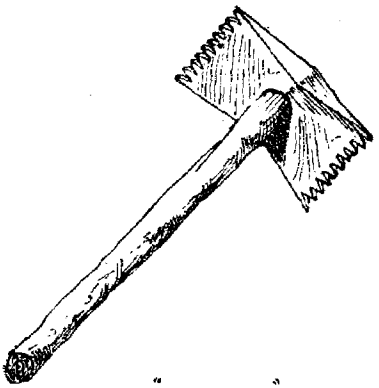
This was taken as a favourable omen by the guardians after they had allowed him to pray in the church. The guardians had expected some sign from Heaven, as their successors would to-day, to follow the admission of a stranger to the Haram. Water was coming into the *sebîl* through the conduit from the country outside ("the distant land"). This conduit for bringing water into the quadrangle of the Haram is also expressly mentioned by Mukadessi (Pilgrims' Text Society, p. 51). This acceptable fall of rain after four years' drought appears to have much impressed Reubeni, for it probably prompted the question he afterwards asked of his brother Jews at Jerusalem (p. 52); compare Joel ii, 23.

STONE DRESSING OF JERUSALEM, PAST AND PRESENT.

By Archibald C. Dickie, A.R.I.B.A.

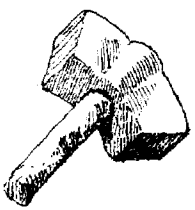
Comparatively little is known about the tools used and the method of handling them by the workers in stone of old Jerusalem, hence I venture to submit to the readers of the *Quarterly Statement* the result of my observations on the subject in the city and elsewhere.[1] In archæology, facts, whether of incidental occurrence or otherwise, are necessarily the only scientific data, from which important deductions may be drawn. My investigations have been strictly pursued with a view towards the possibility of characterising the different styles of masonry discovered in the present excavation to the south of the city as indicative of definite periods. Starting on a basis of certain popular ideas of the characteristic features of the Jewish, Herodian, late Roman, and Crusading stone dressing, I made careful notes on every style of masonry as it was uncovered, at the same time noting its position and bonding, in the hope of coming to some definite conclusion as to relative periods. As the work proceeded, every new piece of masonry raised a new complication, styles mixed together and alternately preceded and succeeded one another, until the whole question became so hopelessly confused that I was forced to turn in another direction to enable me to systematise my notes that they might be of any archæological value. A study of modern buildings and occasional association with native workmen gave me the key, and I decided that I must commence with the dressing of to-day and work backwards. Before touching on ancient masonry, therefore, I will give a list of the principal tools used by the masons of the present day, with short descriptions of the methods of handling them. The European hewer stands over his stone and works

[1] Dr. Schick, in his paper published in the *Quarterly Statement* for 1893, p. 198, *seq.*, gives a good deal of information respecting stone-cutting and stone-dressing tools.

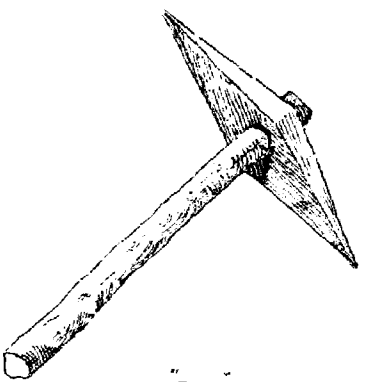


N° 1 "COMB PICK"

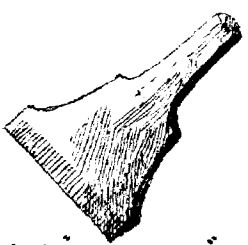
N°2
"CHISEL PICK"



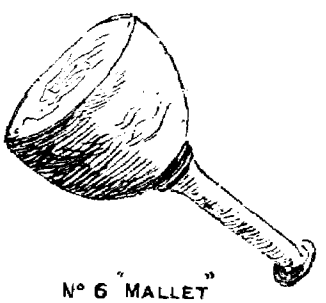
N°3 "MASHEY"



N° 4 "PICK"



N° 5 "DROVING IRON"



N° 6 "MALLET"

down on to it, but the Eastern squats in Oriental fashion and sets himself parallel to the plane on which he operates :—

The "comb pick."—This tool is worked by a short stroke, which alights obliquely on the stone, forming incisions measuring from 1 inch to 2 inches in length each stroke. Four sizes are used, 5, 7, 8, and 9 teeth to the inch ; the handle measures about 16 inches long.

