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## A Violent End.

# An Attack with Clay Sling Projectiles against the Late Bronze Age Fortification in Sântana, South-Western Romania

### Introductory remarks

While taking part in Frankfurt am Main at the first conference organized through the LOEWE project “Prähistorische Konfliktforschung” with a presentation focusing on the Bronze Age fortifications in Western Romania,<sup>1</sup> one of the authors of the present article was asked for details on the discovery of clay sling projectiles in Sântana “Cetatea Veche” (“The Old Fortress”). The discussion opened on that occasion convinced us that insufficient attention had been paid to these weapons and to the context in which they were found.

The presence of some clay sling projectiles in the fortification of Sântana was only briefly mentioned in the preliminary report of the rescue excavations published in 2010. Except for several images of such items discovered during the excavations, the report only recorded that: “Several sling-projectiles, made of burnt clay, were found *in situ*, on the outside of the wall. That is clear and undisputable proof that a considerable portion of the wall was destroyed by a real *artillery fire*”<sup>2</sup>

Shortly afterwards, this piece of information was included in an article that debated the issue of warriors and war during the Late Bronze Age in Lower Mureş: “We found *in situ* that the clay wall and its timber structure, as well as the palisade, were destroyed by clay sling projectiles and that they were torched. One may assume that the area where the attack occurred covers approximately 400–500 m in the northern part of the third enclosure, where over time clay sling projectiles were found in impressive numbers and where, even today at the surface, one may notice chunks of clay

and burnt earth from the wall”.<sup>3</sup> We also presumed that: “The considerable number of these projectiles and the extremely violent attack on a large sector of the defense system of the third enclosure at Sântana make evident the presence of an expeditionary force rather significant in numbers and very well trained militarily. Clay sling projectiles were purposely burned at high temperatures for greater endurance and their weight was up to 600–700 g. Their launch was very precise, as proven by the discovery of approximately 80 pieces in the four meters investigated archaeologically within the fortification. The projectiles’ weight and the distance they needed to be safely shot by the attackers make us think of the possibility that catapults and not only simple leather slings, or other perishable materials, were used”<sup>4</sup>

Taking into consideration the topic of the present volume, we deemed it useful to publish these clay sling projectiles from Sântana in a positivist manner, as this is, in context, a new type of offensive weapon not encountered among the Bronze Age discoveries in the Carpathian Basin. Also, at the time we were making the above notes, the clay sling projectiles had not been yet restored, so that we must now make certain due corrections regarding their exact number and weight.

### Site and context of discovery

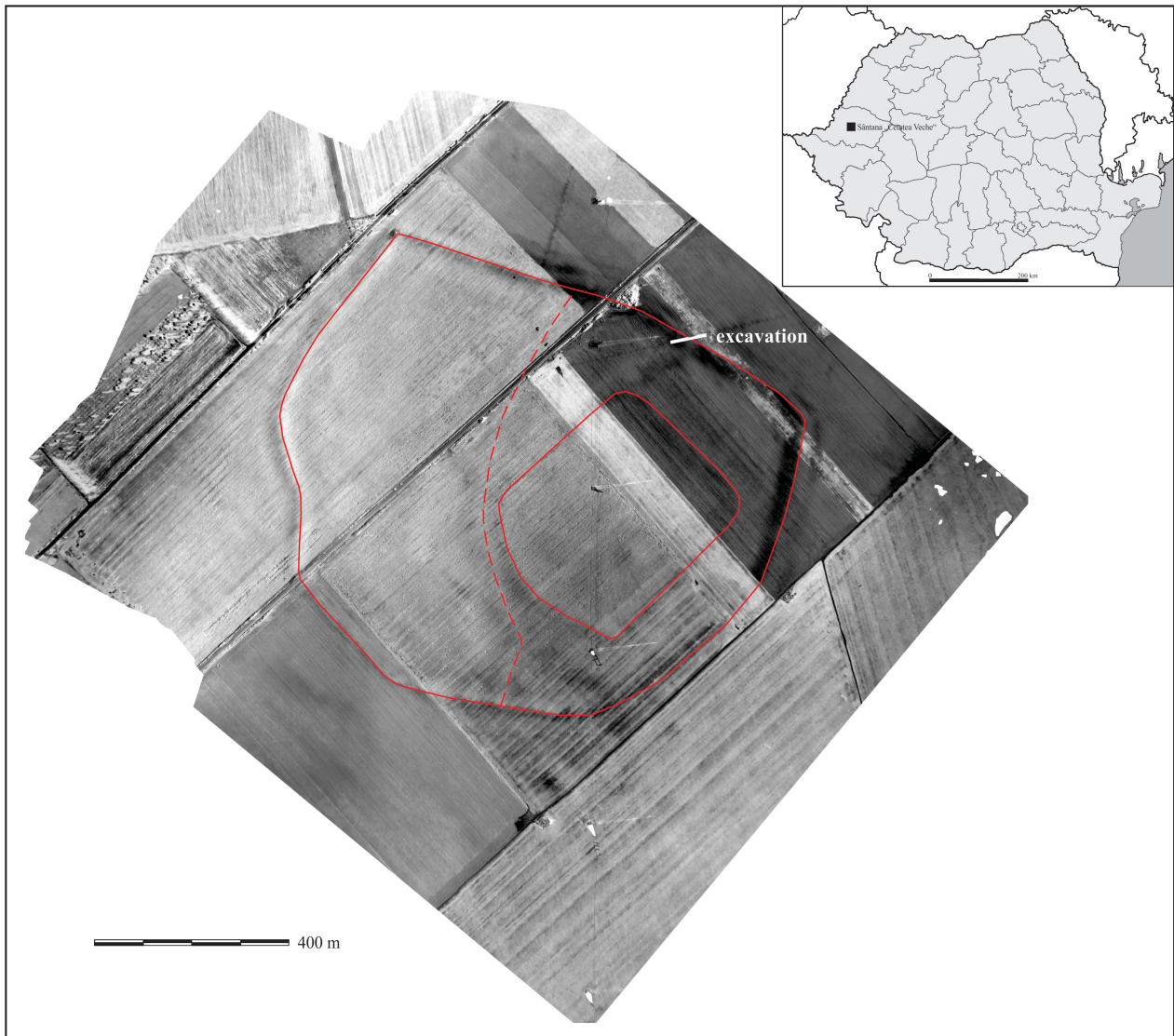
The large earth fortification of Sântana is located in the area of the Lower Mureş Basin, ca. 20 km north-east of the city of Arad (Fig. 1). It has been known for over 200 years, marked on the so-called Josephine topographic map as *Alte Schanz*. One can also collect a series of data interesting for the present article from the Romantic literature of

<sup>1</sup> Florin Gogâltan, *From ditches to ramparts: About the Bronze Age fortifications in western Romania*. F. Gogâltan thanks professors Rüdiger Krause and Svend Hansen for extending the invitation to participate in this conference.

<sup>2</sup> Gogâltan/Sava 2010, 33 Figs. 26. 28–30.

<sup>3</sup> Gogâltan/Sava 2012, 68.

<sup>4</sup> Gogâltan/Sava 2012, 68–69.



**Fig. 1** The Late Bronze Age fortification in Sântana “Cetatea Veche” (graphics by F. Gogâltan/V. Sava)

the nineteenth century.<sup>5</sup> Thus, when in 1876 J. Miletz presented a series of historical and archaeological monuments in the counties of Timiș and Arad, he also mentioned the discovery of “certain reddish slingshots made of burnt soil” around the earthen rampart in Sântana.<sup>6</sup> In the description of this fortification published by S. Márki in 1882, he noted the presence of burnt soil in the structure of the rampart, the thickness of which he set at 0.5–0.6 m.<sup>7</sup> Starting in the 1950s E. Dörner, the first professional archaeologist of the museum in Arad,<sup>8</sup> and other specialists visited the fortifi-

cation in Sântana repeatedly.<sup>9</sup> In 1958, E. Dörner and N. Kiss discovered clay sling projectiles at the train stop “Cetatea Veche”, located ca. 5 km away from Sântana. The items reached the collection of the museum in Arad, while three other clay sling projectiles ended up in the collection of General School No. 1 Sântana.<sup>10</sup> Though the fortification under discussion, just like the one in Cornești, had been attributed to the Avars, E. Dörner changed the dating of these sites radically when he published the gold hoard discovered there in 1888.<sup>11</sup>

The attribution of this fortification to the late period of the Bronze Age was confirmed through the 1963 archaeological excavations coordinated

<sup>5</sup> For a history of research see Gogâltan/Sava 2010, 14–27; Gogâltan *et al.* 2013, 23–25.

<sup>6</sup> Miletz 1876, 166–167.

<sup>7</sup> Márki 1882, 113.

<sup>8</sup> Bader 2015, 9–67.

<sup>9</sup> Gogâltan/Sava 2010, 20–21.

<sup>10</sup> Mureșan 2007, 120 footnote 5.

<sup>11</sup> Dörner 1960.

