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Reviewed Article:

An Experimental Approach to Studying the Technology of Pottery Decoration

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The early Middle Chalcolithic pottery tradition of Seh Gabi Tepe in Iran is called Dalma tradition. Among the different types of Dalma pottery, I have focused on monochrome painted ceramics, to investigate, by means of experimental analysis, how their decoration technology was undertaken. Moreover, I would like to see how advantageous experimental archaeology could be regarding the pottery decoration techniques. Among different

technological aspects, my study is narrowed down to brush strokes and order of decoration. Here I did not replicate the whole pottery manufacturing process; I made clay slabs to apply the decoration to, instead of making complete vessels. This study confirms that experimental analysis can have a supplementary role along with the examination of actual pottery in analysing the technology of pottery decoration.

Introduction

> As there is limited literature on decoration technology of the Dalma wares, this experiment was mainly based on the examination of the actual Dalma pottery and general sources on pottery technology.

Experimental archaeology is a valuable method in studying the technology of artefacts (Stocks 1993; Osborne 1998; Vranich, Harmon, and Knutson 2005). Regarding the pottery industry, experimental archaeology is usually used to study the manufacturing technology (See Zuckerman 2000; Bronitsky and Hamer 1986). However, I aim to study the decoration technology of pottery in this paper. I analyse how pottery was decorated rather than analysing decorative styles and different forms of motifs. Depending on the type of decoration (painted, incised, et cetera), the techniques used can be investigated from different aspects including, the types of pigments and tools, the order of decoration, and the like.

In this paper, I use experimental analysis to examine the early Middle Chalcolithic pottery of Seh Gabi Tepe, an archaeological site in western Iran, to see how this pottery was decorated. I also intend to see how helpful the experiment can be in analysing the technology of pottery decoration. However, the focus of this research is only on monochrome painted ceramics; examining the direction of brush strokes and the order of applying motifs. To achieve this, I first investigated a Seh Gabi pottery assemblage from the Royal Ontario Museum of Toronto (ROM) in detail by means of a hand lens. I mainly focused on junctures to find the start and end of the brush strokes and consequently their directions. Then, I employed the experiment to replicate the decoration process. Before discussing the experiment, the history of the Seh Gabi Tepe site is introduced.

Seh Gabi Tepe

The site of Seh Gabi is located in the Kangavar-Assadabad valley in the Zagros Mountains between Hamadan and Kermanshah in the west of Iran (Hamlin 1973, 224). This site is situated around 6 km northeast of Godin Tepe (See Figure 1) (Levine 1975, 32). Two seasons of excavations at Seh Gabi were carried out by Louis Levine in 1971 and 1973 as part of the Godin Project, sponsored by the Royal Ontario Museum of Toronto (Hamlin 1973, 225; Levine 1975, 31). The size of the site is around 550 by 300 meters and includes several mounds labelled from A to F (See Figure 2) (Young and Levine 1974, 1). Mound B, which is the biggest mound at the site, is dated to the Middle Chalcolithic period and is divided into three sub-

phases; Middle Chalcolithic I or Dalma period (Godin X), Middle Chalcolithic II or Seh Gabi period (Godin IX), and Middle Chalcolithic III or Taherabad period (Godin VIII) (Levine and Young 1987, 21; Henrickson 1991). The pottery for this research comes from the earliest phase of Mound B, dated to the fifth millennium BC. The pottery of this period is called 'Dalma' because it is analogous to the pottery of Dalma Tepe, an archaeological site northwest of Iran, southwest of Lake Urmia in the province of Azerbaijan (Hamlin 1975, 111).

The Dalma assemblage

The sample which I had access to for this study included a limited number of Dalma monochrome ceramics from the Royal Ontario Museum of Toronto. There were 17 monochrome potsherds in the sample. While this museum has a large collection of Seh Gabi pottery in offsite storage, I did not have access to it because of some constraints.

Although the available sample at the ROM was small in size and included some small sherds, the motifs on which were not completely preserved, these constraints would not affect the methodology and goal of this experiment considerably, as the experiment would focus on the decoration technology used on the available Dalma potsherds in the sample. However, it is important to note that this sample may not be representative of the whole Dalma assemblage.

The Dalma pottery can be divided into plain, impressed, and painted ware. The latter includes monochrome, bichrome, and streaky (Young and Levine 1974). Dalma wares were all hand made. Although these ceramics were mainly chaff tempered, varying from coarse to fine, some grit-tempered vessels were present as well. Moreover, they could be completely or unevenly fired (Young and Levine 1974, 2). Among the painted wares, Dalma streaky ware was produced with a different technique from monochrome and bichrome pottery (Levine and Young 1987, 21; Henrickson 1983, 200). As this research only concentrates on monochrome pottery, I describe it here briefly.

Monochrome painted pottery constitutes the dominant group among the painted ceramics (See Figure 3). Most of them were painted only on the outside with geometric motifs, though a few examples with paint on inner or both sides are present. The paint was usually thick and in relief, with a colour range from brown to red. Before painting, the surface could be slipped with a buff slip, or it could remain without slip. The other surface was slipped, either single or double. The latter would be a red or brown slip over a buff one (Young and Levine 1974, 3-4; Levine and Young 1987, 21).

The experimental analysis

As there is limited literature on decoration technology of the Dalma wares, this experiment was mainly based on the examination of the actual Dalma pottery and general sources on

pottery technology, including Rye (1981), Rice (1987), Miller (2007), and particularly Shepard (1976). I did not replicate the whole manufacturing process of complete vessels because this research would focus only on decoration not the manufacturing technology. Therefore, I made clay slabs instead of complete vessels to test the decoration technique on. This might have an effect on some aspects of decoration requiring a curved surface, a point I kept in mind during this research. As the raw materials used in Iran were unavailable for the experiment, I used red art clay bought from an art store to make the slabs. I employed the same red clay as red slip, and I used local brown clay from the University of Toronto Mississauga campus as a substitute for buff slip. As the type of pigments and brushes were not investigated in this experiment, I only used animal-hair brushes for painting; I painted the motifs with red clay and ochre regardless of actual pigments. Although the final products did not look exactly the same as the pottery from Seh Gabi Tepe, the type of clay, brush, and pigments would not considerably affect the decoration techniques I aimed to investigate, which are the brush strokes and order of applying motifs.

