CHAPTER 10

THE QUARRY (PHASE 3)

Conn Herriott

Figure 10.1. The quarrying feature locations within the Tsur Natan *moshav*.

SOCIO-ECONOMIC BACKGROUND[1]

Throughout settlement history of the southern Levant, stone has been an important and near-limitless building material. Contrary to some scholarly assertions (see Safrai and Sasson 2001: 25), in ancient times almost all rock types were used for construction.[2] This abundant raw material was therefore not itself usually the main economic factor shaping the stone supply industry; rather, more important was the cost of labor and transport.

The quarry at Tsur Natan dates mostly to the Byzantine period, at which time the quarry was associated with the adjacent settlement of Antesion. In an industrial tradition extending back to the Iron Age, quarries of the Byzantine period came in large varieties, from privately-owned ca. 10 x 10m 'backyard quarries' with three or four work corners, to groups of very large sites run by cooperatives, such as at Khurvat Bira. The Antesion quarry would have been at the smaller end of the scale but may have been shared by several work groups, or part of a network of quarries tied by ownership or business arrangements.

Stones were usually cut at a quarry to more or less fit the wall or construction for which they were ordered.[3]

1 This section relies largely on the excellent research of Safrai and Sasson (2001).

2 Of course, sedimentary rocks were the most convenient because they naturally split along quarrier-friendly seams.

3 One finds cut and shaped blocks, columns and other elements discarded in ancient quarries, including at Tsur Natan (e.g. Plan 11 below, p. 76).

Figure 10.2. Area A (facing northeast).

Figure 10.3. Area A (facing north).

Figure 10.4. Area B (east) (facing southeast).

Figure 10.5. Area B (west) (facing west).

The reason for this pre-shaping was that the lighter you can make a masonry element, the cheaper it will be to transport and, as noted, transport was a major cost in this industry. Therefore quarriers and builders worked together—builders at least monitoring the quarry operation, and at most forming integrated crews with the quarries.

The larger a block or element, the cheaper it was for quarries to produce because chiseling was the most expensive work carried out on site. On the other hand, the cheapest means of transport was to carry two stones—about 45kg each—on a donkey's back. However, neither of these factors played the main role in deciding a block's size. Rather, the central consideration was actually a wall's width, because this was a major influence on pricing a structure. In one example it has been shown that by increasing by 0.2m the width of blocks in a wall two rows wide—thereby widening the wall from 0.4m to 0.8m—one could reduce the structure's floor area by one third.

Transporting large blocks required planning and a variety of resources. Evidence of lifting devices is sometimes found in ancient quarries. Paved roads were often made for transport from quarries (Antesion was linked to the coast by a road running from the Samaritan Hills, and was also close to the critical *Via Maris*; above p. 10). Where possible, a coastal site was preferred in order to transport the stone more cheaply, by sea. The challenge of keeping cost, time and difficulties to a minimum was sometimes further complicated by projects—like the second temple in Jerusalem—where massive blocks were often not even reduced in weight through pre-shaping until they were set in walls.

Such was its importance that if a region was suitable for quarrying, this inevitably became a central pillar of the local economy. The stone at Dora was not the best, but its coastal location allowed it to thrive (on such projects as the construction of the port at Caesarea). It has been estimated that this quarry drew in 20% of the locality's manpower, and was worked almost continuously for the 1000 years from Hellenistic through Byzantine times.

In general, however, whilst the coastal plain held the greatest demand for stone, it had little to supply. The majority of quarrying was therefore done in the next most economical locations—nearby regions, such as the Shephelah—where quarry work upheld a significant fraction of local livelihoods.

Such was the socio-economic context of the quarry at Antesion (Tsur Natan). We have seen that several industries were alive and well in the settlement, but the value of stone will not have been thereby diminished.

DESCRIPTION OF THE QUARRY

This hilltop is a soil-covered area in which the *nari* bedrock is exposed here and there, and in some locations over quite large areas. Wherever there was a *nari* outcrop of 20m^2 or more, there the ancient workers quarried. In our site area of 32,000m^2, 15 such concentrations of quarrying activity were found (Features F1-15; Figs. 10.1-5; Plans 1-15 [pp. 66-80]).[4] These ranged in size from 35m^2 (F14) to 432m^2 (F9), and 1-4m in depth. In total, we calculate that some 3,200m^3 of stone was quarried at this site (keeping in mind that the actual original quarry covered a much larger area—perhaps three times larger—than that investigated in this project).