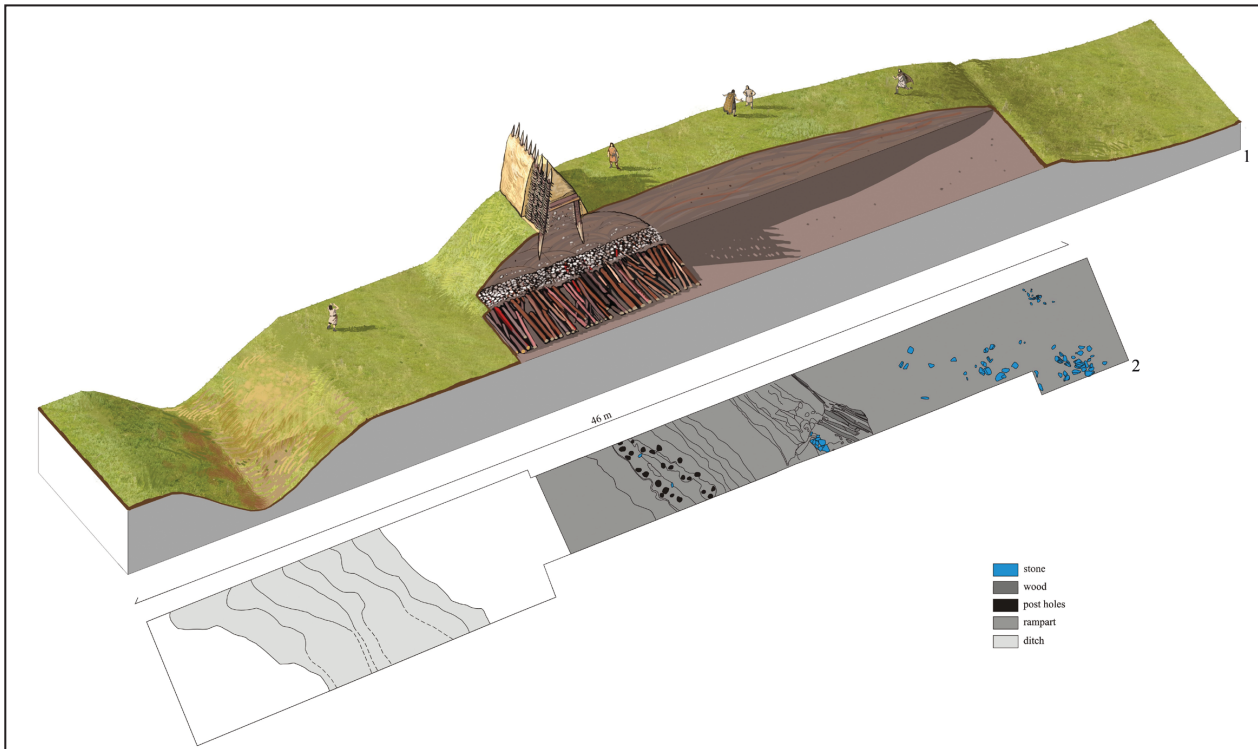


Fig. 2 Reconstruction of the fortification of the third precinct in Sântana “Cetatea Veche” (graphics by F. Gogâltan/V. Sava)

by M. Rusu, E. Dörner and I. Ordentlich. The investigation of the fortification system of what we call today the third precinct attested the presence of a V-shaped ditch measuring 3.5 m in width and more than 3 m in depth in the northern part of the fortification (in the same area as the former train stop “Cetatea Veche”). The soil excavated from the ditch or brought in from various other places was used in the erection of a rampart that displayed successive soil lenses of various colors. Vertical posts measuring up to 0.4–0.5 m in thickness and with a probable height of 6–8 m were placed in front of the rampart. A walkway protected by a wooden parapet probably existed as well on top of the rampart. The entire fortification was burnt at an unknown date and the ditch was filled in. Subsequently, the rampart was heightened and widened with the soil excavated from a ditch measuring 12 m in width and ca. 3 m in depth. After a shorter period of use, this fortification also met a violent end. The disastrous proportions of the fire are suggested by the 4 m wide and 0.3–0.8 m thick layer of burnt soil around the postholes of the palisade.<sup>12</sup> One clay sphere was also published, lacking further information.<sup>13</sup>

Subsequent discoveries came to complete the picture of the violent end of the third precinct in Sântana. It seems that in 1976 certain agricultural works in the area where the first archaeological research had been performed have disturbed a kiln (?) that presumably contained ca. 200 clay projectiles.<sup>14</sup> Naturally, the interpretation of the context must be regarded with due caution, as it was made by a tractor driver, but one must keep in mind the presence, yet again, of a large number of clay sling projectiles on the crest of the burnt rampart in Sântana, in the area of the rail track that crosses the northern side of the site (Fig. 1). Even more spheres, considered to be sling projectiles, were found in 1980 during the excavation of a canal that crossed the fortification, though no further data is available.<sup>15</sup> The clay sling projectiles discovered in 1958 by E. Dörner and N. Kiss were described 50 years later, but they were not illustrated. The items measured between 6.3 and 8.3 cm in diameter and between 200 and 500 g in weight,<sup>16</sup> thus matching the typological and technological parameters of the artifacts discussed below.

<sup>12</sup> Rusu *et al.* 1996, 16; Rusu *et al.* 1999, 144.

<sup>13</sup> Rusu *et al.* 1996 Pl. VI,8; Rusu *et al.* 1999 Figs. 7–8.

<sup>14</sup> Mureşan 2007, 120 footnote 7. 121.

<sup>15</sup> Mureşan 2007, 120 footnote 8.

<sup>16</sup> Mureşan 2007, 120–121.



Fig. 3 Sântana "Cetatea Veche". The crest of the rampart (photo by F. Gogâltan/V. Sava)



Fig. 4 Sântana "Cetatea Veche". The structure of the rampart (photo by F. Gogâltan/V. Sava)



Fig. 5 Sântana “Cetatea Veche”. Clay sling projectiles *in situ* (photo by F. Gogâltan/V. Sava)

In the spring of 2009, a gas pipe disturbed again the area of the third precinct in Sântana. The rescue excavations started in the autumn of 2009 focused on the same area as where the 1963 research had been performed and where the majority of the clay sling projectiles mentioned above were discovered. Besides, our section has intersected the older excavation. The results of our excavations in Sântana were published on several occasions,<sup>17</sup> so here we shall just present several data on the fortification and on the context in which the clay sling missiles were discovered. We note again that the excavations were not completed due to the exhaustion of available funds. Even if the archaeological sterile soil was reached in certain areas, the suggested reconstruction reflects the current knowledge on the last stage of use of the third precinct’s fortification (Fig. 2).<sup>18</sup>

Section S1/2009 initially measured 80 × 4 m and was subsequently extended both in front and

behind the earth rampart by 2.5 m. Thus, the investigated area measured 6.5 m in width only in this part of the section. As we were able to observe, the fortification in Sântana is much more complex than indicated by the previous research. The third precinct was fortified during its last stage of use through a defense ditch and an earth rampart, which supported a very complex palisade on the crest. We noted the fact that in the investigated area the maximum width of the defense ditch was 10.2 m and its depth was 2.86 m. The ditch had been dug into a V-shape, with the outer side more flattened than the inner side. In the filling of the ditch we identified pottery fragments, animal bones, and also several human bones that belonged to a male between 20 and 30 years in age. One fragment of the individual’s skull displays two marks suggesting intentional blows, which probably caused his death.<sup>19</sup> Three clay sling projectiles (cat. nos. 15–17) were also discovered besides the aforementioned artifacts and human bones.

An impressive rampart was erected ca. 5.5 m behind the defense ditch. It was built out of soil,

<sup>17</sup> Gogâltan/Sava 2010; Gogâltan/Sava 2012; Gogâltan *et al.* 2013; Sava *et al.* 2014.

<sup>18</sup> Reconstruction by Radu Olteanu, Victor Sava, and Florin Gogâltan (Olteanu 2016, 9).

<sup>19</sup> Gogâltan/Sava 2012, 70 footnote 92. Fig. 10.

wood and stone and still has a width of 26.82 m and a height of 2.44 m. The rampart is ingeniously made, built in two successive stages. The core was erected on a base made of wood and covered by rocks of various sizes. Everything was then covered with soil, into the shape of a dam, measuring 14 m at the base and 10.4 m at the top. This construction was then extended to the width of 26.82 m by adding soil from behind the rampart. The 2009 excavation identified the fact that the soil inside the rampart had been compacted with wooden “mallets” and that the clay had been previously soaked in water in order to become harder and have better adherence.<sup>20</sup> In order to supplement the primary material required by the elevation of the rampart, besides the soil resulting from the excavation of the defense ditch, people had also excavated a larger area behind the rampart. Thus, another ditch was created behind the rampart, measuring ca. 33 m in width and 2 m in depth (Fig. 2).<sup>21</sup>

A wood and clay structure was built upon the rampart's crest. The entire construction is preserved in a strongly burnt state (Figs. 3-4). Besides the numerous pieces of adobe from the collapse of this wall, we also identified 29 clay projectiles (Fig. 5). A wall became apparent after the debris was removed; it measured 1.26 m in width and 0.4 m in preserved elevation. In the 4 m wide section researched by us, its structure included 24 postholes placed in two rows, with diameters between 0.14 m and 0.26 m. We also noted that the wall's outer side had been covered with clay several times (Fig. 4). One should note that the new measurements indicate the fact that this precinct (the most extensive one of the fortification) covers an area of 81.2 ha (Fig. 1).

