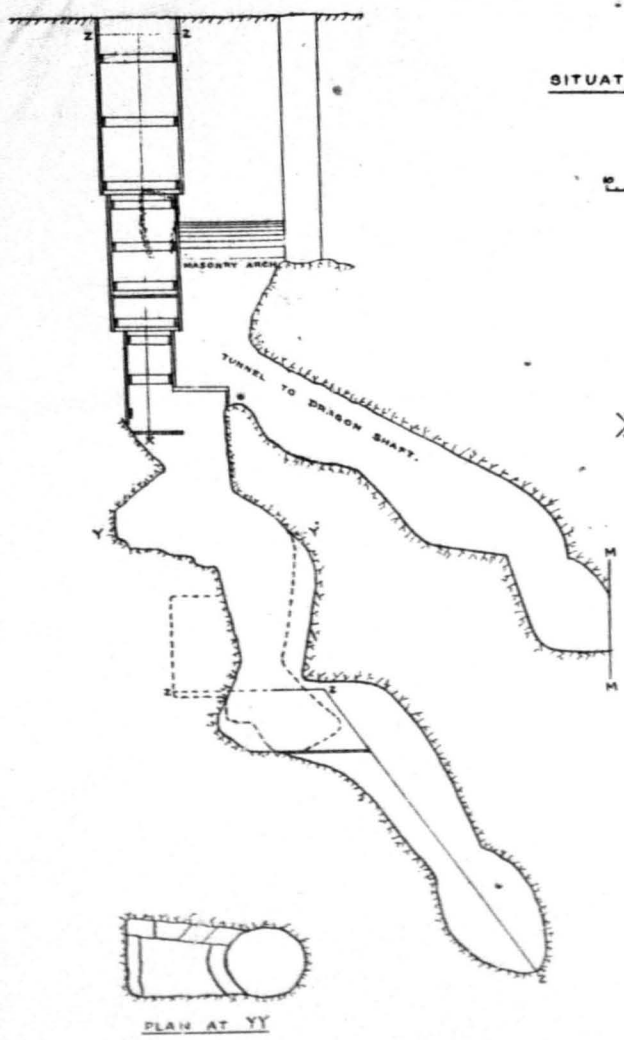
MAIN SHAFT OPHEL HILL

SITUATED 200 FEET WEST OF TOP STEP OF VIRGINS SPRING

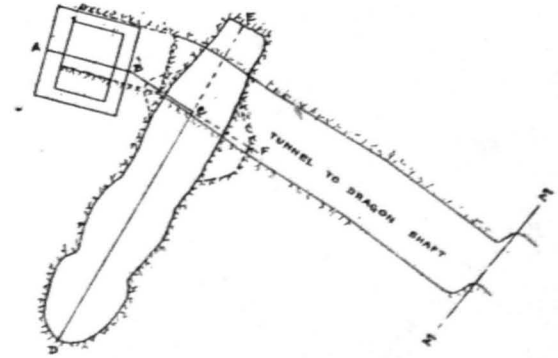
SCALE 1" = 10'



