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Decoration Technology of Dalma Pottery at the Site of Seh Gabi, Western Iran

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Abstract:

In a previous paper (Hossein-Mardi 2014), the Dalma pottery of Seh Gabi Tepe, dating to the early Middle Chalcolithic, was examined by means of experimental archaeology to see how it was decorated and how useful the experimental archaeology could be in studying the technology of pottery decoration. In the current paper, this experiment is viewed from a different angle to address questions about uniformity and diversity of decoration technology among the Dalma monochrome and bichrome ceramics. As technology has a social and cultural aspect, its analysis can help us to better understand the cultural setting of the society in which this type of pottery was produced. In the experiment, we focused on the brush strokes and method of applying paint to see if similar motifs were depicted with the same or different techniques, with types of pigments and tools (e.g. type of brush) remaining to be investigated. The results indicate that the majority of the similar motifs were created with the same decoration techniques. However, some variations in the decoration of some ceramics could be observed.

Keywords:

Dalma Painted Pottery; Monochrome and Bichrome Decorations; Brush Strokes; Seh Gabi; Experimental Analysis

(59- 80)

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1-Introduction

In studying the decoration of ceramics, major attention is usually paid to different decorative styles and the type of motifs (e. g. Smith 2000; Johnson 1969), so the decoration techniques and the question of how decoration was applied on the surface of pottery are seldom discussed in archaeological reports. These techniques can be investigated from different aspects, including the analysis of the types of tools that were employed during application or the direction of brush strokes (see e.g. Castro Gessner 2013). The objective of this study is to examine the uniformity and diversity of the decoration technology of painted pottery at Seh Gabi Tepe in Iran during the Dalma phase or early Middle Chalcolithic period

with a focus on the brush strokes and order of the application of paint. The cultural environment and the society in which potters learn how to make pottery can influence the technological choices potters make (Gosselain 1992; 1998; Dobres and Hoffman 1994; van der Leeuw 1993). Therefore, by examining the technological attributes of these ceramics, we intend to learn about the society in which pottery was practiced.

The Dalma phase at Seh Gabi Tepe included different types of decoration. Although the attributes of all of them will be briefly discussed in this paper, we narrowed our research down to the painted pottery (monochrome and bichrome) for the experimental analysis. We concentrated on the direction in which brush strokes were applied and the method of painting to find out whether individuals used different techniques to paint similar motifs (different technological styles), or all the potters were following the same technique. This allows us to better understand the social context of the pottery under study.

2- Methodology

Thirty potsherds were selected for this study – 28 monochrome and 2 bichrome painted sherds. We tried to select a sample which included potsherds with similar motifs so that their decoration techniques could be compared. Also, as most of the excavated Dalma sherds were small in size, an attempt was made to choose the largest available sherds the motifs of which were better preserved. Our aim was to select the potsherds that were good representative of the Dalma painted wares. Therefore, due to the constraint mentioned above, we did not limit ourselves to the potsherds that came from good archaeological context. For example, some of the potsherds in our sample came from operation G22 which was excavated in arbitrary levels by the excavators to reach the virgin soil. This operation contained good examples of Dalma wares that we included in our sample.

In order to achieve the purpose of this research, we first analyzed the junctures of the lines on the Dalma pottery in our sample available at the Royal Ontario Museum of Toronto (ROM) to discover the direction of brush strokes. Second, we conducted an experimental analysis to replicate the process of decoration to test what techniques were more likely to be used on these ceramics to learn if different techniques were employed to paint similar motifs.

3- The History of the Site

Seh Gabi Tepe is located in the central Zagros of western Iran between the Kangavar and Assadabad valleys (figure 1). Located approximately 6 kilometers northeast of Godin Tepe, the site was excavated by Louis D. Levine in 1971 and 1973 as part of the Godin Project, sponsored by the Royal Ontario Museum. The goal of the excavation was to discover material culture older than the earliest level at Godin Tepe (Young and Levine 1974, 1; Hamlin 1973, 224). First thought to be a late Neolithic site (Young and Levine 1974, 1), Seh Gabi was subsequently redated to the early to late Chalcolithic periods (Levine and Young 1987; Henrickson 1991). The site is approximately 550×300 meters, and contains different mounds: A, B, C, D, E, and F (figure 2). Mound C is dated to the Early Chalcolithic, also known as Godin XI. Mound B, which is the largest mound, is dated to the Middle Chalcolithic period. The Middle Chalcolithic is divided to three phases. The first one is the Dalma period or Godin X (Levine and Young 1987, 17-21; Henrickson 1991). The second phase is the Seh Gabi period or Godin IX, and the last phase is Godin VIII (Henrickson 1991). The Late Chalcolithic period includes two phases, Godin VII and Godin VI, which were found on Mounds A, E, and F (Levine and Young

1987; Young and Levine 1974). This research project focuses on the pottery of the earliest phase on Mound B – the Dalma tradition. In the Kangavar valley, Dalma wares were mainly discovered in Operation XYZ of Godin Tepe and Mound B of Seh Gabi (Henrickson 1985, 69).

4- Dalma Ware and Its Characteristics

These ceramics took the name of Dalma after the site of Dalma Tepe, which had similar types of pottery, located in the Solduz valley in the province of Azerbaijan of Iran (Young and Levine 1974; Hamlin1974). Dalma Tepe was excavated by Charles Burney in 1958 and 1959 and by Cuyler Young in 1961 as part of the Hasanlu Project (Hamlin 1975). This tradition corresponds chronologically with Ubaid 3 and early Ubaid 4 in Mesopotamia (Henrickson and Vitali 1987, 37). According to Levine, it is difficult to tell the difference between the Dalma pottery from Seh Gabi and that of Dalma Tepe at the southwest of Lake Urmia. He mentions that, although some distinctive attributes were present in each group, most of the ceramics were similar to each other (Levine 1975, 33).

However, the Instrumental Neutron Activation Analysis that has been conducted on the Dalma pottery of several sites demonstrates that although the style of these ceramics was homogenous, they were all locally manufactured, so there was no extensive trade with Dalma ware (Henrickson and Vitali 1987). Tonoike (2009), who conducted petrographic and small-scale electron microprobe analyses to study the manufacturing technology of Dalma pottery in northwest of Iran and central Zagros, also suggests that there was a considerable amount of diversity in the Dalma wares, indicating that they were all locally produced.

The Dalma ceramics at Seh Gabi were all hand-made. The dominant temper used in the production of Dalma pottery was plant fibre, ranging from fine to coarse. There was a small amount of grit-tempered pottery beside the main plant-tempered one. Dalma ware can be divided to three classes: painted (monochrome, bichrome, and streaky), impressed, and plain or red slipped ware (Young and Levine 1974). In addition to these Dalma ceramics, small amounts of Black on Buff wares (BOB) and Dalma "Ubaid" Painted wares (DUP) were discovered in the Dalma phase of Mound B at Seh Gabi. These wares, particularly BOB wares, were typical ware types in west central Zagros (Henrickson 1985). The characteristics of all the Dalma ware types are reviewed below before moving to the experimental analysis.

The Dalma plain wares had a slip in shades of red. They were sometimes double slipped with a red color over a buff one (Young and Levine 1974). The Dalma impressed wares, as the name shows, had impressions on their exterior surface. Different tools could be used to apply impressions, including fingertips, fingernails, and a pointed or blunt ended tool. Their surface was also slipped (Young and Levine 1974) (figure 3).