1. Forming clay slabs

The red art clay was already in plastic form, and was mixed with water and temper to reach the required plasticity. Since Dalma pottery was overwhelmingly chaff tempered, I used dry grass for the experiment. To create fine temper, I chopped the grass and rubbed the dry grass between my hands. The amount of temper added to the clay was not measured. I simply added as much temper as seemed necessary based on its workability. When the clay was mixed with temper evenly, I formed the slabs. The clay was formed by hand into a flat surface on which I could apply the slip and motifs. After making the slabs, when the clay was in a condition between plastic and leather-hard, I slightly scraped the surface to remove the small bumps and make it flat (See Figure 4) (Rice 1987, 137; Rye 1981, 86). Rice suggests different tools for scraping such as cane fragments, bamboo, bone, and metal (Rice 1987, 137). I used a piece of stick with a sharp edge, which allowed me to remove the unwanted clay and create a flat surface. Although different tools, such as leather and cloth, can be used to smooth the surface after scraping (Rice 1987, 138), I found it easier to use my hands. After that, I let the slabs become leather-hard before applying a buff slip.

2. Applying buff slip

In Dalma ware, the buff slip was applied to the whole vessel before the inside surface was double-slipped. In the outline of this project, two alternative methods were suggested for applying the buff or light colour slip. The first one was to dip the pottery in the slip, which helps the slip to spread uniformly. The second method was to apply the slip with a cloth. I decided to limit the project to dipping because this method is more efficient when the slip is applied to the whole body. In addition, as the slip on Dalma pottery in the sample was uniform, it would correlate better with dipping technique. The second method is also more

time-consuming, so it sounded less feasible for this experiment. Finally, this stage of pottery production would not directly affect the project's research question. According to Rye (1981, 41), with the dipping method, the slip should be applied when the clay is not completely dry, because the slip splits easily from the dry surface; in the experiment I applied the slip when the clay was still leather-hard. I submerged the leather-hard slabs in a container of light colour slip, and allowed them to dry before applying the second, darker red slip (See Figure 5).

3. Applying red slip to the inside surface

In the next stage, I applied a second slip (darker red colour) to the inside surface. As there was no evidence of drips on the outside surface of the Dalma ceramics in the sample, I did not employ the technique of pouring slip in the vessel. Thus, I used a piece of cloth for this stage (See Figure 6).

The interior surface of some of the Dalma sherds looked smooth and had a slight lustre, encouraging me to test the burnishing technique (Rye 1981, 90) on the inside surface of some of the slabs, to see whether the surface of the archaeological pottery was burnished or not. I burnished two of the slabs with a pebble when the second slip was not yet dry. Comparing the burnished surface of the slabs and the surface of the original potsherds shows that the interior surface of the Dalma ceramics, at least the ones in the sample, was not burnished. In addition, the written sources, such as Young and Levine (1974) and Levine and Young (1987), do not point to the use of a burnishing technique on Dalma monochrome and bichrome painted wares. However, Dalma streaky wares were usually burnished after decoration (Henrickson 1983, 200; Levine and Young 1987, 21). Nevertheless, it seems probable that the surface of some of the ceramics in the sample was wiped with something soft, such as a piece of cloth or hand.

4. Applying motifs

This stage is the main part of the experiment. First of all, I examined the sample of Dalma potsherds carefully to develop preliminary conclusions about the direction of brush strokes. Then, I used the experimental analysis to assess the validity of those conclusions. If I could not identify the direction of the brush strokes through observation, I drew the motifs with different techniques to see which one best matched the motifs of the actual pottery. Different types of motifs in the sample contained rows of triangles, zigzags, crosshatched pattern, and lozenges—including chequered lozenges, hatched and crosshatched lozenges, and lozenges with three parallel lines on each side. Here, I will discuss some of these motifs.

4.1. Rows of triangles

Two potsherds in the sample had rows of triangles. The experiment shows the most plausible way of depicting this motif is first to paint a net pattern consisting of horizontal and diagonal

lines. The next stage is to colour the triangles in the pattern (See Figure 7). If the small triangles were drawn separately, their sides would not be along straight lines, which would differ from the triangles on the original pottery. In other words, the experimental analysis confirms a preliminary pattern is required to create a decoration like this, in which the triangles are ordered beside each other (Shepard 1976, 204-205). In addition, there was another sherd with a triangle motif in the sample that I did not classify under this group (See Figure 8). Although its appearance was slightly comparable to the previous group, in that it was depicting several triangles, its technique was different, and the inside of the triangles was not coloured. The experiment confirms that to draw this motif, a number of parallel lines were fashioned between which the zigzag lines created a series of triangles (Shepard 1976, 204-205). As is obvious on the original potsherd in figure 8, the sides of the triangles would not be along a straight line using this technique.

4.2. Zigzags

Zigzags, as the dominant motif in my sample, included five to six sherds. The examination of the junctures of the lines demonstrates that they were not unbroken zigzag lines all around the vessel. In fact, the hatched lines were drawn in one direction in a column. Then, in the next column, the hatched lines were drawn in the opposite direction. This method was continued all around the vessel. In order to find the decoration technique, I first analysed the junctures of the lines on the actual sherds that helped me get a viewpoint on the probable start and end points of the brush strokes. As the result of this preliminary analysis on the direction of brush strokes was not certain, I considered two possible techniques, which I tested through the experimentation to see which of them was more feasible. In the first technique, considered initially after examining the sherd in Figure 9, the brush had both upward and downward movements. That is, if in the first column the hatched lines were painted with downward movements of the brush, in the next column the brush had upward movements, and in the third column, back to downward movements (See Figure 9). The examination of the other potsherds, such as the one in figure 10, suggests that the junctures more probably show the start point of the brush strokes. Therefore, in the second possible technique, the hatched lines were drawn with downward brush movements, whether left to right or right to left. In other words, if the brush movements in the first column were downward left to right, they would be downward right to left in the next column (See Figure 10). The experiment indicates, considering the limitations of our wrists, that we can draw the zigzag motifs more comfortably with the technique of downward brush movements in either direction. Also, this technique creates motifs more similar to the motifs on the actual pottery. Therefore, the experiment, along with the examination of the junctures on the actual pottery, suggests that the zigzag motifs were probably all decorated with the technique of downward movement of brush in either direction. However, this conclusion is not definite and the examination of more potsherds is required.