CROSS SECTION XX

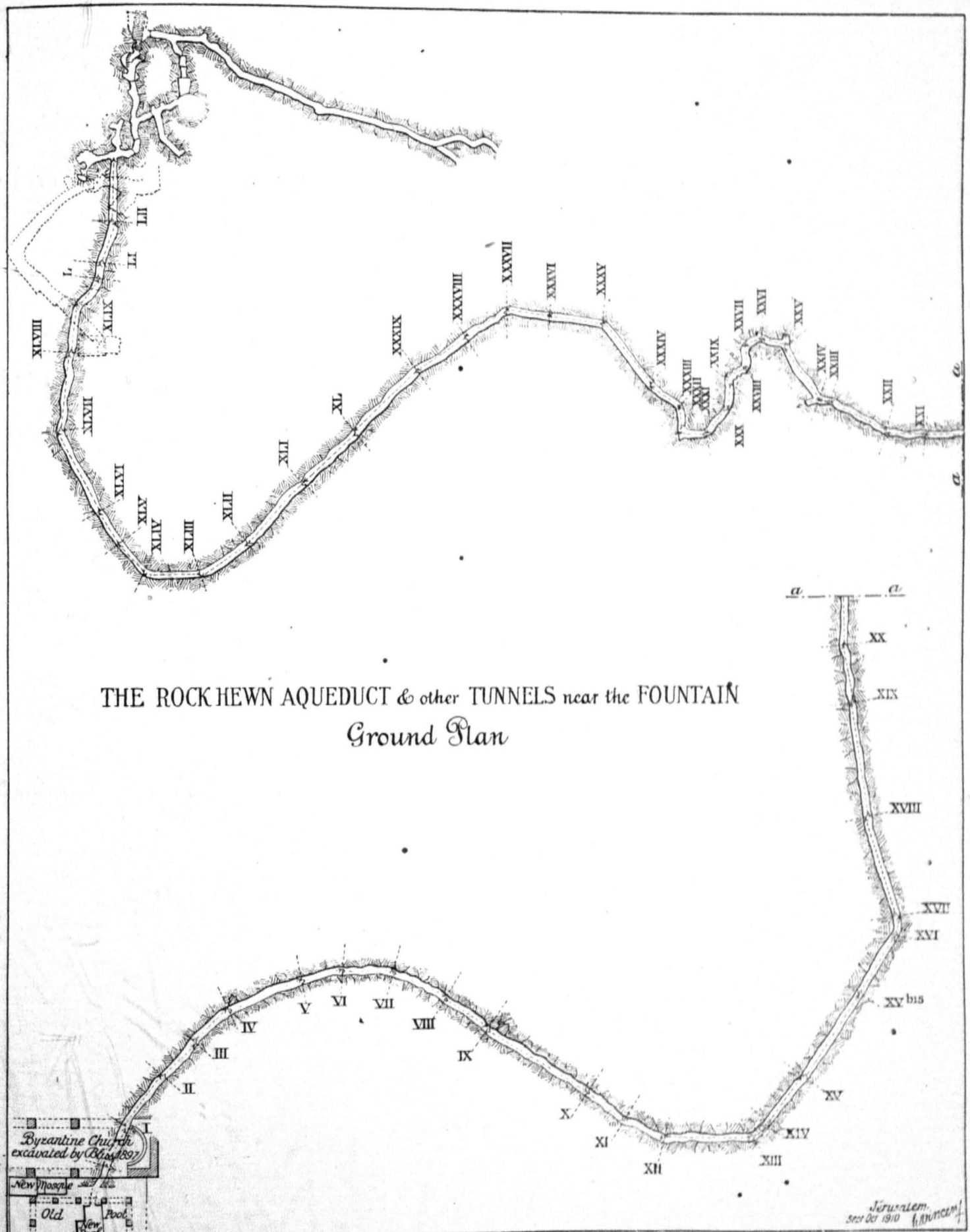


PLAN AT YY



PLAN ON LINE ZZ

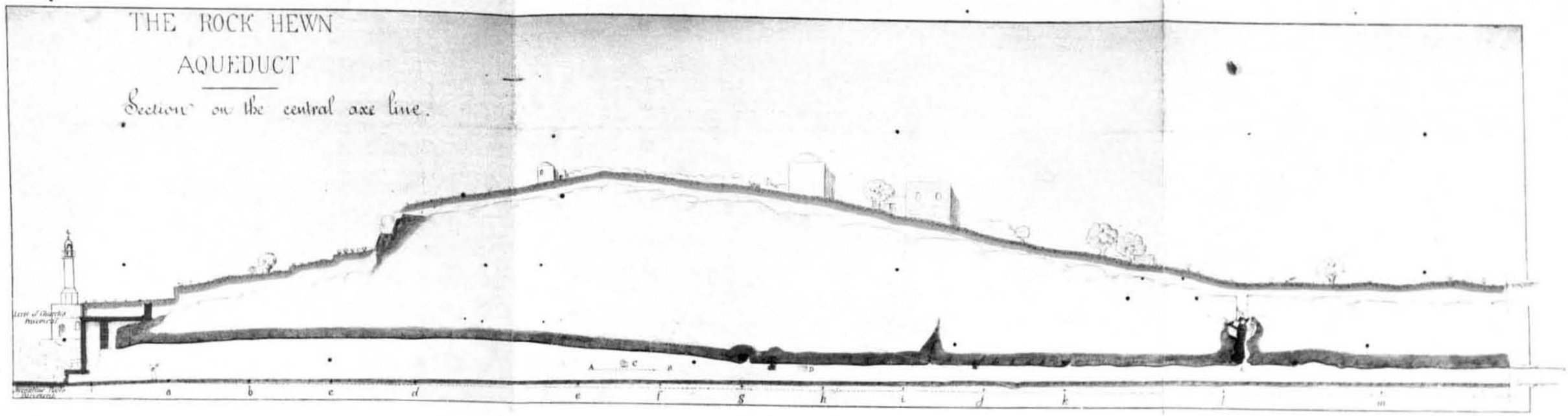
SECTION ALONG A.B.C.D WITH C.E AND C.F SHOWN DOTTED.

