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A preliminary report on the 2008, 2010, and 2011 investigations of Project ArAGATS on the Tsaghkahovit Plain, Republic of Armenia

By Ruben Badalyan, Adam T. Smith, Ian Lindsay, Armine Harutyunyan, Alan Greene, Maureen Marshall, Belinda Monahan, Roman Hovsepyan

With contributions by Khachatur Meliksetian, Ernst Pernicka and Samuel Haroutunian

Keywords: Armenia, Tsaghkahovit Plain, Early Bronze Age, Kura-Araxes, Late Bronze Age, Gegharot, Tsaghkahovit, Aragatsi Berd

Ключевые слова: Армения, Цахкаовитская равнина, ранний бронзовый век, куро-аракс, поздний бронзовый век, Гехарот, Цахкаовит, Арагаци берд

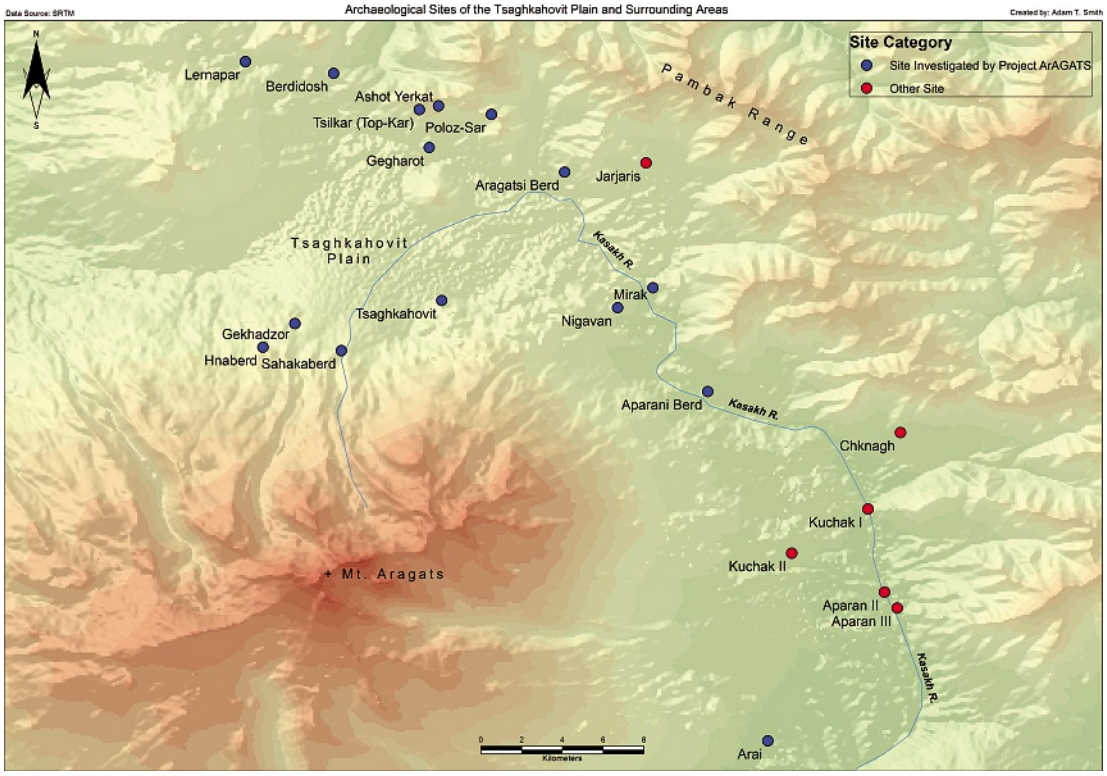

Fig. 1
Archaeological sites of the Tsaghkahovit Plain and surrounding areas

In 1998 the joint Armenian-American Project for the Archaeology and Geography of Ancient Transcaucasian Societies (Project ArAGATS) began a systematic investigation of Bronze and Iron Age sites in the Tsaghkahovit Plain of central Armenia.[1] Our goal was, and remains, to provide an encompassing account of the range of social, economic, and political practices that characterized life in the region and detail the processes that drove major historical transformations over the *longue durée*.[2]

The Tsaghkahovit Plain (2000 m a.s.l.) is a 10–12 km wide upland basin bounded by the northern slope of Mt. Aragats (4090 m), the south-

[1] Avetisyan *et al.* 2000; Badalyan *et al.* 2008; Smith *et al.* 2004; Smith *et al.* 2009.

[2] See the Project ArAGATS website (http://aragats.arts.cornell.edu) for overviews of each season and all of our analytical and field research. This contribution was sent to AMIT during the summer of 2012. Since that time, Project ArAGATS has continued its investigations with field seasons in 2013, 2014, 2015, and 2016. The results of that work will be reported separately.

western slopes of the Pambak range, and the east flank of Mt. Kolgat. The region is crossed by a key north-south transit route that connects the Ararat Plain with points north and hosts the headwaters of the Kasakh river, a key tributary of the Araxes.

Over the course of three field seasons in 2008, 2010, and 2011, Project ArAGATS completed a new phase in its investigations.[3] Building upon continuing work at the sites of Gegharot and Tsaghkahovit, we conducted additional excavations at the Bronze Age settlement at Aragatsi Berd, a Late Bronze Age Cemetery at Tsaghkahovit (Burial Cluster 12), and the medieval *ijevanatun* (caravanserai) at Arai.[4] In addition, topogeodetic work was conducted at the large Bronze and Iron Age settlement at Aparani Berd and the Iron Age settlement at Nigavan as a foundation for future planned work in the Aparan Plain **(Fig. 1)**. Taken together, our investigations provide new insights into a deep, but discontinuous, historical sequence of human occupations: the Early Bronze Age (Gegharot, Aragatsi Berd), the Late Bronze Age (Gegharot, Tsaghkahovit, Aragatsi Berd), the Iron 3 (Achaemenid) period (Tsaghkahovit), and the Middle Ages (Arai).

In this article, we provide an extensive preliminary report on the work related to the Bronze Age occupations of the region at Gegharot, Aragatsi Berd, and Tsaghkahovit. The Iron Age occupation of Tsaghkahovit and excavations at the Medieval site of Arai are described in separate communications (Franklin 2014; Khatchadourian 2014). Our investigations into the Bronze Age Tsaghkahovit Plain have focused on two key anthropological problems: the genesis, growth, and abandonment of the Early Bronze Age Kura-Araxes village and the formation, expansion, and destruction of the region's earliest complex societies during the Late Bronze Age. The data from the field seasons conducted between 2008 and 2011 have provided critical new information on both of these central concerns.[5]

Excavations at Gegharot

Excavations were conducted at the settlement of Gegharot **(Fig. 2)** in three general areas: the west terrace (operations T-2E, T-19, T-31), on the west citadel (operations T-21, T-23, T-24, T-26, T-28, T-30) and on the east citadel (operations T-20, T-22, T-27, T-32, T-33, T-34). On the western terrace, we completed the excavation of the T-2E sanctuary (henceforth, sanctuary 1) described in our previous preliminary report,[6] uncovering a small 12.5 m^2 area in the northeast corner of the building. In addition, we completed the excavation of T-19, a 110 m^2 operation near the center of the terrace, and initiated the excavation of T-31, a 50 m^2 trench, on the northern end of the terrace.[7] On the west citadel, we excavated two adjacent trenches (T-21, T-23) with a total area of 104.2 m^2, and three 5×10 m operations T-26, T-28, and T-30 which continued a line of excavations along the western rim initiated in 2002. In addition, operation T-24 was excavated as a single 5×5 m operation near the northern edge of the summit. On the east citadel, we completed the excavation of T-20, an operation initiated in 2006 and extended investigations in the area with five additional operations (T-22, T-27, T-32–34), covering a total area of 271.2 m^2. Lastly, in concert with a remote sensing project at the site,[8] we opened a small 2×3 m exploratory sounding (T-29) north of the main hill.

The stratigraphy in all excavation units was generally similar, with evidence of two primary cultural levels dating to discrete episodes of settlement during the Early and Late Bronze Ages. Both of these levels were in turn composed of two construction horizons. However, the preservation and robustness of each layer varies considerably in different parts of the settlement, due to a steep slope, the geological characteristics of the outcrop (a folded granodiorite and quartz diorite exposed to severe erosion), and the repeated episodes of destruction and reconstruction that took place during the life of the settlement.

[3] Funding for Project ArAGATS was provided by the National Science Foundation (grant nos. BCS-0964154 and BCS-1147577), the University of Chicago Department of Anthropology Lichtstern Fund (2008), and the IAE NAS RA (2011).

[4] In addition to the authors of this article, the members of the 2008–2011 expeditions included: architects L.Ter-Minasyan (2008, 2010–2011, IAE NAS) and H. Sargsyan (2008, 2010, Yerevan State University), D. Narimanishvili (2010, Tbilisi State University, Georgia), V. Vardazaryan (2011, Yerevan State University), E. Fagan (2008, 2010, University of Chicago), K. Franklin (2008, 2011, University of Chicago), H. Chazin (2010–2011, University of Chicago), K. Kearns (2010–2011, Cornell University), J. Leon (2010–2011, Cornell University), C. Wiktorowicz (2010–2011, Purdue University), J. Nabel (2011, Cornell University). Geodetic surveys at Aparani Berd and Nigavan were conducted by Smbat and Vahe Davtyan. Restoration of ceramic materials described here was conducted by L. Manukyan and A. Ayvazyan (IAE NAS). Conservation of the metal artifacts was completed by L. Atoyants (HMA). Drawings of ArAGATS materials were provided by H. Sargsyan (Fig. 3, 5, 9, 13, 14, 15, 22–1,25, 32,1–6), N. Mkhitaryan (Fig. 6, 7) (IAE NAS), and S.Haroutunian (Fig. 35a, b, c) while artifact photos were done by V. Hakobyan (IAE NAS).

[5] The Project ArAGATS excavation database is available online at http://aragats.arts.cornell.edu. A sandbox read-only version, available to the public, contains extensive descriptions of each locus and find.

[6] Badalyan *et al.* 2008.

[7] Because the excavation of T31 was not completed during the 2011 field season, we will leave a report on it for a future publication.

[8] Lindsay *et al.* 2010.