4.3. Chequered lozenges

Two sherds in the sample had this motif.Although the motif on the potsherd in figure 11 is not completely preserved, it shows part of a chequered lozenge. I concluded it shows a lozenge based on other comparable motifs. The experimental analysis confirms that at first, a preliminary pattern consisting of a big lozenge with a crosshatched pattern inside it was drawn. Then, every other square in the lozenge was coloured in (See Figure 11). Therefore, each square in the big lozenge was not drawn separately. Since the crosshatched lines were thick, the angles of squares slightly overlapped with each other. The experimental analysis confirms that all the other hatched and crosshatched lozenges in the sample followed the same decoration technique.

4.4. Crosshatched pattern

I suggested two possible techniques for this motif after examining the potsherd. In the first technique, I painted a crosshatched pattern. Then, I decorated every other square in the pattern with hatched lines (See Figure 12). In the second technique, instead of a preliminary crosshatched pattern, I drew parallel lines as the borderlines. Then, I painted short hatched lines perpendicular to those parallel lines to create the hatched squares (See Figure 13). However, the experiment confirms that the hatched squares could be painted along straight lines, the same as those on the original pottery, only with a preliminary crosshatched pattern (See Figure 12). The short perpendicular hatched lines in the second technique would not establish those straight lines along the sides of the squares. Therefore, it seems the first technique was used to paint this motif.

Conclusion

In this study, experimental analysis was used to examine how Dalma pottery was decorated, by considering the direction of brush strokes and order of depicting motifs. The other objective of this study was to see how useful experimental archaeology could be in studying the pottery decoration technology. Although close examination of the original pottery could lead to some preliminary theories about the decoration technology, the experimental analysis, as a supplementary technique, was very effective in determining the most plausible technique for decorating each motif. When the examination of potsherds could not support a definite technique, the replication of decoration through experimentation would show which method could create similar motifs, and consequently more feasible, to the motifs of the actual pottery. Thus, I incorporated experimental archaeology with the examination of the actual pottery, to study the decoration technology of the Dalma monochrome ceramics. The experimental analysis confirms that a preliminary pattern was initially drawn for most of the motifs in the Dalma pottery sample. Then, the details were added, such as the motif of crosshatched pattern and the first type of the triangle motifs. In addition, although it is not definite, the experiment suggests that the zigzag motifs were painted with the technique of downward movements of the brush in either direction.

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Keywords ceramics
furnace, kiln or oven

Country Canada
Iran

Bibliography

BRONITSKY, Gordon, and HAMER, Robert, 1986. Experiments in ceramic technology: the effects of various tempering materials on impact and thermal-shock resistance. American Antiquity, 51(1), pp.89-101.

HAMLIN, Carol. 1973. The 1971 excavations at Seh Gabi, Iran. *Archaeology,* 26 (3), pp.224-228.

HAMLIN, Carol. 1975. Dalma Tepe. *Iran,* 13, pp.111-127.

HENRICKSON, Elizabeth F., 1983. *Ceramic styles and cultural interaction in the Early and Middle Chalcolithic of the central Zagros.* Ph. D. University of Toronto.

HENRICKSON, Elizabeth F., 1991. Ceramics iv. the Chalcolithic period in the Zagros highlands. In: Ehsan Yarshater, ed. 1991.*Encyclopedia Iranica*. Vol. V, Fasc. 3. California: Mazda Publishers. pp.278-282.

LEVINE, Louis D., 1975. The excavation at Seh Gabi. In: F. Bagherzadeh, ed. 1975. *Proceeding of the 3rd annual symposium on archaeological research in Iran, Tehran 1974*. Tehran: Iranian Center for Archaeological Research. pp.31-44.

LEVINE, Louis D., and YOUNG Jr., T. CUYLER, 1987. A summary of the ceramic assemblage of the central western Zagros from the Middle Neolithic to the late third millennium BC. In: 1987. *Préhistoire de la Mésopotamie: la Mésopotamie préhistorique et l'exploration récente du Djebel Hamrin: Paris 17-18-19 décembre 1984.*Paris: Éditions du Centre National de la Recherche Scientifique.pp.15-53.

MILLER, Heather M-L., 2007. *Archaeological approaches to technology.* Amsterdam: Elsevier/Academic Press.

OSBORNE, Richard H. 1998. The experimental replication of a stone mortar. *Lithic Technology*, 23(2), pp.116-123.

RICE, Prudence M., 1987. *Pottery analysis: a sourcebook*. Chicago: University of Chicago Press.

RYE, Owen S., 1981. *Pottery technology: principles and reconstruction*. Washington D. C.: Taraxacum.

SHEPARD, Anna O., 1976. *Ceramics for the archaeologist*. Washington D.C.: Carnegie Institution of Washington.

STOCKS, Denys A. 1993. Making stone vessels in ancient Mesopotamia and Egypt. *Antiquity*, 67(256), pp.596-602.

VRANICH, Alexei, HARMON, Paul and KNUTSON, Chris, 2005. Reed boats and experimental archaeology on lake Titicaca. *Expedition*, 47(2), pp.20-27.

YOUNG Jr., T. Cuyler, and LEVINE, Louis D., 1974. *Excavation of the Godin Project: second progress report*, Toronto: Royal Ontario Museum.

ZUCKERMAN, Daphna. 2000. Experimental archaeology at Sha'ar Hagolan: a reconstruction of Neolithic pottery production in the Jordan Valley. *Near Eastern Archaeology,* 63(1), pp.45-50.