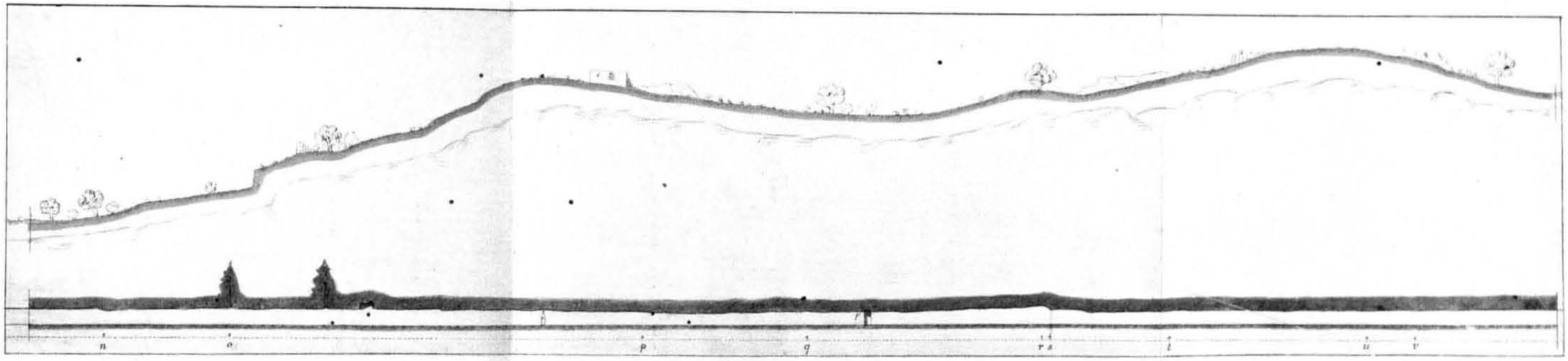


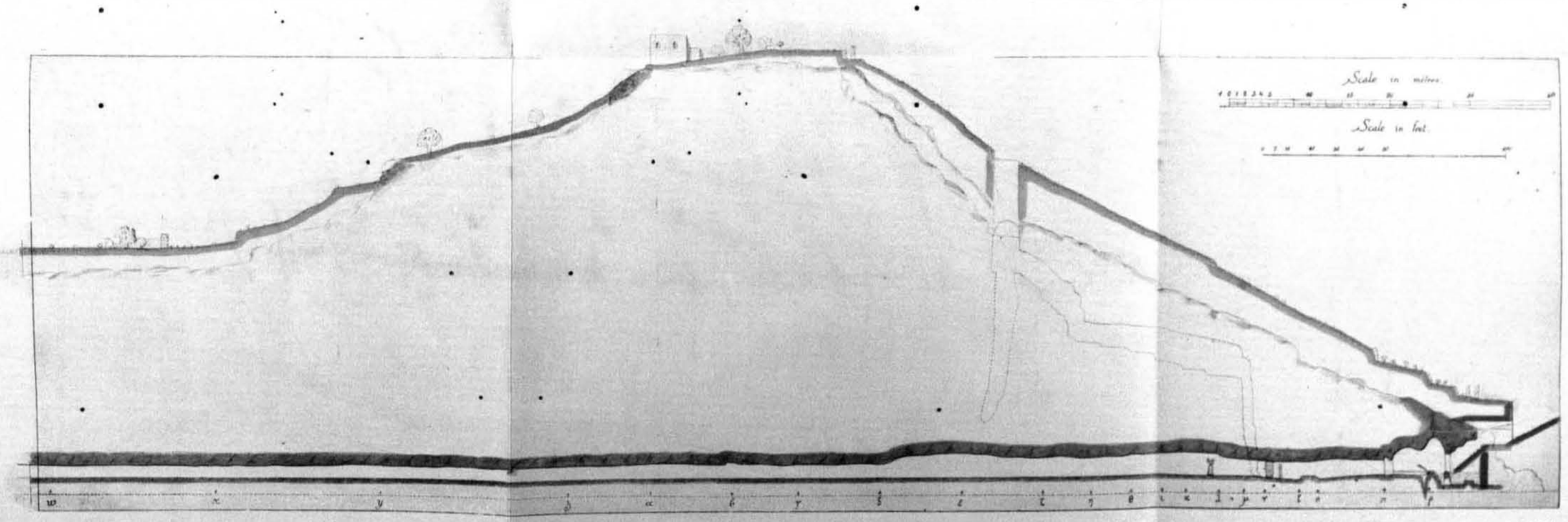
[*N.B.*—*To save space* (*see Text, pages* 41 *and* 42), *both ends of this tunnel-aqueduct* (*from the Virgin's Well at the top of the page to the Pool of Siloam in the lower half*) *are reproduced on the same plate; but to obtain a correct view of the whole excavation the line a—a, between sections* XX *and* XXI, *in the lower half, should coincide with the line a—a* (*now at right angles to it*) *in the upper half.*—ED.]

THE ROCK HEWN AQUEDUCT

Section on the central axe line.



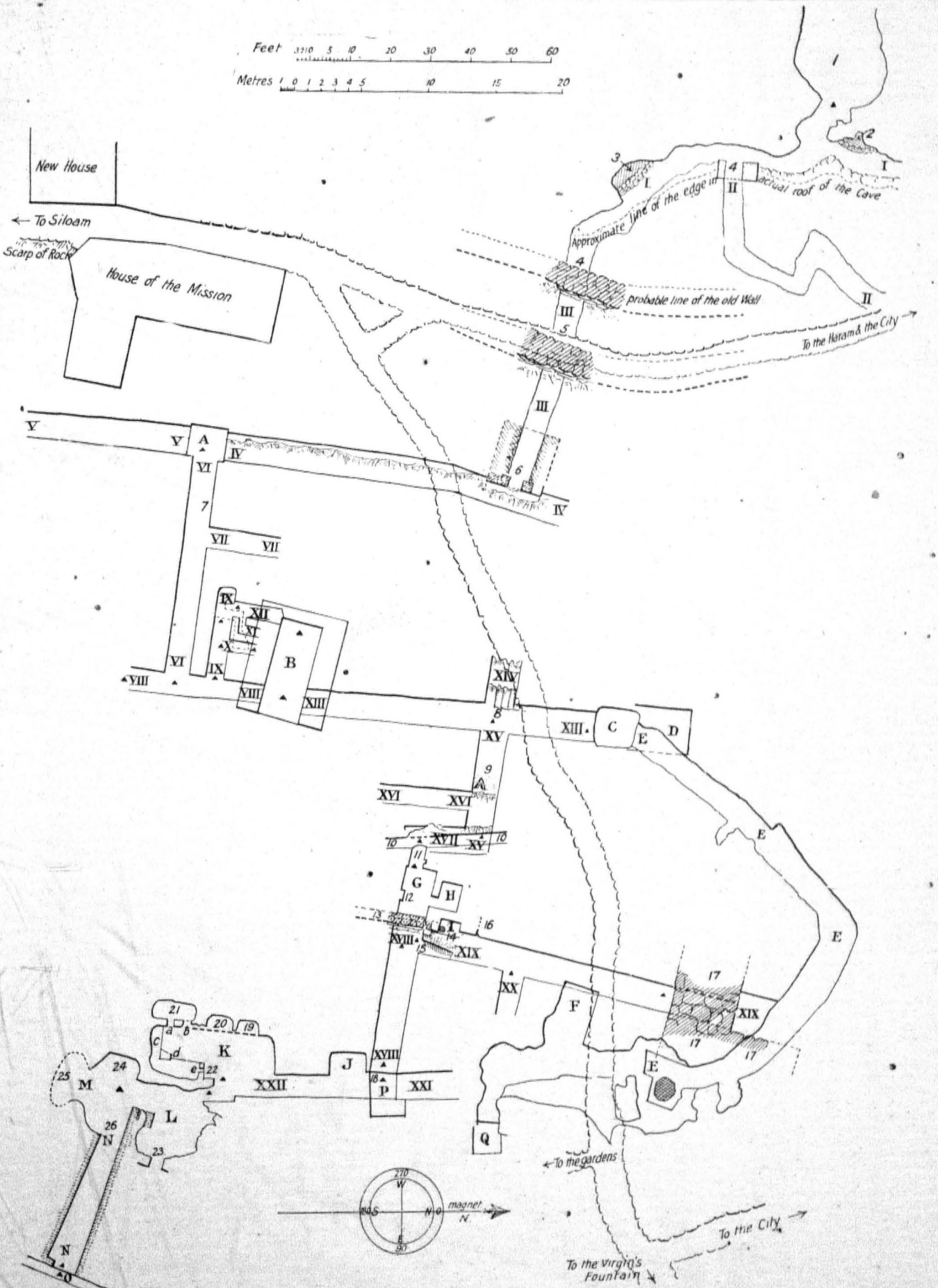




H.V.

