Reviewed Article:

Shaping Minoan Clay Tablets and Hanging Nodules: Contributions from Experimental Research and X-radiography

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This paper investigates the potential for experimental archaeology and X-radiography to improve our understanding of the manufacture and use of two categories of prehistoric Cretan administrative clay objects: clay tablets and hanging nodules. The results are encouraging: the simple and three-fold tablet shaping techniques can be distinguished confidently, incised writing that was erased can, potentially, be made visible again and the

presence of string inside hanging nodules is clearly visible and, for the most part, can be visualised. This paper thus highlights the benefits that could be gained by treating ancient clay documents as archaeological objects and applying standard non-destructive investigative techniques to them.

> “ Replica experiments have demonstrated the great potential of X-radiography to 'see through' ancient administrative objects and visualise information that is otherwise unknown: tablet forming techniques, erased writing on clay tablets and string arrangements for hanging nodules.

Introduction

Drawing on experimental archaeology and radiography, this article investigates the potential of administrative clay objects to reveal hitherto unknown information about the palatial bureaucracy of Middle and Late Bronze Age Crete (Greece). Minoan administrative objects (e.g. clay tablets, roundels, noduli, nodules, and sealings) are iconic objects that have been studied by many scholars as epigraphic and bureaucratic documents. The focus of these investigations has almost exclusively been on the texts inscribed and the seal imagery impressed onto these objects. Some limited macroscopic and experimental work has been conducted on shaping techniques, scribal hands and archival storage arrangements, most commonly in relation to the Late Bronze Age Mycenaean Linear B tablets found on the Greek mainland and Crete (Sjöquist and Åström, 1985; 1991; Palaima, 1988; Driessen, 2000; Perna, 2017; Greco and Flouda, 2017; Judson, 2023;). Surprisingly, no project has as yet investigated these artefacts as archaeological objects in their own right, trying to understand the various stages of their chaîne opératoire - from the collection of raw materials, processing of the clay, shaping techniques, to use and deposition. This research is a first step in this direction and will allow us to cast a more intimate glance on this category of objects for the first time.

The Minoan palaces emerged in the Middle Minoan IB period and continued until their destruction in Late Minoan IB (ca. 1,900-1,500 B.C.). These widespread destructions were followed by cultural discontinuity and subsequent recovery and shift to a more 'Mycenaean' cultural horizon with Knossos as the primary palace on the island (Watrous, 1994; Rehak and Younger, 1998). Scholars assume that each palace had a substantial territory affiliated with it, over which it had some degree of authority. The palaces were both producers and consumers of raw materials, goods and services, and utilised a well-developed bureaucracy to keep track of everything that went in and out. The best-known accounting objects are clay tablets inscribed with signs in the Cretan Hieroglyphic, Linear A, or Linear B scripts. These tablets are internal records of the central palatial administration. However, there are many other administrative objects that were in use alongside tablets. For example, hanging nodules were clay lumps attached to a string with seal impressions on one or more sides. Their likely use was that of a 'label' tied to the accompanying object. Flat-based nodules were clay lumps formed around small, folded parchment sheets to create very small packages, tied with thin string. These were self-contained administrative objects with seal impressions and likely represent secret communication intended for a specific individual. Roundels are rounded clay disks with one or more seal impressions around the edge. Frequently, they are inscribed with symbols or script signs. Their precise purpose is uncertain, but these documents express some kind of interaction between an individual and the 'central administration', and probably functioned as something like a 'receipt'. Similarly, Noduli are a type of clay receipt or token with a seal impression. They are not attached to any object but are independent documents. Direct object sealings were lumps of clay pressed against a container to seal it. These containers could have been made of clay, wood, leather, et cetera. Users of these containers would indicate access privileges by impressing their stamp into the soft clay (Schoep, 1999; Finlayson, 2013; Montecchi, 2017; Weingarten, 2017).

For the purpose of this research, our focus is on clay tablets and hanging nodules as these offer the greatest potential for X-radiography. Roundels, noduli and direct object sealings, on the other hand, are small hand-formed lumps of clay which do not currently offer much scope for further insights. Flat-based nodules, akin to work done on cuneiform tablets hidden inside their clay envelope, would benefit from CT scanning to reveal the parchment void inside in 3D (The Netherland Institute for the Near East, 2018; Rolff, *et al.*, 2020; Spataro *et al.*, 2023).

What is X-radiography?

X-radiography is a type of electromagnetic radiation that penetrates objects in proportion to the atomic density of the materials and thickness of the object. One can then capture the outgoing radiation as a greyscale image on a photographic film or monitor. Following Röntgen's discovery of X-rays in 1896, the technology was quickly applied to medical problems. Not long after, its use started to expand into archaeological and art historical applications, such as human and animal bones, metals, ceramics, paper, paintings, and soils (for a recent summary, see Lang, *et al.*, 2005). In relation to fired ceramics, X-rays have predominantly been used to help illuminate manufacturing methods, though it has also been shown to be a valuable tool in grouping fabrics (Berg, 2008; Berg and Ambers, 2017). Its use in pottery studies is now well established (Rye, 1977; 1981; Carr, 1990; Carr and Riddick, 1990; Berg, 2008; 2009; 2022; Romano and Zingale, 2019). More recently, scholars have started to utilise 3D CT scanners, but the high equipment prices and running costs and extended recording and digital enhancement time associated with this technology means it is unlikely to replace the inexpensive and speedy X-ray technology for some time yet (Berg, unpublished; Karl, *et al.*, 2014; Caloi and Bernardini, 2024).

Identifying forming techniques with X-radiography: pottery and figurines

Whether investigating manufacturing techniques for pots or for figurines, the principle is the same: when motion and pressure are applied to clay objects, the orientation of voids and inclusions reflects this, revealing a recognisable and repeatable pattern for different shaping techniques which can be made visible through X-radiography. Rye (1977; 1981) was the first to demonstrate this principle for pottery in relation to pinching, drawing, coil-building, slab-building, moulding and wheel-throwing with further foundational work undertaken by Carr (1990) and Berg (2008) (See Figure 1). For an overview and best practice guide to X-radiography of pottery, see Berg and Ambers (2017). The same principles also apply to handmade figurines whose forming techniques and sequences can be revealed through X-radiography. Work on sculpted or modelled clay objects has been surprisingly rare given its great potential. Foster (1983), for example, investigated Kourion votive figures. Based on the direction of voids and inclusions, as well as the presence or absence of joins, he was able to provide a detailed manufacturing sequence for the horse and rider figures. A more recent study was undertaken by the author on human Bronze Age figurines from the Minoan Philioremos peak sanctuary. The reconstruction of the manufacturing sequence for the human figurines revealed that these figurines were made of separate lower (legs) and upper (body) parts, which were then joined together. The joint was then strengthened (and disguised) through the application of the clay loin cloth (See Figure 2). Thus, applying X-radiography to clay tablets and other administrative objects made from clay is likely to provide interesting insights into their shaping techniques. To test this hypothesis, experimental replicas were fashioned using a range of shaping techniques and then X-rayed.

Data and Methods: Experimental archaeology

Two types of administrative objects were targeted in these experiments: clay tablets and hanging nodules. We used semifine red-brown natural clay from Whalley Range in Manchester. The clay was processed by the potter Juan Ignacio Jimenez Rivero as described in Tomei and Rivero (2023: Stage 2). To visualise forming techniques more clearly with X-radiography, straw temper was added to the clay for some experiments.

Experiment 1

Replica clay tablets were made using two different shaping techniques: 1) simple and 2) folded. My experimental work is drawing on work done by Judson (2023; British School at Athens, n.d.), who investigated how Mycenaean scribes made Linear B tablets, identifying the two principal methods of simple and triple-folded tablets.

Simple tablets:

1. A ball of clay is pushed down in the centre with a rolling pin. Starting from the centre,

Folded tablets:

1. A ball of clay is pushed down in the centre with a rolling pin. Starting from the centre, the rolling pin rolls out the clay forwards

the rolling pin rolls out the clay to the left and to the right.

