

Umm Qays: The Byzantine Buildings on the Terrace. The Building Materials of Stone and Ceramics

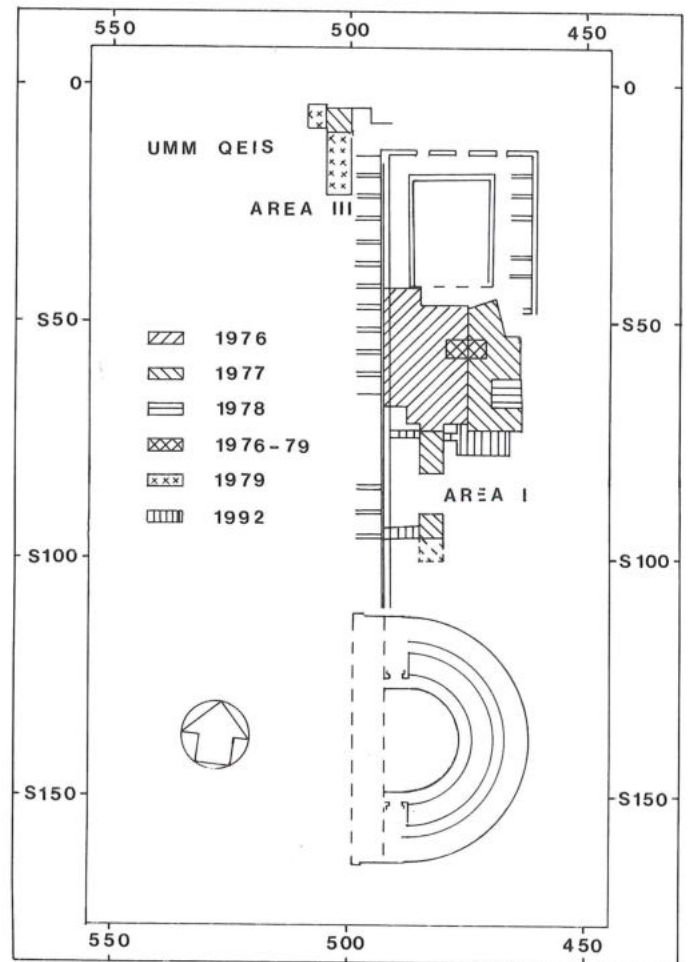
The ruins near Umm Qays (ancient Gadara) were surveyed in 1974 by a team from the German Protestant Institute for the Archaeology of the Holy Land headed by Ute Wagner-Lux.¹ The ruins of the ancient buildings cover a site measuring approximately 1600 x 450 m consisting of a walled city area and an extramural area. Inside the walled city, two areas can be discerned: an Acropolis (approximately 250 x 250 m) in the east and a large Lower City in the west. The main street of the city, *Decumanus Maximus*, runs east-west.

Wagner-Lux and her team made a series of excavations on the large Terrace, situated at the bottom of the western slope of the Acropolis in 1976-1979 and in 1992. This site was labelled Area I. The Terrace, measuring 95 x 32 m, is bounded on the north by the *Decumanus Maximus*, to the south by a Roman theatre, whereas to the west a street, a *cardo*, aligned with vaulted rooms built against the Terrace's retaining wall, ran south from the *decumanus* to the theatre. In 1977 and in 1979 the northern end of the *cardo* (Area III) was excavated (FIG.1).²

The Terrace may be divided roughly into three parts. In the northern part (32 x 32m), a colonnaded courtyard (a so-called *atrium*) was found. The courtyard is entered from the *Decumanus Maximus* by means of three entrances. The inner space was open to the air and on three sides (perhaps on all four sides) surrounded by a colonnade and a covered passageway. A line of rooms along the eastern side of the terrace open onto the eastern passageway.

In the central part, a church complex has been excavated, which consists of two churches. The larger one is situated right in the middle of the Terrace. It is a church of the "centralised type" consisting of a square building with a narthex attached to its west side. The second church is of the "basilica type". It is built against the south wall of the centralised church. The construction of the centralised church has been tentatively dated to the first half of the sixth century. Then, there was a courtyard to the south of it, similar to the one on its northern side.

The basilica was built at a later date, that is in the mid-



1. Plan of Umm Qays (ancient Gadara) Areas I and III.

dle of the seventh century. Both church buildings were destroyed by an earthquake presumably the earthquake of 749.

The centralised church and the colonnaded courtyard represent the Byzantine building phase on the Terrace. The basilica is attributed to the Late Byzantine or the Early Omayyad Period. Underneath the floors of the

¹ U. Wagner-Lux, E.W. Krueger, K.J.H. Vriezen and T. Vriezen-van der Flier, 'Bericht über die Oberflächenforschung in Gadara (Umm Qays) in Jordanien im Jahre 1974'. *ADAJ* 23 (1979) 31-39. This survey added to the archaeological study of the site by Gottlieb Schumacher almost 90 years earlier; G. Schumacher, *Northern 'Ajlun*, London 1890, 46-80.

² U. Wagner-Lux and K.J.H. Vriezen, 'A Preliminary Report on the Excavations at Gadara (Umm Qays) in Jordan from 1976 to 1979'. *ADAJ* 24 (1980) 157-161. U. Wagner-Lux, K.J.H. Vriezen, F. van den Bosch, N.F. Mulder and R. Guinée, 'Preliminary Report on the Excavations and Architectural Survey in Gadara (Umm Qays) in Jordan, Area I (1992)'. *ADAJ* 37 (1993) 385-395.

church buildings and the courtyard, a pavement from the Roman period has been found.³ To the Roman phase also belong the Terrace's retaining walls and the structures along the *cardo* and *Decumanus Maximus*. This building phase has been tentatively dated to the end of the first or the beginning of the second century AD.

In the construction of both churches, *spolia* have been used. It appears there are indications that some of these *spolia* may previously have belonged to the Roman building phase on the Terrace. This raises the question of what was built on the Terrace in Roman times.