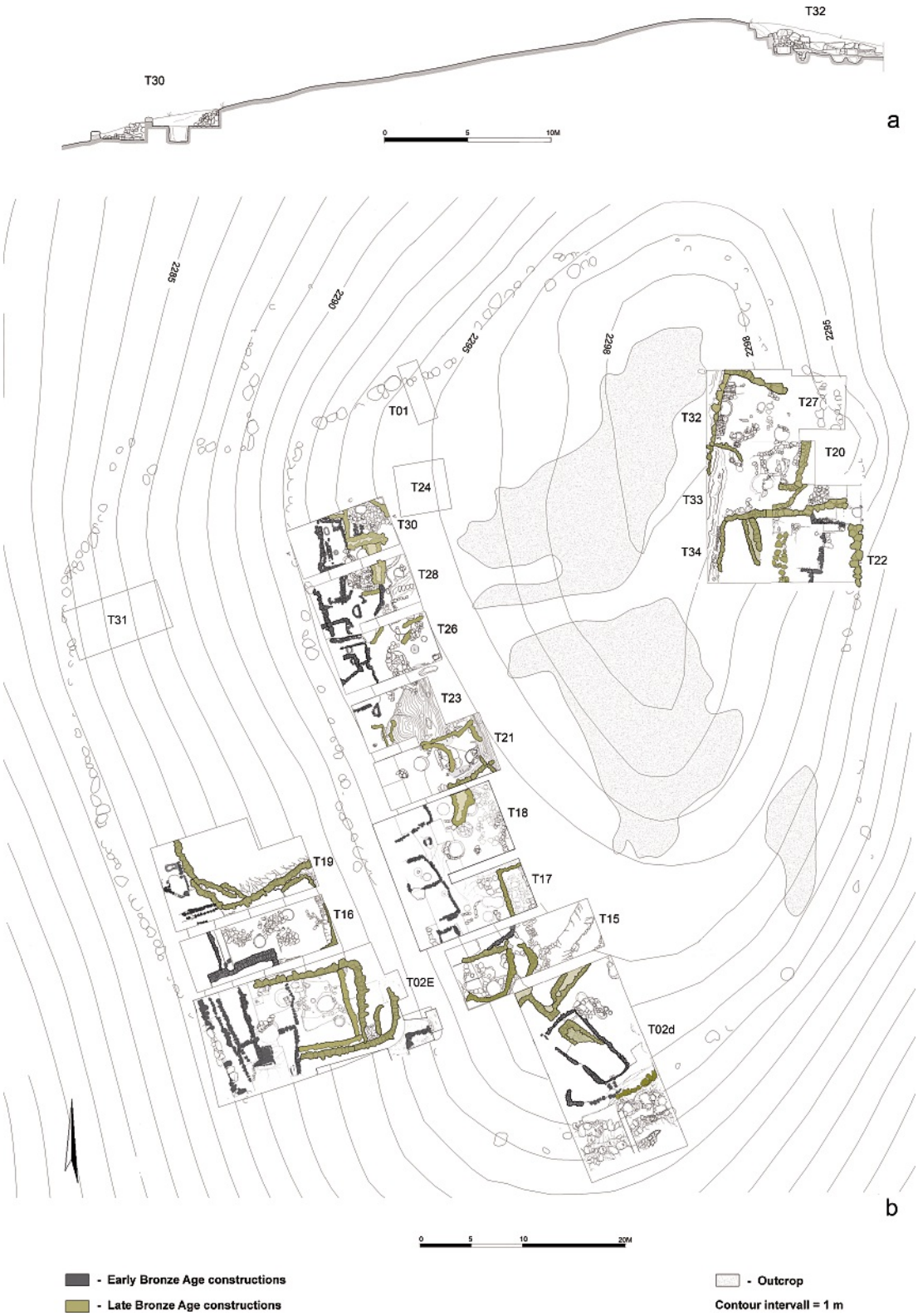

Fig. 2
Map of Gegharot

The Early Bronze Age (Kura-Araxes) settlement

As our prior excavations had revealed, the Early Bronze Age (EB) layers at Gegharot are divided into two horizons, each containing a homogenous and distinct Kura-Araxes ceramic assemblage. The lower horizon consists of ceramics of the "Elar-Aragats" type while the upper horizon is defined by "Karnut-Shengavit" type wares. A series of calibrated radiocarbon determinations suggests that the lower horizon dates to ca. 3350–2900 BC while the upper dates to ca. 2900–2500 BC.[9]

The specific manifestations of this basic stratigraphic schema are distinct in different parts of the settlement. Although EB materials are present to varying degrees in all Gegharot operations, the preservation of EB layers on the citadel is primarily due to the scale and character of Late Bronze Age (LB) construction. Because LB buildings were erected at some distance (approximately 3.5–5.5 m) from the circumferential walls that defined the citadel and terrace, EB levels in that buffer zone remained undisturbed, preserving earlier EB constructions; underneath LB occupation areas, EB remains have survived only as small, fragmentary lenses.

On the west terrace, excavations in T-19 uncovered an intact EB layer in the western portion of the operation. Here, a large LB sub-terracing wall (locus 119/126; see below) divided the excavated area into two parts: an area east of the wall represented by LB cultural deposits and an area to the west with an undisturbed EB occupation layer. This layer was represented by a series of stratified levels of diagnostic materials. The upper level was represented by a concentration of EB ceramic fragments (loci 108, 504, 507), overlapping wall fragments, and limited areas of a preserved floor. The first wall (W1904 locus 122), composed of two rows of stones (1.0 m wide, 3.4 m long) was oriented perpendicular to the slope; only one course of stones was preserved on the lower reaches of the wall (18 cm in height) while three courses remained in the upper (45 cm in height).

To the north of W1904 was a preserved section of an associated floor (locus 112, 2.2 × 3.5 m) which contained *in situ* materials, most notably a fragmented ceramic vessel of the "Karnut-Shengavit" type, a horseshoe-shaped andiron fragment with sheep protome (similar to the discovery of pit 6.2 of T-2E locus 624),[10] and a collection of stone tools including a quern, a cylindrical pestle, a discoid mortar, and a bifaced hand axe that perhaps served as an adze or hoe **(Fig. 3)**. Further to the north, we encountered an irregular triangular stone construction (W1905, 1.6 × 2.0 m) composed on a single course of stones (locus 123) whose function remains unclear.

Just to the north of the locus 112 floor was a stone masonry wall fragment (W1906, 1 m long) and an associated section of an EB floor (loci 509–511) just over 1 m^2, which was articulated with the wall by an adjoining two part hearth with burnt edges (0.5 m in diameter), reinforced around the perimeter by occasional stones. The center of the hearth was filled with a black, organic-rich soil that contained a relatively large collection of botanical material, including barley, wheat, and undefined grains. Within and under the hearth was an *in situ* fragmented vessel.

All of the occupation surfaces defined in operation T-19 can be assigned to Gegharot's upper "Karnut-Shengavit" horizon. Within the west terrace, a number of excavated contexts are stratigraphically related to this occupation level, including an area in T-16 (bounded by walls W205 and W1601), and the upper EB layer uncovered in T-2E (W206–207). It is possible that T-19's upper EB horizon covers an earlier EB I layer, as was the case in T-16 and T-2E. This possibility is indicated by both a few fragments of pottery decorated with dimple ornaments ("Elar-Aragats" type) such as those known from T-31 and possibly by the radiocarbon determination from T-19 locus 112 AA-92844 (see discussion below).

While the 2008–2011 excavations on Gegharot's west terrace uncovered only the upper layer of EB occupation at the site, excavations on the west citadel provided a complete stratigraphic picture of EB cultural layers **(Fig. 4)**.[11] On the western edge of the citadel, the preservation of EB levels was primarily due to the buffer area that later LB inhabitants maintained between the perimeter wall and their primary occupation areas. In this intervening space (the western portions of operations T-23, T-26, T-28, and T-30), two EB horizons were left relatively undisturbed.

In the eastern portion of operations T-21 and T-26, EB levels survived only as lenses of fragmented ceramic vessels lying directly under LB deposits. In the eastern half of T-21, thin (10–16 cm) charred black and orange lenses of EB cultural layers were preserved (locus 35: 2.50 × 0.50 m and locus 39: 1.60 × 0.90 m). In the northern sec-

[9] Badalyan *et al.* 2008; Badalyan *et al.* 2010; Бадалян 2011.

[10] Бадалян/Смит 2008, table IV, 9; Badalyan *et al.* 2008, 56, Fig.13.

[11] The lower "Elar-Aragats" horizon was documented on the west terrace during our earlier investigations in operation T-2E (Badalyan *et al.* 2008).

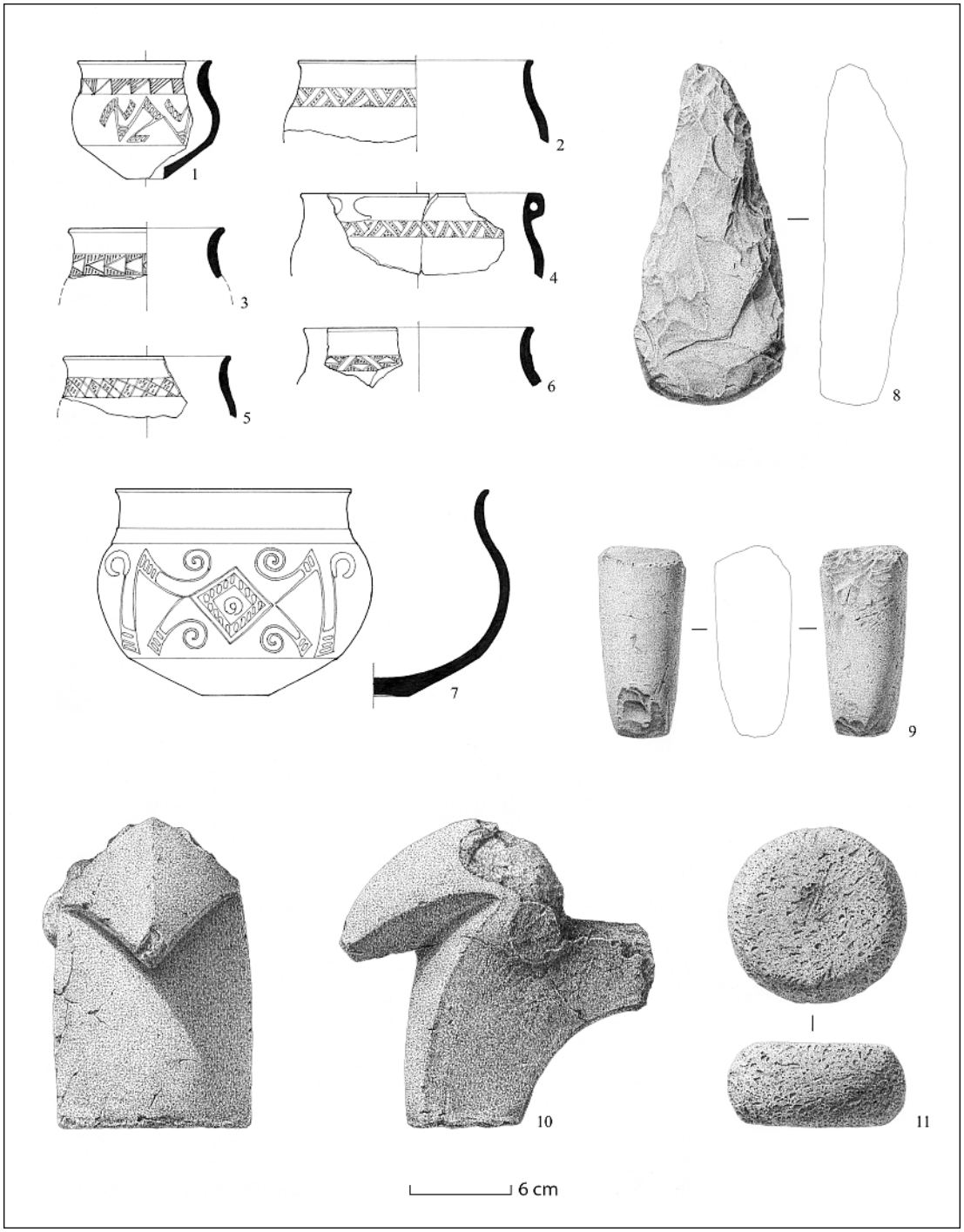

Fig. 3
Gegharot. Materials from the Upper EB level of T-19. 1–7 ceramic; 8–9, 11 stone; 10 fragment of ceramic andiron

tion of the operation, the EB layer extended underneath a LB wall (W2104). This layer contained a large number of richly ornamented pottery of the "Karnut-Shengavit" type, comprising at least 13 vessels (locus 35) **(Fig. 5)**, one of which must be specially noted. It is a vessel in the form of the classic "Karnut-Shengavit" cup, the lower body of which, however, has an intricate profile that may have led to an open base **(Fig. 5,5)**; a fragment with a similar profile was discovered at the settle-

