TECHNOLOGICAL MARKS ON POTTERY VESSELS. EVIDENCE FROM TELL ARBID, TELL RAD SHAQRAH AND TELL JASSA EL-GHARBI (NORTHEASTERN SYRIA)

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Pottery vessels occasionally bear marks that can be traced to various stages in the process of the forming of a pot. Considered together with results of laboratory research, these marks can contribute to a reconstruction of the technological processes involved in the shaping of a vessel and its surface treatment, as well as firing conditions. Since successive stages of pot-making tend to obliterate traces of the earlier steps, practically the only way to determine some of the technological marks is to study vessels that have not been finished too carefully. The well made ones bear hardly any technological marks other than what was a final or intended effect in keeping with the vessel's projected use.

The present investigation is based on a technological study of pottery from three sites in northeastern Syria excavated for the PCMA UW by a Polish archaeological mission under the supervision of Piotr Bieliński. These sites are: Tell Arbid in the basin of the Upper Khabur, and Tell Rad Shaqrah and Tell Jassa el-Gharbi in the basin of the Middle Khabur. The Tell Arbid material includes a variety of pottery categories dated mainly to the third millennium BC (Ninevite 5, EDIII, Akkadian and post-Akkadian), as well as to the Khabur Ware, Mitanni and Hellenistic periods. Tell Rad Shaqrah and Tell Jassa el-Gharbi have yielded mostly EDIII ceramics. An analysis of the pottery has identified and interpreted evidence of technological marks related to different stages in the forming of vessels, from shape building to firing.

FORMING TECHNIQUES

There are many forming techniques in evidence: by hand (pinching, drawing, coiling, slab building, and others) and using tools like a potter's wheel or a tournette. Vessels were made from a single lump of clay or from separate parts that were joined together. Different techniques were frequently used in conjunction with one another. Some aspects of the forming processes cannot be analyzed without laboratory examination (e.g. X-ray) and others leave marks on the vessels themselves.

But since normally the earlier stages in the process were obliterated by any modeling that the pot underwent (scraping, among others) and by the smoothing or slipping that followed, the identification of such marks is often questionable.

Pinching is the forming of a vessel from a single lump of clay; it is often used for making simple pots. Examples of the technique have been recorded at Tell Arbid, Tell Rad Shaqrah and Tell Jassa el-Gharbi [*Fig. 1:1*]. A thumb or fingers are pressed into a lump of clay to "open" it and the clay is subsequently pinched into the desired shape.

Coiling consists of using coils of clay to build up the vessel walls, either particular coils arranged one on top of the other (ring building) or else one long coil spiraling up continuously (spiral coiling); each layer can be composed of a number of separate coils (segmental coiling). The joining between the coils usually disappears in effect of pot modeling and smoothing, hence only carelessly made and unfinished vessels afford examples of the technique. In these rare instances, the evidence is there to be seen mainly on the inside of a vessel [*Fig. 1:2*]. Coiling can be identified also when the coils are poorly joined because, for example, the clay had dried excessively before the next coil was added and the firing additionally weakened the joining. In such cases one can see parallel fissures following the weakly joined coils [*Fig. 1:3*]. Cracks of this kind are sporadic as they are proof of faulty construction that would have adversely affected the durability of a vessel during the firing process and in later use.

Wheel-throwing leaves very characteristic marks in the form of parallel ridges and grooves which can be observed on the vessel surface. Other evidence of wheel-throwing can be found on the base. Vessels were cut from the wheel with a wire or string, while the wheel was in motion or already still. Concentric striations on the base are proof that the wheel was still moving [*Fig. 1:4*]. String-cut bases are common on, among others, cups and goblets from Tell Arbid and Tell Rad Shaqrah from the EDIII and Akkadian periods, when standard pottery was mass-produced in local workshops using a potter's wheel.

Supporting devices were essential during the formative stage (for example, coiling and slab building) and further treatment (e.g. scraping). This could be a mat, board, clay disc or stone support. The device could be turned along with the vessel or else the vessel was turned on the support.

Mat impressions can be seen on the external surfaces of the bases of oval bowls from the late Ninevite 5 at Tell Arbid [*Fig. 1:5*]. The oval shape of these bowls excluded forming on the wheel, hence coiling or slab building must have been used. In the course of the forming, this particular example had been placed on a mat which left its impression in the clay on the base of the vessel.