It has been suggested that there was once a temple on the Terrace.⁴ However, although the Roman pavement is reached in various places on the Terrace, there are not yet any traces of a substantial building connected to this pavement.⁵ Apparently, the idea is inspired by general historical information from the fourth and the fifth century about the destruction of temples and the construction of churches in their place. However, it is doubtful whether a model of 'churches-built-on-temples' is applicable to a large extent in the area of *Palaestina/Arabia*, as the historical record and the archaeological data have not produced substantiating evidence for such a model.⁶ As for our churches in Area I, it remains to be seen whether future excavations will produce new finds.

Instead of a supposed temple, however, another building in the area of the Terrace may contribute to the question, namely the Roman theatre. Like the Terrace, the construction of the theatre is tentatively dated to the end of the first or the second century.

During the fourth to sixth centuries, a stream of imperial decrees was issued against theatres, plays and games.⁷ Finally, it is related by Procopius of Caesarea⁸ that Justinian caused the theatres, hippodromes and circuses to be closed, and that later he ordered the games to be abandoned.

Now this closure of the theatres by Justinian complies with the time scale in which the construction of the centralised church in Umm Qays is dated. This circumstance seems to form the background for the construction of this

church: when the West Theatre in Gadara had fallen into disuse and was closed, the time had come to use the square immediately north of the theatre for new purposes.⁹ So, a Christian *martyrion* was built on the Terrace. Because of its location between the Acropolis and the Lower City, it assumed a prominent place in the ancient town of Gadara.

As mentioned before, *spolia* have been used in the Byzantine-Umayyad building phase on the Terrace. A study of the constructions of the walls and the building materials was made in order to define the types of masonry which were used and to distinguish between the types of the different building phases. In this analysis a study of the mortar used was also included.¹⁰ For the buildings on the Terrace dating from the Byzantine period, we can distinguish between two types of wall construction: Type I and Type II. Later alterations to the buildings may be considered as a third type.

In the wall construction Type I (FIG.2), the lowest course consists of basalt blocks. These may be the remains of earlier walls of the Roman period still *in situ* or a foundation made by reusing Roman *spolia*. For the elevation of the



2. Construction Type IB. Façade of one of the rooms east of the atrium.

³ U.Wagner-Lux and K.J.H.Vriezen, *o.c.* (n. 2: *ADAJ* 24 [1980]) 158-160.

⁴ G.Schumacher, *o.c.* (n. 1) 62f.

⁵ There are still no data indicating that the Terrace was used to serve as the lower platform of a temple higher up the Acropolis hill; cf. the Zeus Temple in Jarash. However, the archaeological investigations higher up the Acropolis have as yet been very limited.

⁶ On this, see K.J.H.Vriezen, 'Churches built over pagan sanctuaries: a frequent phenomenon in Byzantine *Palaestina/Arabia*? On churches, temples and theaters' Pp.69-79 in P.W. van der Horst (ed.), *Aspects of Religious Contact and Conflict in the Ancient World* (Utrechtse Theologische Reeks 31), Utrecht 1995. Editor's comment: see, however, B. Brenk *et al.*, *ADAJ* 39(1995), 211ff. and in *AJA* 100\3 (1996) (Archaeology in Jordan), on the temple foundations beneath the 'Cathedral' of Gerasa.

⁷ So, again and the production of plays and games were prohibited on Sundays and Christian festivals (*Codex Theodosianus* [furthermore: *C.T.*] II.8.23-24; XV.5.2,5; *Codex Iustinianus* [furthermore: *C.I.*] III.12.9; dated 386-469 AD). From the decrees on the rights and duties of the actors and actresses collected in *C.T.* XV.7 (*De scaenicis*) it appears that these people were considered indecent/*infamis* and their conduct was regarded as incompatible with a Christian life (*C.T.* XV.7.1-2,4-5,7-9,11-12; dated 367-394 AD; also: *C.I.* I.4.14, dated to 457-474; *Digestae Iustiniani* III.2.2.5, 6th century).

⁸ *Anecdota* XXVI.7-8.

⁹ In support of this interpretation, three other sites from the area of ancient *Palaestina/Arabia* may be mentioned, where a Byzantine church was built beside a Roman theatre/odeon apparently without a temple nearby. In Tabaqat Fahl (anc. Pella) in the Civic Complex a church was built about 400 AD on a square beside the Roman odeon, which - according to the excavators' hypothesis - became possible after strong Christian opposition caused theatrical performances to cease; A.W.Mc.Nicoll, R.H.Smith and J.B.Hennessy, *Pella in Jordan 1. An Interim Report on the Joint University of Sydney and the College of Wooster Excavations at Pella 1979-1981*, Canberra 1982, 82,108; A.W.McNicoll, P.C.Edwards, J.Hanbury-Tenison, J.B.Hennessy, T.F.Potts, R.H.Smith, A.Walmsley and P.Watson, *Pella in Jordan 2. The Second Interim Report of the Joint University of Sydney and College of Wooster Excavations at Pella 1982-1985*, Sydney 1992, 120f.,147. A similar situation may be suggested for the Church of Bishop Isaiah and the North Theatre in Jarash (anc. Gerasa) and for the theatre and the East church in Haluza (anc. Elusa); F.Zayadine (ed.), *JAP I 1981-1983*, Amman 1986, [205-341] 247,322; A.Negeve, 'The Cathedral of Elusa and the new typology and chronology of the Byzantine churches in the Negev', *LA* 39 (1989), [129-142] 130; *idem*, 'The Cathedral at Haluza (Elusa)', in Y.Tsafir (ed.), *Ancient Churches Revealed*, Jerusalem 1993, 286; *idem*, 'Haluza - 1980', *Excavations and Surveys in Israel* 1982. Vol.1, Jerusalem 1982, [34f.] 34.