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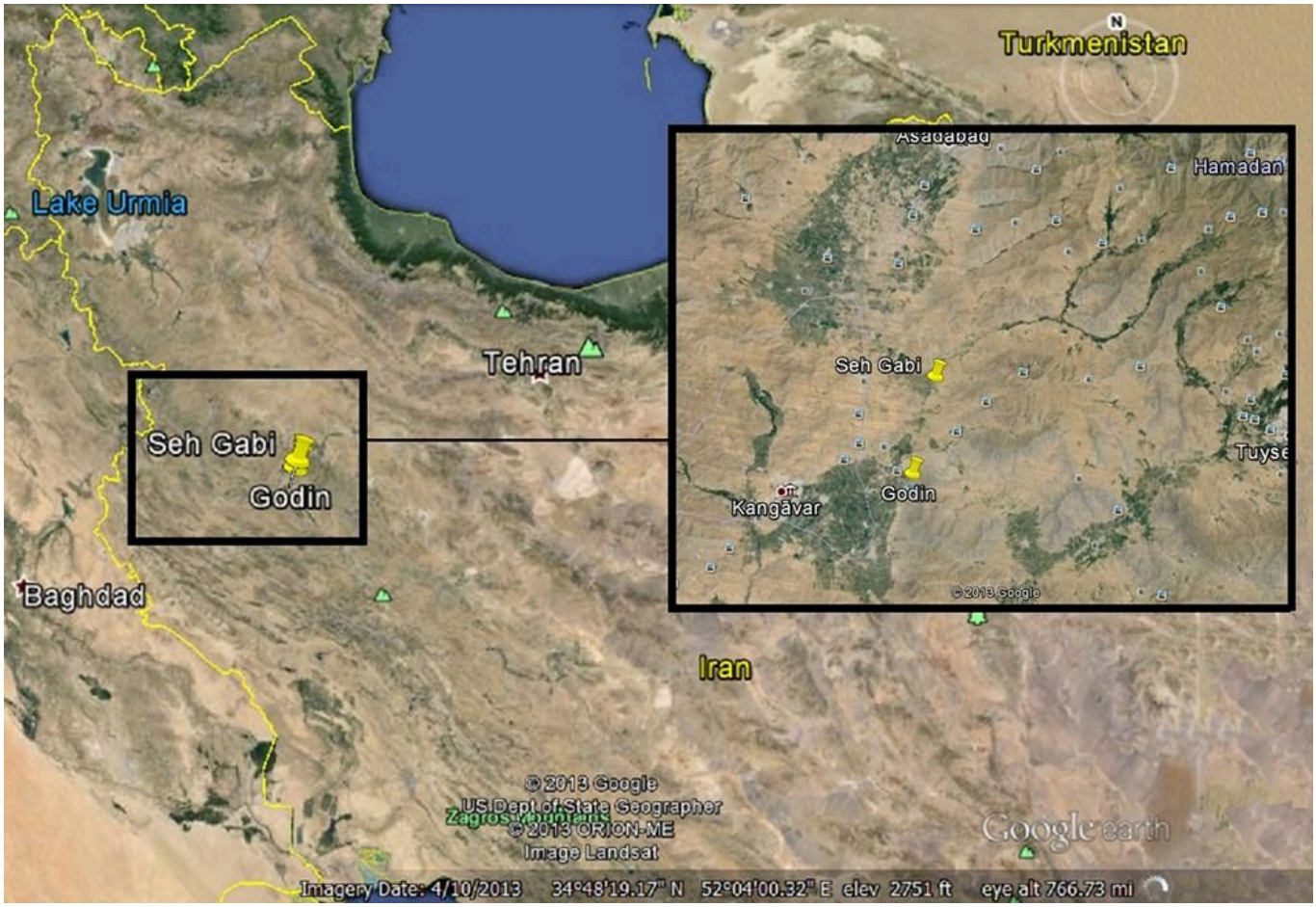

FIG 1. MAP OF IRAN

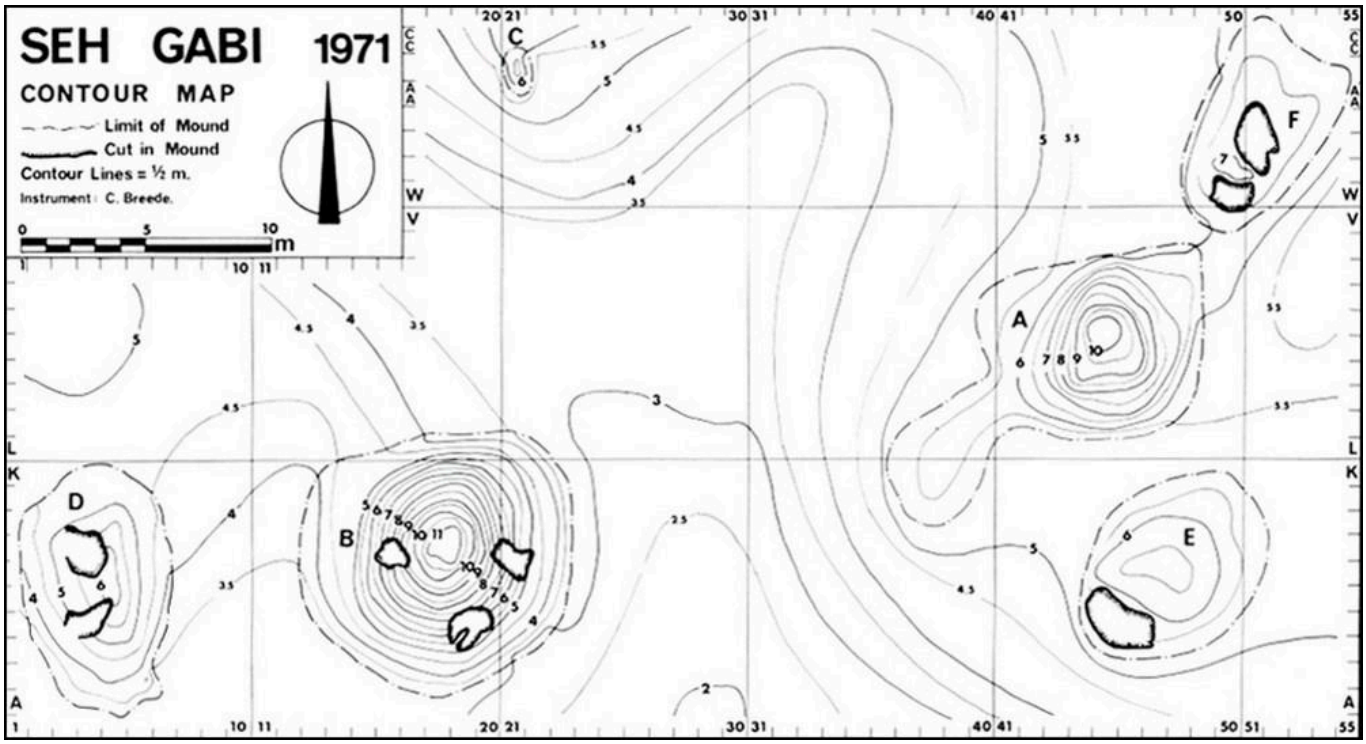

FIG 2. PLAN OF SEH GABI TEPE (HAMLIN 1973). DRAWING BY CLAUS BREEDE.