ARTIFACTS

A variety of artifacts was found in the quarry fill. The majority are dated to the Byzantine period (Fig. 10.7): mostly cooking pots, but also jars, jugs, casseroles, bowls and lids. Similar types, but fewer in number, were dated to the Iron Age, Hellenistic/Roman, Early Islamic and Crusader/Mamluk periods (Figs. 10.6, 8).

Also found were other objects (Fig. 10.9): a hand-stone/weight, some possible kiln slag, two mosaic tiles (tesserae), a spindle whorl and a bead. It was difficult to date these objects.

These finds give the impression of representing the sorts of activities expected of quarry workers—carrying, preparing and serving food and liquids—as well as occasional objects that were lost or washed into the quarry.

4 We note that, due to soil creep and other natural processes, it is possible some quarrying features were covered over time and escaped notice.

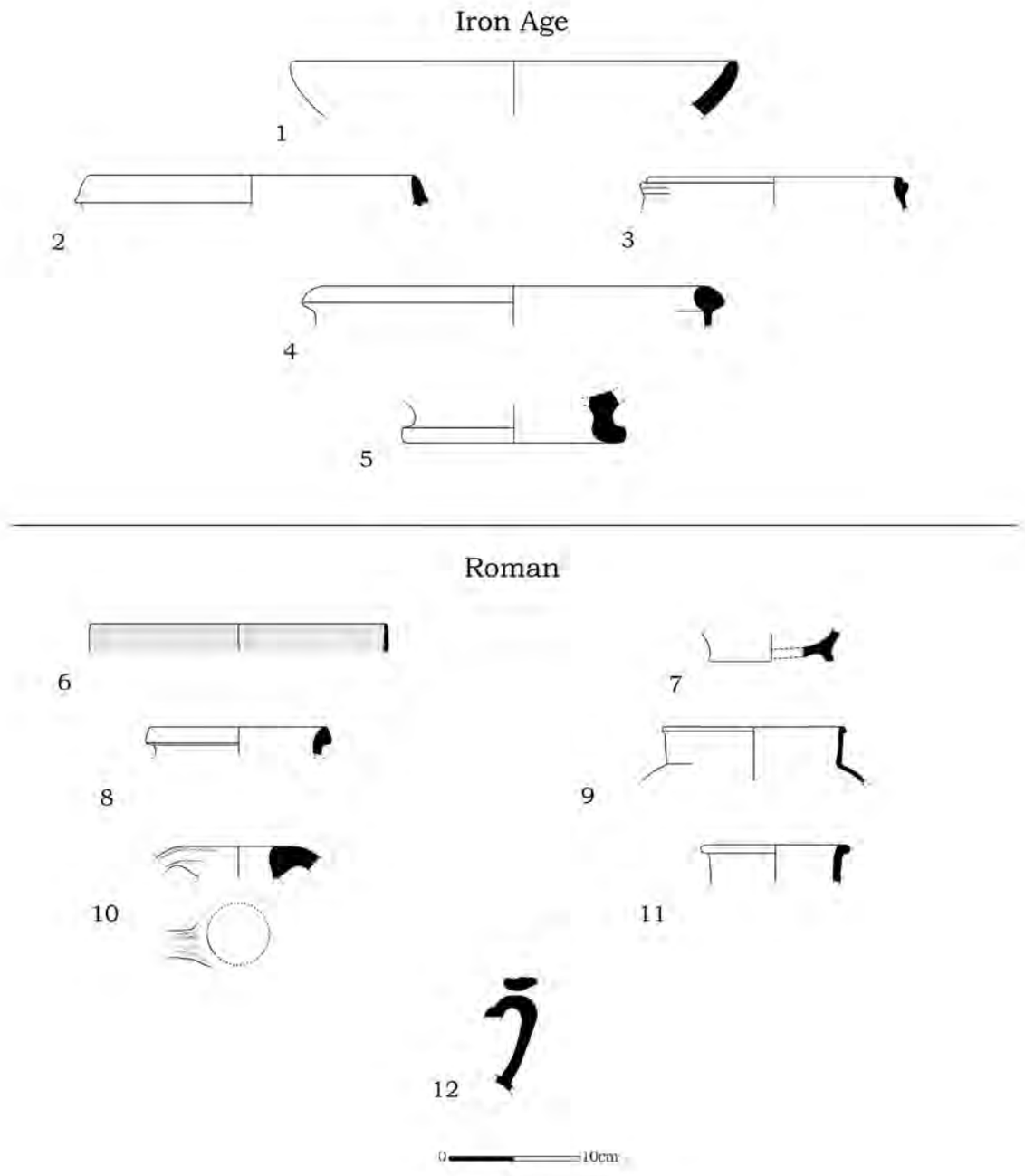

Figure 10.6. Iron Age and Roman period finds from the quarry.