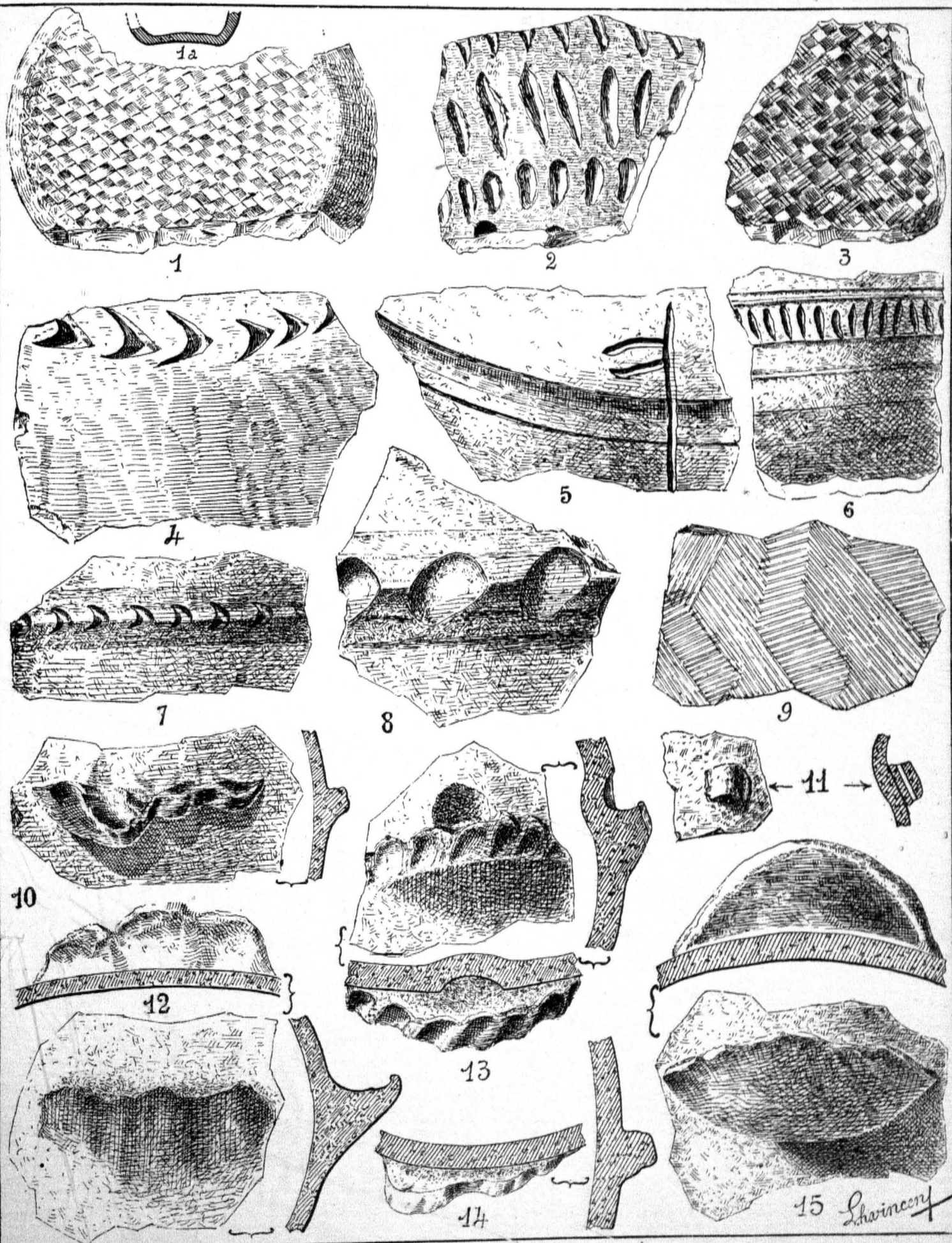
Section to scale of the Subterranean Aqueduct from the Virgin's Well to the Pool of Siloam.

PLATE VI.



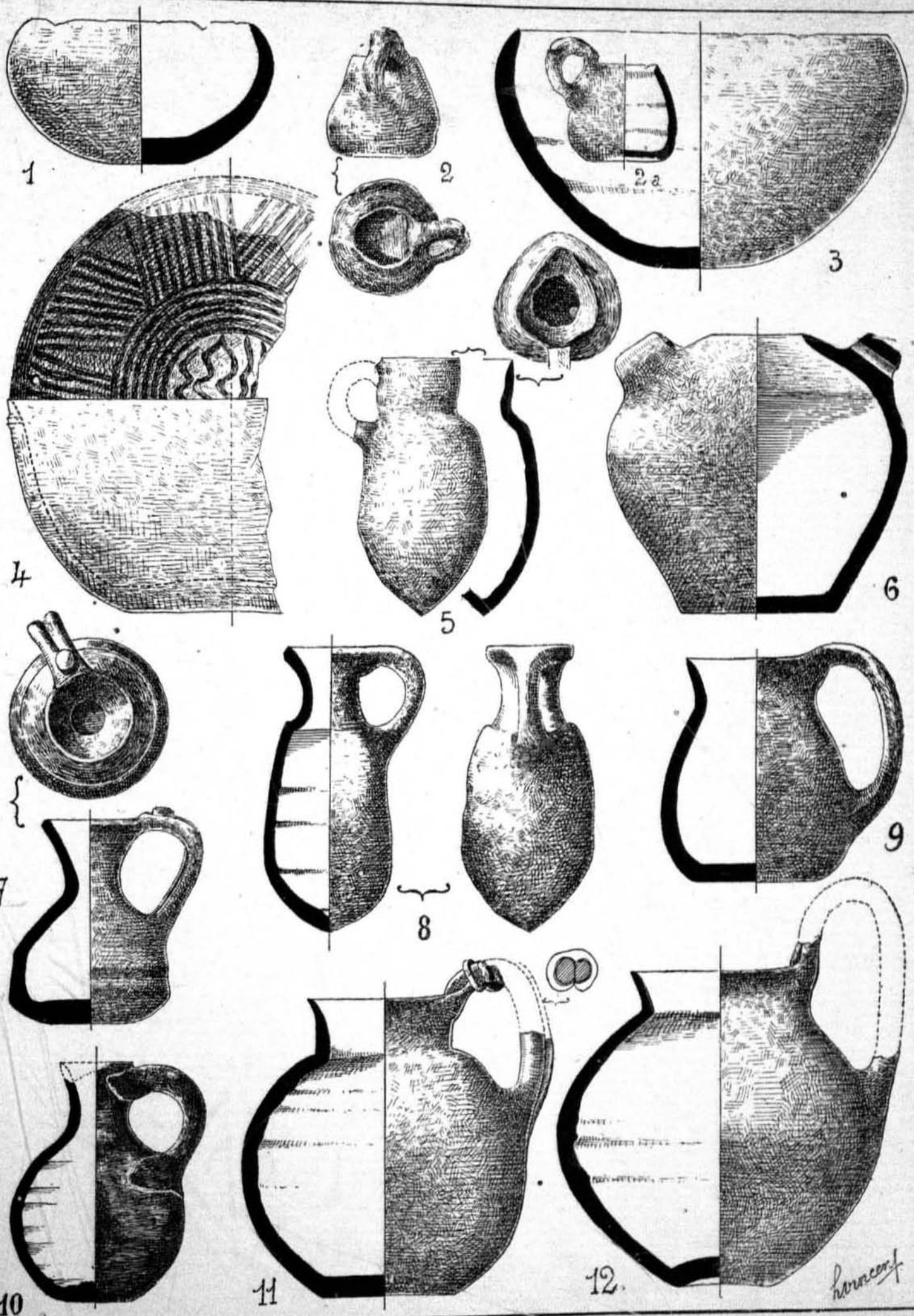
ENERAL PLAN OF THE EXCAVATIONS.