### Catalogue of the clay sling projectiles

1. Clay sling projectile (Fig. 6,1) discovered in section S I, square 58-60 B (in the debris of the wall). The item is spherical in shape, made

<sup>20</sup> We reached this observation by carefully excavating each clay lens. We have noticed that both the thicker and the thinner lenses peeled off in successive layers like onion skins, with thin limestone layers attested between them.

<sup>21</sup> The same situation was also noted in the manner of construction of the first precinct's fortification in Cornești.

- of material tempered with organic fibers, with oxidation firing and light red in color (10R-6/8). The surface displays asperities and small pores. The upper part is covered with a calcareous crust. The impressions of some organic material (possibly straw) can be noted on one of the projectile's sides. – Maximum diameter: 7.4 cm; weight: 293 g.
2. Burnt clay projectile (Fig. 6,2) discovered in section S I, square 58-60 B (in the debris of the wall). The item is conical in shape, the material is tempered with organic matter and a bit of gravel, with oxidation firing and light red in color (10R-6/8). The surface displays certain asperities, small pores and narrow fissures. Several finger imprints are present on the body of the projectile. – Maximum diameter: 8.3 cm; height: 8.2 cm; weight: 462 g.
3. Burnt clay projectile (Fig. 6,3) discovered in section S I, square 60 (in the debris of the wall). Its initial shape was probably spherical; the material is tempered with some organic fibers and a bit of gravel, with oxidation firing and light red in color (10R-6/8). The surface displays asperities, small pores and several thin cracks. Part of the projectile is covered in a calcareous crust. Two pieces of the item have broken off, probably due to impact. – Maximum diameter: 7.6 cm; weight: 249 g.
4. Fragment of a burnt clay projectile (Fig. 6,4) discovered in section S I, square 58-60 (in the debris of the wall). Its original shape cannot be determined. The material was tempered with small organic residues; it went through oxidation firing and has a light red color (10R-6/8). The surface displays asperities. – Preserved length: 6.8 cm; preserved width: 5.5 cm; weight: 145 g.
5. Burnt clay projectile (Fig. 6,5) discovered in section S I, square 58 (in the debris of the wall). The item is approximately spherical and the material is tempered with some organic matter and a bit of sand, with oxidation firing over a substantial part of the body and reduction firing on one part. The predominant color is light red (10R-6/8), with a light gray color in the reduction part (10YR-7/1). The surface is burnished, with certain cracks visible. – Maximum diameter: 7.4 cm; weight: 303 g.
6. Burnt clay projectile (Fig. 6,6) discovered in section S I, square 58 (in the debris of the wall). The item is spherical in shape; the material is

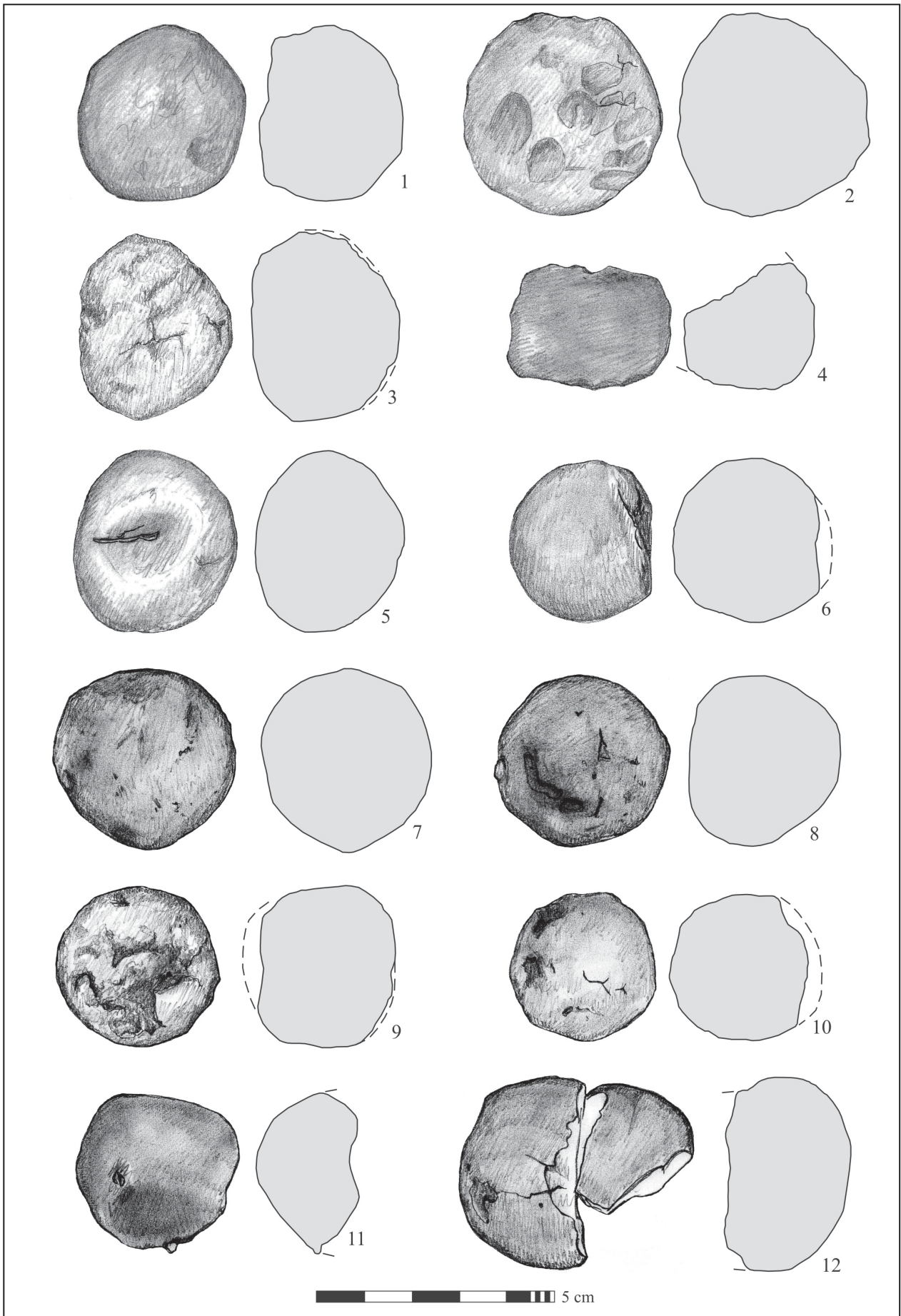


Fig. 6 Sântana "Cetatea Veche". Clay sling projectiles (drawings by F. Gogâltan/V. Sava)

- tempered with organic residues and large-grained sand, with oxidation firing and red in color (10R-5/8). One piece of the projectile is broken off, most probably during impact. The surface is burnished and some narrow cracks are visible. – Maximum diameter: 6.8 cm; weight: 251 g.
7. Burnt clay projectile (**Fig. 6,7**) discovered in section S I, square 58 (in the debris of the wall). The item is spherical; the material is tempered with organic fibers and sand, with oxidation firing and light red in color (10R-6/8). The surface is burnished, with certain pores visible. – Maximum diameter: 7.5 cm; weight: 349 g.
  8. Burnt clay projectile (**Fig. 6,8**) discovered in section S I, square 58 (in the debris of the wall). The item is spherical in shape, the material is tempered with organic fibers and bit of gravel, with oxidation firing and light red in color (10R-6/8). The surface is burnished, but pores and cracks are still visible. – Maximum diameter: 7.2 cm; weight: 282 g.
  9. Burnt clay projectile (**Fig. 6,9**) discovered in section S I, square 58 (in the debris of the wall). Its shape was probably spherical; the material is tempered with organic matter and a bit of gravel, with oxidation firing and light red in color (10R-6/8). The surface displays asperities, small pores and cracks. Two pieces have broken off, most probably due to impact. – Maximum diameter: 7.2 cm; weight: 234 g.
  10. Burnt clay projectile (**Fig. 6,10**) discovered in section S I, square 58 (in the debris of the wall). The item is spherical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface displays asperities, small pores, and cracks. One piece of the projectile is broken due to impact. Impressions of organic materials (possibly straws) are present on one of the projectile's sides. – Maximum diameter: 6.2 cm; weight: 165 g.
  11. Fragment of a burnt clay projectile (**Fig. 6,11**) discovered in section S I, square 58 (in the debris of the wall). The shape of the projectile cannot be determined. The material is tempered with organic matter and a bit of gravel, with oxidation firing on the outside and part of the inside, with a small part with reduction firing. The color of the item is light red (10R-6/8) and gray (10YR-5/1), respectively. The outer surface is well burnished. – Preserved length: 7 cm; preserved width: 6.5 cm; weight: 132 g.
  12. Burnt clay projectile (**Fig. 6,12**) discovered in section S I, square 58-60 (in the debris of the wall). The item is elliptical in shape and the material is tempered with organic matter and a bit of gravel, with oxidation firing and light red in color (10R-6/8). The surface is burnished, but one can still see pores and narrow cracks. Ca. 20% of the projectile is missing. The area of impact is visible on one of the sides. – Maximum diameter: 8 cm; weight: 335 g.
  13. Burnt clay projectile (**Fig. 7,13**) discovered in section S I, square 58-60 (in the debris of the wall). In shape, the item was most likely spherical; the material was tempered with organic matter and a bit of sand, with oxidation firing and light red in color (10R-6/8). The surface displays small asperities, pores and narrow cracks. One piece of the projectile has broken off, most likely due to impact. In the missing part impressions of some organic material (possibly straw) are noticeable. – Maximum diameter: 7.8 cm; weight: 292 g.
  14. Burnt clay projectile (**Fig. 7,14**), highly fragmented, discovered in section S I, square 58-60 (in the debris of the wall). The item was initially more than likely almost spherical in shape; the material was tempered with organic material and a bit of gravel. On the outside and part of the inside it displays oxidation firing, while the core had gone through reduction firing. The colors are light red (10R-6/8) and gray (10YR-5/1) respectively. The outer surface had been slightly burnished, although pores and narrow cracks are visible. – Presumed maximum diameter: 7.2 cm; weight: 229 g.
  15. Burnt clay projectile (**Fig. 7,15**) discovered in section S I, squares 78-68 (the defense ditch). The item is spherical in shape; the material is tempered with organic matter and sand, with oxidation firing; the initial color was probably light red (10R-6/8). The projectile went through secondary firing and is deformed; one side is strongly burnt, even vitrified. – Maximum diameter: 7.5 cm; weight: 299 g.
  16. Fragment of a burnt clay projectile (**Fig. 7,16**) discovered in section S I, squares 78-68 (the defense ditch). The item was probably spherical in shape; the material was tempered with organic matter, sand and gravel. The projectile went through secondary firing and dis-



