In memoriam dr. István Bajusz (1954–2021)

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ROMAN ROTARY QUERNS FROM CĂLUGĂRENI / MIKHÁZA

László SZEKERNYÉS* – Szilamér-Péter PÁNCZÉL**

The present paper analyses the possible provenience, the morphological and technological aspects of the Roman rotary querns' lithic raw material discovered at the military site of Călugăreni / Mikháza located on the eastern limes of Roman Dacia. Even though the querns provide only a glance on aspects of Roman everyday life, the daily subsistence of the military and civilian population can be grasped through the process of grinding.

Keywords: rotary querns, legionary type, *limes*, andesite, Gurghiu Mountains
Cuvinte cheie: râșnița, tipul legionar, *limes*, andezit, Munții Gurghiu

The Roman military site of Călugăreni / Mikháza is located in the Transylvanian basin on the eastern limes of Roman Dacia at the foot of the Gurghiu / Görgény Mountains in the Niraj / Nyárád Valley. The Roman auxiliary fort of the *cohors I Augusta Itureorum* was surrounded by a military *vicus* (Fig. 1).[1] Since 2013 the archaeological excavations and field walking surveys have revealed a wide range of Roman artefacts, among them 30 rotary quern components.

In Europe the rotary quern was originally used by the Celtic communities. The earliest archaeological evidence concerning the use of this household implement are from the Iberian peninsula and are dated to the 5th century BC.[2] This tool (Fig. 2), apparently a banal object, was composed of two stone discs: the lower stationary bedstone (lat. *meta*) with a central axe made of wood or iron, and an upper rotating stone, the runner (lat. *catillus*) with a central hopper hole, an attached iron or wood crossbar called rind and a handle. The quern revolutionized the cereal grinding process, and the diet of Europeans changed considerably as a result.[3]

We don't know exactly when the Romans (Fig. 3) adopted this invention, but it is mentioned by Cato[4] as a widespread and indispensable tool, named *molas hispanensis.* Although Pliny the Elder mentioned it as a Volscus invention,[5] which could raise some questions related to its origins, the historically accepted opinion is that the Romans adapted it from the Celtic communities.

Virgil is the first author who described the use of the rotary querns.[6] The Romans optimized and improved it for roughly three hundred years, until the 2nd century AD, when it reached the rank of a veritable ancient "kitchen machine". Not accidentally was the rotary quern called also *molas versatiles* (multipurpose

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[1] For research history and recent results see: Pánczél–Bajusz 2021; Höpken et al. 2020.
[2] Alonso–Frankel 2017, 416.
[3] Grüll 2013, 29.
[4] Cato, *De agri cultura* 10.4.
[5] Plinius, *Nat. Hist.* 36.135.1.
[6] Vergilius, *Moretum*.

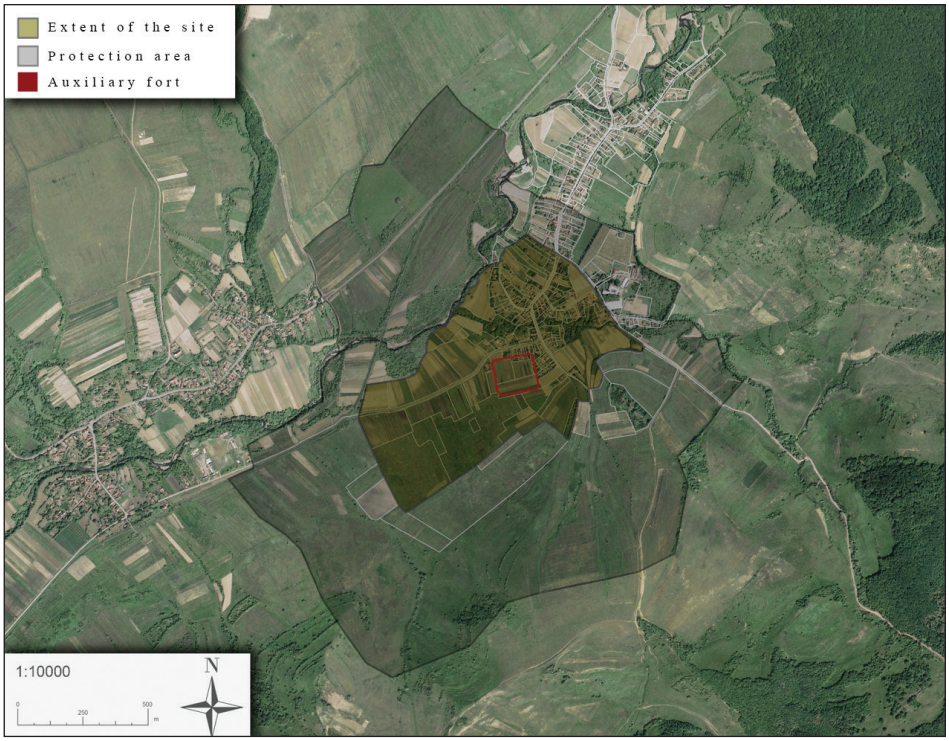

Fig. 1. The extent of the Roman military site of Călugăreni / Mikháza (Made by N. Laczkó and Sz. P. Pánczél).

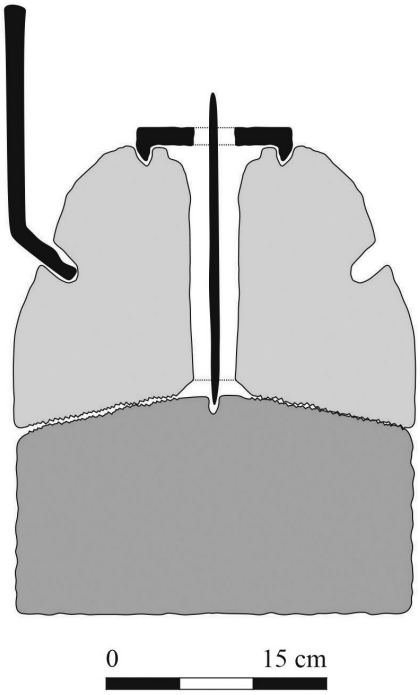

Fig. 2. Sketch of a Celtic quern (After Peacock 2013, 68, fig. 4.5/c).

quern) or *molas legionaria*.[7] The growing popularity of the rotary quern goes hand in hand with the expansion of the Roman Empire and the modernisation of the military due to the reforms of Marius. The army needed to organize the supply of the soldiers stationed permanently in the forts and their daily cohabitation with comrades in the *contubernia*.[8] This meant, that they needed to process, grind, bake or cook their grain supplement for themselves. On the other hand, they needed to maintain their mobility and march long distances with their weapons and equipment, including their stone querns.[9] These two issues led to the optimization of the rotary querns.

The Celtic rotary quern was used for grinding and/or dehusking cereals for everyday consumption. Their crop production and alimentation habits were based mostly on spelt, barley, rye, oats and millet due to the climate conditions.[10] These cereals are less adequate for

[7] Peacock 2013, 74.
[8] Goldsworthy 2004, 90.
[9] Jodry 2011, 87.
[10] Grüll 2013, 3–4.

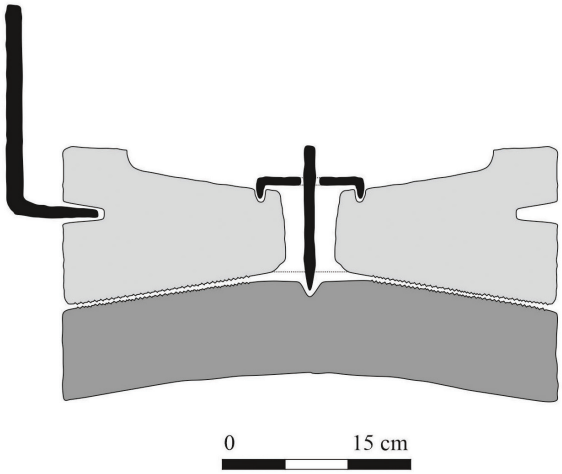

Fig. 3. Sketch of a standard Roman quern.

proofed bread baking because they are poor in gluten. For this reason, they processed the cereals for mainly porridge or soups. The technical characteristics and morphology of the Celtic querns were suitable for these aspects. The main attributes are a relatively heavy upper stone, smaller diameter, typical beehive, conical or cylindrical shape.[11] Relevant versions are the Dacian type appearing mainly in Transylvania, the puddingstone type characteristic mainly for Great Britain and the Iberian type, popular on the Iberian Peninsula.[12] The Celtic quern was ideal primarily to crush the cereals with only one milling sequence, in a short time.

The Roman improvements changed not only the shape, but also other aspects in order to adapt the quern for a specific diet. The standard Roman quern characteristics are a relatively flattened biconcave lighter upper stone, with the working surface designed primarily for cutting, not crushing, and a relatively large diameter.[13] This way, the Romans could grind the cereals for groats and for different coarse types of flour to make proofed bread and even quality bakery products.

The military site of Călugăreni has the advantage that we have a set of 30 quern fragments used by civilians and soldiers of the military unit alike. The querns are composed of 21 *catilli* and 9 *metae* fragments made of volcanic rocks.

Petrographic analysis[14] of the raw material revealed that the lithic substance of the querns is andesite originating probably from the nearby sources (Fig. 4). This is also supported by the fact that the Gurghiu Mountains located in the vicinity, are formed of the same type of andesite

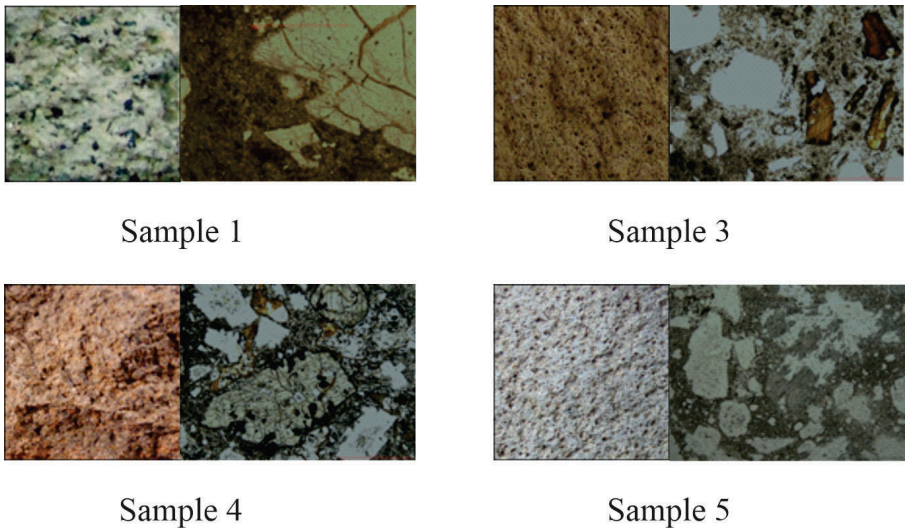

Fig. 4. Micro and macro photos of the samples (Made by Á. Gál and A. Szakács).