PLATE VII.



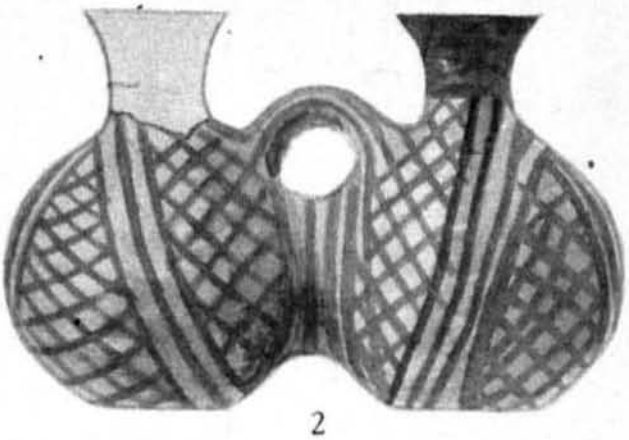
POTTERY FOUND BY THE EXPEDITION.

PLATE VIII.

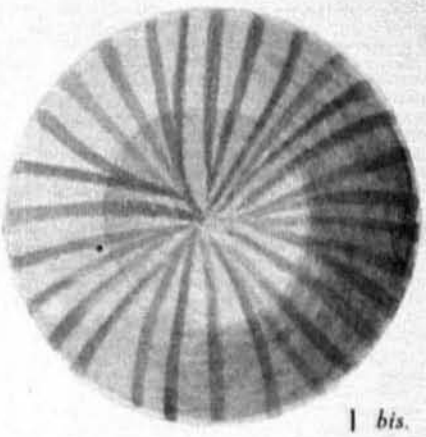


POTTERY FOUND BY THE EXPEDITION.

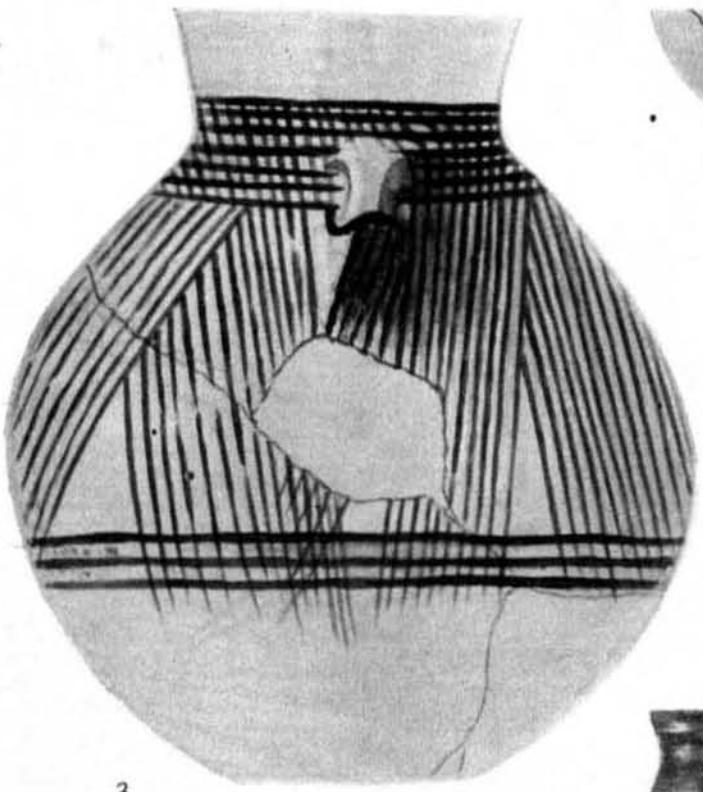
1.