Figure 10.6.

No.	Object	Reg. no.	Locus	Area	Period	Description	Parallels
1	Bowl? Cooking bowl? Stand?	6/8	-	F6	Iron Age II B/C	Beige coarse ware; many dark inclusions	
2	Cooking pot	18/1		F13	Iron Age	Light brown ware; moderate amount of white inclusions	Amiran 1969: Pl. 75:16
3	Cooking pot	10/9	-	F9	Iron Age	Red war; many white inclusions; burning on rim exterior	Zimhoni 2004: 25.8:4
4	Krater	17/15	1	F7	Iron Age	Orange, coarse, poorly fired ware; many white and dark inclusions	Thareani 2011: 62, Pl. 84
5	Jar	2/2	-	F1	Iron Age?	Light beige/orange ware; many small dark inclusions	
6	Bowl	4/3	-	F3	Roman	Red, fine ware; red slip on interior and exterior; *terra sigillata* (or imitation)	Avissar 2005: 49, Fig. X.1-13
7	Bowl/fish plate?	15/8	-	F12	Hellenistic/ Roman	Red/orange ware	Avissar 2005: 49, Fig. X.1-13
8	Cooking pot	16/8	1	F7	Roman	Beige/gray, coarse ware; frequent light and dark inclusions	Magness 1993: 218, Form 3B
9	Cooking pot	12/14	-	F7	Roman	Red/brown ware; very occasional white inclusions	Avissar 2005: 52, Fig. X.3.3
10	Cooking pot	19/11	-	F14	Roman	Orange ware; light brown/gray slip	Magness 1993: 219, no. 2
11	Cooking pot	12/7	-	F7	Roman	Orange/gray ware; very occasional white inclusions	Avissar 2005: 52, Fig. X.3.3
12	Jug	17/1	1	F7	Roman	Orange ware; occasional white inclusions	Avissar 2005: 58, Fig. X.7.7; 46, Fig. 2.7; Magness 1993: 219-221, Form 4