"Chisel pick."—Worked with a "mashey"—upward slanting stroke ; the head of the "mashey" is cut obliquely to suit the position of the operator, makes a rough "pock-marked" dressing, and is also used for roughly taking down the face of a stone, in which case the effect is deep, flaky, and irregular.

"Pick."—Gives the same dressing as "chisel pick," "pock-marking," and is used for finer work ; gives a shallower and more delicate effect ; used with a short, straight stroke ; handle 16 inches long.

"Droving iron."—Worked with a wooden mallet, in the same manner as an English droving iron, but as the tool is sharper and is placed more perpendicularly on the stone, the furrows are deeper and closer. Each furrow is worked in sections of the width of the tool.

"Quarry pick."—Used with a long curved stroke, and makes long irregular incisions at fairly regular intervals. Only used in the quarry for cutting stones from the rocks.

Such, briefly, are some of the hewers' tools used in modern stone dressing. Careful examination of those dressings, and comparison with what has been found in the excavations, have, from their almost identical similarity, proved to my mind that the same tools used in dressing the stones of the city walls of ancient Jerusalem are to-day used in the same manner in the erection of the hundreds of edifices which are so fast crowding out her ancient monuments.

That these tools have been more or less continuously used from the time of their introduction into the hands of the artificer who, from century to century, has continued to add his testimony to the city's ancient glory, seems therefore a natural inference. The following notes on the tooling of stones from ancient times to the present day will support this theory, and may, I hope, be in some way valuable in influencing archæological conclusions.

I will commence with what is popularly called Jewish masonry, *i.e.*, large stones with projecting bosses and back-set margins. This is the most characteristic class of work of the recently discovered south wall. The bosses vary in projection from 10 inches to 2 inches, and show no tool marks on the fractures, they are roughly squared with irregular margins, varying from 3 inches to 5 inches in width, which are usually finished off by a comb-pick dressing. In some cases the margins have been dressed off with a $\frac{1}{2}$-inch drafting chisel, and in a very few instances they are simply chisel-picked (*see* specimens A, B, C, D, E, in *Quarterly Statement* of July, 1895, and in specimen Q in *Quarterly Statement* of October, 1895). The heights of these stones vary considerably, but the

average is from 21 inches to 25 inches, and they are, comparatively speaking, roughly squared and bedded, although the beds and joints are well cleaned off. An earthy mortar with a very small percentage of lime, has in some cases been used, but its absence is more general. This class of masonry can be seen immediately on the top of the great course of the Haram Area wall. I have seen it in the wall abutting on Hadrian's Arch, at Athens, and I fancy the Roman wall at Gloucester, described in last *Quarterly* by Mr. Bellows, is of the same character. The walls of the castle at Banias are built of similar stones, except that in many cases the faces of the bosses show rough tool marks and the margins are pick dressed. To-day, boss and margin dressing is used in Jerusalem, and although the stones are of much smaller proportions, the same principle continues.

Specimen D, in the *Quarterly* Report of January, 1896, shows a style of masonry of very different character. The proportion of the stones is similar, and a few have slightly projecting centres of not more than ¼ inch. The margins are carefully comb-picked, and the centres are pick-dressed. The stones are perfectly squared and set. Vertical joints are worked fine and true, and beds are cleaned off smooth, without lime. A look at elevation CD, Plate I, will at once show from the bonding that it is the earliest piece of masonry in this side of the tower, and that the introduction of the margin and boss stones is of a later date.

It is now pretty generally accepted by the best authorities on Jerusalem topography that the wall to which this tower belongs was in existence at the time of the siege of Titus. Dr. Bliss, in his report of January, 1896, gives good reasons for supposing that this wall was never again restored after its destruction, viz., from the accumulation of *débris* between it and the superimposed wall (*see* Section AM, Plate I), which may date from the two periods of Hadrian and Eudoxia. Three distinct periods are shown in this tower. The latest face—built of two styles, viz., rough boss and comb-margin stones, and chisel-pick centres and comb-margined stones (the latter evidently re-used), and distinctly shown by the straight wide vertical joint—therefore belongs to a period previous to 70 A.D. Given that it may date to a Herodian or late Jewish period, the intermediate restoration of the same class of masonry might belong to a middle Jewish period. This throws the finely dressed piece of masonry I have just described back to very early times. Its beautiful working suggests a leading historical period, when the chisel spoke while the sword lay dumb, and is akin to time of "costly stones according to the measure of hewed stones, sawed with saws within and without, even from the foundation to the coping" (1 Kings vii, 9).