2. A ball of clay is rolled out into a coil by hand first. Starting from the centre, the rolling pin rolls out the clay to the left and to the right.
3. A ball of clay is rolled out into a coil by hand first. Starting from the centre, the rolling pin rolls out the clay upwards and downwards.
4. A ball of clay is rolled out into a coil by hand first. Using the palm of a hand, the coil is pressed down into a flat tablet shape.
5. A ball of clay is pushed down in the centre with a rolling pin. Starting from the centre, the rolling pin rolls out the clay upwards and downwards.

and backwards, then to the left and to the right. The bottom third is folded inwards and then the top third is folded on top. The edges and joints are smoothed.

2. A ball of clay is rolled out into a coil by hand first. Starting from the centre, the rolling pin rolls out the clay forwards and backwards. The bottom third is folded inwards and then the top third is folded on top. The edges and joints are smoothed.
3. Using a rolling pin, a ball of clay is rolled out into all directions into a flat round shape. The bottom third is folded inwards and then the top third is folded on top. The edges and joints are smoothed.
4. A ball of clay is rolled out into a coil by hand first. The clay is then pushed flat with the palm of the hand. The bottom third is folded inwards and then the top third is folded on top. The edges and joints are smoothed.

TABLE 1. EXPERIMENTAL SHAPING TECHNIQUES FOR CLAY TABLETS.

Experiment 2

The second set of tablet experiments was designed to investigate the orientation of the voids and inclusions with the aim of helping to visualise shaping techniques better. Very little water is used in the making of clay tablets. As a result, the clay is very dense and has few air voids that would be visible on X-rays. Instead, straw was added to the clay to help visualise the orientation of inclusions after they had been shaped according to the two principal techniques. Straw has a different radiodensity from clay and is therefore easily visible on X-rays and, because straw is elongated, its shape shows the orientation of the inclusions clearly.

1. A simple clay tablet (Method 1.3) was prepared with straw temper added to the clay.
2. A folded clay tablet (Method 2.4) was prepared with straw temper added to the clay.

TABLE 2. EXPERIMENTAL CLAY TABLETS WITH STRAW TEMPER ADDED.

Experiment 3

A third set of experiments was undertaken with clay tablets to determine whether inscribed writing that had been erased by ancient scribes (and the tablet re-inscribed) could be detected with X-rays. For this experiment, a simple replica clay tablet had text inscribed into its surface with a toothpick while still wet (See Figure 3). It was then left to dry for different lengths of time before fresh clay or water was applied to the surface or the surface was smoothed with an implement to obliterate the inscription (See Figure 4). That re-inscribing took place has been confirmed by macroscopic inspection of Linear A tablets which has shown that many were, in fact, palimpsests, meaning that the original text had been erased and new text added (Schoep, 1999). In other cases, evidence is more tangential. For example, Linear B tablets were cut to a size inconsistent with the amount of writing currently visible, leading scholars to argue that the tablet size matched the original text which had been erased subsequently and over-written (Tomas, 2013). In contrast to the Minoan and Mycenaean tablets , Mesopotamian ones were rarely erased or reinscribed. Instead, scribes remoulded old tablets or soaked them in water to prepare a recycled batch of clay (Taylor, 2011). No doubt, this form of recycling also took place in Minoan Crete, though we lack evidence for it.

1. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The text was then obliterated by smoothing the wet clay by hand.
2. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The text was then obliterated by smearing the wet clay over the inscribed text immediately. The captalised alphabet was then inscribed from left to right across the entire length of the tablet.
3. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The tablet was allowed to air dry for 12 hours at room temperature. The inscribed text was then obliterated by rubbing the convex surface of a spoon over the letters.
4. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The tablet was allowed to air dry for 36 hours at room temperature. Water was then applied to the tablet surface to rub out the letters with the convex surface of a spoon.
5. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The tablet was allowed to air dry for 36 hours at room temperature. A layer of wet clay was then smeared across the surface to obliterate the inscribed letters.
6. A simple clay tablet (Method 1.3) was inscribed with large capital letters across the entire length of the tablet whilst the clay was still wet. The tablet was allowed to air dry for 132 hours at room temperature. A layer of wet clay was then smeared across the surface to obliterate the inscribed letters.

TABLE 3. INSCRIPTION EXPERIMENTS ON REPLICA CLAY TABLETS.

Experiment 4

A hanging nodule is a simple piece of hand-formed clay that is squeezed around a plain, twisted or knotted string. The great range of string-knot arrangements used in the past was revealed by Montecchi (2017) who analysed silicone casts of broken hanging nodules kept in the Corpus of Minoan and Mycenaean Seals archive and identified at least four different arrangements: 1) nodule over a single knotted end of a string; 2) nodule over the length of a single (at times knotted) string; 3) a nodule over the two loose ends of a string; and 4) a nodule over the two twisted ends of a single string. Unlike the examples in the archive which were broken, many of these administrative clay objects have been found intact with the string burnt out following an accidental fire that turned the artefact into fired ceramics. Therefore, this experimental study was performed to determine whether the type of knot (single or double), the number of strings (one, two) and their arrangement (simple, twisted, knotted) can be visualised with X-radiography non-destructively (See Figures 5-6). The clay was allowed to air-dry before X-rays were taken. Because of the different radiodensity of clay and string, one would expect the string and knot to be clearly visible on the X-ray. Future experiments may wish to investigate whether different string materials could be visualised accurately by X-ray.

1. Nodule with two twisted ends of a single string
2. Nodule with two ends knotted (single) of a single string
3. Nodule with two ends of a single string
4. Nodule with single knotted string
5. Nodule with double knotted end of a single string
6. Nodule with single knotted end of a single string

TABLE 4. STRING EXPERIMENTS WITH CLAY NODULES.

Data and Methods: X-ray

The X-ray machine used was a CD38 Mobile with a 1.2mm focal spot, 1m film to source distance and an Agfa cassette. The maximum exposure options are 125 kV and 50 mAs. X-ray translucent wedges were used as needed to position the objects correctly. For both clay tablets and hanging nodule replicas, two X-ray views were taken: top-down and side view. X-rays were developed and annotated using the Agfa CR30-X Developer. The resulting jpeg images were enhanced using the Adjust Colour function in Preview (Mac). For a summary on the history, theory and practice of X-radiography of archaeological ceramics, see Berg and Ambers (2017).

Replica ID	Object type	Object shape	Dimensions/cm (length:width:thickness)	Shaping technique
1	tablet	Palm-leaf	18.2:3.5:0.8-0.9	Simple
2	tablet	Palm-leaf	14.3:4.6:0.9-1.7	Triple-fold

3	tablet	Palm-leaf	14.6:4.1:0.5-1.1	Triple-fold
10	tablet	Palm-leaf	16.6:3.0:0.8-1.2	Simple
11	tablet	Palm-leaf	14.0:4.8:0.4-1.9	Triple-fold
12	tablet	Palm-leaf	17.8:4.5:0.7-1.0	Simple
13	tablet	Palm-leaf	18.8:4.0:0.6-0.7	Simple
14	tablet	Palm-leaf	16.5:3.8:0.7-0.9	Simple
15	tablet	Palm-leaf	15.6:4.0:0.5-0.7	Simple
1.1	tablet	Palm-leaf	14.3:6.5:0.3-0.4	Simple
2.1	tablet	Palm-leaf	20.8:4.2:0.3-0.8	Simple
3.1	tablet	Palm-leaf	16.0:7.9:0.4-0.6	Simple
4.1	tablet	Palm-leaf	20.3:4.7:0.3-1.4	Triple-fold
5.1	tablet	Palm-leaf	18.7:4.5:0.3-0.9	Triple-fold
6.1	tablet	Palm-leaf	16.5:5.2:0.6-1.3	Simple
7.1	tablet	Palm-leaf	15.2:4.5:0.3-1.3	Triple-fold
8.1	tablet	Palm-leaf	25.8:4.0:0.4-1.0	Simple
9.1	tablet	Palm-leaf	27.5:3.2:0.3-08	Simple
20	nodule		4.0:2.6:1.4-1.6	Hand-formed
21	nodule		4.0:2.1:1.0-1.4	Hand-formed
22	nodule		4.5:3.8:1.0-1.3	Hand-formed
23	nodule		3.9:2.0:0.9-1.1	Hand-formed
24	nodule		4.0:2.5:0.9-1.3	Hand-formed
25	nodule		3.5:2.0:0.9-1.3	Hand-formed

TABLE 5. KEY INFORMATION ABOUT REPLICA TABLETS AND HANGING NODULES.