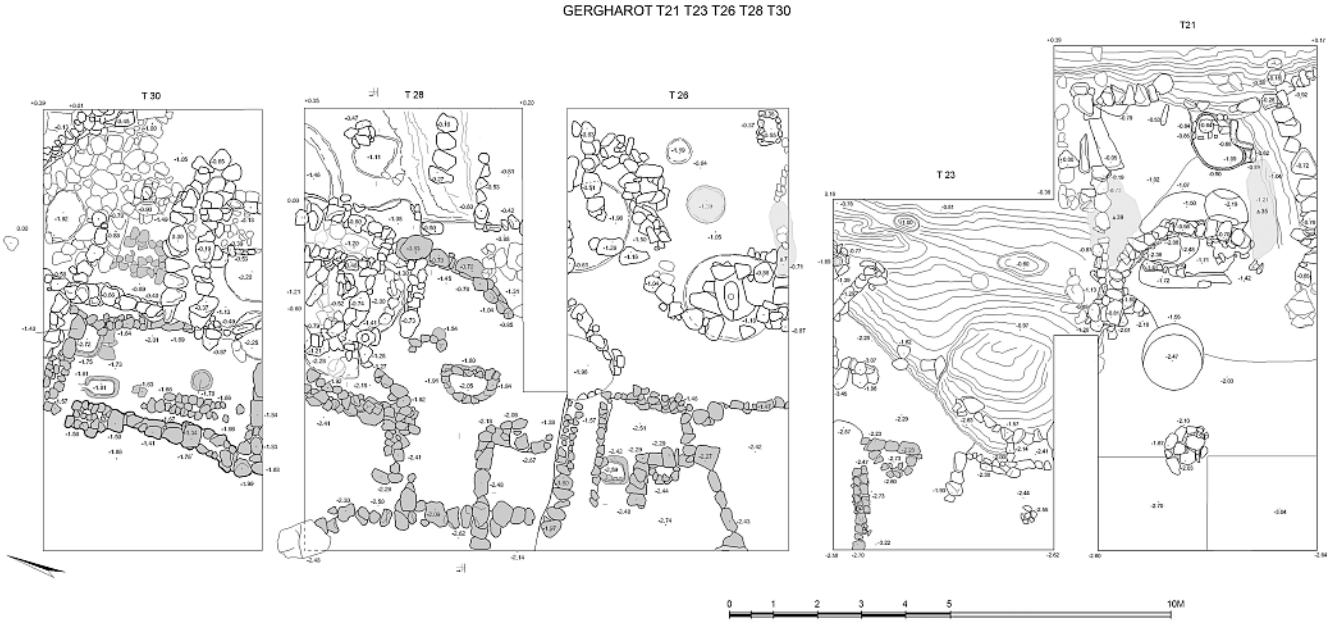

Fig. 4
Gegharot. Plan of west citadel operations T-21, T-23, T-26, T-28, and T-30. EB constructions shaded in gray

ment of Karnut in the adjacent Shirak Plain.[12] Perhaps these vessels are fragments of vases, censers, or so-called double-vessels – jars with a rim shaped like a bowl or goblet similar to those from Serkertepe[13] in north-east Azerbaijan and Torpakh-kala[14] in Dagestan (in the latter example, however, the upper cup was not connected to the lower opening). A radiocarbon date (Bln-5374; 4255 ± 39 BP) from Torpakh-kala points to a date contemporary with the "Karnut-Shengavit" (upper EB) layers at Gegharot.[15] An equally rich lens of the upper EB floor was found in locus 39 (2.5 m northwest of locus 35). Amongst the dense assemblage of "Karnut-Shengavit" pottery **(Fig. 6)** was an arsenical bronze double-pointed awl (length = 2.3 cm, see discussion of ArAGATS metals below).

The next fragment of the "Karnut-Shengavit" horizon was uncovered in operation T-26, separated from the previous floors by the large rock outcrop which occupied much of T-23 (locus 7, 6.5 m north-northwest of T-21 locus 39). Here, a burnt orange clay lens 0.6 × 1.5 m in area was preserved under the LB floor along the southern edge of the excavation unit in a shallow (30 cm), possibly artificial, depression in the bedrock. Among the ceramic inventory **(Fig. 7)** it is important to note a miniature cup that had been restored during the EBA with bitumen **(Figs. 7,8)**.[16]

The lower (western) half of T-21 was greatly eroded by the encroaching slope. No EB level was preserved, only a homogenous assemblage of EB ceramics within deposits of fine sand formed by the destruction of the granite substrate. Within this 15–20 cm thick sandy deposit (locus 36), EB ceramic fragments covered an area of 2.2 × 4.3 m. No constructions or floors were found in association with this assemblage. However, its stratigraphic position corresponds to the floor in operation T-18 (locus 29, excavated in 2006), which included two large *in situ* EB vessels, set into the floor.

On the lower, western, portions of T-26 and T-28, we uncovered two EB occupation levels. The upper horizon (elev. 2292.21–2291.88 m a.s.l.), which corresponds stratigraphically to the floors discussed above, included a rectangular room in the western portion of T-26 bounded by stone masonry walls (W2601 and W2602). The north wall (W2602, lo-

[12] Storage of the Museum of the History of Armenia no. 3017/31.
[13] Мусаев 2006, 44, Table XXIII,2.
[14] Гаджиев/Магомедов 2008, 280 Fig. 4,7–8.
[15] Гаджиев/Магомедов 2008, 281.

[16] Analysis of the bitumen at the Institute of Geological Sciences of NAS RA (P.Tozalakyan, R.Gazumyan) confirmed that the substance was a metamorphic bitumen of the asphalt class. The use of bitumen for the restoration of small vessels (filling cracks, repairing edges) and joining separately manufactured parts (e.g., the neck and body of medium-sized jars) has been repeatedly observed on Gegharot materials (e.g., T-2c locus 10/T-2E locus 110; T-2E, loci 538 and 555; T-20 loci 9–10). A number of examples (e.g., Gegharot T-19 locus 501; Aragatsi Berd AB4 locus 7) show that the edge of the body and necks were corrugated in order to create a better surface for joining. The use of bitumen has also been recorded in the Kura-Araxes ceramics of settlements at Mets Sepasar, Tsaghkasar, Teghout I (Dzori Gex), and the tomb at Ardasubani.

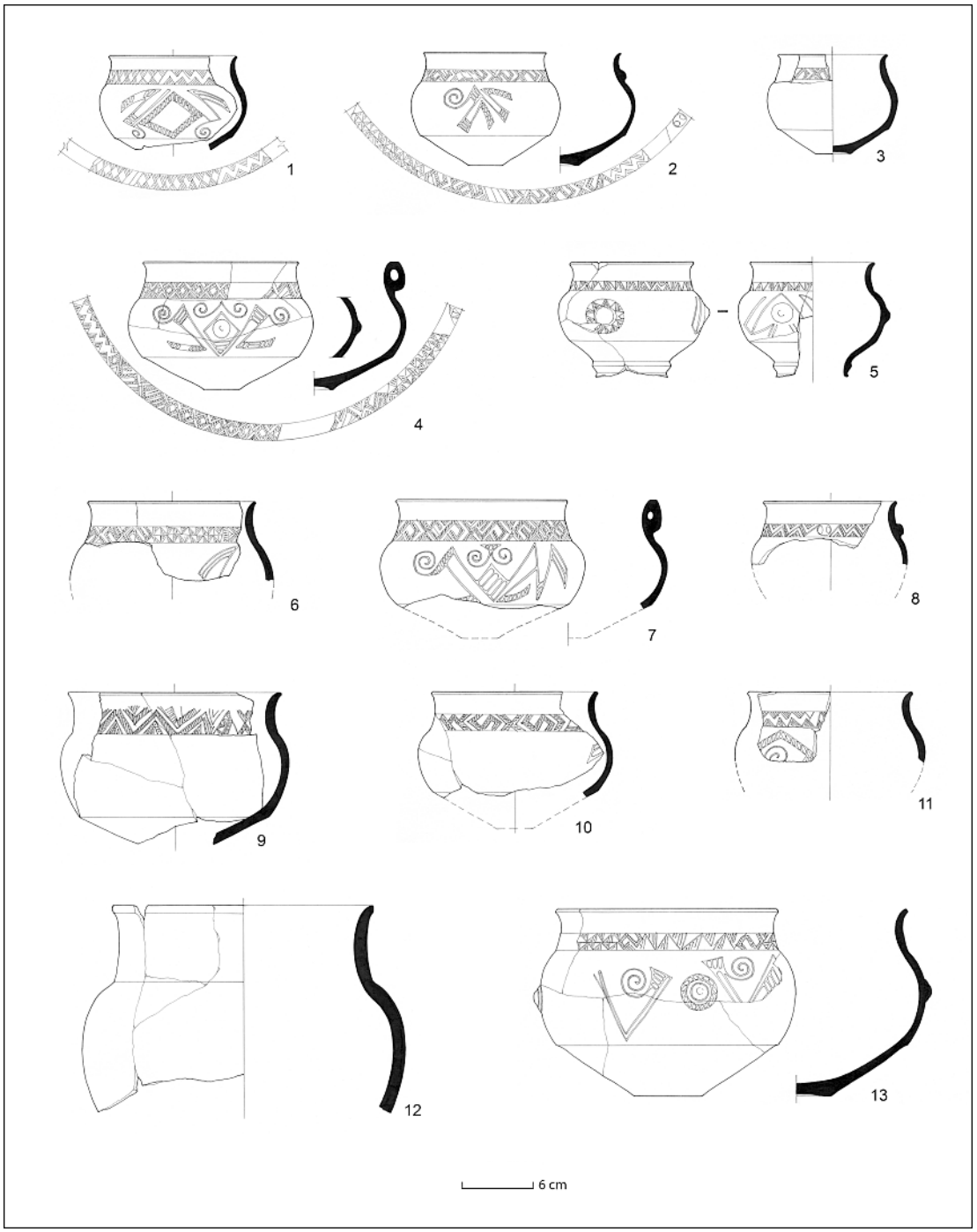

Fig. 5 Gegharot. EB ceramics from operation T-21 locus 35

cus 31) was 2.6 m long and 0.2 m wide, preserved in 1–3 courses of stones to a height of 0.30–0.37 m.