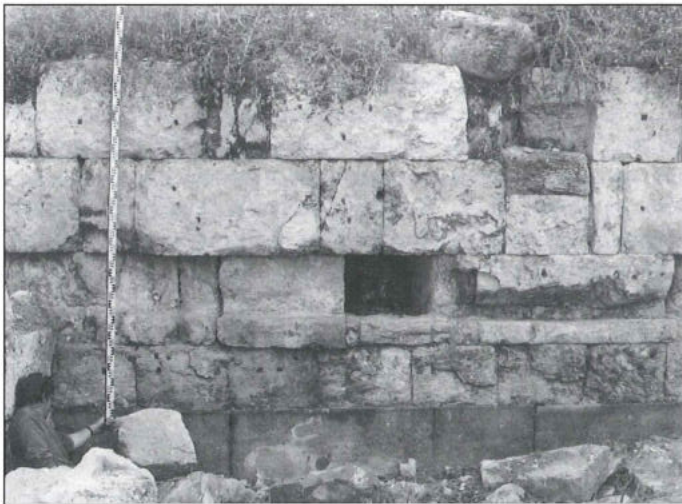
¹⁰ However, the plaster layer that once covered the walls has not yet been examined in detail.

wall, blocks and architectural elements of basalt have been used again to construct thresholds and door frames, whereas the rest of the wall is made of rectangular white limestone blocks. In some of them, ornamented architectural elements can still be recognised. Only the undecorated sides of these architectural fragments are visible in the wall face. Mostly, the blocks have been put together without using mortar.¹¹ In Type I, two subtypes may be distinguished according to the kind of limestone used: Type IA and Type IB. Type IA is used for the eastern Terrace wall and partly for the northern façade of the *atrium* (FIG.3). For this type, predominantly white, rose-veined, coarse limestone blocks have been used in elevation.¹² Type IB was used in the walls of the centralised church and in the façade walls of the rooms east of the *atrium* (FIG.2). Here, white fine limestone architectural elements and blocks have been used and occasionally a piece of rose breccia limestone (e.g. in the north-east apse of the centralised church).

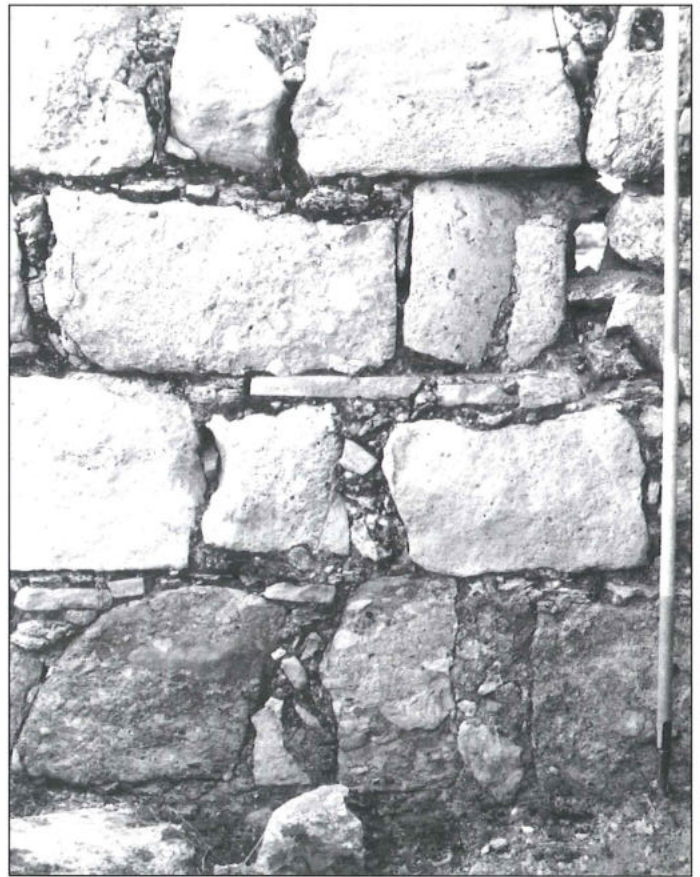
In the wall construction of Type II (FIG.4), predominantly blocks of rose breccia limestone have been used which, in part, still show the curvature of a column shaft together with some white fine limestone blocks made mainly of remodelled ornamented architectural elements. In this type, the wall is built up in courses of building stones (ca. 40 cm high) alternating with thick (5-10 cm high) layers of mortar. Also between the stones of one course mortar is added.¹³ The construction Types I and II can be found side by side in the building phase, to which the centralised church belongs. Type I was mostly used for façades and visible walls and Type II for internal walls.

Only small parts of the Roman building phase on the

Terrace still remain *in situ*; these parts were used as a foundation for the Byzantine buildings. The rest of the Roman buildings has disappeared from the Terrace. It is suggested that much of its building material was reused for the construction of the centralised church and the *atrium* and its rooms. This applies certainly for some of the architectural elements of basalt. As for the *spolia* made of other stone material, it is not yet clear whether they originate from earlier buildings on the Terrace. By studying the *spolia* used for the Byzantine buildings, the building material of the earlier periods may be reconstructed in part. The building material consists of basalt architectural elements such as: columns, bases, capitals and door frames; of white rose-veined coarse limestone blocks; white, fine limestone architectural fragments of capitals, friezes and bases and of rose breccia limestone columns. These different materials and *spolia* were not only used in elevation, but also for the pavement of the *atrium*. All these building materials were presumably quarried and prepared in the area of Umm Qays.¹⁴



3. Construction Type IA. East terrace wall.



4. Construction Type II. Internal wall of one of the rooms east of the *atrium*.

¹¹ When mortar is used, this consists of light grey (quick) lime mixed with small pieces of rose breccia limestone and stone slabs (possibly taken from the Roman pavement of the Terrace) and occasionally white limestone and basalt.

¹² The construction of the northern façade forms one bond with the eastern wall.