Discussion

Tablet shaping techniques

X-rays are easily able to distinguish between simple and folded tablets both in the top-down view and the side view (See Figures 7-10). The air spaces between the folds are clearly visible in the side view and the unevenness of the tablet thickness is visible in the top-down view. In contrast, the simple tablet is characterised by a coherent thickness throughout and an absence of joints or voids.

Among the simple tablets, the directional pressure of the rolling pin is only visible, if it is only exerted in one direction without subsequent correction, and pressure is applied to cause thickness differences that are made visible in the X-ray (See Figures 11-12). The same applies to tablets made by applying palm pressure: when done in such a way as to result in thickness differences, then these are visible on the X-ray (Figure 13). If thickness differences are not obliterated by subsequent actions, rolling pin activity and palm pressure can be distinguished by the shape of their imprint into clay: a rolling pin applies consistent pressure across the width of the tablet (Figures 11-12), whereas a palm print exerts greater pressure in the centre than the edges (See Figure 13). Whether or not the clay ball was first shaped into a coil cannot be detected by X-ray.

As regards folded tablets, the multiple folding actions and the subsequent smoothing of the edges and joints make it difficult to detect directionality of the rolling pin. No pattern can easily be discerned on the X-ray (See Figure 10). Whether or not the clay ball was first shaped into a coil cannot be detected by X-ray.

Orientation of inclusions

The top-down X-ray view of the simple tablet shows a random orientation of the straw inclusions and a parallel alignment to the surface for the side view (See Figures 14-15). This is entirely in line with what we would expect based on our knowledge of pottery-forming techniques. The physical pressures exerted when making a tablet are similar to mould-made or pinched pots, which show an equivalent orientation in X-rays (See Figure 1). The top-down view of the folded tablet also shows a random orientation of the straw inclusions. Unfortunately, the side view is difficult to interpret due to the various folding layers (See Figures 16-17).

Detecting tablet inscriptions

When the clay was wet, inscribed text could easily be obliterated and the X-ray shows no trace of the original inscription as the clay was sufficiently malleable to fill the incised gaps (See Figures 3, 18). However, when a tablet has dried to the leather hard stage, the application of water or wet clay may not penetrate the spaces sufficiently well to erase the original inscription completely when viewed on an X-ray, even though the tablet may appear entirely void of text to the naked eye (See Figures 19-20). Since we know that the Minoans practised tablet recycling, there remains a potential of X-rays to detect erased ancient text on reused clay tablets.

Hanging nodules shaping techniques and string arrangements

As expected, the existence of string and knot is clearly visible on the X-rays (and would be equally visible if the string had burnt out from exposure to fire and had left a void behind) (See Figures 5-6, 21-22). The frequency of knotting is hard to discern and it impossible to distinguish double knots from single knots. Twisted string can be visualised satisfactorily. Thus, the experiments have shown the potential of X-radiography in revealing the 'content' of intact hanging nodules.

Conclusions

Replica experiments have demonstrated the great potential of X-radiography to 'see through' ancient administrative objects and visualise information that is otherwise unknown: tablet forming techniques, erased writing on clay tablets and string arrangements for hanging nodules. Being a non-destructive technique, X-rays are easy and quick to take and can reveal much about past administrative practice that is currently hidden.

Keywords tablet weaving
clay
experimental archaeology

Country Greece

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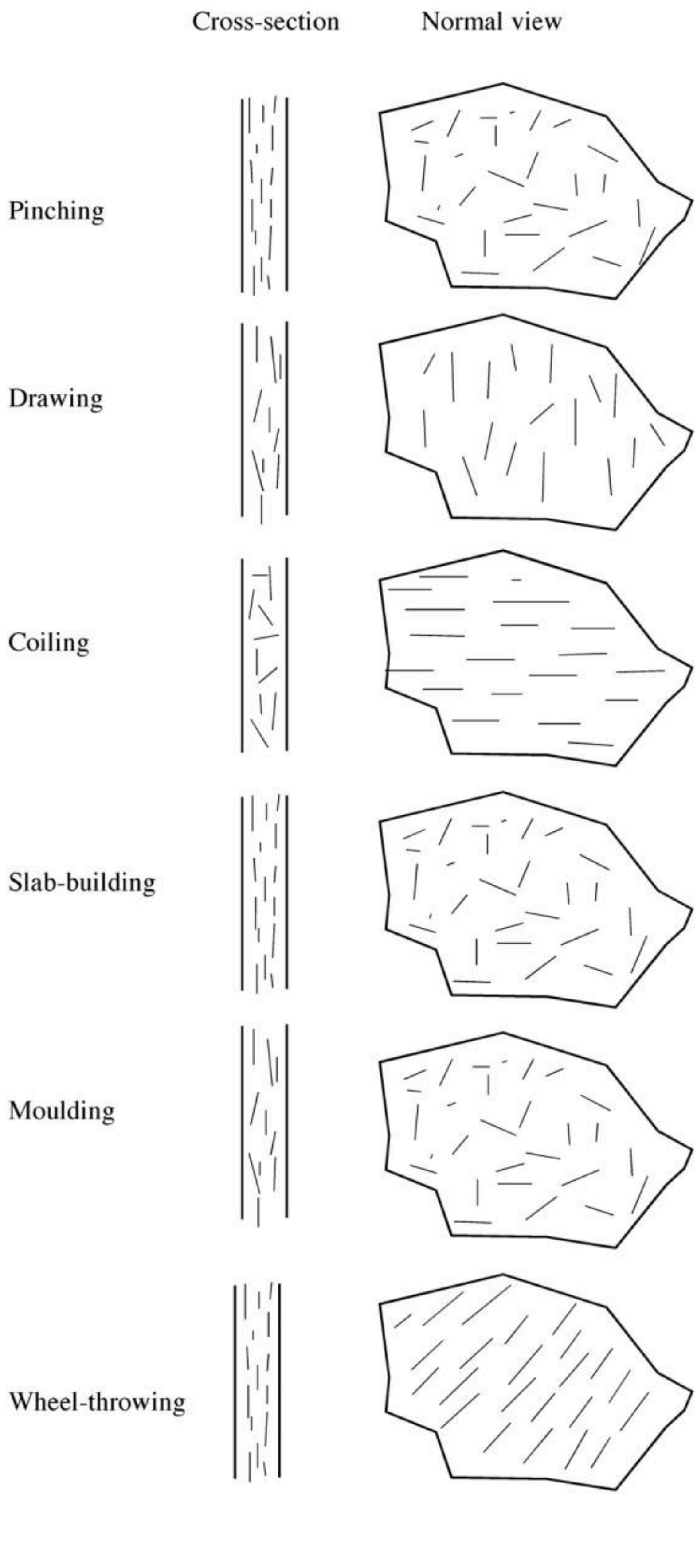

FIG 1. CHARACTERISTIC FEATURES OF THE MAIN POTTERY FORMING TECHNIQUES (AFTER CARR 1990: FIG. 1; RYE 1981).