[11] Hörter 1994, 22.
[12] Peacock 2013, 70–71.
[13] Gaultier 2008–2009.
[14] The petrographic analysis of the samples was done at the Geological Department of the Babeș-Bolyai University in Cluj-Napoca by Dr. Ágnes Gál and Dr. Alexandru Szakács to whom we are grateful.

and since medieval times, the local population has been quarrying the stone material from areas bearing names like *Kőlik* (Stonepit), *Köves hegy* (Stony mountain), *Köves mező* (Stony field), *Kőliki vályú* (Sink at the stonepit) and *Köves bérce* (Stony cliff). It is justified to presume that the Romans also exploited this raw material from the vicinity, the quarries are easily reachable within a 5–15 km radius.

In the case of querns, the typological variety is larger on the *catilli*, because the *metae* are static and show less options for diversification. It is an almost impossible task to make a generally valid chrono-typology in case of ancient molinology. The querns are two-piece household tools, which are rarely discovered together. They are very durable, and were therefore used for a long time and are also partially replaceable or even repairable. Last but not least, on a long term daily use, they certainly suffer external deterioration, go through reshaping processes and abrasion of the grinding surfaces. We can only remark some clear and very distinctive technical differences, which form the basis for typological differentiations.

For the analysis of the Călugăreni material, the major geometrical characteristics recommended and used by David Peacock[15] have been taken into account, such as the cylindrical, hemispheric and conical shapes. According to him we can subdivide the main types based on particular morphological characteristics such as the shape of the hopper hole, rind form, handle position (Fig. 5) and the presence or absence of a rim on the upper part of the *catillus*.

It is also worth noting that two specialists in ancient molinology, Nicolae Gudea[16] and Nicolae Branga,[17] also used mainly this guideline in their work concerning the material from Roman Dacia. Our material has been structured following the Gudea typology,[18] and even if it needs updating, it is at the moment the one which allows us to compare our material to the finds from Dacia Porolissensis (Fig. 6). As a general tendency we can state that *catilli* fragments usually have rims (Gudea

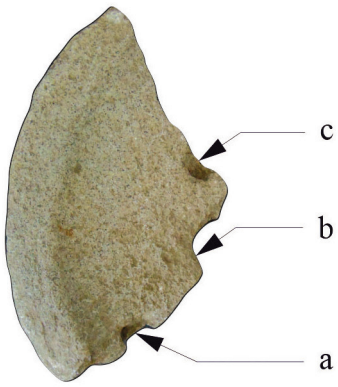

Fig. 5. Technical elements of a *catillus* (1C): a. handle hole; b. hopper; c. rind hole.

Var. 1a), if it was preserved the hopper was rectangular (Gudea Var. 2a), the most popular rind type is the one with short metal bar (Gudea Var. 3b) and the handle was fixed usually on the side

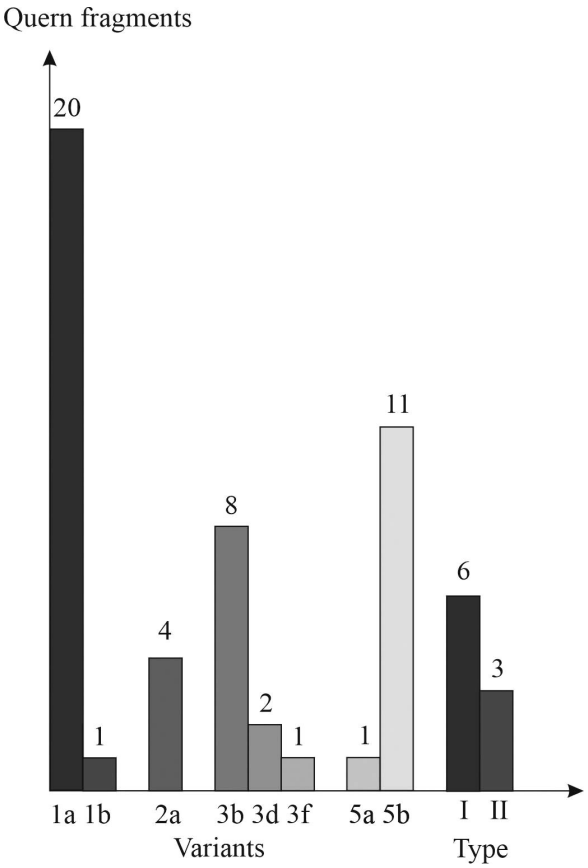

Fig. 6. Distribution of the querns based on the types and variants after Gudea's typology.

[15] Peacock 2013, 61.
[16] Gudea 1997.
[17] Branga 1969–1973.
[18] Gudea 1997, Abb. 2–3.

(Gudea Var. 5b). The meta have mostly flat base (Gudea Type I) and in some cases can be concave as well (Gudea Type II).

Except for two complete *metae* (3M, 7M), the material is quite fragmentary, so only some morphological aspects were detectable on certain objects. According to Peacock's main cylindrical type and the average diameter vs. height proportion, analogies for the Călugăreni querns from other provinces have been found also at Meldi,[19] Argentomagus[20] and the Eiffel region.[21] Concerning their dating, based on analogies and the chronology of the site, we can presume that the quern stones from Călugăreni can most probably be dated roughly from the late first, until the middle of the third century.

For the analysed material the following aspects could be observed:

1. The diameter of the stones. In the case of *catilli* the diameters range from 32 cm to 44 cm, in case of *metae* from 32 cm to 40 cm. The measurements fit well into the dataset of the typical Roman querns from the 2nd–3rd century. A quantification in accordance to their place of discovery (Fig. 7) combined with the diameter suggests that the smaller *catilli* were preferred by the military.

2. Approximate weight. Based on our fragments, a complete quern with an average diameter of 37 cm, made of local andesite weighed around 30 kg. Of course, during use, the quern loses some weight due to the abrasion of the grinding surfaces. The concave base of the type II *metae* (8M–9M) was carved out probably to facilitate transportation without influencing the quality of the grinding process.

3. Height of the stones. The external height of *catilli* is between 8.3–14 cm, the *metae* are between 5.5–10 cm, which is typical for the standard Roman querns.

4. The position of the handle. We can observe two types of fixing position in case of the handle (Fig. 8) on the *catilli*. In 11 cases the handle hole is preserved on the lateral side (2C, 3C, 4C, 5C, 6C, 7C, 8C, 9C, 12C, 13C, 14C) and 1 shows possibly both fixing positions: beside a clearly visible lateral hole a possible upper hole can be observed (1C), later can be a fixing point of the rind as well. On one fragment clear evidence of reparation marks are visible (9C) attesting the maintenance and care of the owner for his tool.

5. Form of the hopper. In most cases the querns are broken at the hopper, so their exact shape is difficult to establish, only in four cases we can state that the hopper was rectangular (1C, 2C, 3C, 11C).

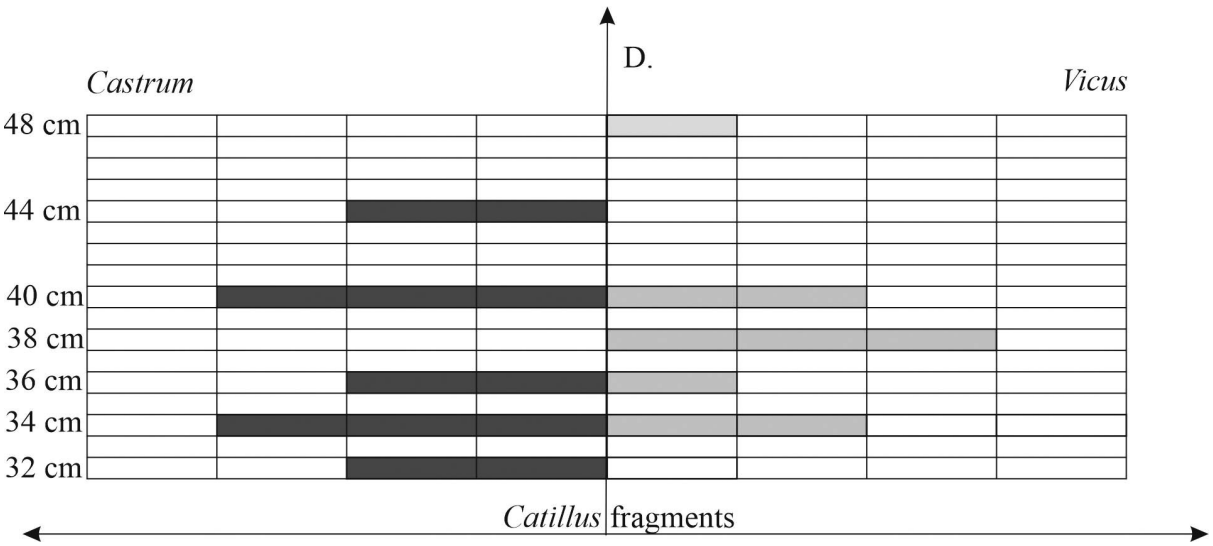

Fig. 7. Distribution of the *catilli* based on their diameter.

[19] Lepareux-Couturier 2011.
[20] Gaultier 2008–2009.
[21] Hörter 1994.