Many vessels were manufactured using composite forming methods. The big and medium-sized jars from the late Ninevite 5, EDIII and Akkadian periods on Tell Arbid are a good example. The neck and rim were formed separately and attached to the body; the seam is often marked by finger impressions and other marks of the joining [*Fig. 1:6*]. Horizontal cracking can also be observed just below the neck, most likely at the seam line. It could be due to excessive drying of the clay before the parts were joined, thus weakening the seam. The rim and neck were wheel-thrown in all likelihood (evidence of turning), while the body of the jar was made by coiling; the outer surface of the vessels shows evidence not of turning, but of smoothing with a soft tool. Scraping marks can be seen on the inside surface of the vessel, below the neck.

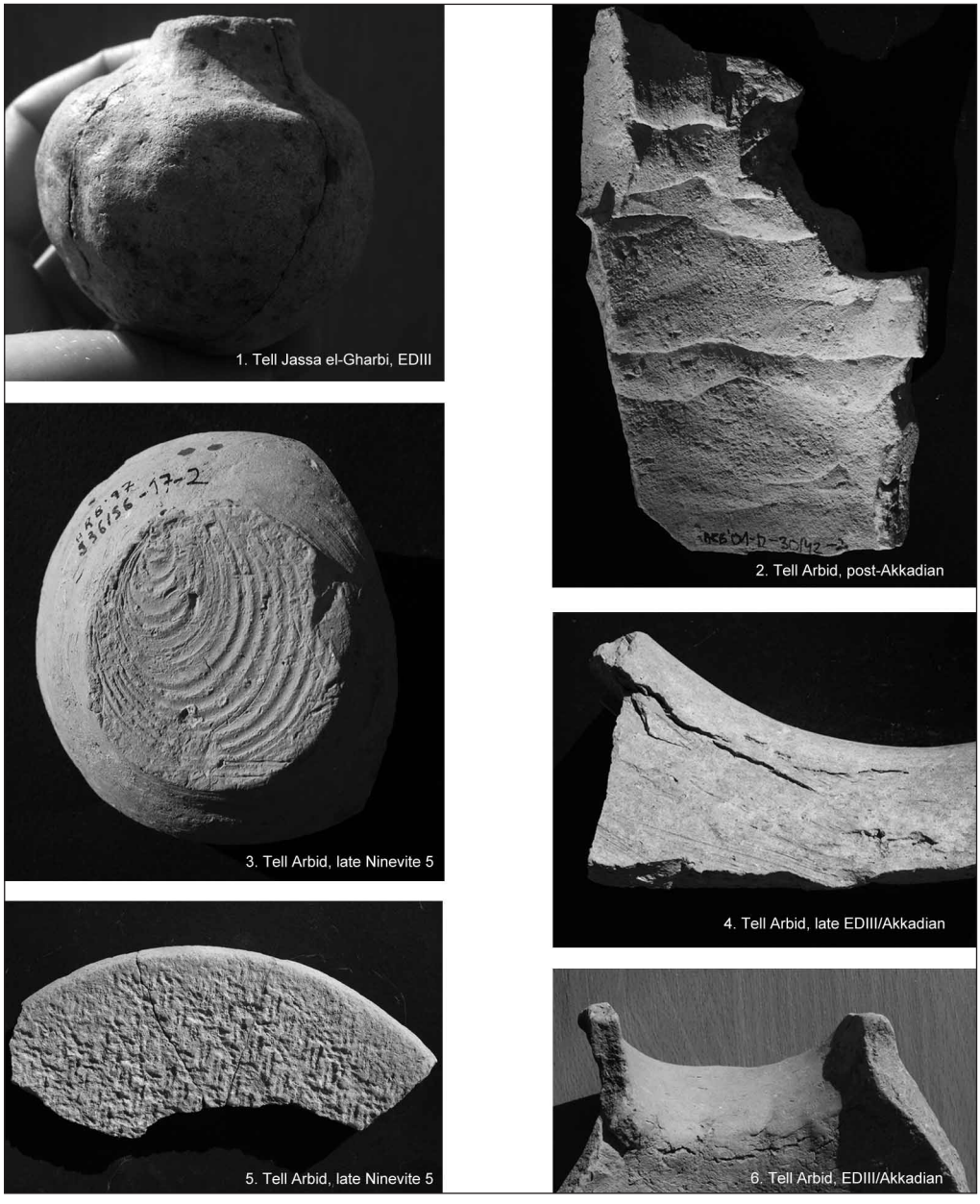

Fig. 1. Technological marks exemplifying different forming techniques: 1 – small handmade jar formed by pinching, the rim diameter corresponding to the thickness of a thumb; pinching marks discernible on the surface; 2 – inner surface of a potstand with traces of coiling building; 3 – string-cut base of cup; 4 – horizontal cracking where coils were joined on inside surface of a jar; 5 – impression of a mat on the base of an oval bowl; 6 – finger impressions and other marks on the inside surface showing where neck and rim were attached to body (Photos A. Smogorzewska)