FIG 3. EXAMPLES OF MONOCHROME POTTERY

FIG 4. FORMING SLABS

FIG 5. APPLYING BUFF SLIP TO THE WHOLE BODY

FIG 6. APPLYING RED SLIP TO THE INSIDE SURFACE

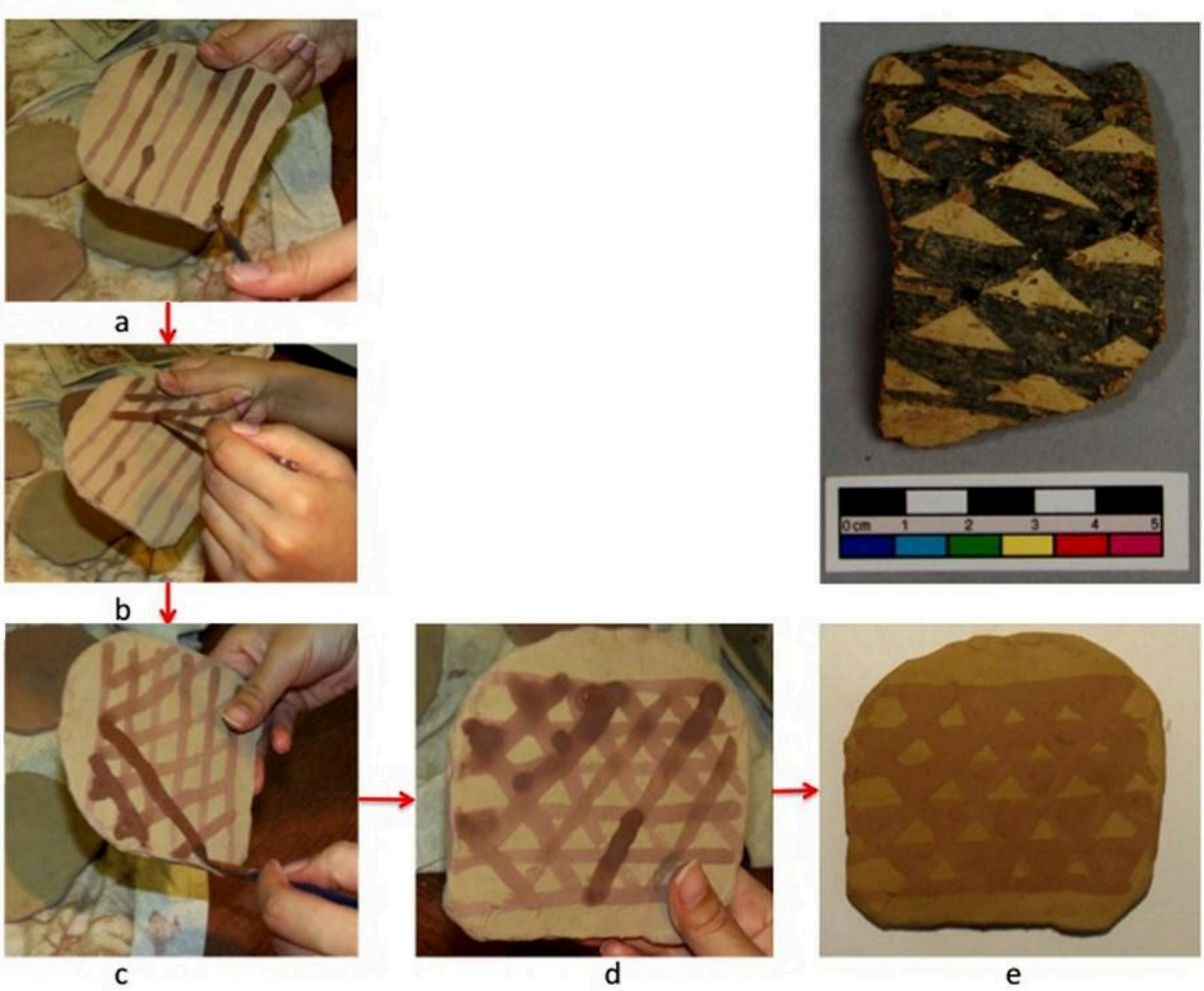