¹³ The mortar of Type II consists of light grey (quick) lime, with pieces of stone slabs and small pieces of rose breccia limestone, white limestone and

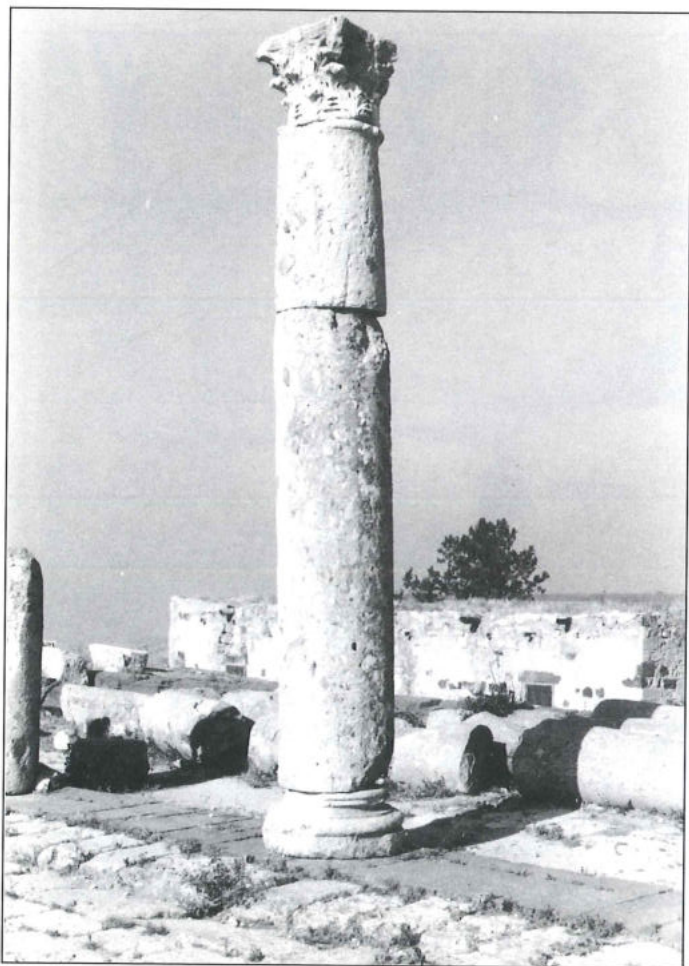
occasionally basalt. This mortar is very similar to the mortar of Type I.

¹⁴ Only detailed examination of the geological situation can demonstrate this. A general representation for the north of Jordan is given by G.R.H. Wright, *Ancient Building in South Syria and Palestine*. (Handbuch der Orientalistik. Abt. 7, Kunst und Archäologie. 1.Bd., Der alte Vorderer Orient. 2. Abschnitt, Die Denkmäler. B., Vorderasien: Lfg. 3). Leiden/Köln, E.J. Brill, 1985, figs. 8 and 9. Basalt as well as different types of limestone are present in the region of Umm Qays.

The following is presented as a tentative conclusion: for the construction of the Byzantine buildings on the Terrace, four kinds of *spolia* were available: rose breccia columns, white fine limestone architectural elements and white rose-veined coarse limestone blocks.¹⁵ These were used together with the basalt architectural elements available from the earlier buildings on the Terrace. The best preserved *spolia* were reused in their original function (columns, door frames; see the centralised church and the *portico* of the *atrium*, FIG. 5); the other *spolia* were reused in wall constructions and for the pavement of the *atrium* (FIG.6).

Two other categories of building materials to be discussed here are the roof tiles and the *tubuli* found in Areas I and III. These objects are ceramic building materials made by hand. The fact that, in Area I, roof tile fragments constituted about half of the volume of all ceramic finds, required further specialised study.¹⁶

In the following, some of the preliminary results are presented. Basically the roof tiles may be divided in two types:



5. *Spolia* reused in their original function: columnshaft of rose breccia, capital and base of white fine limestone. *Portico* of the *atrium*.

1. The *tegula*, a flat slab with flanged rims on the two long sides;
2. The *imbrex*, a curved tile covering the seam between two *tegulae*.

Both types reveal a wide variety of forms, which might suggest a series of *tegula* types and a series of *imbrex* types based upon rim forms. A closer inspection of the fragments, however, demonstrated that, despite the variety of rim forms, there is only a limited number of different wares and construction processes to be discerned. By the use of one raw material together with one construction process, various forms were produced. Therefore the roof tiles were studied according to the principles of ceramological analysis in which typology is mainly based on ware and manufacture and only roughly on form.¹⁷

In order to study the ware types, of all kept roof tile fragments an edge was taken off to inspect the fresh break. As a result, fourteen ware types were identified: eight ware types, two of which have three subtypes each taken (TABLE 1: I-VIII). Moreover, two different clay samples were inspected: one from a natural clay resource from Umm Qays still used by potters in the village (clay B) and one from a clay deposit excavated in 1994 from an industrial area of ancient Gadara¹⁸ (clay A) (TABLE 1: A-B).

When the types and subtypes of low frequency ($\leq 1.3\%$) are not considered, there remain seven main types. Of these, Type I shows the same characteristics as the sample of the natural clay bed from Umm Qays (clay B): clay with a natural admixture of quartzite silt and angular and rounded quartzite and manganese grains of $<1\text{mm}$ and sporadic sand and gravel grains added. Type II seems to correspond to the clay deposit excavated (clay A). These wares seem to be closely related; the temper added is characterised by the absence of rounded quartz grains. Ware Type III is characterised by a high percentage (22,5%) of non-plastics, almost exclusively angular basalt grains. Types IV and V-2 are characterised by mixed temper, in which sieved rounded quartz grains make a dominant element. Type V has a virtually exclusive sieved quartz grain temper. Finally Type VI is characterised as a very pale brown/yellow firing clay with a very low percentage of non-plastics (4%).