2

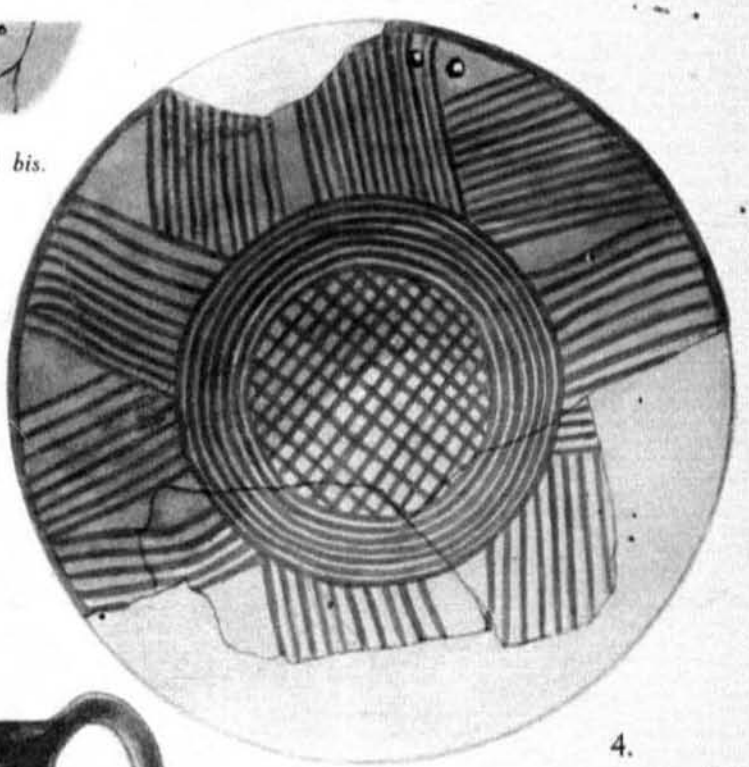


1 *bis.*



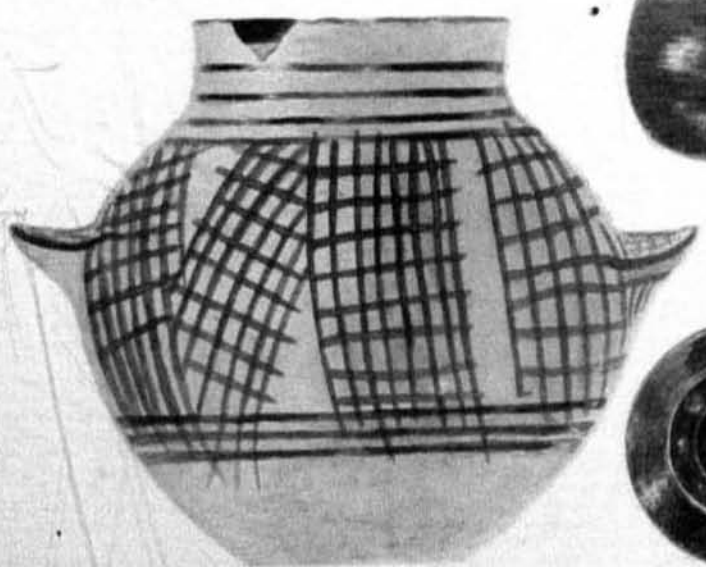
3

4 *bis.*



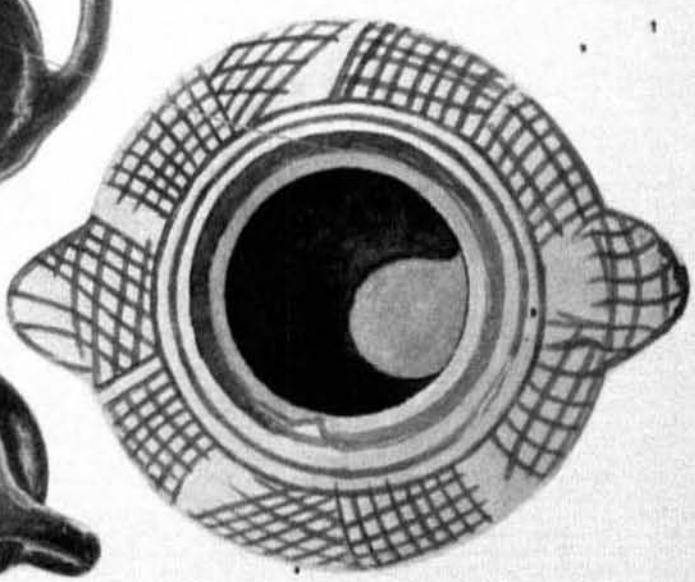
4.

6



5.

6 *bis.*



5 *bis.*

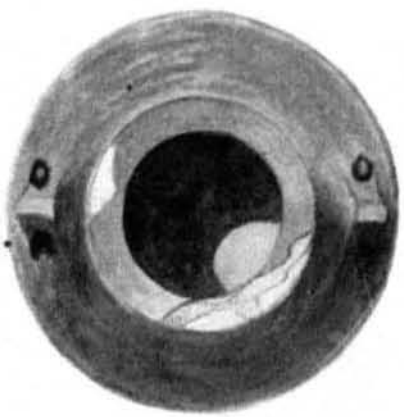
H.V.

Pottery found on Mount Ophel by the Expedition of 1909-11.

1.

2.

5.



6a.

6.

3.

4.

H.V.

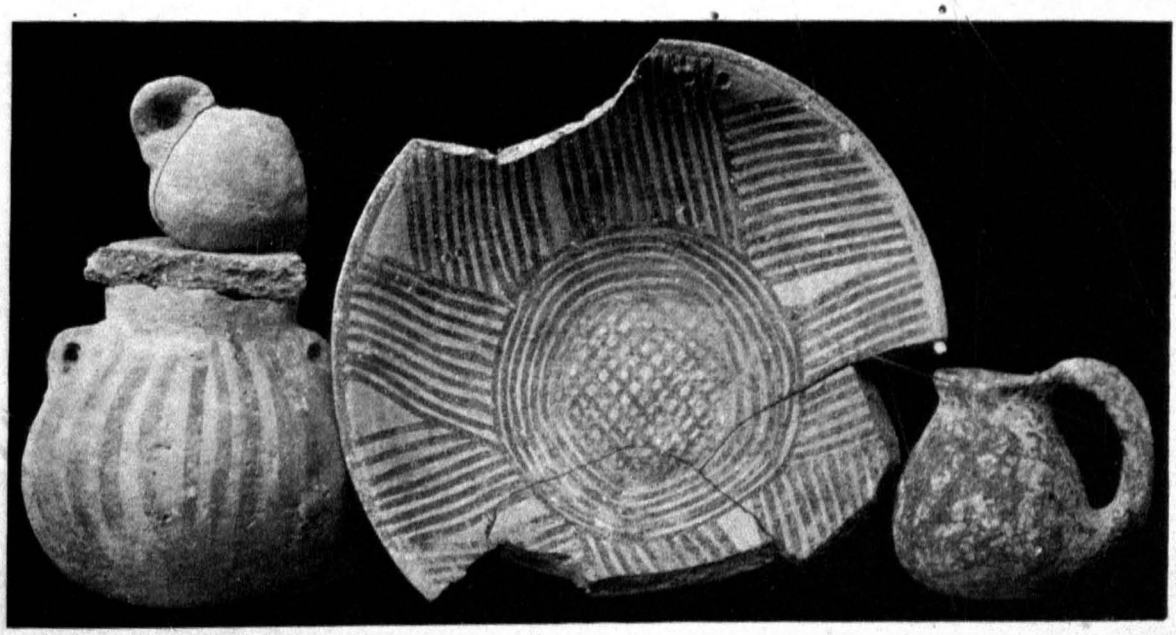
Pottery found on Mount Ophel by the Expedition of 1909-11.