The eastern wall of the room (W2601's northern half, locus 30) was constructed of regular stone masonry, 0.26 m wide in 1–2 lines of stones and 2.2 m in length, preserved to a height of 3–5 courses (0.35–0.55 m). The southern continuation of W2601, 2 m in length, was highly disturbed, perhaps due to an episode of collapse and partial reconstruction. Interestingly, 2.2 meters south of the corner of W2601 and W2602 we uncovered a small perpendicular line of stones, 1,45 m in length, sug-

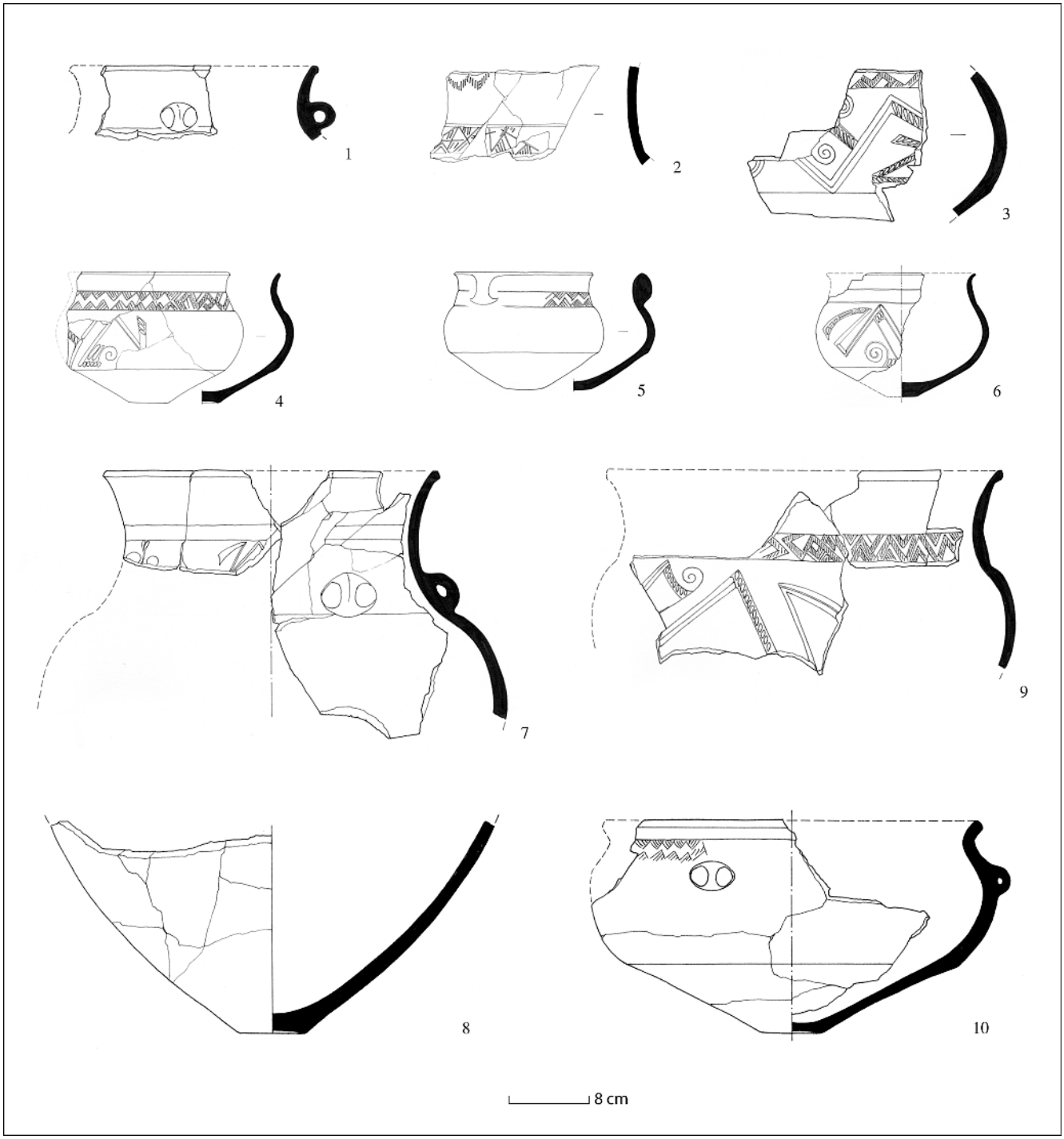

Fig. 6
Gegharot. EB ceramics from T-21 locus 39

gestive of a partition. The subsequent discovery underneath these stones of a hearth (locus 8) suggests this rudimentary construction was associated with a rebuilding episode. The hearth was made from a fragment of a large EB vessel set in a shallow pit, encircled by small stones and encircled by a clay ring. The floor of the room (loci 2, 5) included EB ceramics, a flint sickle blade, and fragments of obsidian. The general lack of *in situ* materials suggests that the building was abandoned.

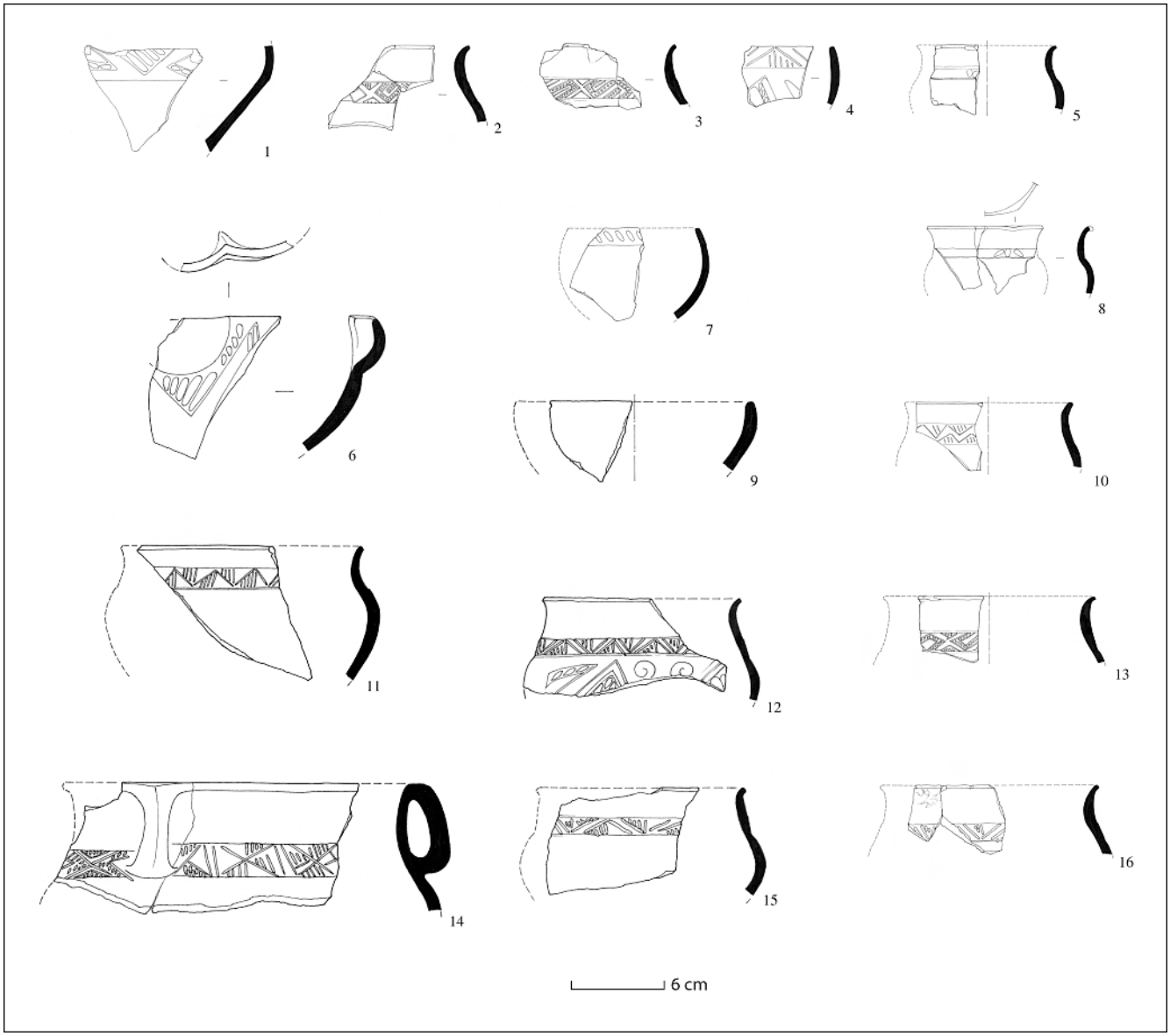

Fig. 7
Gegharot. EB ceramics from T-26 locus 7

Near the center of the adjacent operation, T-28, we encountered the remnants of the same upper EB layer with clay floors, bounded to the east and southeast by wall W2806 (locus 29). This curved stone masonry construction, 3.2 m long and 0.5 m wide, was built of fairly large stones[17] and was preserved in 2 courses to a height of 0.57 m. A yellow clay floor (locus 12, 21) 3.5 × 3.9 m and 5–12 cm thick was recorded at an absolute elevation of 2292.15 m a.s.l. In addition to ceramic fragments and stone tools, the floor was littered with an unusually large number of animal bones. A section of the floor immediately adjacent to wall W2806 (locus 12) was very densely packed and contained only very small pottery sherds and pieces of highly fragmented, calcified bone. Some areas included multiple floor layers that were most visible on the southern edge of the operation. Near the center of the floor, covered by the last episode of re-flooring, was a small shallow hearth (locus 22) 35 × 26 cm, surrounded by a circle of scorched earth. Below this upper floor was a sandy erosional deposit containing EB ceramics and a large number of animal bones (locus 20). At 0.5 meters parallel to the western end of W2810,

[17] Average stone dimensions: 25/40/55 × 35/50/75 × 25/30 cm.