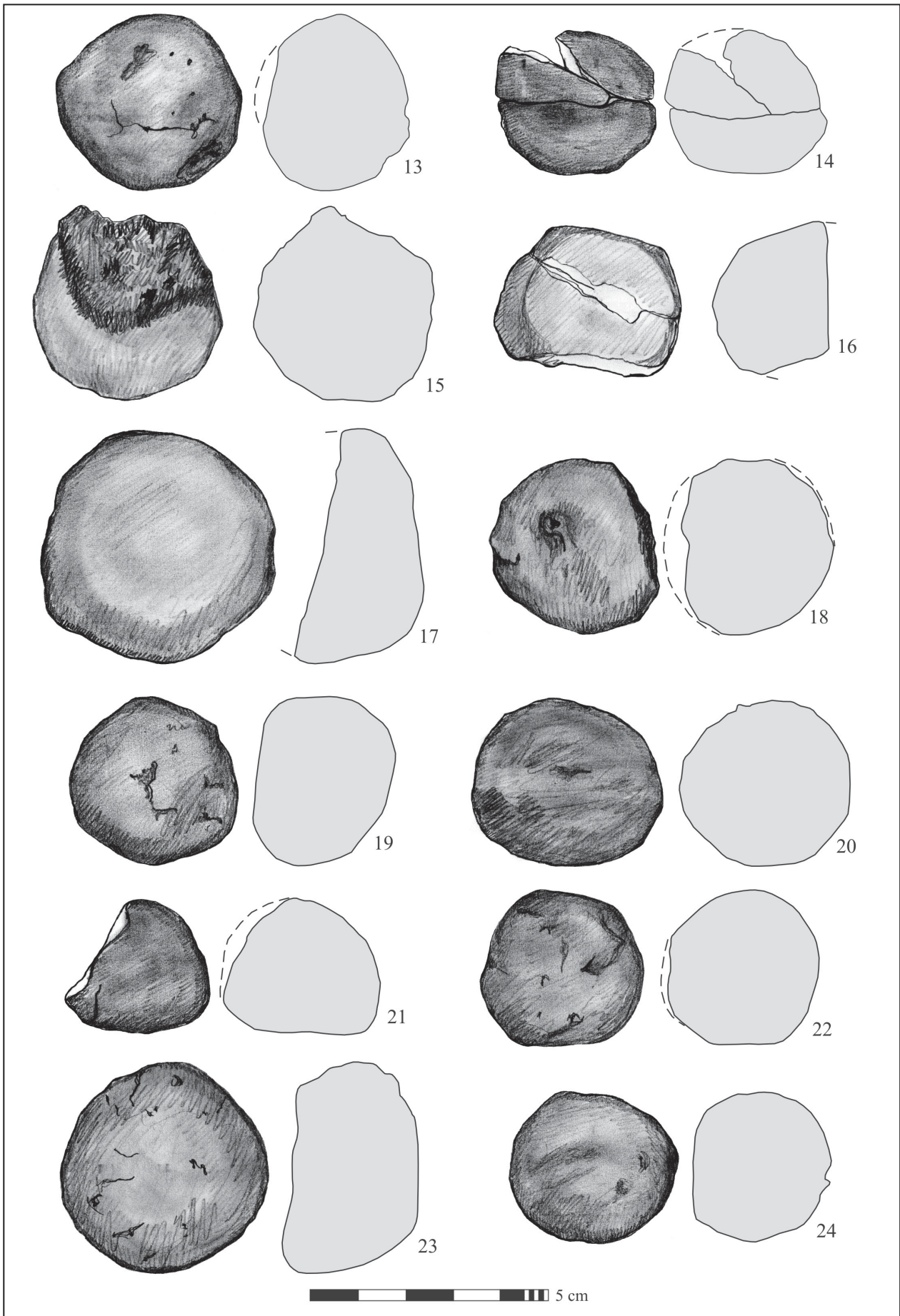


Fig. 7 Sântana "Cetatea Veche". Clay sling projectiles (drawings by F. Gogâltan/V. Sava)

- plays the following colors: reddish brown (5YR-5/4), dark reddish gray (5YR-4/2), and dark gray (5YR-4/1). – Presumed maximum diameter: 7.7 cm; weight: 221 g.
17. Fragment of a burnt clay projectile (**Fig. 7,17**) discovered in section S I, squares 78-68 (the defense ditch). The item was probably spherical in shape initially, the material was tempered with organic matter, sand and gravel, with oxidation firing; the outside is light red in color (10R-6/8) and the core is light gray (5YR-7/1). Half of the item is missing. The outside is slightly burnished. – Presumed maximum diameter: 9.6 cm; weight: 416 g.
  18. Burnt clay projectile (**Fig. 7,18**) discovered in section S I, squares 58-60 B (in the debris of the wall). The item was initially spherical in shape; the material was tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface displays asperities, small pores and narrow cracks. Two pieces of the projectile have broken off due to impact. – Maximum diameter: 7.3 cm; weight: 276 g.
  19. Burnt clay projectile (**Fig. 7,19**) discovered in section S I, squares 58-60 B (in the debris of the wall). The item is elliptical in shape; the material was tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface displays asperities and small pores. The area of impact is visible on one of the sides. – Maximum diameter: 7 cm; weight: 228 g.
  20. Burnt clay projectile (**Fig. 7,20**) discovered in section S I, squares 58-60 B (in the debris of the wall). The item is spherical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface displays asperities and small pores. Part of the item is covered with a calcareous crust. Faint traces of finger prints are visible on the item's body. – Maximum diameter: 7.9 cm; weight: 303 g.
  21. Burnt clay projectile (**Fig. 7,21**) discovered in section S I, squares 58-60 B (in the debris of the wall). The item is hemispherical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface displays asperities, small pores and thin cracks. A small part of the item is covered with calcareous crust. One piece of the projectile has broken off during impact. – Maximum diameter: 6.7 cm; weight: 177 g.
  22. Burnt clay projectile (**Fig. 7,22**) discovered in section S I, squares 58-60 B (in the debris of the wall). The item is spherical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface is burnished. The area of impact is visible on one of the sides. – Maximum diameter: 7 cm; weight: 280 g.
  23. Burnt clay projectile (**Fig. 7,23**) discovered in section S I, squares 58-60 (in the debris of the wall). The item is elliptical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface of the item displays asperities, small pores and thin cracks. – Maximum diameter: 8.9 cm; weight: 365 g.
  24. Burnt clay projectile (**Fig. 7,24**) discovered in section S I, squares 58-60 (in the debris of the wall). The item is spherical in shape; the material is tempered with sand, with oxidation firing and light red in color (10R-6/8). The surface of the item displays asperities; one part is covered with calcareous crust. – Maximum diameter: 6.9 cm; weight: 222 g.
  25. Burnt clay projectile (**Fig. 8,25**) discovered in section S I, squares 58-60 (in the debris of the wall). The item is hemispherical in shape; the material is tempered with sand and a bit of organic matter, with oxidation firing and light red in color (10R-6/8). The surface is burnished. One piece of the projectile has broken off. – Maximum diameter: 7.6 cm; weight: 279 g.
  26. Fragment of a burnt clay projectile (**Fig. 8,26**) discovered in section S I, square 56-58 (in the debris of the wall). The shape of the projectile cannot be determined. The material is tempered with organic matter and sand, with oxidation firing and light red color (10R-6/8). The outer surface is well burnished and displays small pores. – Preserved length: 7 cm; preserved width: 6.1 cm; weight: 89 g.
  27. Fragment of a burnt clay projectile (**Fig. 8,27**) discovered in section S I, square 56-58 (in the debris of the wall). The shape of the projectile cannot be determined. The material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The outer surface is burnished. – Preserved length: 7.1 cm; preserved width: 5 cm; weight: 96 g.