FIG 7. ROWS OF TRIANGLES

FIG 8. ANOTHER TYPE OF TRIANGLE MOTIFS IN THE SAMPLE

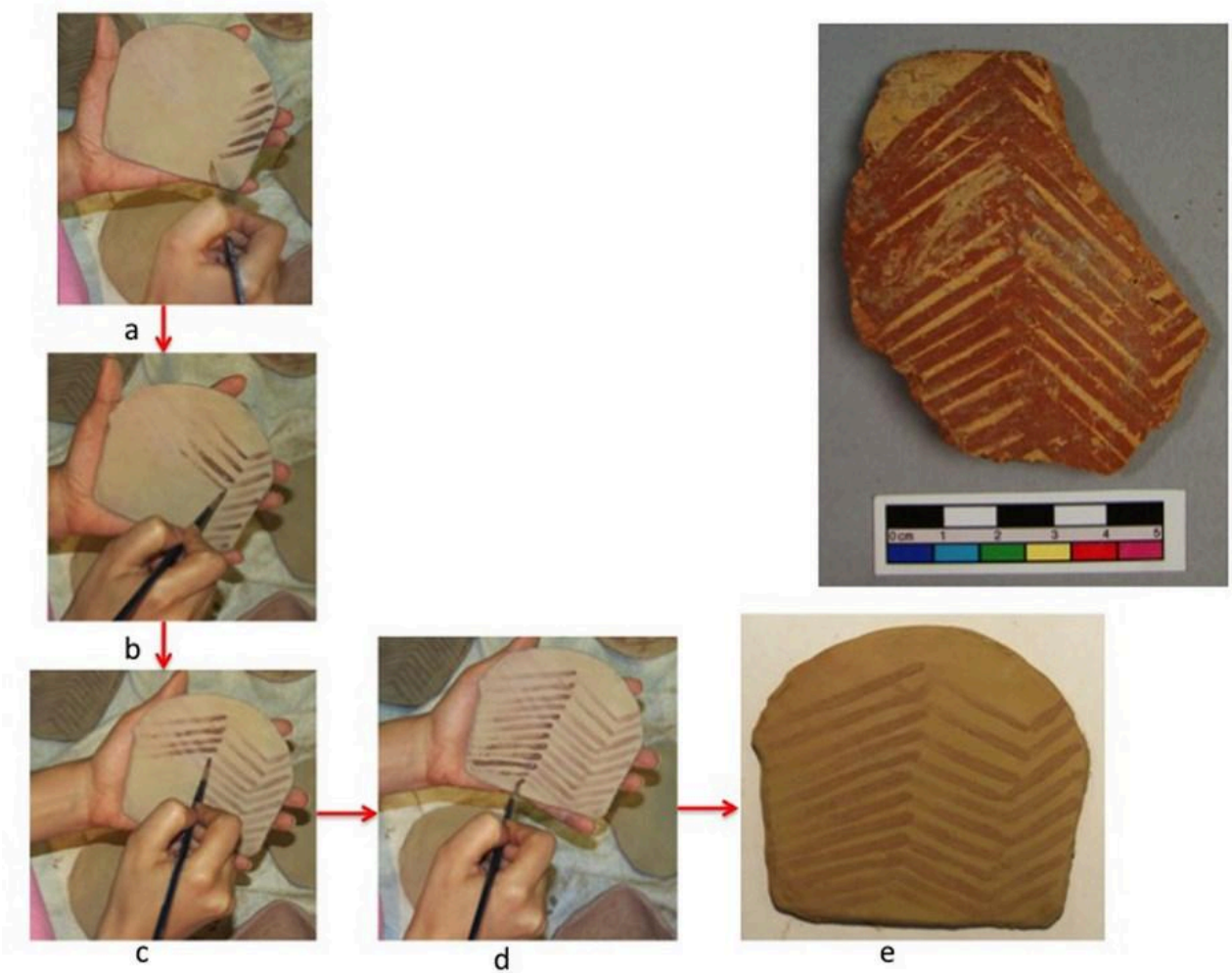

FIG 9. ZIGZAGS, THE TECHNIQUE OF UPWARD AND DOWNWARD MOVEMENT OF BRUSH