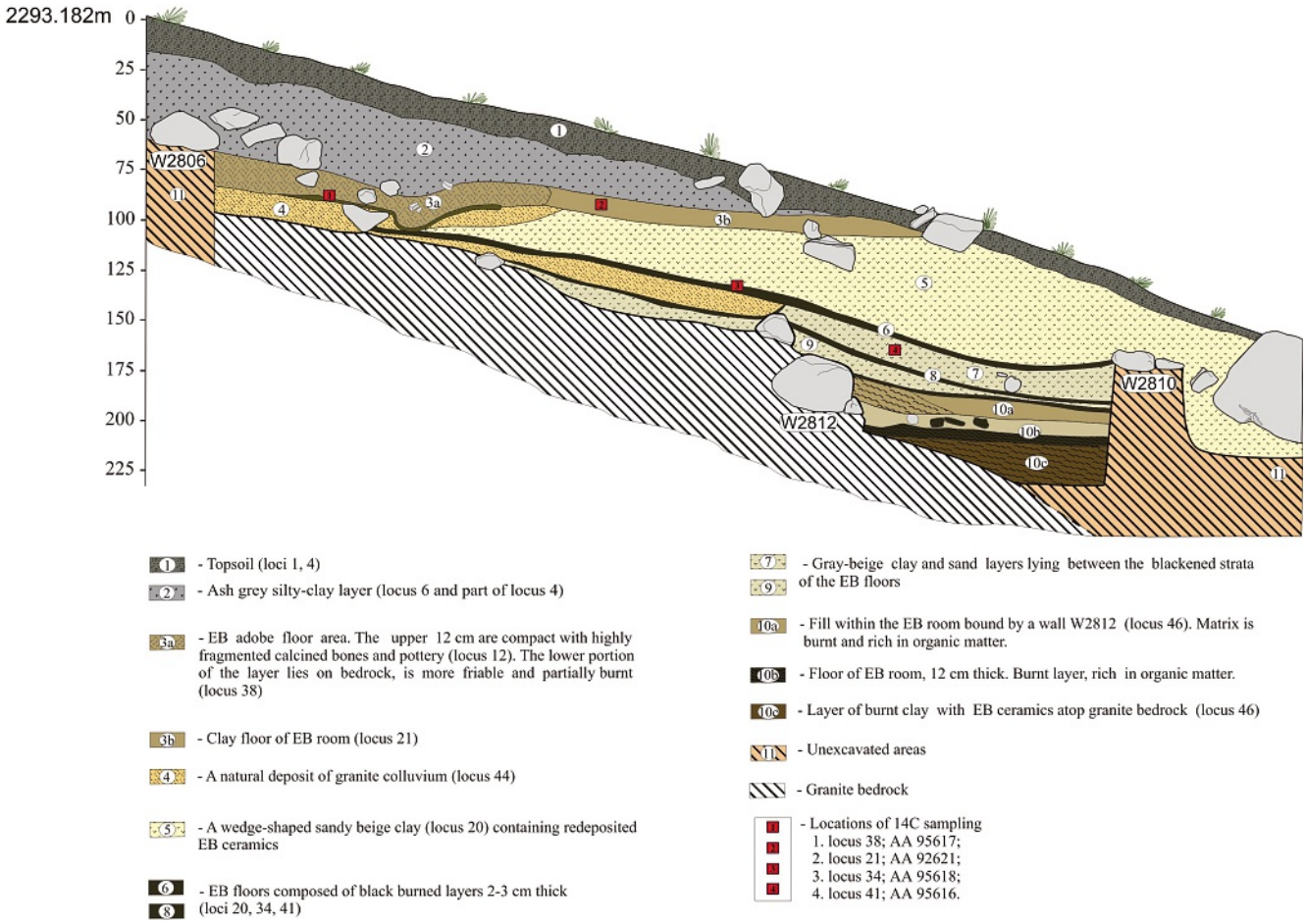

Fig. 8 Gegharot. Stratigraphic section from operation T-28, south baulk

was a line of large stones (locus 33).[18] The wall blocks extending perpendicular to wall W2812's lower course were separated from it by a thin layer of soil.

The excavation of T-30 revealed a single large EB room in the western half of the trench that was stratigraphically and planigraphically correlated with the T-28 structures discussed above. The room is defined on its western edge by a complex stone masonry wall, W3006 (length 3.8 m). The central portion of the wall (0.3–0.4 m wide) is composed of a number of large stones, while the northern (0.5–0.6 m wide) and southern (0.5 m wide) sections are composed of small rounded cobbles in two or three courses. The wall delimits a clay floor that was littered with EB ceramics (loci 22, 23, elev. 2292.20–2291.94 m a.s.l.). Set into the floor, 20 cm east of W3006 was a small (0.45 m wide) cobble "platform" (W3008) built of two-three parallel rows of stones. The northern boundary of the room was defined by wall W3009 (2 m long, 0.45 m wide). In the northeast corner of the room was an open bell-shaped pit (locus 28), 0.50 m in diameter at the mouth. The pit was dug into the bedrock and the opening was defined by a rim of clay 10–12 cm wide. The walls of the pit were lined with small stones in some places. The pit was excavated to a depth of 2.8 m below the EB surface, but the bottom was not reached prior to the end of the 2011 field season. At a depth of 2.4 m we encountered a burnt layer which included pieces of charcoal. It is not clear at present whether this layer was deposited as part of the original operation of the pit or if it was the result of a subsequent depositional event.

Half a meter west of the pit was a hearth-furnace (locus 29; elev. 2292.01 m a.s.l.). It is possible that this oval (0.5 × 0.9 m) feature had an arched roof, as evidenced by the collapsed remains of baked clay within the chamber found lying with their inner sides face down. The collapsed pieces of

[18] Average stone size: 25/45/60 × 35/55/60 cm.

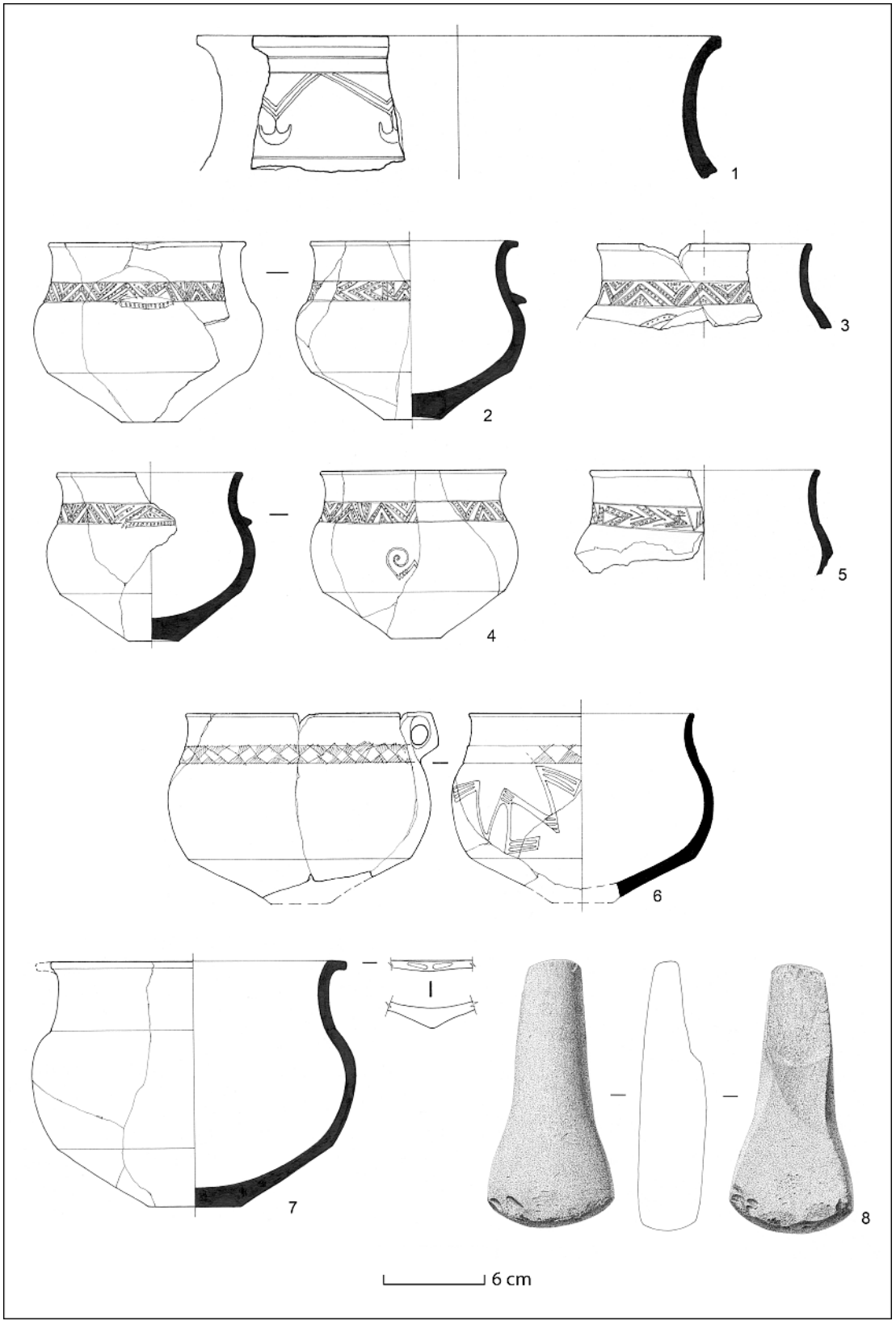

Fig. 9
Gegharot. EB materials from operation T-20 locus 104. – 1–7 ceramic; 8 stone