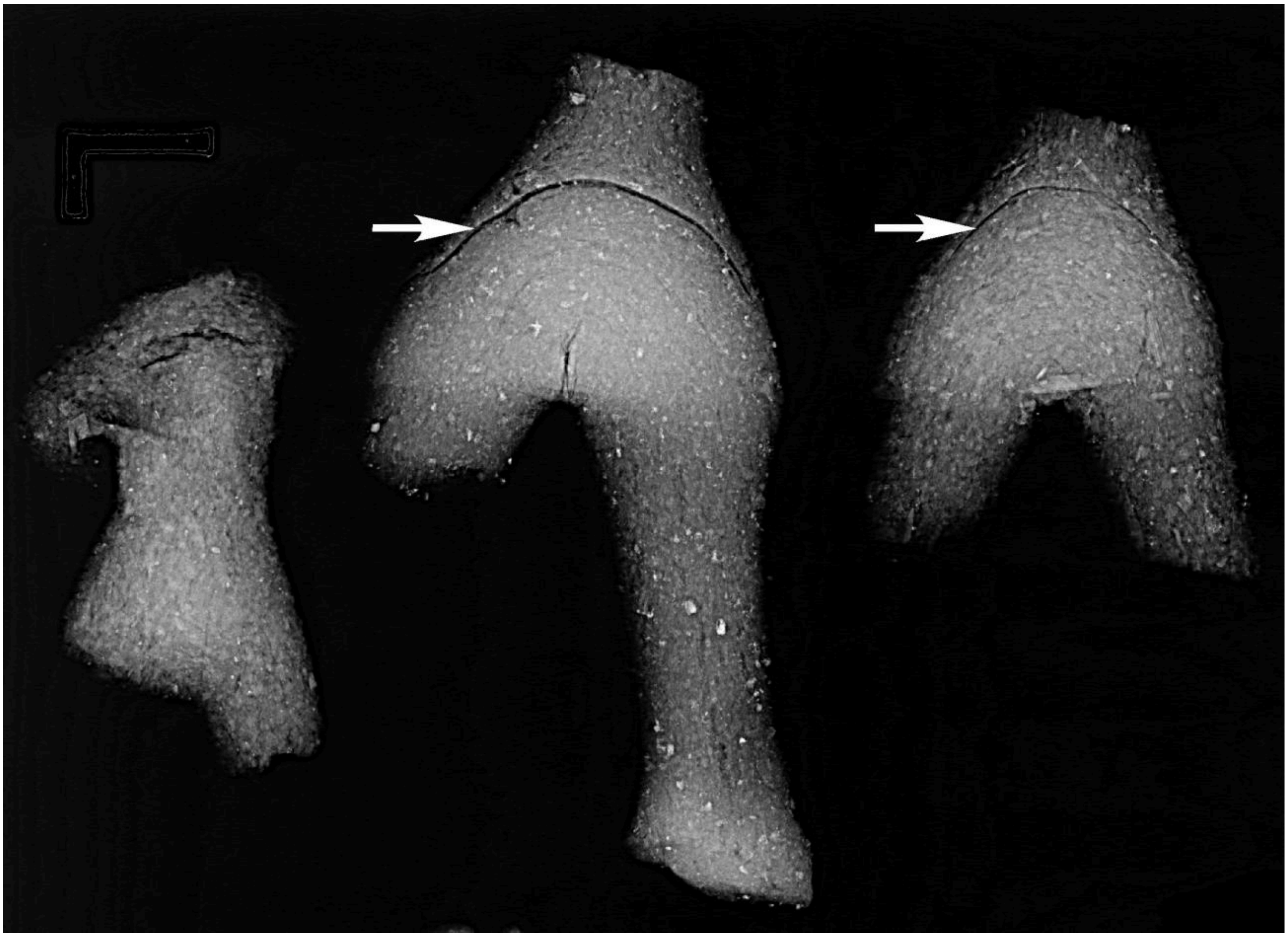

FIG 2. X-RAYS OF THREE HUMAN FIGURINES FROM THE MIDDLE MINOAN PHILIOREMOS PEAK SANCTUARY, CRETE, GREECE. LEFT: ID 204101: HUMAN FIGURINE. THE ORIENTATION OF VOIDS AND INCLUSIONS WITHIN THE BODY INDICATES THAT THE MAIN BODY AND LEGS WERE MADE FROM ONE SINGLE PIECE. THE ARMS WERE ROLLED FROM A SEPARATE COIL AND THEN WRAPPED AROUND THE TOP AND ATTACHED TO THE BODY. MIDDLE: ID 406144: MALE FIGURINE. THE LEGS WERE MADE FROM A COIL THAT WAS BENT IN THE MIDDLE AND THE FOOT FORMED BY ‘PULLING’. THE BODY WAS MADE FROM A SEPARATE PIECE OF CLAY THE LOWER PART OF WHICH HAD BEEN OPENED UP LIKE A CONE TO CREATE THE UPPER HALF OF THE LOINCLOTH WHICH WAS THEN SMOOTHED DOWNWARDS TO COVER THE BUTTOCKS. THIS ARRANGEMENT HAD THE ADVANTAGE OF OBSCURING THE BODY-LEG JOINT SO OBVIOUS IN THE X-RAY (SEE ARROW). RIGHT: ID 307106: MALE FIGURINE. SAME AS MIDDLE FIGURINE. PHOTO BY INA BERG.

FIG 3. TABLET INCISED WITH PARTIAL ALPHABET WHILE WET. PHOTO BY INA BERG.

FIG 4. TABLET AFTER WET CLAY HAD BEEN APPLIED OVER THE INCISED LETTERS AND THE SURFACE SMOOTHED. PHOTO BY INA BERG.

FIG 5. HANGING NODULES: TOP ROW (LEFT TO RIGHT): NODULE WITH TWO TWISTED ENDS OF A SINGLE STRING – NODULE WITH TWO ENDS KNOTTED (SINGLE) OF A SINGLE STRING – NODULE WITH TWO ENDS OF A SINGLE STRING. BOTTOM ROW (LEFT TO RIGHT): NODULE WITH SINGLE KNOTTED STRING – NODULE WITH DOUBLE KNOTTED END OF A SINGLE STRING – NODULE WITH SINGLE KNOTTED END OF A SINGLE STRING. PHOTO BY INA BERG.

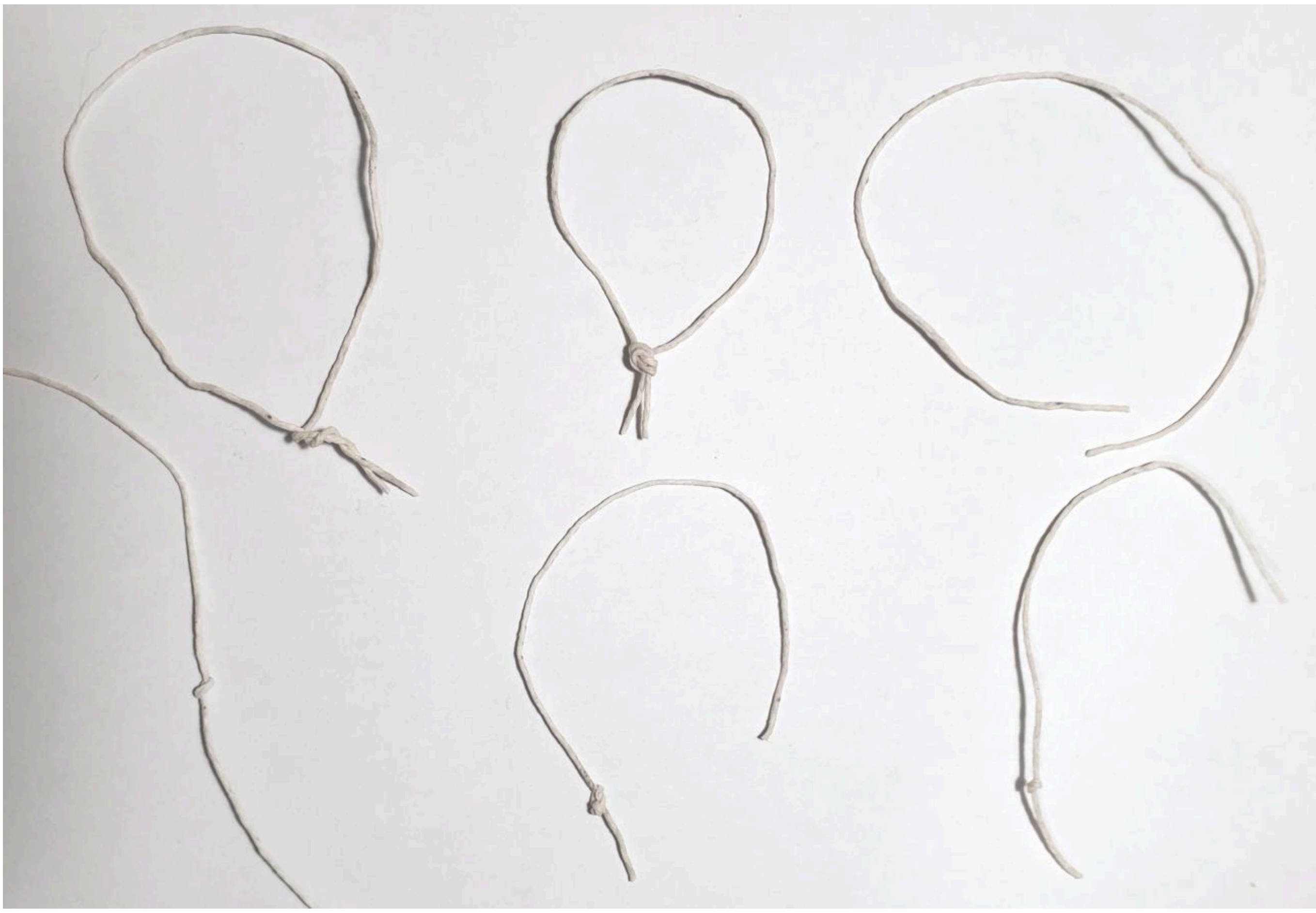

FIG 6. HANGING NODULE STRING ARRANGEMENTS: TOP ROW (LEFT TO RIGHT): TWO TWISTED ENDS OF A SINGLE STRING –TWO ENDS KNOTTED (SINGLE) OF A SINGLE STRING –TWO ENDS OF A SINGLE STRING BOTTOM ROW (LEFT TO RIGHT): SINGLE KNOTTED STRING –DOUBLE KNOTTED END OF A SINGLE STRING –SINGLE KNOTTED END OF A SINGLE STRING. PHOTO BY INA BERG.