This example clearly shows that comb-margin and rough boss was used after pick-centre and comb-margin dressing. Yet the tower found beside the gate near Siloam (*see Quarterly* Report of July, 1895, Specimen D), illustrates exactly the reverse. Here the beds and joints are not worked quite so fine as in the former instance and are set in lime, but perfectly squared and set straight and true; the lime joints are neatly

drawn, uniform throughout, about ¼ inch wide. The same pick-centres and comb-margins are observed built along with comb-margins and rough boss dressing—both *in situ*—and this tower is evidently a later addition to the wall (built of rough boss and margin stones), as the latter —which at that point is plastered—runs behind the projection, leaving an open joint of about 1 inch wide.

Two such examples give a striking illustration of the freedom with which the ancient builders used their tools. Chisel-pick centre with comb-pick margin precedes comb-pick margin with rough boss dressing, which latter, in its turn, precedes, and is also contemporaneous with, the former. Comb-pick margin with chisel-pick centre dressing occurs on the stones of the castle discovered outside the wall and gate at Siloam (*see* Report of October, 1895), on Crusading work, in the Turkish walls of the sixteenth century, and to-day the same style of dressing is seen.

It is interesting to note that the *picked margin* (in distinction from the *comb-pick* margin) with the rough boss occurs only in a few isolated cases in the south wall, and, excepting one instance, none have been *in situ*. The boss and margined stone in Specimen OK, *Quarterly* Report, January, 1896, is of this class, and is a fair sample of the isolated positions in which they have been found. The tower discovered near the English cemetery (*see* Report of October, 1894) is the one solitary example *in situ* in the whole line of wall from that point to Siloam. The margins are *pick* dressed, and the bosses are rough and show no tool mark. The courses average 27 inches high, and the stones, though roughly jointed, are set true in lime joints about ½ inch wide. The boss and margined stones in the lower courses of the wall projecting from the Haram Area are similarly dressed, although of much larger proportions, and some of the stones built into the present Turkish south wall of the city are also of this class. The fact that all these stones are of the hard "Mizzeh" beds, however, probably accounts for this peculiarity.

The beautifully dressed and jointed stones in the walls of the Haram Area and the lower courses of the Jews' wailing place, usually assigned to the time of Herod, stand unique in their character. Only once has this class of dressing been found in the excavations, and that on a fragment built into a later restoration of the wall, beside the projecting chambers described in Report of January, 1896. It is a fragment from earlier work and is built along with boss and margin stones. The sunk margins, and about 1 inch all round the slightly projecting centre of this style, is worked over with the comb-pick, the centres being finished off with a very shallow picking, much more carefully and delicately executed than any of the picking I have before described. The proportions of these, as can be seen from Sir Charles Warren's records, are huge in comparison with what have been found in the present excavations.

The stones in the upper later wall (*see* Reports of January, 1895 and 1896) may be described in general as even-faced dressing without margins. A few have picked centres and margins, but the characteristic stones are cleaned off plain, either with the comb-pick, or a long stroke-toothed tool,

which dresses in irregularly curved drafts of about $\frac{3}{16}$ inch to $\frac{1}{4}$ inch wide, varied in direction, presumably to suit the position and convenience of the hewer. A few plain chisel-picked stones are also seen (*see* specimen in Report of January, 1895). Joints are well-worked and the setting is true. The comb-picked stones are similar to the stone under the springer of Robertson's Arch, and to a few stones in the Haram Area wall, where the city wall projects from the Mosque el Aksa. These latter, from their position and bonding, evidently existed before the Byzantine Arch, which has been inserted into the wall at that point. The upper courses of the Jews' wailing place show similar dressing. Plain-faced *chisel*-picked stones are also built along with comb-picked in the upper courses of the wailing place, and similar comb-pick and chisel-pick plain dressing can be traced up to the present day.