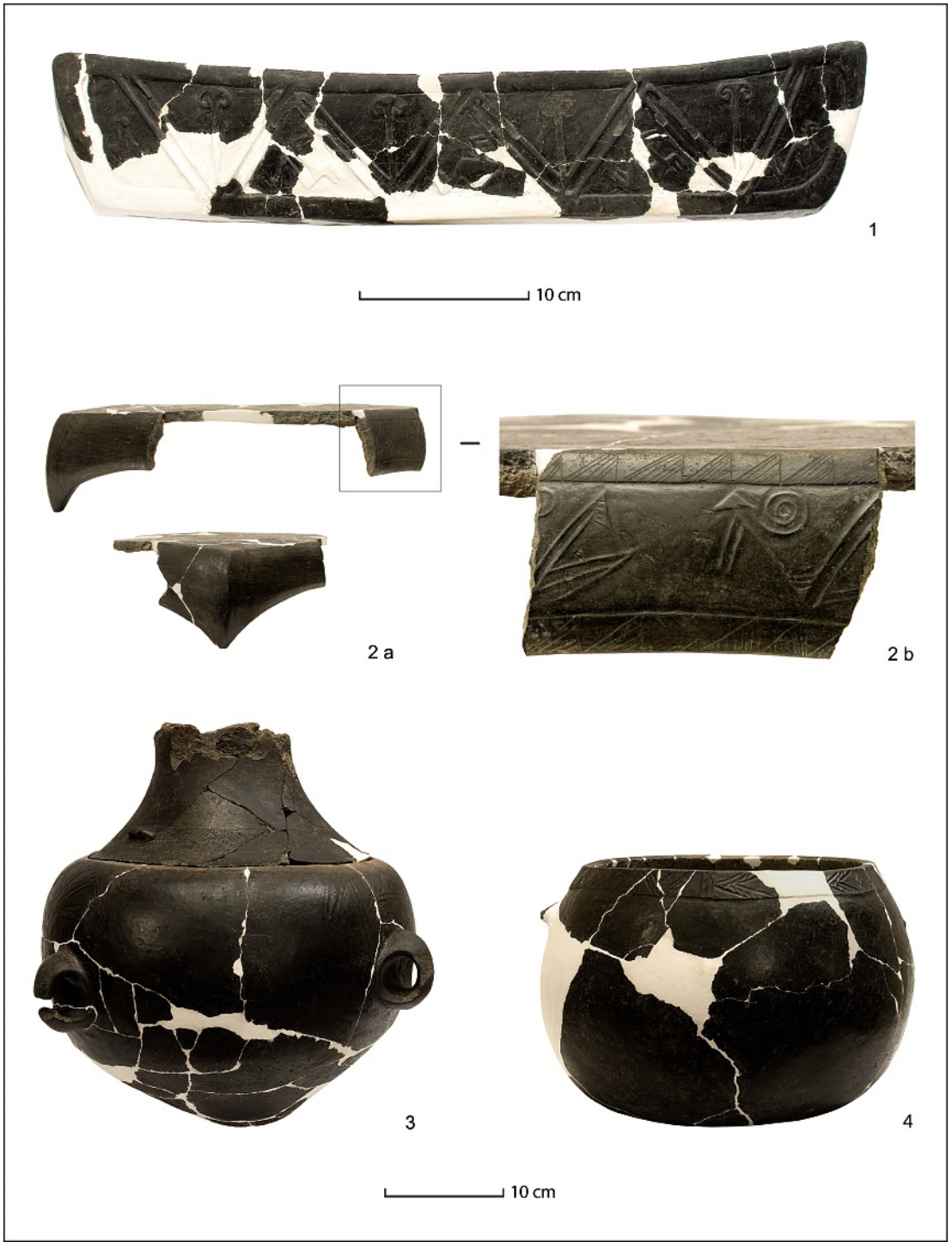

Fig. 10
Gegharot. Photos of EB unique finds. – 1 EB plaque from T-22 locus 115 (dimensions: length 44 cm bottom, 49.2 cm top; height 8.5 cm middle, 10.2 cm sides; – 2 EB "table" from T-30 locus 22. a profile; b detail of ornamentation (without scale); – 3 EB ceramic vessel from T-22 locus 9–10 made in two parts and joined with bitumen; – 4 EB ceramic vessel from T-22 locus 9–10

baked clay were marked with traces of finger impressions, as was the trough-shaped bottom of the furnace. The northern end of the furnace narrows at the neck to a diameter of 18 cm. The clay walls of the construction were 2 cm thick. Near the opening was found a cylindrical tripod cup, decorated with geometric patterns. The cup is morphologically similar to an unornamented vessel found in the "Kar-

nut-Shengavit" levels of T-2E.[19] 2.15 meters south of the hearth-oven we uncovered a circular shallow depression[20] cut into the bedrock (30 cm in diameter, 12 cm deep), lined and rimmed with clay (the clay rim was 0.6 m thick) (locus 32; elev. 2292.11 m a.s.l.). This hearth was highly burned. Traces of a similar feature were discovered 1 m to the northeast (locus 32) extending underneath the LB wall W3001. Along the southern edge of the room, we excavated a number of stones that may comprise the south wall of the room. This construction was disturbed by a LB pit (locus 30) which cut through the EB floor. Another stone wall or platform (W3011) was excavated parallel to the LB wall W3004; W3011 encircles the eastern edge of the bell-shaped pit (locus 28). It appears that the construction of the LB wall W3004 destroyed the eastern wall of the EB room. In any case, within the area delimited by LB walls in the eastern half of T-30, we encountered a large concentration of EB material (locus 13). The entire floor area was covered with dense clusters of EB ceramics, most notably a "table" on four legs with ornamentation on one side **(Fig. 10,2)**. The only non-ceramic artifacts from the room were a flint sickle blade, a tuff disc, and a pumice tool.

The western portions of T-26 and T-28, the upper EB level described above, contained a diverse assemblage of "Karnut-Shengavit" pottery, and covered an earlier EB horizon. The most complete stratigraphic picture of EB cultural deposits was provided by the excavation of T-28 **(Fig. 8)**. Here, the floor of the upper horizon (loci 12 and 21 bounded by wall W2806) sealed the sand deposit which contained re-deposited EB ceramics. The shape and texture of the intervening sand layer indicated a relatively long period of erosional accumulation. At the same time, the sand layer's flat horizontal upper limit suggests that the surface was graded in ordered to provide a level surface for the construction of the upper EB occupation. Wall W2810, discussed above, served as a terrace wall for the upper horizon, delimiting the citadel embankment. Underneath the layer of sand lay a 55–65 cm thick horizon, featuring a series of thin 2–3 cm black burnt layers angled down slope (loci 20, 34, 41) and separated by intermittent lenses of granitic sand. Underneath these layers, we uncovered two rooms, portions of which extend under the northern and southern baulks and under wall W2810. The rooms were rectilinear, oriented along a north-south axis. The extant portions of the northern room define a 2–2.5 × 2.3 m space; the surviving portion of the south room was 1–1.25 × 2.4 m in area. The walls were defined by one or two courses of large and small stones set directly on the bedrock. In the southern area (locus 46, elev. 2291.55 m a.s.l.) we recorded a floor on which lay rectangular blocks of clay, flat stones, and ceramic sherds. The central floor area was bordered by a thin strip (2 cm) of yellow clay which ran along the base of the walls, perhaps indicating the eroded remains of clay plastering. The primary material excavated from these rooms was ceramic sherds, as well as several fragments of andirons, including a piece of a rectangular stand with an embossed spiral ornament. Fragments of four- and/or three-legged potstands with similar patterns are known from the excavations at Shirakavan and burial 9 at Keti.[21]

Constructions uncovered in the western third of T-26 correspond stratigraphically and planigraphically with the lower horizon rooms located in T-28. The lower EB level in T-26 is represented by a trapezoidal room with a clay hearth. This room (locus 27) is smaller than the upper horizon room (1.3–1.9 m N-S × 1.85 m E-W). It is delimited by walls W2609, W2610, and W2611 (loci 38, 39, 40) and extends under the western baulk of the excavation unit. The walls were built of flat stone blocks preserved in 1–2 courses of masonry. A small (70 × 35 cm) semicircular construction of pebbles was set against the eastern wall (W2610), from which we recovered a fragment of a quern. At a depth of 2291.26 m a.s.l. we encountered largely sterile granitic sand that marked the base of our excavations.

A small line of stones built against the eastern (external) façade of W2610 divides the deposits into two discrete portions. To the south we encountered largely sterile granitic sand while to the north deposits were composed of brown clay with high artifact densities. Between walls W2602 and W2609 at a depth of 2291.45 m a.s.l. we uncovered a construction of highly fired clay. The poor preservation of the feature precludes a restoration of the shape of the construction, but it was most likely a round hearth 0.65 m in diameter. Within the feature we recovered only fragments of burnt clay and fragments of an obsidian arrowhead. A similar point was found under the EB wall W2601. In general, the artifactual remains from the floor layer consisted primarily of ceramic sherds. To put the T-26/28 lower horizon constructions in a wider context,

[19] Badalyan *et al.* 2008, Fig. 12b.

[20] The presence in the same room of standard round hearths and a vaulted oven trains our attention on the specific function of the latter feature. There are no characteristic elements that allow us to identify the specific function of the furnace. However, its shape and size are similar to the smelting furnaces excavated on the second hill of Babadervish (see Махмудов *et al.* 1968).

[21] Torosyan *et al.* 2002, 14, Table II,6; Петросян 1989, 45 Table 34, Fig. 4.

Fig. 11
Gegharot. EB bronze artifacts. – 1 Pendant from T-29 locus 4 (dimensions: 3.3 cm long, 1.85 cm maximum width, 0.1–0.2 cm thick, 3.1 g.); – 2 Beads from T-22 locus 115 (dimensions: 0.8–0.9 cm in diameter, 0.45–0.55 cm thick, 1.0–1.1 g)

they are similar in layout and orientation to the rooms uncovered in T-17/18 and define a single stratigraphic and planigraphic unit.

In the east citadel operations **(Fig. 16)**, EB occupation levels were discovered in the central and southern areas of operation T-20. Here we uncovered a 3.7 m long retaining wall oriented on a north-south axis (locus 105) which created a small terrace 100–120 cm high. Atop the terrace we uncovered fragments of a clay floor (locus 104, 6–10 cm thick) strewn with an inventory of *in situ* artifacts, including intact (locus 108) and fragmented "Karnut – Shengavit" ceramic vessels and stone tools **(Fig. 9)**; the southern portion of the same floor, excavated in 2006, contained fragments of ceramics, complete vessels **(Fig 10,3–4)** and a hearth (loci 9–10). Near the retaining wall, intruding into the embankment was a pit (locus 109) 30–35 cm in diameter and 40 cm deep, containing only a few fragments of pottery. The floor area, which seems from the artifactual remains to have hosted domestic activities, appears to have been an exterior space as it was not planigraphically associated with any extant wall constructions. However, to the north and south of the floor, we uncovered corner fragments of contemporary buildings and their corresponding interiors, defined by walls of one or two courses of small stones (15–20 cm). Inside the surviving area of the northern building (Locus 107) we recovered a large assemblage of EB ceramic fragments (approximately 1,500 sherds, of which only 24 belonged to the LB), while lithic and bone densities were only moderate.

In operation T-22, EB layers were represented by both sporadic finds of "Karnut-Shengavit" pottery and a high density deposit of ceramic fragments (locus 108) set directly on the bedrock. This deposit lacked a clear context due to both the erosion of the slope and later LB construction. The only associated architectural element was a single row of stones that may represent a surviving fragment of a wall which defined the eastern limit of the occupation. The material assemblages from locus 108 include black burnished pottery fragments with ornamentation in high relief in the form of single and double (?) spirals combined with lozenges bearing (possibly zoomorphic) figures, a bird with a triangular body, and large dimple ornaments (diameter 1.5–2.0 cm). These materials can be typologically assigned to the "Elar-Aragats" early EB complex.