H.V.

Pottery found on Mount Ophel by the Expedition of 1909-11.

PLATE XII.

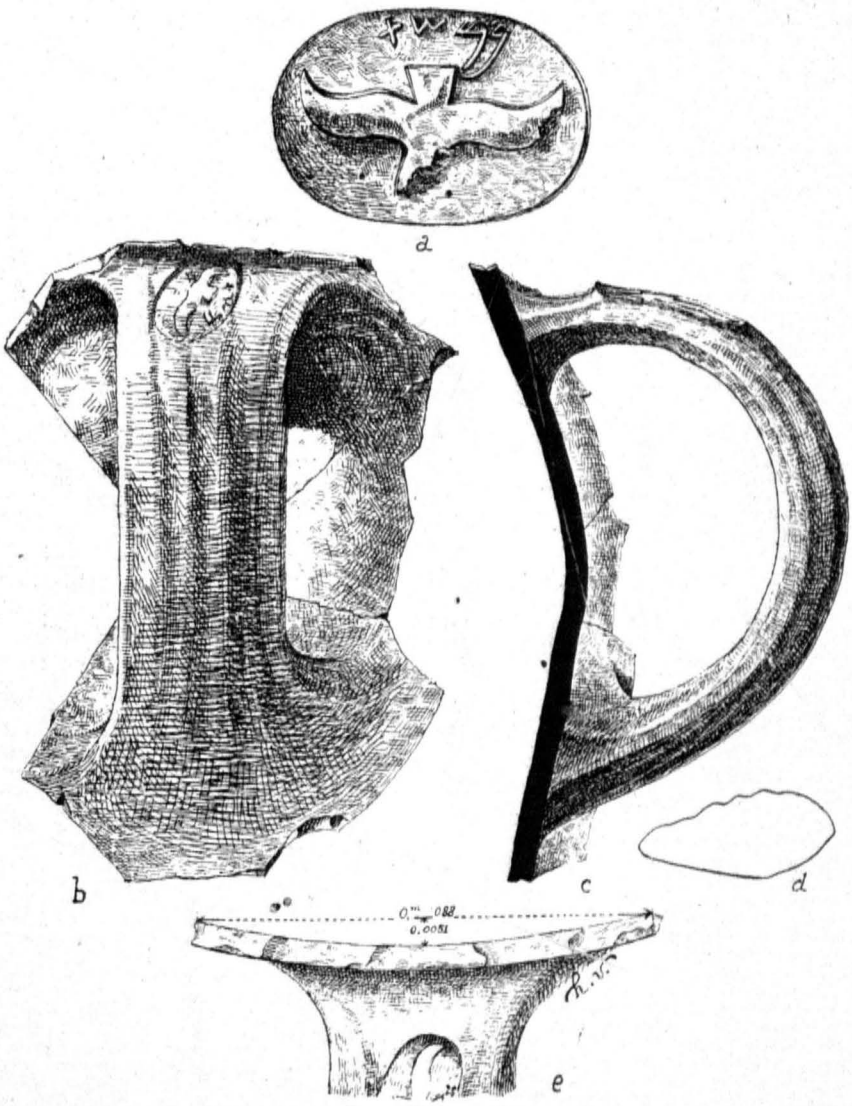
1.



2.

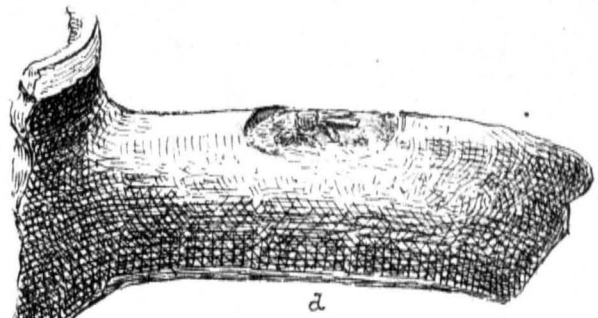
POTTERY FOUND BENEATH THE OLD CITY OF DAVID ON MOUNT OPHEL.

PLATE XIII.



STAMPED POTTERY FOUND BY THE EXPEDITION OF 1909-11.

PLATE XIV.