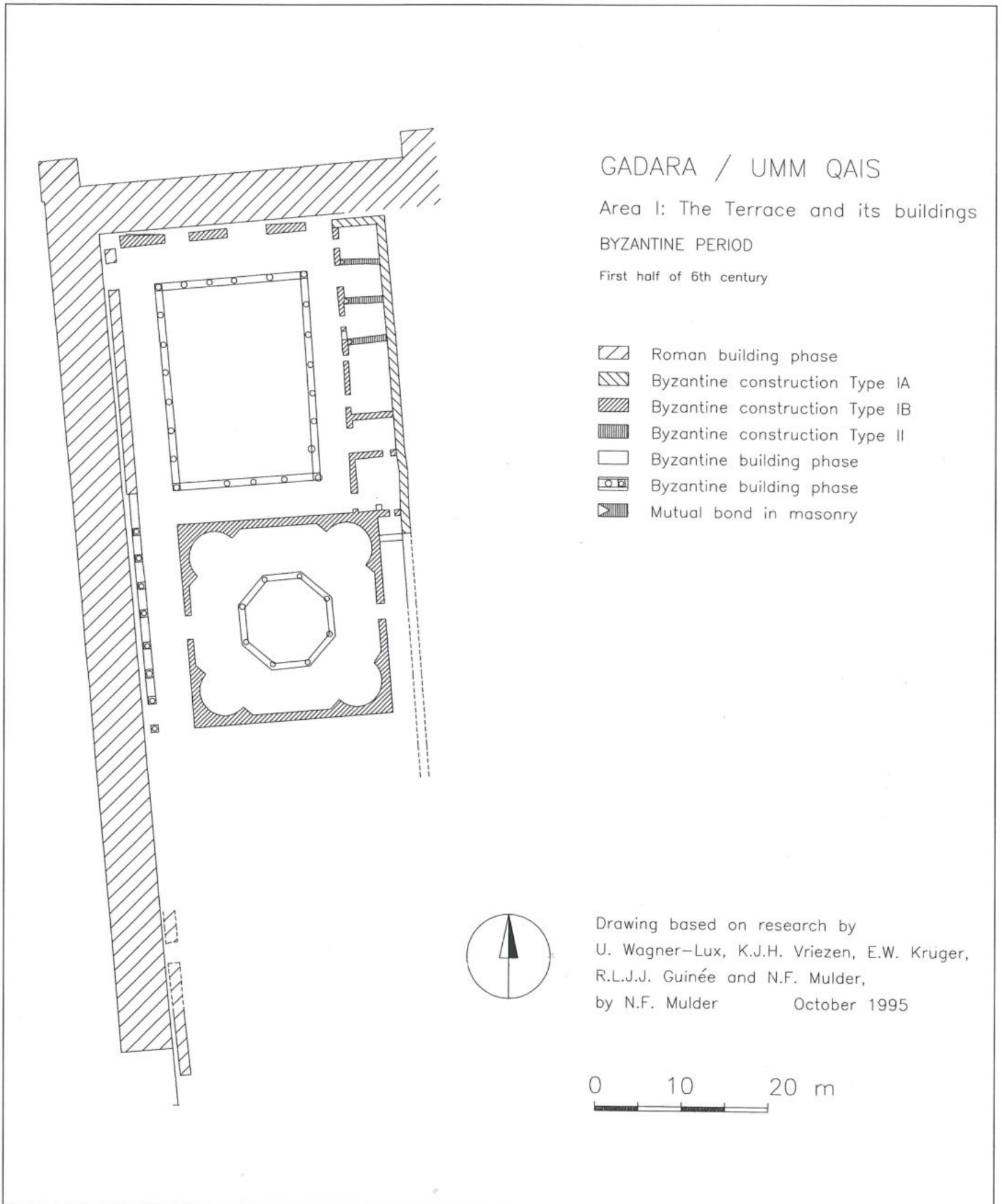
It is surmised that the wares I and II may come from the Umm Qays plateau itself: together they make more than one-third of the total repertoire. The wares, which are characterised by the admixture of sieved, rounded quartz grains, Types IV, V and V-2, may originate from the area of a river bed or a seashore; they make almost half of the total repertoire. Type VI (8.7%), the clear coloured and almost untempered ware, is distributed in a far larger area than the region of Umm Qays, as will be discussed below. Possibly the basalt tempered Type III (4.2%) is also non-local.

¹⁵ Possibly the *opus quadratum* blocks and the matching architectural elements originate from one building.

¹⁶ This study was financially assisted by travelling grants from the Netherlands Organisation for Scientific Research (NWO).

¹⁷ The typology achieved by this method has a rather limited range of types and may eventually be refined by the introduction of form typology.

¹⁸ We are thankful to Susanne Kerner for presenting this sample to us.



6. The Terrace and its buildings in the Byzantine Period (first half of sixth century).

Table 1. Analysis of excavated roof tile wares (I-VIII), excavated clay deposit (A) and natural clay source (B).

Type	nonplastics						characteristics	voids organ.	voids anorgan.	porosity	weight cm ²	presence %
	size / percentage			size/numb.								
	1000-600μ	600-250μ	250-150μ	150-75μ	75-38μ	>1mm/cm ²						
I	2	2	1,5	2.5	6	1,5	r/b, rnd/ang	1	v1	20.3	3.9	28.7
I-1	1.5	1.5	2	2.5	7	2	r/b, rnd/ang	1	v1	23.4		1.3
I-2	2	1	2	5	5	3	r/b, rnd/ang		h	13.9	4.3	0.6
I-3	1.5	1.5	1.5	2.5	8	2	undiss. clay			20.2	3.4	0.2
II	1	1.5	1.5	2	5	1.5	r/b, rnd/ang	1	1	20.6	4.2	9.7
III	1	2.5	2	2	15	2	basalt	m		23.9	2.8	4.2
IV	1.5	4	2.5	1.5	14	<1	basalt/qrtz		1	18.6	3.0	26.3
V	1.5	6	2	1	0.5	<.5	quartz		h	21.8	3.1	13.1
V-1	0.5	3	2	2	20		lime		h	21.6	2.7	1.1
V-2	1.5	7	4	2	1.5		lime/quartz		1	18.9	2.6	5.4
V-3	1	1.5	2	7.5	3.5	1.5	quartz	1	h	10		0.1
VI	1	0.5	1	0.5	1	1	quartz/lime		v1	21.5	2.8	8.7
VII	2	7	6	6		sng	r/b, rounded			16.2		0.1
VIII	1	1	1	4	2		quartz			19.1		0.5
A	0.5	0.5	1	1	3		r/b, rnd/ang		m	12.6		
B	0.5	1.5	2	3	5		r/b, rnd/ang	1	h	24.9		