The Dalma painted wares, the focus of this research, were painted on either or both sides; however, the majority of them were decorated only on the exterior surface (figure 4). Within our sample, all ceramics were painted only on the exterior surface. Dalma Painted wares were decorated with geometric motifs. These motifs could be applied on a buff slipped surface or directly on an unslipped surface. The majority of the ceramics were monochrome, and the color scheme of motifs varied from red to dark brown or black (figure 4, left column). Nevertheless, a small amount of them were bichrome with red and black patterns on a buff slip (figure 4, middle column). The Dalma bichrome was absent at Dalma Tepe itself. The paint of the Dalma painted wares

was generally thick, and could be felt while touching the surface. The unpainted side of the pottery was single or double slipped (Young and Levine 1974; Levine and Young 1987). Henrickson (1983) has analyzed the frequency of different motifs, and concluded that there were differences in the percentage of motif types between bichrome and monochrome pottery, which might result from small sample size of bichrome wares. According to her, triangles were the dominant motif of the bichrome wares, while it was rare among the monochrome wares. Henrickson suggested two possible scenarios. First, different potters made two types of pottery; second, the same potters decided to apply more triangle decorations on bichrome than on monochrome pottery (a matter of choice) (Henrickson 1983, 202-203). Dalma streaky ceramics were slightly different from other types of the painted pottery. They had streaky decoration, and could sometimes be slightly burnished after being painted (figure 4, right column) (Henrickson 1983, 200).

5. Experimental Analysis

To define the process of this experiment, we relied on our own observation of the original Dalma pottery as well as some main references on pottery technology such as Rye (1981), Rice (1987), Miller (2007), and particularly Shepard (1956) because unfortunately the sources on decoration and manufacturing technology of Dalma pottery are very little.

As the Seh Gabi pottery sample contained only potsherds and more importantly, the focus of this research was on decoration techniques, we did not replicate the whole manufacturing process of pottery – the whole *chaîne opératoire*. Thus, instead of making complete vessels, we made clay slabs to examine the decoration on them. This might have an effect on some aspects of decoration requiring a curved surface, a point we kept in mind during this research. Unfortunately, we did not have access to local raw materials of Iran to replicate the process, so red art clay, bought from an art store, was used to make the tablets, and local brown clay from the University of Toronto Mississauga campus was employed instead of buff clay for slipping. We employed red clay and ochre to draw the motifs on the pottery surface. Therefore, the final products did not look exactly the same as the ancient pottery in the sample. Nevertheless, the decoration methods we aimed to analyze would be the same as on genuine sherds, not significantly affected by the clay type upon which they were applied.

Here, we do not go through the details of making clay slabs in this experiment. The comprehensive information in this regard can be found in a previous article on this experimental analysis (Hossein-Mardi 2014). Thus, only a brief description of the preliminary stages of the experiment – making clay slabs – is presented here. To make the slabs, plant temper was used because the examination of the original potsherds shows plant fiber was the dominant temper in these ceramics. After adding plant temper to clay, the slabs were formed by pinching technique, which was not the main technique to form the Dalma vessels. The forming technique, however, does not affect the main purpose of the experiment, i.e. decoration. Then, the slabs were dipped in a buff slip when they were still leather-hard because slip sticks to leather-hard clay easier than dry one (Rice 1987, 41). In addition, dipping creates a uniform slip over the whole body. Next, a red slip as the second slip was applied to the inner surface with a piece of cloths. The next stage, drawing the motifs, was the main part of the experiment.

According to Shepard (1956, 203), different factors, including the thickness of paint, type of brush, the way a brush is

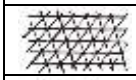
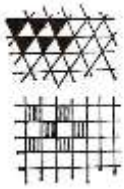
handled, and the capability of potters, influence the quality of pottery decoration.

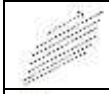
Shepard (1956, 168-172) provides detailed information about the types of pigments and their characteristics. It would be difficult to guess the type of the pigments used based on their visual appearance. A chemical analysis would be essential to accomplish this purpose. However, as the main focus of this research was only on the brush strokes and order of painting, we did not look at this aspect of decoration for our experiment. Thus, in this analysis, red clay, ochre, and mixture of red clay and ochre were employed to decorate the slabs regardless of the actual pigments on the Dalma pottery. For the paint application itself, we limited ourselves to animal-hair brushes, and ignored plant brushes. Again, this would not influence the main goal of this research mentioned above. For our purpose, Shepard provides a clear guideline for distinguishing the direction of brush strokes (see Shepard 1956, 203-213).

In order to determine the direction of brush strokes and painting strategies, first, the actual Dalma potsherds were observed closely which could lead to an initial conclusion in this regard. Thereafter, experimental analysis was employed to evaluate the validity of that conclusion. The motifs, whose brush strokes could not be guessed through observation, were painted with different techniques in our experiment to find out which one better corresponded to the motifs of the original pottery.

Below, we discuss the order of decoration and the brush strokes for the motifs in the sample. The process of decoration has been shown in two ways. First, a series of notations were selected by us to clarify the process along with a detailed explanation in the text. The table below (table 1) demonstrates what each sign stands for. Second, the figures at the end of this paper indicate the process pictorially.

Location of Table 1

	Notations	**Descriptions**
	NP	Net pattern as a guide for repeated shapes
	CHP	Cross-hatched pattern as a guide for repeated shapes
	CS	Coloring every other shape such as square or triangle in a pattern (solid, hatched, etc.)
	SPLP	Short parallel lines (hatched) side by side perpendicular to the border lines
	SPLA	Short parallel lines (hatched) side by side at an angle to the border lines
	PLB	Parallel lines with space between them as a guide (border lines)
	SDL	Short Diagonal lines with space between them, forming the sides of the lozenges (border lines)

	DLDLR	Diagonal lines in a column downward from left to right
	DLDRL	Diagonal lines in a column downward from right to left
	DLULR	Diagonal lines in a column upward from left to right
	DLURL	Diagonal lines in a column upward from right to left
	L	Lozenges drawn separately (the brush is lifted when turning an angle)
	ZLL	Two zigzag lines with peaks touching forming a row of lozenges
	CHPS	Crosshatched pattern inside a shape (lozenge, square, etc.)
	HPS	Hatched pattern inside a shape (lozenge, square, etc.)
	TZL	Three zigzag lines with separate strokes for each direction
	ZL	Zigzag line

The examination of actual Dalma potsherds confirms that, in all the motifs, the brush was lifted when turning an angle because the lines would be sharp and angular when consisting of separate strokes (Shepard 1956, 205 shape d), so the same technique was employed in our experiment.

5-1. Monochromes

5-1-1. Rows of Triangles: The first motif, which is discussed here, is the rows of triangles (figure 5). There are two examples with triangle motif in our sample. Our experiment in replicating this motif verified the following decoration technique:

NP $\rightarrow$ CS

In this motif, definitely an outline in the form of a net pattern (horizontal and diagonal lines) was drawn first. Then, the small triangles in the net pattern were colored. Shepard (1956). depicts the same motif in two different ways (figure 6). The motifs of these sherds are similar to the right motif in figure6. The examination of the potsherds demonstrates the sides of the triangles on the actual pottery are along straight lines. Subsequently, the experiment demonstrates that the sides of triangles would not form straight lines if the ancient potters did not have a preliminary net pattern as a guide. As a result, we can confidently conclude that the small triangles were not separately drawn next to each other, or they were not zigzag lines between the horizontal lines as shown in the left motif in figure 6. In fact, the technique of a preliminary net pattern is the most reasonable technique for this motif.