Several notable finds came from a partially disturbed context and thus cannot be securely assigned to a specific EB horizon. Among the materials excavated in T-22, those from locus 115 deserve special note. First, we recovered fragments of a rectangular "plaque" with smooth raised sides and a flat bottom that was tapered on both ends **(Fig. 10,1)**. The internal space of the upper surface is divided into nine fields by a series of alternating triangles formed by paired lines in relief. Inside the four upside down triangles are vertical rods with double volutes; four of the five triangular fields (one was not preserved) contained ornithomorphic images. A series of similar finds comes from Gyuzelovy[22] and fragmentary comparanda are also known from Sos Höyük.[23] Second, the excavation of T-22 locus 115 revealed two copper biconical beads similar to those found in sealed contexts from the Kura-Araxes burials 22, 29, 35 at Aradetis Orgora,[24] burial 8 at Kvatskhelebi, and burials 2, 3, and 4 at Tulepia (Tvlepias Tskaro).[25]

Although our extramural sounding, operation T-29, did not locate a preserved occupation layer, we did recover (locus 4) a bronze triangular pendant with two symmetrical volutes at the top and lateral loop for hanging **(Fig. 11,1)**. The pendant has no direct analogues, but the motif of paired spirals closely resembles the anchor-shaped pendants on the EB necklace from operation T-2d at Gegharot **(Fig. 32,1)**.[26]

To summarize our 2008–2011 investigations of the EB at Gegharot, we should first note the similar stratigraphic pattern on the west terrace (T-2E) and west citadel (T-28). Both stratigraphic col-

[22] Koşay/Vary 1967, 42, Lev. XII, XXXVII, G.131, G.178, G.206.
[23] Sagona *et al.* 1995, Fig. 8:8; Sagona *et al.* 1996, Fig. 11:5, 6; Sagona *et al.* 1997, Fig.7:5.
[24] Koridze/Palumbi 2008, 128 Fig. 5.4; 131 Fig. 16.3; 133 Fig. 19.3; ღამბაშიძე *et al.* 2010, Table XI.
[25] Glonti *et al.* 2008; ღამბაშიძე *et al.* 2010, Table VIII.
[26] Smith *et al.* 2004, Fig. 15; Hayrapetyan 2005; Meliksetian *et al.* 2009.

Site	Operation	Material	Lab Number	14C Date (BP)	Calibrated Date (BC) 95.4% Probability
Gegharot, 2008	T-20, l.104	charcoal	AA-92623	4283 ± 40	3020–2763
Gegharot, 2008	T-19, l.112	charcoal	AA-92844	4620 ± 120	3646–3017
Gegharot, 2010	T-22, l.105	charcoal	AA-92622	4128 ± 41	2872–2580
Gegharot, 2010	T-28, l.21	charcoal	AA-92621	4104 ± 40	2872–2500
Gegharot, 2011	T-28, l.38	charcoal	AA-95617	4119 ± 42	2873–2576
Gegharot, 2011	T-30, l.22	charcoal	AA-95615	4204 ± 52	2906–2630
Gegharot, 2011	T-28, l.41	charcoal	AA-95616	4374 ± 42	3263–2899
Gegharot, 2011	T-28, l.34	charcoal	AA-95618	4391 ± 49	3325–2902

Tab. 1
Radiocarbon determinations related to Gegharot EBA contexts from the 2008–2011 field seasons (calibrations by OxCal v. 4.1.7 Bronk Ramsay 2010 r. 5)

umns contained discrete EB layers comprised of two isolated horizons, each of which was characterized by a distinct ceramic complex, "Karnut-Shengavit" and "Elar-Aragats". The hiatus between the two primary phases of EB occupation was marked by a pronounced wedge-shaped layer of sandy colluvial soil, which was, according to the extant radiocarbon dates, relatively brief.

Of the eight radiocarbon determinations submitted from the EB layers excavated at Gegharot from 2008–2011 **(Tab. 1)**, six (AA-92623, AA-92844, AA-92622, AA-92621, AA-95617, AA-95615) belong to the upper "Karnut-Shengavit" horizon. Most of the dates fit comfortably within the date range of 2900–2500 BC defined for this occupation by prior determinations, although the results of AA-92623 only partially correspond to this range. The sample from T-19 locus 112 (AA-92844) was stratigraphically linked to the upper "Karnut-Shengavit" horizon, so its surprisingly early date may indicate disturbance of an earlier horizon by later construction. In any case, the magnitude of the statistical range for this sample makes it a less useful determination. Lastly, the dating of the lower "Elar-Aragats" horizon, defined by samples AA-95616 and AA-95618, indicates a range of 3350–2900 BC, supporting previous determinations for the age of the lower horizon of EB settlement at Gegharot.

The division of the EB levels at Gegharot into two distinct horizons makes possible an examination of change over time in the fauna at the site, albeit on a limited scale. As with all of the other faunal samples from the Tsaghkahovit Plain, both of the EB faunal sample sets from Gegharot are composed primarily of mammals,[27] the Karnut-Shengavit sample also contains snake and toad remains, and both have birds of varying sizes, but these non-mammalian remains are rare (see **Tab. 2)**. Among the mammals identified to the level of genus, sheep and goats form the majority of both samples, but the Elar-Aragats sample has a significantly higher proportion of cattle than does the Karnut-Shengavit sample, which more closely resembles other Tsaghkahovit Plain assemblages. Equids are present in both samples; however, only in the Karnut-Shengavit sample could they be identified more specifically, with one domesticated horse (T-19.6) and one onager present. Pigs are present in the Karnut-Shengavit sample (from T-19.109, T-26.05, T-28.11), but absent from the Elar-Aragats sample.

Given the small size of the Elar-Aragats sample, no further work could be done to examine herding patterns within this horizon. Survivorship was calculated for sheep and goats in the Karnut-Shengavit sample, but even this suffered from sample size issues. Only Stage A had a sufficiently large sample size to be considered reliable; survivorship in this stage is comparable to that in other Tsaghkahovit Plain samples (see **Tab. 3)**. Survivorship in the other two stages, especially Stage C, is extremely low and would indicate a herd that was not viable, but the sample size for both stages makes these figures suspect.

It has been suggested that settlement in the EB period became more nomadic over time,[28] and the higher proportion of cattle in the earlier horizon at Gegharot might support this idea. However, the presence of pigs, albeit in small quantities, in the Karnut-Shengavit sample suggests that the population was not entirely nomadic. Nevertheless, the differences in the two samples indicate an intriguing divergence in pastoral practices between the two horizons of the EBA.

[27] Only the fauna from contexts which could be identified definitively as Elar-Aragats or Karnut-Shengavit are included in this analysis. The total analyzed Early Bronze Age fauna sample includes additional contexts that have not been assigned to a specific sub-horizon.

[28] e.g. Kushnareva 1997.

		Gegharot Early Bronze Elar-Aragats			Gegharot Early Bronze Karnut-Shengavit		
		NISP	% NISP	% NISP to genus	NISP	% NISP	% NISP to genus
Bufonidae	Toads	0	0.00%		23	0.81%	
Squamata	Snakes	0	0.00%		1	0.04%	
Fish		0	0.00%		3	0.11%	
Large bird		2	0.19%		0	0.00%	
Medium bird		1	0.09%		0	0.00%	
Small bird		0	0.00%		1	0.04%	
Indeterminate		656	61.71%		810	28.64%	
Large mammal		85	8.00%		419	14.82%	
Medium mammal		126	11.85%		571	20.19%	
Small mammal		3	0.28%		42	1.49%	
Artiodactyl		0	0.00%		0	0.00%	
Large artiodactyl		0	0.00%		0	0.00%	
Medium artiodactyl		0	0.00%		0	0.00%	
Bovid		3	0.28%		1	0.04%	
Bos	Cattle	85	8.00%	49.95%	207	7.32%	22.28%
Capra	Goat	4	0.38%	2.16%	37	1.31%	3.98%
Ovis	Sheep	6	0.56%	3.24%	120	4.24%	12.92%
Gazella	Gazelle	1	0.09%	0.54%	2	0.07%	22.00%
Ovis-Capra-Gazella		1	0.09%		0	0.00%	
Ovis-Capra		83	7.81%	44.86%	442	15.63%	47.58%
Cervid		0	0.00%		23	0.81%	
Cervus	Red deer	1	0.09%	0.54%	1	0.04%	0.11%
Dama	Fallow deer	0	0.00%	0.00%	1	0.04%	0.11%
Equus		2	0.19%		4	0.14%	0.43%
Equus caballus	Horse	0	0.00%	0.00%	1	0.04%	0.11%
Equus asinus	Donkey	0	0.00%	0.00%	0	0.00%	0.00%
Equus hemionus	Onager	0	0.00%	0.00%	1	0.04%	0.11%
Equus asinus/hemionus		0	0.00%	0.00%	0	0.00%	0.00%
Sus	Pig	0	0.00%	0.00%	3	0.11%	32.00%
Carnivore		0	0.00%		0	0.00%	
Canid		0	0.00%		2	0.07%	
Large canid		1	0.09%		2	0.07%	
Canis familiaris	Domesticated dog	3	0.28%	1.62%	3	0.11%	0.32%
Canis lupus	Wolf	0	0.00%	0.00%	1	0.04%	0.11%
Vulpes	Fox	0	0.00%	0.00%	0	0.00%	0.00%
Meles	Badger	0	0.00%	0.00%	0	0.00%	0.00%
Lepus	Hare	0	0.00%	0.00%	11	0.39%	
Rodentia		0	0.00%		1	0.04%	
Microtus	Vole	0	0.00%	0.00%	15	0.53%	1.61%
Spermophilous	Souslik	0	0.00%	0.00%	80	2.83%	8.61%
Total		1063			2828		

Tab. 2 Faunal assemblage for Gegharot EB contexts (2007–2011 field seasons) according to Number of Identified Specimens.

	Stage A	Stage B	Stage C
Gegharot Early Bronze Karnut-Shengavit	75.00%	47.62%	25.00%
Gegharot Late Bronze	69.75%	55.29%	33.42%
Aragatsi Berd Late Bronze	65.22%	33.33%	42.86%
Tsaghkahovit Lower Town Late Bronze	82.91%	82.69%	62.50%

Tab. 3
Sheep-goat survivorship percentages for Project ArAGATS Bronze Age contexts (2007–2011 field seasons)[29]

Fig. 12
Gegharot. Photo of LB Shrine 2, Operation T-21

Paleobotanical remains from the EB occupation at Gegharot provide considerable material for understanding both the local environment and developing plant economies. Gegharot's EB layers have to date yielded the greatest quantity of archaeobotanical material of the Tsaghkahovit Plain sites (approx. 31,200 units; **Tab. 4)** thanks in large part to the EB occupation uncovered in operations T17 and T18.[30] The following taxa of cultivated plants prevail in the EB samples from Gegharot **(Tab. 4)**: cultivated barley (*Hordeum vulgare* – the majority of which belonged to hulled varieties, and a part of this belonged to multi-rowed subspecies *Hordeum vulgare* ssp. *vulgare* convar. *vulgare*), bread wheat (*Triticum aestivum* amongst which was common *Triticum aestivum* ssp. *vulgare*) and club wheat (*Triticum aestivum* ssp. *compactum*). The barley to wheat ratio is 95% to 5% in EB samples from Gegharot. Species of *Galium*, families of Poaceae and Polygonaceae are prevailing amongst EBA samples of Gegharot.

EB agriculture on the Tsaghkahovit Plain, as represented by paleobotanical evidence from Gegharot, appears to have been based on cereal cultivation, particularly hulled barley and bread wheat. This pattern is in contrast with earlier Neolithic and Chalcolithic agricultural traditions in the region which were based on an almost equal representation of cereals, pulses, and oil plants in the surviving archaeological record.[31]

[29] Stage A is comprised of the following elements: distal humerus, innominate, proximal radius, scapula, first phalanx, and second phalanx. For sheep and goats it represents roughly ages 6–13 months; for cattle, 10–24 months. Stage B is comprised of distal tibia and distal metapodials. For sheep and goats it represents roughly 15–24 months, for cattle, 24–32 months. Stage C is comprised of distal femur, proximal femur, proximal humerus, distal radius, proximal tibia, and proximal ulna. For sheep and goats it represents roughly 36–42 month, for cattle, 42–48 months. Ages from Schmid 1972 and Silver 1969.