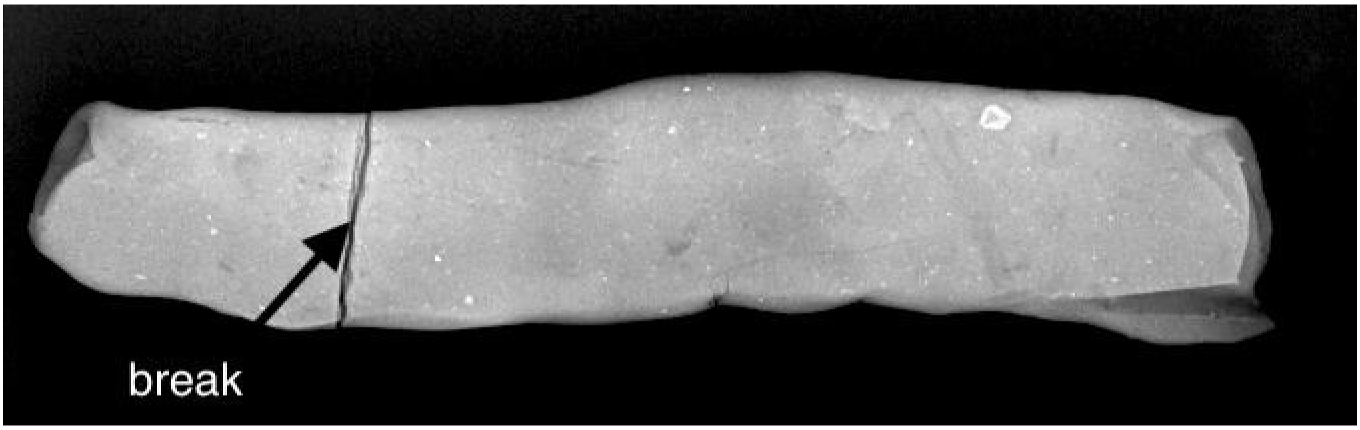

FIG 7. SIMPLE TABLET (METHOD 1.2). TOP-DOWN X-RAY VIEW. BLACK ARROW INDICATES A BREAK. PHOTO BY INA BERG.

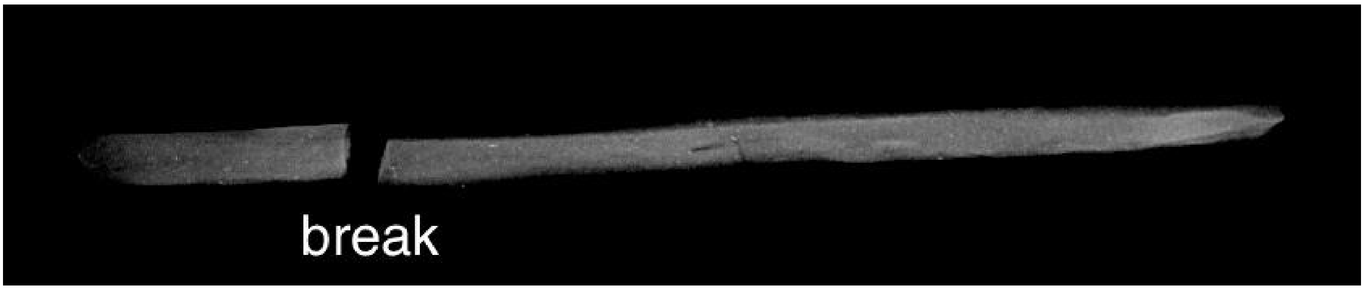

FIG 8. SIMPLE TABLET (METHOD 1.2). SIDE X-RAY VIEW. BREAK INDICATED. PHOTO BY INA BERG.

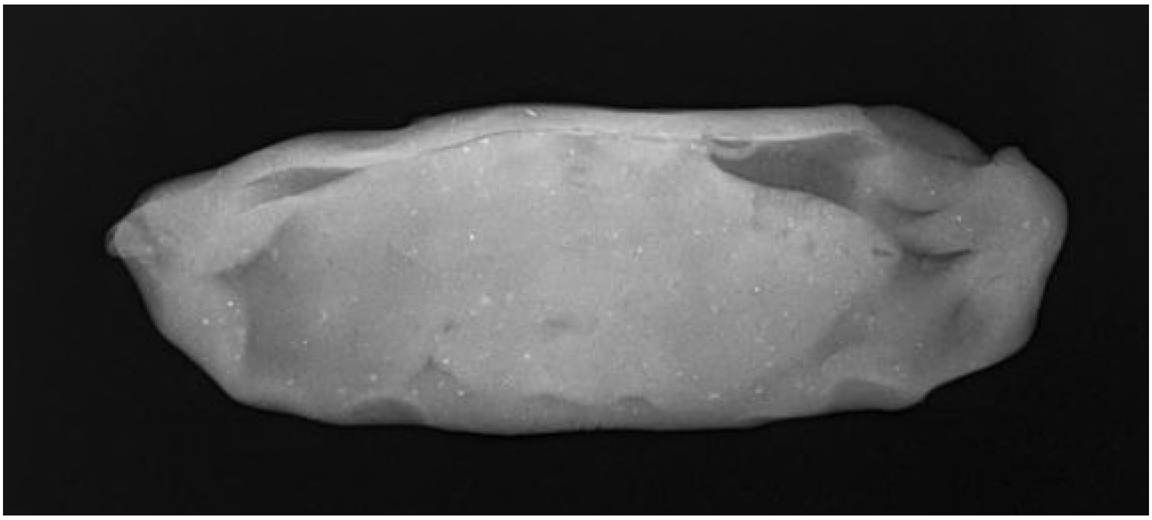

FIG 9. FOLDED TABLET (METHOD 2.1). TOP-DOWN X-RAY VIEW. PHOTO BY INA BERG.

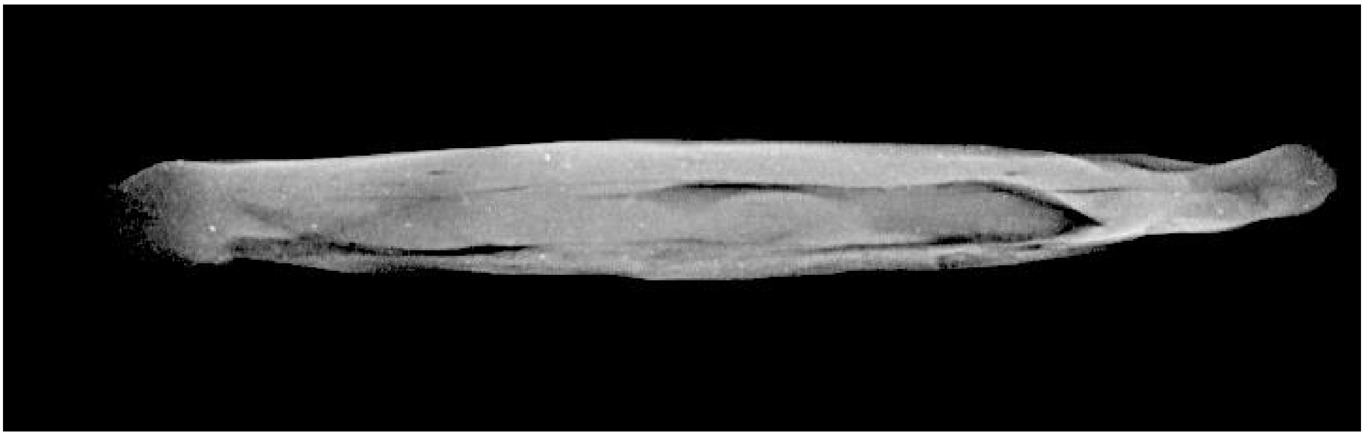

FIG 10. FOLDED TABLET (METHOD 2.1). SIDE X-RAY VIEW. PHOTO BY INA BERG.