On the other hand, there is another sherd in our sample with roughly a similar appearance but with a different decoration technique (figure 7). In contrast to the above group, the inside of the triangles of this example was not colored. Moreover, the sides of the triangles on this Dalma sherd are not along straight lines, confirming that the technique of decoration is different from the rows of

triangles described above. The experiment indicates that to draw this motif, a series of parallel horizontal lines were drawn between which the zigzag lines were depicted creating a number of triangles. This technique is comparable to the left motif in figure 6.

PLB → ZL

Unfortunately, it is the only example in the sample, and its motif is not well preserved. Despite a slight similarity to the category of the rows of triangles, as its appearance was not absolutely the same and every other triangle was not colored, we did not classify it under the above category. Thus, this diversity does not necessarily mean that the same triangle motifs were produced with different techniques, but it can demonstrate that there were two different types of triangle motifs in the sample that were created with different techniques. Furthermore, this sherd was different not only in the way the motif was applied but also in the quality of paint. The paint was not viscous the same as most of the Dalma examples, and the lines were thick and executed rather carelessly.

5-1-2. Zigzags: The zigzag pattern was the dominant motif in our assemblage – associated with 11 sherds (figures 8-11). The examination of junctures of the lines indicates that zigzags were not unbroken zigzag lines depicted on the pottery. Instead of drawing a horizontal zigzag line all around the vessel and then moving to the second line, hatched lines were drawn in a vertical column in one direction. Then, in the next column, the hatched lines were painted in the opposite direction. Again, in the third column, the direction of the lines was the same as the first column, and this technique continued all around the vessel. The close examination of the Dalma sherds to find the start and end of the brush strokes suggested two different decoration techniques. Consequently, the experimental analysis was used to find out which technique had a higher probability.

According to the first possible technique that came to our mind at first glance after analyzing the potsherd in figure 8, the brush could have both upward and downward movements. If that were the case, the decoration process would be as follows:

If starting from right to left:

DLDRL → DLURL → DLDRL → DLURL (figure 8)

or if starting from left to right:

DLDLR → DLULR→ DLDLR → DLULR (figure 9)

Since we did not have the complete intact vessel, we could not find out whether the decoration started from left to right or right to left. Nevertheless, in this technique, if the hatched lines were painted downward in the first column, they were drawn with upward brush movements in the second column and again with downward movements in the next column. However, the theory of upward and downward movement of brush is not definite, and it can be questioned by more thorough examination of junctures of the lines on the other potsherds with the same motif in the sample (figures 10-11).

Some potsherds, such as the one in figure 10, suggest a second technique for the zigzag motif, which sounds more feasible. Unfortunately, the potsherd in figure 10 is so small that the other end of the hatched lines is not preserved, and makes it difficult to come to a definite conclusion. However, the preserved part suggests that the junctures probably indicate the start point of the brush strokes. In this case, all the hatched lines were depicted downward, whether left to right or right to left, starting from the junctures. That is, if the hatched lines were painted downward left to right in the first column, in the second column they would be painted downward right to left. Thus, the way we replicated the decoration of this sherd is different from the previous one (figure 10).

DLDLR → DLDRL → DLDLR → DLDRL

The question that raises now is whether or not this sherd in figure 10 and the previous one in figure 8 were produced with different methods. Our experiment suggests that downward diagonal lines in either direction can be drawn more comfortably considering the limitations our wrists have, and this technique creates motifs that more resemble the motifs of the original pottery. Therefore, we favor downward movement of brush in either direction for all these sherds based on the close examination of junctures on the original Dalma pottery (start and end points of brush strokes) and the replication of this motif in our experiment with both types of brush movements. In addition, when the first sherd in figure 8, which is a rim, was held upside down, the technique of merely downward brush strokes looked more probable than the other technique. In this situation, we assumed that the junctures in the middle were the ends of the brush strokes that have reached each other (figure 12). Holding the pottery upside down in order to apply the decoration more comfortably is a possibility we should keep in mind. As a result, it is very likely that all the sherds with the zigzag motif in the sample were decorated with the method of downward brush movement.

On some of the sherds in the sample, four to five zigzag lines were grouped together, and there was a narrow space between each group (figure 11, numbers 1-6). Similar to the other examples above, it seems the 4-5 oblique lines in the same direction were executed together before moving to the oblique lines in the opposite direction because it would be confusing to draw each thin zigzag line separately all around the vessel and then move to the next thin zigzag line. The other point is that the start and end of each oblique line did not necessarily meet the start and end of the other line beside it, and they sometimes overlapped.

To sum up, there can be two possible hypotheses. According to the first hypothesis, there were two different techniques for the application of zigzag motif: upward and downward brush strokes and only downward brush strokes. The second hypothesis is that there was only one technique, in which the zigzag motif was applied with downward movement of brush (employment of a similar technique for all these sheds). Because of the above reasons, we would favor the second hypothesis. Nevertheless, a larger sample is required to find the certain answer, and the current sample is very small for this purpose.

5-1-3. Checkered Lozenges or Triangles: The next motif is what we call checkered lozenges or triangles (three sherds). Along the rim of the vessel, the motifs were often executed as triangles (figure 14, left). Lozenges usually occurred on the body of the vessel below the rim. The process of drawing this motif would be as follows (figure 13):

L (or triangle)→ CHPS → CS

The initial examination of the archaeological potsherds and the experiment suggest that this motif followed the same technique as the category of the rows of triangles mentioned above in that a preliminary pattern was drawn first, in this case inside a lozenge; next, the inside of pattern was colored. In other words, after drawing a big lozenge, its inside was crosshatched as a guide for repeated squares. Then, every other square was painted solidly. As the crosshatched lines were thick, the angles of squares slightly overlapped with each other. The close examination of the three sherds with this motif demonstrates that they were all created in the same way.

5.1-4.Hatched and Crosshatched Lozenges: Our sample included five potsherds that were decorated with either crosshatched lozenges or both crosshatched and hatched lozenges. The possible painting techniques for the motif of hatched and crosshatched lozenges have been described

below. The first possible technique is indicated in figure 15 for one of these potsherds and can be described as follows:

In the first row of lozenges, each lozenge was drawn separately after which the crosshatched pattern inside of them was added. For the second and the third rows the sides of the lozenges on the ancient example are along a straight line, so in our experiment we sketched some diagonal lines as shown in figure 15. Then, the short parallel lines at an angle to those lines were drawn to create lozenges with hatched patterns. Some of them then became crosshatched.

(Only the 1st row) L → CHPS → (next rows) SDL → SPLA

However, careful examination of this potsherd inspired us to do the painting in a different way as well. In this technique, the rows of lozenges were first outlined in the form of two zigzag lines alongside each other with their peaks touching (figure 16). As observed with many other motifs, the brush was lifted when changing painting direction. Then, the hatched and crosshatched decoration was added inside the lozenges.

(1st and 3rd rows) ZLL → CHPS → (2nd row) ZLL→ HPS

Finally, the other possibility is that each lozenge was executed separately before moving to the next lozenge.