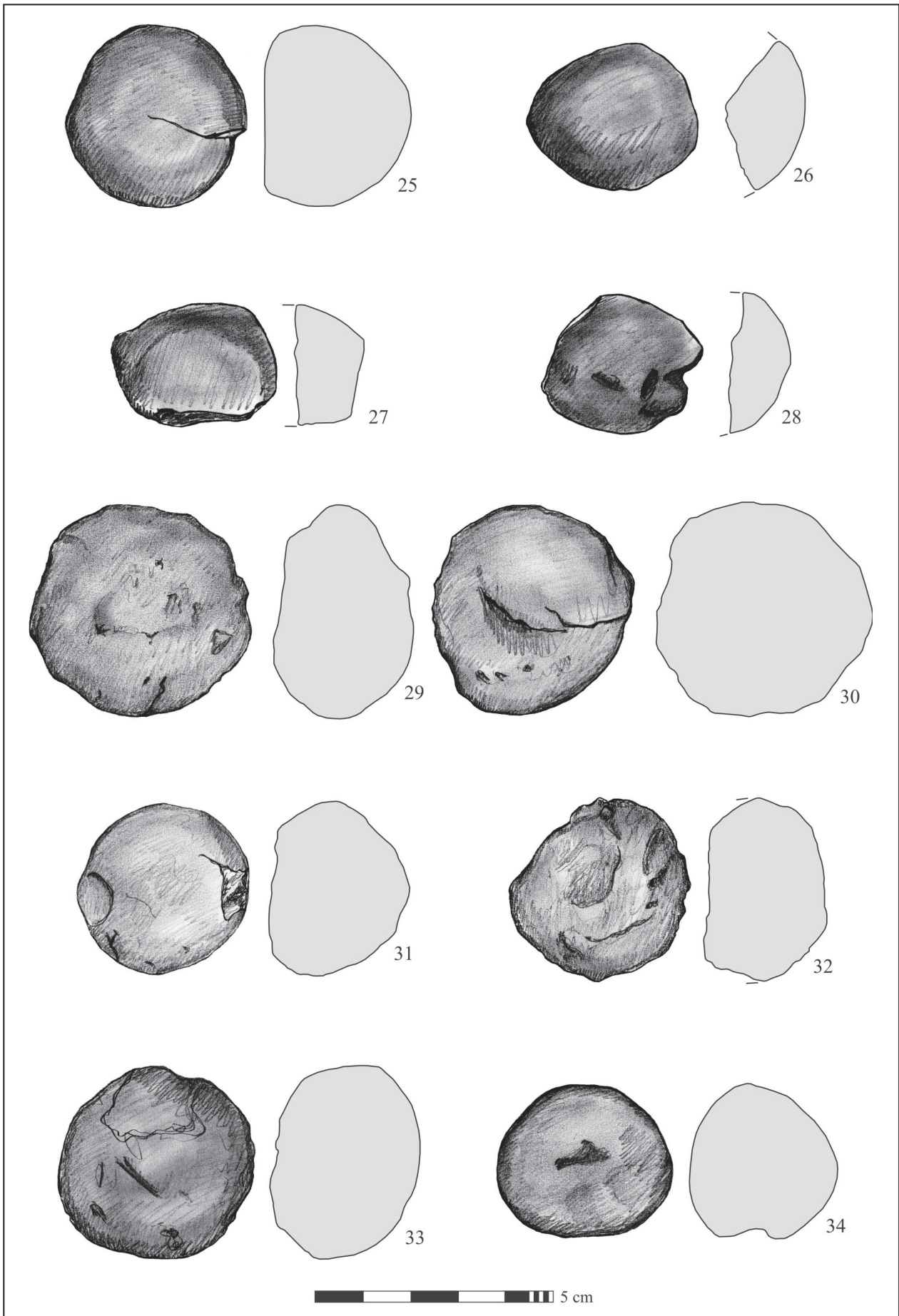


Fig. 8 Sântana "Cetatea Veche". Clay sling projectiles (drawings by F. Gogâltan/V. Sava)

28. Fragment of a burnt clay projectile (**Fig. 8,28**) discovered in section S I, squares 56-58 (in the debris of the wall). The shape of the projectile cannot be determined. The material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The outer surface is burnished. – Preserved length: 5.9 cm; preserved width: 5.8 cm; weight: 74 g.
29. Burnt clay projectile (**Fig. 8,29**) discovered in section S I, square 56-58 B (in the debris of the wall). The item is elliptical in shape; the material is tempered with organic matter and sand, with oxidation firing and light red in color (10R-6/8). The surface of the item displays asperities, small pores, and thin cracks. One small part of the item is covered with calcareous crust. – Maximum diameter: 9.1 cm; weight: 369 g.
30. Burnt clay projectile (**Fig. 8,30**) discovered in section S I, square 56-58 B (in the debris of the wall). The item is spherical in shape; the material is tempered with sand, with oxidation firing and a weak red in color (10R-5/3). The surface of the item displays asperities and small cracks. One small part of the item is covered with calcareous crust. – Maximum diameter: 8.3 cm; weight: 427 g.
31. Burnt clay projectile (**Fig. 8,31**) discovered in section S I, square 56-58 B (in the debris of the wall). The item is hemispherical in shape; the material tempered with organic matter, with oxidation firing and light red in color (10R-6/8). The surface is well burnished, displaying few pores and a few thin cracks. Impressions of some organic material (possibly straw) are present on one of the sides of the projectile. – Maximum diameter: 7.1 cm; weight: 271 g.
32. Fragment of a burnt clay projectile (**Fig. 8,32**) discovered in section S I, square 56-58 B (in the debris of the wall). Initially the item was hemispherical or elliptical in shape; the material tempered with organic matter and a bit of gravel, with oxidation firing and light red color (10R-6/8). The surface of the item displays asperities. – Maximum diameter: 7.8 cm; weight: 226 g.
33. Burnt clay projectile (**Fig. 8,33**) discovered on the crest of the rampart, south of the rail track, during field research on 18 November 2009. The item is elliptical in shape; the material tempered with sand, with oxidation firing and light red in color (10R-6/8). The surface

of the item is burnished. In certain areas the item is covered with calcareous crust. – Maximum diameter: 7.8 cm; weight: 341 g.

34. Burnt clay projectile (**Fig. 8,34**) discovered inside the fortification, south of the rail track, during field research on 18 November 2009. The item is spherical in shape; it contains a bit of organic matter, with oxidation firing, light red in color (10R-6/8). The surface of the item is burnished. A small part of the item is covered with calcareous crust. – Maximum diameter: 7.6 cm; weight: 248 g.

### Several typological and technological considerations of the clay projectiles

According to the shape, we have identified four basic types of projectiles: spherical, hemispherical, elliptical, and conical (**Fig. 9**). The selection of these shapes probably took into account the types of slings employed. As one can note from the graph below, the majority are spherical (**Fig. 10**). Hemispherical and elliptical ones are found in comparable proportions, but they are much less numerous than those in the first category. The hemispherical shape was intentionally made, as such items could be better positioned in flexible hand slings.

As for their manufacturing, the imprints of fingers preserved on some of the items (cat. nos. 2. 20; **Fig. 6,2. 7,20**) suggest the fact that each projectile was modeled by hand. We do not believe that moulds were used for mass production. It also seems that the quantity of clay required by each individual projectile was carefully measured. For this reason, most of the projectiles measure between 7 and 8 cm in diameter (**Fig. 11**) and weigh between 200 and 300 g (**Fig. 12**). Still, a consistent group includes larger items, measuring between 8 and 9 cm in diameter and between 300 and 400 g in weight (**Figs. 11–12**). The smallest projectile has a diameter of 6.7 cm and a weight of 177 g (cat. no. 21; **Fig. 7,21**), while the heaviest has a probable diameter of 9.6 cm and a weight of more than 800 g (cat. no. 17; **Fig. 7,17**).