d

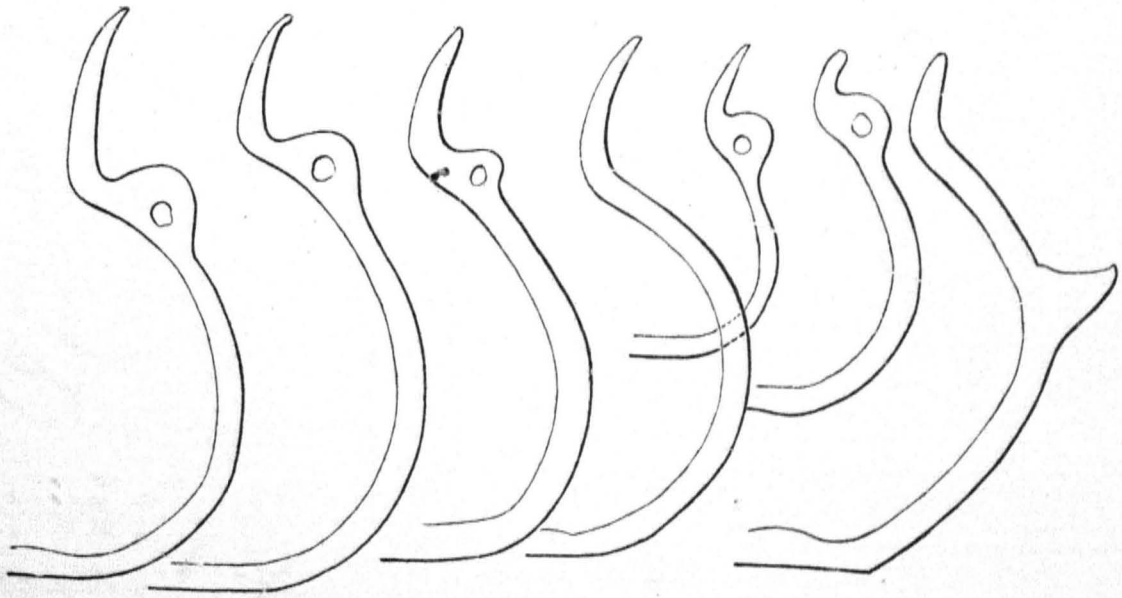
b

c

d

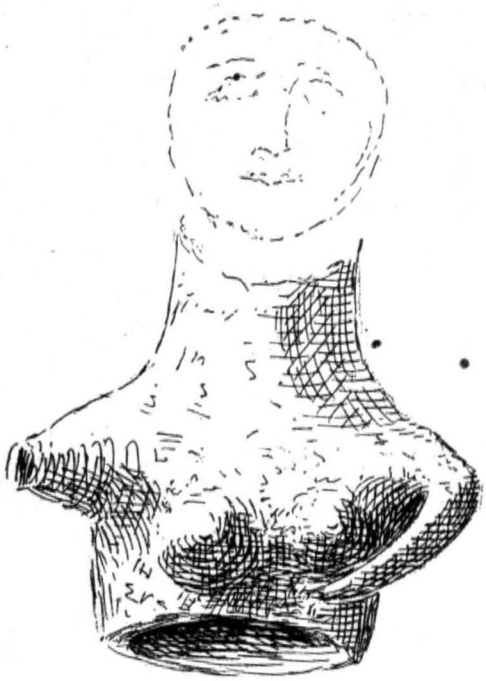
SOME INSCRIPTIONS FOUND BY THE EXPEDITION OF 1909-11.

PLATE XV.



SECTIONS OF JARS FOUND ON MOUNT OPHEL.

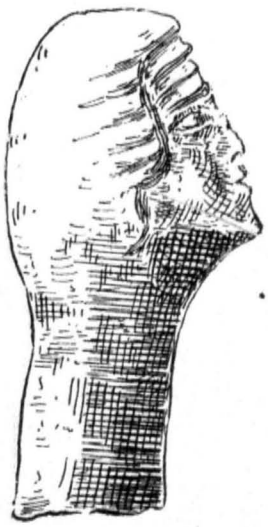
PLATE XVI.



1.

2.

3.



4.

5.

ARCHAIC IDOLS FOUND ON MOUNT OPHEL.

PLATE XVII.

THE POOL OF SILOAM BEFORE 1909.

By Courtesy of Mr. H. J. Sheps'one and the American Colony in Jerusalem.

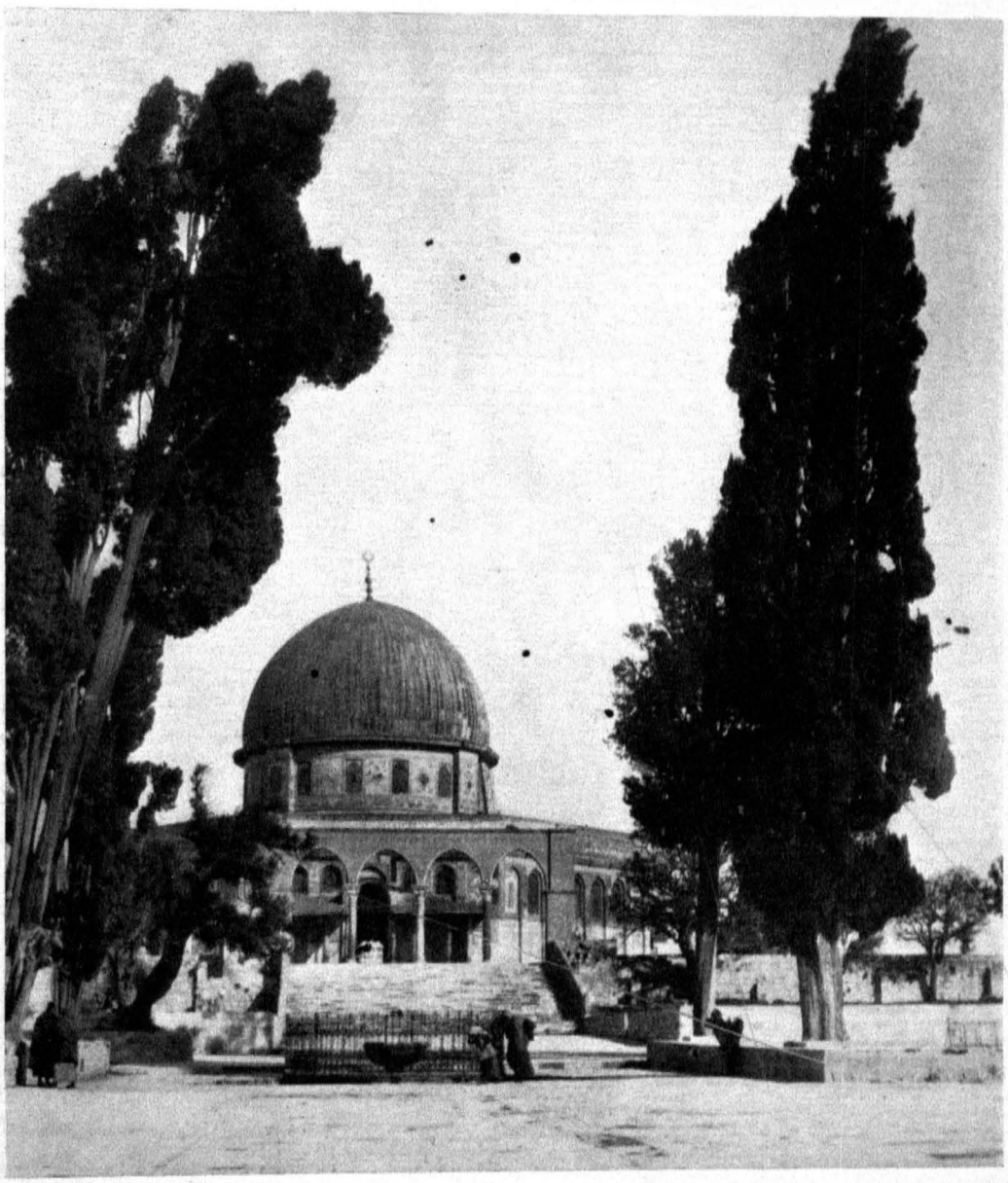


Photo by G. C. B.

THE MOSQUE OF OMAR.