Quarry-picked stones occur in all ages.

The parallel furrowed tooling, usually assigned to the Crusading period, has been found nowhere in the excavations except in the wall which was uncovered in the Augustinian property, and which is undoubtedly of that late period. I have never seen it in earlier work, but in more modern work it crops up continually, and only a week ago I sat beside a native workman while he completed the dressing of a stone which, with a little weathering, would have taken a place with perfect security in the recently discovered wall. The "droving iron" was the tool used. In a few cases the same method of use with a toothed tool has been employed, which gives the furrowed effect with a combed detail. A diagonal direction is usually followed in the dressing, but this is not essentially necessary to class it with Crusading work, as there are many perpendicularly furrowed stones built in juxtaposition to diagonal work.

In last *Quarterly Statement*, Mr. Bellows calls attention to the back-setting or battering of ancient building, and quotes Viollet le Duc, in referring to the wall at the Haram Area, as considering back-setting an indication of "very high antiquity," consequently adding this as additional proof that this masonry is Phœnician. Allow me to give the following facts :—

The wall emerging from the Jewish Cemetery (*see* Report, July, 1895) stands four courses high and is back-set on each course from 2 inches to 5 inches. A part of the tower found near gate at Siloam is back-set on each course for six courses from $\frac{3}{8}$ inch to $\frac{7}{8}$ inch. The tower in the lower wall (*see* Report of January, 1896) at south-east angle is back-set three courses, 2 inches on each course. Some of the towers of the existing Turkish south walls are back-set in the same manner, and at Gloucester Mr. Bellows has found the same peculiarity.

The stones of the old south wall are usually laid on their natural beds, but there are many examples of their being set on hem.

These are the results of my investigations, and whatever light may be shed on the question, it does not, I am afraid, assist much towards defining the date of a building by its dressing. On the contrary, it tends to encourage scepticism as to the possibility of fixing periods by any hard-

and-fast rules of masonry alone. Unlike the case of Cyclopean polygonal masonry, the examples I have quoted show no line of demarcation, not even a period of transition. Each succeeding style has mingled with its predecessor from the time of its introduction; boss and margin work may have been used in early Jewish times, but was undoubtedly used in later Jewish, Roman times, and afterwards; comb-pick margin with pick-centred dressing was certainly used contemporarily with the boss and margin, and may have been used before. Quarry-pick dressing is universal. The delicate pick-centre and comb-pick margined dressing of the Haram Area is certainly characteristic of one great building period, such as that of Herod might signify. The plain-faced, comb-pick, and chisel-pick styles may have been introduced into Jerusalem in Roman times and have been used since. The furrowed Crusading dressing seems alone to definitely date its origin, and its after-use is beyond doubt. Ornament, characteristic mouldings, or plans, are all sufficient data on which to base the date of buildings. Dressing is an indication, combined with peculiarities of setting or jointing its evidence becomes most valuable, but unless backed by some such auxiliary as position, pottery, or the like, simple masonry is a frail basis on which to found archæological deductions in Jerusalem.

THE CAMP, JERUSALEM,
August 17*th*, 1896.

THE QUALITY OF THE WATER IN JACOB'S WELL.

By Dr. HENRY BAILEY.

PROFESSOR GEORGE ADAM SMITH, of the Free Church College, Glasgow, has forwarded the following letter from Dr. Henry Bailey, on the qualities of the water in Jacob's Well, and why the Samaritan woman went there to draw. Dr. Bailey was for three years medical missionary of the Church Missionary Society at Nâblus :—

"BISHOPSTOKE, NEAR SOUTHAMPTON,
"*October* 15*th*, 1896.

"The question as to why the Woman of Samaria should have gone to such a distance as Jacob's Well, when a copious fountain gushed forth from the mountain side close by, does not present any difficulties to anyone familiar with the locality and people.

"Apart from the sacred character of the well, which some might suppose an attraction, its waters have a great local reputation for purity and flavour amongst the natives of El 'Askar and Nâblus. The excellence of various supplies of water and their respective qualities are a favourite topic of conversation with Easterns, and in a hot climate, and where other beverages are almost unknown, it is not surprising to find that the