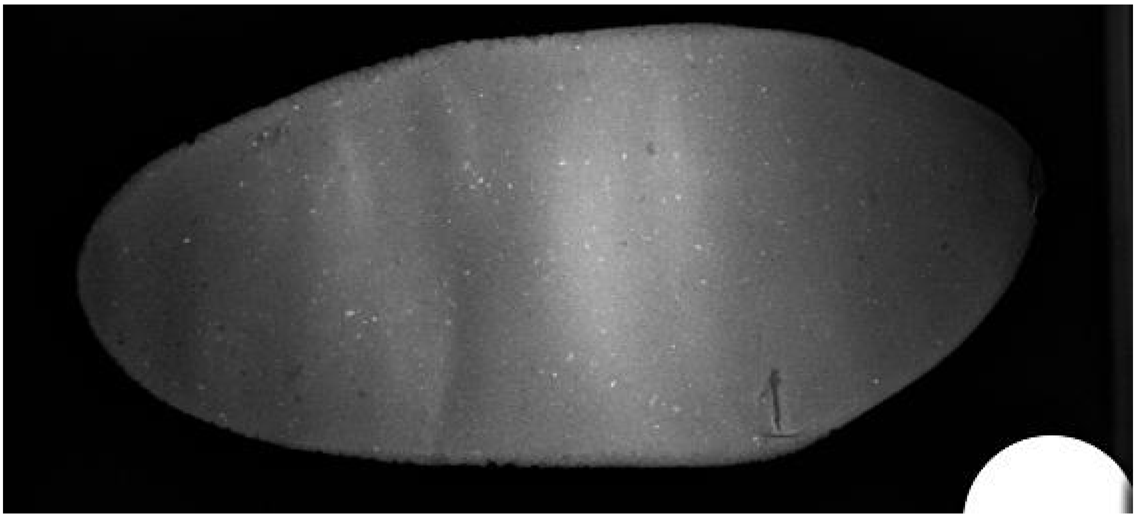

FIG 11. SIMPLE TABLET (METHOD 1.1). ROLLED OUT WITH A ROLLING PIN LEFT AND RIGHT FROM CENTRE. TOP-DOWN X-RAY VIEW. WHITE OBJECT IN BOTTOM RIGHT CORNER IS A METAL MEASURING BALL. PHOTO BY INA BERG.

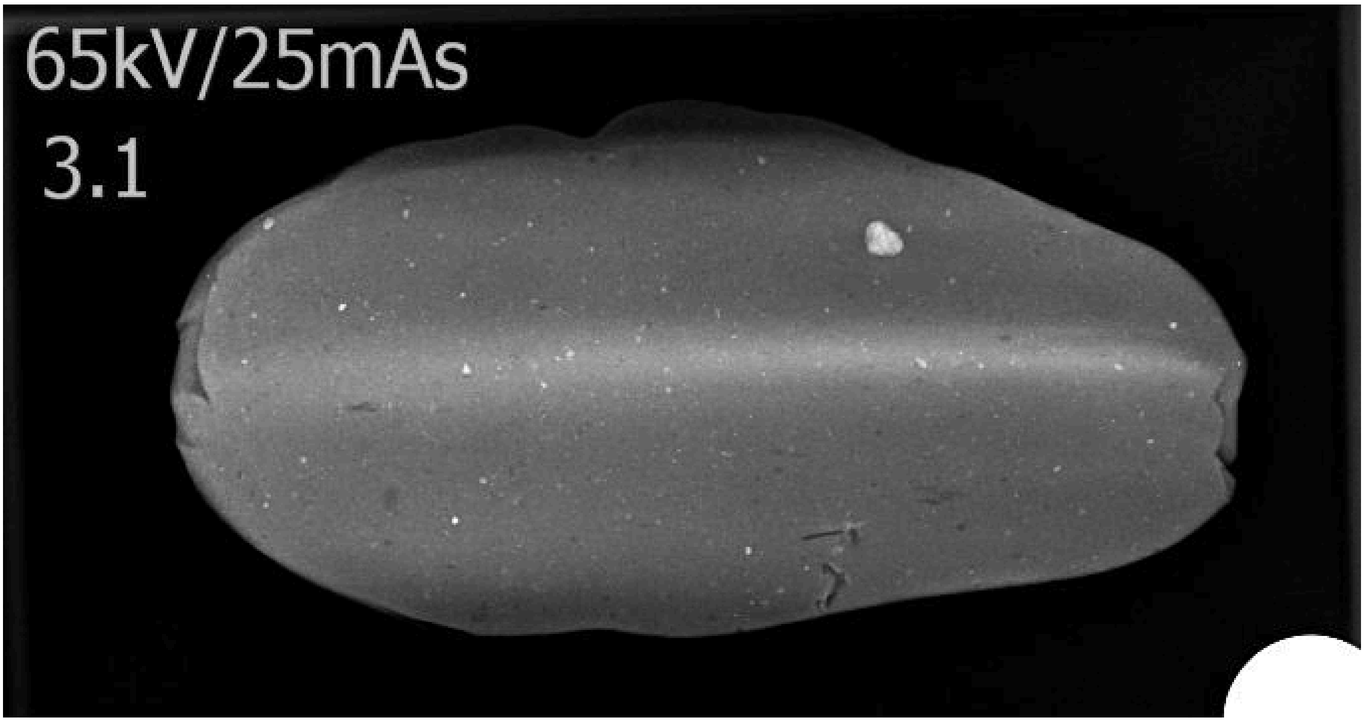

FIG 12. SIMPLE TABLET (METHOD 1.5). ROLLED OUT WITH A ROLLING PIN UPWARDS AND DOWNWARDS FROM CENTRE. TOP-DOWN X-RAY VIEW. WHITE OBJECT IN BOTTOM RIGHT CORNER IS A METAL MEASURING BALL. PHOTO BY INA BERG.

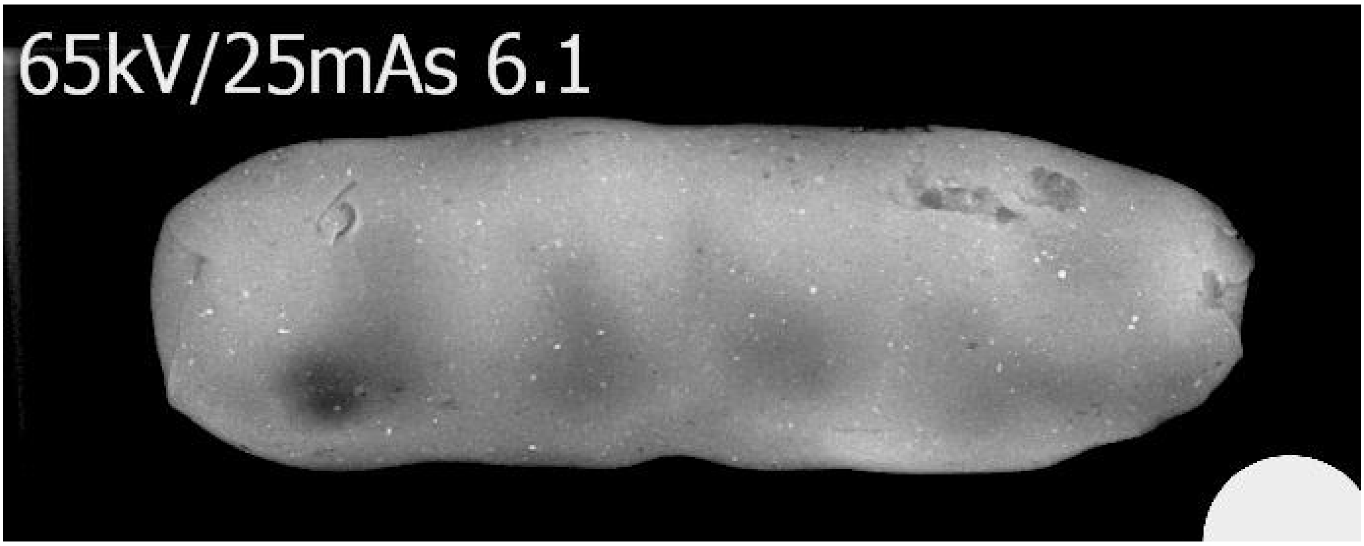

FIG 13. SIMPLE TABLET (METHOD 1.4). MADE BY MANUALLY FORMING A CLAY COIL AND THEN PRESSING THIS DOWN WITH THE PALM OF ONE'S HAND INTO A FLAT TABLET SHAPE. TOP-DOWN X-RAY VIEW. WHITE OBJECT IN BOTTOM RIGHT CORNER IS A METAL MEASURING BALL. PHOTO BY INA BERG.