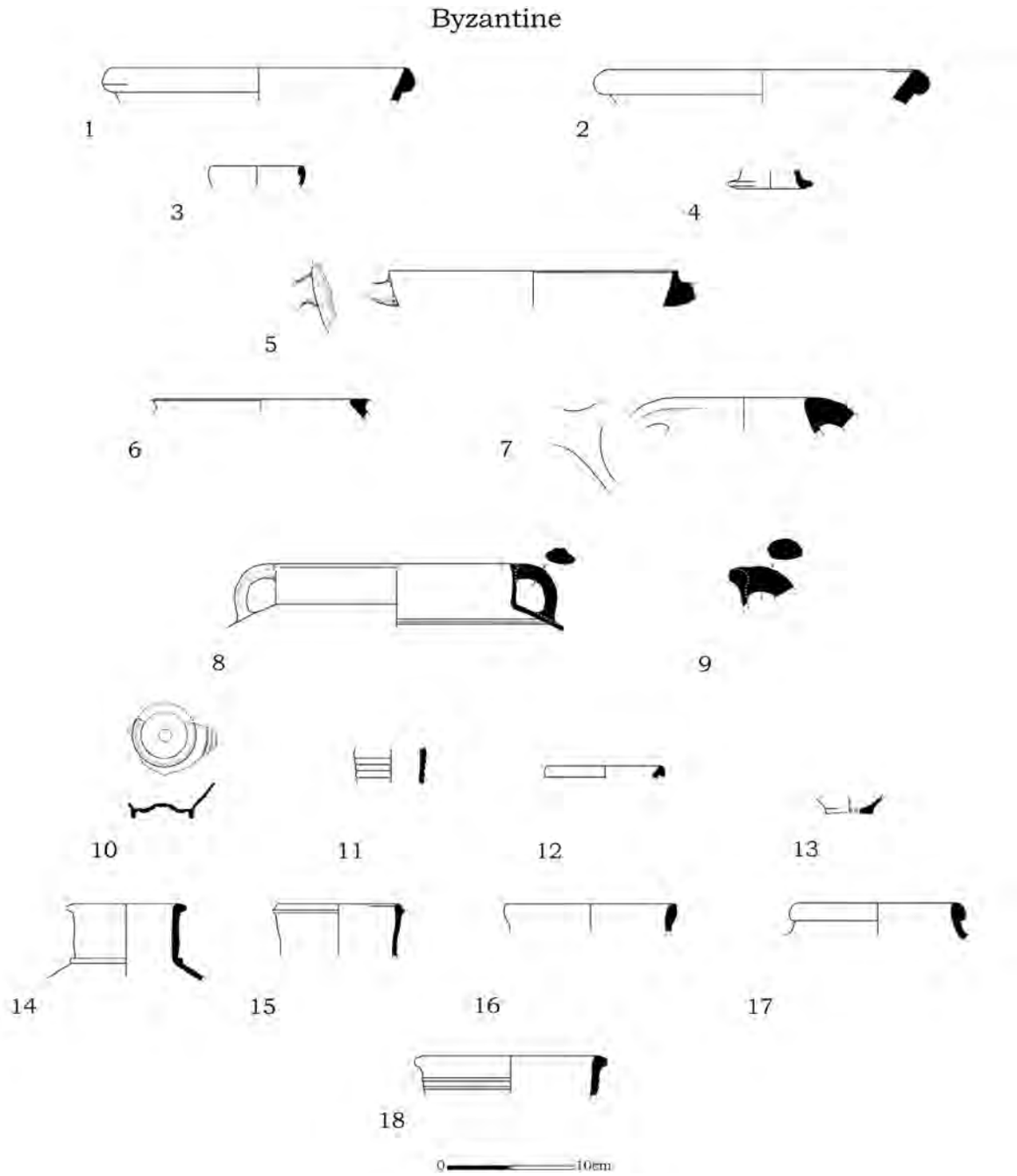

Figure 10.7. The Byzantine finds from the quarry.

Figure 10.7.

No.	Object	Reg. no.	Locus	Area	Period	Description	Parallels
1	Bowl	6/6	-	F6	Byzantine	Light orange ware; well-fired; similar imitation of 'African Red Slip Ware'?	Avissar 2005: 67, Fig. XII.1.6, 8
2	Mortarium	2/1	-	F1	Byzantine	Orange ware; many beige inclusions; imitation of 'African Red Slip Ware'?	Magness 1993: 196
3	Bowl	19/2	-	F14	Late Roman/ Byzantine	Mid-brown, slightly gritty ware	Magness 1993: 196
4	Lid/stopper?	19/8	-	F14	Late Roman/ Byzantine	Light orange ware; light brown slip on interior and exterior	
5	Casserole	12/8	-	F7	Byzantine	Red ware	Magness 1993: 214, no. 1
6	Cooking pot	12/9	-	F7	Byzantine/ Early Islamic	Orange/brown ware; occasional white inclusions	Magness 1993: 236-239; 219-221, Form 4
7	Cooking pot	2/11	-	F1	Byzantine/ Early Islamic	Light beige ware	Taxel 2011: 191, Pl. 249
8	Cooking pot	17/17	1	F7	Byzantine	Red/brown ware	Magness 1993: 236-239; 219-221, Form 4
9	Cooking pot	2/9	-	F1	Byzantine/ Early Islamic	Dark red ware	Taxel 2011: 191, Pl. 249
10	Jug	16/10	1	F7	Byzantine	Red/orange ware	Magness 1993: 238, no. 1, Form 1B; 246, Form 6A; Taxel 2011: 201, Pl. 256.6
11	Jug	4/1	-	F3	Byzantine	Red/brown ware; occasional small white inclusions; 'Fine Byzantine Ware'	Magness 1993: 238, no. 1, Form 1B
12	Jug	6/7	-	F6	Byzantine	Beige/orange ware	Magness 1993: 246, Form 6A
13	Jug/juglet	17/13	1	F7	Roman/ Byzantine/ Early Islamic	Light orange/beige ware	Taxel 2011: 201, Pl. 256.6
14	Jar	17/12	1	F7	Byzantine	Red/brown ware; occasional inclusions	Avissar 2005: 73, Fig. XII.7.7
15	Jar	16/4	1	F7	Roman/ Byzantine	Light red, gritty ware; exterior light gray in color; occasional inclusions	Taxel 2011: 199, Pl. 254
16	Jar/jug	10/1	-	F9	Byzantine/ Early Islamic	Orange/light brown ware; frequent small dark inclusions	Magness 1993: 227, no.1; 142, Fig. 2.17
17	Jar	2/3	-	F1	Byzantine	Light red ware; occasional white inclusions	Avissar 2005: 73, Fig. XII.7.7
18	Jar	19/10	-	F14	Byzantine/ Early Islamic	Orange ware	Taxel 2011: 199, Pl. 254