FINISHING: SECONDARY FORMING TECHNIQUES AND SURFACE TREATMENT

Once the vessel had been formed, it needed further treatment. First of all, the shape was modified and modeled, eliminating any observable faults and unevenness, such as traces of where the different elements of a vessel had been joined. This treatment takes place before the clay dries out, usually when the vessel is still wet or leather-hard. Secondary forming techniques include paddling, scraping and trimming, which are all useful in changing pot dimensions and wall thickness. Vessel surfaces were treated by different variants of smoothing and texturing, the choice of technique being dependent on intended vessel function. Texturing and burnishing was applied in the case of vessels of utilitarian use. Burnishing reduced permeability which was particularly important in the case of cooking pots. Surface treatment is an important factor modifying the thermal properties of a vessel. Texturing of the outer surface of a vessel increased the surface that absorbed heat from the fire. It also prevented slipping of the pots and made them easier to carry.

Scraping was commonly employed on vessels made by coiling, molding or pinching.

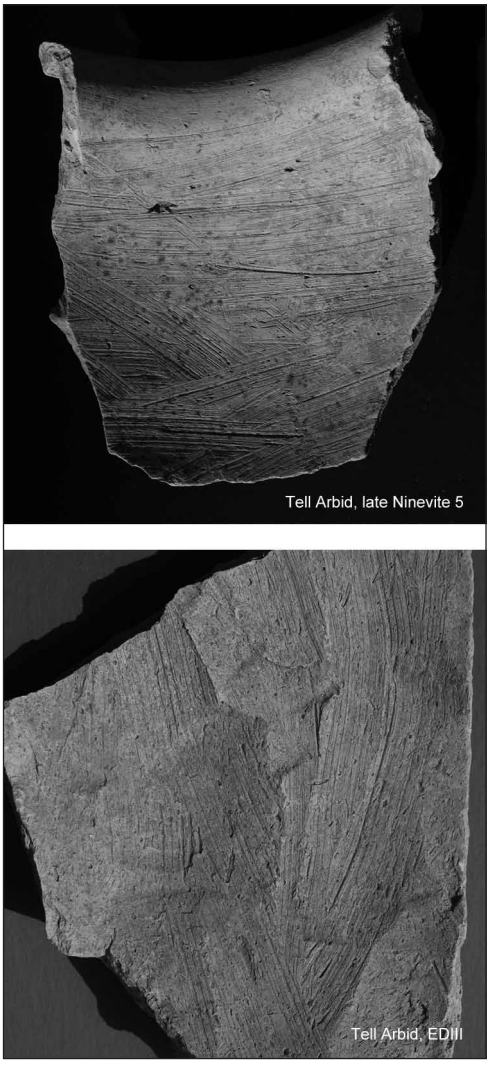

Fig. 2. Scraping and tooling marks on the inside surface of jars (Photos A. Smogorzewska)

Fig. 3. Gray carinated bowl with burnished surface (Photo A. Smogorzewska)

It was a time-consuming process that removed any faults observed on the pot surface and thinned the walls by removing excess clay to obtain a lighter product. Scraping was done with shells, flaked stone, bone and ceramic sherds, including also pottery ring scrapers. Surface marks are extremely characteristic: striations and grooves, their width and depth dependent on the kind of clay, degree of drying and tool used. Scraping has been observed on the inside walls of jars from Tell Arbid. The medium and big late Ninevite 5 jars bear evidence of this secondary forming technique just below the neck [*Fig. 2,* top], while those from the EDIII period reveal also evidence of modeling of the walls and removal of excess clay using a scoop of rectangular shape with rounded edges [*Fig. 2,* bottom].