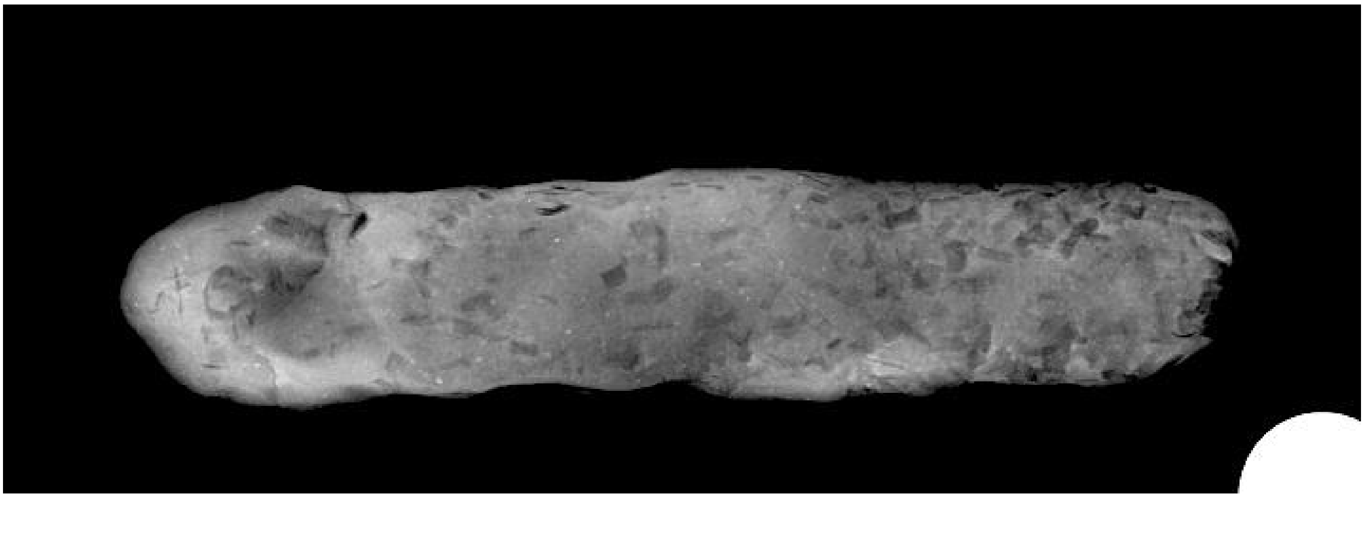

FIG 14. SIMPLE TABLET (METHOD 1.4). CLAY WITH THE STRAW TEMPER. MADE BY MANUALLY FORMING A CLAY COIL AND THEN PRESSING THIS DOWN WITH THE PALM OF ONE'S HAND INTO A FLAT TABLET SHAPE. TOP-DOWN X-RAY VIEW. WHITE OBJECT IN BOTTOM RIGHT CORNER IS A METAL MEASURING BALL. PHOTO BY INA BERG.

FIG 15. SIMPLE TABLET (METHOD 1.4). CLAY WITH THE STRAW TEMPER. MADE BY MANUALLY FORMING A CLAY COIL AND THEN PRESSING THIS DOWN WITH THE PALM OF ONE'S HAND INTO A FLAT TABLET SHAPE. SIDE X-RAY VIEW. PHOTO BY INA BERG.

FIG 16. FOLDED TABLET (METHOD 2.4). CLAY WITH THE STRAW TEMPER. TOP-DOWN X-RAY VIEW. PHOTO BY INA BERG.

FIG 17. FOLDED TABLET (METHOD 2.4). CLAY WITH THE STRAW TEMPER. SIDE X-RAY VIEW. PHOTO BY INA BERG.

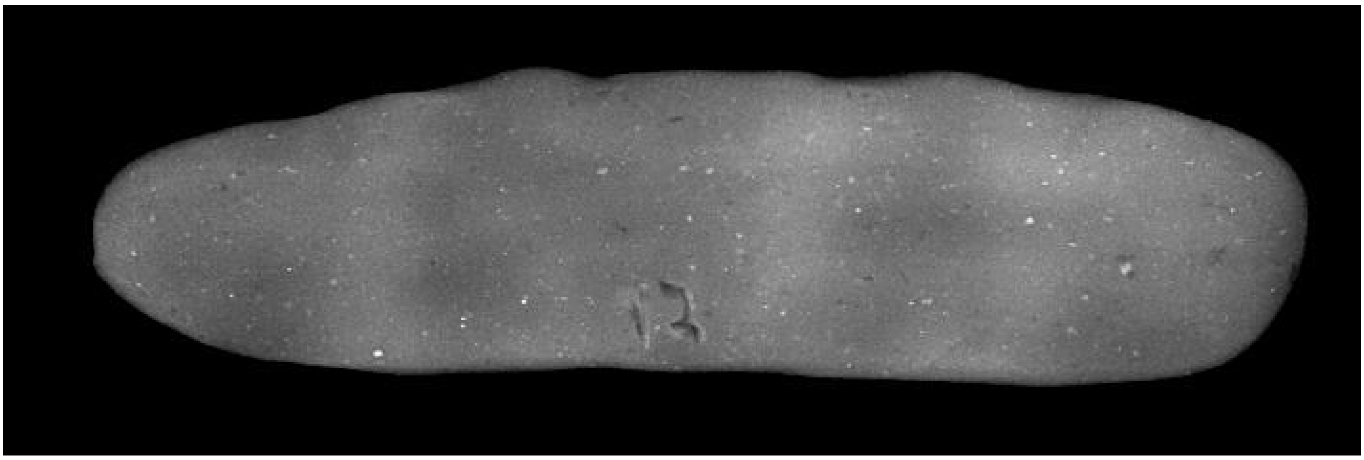

FIG 18. SIMPLE TABLET THAT HAD BEEN INSCRIBED WITH LETTERS OF THE ALPHABET WHILE WET (SEE FIGURE 5). THE LETTERS WERE THEN ERASED BY RUBBING A WET SPOON OVER THE INCISED LETTERS 12 HOURS LATER. TOP-DOWN X-RAY VIEW. PHOTO BY INA BERG.

FIG 19. SIMPLE TABLET 14 THAT HAD BEEN INSCRIBED WITH LETTERS OF THE ALPHABET WHILE WET. THE LETTERS WERE THEN ERASED BY ADDING A THIN LAYER OF WET CLAY TO THE SURFACE 36 HOURS AFTER THE ORIGINAL INCISION. PHOTO BY INA BERG.

FIG 20. TOP-DOWN X-RAY VIEW OF SIMPLE TABLET 14 WITH INSCRIBED LETTERS VISIBLE DESPITE THEIR OSTENSIBLE OBLITERATION. PHOTO BY INA BERG.