6. Position and type of the rind. Some of them have a longer rind (2C, 8C) and most of them only had a short rind slot (1C, 3C, 4C, 5C, 6C, 7C, 10C, 11C). One *catillus* had possibly a cross shaped rind slot (9C)

7. The presence of a rim. The upper rim and the biconcave shape of the *catillus* is a typical Roman invention present on querns since the 1st century AD.[22] This prevents the seeds of grain from spreading due to the centrifugal force, but it could also serve as a measuring unit.[23] The concave shape is also useful, because it allows the continuous alimentation of the hopper and the speeding up of the grinding process. The

Fig. 8. Lateral handle hole in section (9C).

dimensions of the rim vary from 1–2 cm in height and a width of a few centimetres.

8. The angles of the working surfaces. The angle helps to eliminate the grind by the centrifugal force generated during the rotation. A sharper angle (higher than 15 degrees) speeds up the grinding process, but the result is a rough grout, which is ideal for crushing and dehusking cereals. A lower angle (from 0 to 15 degrees) makes the grinding process slower and the result is a close grain. It seems that the Romans optimized the angle of the working surface somewhere between 6–13 degrees.

9. Dressing patterns. The hardness and texture of the stones are the major factors which influence the results of the grinding process,

Fig. 9. Radial dressing patterns (3M).

therefore the Romans, and not only them, preferred volcanic rocks (granite, basalt, andesite, trachyt, dacit).[24] The texture of the stones is also crucial, the compact stone is abrasion-resistant, but the working surface is less abrasive and the

Fig. 10. Geometrical dressing patterns (1M).

shear force is low. This results in lower working efficiency, but the grist is cleaner and does not include stone particles. The shear force and efficiency increase with a more porous texture, but

[22] Lepareux-Couturier 2011, 414, fig. 8.

[23] Roughly two *sextarius* (1 *sextarius* is ca. 546 ml) of grain would fit in such a *catillus*, and this was enough for a two day portion of leavened bread for a person.

[24] Grüll 2013, 27.

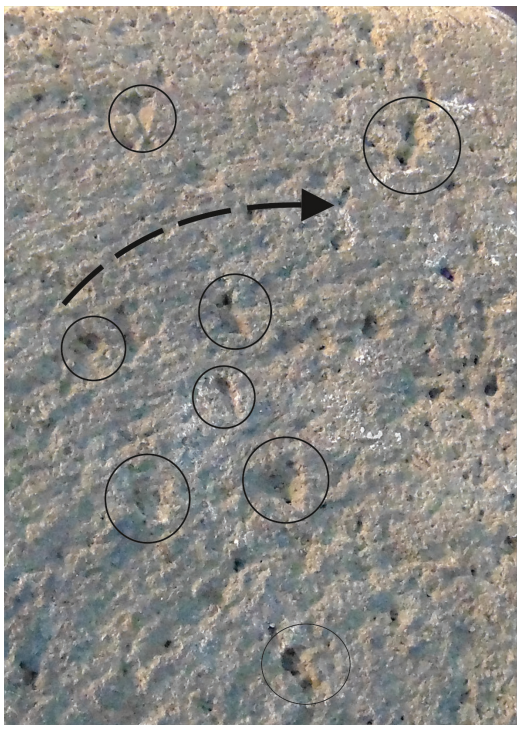

Fig. 11. Picked dressing patterns (12C).

so does the fretting and the grist will be contaminated with stone particles. Not to mention, that in this case the querns are more friable and their lifetime will be shorter. To increase the grinding efficiency of stones with a harder texture, the surface was dressed using different patterns of great variety. On the Călugăreni material four types of dressing patterns could be identified: radial (Fig. 9), geometrical (Fig. 10) picked (Fig. 11) and mixed (Fig. 12).

Fig. 12. Mixed dressing patterns (4C).

Fig. 13. Concentric traces of abrasion on the work surface (11C).

10. Traces of abrasion. We have prominent marks of abrasion on all of the querns, resulting in a rubbed work-surface (Fig. 13), attesting their daily use.

11. Fastening the central axe. On a sole *meta* (3M) an iron pivot with lead bonding was preserved as well (Fig. 14). Lead was probably used to fix both the handles (2C) and the rind (9C), as visible on a *catillus* fragment (Fig. 15).

Fig. 14. Iron pivot with lead bonding in a *meta* (3M).

Fig. 15. Lead traces in the handle hole (2C).

The quite homogenous character of the material from Călugăreni could be explained with the presence of a local stonemason's workshop using the local andesite to produce querns. Even if, there is a slight variation in the morphological aspects of the quern stones discovered in the *vicus* or the fort, we can presume that this workshop produced for civilians and soldiers alike.

A possible explanation for the shortage of *metae* could be, that the lower stone disc was far more resistant then the upper one and if a *catillus* was broken, a new one was made to fit with the old *meta*. Of the 21 *catilli* 13 fragments are from the fort and 9 are from the *vicus*, and the diameter suggests that the smaller *catilli* (Fig. 7) were preferred by the military. It seems like the damaged pieces were thrown away or reused as building material.

The morphological and petrographic analysis illustrates, that in the case of Călugăreni they had an excellent local source (Fig. 16), wherefore they didn't need to import querns from other regions of the province or other provinces of the Empire.

The use of lead as bonding material, a veritable "super glue" of ancient times, was common in construction, but is surprisingly rarely noticed in the case of querns. The typically and frequently mentioned leather-fastened lateral elbow handle, which seems to be common in the provinces from Western Europe[25] is not present in our material, although this fastening type is listed by N. Gudea in the case of Dacia Porolissensis.[26]

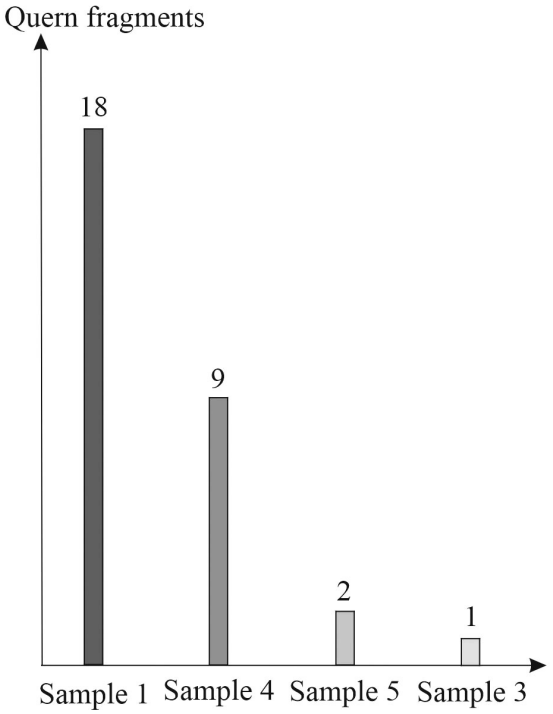

Fig. 16. Distribution of the quern fragments based on their raw material.

The lack of larger millstones suggests for now, that the grinding of the cereals had rather a domestic character in Călugăreni and did not reach the level of industrialization known from larger urban centres.

CATALOGUE[27]

1C. *Catillus* fragment (Pl. I/1C)
Dimensions: Cs. 25%; Ed. 36 cm; dp. 27.5 cm; L. 19.4; w. 14.3 cm; H. 9.5 cm; h. 5 cm; Rw. 4.3 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral with d. 3 cm circular handle hole, upper face with rim, handle hole of 1.5 × 2.4 cm, hopper of 2.4 × 3.5 cm and rind slot of 2.5 × 2.5 cm, biconcave, self-sharpened, rubbed work-surface, broken at the hopper/rind/handle.
Provenance: Călugăreni *principia* (trench A/2014), context spoil; SF. 10286, Inv. no. 16327.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 2a, 3b, 5a/b.

[25] Lepareux-Couturier 2011, 418, fig.13.
[26] Gudea 1997, Abb. 2–3, Var. 5c.
[27] All the objects belong to the Archaeological collection of the Mureș County Museum. The following abbreviations have been used: Cs.= circle segment; Ed. = external diameter; dp. = upper diameter; d. = diameter; L. = length; w. = width; H. = exterior height; h. = hopper height; Rw. = rim width; Rh. = rim height; Inv. no. = inventory number; SF. = small find number, Var. = type variant, Type = major type.

2C. *Catillus* fragment (Pl. I/2C)
Dimensions: Cs. 24%; Ed. 40 cm; dp. 32 cm; L. 23; w. 14 cm; H. 11 cm; h. 2 cm; Rw. 4 cm; Rh. 1.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral with 2.3 × 2 cm rectangular handle hole and lead traces, upper face with rim, hopper of 2 × 4 cm and rind slot of 1.2 × 1.3 cm, self-sharpened, biconcave, rubbed work-surface, broken at the hopper/rind/handle.
Provenance: Călugăreni *principia* (trench A5/2016) context 288; SF. 10561; Inv. no. 16331.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 2a, 3d, 5b.

3C. *Catillus* fragment (Pl. I/3C)
Dimensions: Cs. 27%; Ed. 34 cm; dp. 27 cm; L. 26; w. 16 cm; H. 14 cm; h. 5 cm; Rw. 3.5 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral with d. 3 cm circular handle hole, upper face with rim, hopper of 2 × 3.3 cm and rind slot of 2 × 1 cm, self-sharpened, biconcave, rubbed work-surface, broken at the rind slot and possible vertical handle hole.
Provenance: Călugăreni *principia* (trench A/2016) context 268; SF. 10450; Inv. no. 16330.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 2a, 3b, 5b.

4C. *Catillus* fragment (Pl. I/4C)
Dimensions: Cs. 20%; Ed. 36 cm; dp. 27 cm; L. 10; w. 10 cm; H. 11,5 cm; h. 8 cm; Rw. 4.5 cm; Rh. 2.0 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: straight lateral with d. 2.5 cm circular handle hole, upper face with rim and possible rind slot, biconcave, self-sharpened (radial and cross carving marks present), rubbed work-surface, broken at the handle/rind.
Provenance: Călugăreni, *vicus* (fieldwalking/2013); SF. F1; Inv. no. 16320.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3b, 5b.