Smoothing of the vessel surface could be done with a soft tool, like a textile, leather, bundle of grass or with the hand. Wet smoothing leaves a matt surface after drying. Sometimes it is possible to discern marks left in the wet clay by smoothing with a bundle of straw, for example. Wet-smoothing is the most typical form of surface treatment found on vessels from the three sites in question.

Burnishing is a treatment applied to the clay surface when it is leather-hard. The tools used are hard and smooth, like a pebble, a bone or a horn. The compaction of clay particles gives the effect of a shiny surface with characteristic facets [*Fig. 3*]. The effect may disappear if the burnishing is done on a wet surface, since the clay will continue to shrink.

Texturing can be to an equal degree functional and decorative. It is frequent on utilitarian vessels, like cooking pots and other vessels used in the household. It was mainly the base and bottom part of a vessel that was treated in this way, the rough surface obtained by a variety of methods, such as brushing, striating, impressing or by applying a coating of clay (most often with sand or crushed rocks added).

The lower parts of large bowls from the Ninevite 5, EDIII and Akkadian periods on Tell Arbid were frequently textured by parallel scoring. This was done with a bundle of straw or by striating the surface with a hard denticulated edge (shell, retouched flaked tool, ceramic scraper) [*Fig. 4,* top]. A textured bottom surface made it easier to

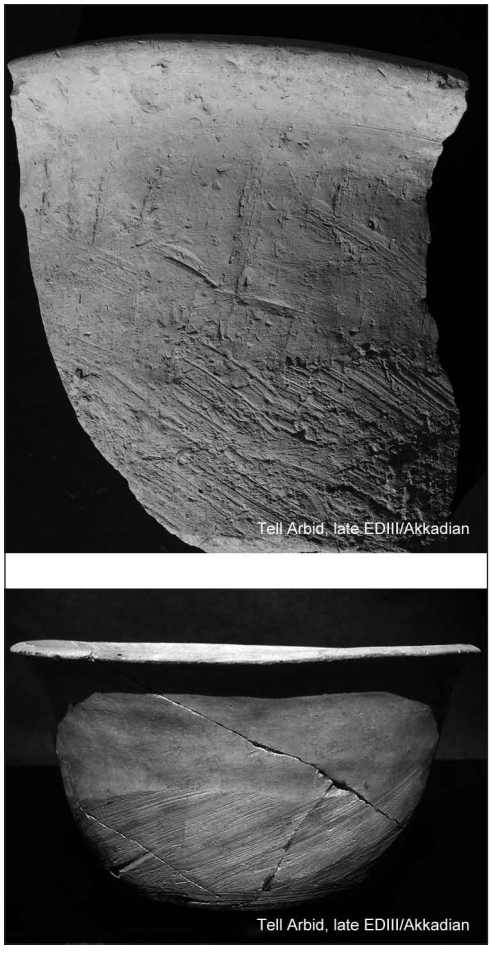

Fig. 4. Big bowls with textured bottom surfaces (Photos A. Smogorzewska [top] and A. Reiche)