(1st and 3rd rows) L → CHPS → (2nd row) L→ HPS

According to the experiment, the last two methods appears to be more likely since they were easier and more practicable. There is no convincing reason, however, for favoring one technique over the other one. Unfortunately, the other potsherds with this motif are not large enough to lead us to a definite answer. The same as the motifs discussed in section V-1-3, in some examples, the first row along the rim consisted of crosshatched triangles, followed by crosshatched lozenges in the next rows (see figure 17).

5-1-5. Crosshatched Pattern: Theoretically, two different techniques could be used to apply this type of decoration (one sherd in the sample): in the first technique, a preliminary outline, a crosshatched pattern, was drawn first, after which the inside of every other square was decorated with a hatched pattern. The crosshatched outline covered the whole surface of the sherd (figure 18).

CHP → CS

In the second possible technique, as it is shown in figure 19, instead of a preliminary crosshatched pattern, we used parallel lines as the borderlines (the preliminary outline), and drew short hatched lines perpendicular to them to create the small hatched squares.

PLB → SPLP

On the original Dalma pottery, the sides of the hatched squares are along straight lines creating the crosshatched pattern. The experimental analysis verifies that the clear straight lines of the crosshatched pattern on the original sherd could only be replicated by the first technique in which a preliminary crosshatched outline was used. Thus, the latter technique would not have been used since the short perpendicular lines, which formed the sides of the squares, were not necessarily along clear straight lines in that technique. If we compare the sides of the small hatched squares in figure 19 with those of the original sherd, their differences become clear. Thus, based on our experiment, we conclude that the first technology is representative of the way this pottery was decorated.

5-1-6. Lozenges (each side consisting of three parallel lines): This motif (one sherd in the sample) is presented in figure 20. Based on detailed examination of the original sherd, we could suggest two possible ways of how this motif was drawn: In the first one, three thin zigzag lines were drawn along the rim. Again, each zigzag line was not a single line, and the brush was lifted when turning the angle. To create the lozenge that was depicted

in the middle of the original potsherd, the zigzag lines must have been drawn alongside each other with their peaks touching (figure 20). Also, it appears each three thin diagonal lines in the same direction were drawn together before drawing the lines in the opposite direction.

(1^{st} row) TZL → (2^{nd} row) ZLL (here each side of lozenges consists of three thin lines)

We also tested another technique to illustrate this motif. In this one, rather than drawing zigzag lines with their peaks touching, each lozenge was painted separately (figure 21).

TZL → L (here each side of lozenges consists of three thin lines)

With the first method, the pattern would be illustrated more evenly and smoothly. Moreover, as the original potsherd had three thin zigzag lines along the rim, the idea of zigzag lines with their peaks touching to form lozenges sounds more probable. Nevertheless, the second method cannot be completely rejected.

5-1-7. Combination of Different Motifs: The motifs depicted on some of the sherds were a combination of motifs discussed above such as crosshatched lozenges or triangles and zigzag lines (see figure 22), and their line junctures suggest that the motifs were executed with the same techniques. Therefore, we do not go through their painting techniques again.

5-2. Bichromes

5-2-1. Crosshatched Lozenges and Zigzag Lines: The motifs of the two bichrome sherds in the sample included crosshatched lozenges and zigzag lines that were depicted in the same way as the monochrome ceramics explained above. The decoration technology observed on them can be listed as follows (figures 23 & 24):

Figure 23: (1^{st} row) TZL → (next row) L → CHPS → CS → (next row) TZL → (next row) L → CHPS → CS

or

(1^{st} row) TZL → (next row) ZLL → CHPS → CS → (next row) TZL → (next row) ZLL → CHPS → CS

Figure 24: (1^{st} row) L (triangle) →CHPS → (next row) ZL→ (next row) TZL → (next row) ZL→ (next row) L → CHPS

As mentioned before, one possibility regarding the three zigzag lines is that each zigzag line was sketched all around the vessel with separate strokes for each direction before moving to the next zigzag line. However, it is more probable that three oblique lines were drawn together pointing in the same direction, after which three oblique lines pointing in the opposite direction were added. This technique seems to have continued around the vessel. The reason for favoring the second technique over the first one is its faster application and its better correlation with the technique of zigzag lines discussed in section V-1-2.

As the techniques of brush strokes found on the bichrome wares were the same as those on the monochromes, what we would like to focus on is the method of applying different colors. On the pottery in figure 23, it appears all the motifs were painted in red, and in the next stage, the lozenges were colored again in black. In other words, the black color was applied over red since the trace of red color is evident along the edges of the lozenges when examining the Dalma potsherd closely. However, on the second sherd in figure 24, both colors were directly applied to the buff slipped surface. There is no evidence of red color beneath the black one on the original sherd, so a different decoration technique was employed here. Moreover, there were a few bichrome sherds that were not included in this research because their size was small and consequently their motif was not clear. Nevertheless, their examination could confirm that different colors were painted directly on the surface of the pottery the same as the sherd in figure 24. In addition, on this sherd, it

is probable that some motifs were painted in one color first, and then the other motifs with a different color were applied to the empty spaces between the first motifs. The other possibility is to change the color as moving from top to bottom as shown in figure 24.
Table 2 shows the list of all the potsherds in the sample and their motifs.

Location of table 2

Monochrome			
ROM Accession Number	**Pottery Number**	**Motifs**	**Figure #**
971.484.48	G22.14.75	Rows of triangles (net pattern)	5 (right)
973.455.57	F22.325.118	Rows of triangles (net pattern) and zigzag lines	5 (left)
971.484.39	G22.12.28	Triangles (horizontal and zigzag lines forming triangles)	7
971.484.51	G22.14.73	Zigzags	8
971.484.44	G22.13.24	Zigzags	10
971.484.42	G22.12.29	Zigzags	11 - #8
971.484.40	G21.62.51	Zigzags	11 - #4
971.484.38	-	Zigzags	11 - #9
971.484.364	G22.12.21	Zigzags	11 - #3
971.484.369	G22.15.13	Zigzags	11 - #6
-	G22.15.12	Zigzags	11 - #1
-	G22.15.14	Zigzags	11 - #5
-	G22.19.3	Zigzags	11 - #7
-	G22.20.19	Zigzags	11 - #2
971.484.47	G21.69.17	Checkered lozenges	13
973.455.61	-	Checkered lozenges	14 (right)
-	G21.62.27	Checkered triangles and zigzag lines	14 (left)
973.455.60	-	Hatched and crosshatched lozenges	15
-	G22.14.33	Crosshatched lozenges	17 (up right)
-	G22.14.51	Hatched and crosshatched lozenges and triangles	17 (up left)
-	F22.325.49	Crosshatched lozenges and triangles	17(down right)
-	H19.46.4	Crosshatched lozenges and triangles	17 (down left)
973.455.70	F22.325.126	Crosshatched pattern	18
971.484.52	G22.14.74	Lozenges(each side consisting of three parallel lines)	20
971.484.371	G22.15.22	Crosshatched lozenges and zigzag lines	22 (up right)
-	G22.14.49	Crosshatched triangles and zigzag lines	22 (up left)
-	G22.16.17	Crosshatched lozenges and zigzag lines	22(down right)
-	G22.16.24	Crosshatched lozenges and zigzag lines	22 (down left)
Bichrome			
971.484.41	-	Crosshatched lozenges and zigzag lines	23
971.484.50	-	Crosshatched lozenges or triangles and zigzag lines	24