From a technical perspective, we have noted the fact that the clay material from which the projectiles were modeled had been tempered with organic remains, adding sometimes gravels and/or sand. After an initial drying stage on a surface covered with straw or other vegetal remains, the projectiles were strongly fired in an oxidising atmosphere,

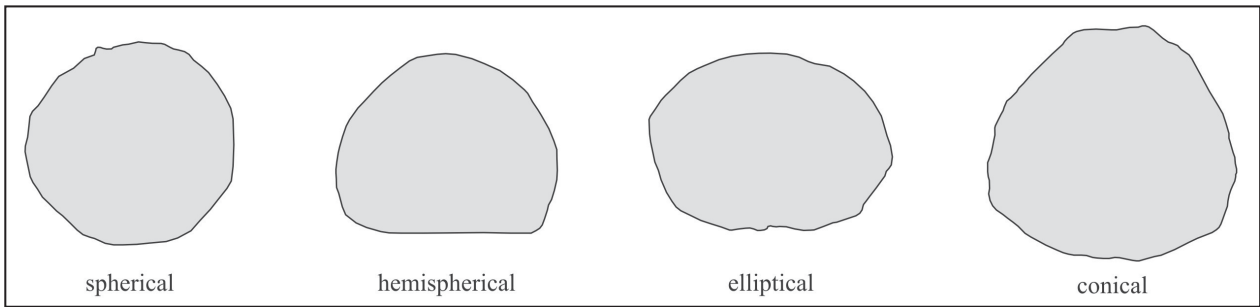


Fig. 9 Typology of clay sling projectiles in Sântana “Cetatea Veche” (drawing by F. Gogâltan/V. Sava)

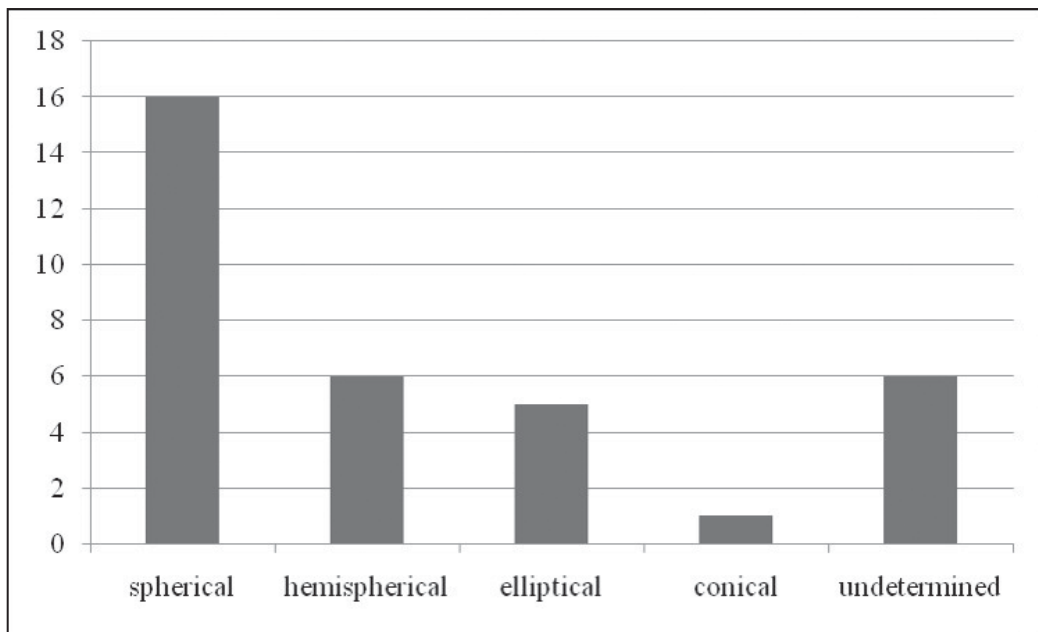


Fig. 10 Distribution of the projectiles according to their shape (graphics by F. Gogâltan/V. Sava)

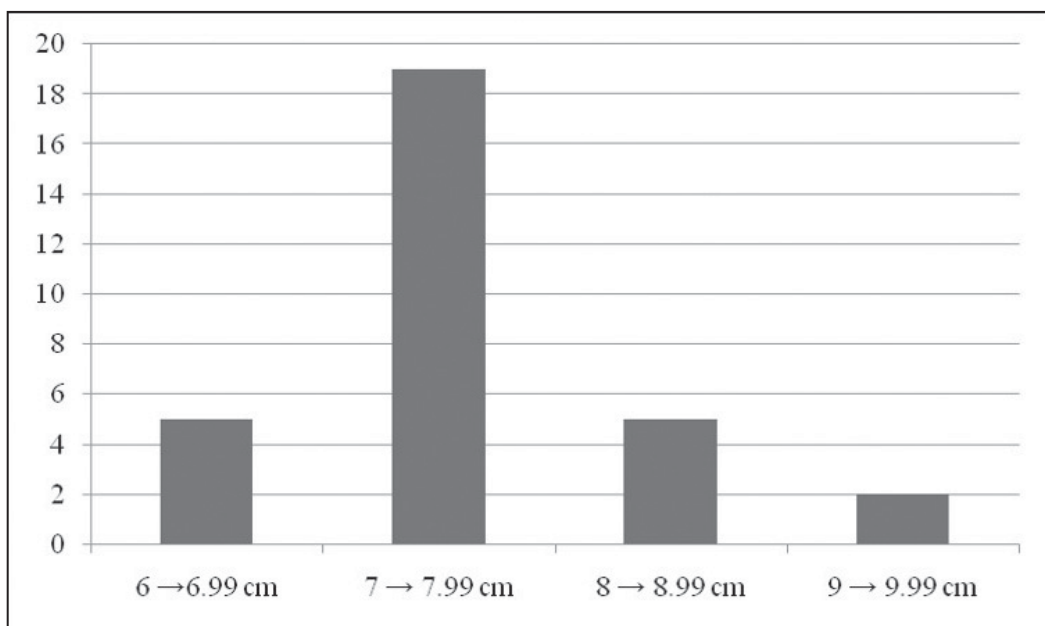


Fig. 11 Distribution of the projectiles according to their diameter (graphics by F. Gogâltan/V. Sava)

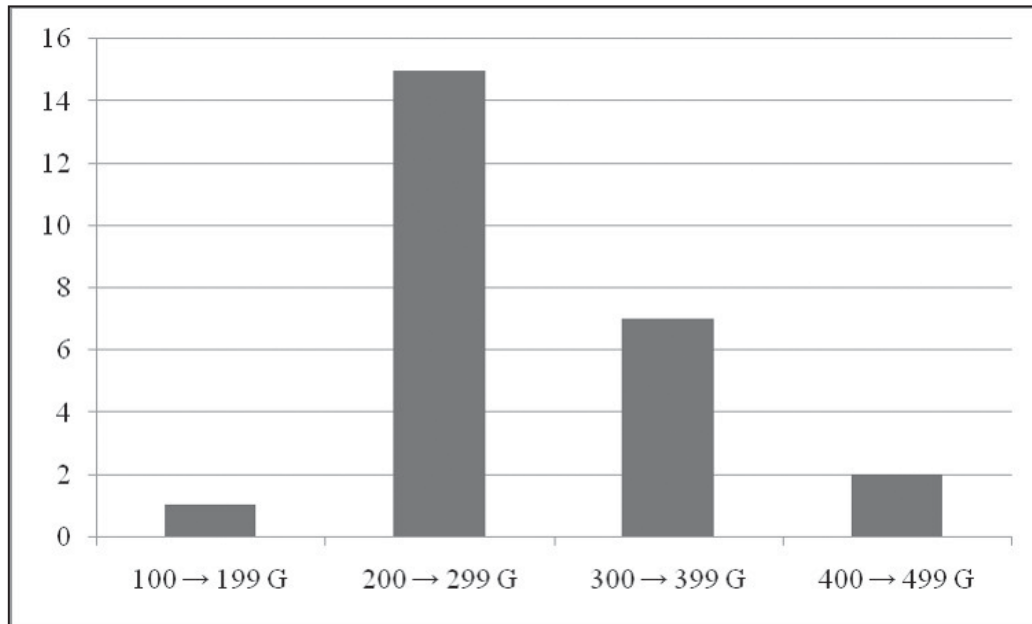


Fig. 12 Distribution of the projectiles according to their weight (graphics by F. Gogâltan/V. Sava)

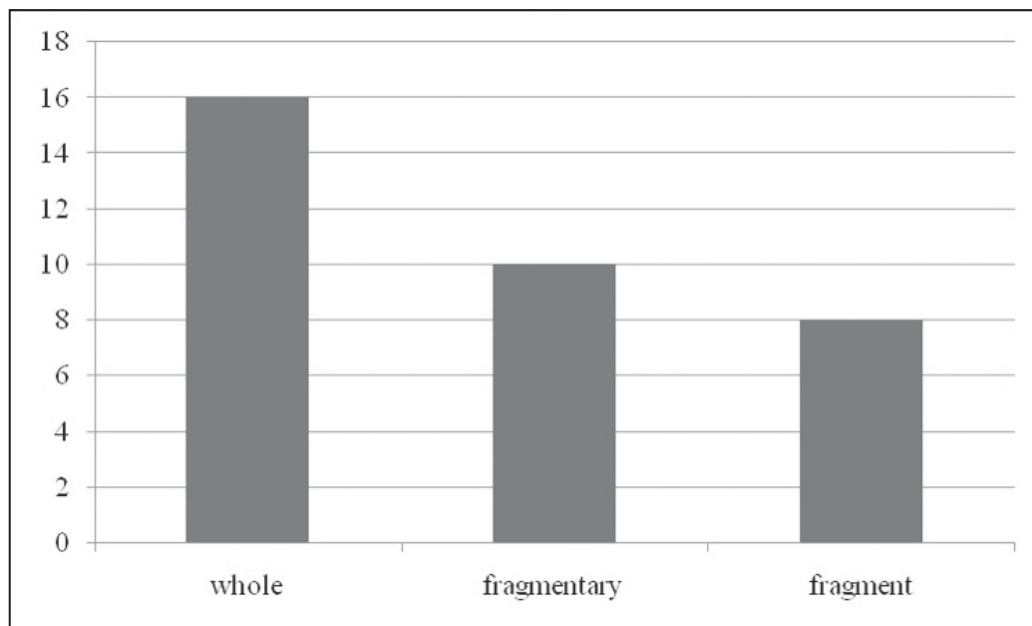


Fig. 13 Distribution of the projectiles according to their state of preservation (graphics by F. Gogâltan/V. Sava)

frequently obtaining a red color. At the same time, we have noted that the outer surface of some of the items is well burnished and that their makers took great care to render them as aerodynamically as possible. In other cases, the surface displays pores, asperities, and cracks created during firing.