5C. Two joining *Catillus* fragments (Pl. II/5C)
Dimensions: Cs. 20%; Ed. 34 cm; dp. 27.5 cm; L. 14.5; w. 12.0 cm; H. 9.2 cm; h. 4.4 cm; Rw. 5.2 cm; Rh. 2.0 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral with 2.3 × 2.3 cm rectangular handle hole, upper face with rim and rind slot of 1 × 2.8 cm, biconcave, self-sharpened, rubbed work-surface, broken at the handle/rind.
Provenance: Călugăreni *principia* (trench A1/2015) context 108; SF. 929; Inv. no. 16326.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3b, 5b.

6C. *Catillus* fragment (Pl. II/6C)
Dimensions: Cs. 20%; Ed. 44 cm; dp. 37 cm; L. 15; w. 4.4 cm; H. 10 cm; h. 3 cm; Rw. 3.5 cm, Rh. 2 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral with d. 2.5 cm circular handle hole, upper face with rim and rind slot of 2.8 × 4.6 cm, biconcave, self-sharpened, rubbed work-surface, broken at the handle.
Provenance: Călugăreni *principia* (trench A1/2015) context 233; SF. 10364; Inv. no. 16328.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3b, 5b

7C. *Catillus* fragment (Pl. II/7C)
Dimensions: Cs. 11%; Ed. 38 cm; dp. 31 cm; L. 20; w. 12 cm; H. 11,5 cm; h. 6 cm; Rw. 4.5 cm; Rh. 1.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral with d. 2 cm circular handle hole, upper face with rim and rind slot of 1 × 3 cm, biconcave, self-sharpened, rubbed work-surface, broken at the handle/rind.
Provenance: Călugăreni *vicus* (trench C3/2016) context 2085; SF. 5374; Inv. no. 16323.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3b, 5b.

8C. *Catillus* fragment (Pl. II/8C)
Dimensions: Cs. 15%; Ed. 38 cm; dp. 30 cm; L. 17; w. 15 cm; H. 14 cm; h. 4 cm; Rw. 4.5 cm; Rh. 1.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral with d. 4 cm circular handle hole, upper face with rim and rind

slot of 3 × 3 cm, biconcave, self-sharpened, rubbed work-surface with concentric lines, broken at the hopper/handle.
Provenance: Călugăreni *vicus* (trench AIII/80 CM 12–13/2018) context 204; SF 306; Inv. no. 16335.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3d, 5b.

9C. *Catillus* fragment (Pl. III/9C)
Dimensions: Cs. 15%; Ed. 48 cm; dp. 39 cm; L. 20; w. 10 cm; H. 15 cm; h. 9 cm; Rw. 4.5 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral with 2 × 2.6 cm rectangular handle hole, upper face with rim and cross shaped variant rind slots of 1.8 × 1.8 cm with lead traces, reparation marks on the rim, biconcave, self-sharpened, rubbed work-surface with concentric lines, broken at the hopper/rind/handle.
Provenance: Călugăreni *vicus* (trench A/2019) context 587; SF. 11909; Inv. no. 16338.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3f, 5b.

10C. *Catillus* fragment (Pl. III/10C)
Dimensions: Cs. 15%; Ed. 34 cm; dp. 26 cm; L. 15; w. 14.5 cm; H. 11 cm; h. 6.3 cm; Rw. 4 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, upper face with rim, rind slot of 2 × 2 cm, biconcave, self-sharpened, rubbed work-surface, broken at the rind.
Provenance: Călugăreni *vicus* (trench AV/78 CM 10–11/2018) context 425; SF 591; Inv. no. 16336.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 3b.

11C. *Catillus* fragment (Pl. III/11C)
Dimensions: Cs. 25%; Ed. 36 cm; dp. 27.5 cm; L. 19.4; w. 14.3 cm; H. 9.5 cm; h. 5 cm; Rw. 4.3 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 4.
Description: bevelled lateral, upper face with rim, hopper of 3 × 4 cm and rind slot of 2.2 × 2.2 cm, biconcave, self-sharpened, rubbed work-surface, broken at the hopper/rind.
Provenance: Călugăreni *principia* (trench A/2014), context spoil; SF. 658, Inv. no. 16337.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 2a, 3b.

12C. Four joining *Catillus* fragment (Pl. III/12C)
Dimensions: Cs. 23%; Ed. 40 cm; dp. 33 cm; L. 13.5; w. 20 cm; H. 13.5 cm; h. 9 cm; Rw. 3.5 cm; Rh. 1 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: bevelled lateral with d. 2.5 cm circular handle hole, upper face with rim (picked carving marks present), biconcave, self-sharpened, rubbed work-surface with traces of burning, broken at the handle.
Provenance: Călugăreni *principia* (trench A3/2015) context 233; SF. 10107; Inv. no. 16324.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 5b.

13C. *Catillus* fragment (Pl. IV/13C)
Dimensions: Cs. 8%; Ed. 38 cm; dp. 30.4 cm; L. 13.4; w. 11.3 cm; H. 9 cm; h. 2 cm; Rw. 3.6 cm; Rh. 2 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: bevelled lateral with d. 3 cm circular handle hole, upper face with rim, biconcave, self-sharpened, rubbed work-surface, broken at the handle.
Provenance: Călugăreni *vicus* (trench C/2013) context 2007; SF. 2546; Inv. no. 16321.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a, 5b.

14C. *Catillus* fragment (Pl. IV/14C)
Dimensions: Cs. 25%; Ed. 32 cm; dp. 23 cm; L. 13.2; w. 12.6 cm; H. 11 cm; Rw. 4 cm; Rh. 1.5 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: bevelled lateral with 2 × 2 cm rectangular handle hole, upper face with rim, biconcave, self-sharpened, rubbed work-surface, broken at the handle.
Provenance: Călugăreni *principia* (trench A5/2016) context 288; SF. 10572; Inv. no. 16332.
Dating: 2nd–3rd century AD.

Type: Gudea 1997, Abb. 2–3, Var. 1a, 5b.

15C. *Catillus* fragment (Pl. IV/15C)
Dimensions: Cs. 17%; Ed. 44 cm; dp. 34 cm; L. 18; w. 15 cm; H. 10 cm; h. 2.5 cm; Rw. 5 cm; Rh. 2 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, upper face with rim, biconcave, self-sharpened, rubbed work-surface.
Provenance: Călugăreni *principia* (trench A/2016) context 268; SF. 10444; Inv. no. 16329.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

16C. *Catillus* fragment (Pl. IV/16C)
Dimensions: Cs. 21%; Ed. 40 cm; dp. 34 cm; L. 16; w. 20 cm; H. 8.3 cm; h. 4 cm; Rw. 3 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, upper face with rim, biconcave, self-sharpened, rubbed and damaged work-surface.
Provenance: Călugăreni *vicus* (trench AIII/80 CM14–15/2018) context 123; SF. 208; Inv. no. 16334.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

17C. *Catillus* fragment (Pl. V/17C)
Dimensions: Cs. 17%; Ed. 40 cm; dp. 32 cm; L. 22; w. 10 cm; H. 11 cm; h. 6 cm; Rw. 4 cm; Rh. 1.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, upper face with rim, biconcave, self-sharpened, rubbed work-surface.
Provenance: Călugăreni *vicus* (trench C3/2016) context 2091; SF. 5902; Inv. no. 16319.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

18C. *Catillus* fragment (Pl. V/18C)
Dimensions: Cs. 27%; Ed. 34 cm; dp. 26 cm; L. 24; w. 14 cm; H. 9.5 cm; h. 4 cm; Rw. 4 cm, Rh. 2 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, upper face with rim, biconcave, self-sharpened, rubbed work-surface.
Provenance: Călugăreni *principia* (trench A/2016) context 268; SF. 10448; Inv. no. 16322.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

19C. *Catillus* fragment (Pl. V/19C)
Dimensions: Cs. 12%; Ed. 34 cm; dp. 28 cm; L. 13.2; w. 12.4 cm; H. 8 cm; h. 2 cm; Rw. 3 cm; Rh. 1.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral, upper face with rim, biconcave, self-sharpened, rubbed work-surface
Provenance: Călugăreni *vicus* (trench C3/2015) context 2095; SF. 53332; Inv. no. 16333.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

20C. *Catillus* fragment (Pl. V/20C)
Dimensions: Cs. 25%; Ed. 32 cm; dp. 23 cm; L. 18; w. 20 cm; H. 9 cm; h. 4.2 cm; Rw. 4.5 cm; Rh. 1 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral, upper face with rim, biconcave, self-sharpened, rubbed work-surface.
Provenance: Călugăreni *principia* (trench A/2014), context 67; SF. 704; Inv. no. 16325.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1a.

21C. *Catillus* fragment (Pl. VI/21C)
Dimensions: Cs. 20%; Ed. 40 cm; L. 18; w. 16 cm; H. 7 cm, h. 7.5 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: possibly carved out of a *meta*, straight lateral, convex upper face with carving marks, concave and rubbed work surface, self-sharpened, broken at the hopper.
Provenance: Călugăreni *principia* (trench A3/2015) context 113; SF. 957; Inv. no. 16339.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Var. 1b.

1M. *Meta* fragment (Pl. VI/1M)
Dimensions: Cs. 28%; Ed. 40 cm; L. 15.6; w. 13 cm; H. 8.5 cm; h. 11 cm.