6. Discussion and Conclusion

The results demonstrate that the same technique was usually employed to depict similar motifs. For example, in drawing all these motifs, the brush was lifted when changing the direction because these motifs

consist of angular lines, which only result from lifting the brush. Moreover, the zigzags were not unbroken zigzag lines around the vessel. They consisted of a series of diagonal lines. It appears those in the same direction were drawn together before moving to the diagonal lines in the opposite direction, and this technique continued around the vessel, creating zigzags. Also, the start and end of each diagonal line could sometimes overlap with the line beside it. In addition, the motifs of crosshatched pattern and rows of triangles share some similarities. For the motif of crosshatched pattern, a preliminary crosshatched pattern was drawn as a guide. Then, hatched designs were added to every other lozenge or square inside the pattern – it should be noted that although the final result looks like hatched lozenges, this motif is different from the motif of hatched and crosshatched lozenges discussed in section V-1-4. Similar to the motif of crosshatched pattern, to paint the motif of the rows of triangles, a net pattern was drawn as a guide inside which repeated triangles were colored. There was another sherd which had a similar motif to the motif of triangles but was produced with a different technique – zigzag lines and horizontal lines together forming triangles. Nevertheless, we did not consider it a different technique for the same motif but a different type of triangle motif because every other triangle was not colored on that one, which created a different appearance from the former group.

In general, some diversities could be suggested among the Dalma painted wares, mostly being tentative due to small sample size as well as small size of the sherds. For the zigzag lines, we could not decide with confidence if both upward and downward movement or only downward movement of brush was used. However, the experimental analysis suggests zigzag lines could be executed more easily with downward brush movements. In addition, the study of the junctures of the lines preserved on the Dalma ceramics better support the idea of downward movement of brush. It is also possible some vessels were held upside down when they were decorated. We should keep in mind that the direction of brush could be influenced by different factors such as how the vessel was held when the paint was applied (e.g. upside down) and if the producer was right-handed or left-handed. One diversity in the decoration technology occurred among the bichrome ceramics regarding the order of applying paint. In one example, the second color was applied over the first one, while both colors were directly applied to the buff surface in the other examples. However, as there are only two bichrome sherds in our sample, this result should be treated with caution. The other diversity that could be suggested was in the quality of the execution of paint. In a few examples, such as the one in figure 7, the lines were thick and the motifs were not well executed. The motifs were not as detailed and fine as the motifs of most of the Dalma wares. This points to different levels of experience among the Dalma potters in rendering motifs.

In conclusion, while some diversities could be suggested, it seems that the Dalma potters were usually using the same painting techniques to create the majority of the similar motifs. That could result from a standard learning environment where potters could share their knowledge. Also, according to Gosselain (2000), some stages of production such as decoration which are clearly visible on the surface of pottery can affect the choices other potters make. These potters could be influenced by the same technique and adopt it. The visible techniques are also subject to change through time due to different reasons such as interactions with other people (Gosselain 2000, 191). As a result, we can assume, due to their visibility, similar decoration techniques were adopted by different Dalma potters. While the degree of

experience in executing motifs was to some extent different among the Dalma potters as reflected in the quality of paint on a few sherds, the Dalma painted ceramics, in general, were rather high quality wares that were slipped and decorated with beautiful geometric motifs.

Finally, we would like to note that this research was a methodological study of the Dalma painted wares to demonstrate that the visual examination of the actual pottery and the experimental analysis can be combined to address technological questions. While our results, need to be considered as preliminary, they provide important discussion points and a basis for related research projects. It would, therefore, be valuable to apply this approach to a larger sample to reach a more definite conclusion about the degree of uniformity and diversity among the Dalma painted pottery. For further research, it would be beneficial if we compare the decoration techniques of Dalma pottery at Seh Gabi Tepe with the Dalma pottery at other sites such as Dalma Tepe to determine how different the pottery decoration technology was between different regions.

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Figure 1: The location of the site of Seh Gabi in western Iran

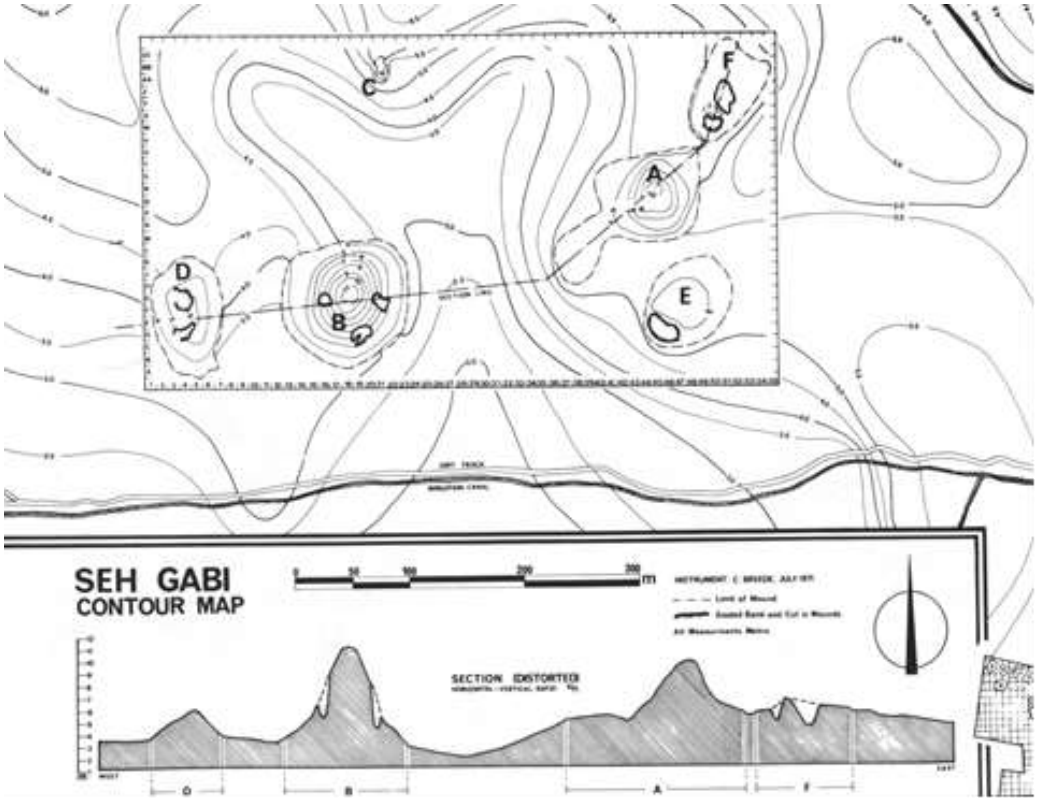

Figure 2: Plan of the site of Seh Gabi in Young and Levine (1974, 57)