LEGENDA:

ang	angular	h	high
b	black	l	light
r	red	m	medium
rnd	rounded	v1	very light
			undiss. undissolved clay
			sng. singular
			(an) organ. (an) organic

In the manufacture of the roof tiles, various construction processes may be discerned. Information on the tile manufacture from classical sources¹⁹ seems to corroborate with observations of brick and tile making in more recent times.²⁰ In their study of tile manufacture in the Eastern Mediterranean region, Hampe and Winter illustrated the manufacture of the curved tiles.²¹ There, it may be seen how a lump of clay is pressed into a wooden frame in order to form a clay slab. Then the slab - still in plastic condition - is pressed over a more or less semi-cylindrical mould to form a curved tile, which is then laid out in the yard to be dried. The inspection of the *imbrex* fragments from Umm Qays showed that for all ware types except one (VI), the same basic method of manufacture was used (FIG.7).

The manufacture of tiles of the *tegula* type may be studied on account of the visible traces which the process left on the surface of the tiles (e.g. clay ridges) and in the tile itself (e.g. air holes and folds), and may be reconstructed as follows. After a lump of clay was pressed into a wooden frame to form a slab, the two longer sides of the rectangular slab were curved up and folded over. The final rim form depended on the position of the fingers and on the

kind of tools used to press and finish off the flange (FIGS.8 and 9).

Both the *imbrices* and the *tegulae* show a notable difference between the items made of Ware Types I and II (FIGS.7 and 8) and the items made of Ware Types III, IV and V (FIGS.7 and 9), as the latter are more carefully finished than the former and therefore they are finer and show a wider variety of forms.

The tiles of Ware Type VI stand out, not only because of the ware, but also by their manufacture. Contrary to the *imbrices* already mentioned above, these *imbrices* were not pressed over a mould but into a mould, resulting in a more angular formed *imbrex* tile (FIG.10). Also the *tegulae* of Ware Type VI show a distinct form and surface treatment: both surfaces of the slab have been finished with a tool and with fingers, the folded-over flanges are angular in section and continue a little around the corner on one of the short sides, whereas parallel to the opposite short side a ridge is attached to the surface (FIG.11). These tiles, in ware and in shape, correspond to the roof tiles Type B from Tall Keisan.²² Therefore, these ware VI roof tiles are supposed to have a wider area of distribution, covering northern Palestine and northern Transjordan as well.

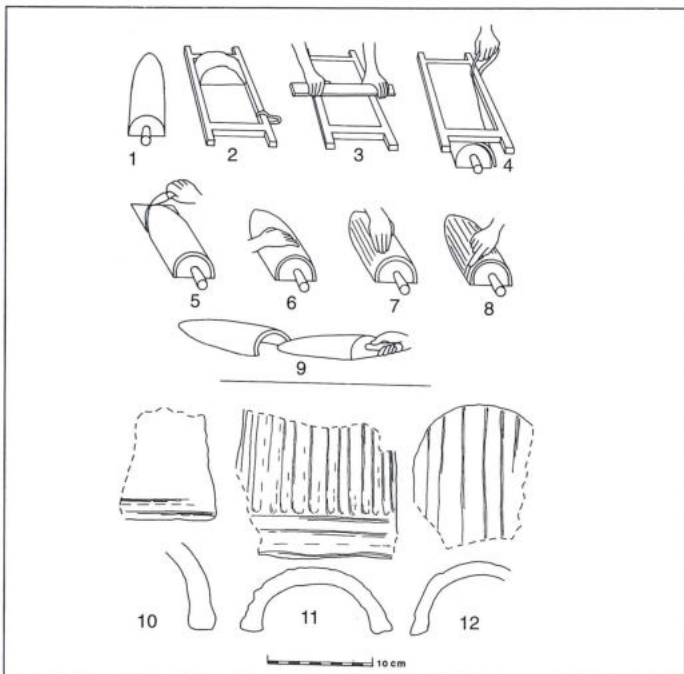
¹⁹ H.Blümner, *Technologie und Terminologie der Gewerbe und Künste bei Griechen und Römern II*, Leipzig 1879 [reprint: Hildesheim 1969], 14f., 18, 30f.

²⁰ See e.g. for the Netherlands: J. H. Holwerda and W. C. Braat, *De Holdeurn bij Berg en Dal. Centrum van pannbakkerij en aardewerkindustrie in den Romeinschen tijd* (Oudheidkundige Mededelingen, Suppl.N.R. 26), Leiden

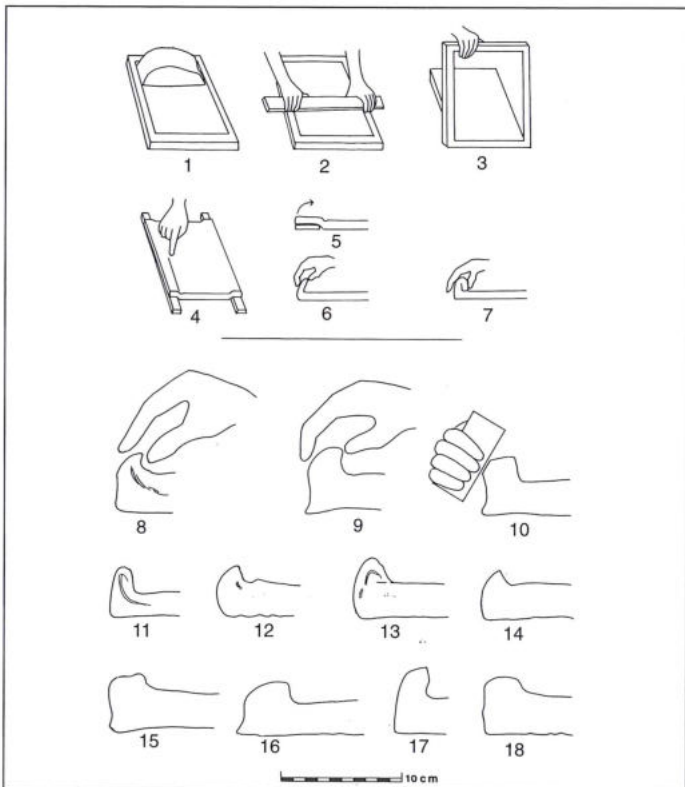
1946, 104ff.