Taking into consideration the fact that the projectiles were used in a conflict, the proportion between fragmentary and whole items is in favor

of the first (Fig. 13). Whereas some of the clay sling projectiles broke upon hitting the clay wall, others only display slight damages. Also, some of the projectiles display traces of secondary burning. It is difficult to say whether they were heated beforehand in order to have a more devastating effect, or whether the traces of secondary burning are due to the strong fire that followed the attack and which engulfed the items under discussion as well.

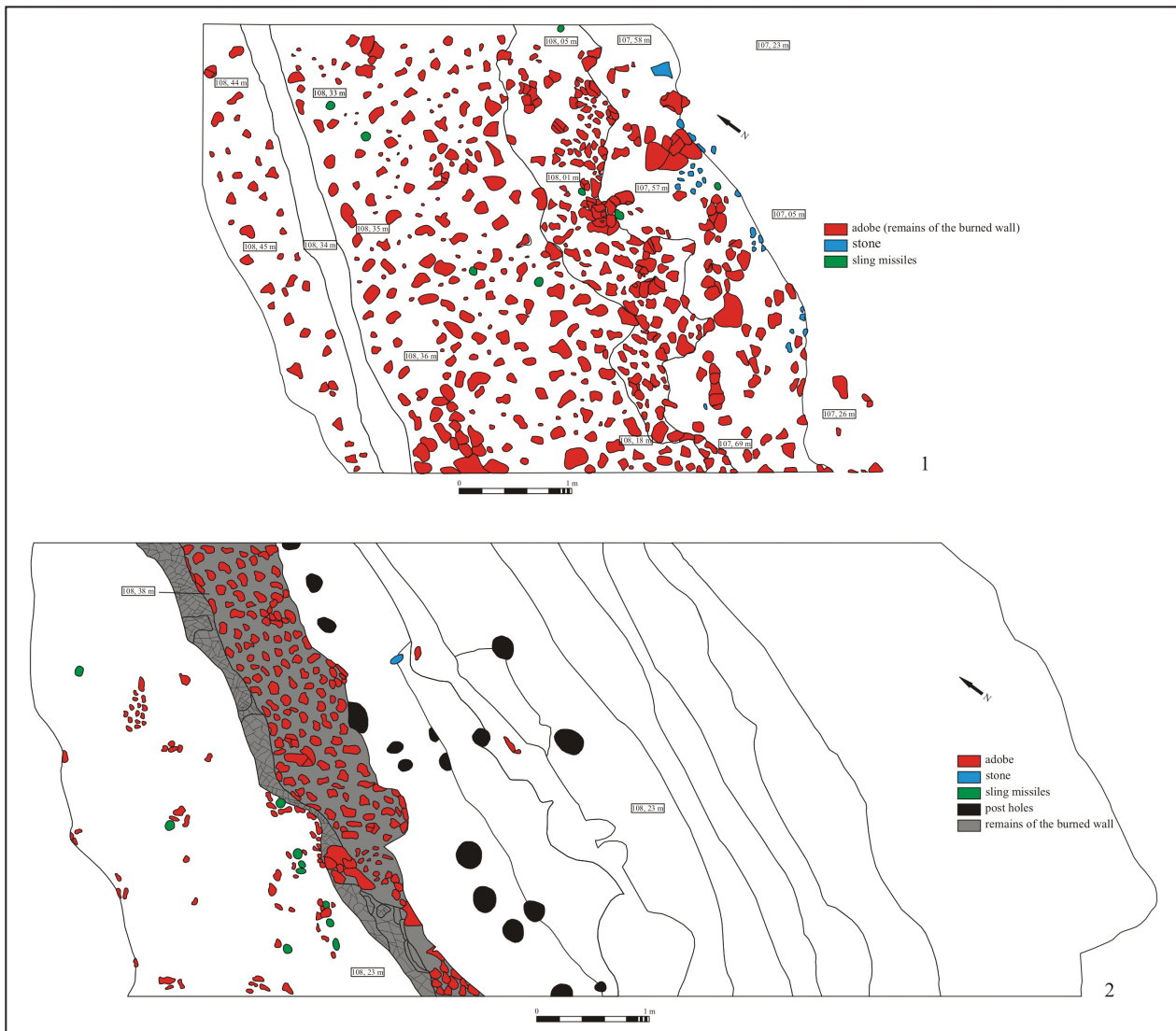


Fig. 14 Sântana "Cetatea Veche". 1-2 The crest of the rampart (plan by F. Gogâltan/V. Sava)

## Several conclusions

Out of the 34 clay sling projectiles published on this occasion, 29 were discovered in the debris of the wall located along the crest of the rampart (Fig. 3-5; 14,1-2). Three other projectiles were identified in the defense ditch and during field walking surveys. Yet another item was found inside the precinct, at a small distance behind the fortification system and another on the top of the hill, south of the rail track that crosses the fortification.

The "standard" projectile seems to have been spherical in shape, with a diameter between 7 and 8 cm and a weight between 200 and 300 g (Fig. 11-12). They could be hurled with the same type of sling by slingers trained to throw such weights. But, as previously indicated, there are also projectiles weighing more than 800 g (half of such a projectile weighs

416 g, Fig. 7,17), and this type required a different kind of sling and a different kind of training for the slingers. A projectile weighing 462 g is the only conical-shaped item in the collection (cat. no. 2, Fig. 6,2). Two types of slings were certainly in use in the Greek and Roman worlds, possibly earlier:<sup>22</sup> the flexible hand sling (*fulda* in Latin) and the staff sling (*fustibalus* in Latin). The first type was easier to use and more practical, while the latter allowed for the firing of heavier projectiles, being a popular siege weapon throughout the Middle Ages.<sup>23</sup>

<sup>22</sup> The first representation of a Bronze Age sling (ca. 1550 BC) is found on a silver rhyton from Mycenae Shaft Grave IV (Vermeule 1964 Pl. XIV). The depiction suggests a group of slingers and archers defending a fortification.

<sup>23</sup> Korfmann 1973, 37-38.

Spherical clay sling projectiles were found in a series of Early Neolithic tells in the Orient and Asia Minor, in countries such as Jordan, Turkey, Syria, Iran and Iraq.<sup>24</sup> Their functionality has been intensely debated. According to M. Korfmann, the sling was used in the Near East ever since the Mesolithic period as a hunting weapon, an opinion shared by other specialists. There are also other hypotheses according to which such clay balls were used as counting devices, in the process of food preparation, as raw material for the production of other clay artifacts, and also as weapons in various conflicts.<sup>25</sup> Clay sling projectiles are also well known from the Early Neolithic period in insular and continental Greece (Argissa, Dendra, Elateia, Sesklo, Soufli etc.), Albania and Thrace.<sup>26</sup> Contrary to the opinions mentioned above, according to C. Perlès the “sling bullets” in question had a practical use, as “shepherds’ implements”, used to gather animal herds.<sup>27</sup> They continued to be used in south-eastern Europe during the subsequent periods, relatively concentrated in Greek Thrace.<sup>28</sup>

In south-western Romania and south-eastern Hungary, the first clay sling projectiles appeared in the Early Neolithic (ca. 6000–5400 BC). The earliest item was discovered in the Starčevo-Criș-Körös settlement in Arad-Str. Voievod Moga.<sup>29</sup> Several burnt clay sling projectiles were also found in the Middle Neolithic (ca. 5400–5000 BC) settlements in Arad-Grădiște 2<sup>30</sup> and Battonya-Vidpart.<sup>31</sup> In Battonya-Vidpart, the author of the excavation mentions the fact that the clay balls with the diameter of 6–8 cm were discovered on the eastern side of dwelling no. 2. In Parța, sling projectiles are mentioned as frequent occurrences, discovered in various contexts (dwellings, sanctuary, and kilns).<sup>32</sup> More than 200 such items were found at this site, some with a diameter measuring up to 10.5 cm and a weight of 950 g.<sup>33</sup> They have been associated to the existence of conflicts

between the communities in the area.<sup>34</sup> In the Late Neolithic (ca. 5000–4500 BC) settlement in Hodoni-Picioroane no less than 225 such projectiles were found stacked in piles.<sup>35</sup> A burnt clay sling projectile found in Ghilad measured 5.5 cm in diameter and weighed 130 g.<sup>36</sup>

No clay sling projectiles are yet known for the Copper Age/Eneolithic period (ca. 4500–2800/2700 BC) in the Lower Mureș.<sup>37</sup> Likewise, such items are missing from the tells of the Early and Middle Bronze Age (ca. 2200–1600/1500 BC) in Semlac-Livada lui Onea,<sup>38</sup> Periam-Movila Șanțului/Sánczhalom/Schantzhügel,<sup>39</sup> Pecica-Șanțul Mare/Nagysánc,<sup>40</sup> Munar-Weingarten/Wolfsberg<sup>41</sup> or the non-fortified settlements of the Late Bronze Age (ca. 1600/1500–1000 BC) in Șagu-Sit A1\_1,<sup>42</sup> Felnac-Complexul Zootehnic,<sup>43</sup> Sânicolau Mare-Seliște<sup>44</sup> etc. No such finds were made at sites attributed to the First Iron Age (ca. 1000–450 BC) either.<sup>45</sup> The entire area was intensely investigated through surface investigations as well, and such searches have not led to the identification of clay sling projectiles either.<sup>46</sup> Thus, their absence during the Bronze Age cannot be attributed to the often invoked precarious state of research.