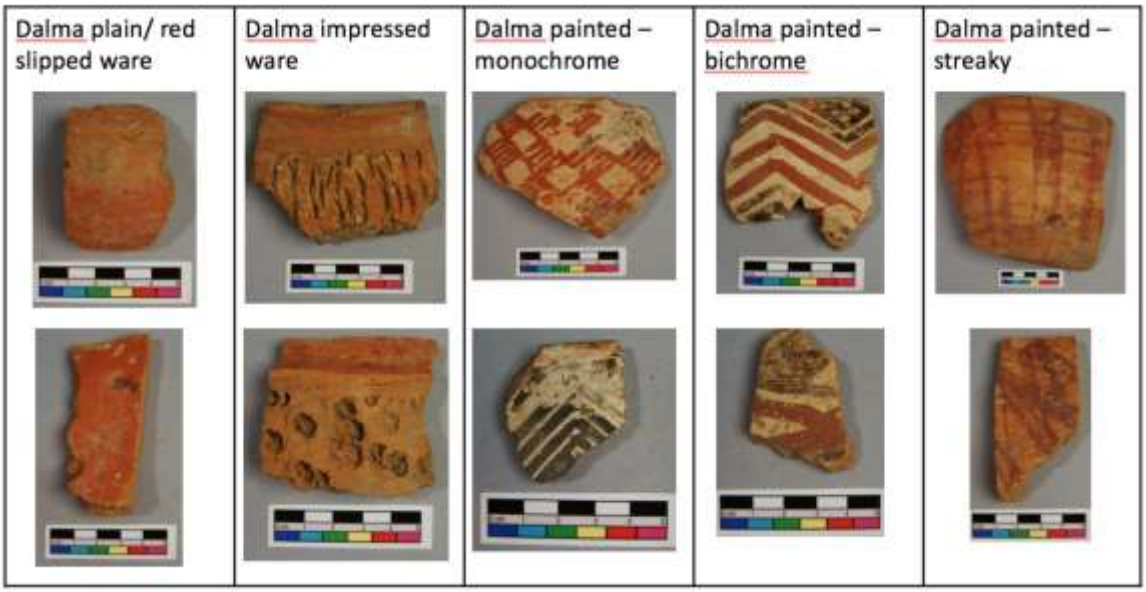

Figure 3: Examples of Dalma plain, Dalma impressed, Dalma painted wares: monochrome, bichrome, and streaky

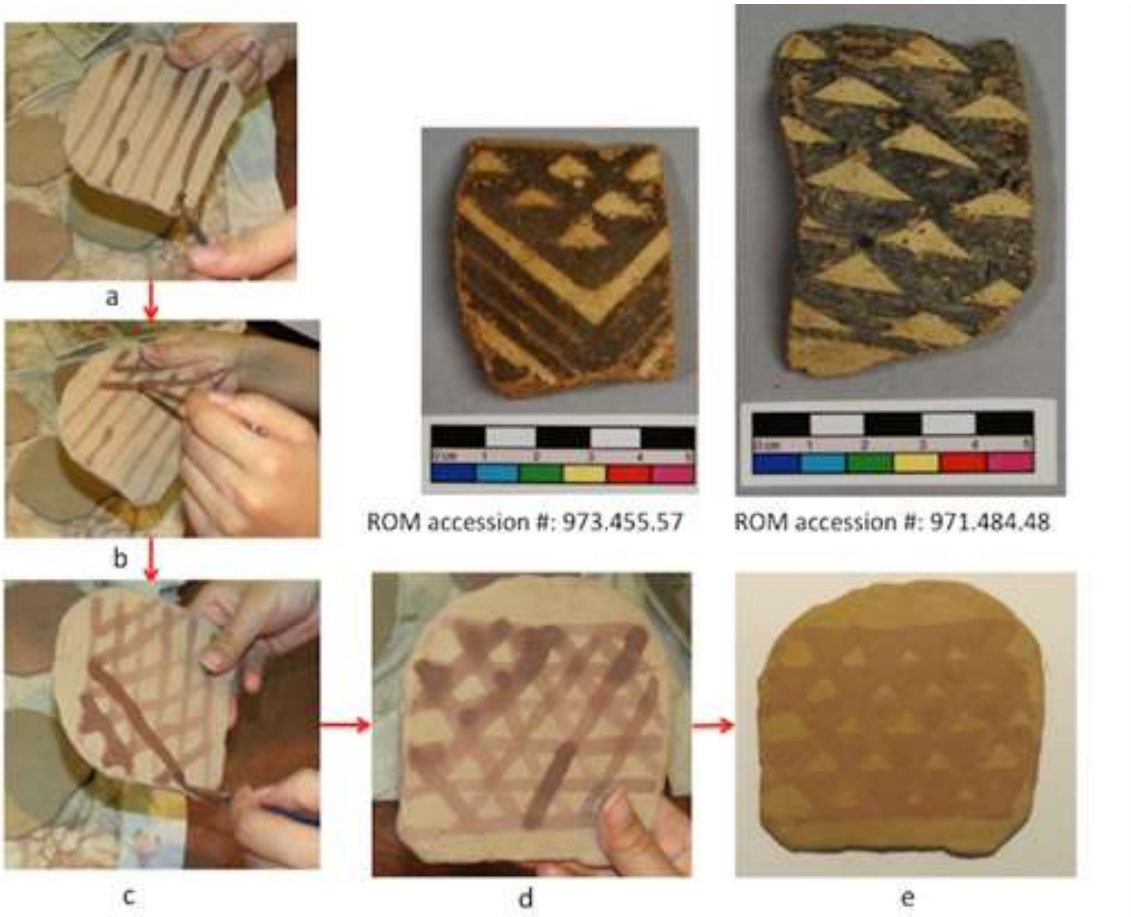

Figure 4: Rows of triangles

Figure 5: Different methods for depicting rows of triangles – image in Shepard (1956, 205)