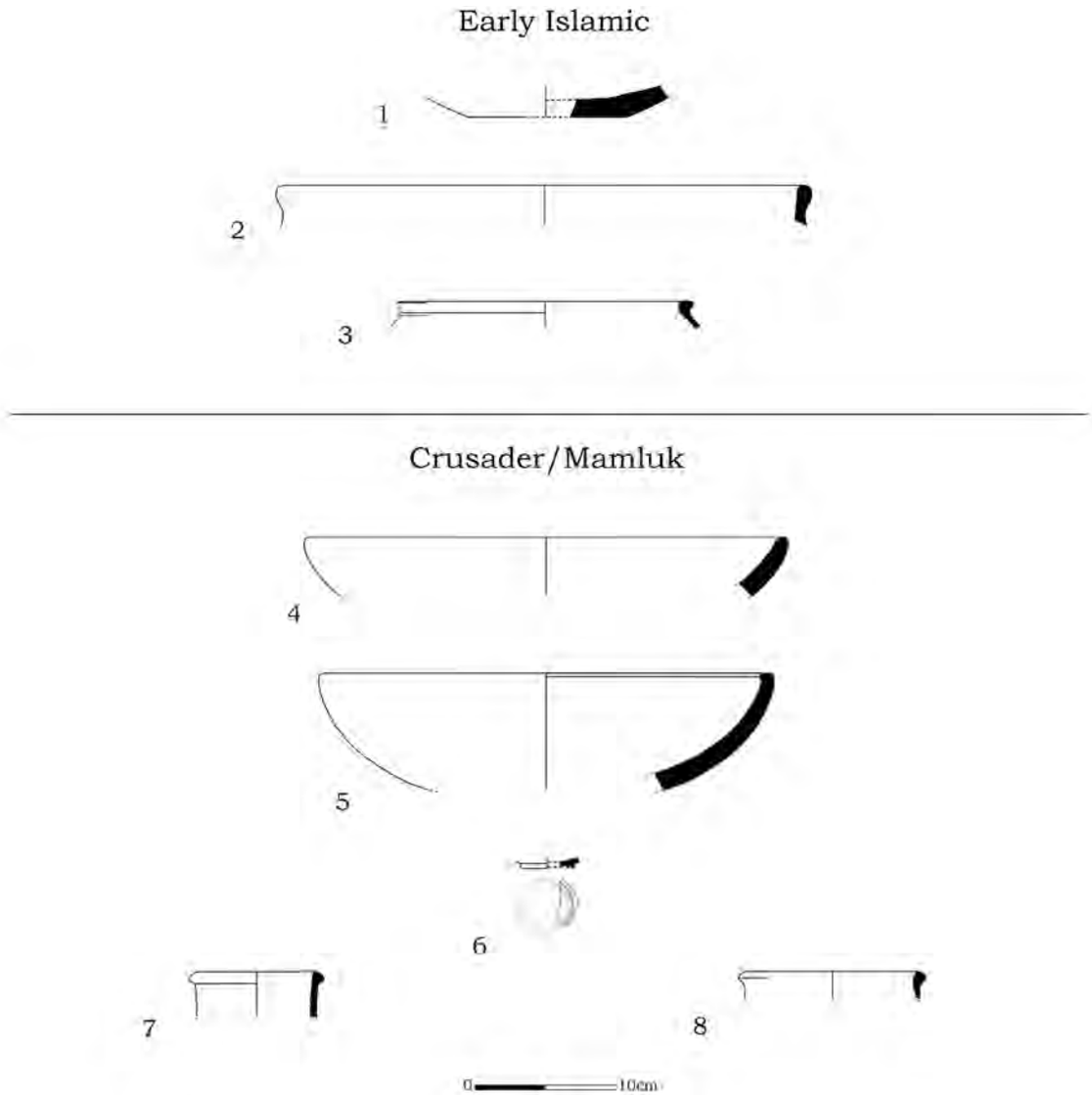

Figure 10.8. Early Islamic and Crusader/Mamluk finds from the quarry.