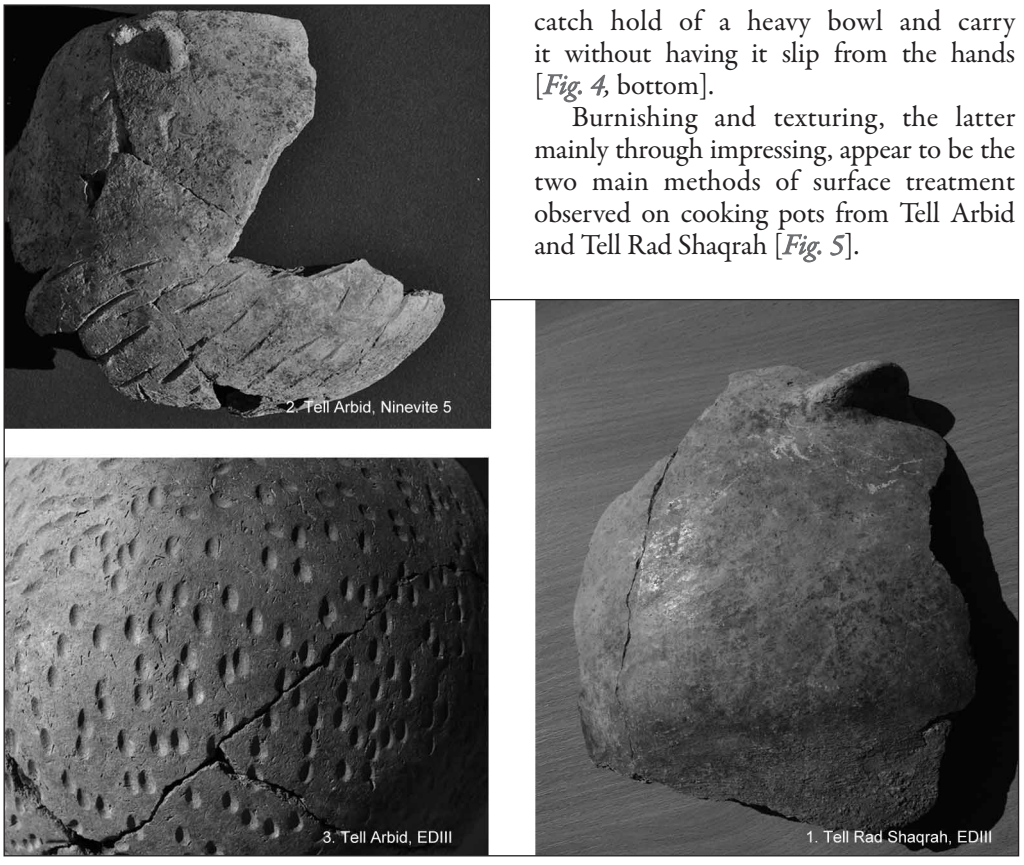

Fig. 5. Cooking pots with textured bottoms: 1 – surface burnished except for bottom part and base which is textured with an added coat of clay mixed with crushed basalt; 2 – incisions on the base and bottom part; 3 – surface burnished with dimpled impressions on the base and bottom part (Photos A. Smogorzewska [top] and A. Reiche)

catch hold of a heavy bowl and carry it without having it slip from the hands [*Fig. 4*, bottom].

Burnishing and texturing, the latter mainly through impressing, appear to be the two main methods of surface treatment observed on cooking pots from Tell Arbid and Tell Rad Shaqrah [*Fig. 5*].

DRYING AND FIRING

S-shaped cracking of the base is a typical fault which often appears during the drying process and is magnified in firing [*Fig. 6*]. Cracking is caused by different amounts of water in the clay of the vessel, resulting in uneven shrinkage. In a wheel-turned pot the base will be wetter than the upper parts and will therefore shrink differently and be more susceptible to deformation and cracking. Some vessels bear evidence of repairs, the cracks being sealed with bitumen, for example.

Black vessel surfaces and a thin black layer just below the surface when the core is brown can be the effect of smudging [*Fig. 7*], which is a form of firing in an open fire. Air is cut off at the end of the firing process — by smothering the fire with a thick layer of sawdust, manure or straw — thus without

oxygen access, the charcoal is deposited on the pot surface and in the pores. Smudging was intended as a means of blackening of the surface as well as sealing of the pores by the charcoal deposited in them. It occurs frequently in association with burnishing. Smudging is not common in the ceramic assemblage from the three sites. The dark gray surface of some vessels of Burnished Ware, which were common at Tell Arbid in the late Ninevite 5 period, is the effect of smudging.

A gray core observed in the break in some vessels reflects incomplete oxidation of organic substances present in the clay. It means that the firing conditions were insufficient: low firing temperature, too little oxygen and/or short firing time. Gray cores are common in cooking pots which were fired in low temperatures [*Fig. 8*].

Fig. 6. S-shaped cracking of the base (Photo A. Smogorzewska)

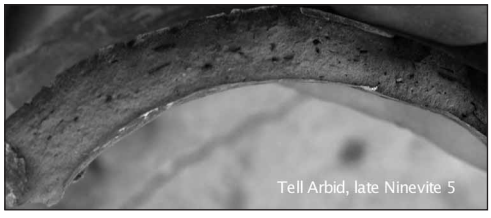

Fig. 7. Dark gray burnished carinated bowl with smudging effect observed in the core (Photo A. Smogorzewska)

Fig. 8. Dark gray core observed in the break of a cooking pot sherd (Photo A. Smogorzewska)

POTTER'S TOOLS

A variety of tools was used for vessel modeling and surface treatment. They have been found widely on archaeological sites in the Near East, including Tell Gubba (Ii 1991: Fig. 9), Ur (Woolley 1934: Pl. 221; 1955: Pls 16, 45), Kish (Mackay 1925: Pl. 44), Nippur (McCown *et alii* 1967: Pl. 156.24), Tell Asmar (Delougaz 1952: Pl. 131), Susa, Tepe Hissar (Mecquenem, Scheil 1928: Fig. 18; Mecquenem, Contenau 1943: Fig. 10; Steve, Gasche 1971: Pl. 28), Habuba Kabira (Sürenhagen 1978: Figs 32–34), Tell Abada (Jasim 1985: Fig. 62).