Material: pyroxene or basalt andesite, similar to sample 4.
Description: straight lateral, flat base, self-sharpened, convex and rubbed work-surface (geometrical carving marks present), d. 3 cm circular pivot hole.
Provenance: Călugăreni *vicus* (trench AV78 CM9/2019); context 547; SF. 654; Inv. no. 16344.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

2M. *Meta* fragment (Pl. VI/2M)
Dimensions: Cs. 8%; Ed. 38 cm; L. 22; w. 8.8 cm; H. 7 cm; h. 9 cm.
Material: amphibole andesite, similar to sample 1.
Description: bevelled lateral, flat base, self-sharpened, convex and rubbed work-surface (radial carving and pecking marks present), d. 3 cm circular pivot hole.
Provenance: Călugăreni *vicus* (trench AIII 80CM 4–5/2018) context 65; SF. 130; Inv. no. 16342.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

3M. *Meta* (Pl. VIII/3M)
Dimensions: Cs.100%; Ed. 38 cm; H. 8.5 cm; h. 15 cm.
Material: pyroxene andesite, sample 5.
Description: straight lateral, flat base, self-sharpened, convex and rubbed work-surface (radial carving and pecking marks present), d. 2.5 cm circular pivot hole with iron pivot and lead bonding.
Provenance: Călugăreni, *castrum* (collection of Kovács Dénes); Inv. no. 16353.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

4M. *Meta* fragment (Pl. VII/4M)
Dimensions: Cs. 30%; Ed. 37 cm; L. 25; w. 7 cm; H. 10 cm; h. 16 cm.
Material: pyroxene andesite, similar to sample 5.
Description: straight lateral, flat base, self-sharpened, convex and rubbed work-surface (carving marks present), d. 2 cm circular pivot hole.
Provenance: Călugăreni, *vicus* (fieldwalking/2013); SF. F2; Inv. no. 16318.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

5M. *Meta* fragment (Pl. VII/5M)
Dimensions: Cs. 49%; Ed. 32 cm; L. 36; w. 16 cm; H. 6.7 cm; h. 8.8 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: straight lateral, flat base, self-sharpened, convex and rubbed work-surface, d. 3 cm circular pivot hole.
Provenance: Călugăreni *vicus* (trench AIII 80CM 12–13/2018); context 175; SF 274; Inv. no. 16343.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

6M. *Meta* fragment (Pl. VIII/6M)
Dimensions: Cs. 20%; Ed. 36 cm; L. 18; w. 18 cm; H. 6 cm, h. 6.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, flat base, self-sharpened, convex and rubbed work-surface.
Provenance: Călugăreni *vicus* (trench C3/2016) context 2084; SF. 5375; Inv. no. 16341.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type I.

7M. *Meta* (Pl. VII/7M)
Dimensions: Cs. 100%; Ed. 40 cm; H. 9 cm; h. 13 cm.
Material: amfibole andesite, similar to sample 3.
Description: straight lateral, concave base, self-sharpened, convex and rubbed work-surface, d. 3.5 cm circular pivot hole.
Provenance: Călugăreni, *castrum* (collection of Kovács Dénes); Inv. no. 16354.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type II.

8M. *Meta* fragment (Pl. VIII/8M)
Dimensions: Cs. 11%; Ed. 38 cm; L. 15.3; w. 12.6 cm; H. 6.0 cm, h. 7.5 cm.
Material: amphibole andesite, similar to sample 1.
Description: straight lateral, concave base, self-sharpened, convex and rubbed work-surface.
Provenance: Călugăreni *vicus* (trench C/2013), context 2003, SF. 2398; Inv. no. 16340.
Dating: 2nd–3rd century AD.

Type: Gudea 1997, Abb. 2–3, Type II.

9M. *Meta* fragment (Pl. VIII/9M)
Dimensions: Cs. 20%; Ed. 36 cm; L. 18; w. 13 cm; H. 5.5 cm; h. 7 cm.
Material: pyroxene or basalt andesite, similar to sample 4.
Description: straight lateral, concave base, self-sharpened, convex and rubbed work-surface (pecking marks present).
Provenance: Călugăreni *vicus* (trench C/2013); context 2001; SF. 2195; Inv. no. 16345.
Dating: 2nd–3rd century AD.
Type: Gudea 1997, Abb. 2–3, Type II.

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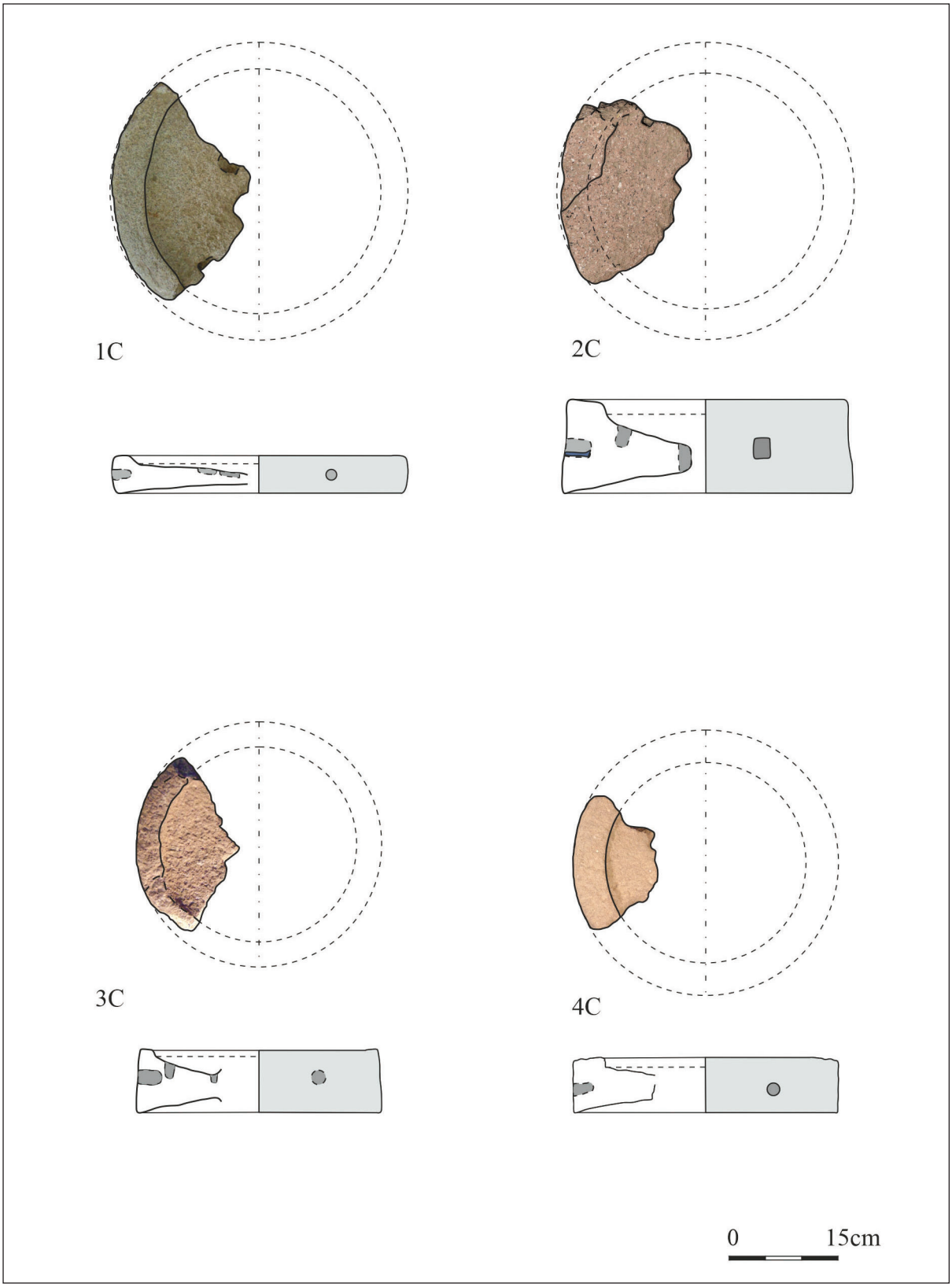

Plate I. *Catillus* (1C–4C).

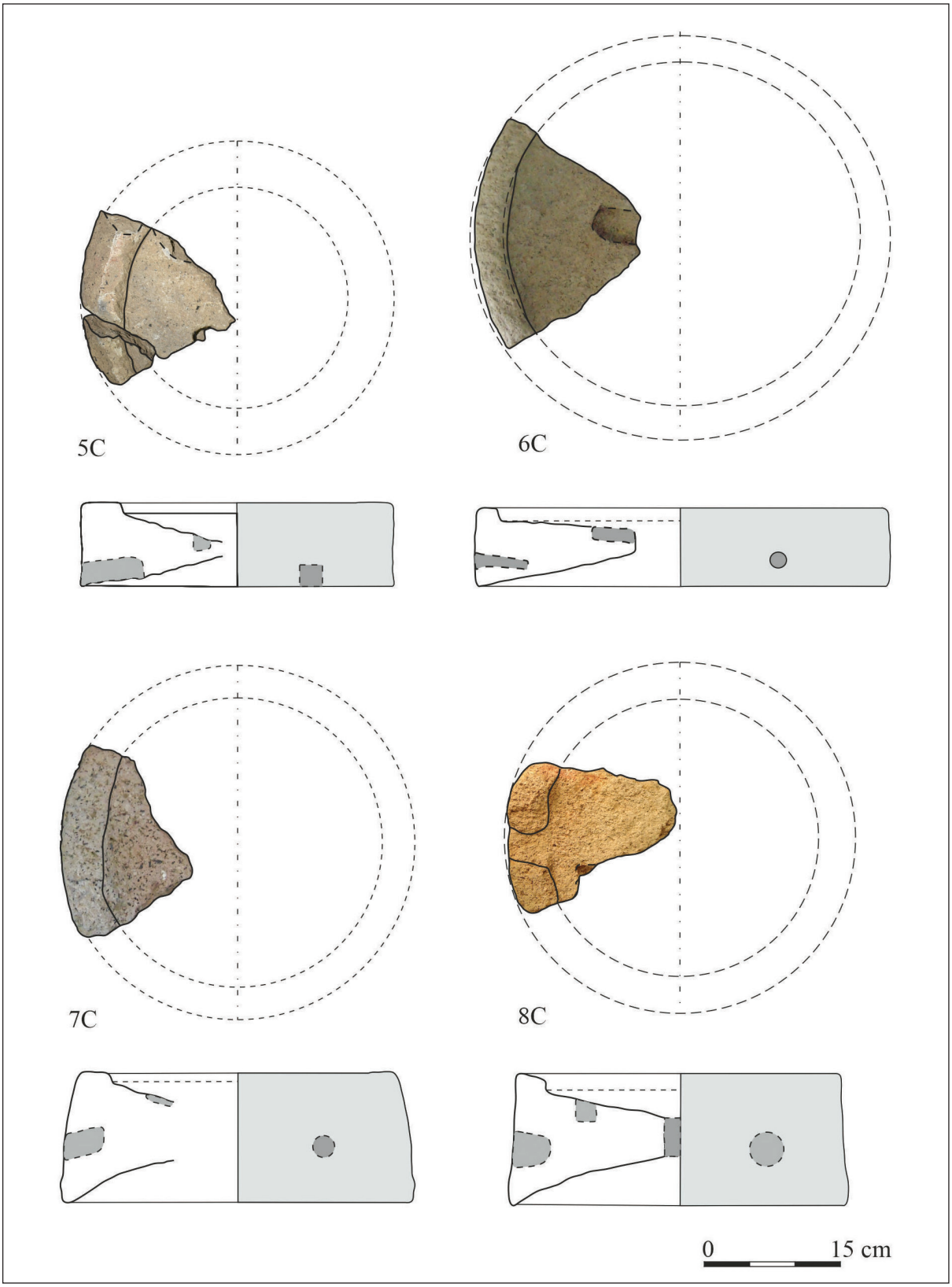

Plate II. *Catillus* (5C–8C).