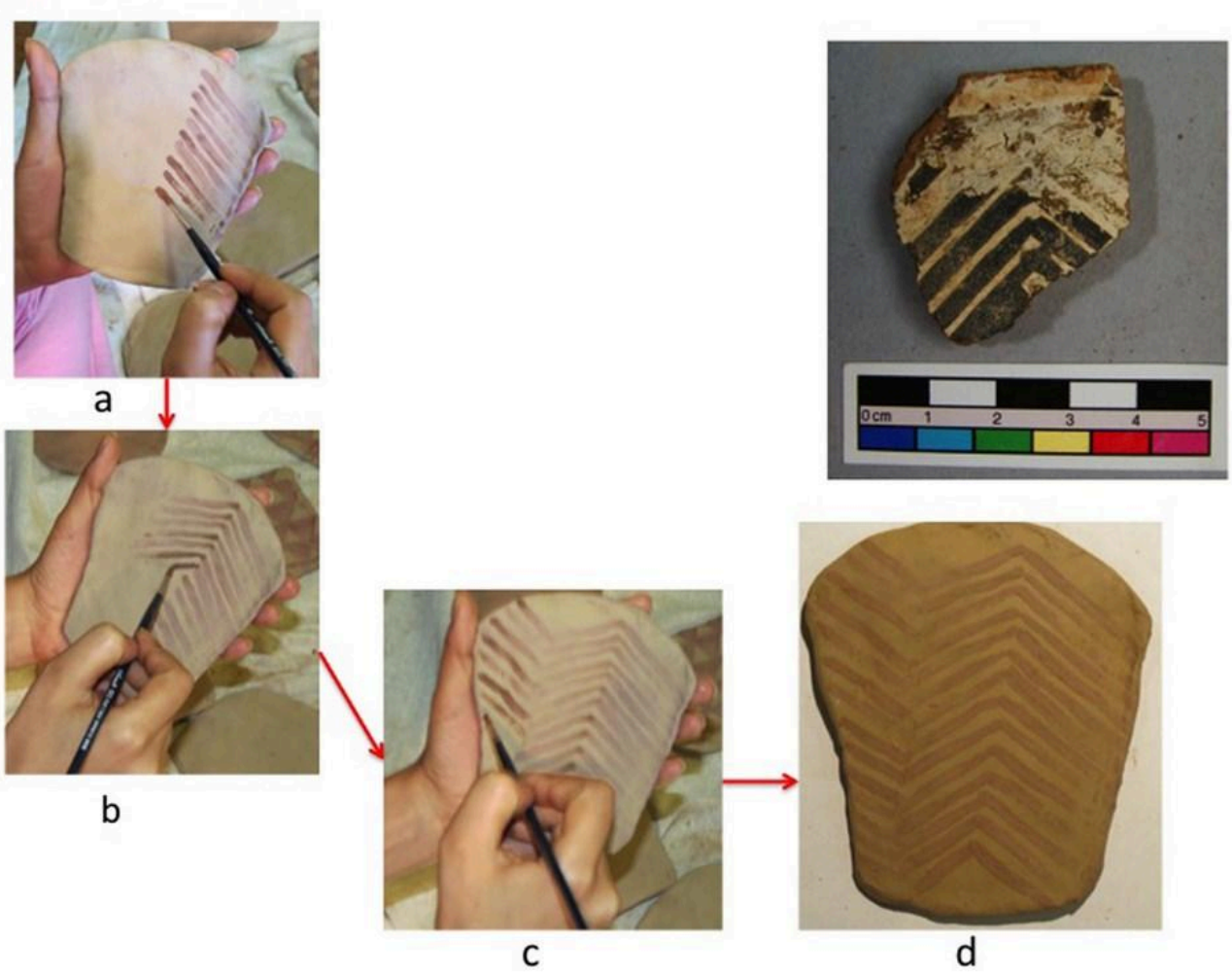

FIG 10. ZIGZAGS, THE TECHNIQUE OF DOWNWARD MOVEMENT OF BRUSH IN EITHER DIRECTION

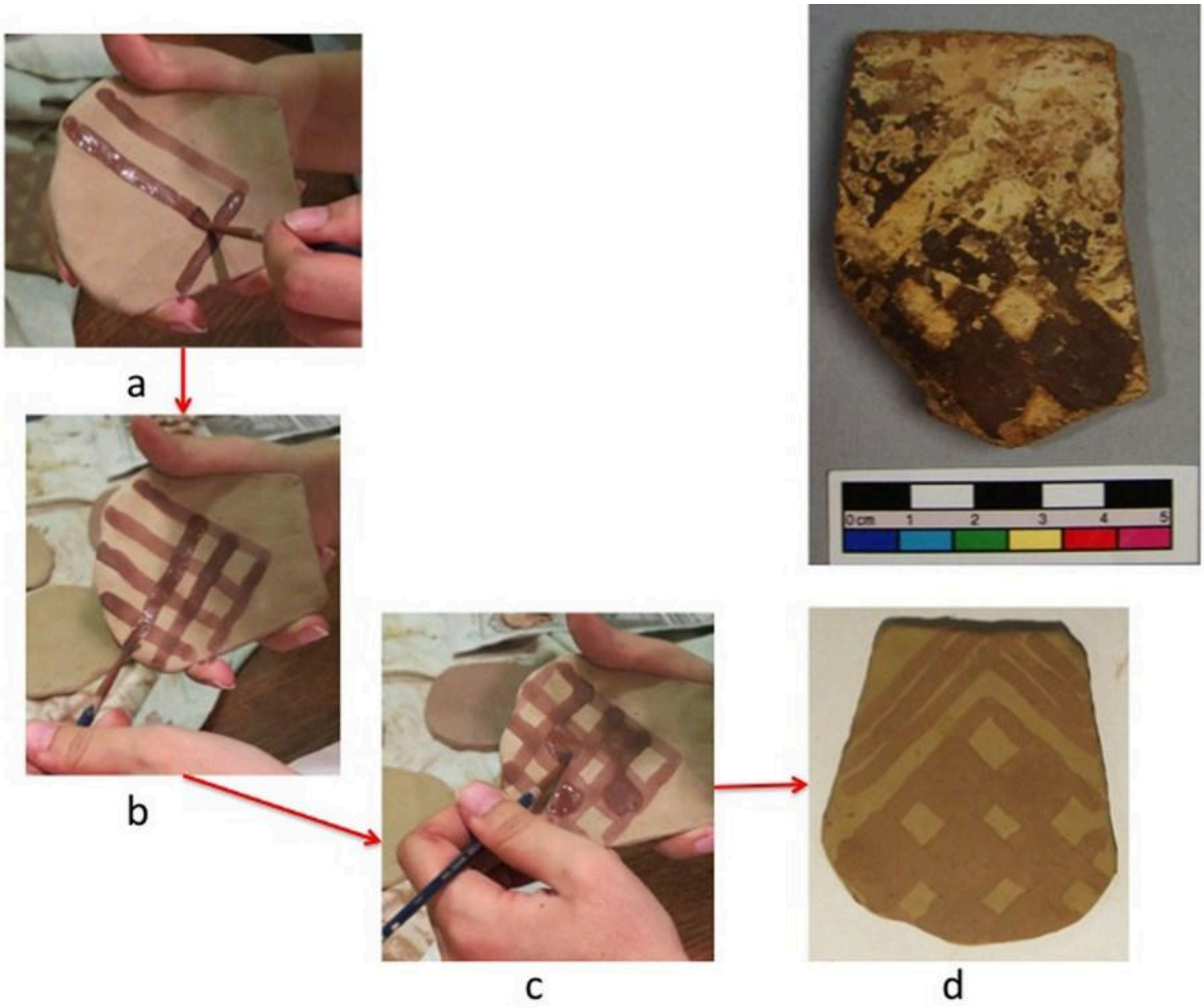