Figure 6:
A different type of triangle motif

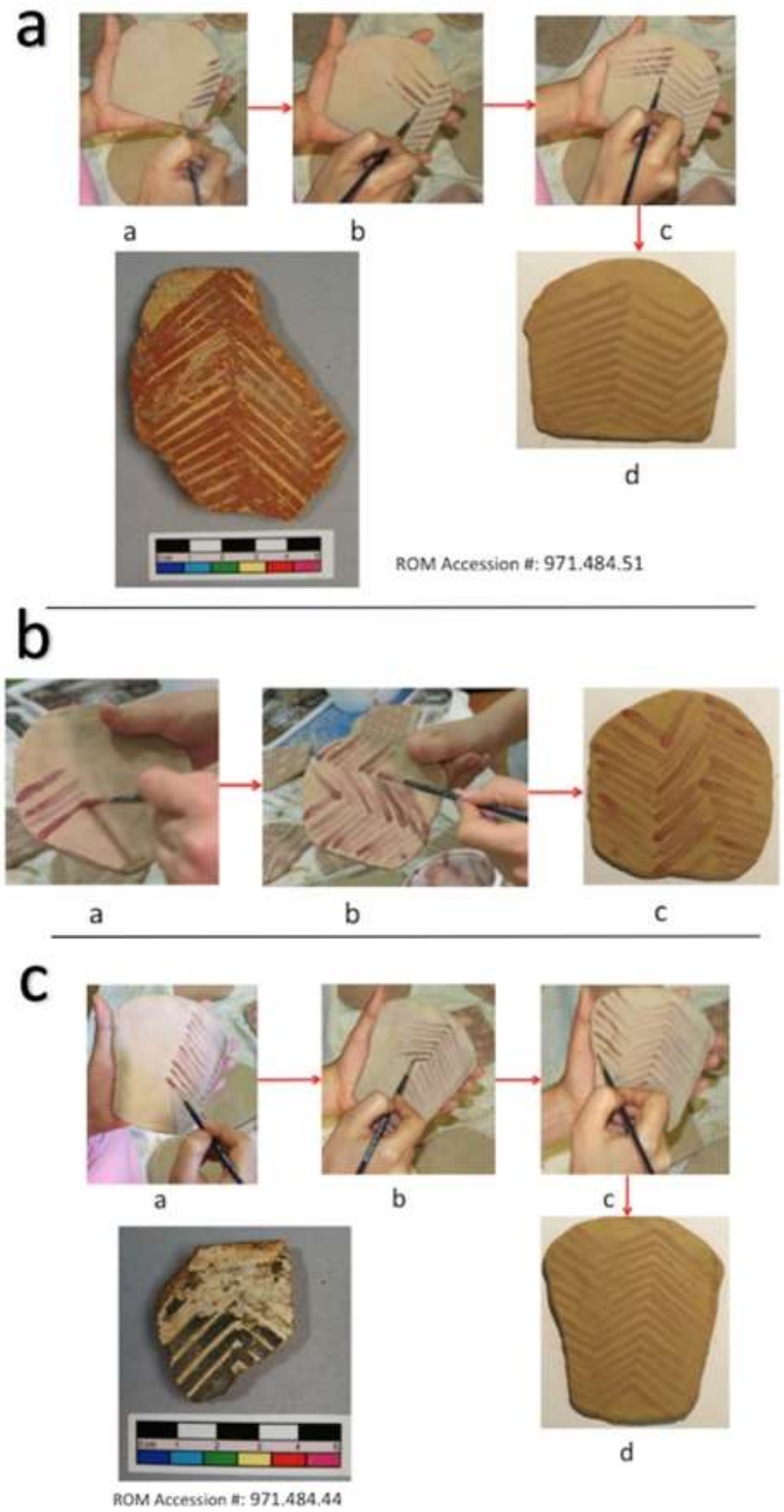

Figure 7: a- Zigzag pattern (upward and downward movement of brush), b- Zigzag pattern from left to right, c- Zigzag pattern (downward movement of brush in either direction)