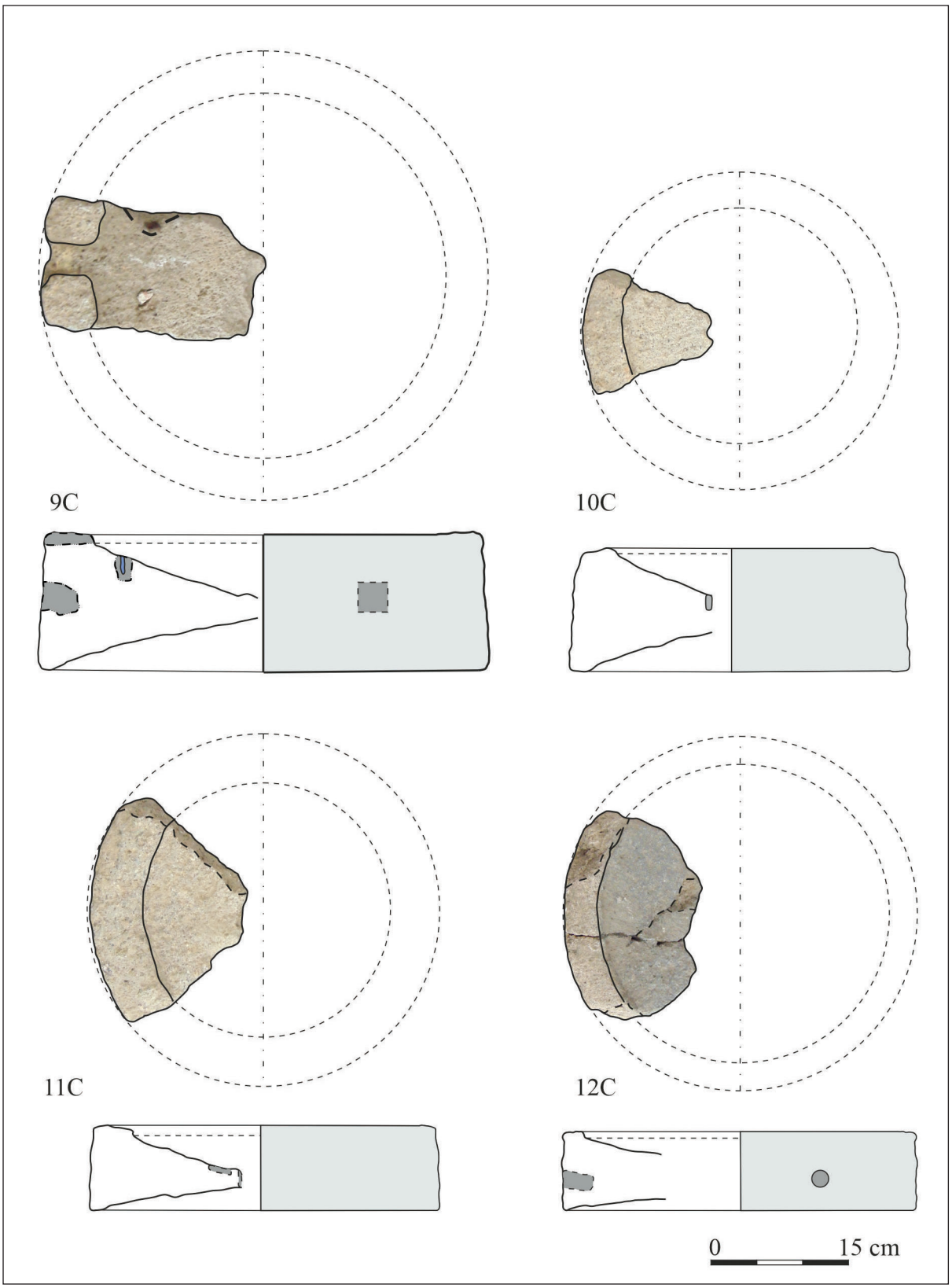

Plate III. *Catillus* (9C–12C).

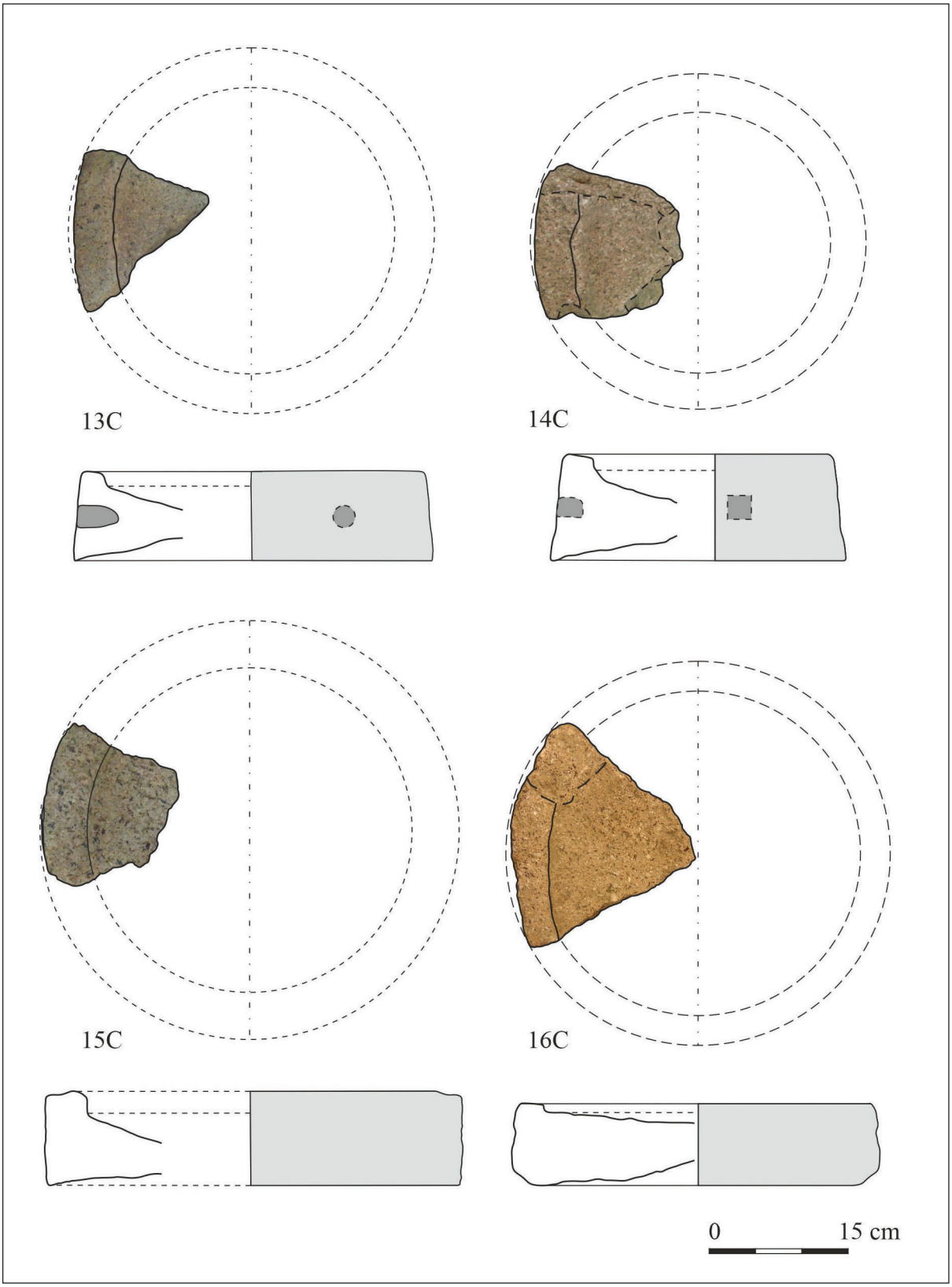

Plate IV. *Catillus* (13C–16C).