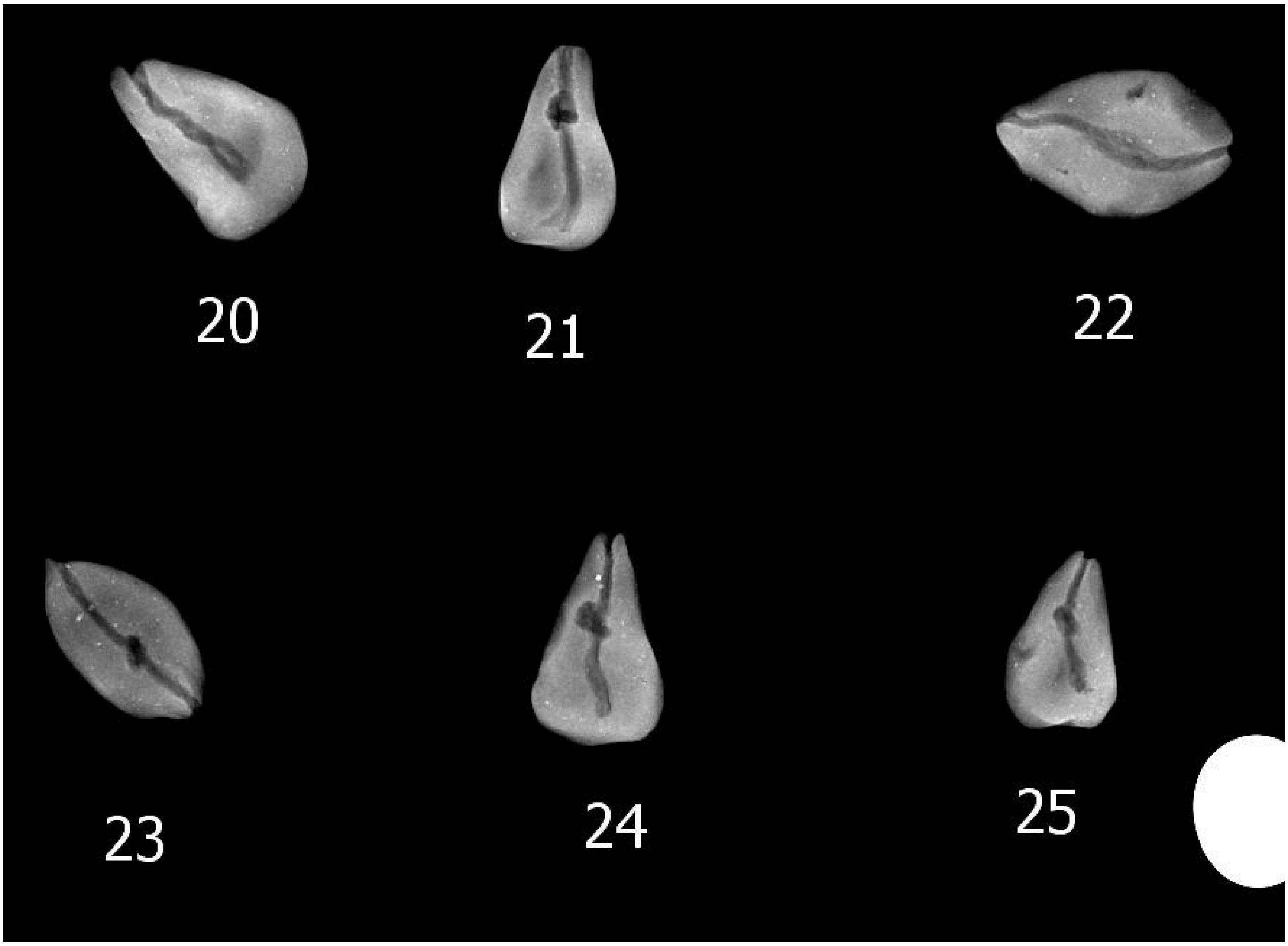

FIG 21. HANGING NODULES: TOP ROW (LEFT TO RIGHT): NODULE WITH TWO TWISTED ENDS OF A SINGLE STRING – NODULE WITH TWO ENDS KNOTTED (SINGLE) OF A SINGLE STRING – NODULE WITH TWO ENDS OF A SINGLE STRING. BOTTOM ROW (LEFT TO RIGHT): NODULE WITH SINGLE KNOTTED STRING – NODULE WITH DOUBLE KNOTTED END OF A SINGLE STRING – NODULE WITH SINGLE KNOTTED END OF A SINGLE STRING. TOP-DOWN X-RAY VIEWS. WHITE OBJECT IN BOTTOM RIGHT CORNER IS A METAL MEASURING BALL. PHOTO BY INA BERG.

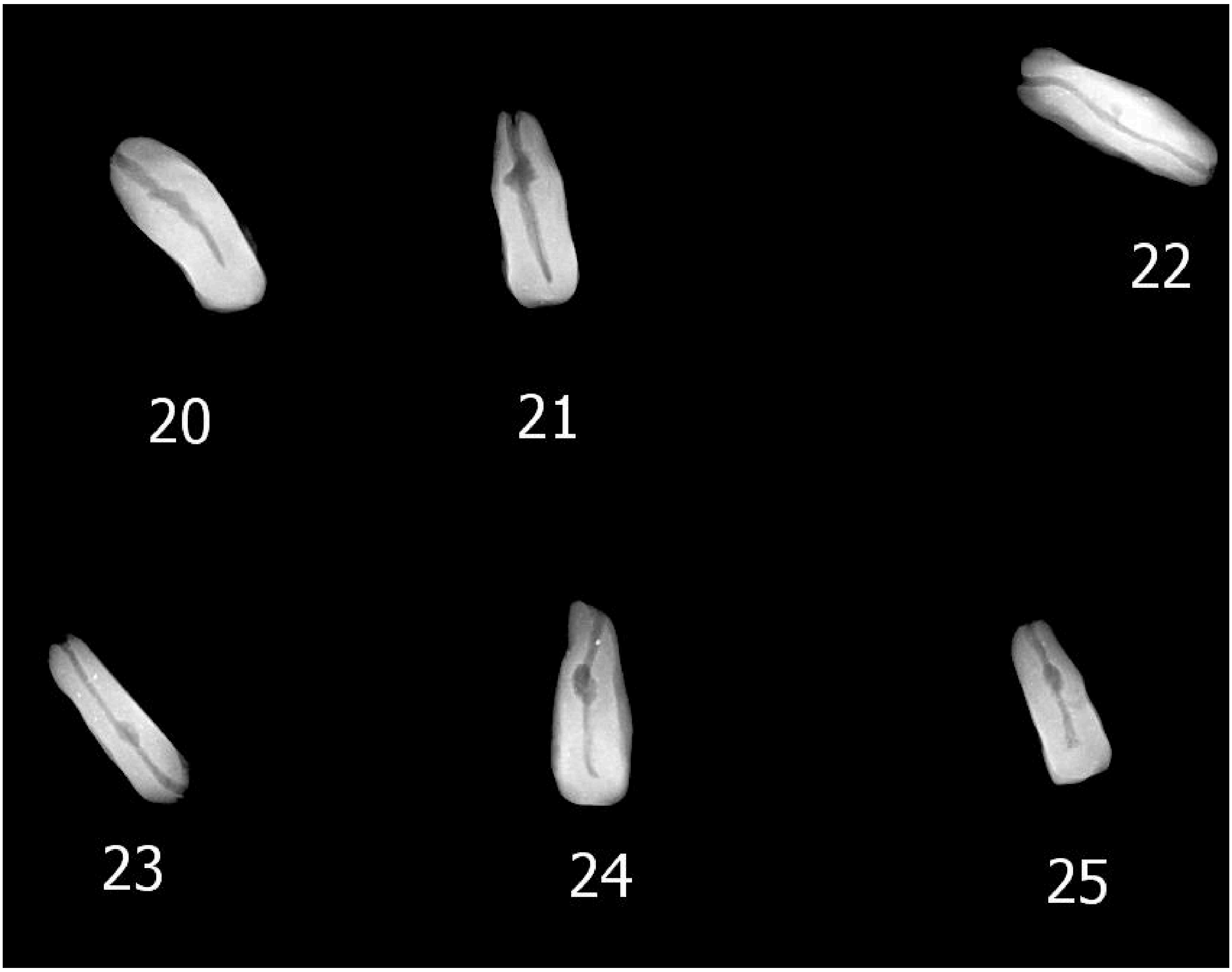

FIG 22. HANGING NODULES: TOP ROW (LEFT TO RIGHT): NODULE WITH TWO TWISTED ENDS OF A SINGLE STRING – NODULE WITH TWO ENDS KNOTTED (SINGLE) OF A SINGLE STRING – NODULE WITH TWO ENDS OF A SINGLE STRING. BOTTOM ROW (LEFT TO RIGHT): NODULE WITH SINGLE KNOTTED STRING – NODULE WITH DOUBLE KNOTTED END OF A SINGLE STRING – NODULE WITH SINGLE KNOTTED END OF A SINGLE STRING. SIDE X-RAY VIEWS. PHOTO BY INA BERG.