FIG 11. CHECKERED LOZENGE

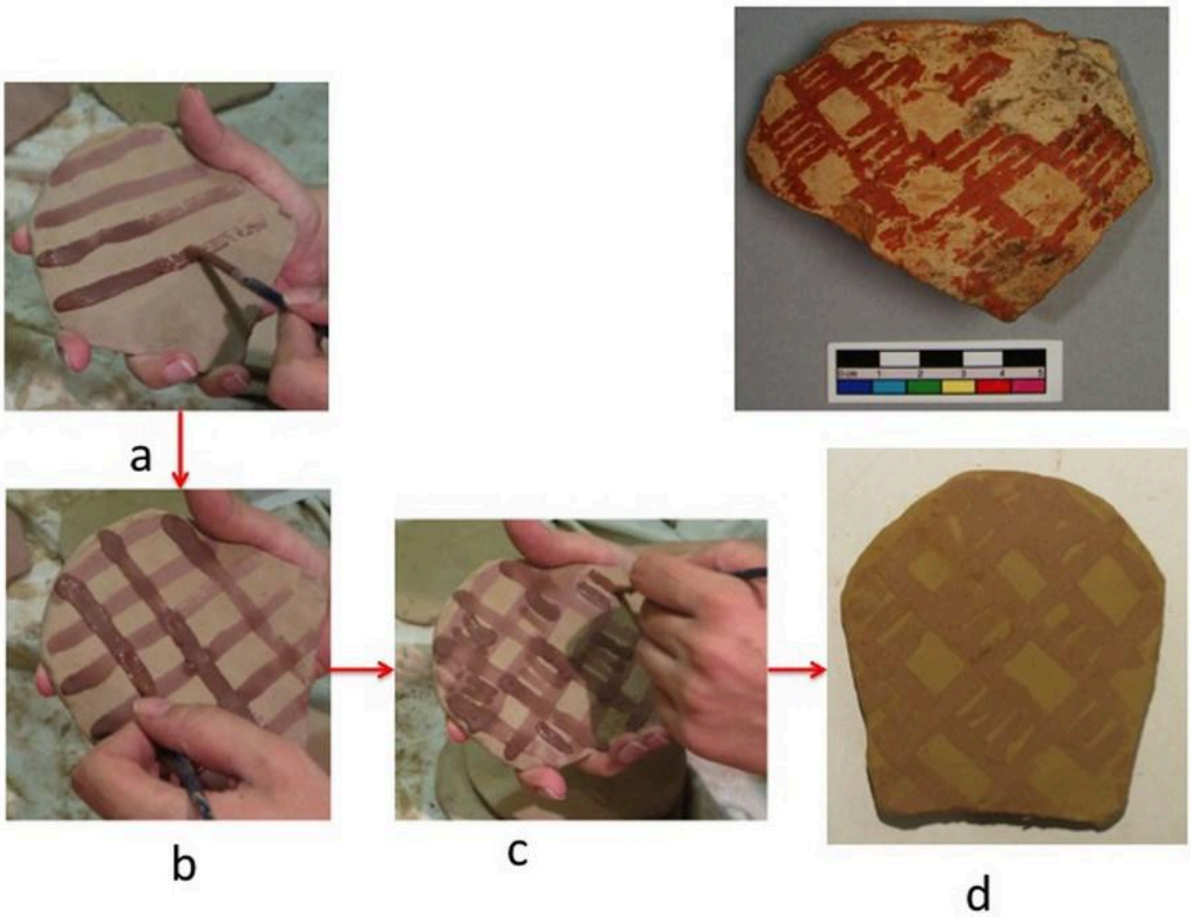

FIG 12. CROSSHATCHED PATTERN

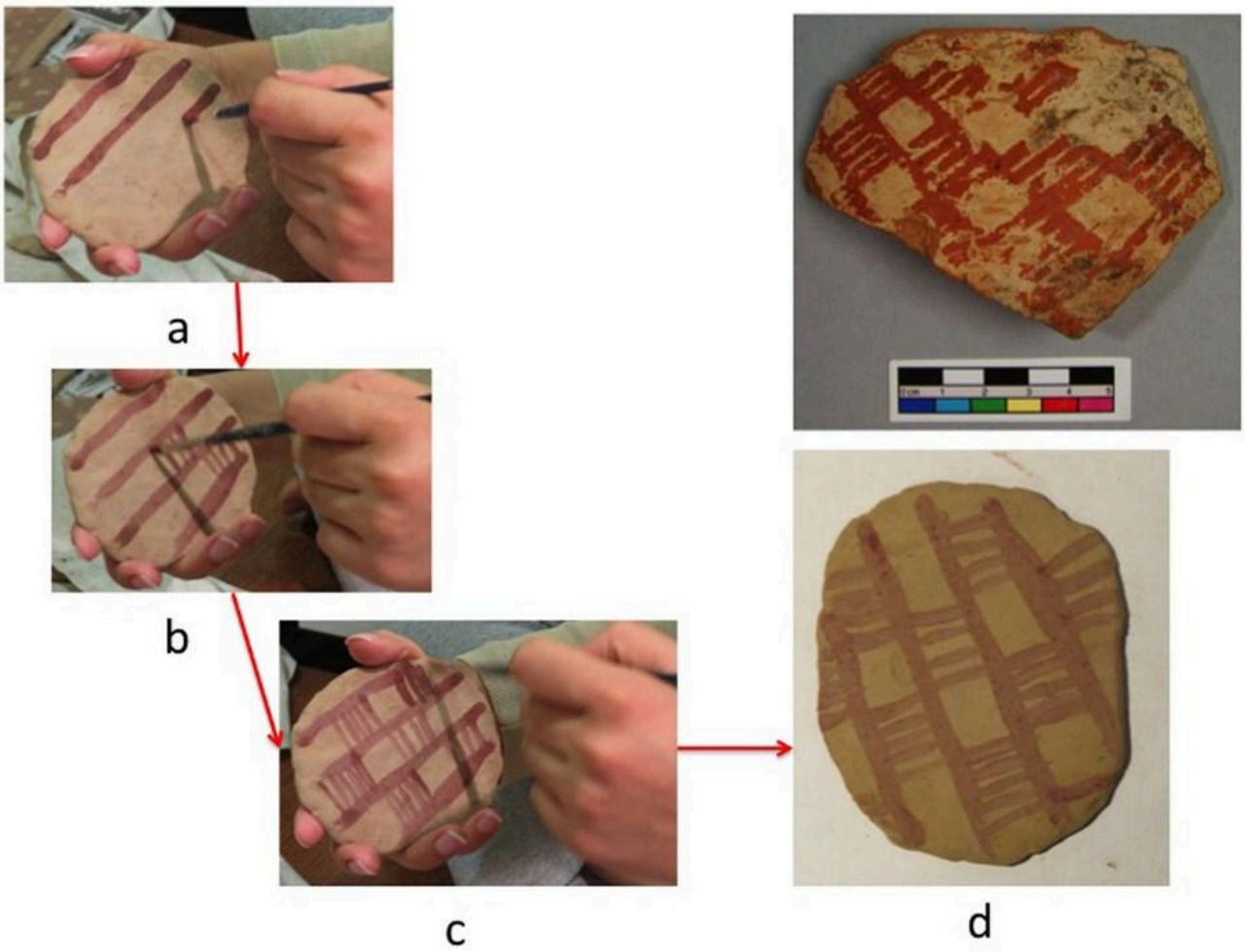

FIG 13. CROSSHATCHED PATTERN WITH A DIFFERENT TECHNIQUE