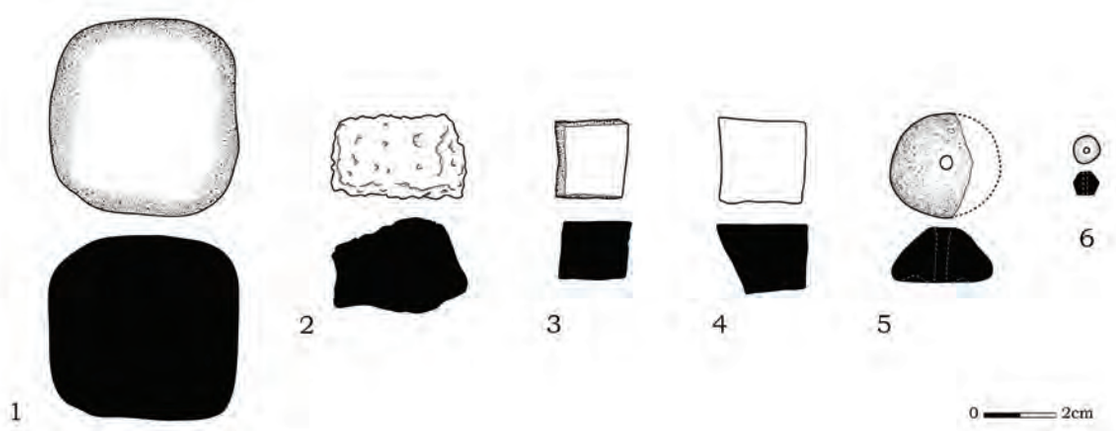

Figure 10.9. The non-ceramic finds from the quarry.

Figure 10.8.

No.	Object	Reg. no.	Locus	Area	Period	Description	Parallels
1	Bowl	15/7	-	F12	Early Islamic	Gray ware; hard; few inclusions	Avissar 2005: 132, Fig. XIII.89 (Type 2)
2	Cooking bowl	2/13	-	F1	Early Islamic	Light red coarse ware, poorly fired; many light and dark inclusions	Avissar 2005: 143, Fig. XIII.102.1
3	Casserole	19/5	-	F14	Early Islamic	Red ware; burnished on interior and rim	Magness 1993: 214, no. 3
4	Bowl	10/3	-	F9	Crusader/ Mamluk	Orange/brown coarse ware; many white inclusions; poorly fired; possible burnishing on interior	Avissar 2005: 130, Fig. XIII.86.2 (Type 33)
5	Bowl	19/14	-	F14	Crusader/ Mamluk	Orange/brown coarse ware; many white inclusions; poorly 77fired; burnished on interior	Avissar 2005: 104, Fig. XIII.46 (Type 62)
6	Bowl	2/14	-	F1	Mamluk	Light beige ware	
7	Jar	12/3	-	F7	Crusader/ Mamluk	Light beige/orange ware; moderate amount of white inclusions	Avissar 2005: 153, Fig. XIII.121.6
8	Jar	10/4	-	F9	Crusader/ Mamluk	Beige ware	Avissar 2005: 153, Fig. XIII.121.6

Figure 10.9.

No.	Object	Reg. no.	Locus	Area	Period	Description
1	Handstone/ weight	1/1	-	F1	?	Cuboid basalt stone; at least three sides smoothed (fourth side covered by cortex)
2	Slag?	12/13	-	F7	?	Irregular shape; light in weight
3	Tessera	10/8	-	F9	?	Light beige/gray, hard metamorphic rock; one side smooth
4	Tessera	15/12	-	F12	?	Blue/gray, hard metamorphic rock; sides slope inward, down from top
5	Spindle whorl	16/9	1	F7	?	Dark gray/blue stone or ceramic material
6	Bead	6/9	-	F6	?	Blue glass