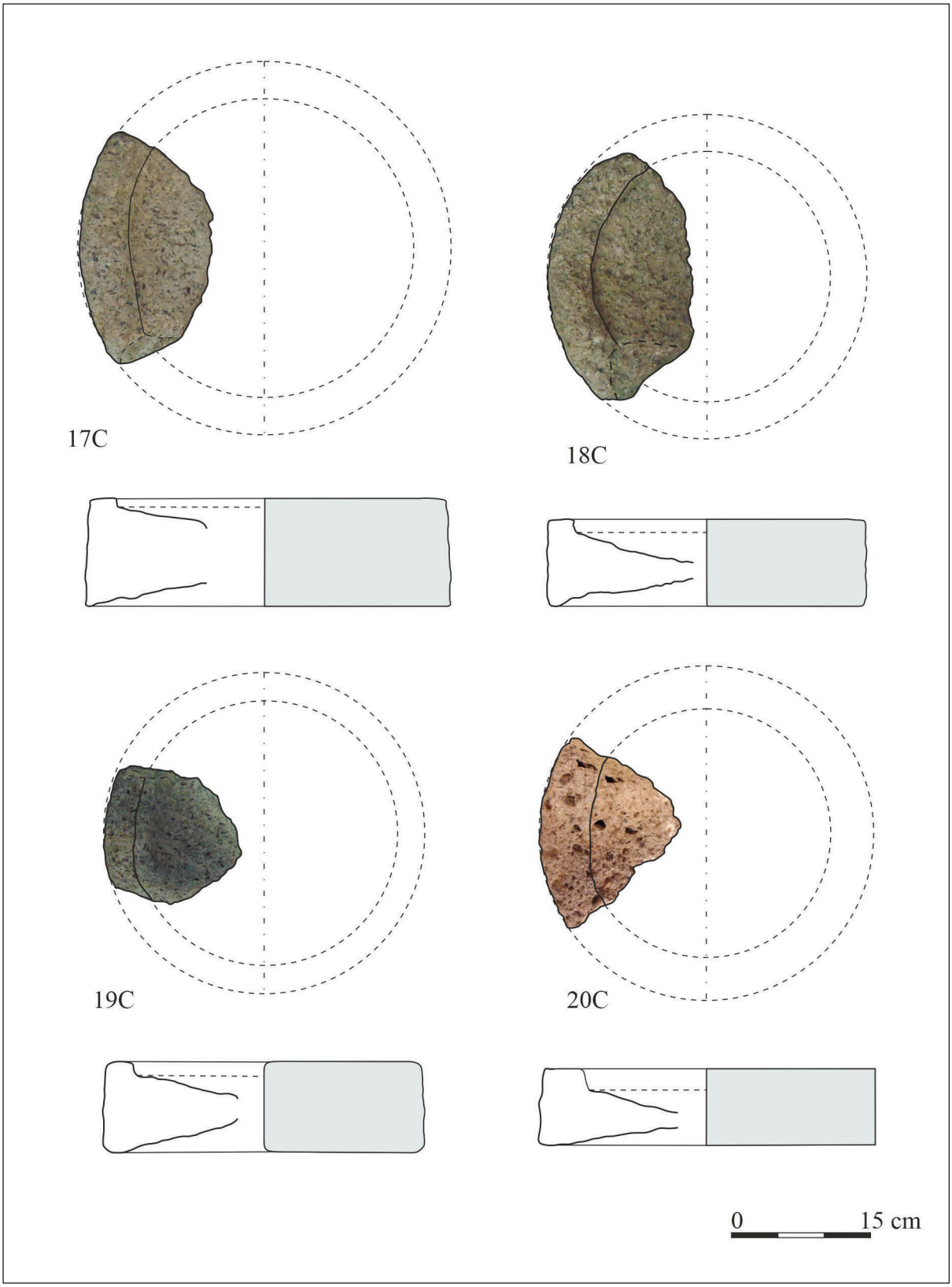

Plate V. *Catillus* (17C–20C).

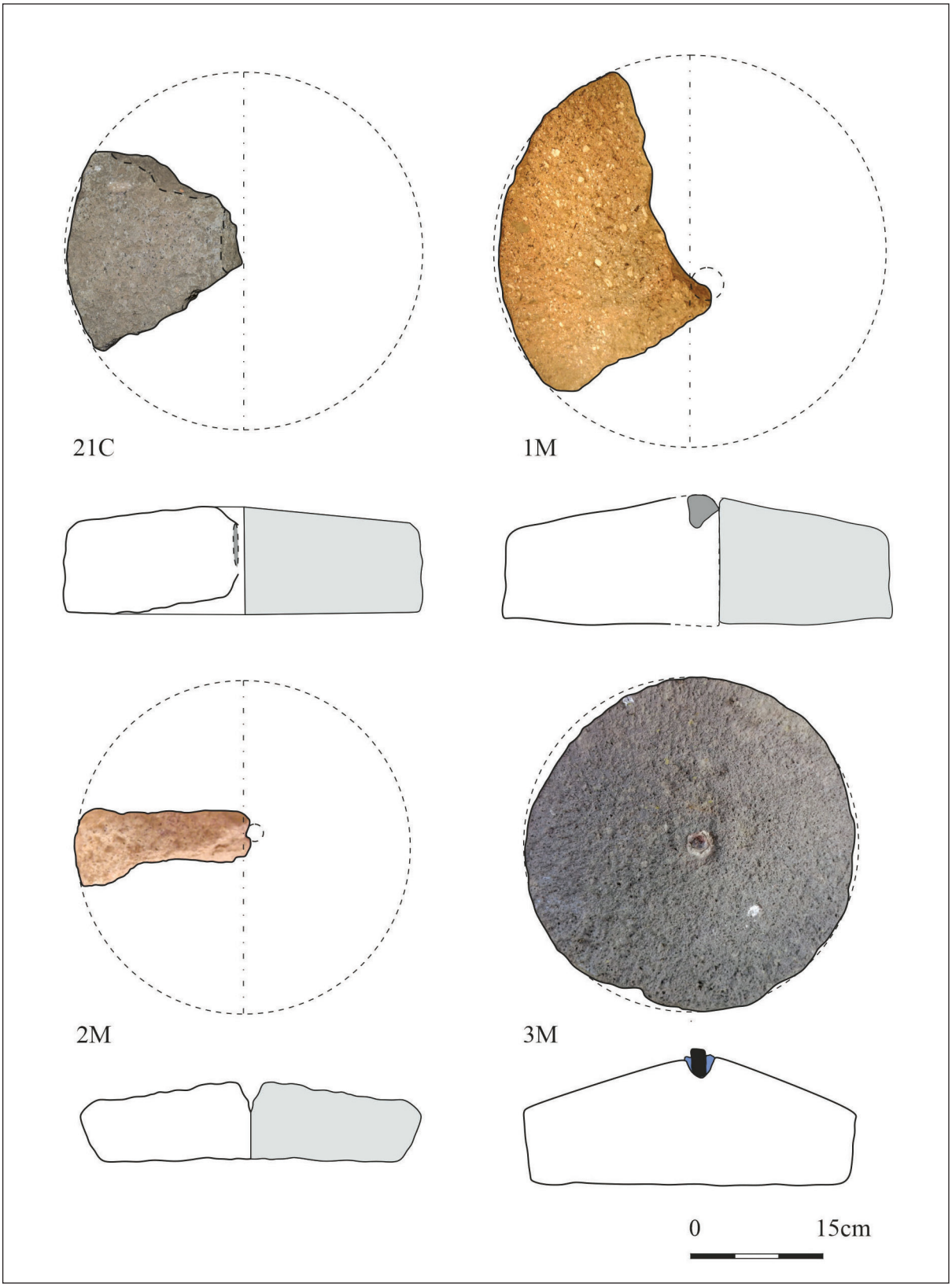

Plate VI. *Catillus* (21C) and *meta* (1M–3M).

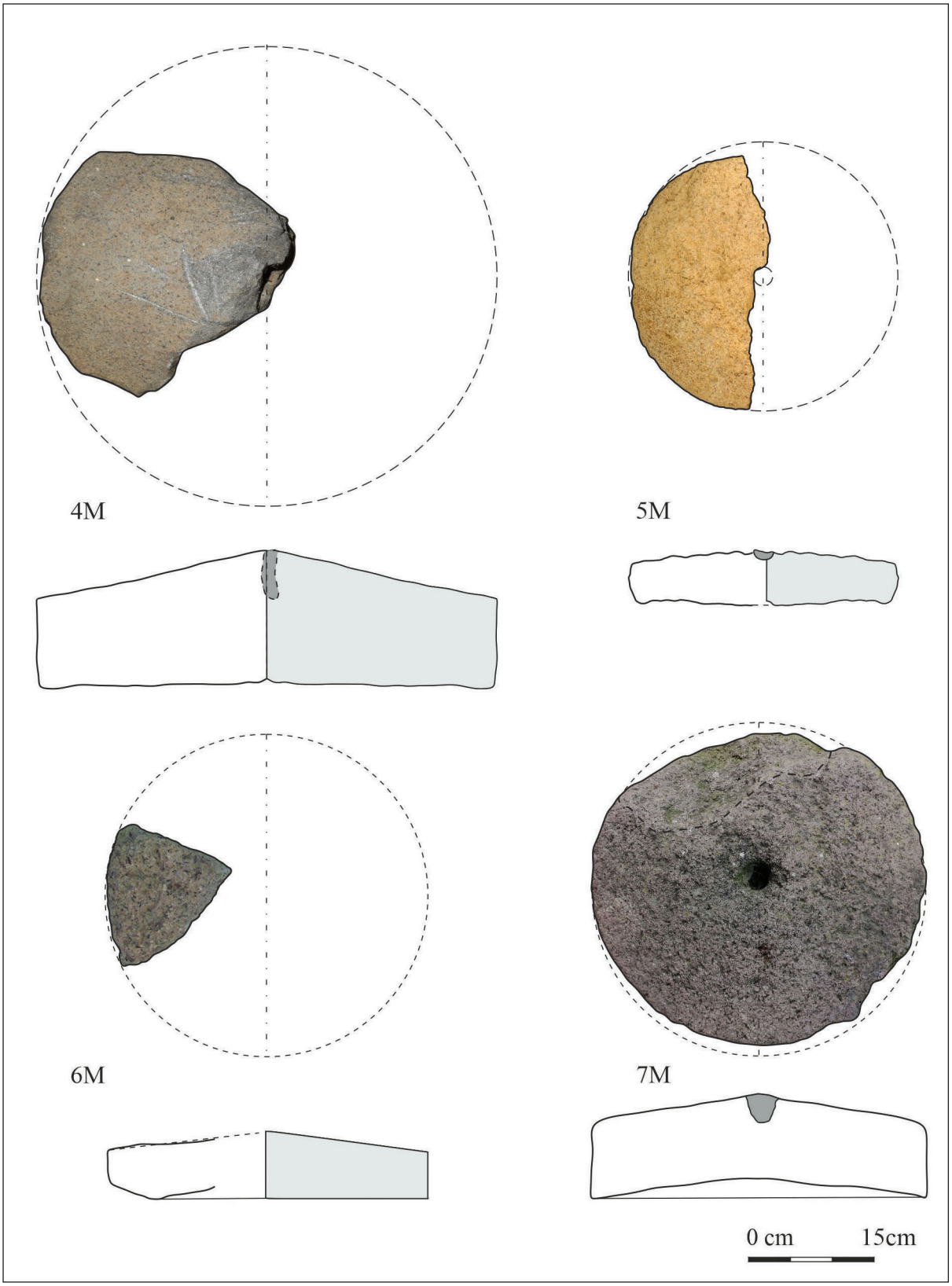

Plate VII. *Meta* (4M–7M).