²¹ R.Hampe and A.Winter, *Bei Töpfern und Ziegeln in Süditalien, Sizilien und Griechenland*, Mainz 1965, 26-29; Taf.15, 42, 48f., 55.

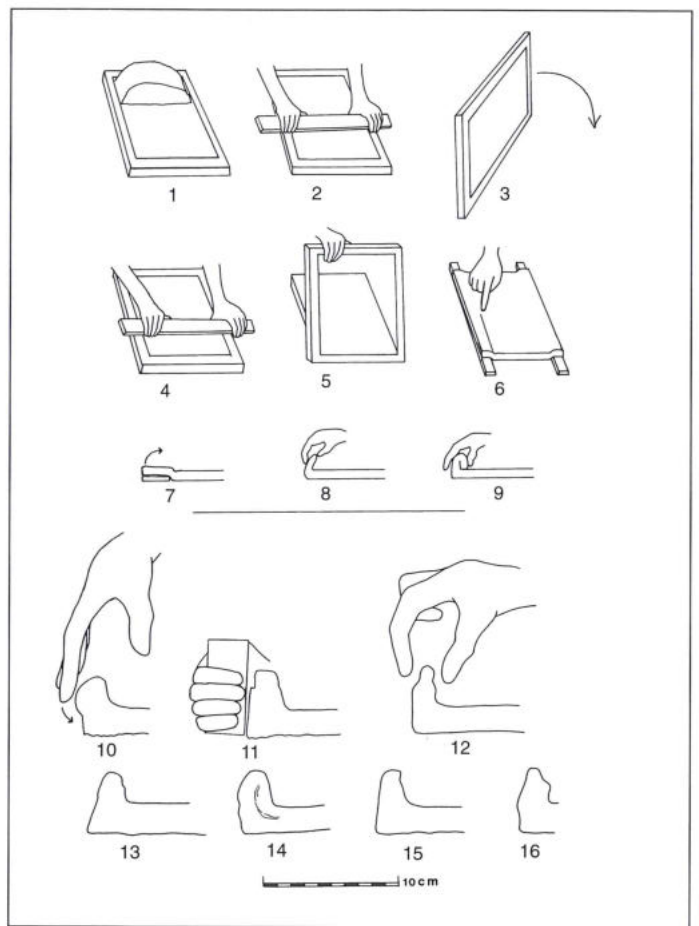
²² J. Landgraf, Pp. 84-87 in J.Briend and J.-B.Humbert eds., *Tell Keisan (1971-1976), une cité phénicienne en Galilée*, Fribourg-Göttingen-Paris 1980.



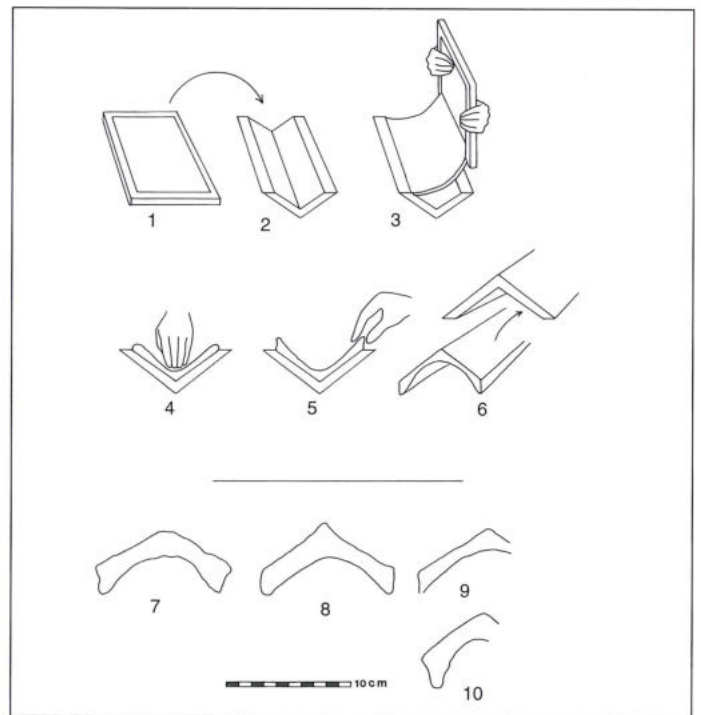
7. *Imbrex* manufacture: Ware Types I and II (1-6,9), Ware Types III-V and V-2 (1-9). Semi-cylindrical mould (1), pressing a lump of clay into a wooden frame (2-3), cutting the clay slab free from the frame and pressing it over the mould (4-6), finishing the *imbrex* surface (7-8), removing the mould (9), *imbrex* sherds Ware Type I/II (10) and Ware Types III-V (11-12).