Figure 8: Other examples of zigzag motif in the assemblage

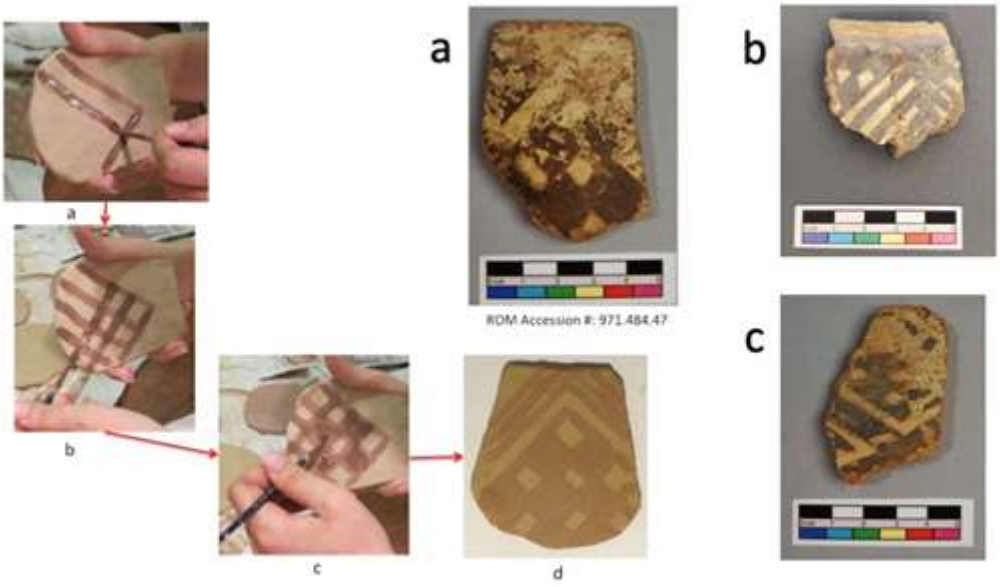

Figure 9: Checkered lozenges or triangles

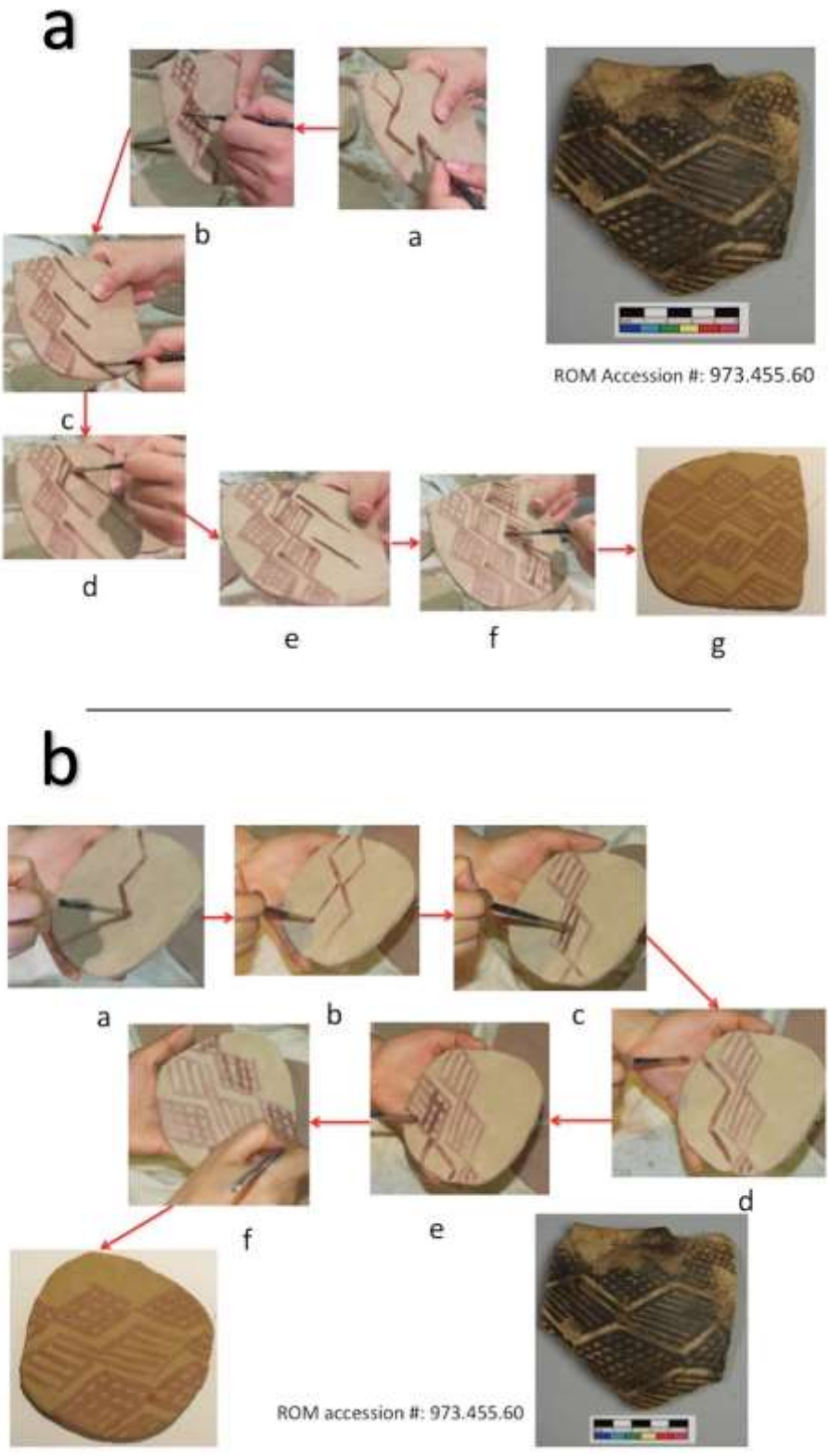

Figure 10: Hatched and crosshatched lozenges – two techniques

Figure 11: Other examples of hatched and crosshatched lozenges

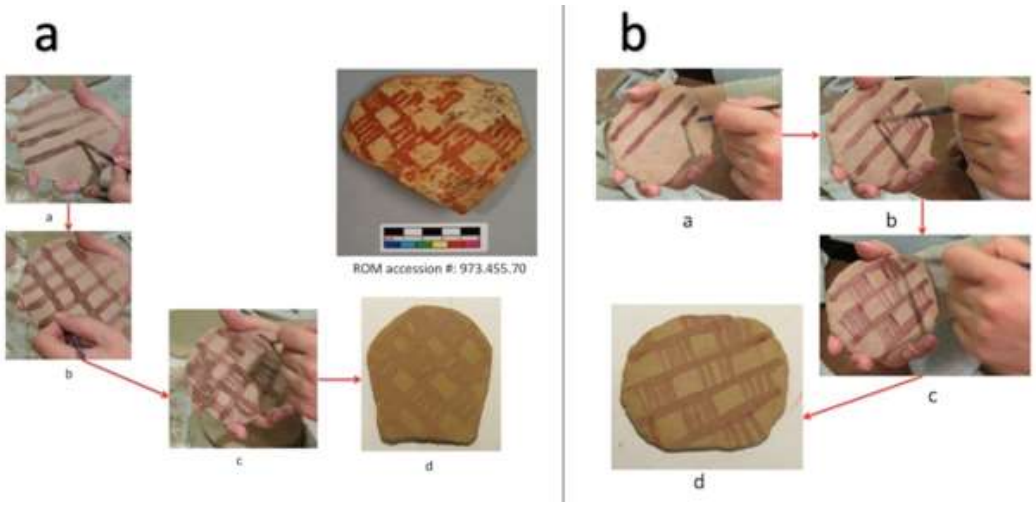

Figure 12: Crosshatched pattern – two techniques (the possibility of b is rejected)

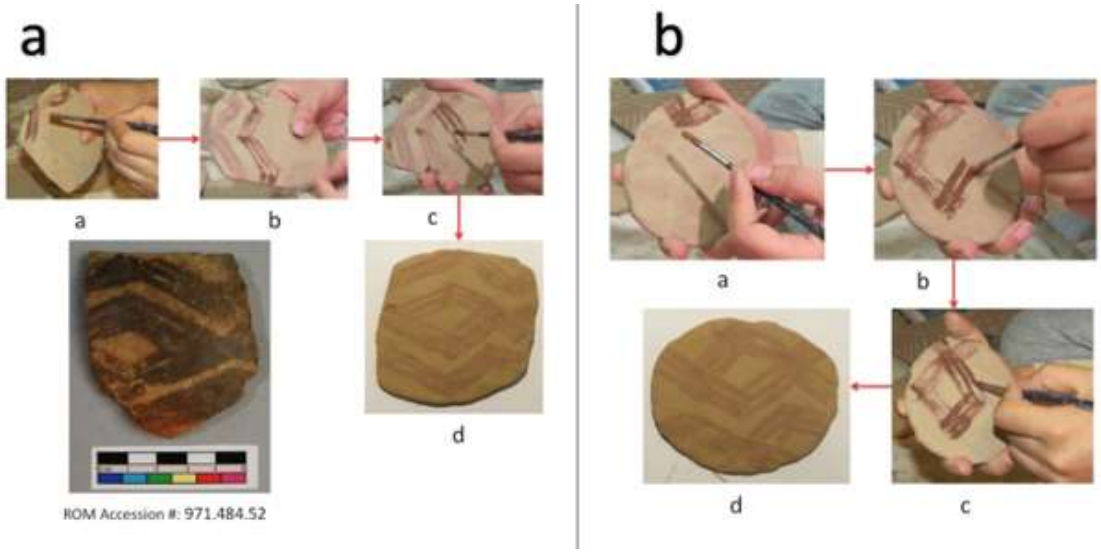

Figure 13: Lozenges (each side consisting of three parallel lines) – two techniques

Figure 14: Potsherds with a combination of crosshatched lozenges and zigzag lines

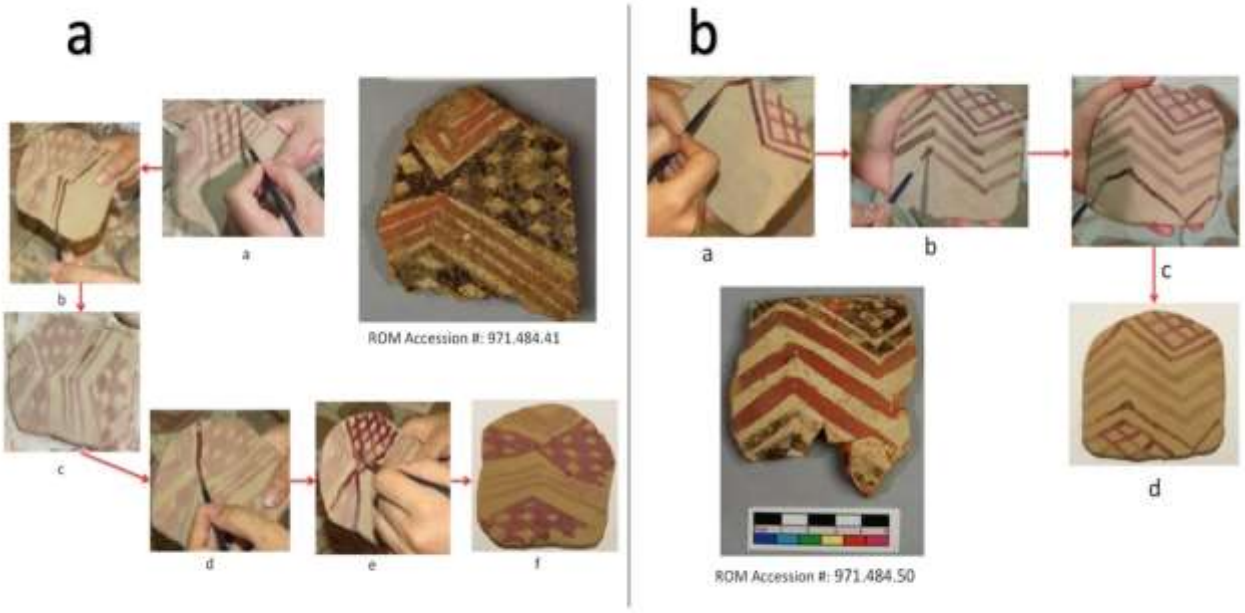

Figure 15: Bichrome wares – a- Second color seems to have been applied over the first one, b- Both colors applied directly on the buff surface

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