METHODS AND DETAILS OF QUARRYING

The main method of quarrying at the site—following patterns across the southern Levant and indeed much of the world (Ayalon *et al.* 1994)—was to cut steps into rock outcrop pings. That way, several sides of the next block to be extracted would already be free and at least roughly straightened. The ancient method of removing blocks which we see at Antesion was also shared across the Mediterranean: pick- and chisel-cut channels—usually trapezoidal in profile, to save digging—freed up any unexposed sides of the chosen block-to-be, and then the base was separated from the bedrock. There were several ways to carry

out this final phase: chiseling in sideways under the block; cutting holes under the block and then forcing trapezoidal pegs into these holes until the piece was freed;[1] or a combination of these methods; there is also evidence for a cutting tool of sorts,[2] although this was more often used for removing the back of a block from a vertical bedrock face; and finally, it was sometimes possible to insert crow bar-like tools into prepared holes under the stone and lever the block free of the bedrock surface. Apparently—and surprisingly—there is no ancient Levantine evidence for the 'wet peg' stone-splitting method. Indeed, no such evidence was found at Antesion either; however, chisel and other tool marks and channels were clearly recognizable.

These tool marks revealed that the quarrying of these outcrops followed a consistent pattern in block sizes (ca. 1.1 x 0.6 x 0.5m) and tool sizes. However, there is no pattern in the scale of quarrying episodes (that is, quantities of stone removed at one time, leaving co-aligned block scars). From this we can infer that all scales of activity are in evidence.

The topmost 1-3m of the stone outcrops at Antesion was a hard *nari* stone, which was favoured for quarrying. Beneath was a softer chalk, in which there is no evidence of quarrying. This makes sense: why would this poor-quality stone be used when harder *nari* was available?

Research on some of this greater quarry has been published elsewhere (Ayalon *et al.* 1994) and the results agree with ours.

CHRONOLOGY

Ancient quarries are notoriously difficult to date, because technologies and block sizes changed very slowly over time. However, the potsherds found on their surfaces suggest that these Antesion quarry features were mostly cut in the 5-8th centuries CE, i.e. in the Byzantine period. This clustering of artifact dates, as well as the regular block sizes being cut at the site and the standard tool sizes suggest that the quarrying activity was mostly carried out in a single, more-or-less unbroken tradition of workmanship, rather than isolated periods and by non-associated groups (although some anomalies were identified).

As said, the fact that the quarry respected the aforementioned L5 oil press and the L7 press basin indicates that it post-dated or was contemporary with these features. The quarry post-dated the Iron Age tomb, of course, which as we have said was truncated by the F12 quarry.

Again, in terms of the post-quarrying history of the site, the amphitheatre-like hollows left by this activity were used as sheltered places for undefined activities involving wall construction, fires and pottery waste disposal (L1 [Fig. 11.1, Plan 7, p. 72], L4 [Fig. 11.2, Plan 14, p. 79]).

The fact that this quarry was only active in the Byzantine-Early Islamic period is interesting if we remember that the region's population was at its most dense in Byzantine times. It seems that only under such demand for stone could the price of transport down from this high hill make economic sense for those involved. Once demand dropped, the quarry was abandoned.

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1 From which perhaps derives the halakhic term for completing any task: 'the final hammer blow' …. מכה בפטיש.

2 In rabbinical sources this is called an ararin or tsiporen ('fingernail').

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CHAPTER 11

POST-QUARRY ACTIVITY (PHASE 4)

Conn Herriott

At the bases of two quarry features—F7 and F14—we found evidence for later activities.

L1 was a large and concentrated quantity of Byzantine/Early Islamic potsherds was found in the hollow formed by F7 (Fig. 11.1, Plan 7 [p. 72]). No complete vessels were restorable, suggesting that these sherds were remains of vessels which had already broken before deposition. The walls of the quarry here were also stained by soot. We interpreted this context as a waste deposit.

L4 was located at the base of F14, where a rough and simple dry-stone wall was built across the corner of the quarry, forming an enclosed space (Fig. 11.2, Plan 14 [p. 79]). North of the wall was found a concentration of compacted earth, which was reddish in color as though oxidized by heat. In the enclosed space were found Late Byzantine/Early Islamic sherds; much soot staining was evident on the bedrock surface. We interpreted this feature as a kiln or some form of shelter, in use at the same time as or immediately following the quarrying work.

Figure 11.1. The L1 pottery concentration (facing southwest).

Figure 11.2. The L4 construction set within quarry F14 (facing northwest).