The great fortified settlements of the Late Bronze Age (ca. 1600/1500–1000 BC) in south-western Romania or south-eastern Hungary, like the one in Sântana, have benefited from archaeological investigations in the past as well.<sup>47</sup> There are currently several projects envisaging, in addition to Sântana, the sites in Cornești-Iarcuri,<sup>48</sup> Munar,<sup>49</sup>

<sup>24</sup> Korfmann 1972.

<sup>25</sup> Kubíková 2013, 14–16.

<sup>26</sup> Vutiropulos 1991, 14–30.

<sup>27</sup> Perlès 2001, 228–231.

<sup>28</sup> Vutiropulos 1991, 34–84; Ivanova 2008, 60–62.

<sup>29</sup> Lazarovici/Pădureanu 1981, 55 Fig. 8,7.

<sup>30</sup> Lazarovici/Pădureanu 1982, 16 Pl. IV B 4.

<sup>31</sup> Szénászkly 1979, 67.

<sup>32</sup> Lazarovici 1979, 87 Pl. XII, H/27–28; Lazarovici *et al.* 1985, 21; Lazarovici *et al.* 2001, 107. 126. 156. 159; Lazarovici/Lazarovici 2006, 232.

<sup>33</sup> Germann/Resch 1994, 98–99 Taf. 1.

<sup>34</sup> Lazarovici 2013, 67.

<sup>35</sup> Moga/Radu 1977, 231–233, Pl. II.

<sup>36</sup> Rogozea/Seculici 2014, 282 Pl. III,7.

<sup>37</sup> Sava 2015a; Sava 2015b.

<sup>38</sup> Gogâltan 2014.

<sup>39</sup> Soroceanu 1991; Gogâltan/Ignat 2014.

<sup>40</sup> Soroceanu 1991; O’Shea *et al.* 2011; Găvan/Ignat 2014 with older literature; Nicodemus/O’Shea 2015.

<sup>41</sup> Sava/Gogâltan 2014 with older literature; Gogâltan 2016.

<sup>42</sup> Sava *et al.* 2011.

<sup>43</sup> Sava 2016.

<sup>44</sup> Forțiu/Stavilă 2015.

<sup>45</sup> Gumă 1993; Sava/Pădureanu 2009; Sava 2011.

<sup>46</sup> Pădureanu 1985; Pădureanu 1988; Dorogostaisky/Ardelean 2014; Rogozea/Rogozea 2016.

<sup>47</sup> Banner 1939 (Orosháza-Nagyatársánc); Medeleț 1993; Micle *et al.* 2006 (Cornești).

<sup>48</sup> Szentmiklosi *et al.* 2011; Heeb *et al.* 2012; Heeb *et al.* 2014, 86 Abb. 19; Szentmiklosi *et al.* 2016.

<sup>49</sup> Sava/Gogâltan 2014; Gogâltan 2016, 90–95, Fig. 2-6.



Végegyháza-Zsibrik-domb (Kaszaper)<sup>50</sup> and Csanádpalota-Földvár.<sup>51</sup> In Cornești and Csanádpalota, archaeologists have also tested the systems of fortification or have performed intense surface research. None of the sites have revealed clay sling projectiles. The destruction of these fortifications was also violent, but they fell to different siege techniques.

The presence of these projectiles in an area without a tradition of using them is thus hard to explain. This type of offensive weapon is not characteristic to the European Bronze Age.<sup>52</sup> There is also insufficient evidence in the Levant with regard to their use as defensive weapons. Hence, A. A. Burke's conclusion that: "at no period in history are slingers known to have attempted to breach walls with their projectiles."<sup>53</sup> Clay sling projectiles seem to have been an "invention" of those who decided to besiege the fortification in Sântana. We are far from understanding all the implications of this attack; therefore, the project needs to continue. One is left with numerous questions and a single certainty: in the Lower Mureș a Late Bronze Age fortification ended violently after an attack with clay sling projectiles.

Starting in the spring of 2017, we recorded with the GPS all the clay sling projectiles in the areas where systematic surface research could be performed, in order to establish as exactly as possible the perimeter of the area under attack. The field research will be resumed when the agricultural work allows. We have thus avoided discussing now the size of the attack on the fortification in Sântana, despite the fact that we have made certain suppositions in the past.<sup>54</sup> There is also the need to analyze the firing temperatures of the clay sling projectiles and the torched clay wall, as well as the chemical compositions of the material from which they were made. Another remaining challenge is to establish the distance at which the various types of clay sling projectiles were fired and to reconstruct the manner of besieging.<sup>55</sup>

<sup>50</sup> Lichtenstein/Rózsa 2008, 45-46. 50. 54-55; Milo *et al.* 2009; Rózsa 2010, 6-8.

<sup>51</sup> Priskin *et al.* 2013; Szeverényi *et al.* 2014; Szeverényi *et al.* 2015.

<sup>52</sup> Drews 1993, 104-208; Osgood 1998; Harding 2007; Weinberger 2008.

<sup>53</sup> Burke 2004, 60.

<sup>54</sup> Gogâltan/Sava 2012, 68-69, Fig. 7.

<sup>55</sup> One can thus verify some of the suppositions formulated for the Roman Period, such as Völling 1990, 43 or Baatz 1990, 65.

If our initial estimations seemed inconceivable for the conflictual realities of the European Bronze Age, today the DFG project focused on the research on the battlefield in Tollensetal provides another perspective.<sup>56</sup> Even though one must temper the impulse of turning to analogies in the Homeric world and the Trojan War,<sup>57</sup> we cannot avoid thinking of the most famous prehistoric siege and the dramas taking place under the walls of Troy.<sup>58</sup> Only by resuming research in Sântana we hope to open yet another window, dark as it may be, to a past that we place in the end of the Bronze Era. The new siege technique involves specially trained fighters, a fighting strategy and a tactical organization worthy of a great military commander.<sup>59</sup> We believe that we are not wrong in stating that two armies of professionals faced each other in Sântana: one that built and defended a large-size complex fortification and the other that knew how to conquer it.

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- <sup>56</sup> Jantzen *et al.* 2014, with older literature; Terberger *et al.* 2014; Lidke *et al.* 2015; Jantzen/Terberger 2016.
- <sup>57</sup> Kienlin 2015.
- <sup>58</sup> Besides, those slingers from Locris also took part in the conflict (*Iliada* XIII, 712–719).
- <sup>59</sup> Wileman 2009, 35–43.

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**Florin Gogâltan and Victor Sava, A Violent End. An Attack with Clay Sling Projectiles against the Late Bronze Age Fortification in Sântana, South-Western Romania**

The large earth fortification of Sântana is located in the area of the Lower Mureş Basin, ca. 20 km north-east of the city of Arad. The attribution of this fortification to the late period of the Bronze Age was confirmed through the 1963 archaeological excavations coordinated by M. Rusu, E. Dörner and I. Ordentlich. In the spring of 2009, a gas pipeline disturbed the area of the third precinct in Sântana. Rescue excavations started in the autumn of 2009 and focused on the same area as where the 1963 research had been performed. The results of our excavations in Sântana were published on several occasions, so here we shall just present several data on the fortification and on the context in which the clay sling projectiles were discovered.

**Florin Gogâltan and Victor Sava, Ein gewaltsames Ende. Ein Angriff mit Schleudergeschossen aus Ton auf die spätbronzezeitliche Befestigung in Sântana, Südwestrumänien**

Die große Erdbefestigung von Sântana liegt im Gebiet des unteren Mureş-Beckens, ca. 20 km nordöstlich von Arad. Die Datierung der Befestigungsanlage in die späte Bronzezeit wurde durch die von M. Rusu, E. Dörner und I. Ordentlich geleiteten Ausgrabungen 1963 bestätigt. Im Frühjahr 2009 zerstörte eine Gas-Pipeline den dritten Ring der Befestigung in Sântana. Rettungsgrabungen begannen im Herbst 2009 und konzentrierten sich auf das gleiche Areal wie die Untersuchungen von 1963. Die Ergebnisse unserer Ausgrabungen in Sântana wurden mehrfach publiziert, so dass wir hier nur einige Daten zur Befestigung und zum Kontext, in dem die Schleudergeschosse aus Ton entdeckt wurden, vorstellen möchten.