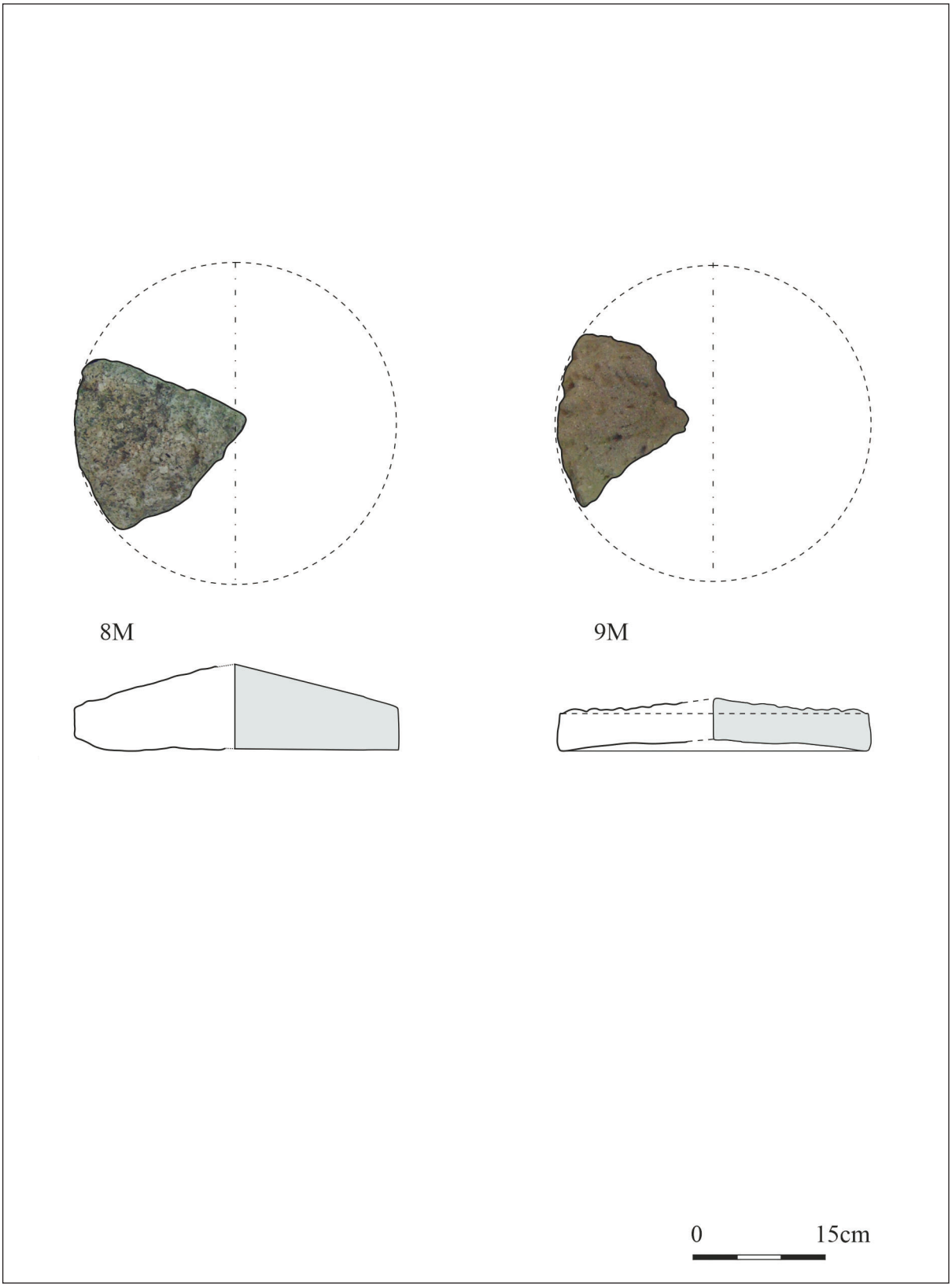

Plate VIII. *Meta* (8M–9M).

ABBREVIATIONS

ActaArchHung	Acta Archaeologica Academiae Scientiarum Hungaricae
ActaMN	Acta Musei Napocensis
AISC	Anuarul Institutului de Studii Clasice Cluj
Aluta	Aluta. Studii și cercetări
AnB	Analele Banatului (Serie nouă 2006–)
Angustia	Angustia. Muzeul Carpaţilor Răsăriteni
AnnUA-Hist	Annales Universitatis Apulensis. Series Historica
Antiquity	Antiquity. A Quarterly Review of Archaeology
Apulum	Apulum. Acta Musei Apulensis
ArchÉrt	Archaeologiai Értesítő
ArchHung	Archaeologia Hungarica
ArchKorr	Archäologisches Korrespondenzblatt
ArchSlovMonComm	Archaeologica Slovaca Monographiae: Communicationes
Argesis	Argesis. Studii și comunicări
AVSL	Archiv des Vereins für Siebenbürgische Landeskunde
Banatica	Banatica, Muzeul Banatului Montan
BB	Bibliotheca Brukenthal
BCȘS	Buletinul Cercurilor Științifice Studențești
BeitUfGMMKR	Beiträge zur Ur- und Frühgeschichte des Mittelmeer-Kulturraumes
BerRGK	Bericht der Römisch-Germanischen Kommission
BICA	Bullettino dell'Instituto di corrispondenza archeologica = Bulletin de l'Institut de correspondance archéologique
BHAUT	Bibliotheca Historica et Archaeologica Universitatis Timisiensis
BJ	Bonner Jahrbücher
BMA	Bibliotheca Musei Apulensis
BMM	Bibliotheca Musei Marisiensis
BudRég	Budapest Régiségei
CA	Cercetări Arheologice
Carpica	Carpica. Muzeul Județean Iulian Antonescu
CCAR	Cronica Cercetărilor Arheologice din România
CH	Cahiers d'Histoire. Publiés par les Universités de Clermont-Ferrand
CommArchHung	Communicationes Archaeologicae Hungariae
Dacia (N. S.)	Dacia. Recherches et décuvertes archéologiques en Roumanie, I–XII (1924–1948), Nouvelle série (N. S.): Dacia. Revue d'archéologie et d'histoire anciene
DDMÉ	A Debreceni Déri Múzeum Évkönyve
DissArch	Dissertationes Archaelogicae ex Instituto Archaeologico Universitatis de Rolando Eötvös Nominatae
DM	Dissertationes et monographiae Beograd
DolgKolozsvár (Ú.S.)	Dolgozatok az Erdélyi Nemzeti Múzeum Érem- és Régiségtárából, (Új sorozat 2006–)
DolgSzeged	Dolgozatok a Szegedi Tudományegyetem Régiségtudományi Intézetéből
EDR	Ephemeris Dacoromana
EMúz	Erdélyi Múzeum

EphemNap	Ephemeris Napocensis
HOMÉ	A Herman Ottó Múzeum Évkönyve
IA	Internationale Archäologie
ICA	Interdisciplinary Contributions to Archaeology
IPH	Inventaria Praehistorica Hungariae
JAHA	Journal of Ancient History and Archaeology
JAAH	Journal of Archaeology and Ancient History
JASc	Journal of Archaeological Science
JbRGZM	Jahrbuch des Römisch-Germanischen Zentralmuseums
JRA	Journal of Roman Archaeology
JRS	Journal of Roman Studies
KM	Keresztény Magvető. Az Erdélyi Unitárius Egyház Folyóirata
KuBA	Kölner und Bonner Archaeologica
Lymbus	Lymbus. Magyarságtudományi Forrásközlemények
Marisia	Marisia (V–XXXV): Studii şi Materiale
Marisia-AHP	Marisia: Archaeologia, Historia, Patrimonium
MCA	Materiale şi Cercetări Arheologice
MFMÉ (StudArch)	A Móra Ferenc Múzeum Évkönyve, (Studia Archaeologica 1995–)
MGLDMS (N. F.)	Magazin für Geschichte, Literatur und alle Denk- und Merkwürdigkeiten Siebenbürgens, Neue Folge
Mousaios	Mousaios. Muzeul Judeţean Buzău
MSVFG	Marburger Studien zur Vor- und Frühgeschichte
MűvtÉrt	Művészettörténeti Értesítő
NuclInstMethPhys-Sect. B	Nuclear Instruments and Methods in Physics Research. Section B
OJA	Oxford Journal of Archaeology
PAS	Prähistorische Archäologie in Südosteuropa
PBF	Prähistorische Bronzefunde
Radiocarbon	Radiocarbon. An International Journal of Cosmogenic Isotope Research
ReiCretActa	Rei Cretariae Romanae Fautorum Acta
RégFüz	Régészeti Füzetek
RevBis	Revista Bistriţei. Complexul Judeţean Muzeal Bistriţa-Năsăud
Sargetia (S.N.)	Sargetia. Acta Musei Devensis
SBA	Saarbrücker Beiträge zur Altertumskunde
SCIV(A)	Studii şi Cercetări de Istorie Veche (şi Arheologie 1974–)
SlovArch	Slovenská Archeológia
StCl	Studii Clasice
StComSibiu	Studii şi comunicări. Muzeul Brukenthal
StComSM	Studii şi Comunicări Satu Mare
SUBB-Historia	Studia Universitatis Babeş–Bolyai, series Historia
StudUCH	Studia Universitatis Cibiniensis, Series Historica
Terra Sebus	Terra Sebus. Acta Musei Sabesiensis
Thraco-Dacica	Thraco-Dacica. Institutul de Arheologie "Vasile Pârvan" Centrul de Tracologie
Tisicum	Tisicum. A Jász-Nagykun-Szolnok Megyei Múzeumok Évkönyve
Tyragetia	Tyragetia. The National Museum of History of Moldova
UPA	Universitätsforschungen zur Prähistorischen Archäologie
VAH	Varia Archaeologica Hungarica
WMMÉ	A Wosinsky Mór Múzeum Évkönyve
ZPE	Zeitschrift für Papyrologie und Epigraphik