The clay tools include crescent-shaped objects, flat or slightly arched chisel-like bars and "scoops" with one sharpened edge. There are also scrapers and flaked discs used as potter's tools for scraping, trimming and

smoothing. Objects of wood, bone and horn, shaped like knives or scoops, must have also been used, as well as bone and stone polishers, pieces of leather, shells and ordinary pottery sherds. A small wooden or bone knife would have served to trim excess clay and remove any faults observed on the surface of the modeled vessel [*Fig. 9*]. There is no reason to refuse the Arbidian potters the ingenuity of using a similar variety of fruit shells, hard fruits, seeds and leaves for the purposes of potmaking, as is done by various other prehistoric and modern peoples.

The Tell Arbid assemblage has yielded six pottery ring scrapers [*Fig. 10*].[1] Five examples come from the residential quarter in the northwestern part of Tell Arbid (sector D), which is dated to the late Ninevite 5 phase. Alongside waste pottery, which includes vessels that have been deformed and fused in effect of too high temperatures, as well as pottery discarded from a furnace after unsuccessful firing, scrapers are tangible proof of the existence of a local ceramic industry. Some pottery

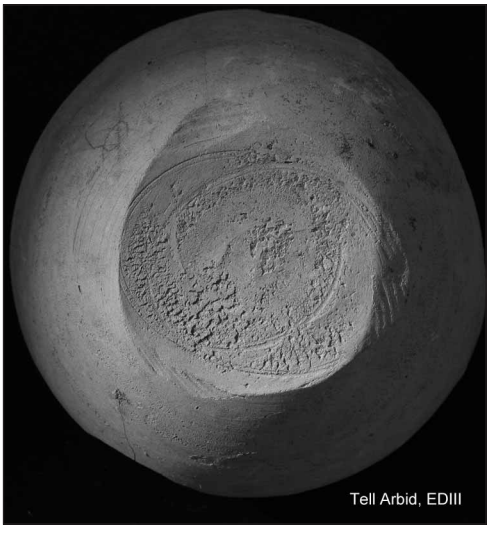

Fig. 9. Base of a cup cut off and modeled with a wooden or bone knife (Photo A. Smogorzewska)

Fig. 10. Pottery ring scrapers (Photo A. Smogorzewska)

Fig. 11. Marks left by scraping and impressions of ring scrapers on the inside surface of a jar (Photo A. Smogorzewska)

1 Ceramic ring scrapers are known from a large part of the Near East (from western Syria to Iran), including sites like Habuba Kabira (Sürenhagen 1974/5 Figs. 19:157; 31:1), Tell Gubba (Ii 1991: Fig. 9:9–11), Tell Beydar (Rova 2003: Pl. 11:S, Sc), the Amuk region (Braidwood, Braidwood 1960: Fig. 212:5, 270), Tell Brak (Oates 1986: Fig. 4:71, 72; Oates, Oates 1993: Fig. 51:27; Matthews 2003: Fig. 2.6:32, 2.7:21, 2.8:29, 4.18:4, 5, 4.23:25), Tell Chagar Bazar (McMahon *et alii* 2001: Fig. 5:o), Kurban Höyük (Algaze 1986: Fig. 4:NN), Godin Tepe (Badler 2002: Fig. 18:B 01 69).

scrapers were found in a courtyard in the residential quarter in sector D where vessels could have been made. The Tell Arbid pottery scrapers are fragmentary ring-shaped objects (no complete ring scrapers have been recorded). The working edge is usually thinned, while the opposite end is thickened, often simply by pinching. Other examples of pottery ring scrapers have simple edges. Tell Arbid has also yielded examples of pottery with characteristic marks left by pottery ring scrapers. These are crescent-like impressions of the tool that was used for scraping the inside surface of big jars from the EDIII period [***Fig. 11***]. These impressions match the pottery ring scrapers in shape and size.

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