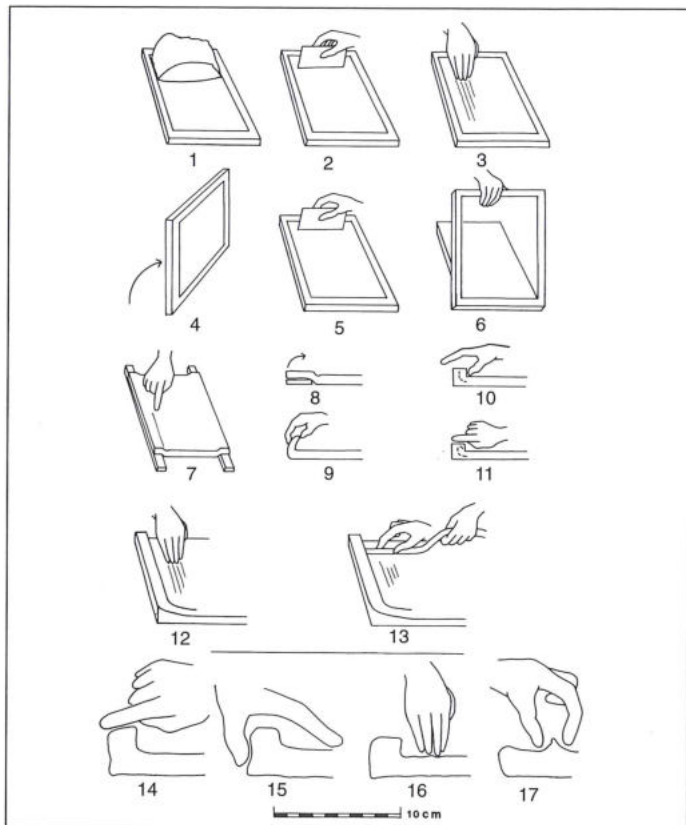
8. *Tegula* manufacture: Ware Types I and II. Pressing a lump of clay into a wooden frame and smoothing the upper surface (1-2), removing the frame (3), preparing the folding of the rim (4-5), folding over the rim and finishing the flange (6-7), *tegula* sherds and the finishing of their flanges (8-18).



9. *Tegula* manufacture: Ware Types III-V and V-2, see FIG. 8; here the lower surface is also smoothed (3-4). *Tegula* sherds and the finishing of their flanges (10-16).



10. *Imbrex* manufacture: Ware Type VI. Pressing the clay slab into a mould and removing the mould (1-6), *imbrex* sherds (7-10).



11. *Tegula* manufacture: Ware Types VI, see FIG.8; a clay ridge is added (13,17).

An even larger area of distribution can be assumed for a type of roof tiles not yet mentioned, namely the tiles made of Ware Type VII. They constitute only 0.1% of the repertoire in Umm Qays Area I and are identical to one of the roof tile wares known from Jerusalem.²³ Thus, in the study of the ware different types were identified and some of these could be grouped together according to corresponding main characteristics and each of these groups was supposed to have a different area of origin and distribution. Also in the study of the manufacture, different processes were identified and each of these appeared to be related to one of the groups of ware types:

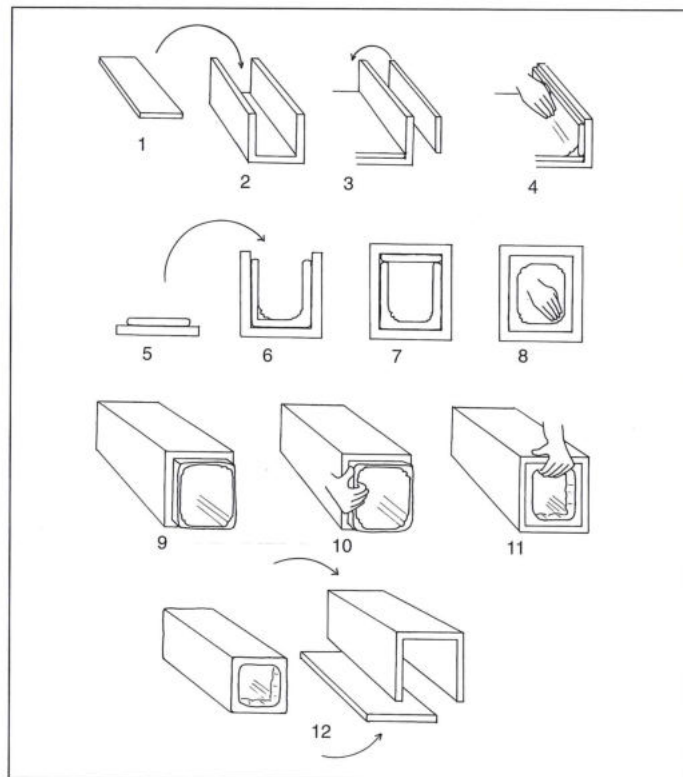
- Ware Types I and II; local?; poor surface treatment;
- Ware Types IV, V and V-2; quartz sand region; form finish and surface treatment;
- Ware Type III; basalt region; form finish and surface treatment;
- Ware Type VI; Galilee/NW Transjordan; angular forms, *imbrex* pressed into mould.

In order to understand the presence of such a variety of Ware Types, a preliminary study of the distribution of the Wares in Areas I and III was made. As a result certain concentrations and gaps in the distribution of wares I, IV and VI are revealed. This may be due to differences in

roof construction or roof repairs, but this issue will be subject to further study.

The second category of handmade ceramic building materials to be discussed is that of the *tubuli* (box tiles): rectangular ceramic pipes used for wall heating. The fragments found in Area I are all made of Ware Type I. Not only in ware, but also in manufacture they resemble the roof tiles, as they are built of rectangular flat tiles. However, as can be seen in the construction drawing (FIG.12), their manufacture is more elaborate and a different type of "mould" was used. The air-holes and the deep finger-made grooves inside the rectangular corners are the traces of the assembling process. They make up the characteristics of these tiles together with the inward folded rims around the more or less round opening in the smaller sides.

This contribution based on Umm Qays Area I may show that in the study of the natural resources of Jordan used throughout the ages, the less attractive objects such as building materials must also be taken into account. Because they represent massproduced commodities, their study may give new insights into questions of distribution patterns.



12. *Tubulus* manufacture. Pressing a clay slab into a mould (1-2), placing a second clay slab into the mould and assembling the slabs (3-4), adding the fourth slab (5-8), folding the pinched-out clay back over the rim of the short side (9-11), removing the mould (12).

²³ Excavations underneath the Church of the Redeemer: roof tile ware 4; K.J.H.Vriezen, *Die Ausgrabungen unter der Erlöserkirche im Muristan*,

Jerusalem (1970-1974) (Abhandlungen des Deutschen Palästina-Vereins, Band 19), Wiesbaden 1994, 259f.