[30] Hovsepyan 2008.

[31] Hovsepyan/Willcox 2008.

			Gegharot, EBA	Gegharot, LBA	Aragatsi Berd, LBA	Tsaghkahovit (SLT), LBA
Number of samples			***36***	***114***	**13**	***71***
Volume of processed sediments (liter)			*237*	***1,728***	**37**	**945**
Concentration of total carpological material (unit/liter)			131.7	5.6	3.3	3.4
Concentration of cultivated plants carpological material (unit/liter)			**127.5**	**1.1**	**1.2**	**1.5**
Taxa number			**179**	**95**	**19**	**62**
Plant Taxa	**31,207**	**Preservation***	**26,931**	**9,680**	**121**	**3,216**
Cultivated cereals	**96.8%**		**96.3%**	**19.1%**	**36.4%**	**43.5%**
Unidentified grains (fragments) ratio inside cereals			**2.9%**	**26.9%**	**43.2%**	**61.4%**
Triticeae gen. spp.	grains	C	861	453	19	858
	unidentifiable fragments	M		37		
	rachis internodes	C		1		
	glumes bases	C		6		
	awns	M				+
Barley – wheat ratio			**94.6%**	**74.8%**	**56.0%**	**74.5%**
Hordeum vulgare	unidentifiable grains	C	264	603	13	311
		M		25		
	rachis fragments	C	2	2		
	triplet middle grains	C	2	2		
Hordeum vulgare (hulled)	triplet position unidentifiable hulled grains	C	25,770	225	1	72
		M		63		
Hordeum vulgare (hulled)	triplet middle hulled grains	C	356	32		10
Hordeum vulgare subsp. *vulgare* convar. *vulgare*	triplet left hulled grains	C	721	20		3
	triplet right hulled grains	C	644	8		
Wheat - barley ratio			**5.4%**	**25.2%**	**44.0%**	**25.5%**
Triticum spp.	grains	C	154	100	6	64
	glume base	C	1	1		1
Triticum sp. (hulled)	spikelet fork	C		3		
Triticum aestivum/ turgidum	grains	C	628	51	1	15
Triticum cf. *aestivum*	grains	C	25	18		4
Triticum aestivum	internode	C	2	1		
Triticum cf. *aestivum* (small grained)	grains	C	91	5		
Triticum cf. *aestivum* ssp. *vulgare*	grains	C	527	16	2	8
Triticum cf. *aestivum* ssp. *compactum*	grains	C	128	10	1	8
Triticum cf. *aestivum* ssp. *sphaerococcum*	grains	C	9	1	1	3
Triticum cf. *aestivum* ssp. *spelta*	grains	C	2	1		1
Triticum durum/dicoccum	grains	C		12		9
Triticum cf. *durum*	grains	C	2	4		1

			Gegharot, EBA	Gegharot, LBA	Aragatsi Berd, LBA	Tsaghkahovit (SLT), LBA
Triticum cf. *dicoccum*	grains	C	8	40		4
		M		2		
Triticum dicoccum	grains	C	1	29		16
Triticum cf. *dicoccum*	glume base	C		1		
Triticum dicoccum	spikelet	C		1		
Triticum cf. *dicoccum*	spikelet "forks"	C				1
Triticum dicoccum	spikelet "forks"	C	2	23		1
Triticum dicoccum	internode	C		2		
Triticum cf. *monococcum*	grains	C	1	4		
Triticum monococcum	grains	C		1		
Triticum cf. *monococcum*	spikelet "forks"	C	3	2		
Triticum dicoccum/Secale sp.	grains	C	2	2		
Other cereals (possibly cultivated)			**0.0%**	**2.8%**	**0.0%**	**1.5%**
cf. *Secale* sp.	grains	C		3		
Secale sp.	grains	C	3	17		
cf. *Panicum miliaceum*	hulled grains	M		7		1
	naked grains	C				7
Panicum miliaceum	naked grains	C		11		
Grape (Vitaceae)						
Vitis vinifera	pip	C		2		
Weeds			**3.2%**	**80.9%**	**63.6%**	**56.1%**
Poaceae						
Poaceae gen. spp.	grains	C	60	104		93
Paniceae gen. spp.	grains	C/M		15		11
Bromus sp.	grains	C	21	15		3
Lolium sp.	grains	C	8	9		11
Hordeum sp. (wild)	grains	C		3		
cf. *Aegilops* sp.	grains	C	7	1		
cf. *Avena* sp.	grains	C/M		9		1
Poa bulbosa	bulb-grains	C	1			
Fabaceae						
Viceae gen. spp.	seeds	C	23	17		
Fabaceae gen. spp. 2 (small seeded)	seeds	C	5	11		
Rubiaceae						
Galium sp.	mericarps	C/M	25	40	1	30
Galium cf. *spurium*	mericarps	C/M	435	974	22	352
Galium cf. *aparine*	mericarps	C/M	36	3		8
Asperula sp.	mericarps	C	1	3		3
Boraginaceae						
Buglossoides arvensis	erems&seeds	M/C	16	3920	32	179
Anchusa arvensis	erems&seeds	M/C		55		3
Echium sp.	erems	M		49		1

			Gegharot, EBA	Gegharot, LBA	Aragatsi Berd, LBA	Tsaghkahovit (SLT), LBA
Asperugo procumbens	erems	M/C		10	10	5
Rochelia sp.	erems	M/C		5		
Heliotropium sp.	erem	C	1			
Lapula sp.	erem	M	1			
Polygonaceae						
Polygonaceae gen. spp.	nutlets	C/M	2	24		10
Rumex sp.	nutlets	C/M	19	31	1	6
Polygonum spp.	nutlets	C/M	12	359	1	47
Polygonum cf. *aviculare*	nutlets	C/M	3	39		58
Polygonum convolvulus	nutlets	C/M	14	234	1	43
Polygonaceae/Cyperaceae spp.	nutlets, seeds	C/M	24	208		145
Cyperaceae						
Cyperaceae gen. spp.	nutlets	C/M	13	109		41
Scirpus sp.	nutlets	C		30	1	9
Carex sp.	nutlets	C	3	40	1	44
Eleocharis sp.	nutlets	C		6		3
Brassicaceae						
Brassicaceae gen. sp.	seeds	C/M		7	2	13
Thlaspi spp.	seeds	C/M	6	63		59
Neslia sp.	capsules	C/M	7	72		48
Alyssum sp.	seeds	C/M		16		
cf. *Camelina* sp.	seeds	C/M	3			
cf. *Bunias* sp.	capsule	C/M		4		
Convolvulaceae						
Convolvulus sp.	nutlets	C/M	5	37		2
Chenopodiaceae						
Chenopodium sp.	seeds	C/M	13	236	1	52
Solanaceae						
Hyoscyamus sp.	seeds	C/M	27	26		79
Ranunculaceae						
Adonis sp.	seeds	C	2	31		1
Ranunculus spp.	seeds	C		4		2
Scrophulariaceae						
Veronica sp.	fruit (capsule)	C		1		
Asteraceae						
Asteraceae gen. spp.	seeds	C/M		36		3
Apiaceae						
Chaerophyllum sp.	mericarp	C/M	1	9		
Apiaceae gen. sp.2	seeds	C/M		2		5
cf. *Prangos* sp.	seeds	M		1		
Lamiaceae						
Lamiaceae gen. spp.	nutlets	C/M	4	50		6

			Gegharot, EBA	Gegharot, LBA	Aragatsi Berd, LBA	Tsaghkahovit (SLT), LBA
Caryophyllaceae						
Caryophyllaceae gen. sp.	seeds	C/M		31		5
Vaccaria sp.	seeds	C/M	4	8		2
Scleranthus sp.	fruit	C/M	3	7		11
Papaveraceae						
Papaveraceae gen. spp.	seeds	C	1	1		
Malvaceae						
Malvaceae gen. sp.	seeds	C		1		
cf. *Althaea* sp.	seeds	C	1			1
Violaceae						
cf. *Viola* sp.	seeds	C		6		1
Urticaceae						
cf. *Urtica* sp.	seeds	C/M	1	45		
Rosaceae						
Rubus sp.	nutstones	C/M				1
Rosa sp.	nutstones	C	3	34		15
Cupressaceae						
Juniperus sp.	twigs	C/M		63		
Unidentified Species			**0.6%**	**6.8%**	**3.3%**	**12.2%**
	seeds	C/M	186	657	4	392
Granary weevils & other insects	C/M		22			

Tab. 4
Plants identified in the macrobotanical samples from the primary occupation contexts examined by Project ArAGATS (2008–2011 field seasons)

The Late Bronze Age (Lchashen-Metsamor) settlement

LB levels succeed the EB occupations in all excavation units within Gegharot's citadel and west terrace and in the extramural areas explored by operations T-25 and T-29. While the EB occupations at Gegharot indicate a largely egalitarian agricultural village without clear evidence of social differentiation, the LB occupation is defined by greater social stratification and political centralization. Moreover, the excavations of LB Gegharot have documented a number of dramatic episodes that took place in the Tsaghkahovit Plain during the second half of the 2nd mill. BC which resulted in the total destruction of the site, the partial reconstruction of several complexes, and the final immolation and abandonment of the settlement.

Radiocarbon determinations conducted on samples recovered from Gegharot's LB horizon since 2002 date the two phases of occupation broadly to the late 15th–late 11th cent. BC **(Tab. 5)**.[32]

Gegharot during the LBA constitutes a particularly unique site due to the presence of three shrine complexes. The first of these shrines, uncovered on the west terrace (T-2E), was discussed in our previous report.[33] In 2008, a second shrine complex was discovered in operation T-21 on the west citadel **(Figs. 4; 12)**. This LB layer was represented in the central and eastern portions of the excavation which contained two occupation levels. The lower level, 0.63 m thick (loci 3, 6) beginning at a depth of 2293.14 m a.s.l., covered an area of 16–20 m^2.

[32] In collaboration with Stuart Manning and the Malcolm and Carolyn Weiner Laboratory for Aegean and Near Eastern Dendrochronology at Cornell University, we are currently working to refine this chronology in order to both define the temporal limits of each occupation phase and establish the dates for the two destruction episodes. The results of this work will be reported in a separate communication when the results are available.

[33] Бадалян *et al.* 2005; Badalyan *et al.* 2008.

Tab. 5 Radiocarbon determinations related to Gegharot LBA contexts from the 2008–2011 field seasons (calibrations by OxCal v. 4.1.7 Bronk Ramsay 2010 r. 5)

Site	Operation	Material	Lab Number	14C Date (BP)	Calibrated Date (BC) 95.4% Probability
Gegharot, 2010	T21, l. 35	charcoal	AA-92624	2891 ± 39	1250-939
Gegharot, 2010	T-21, l. 6	charcoal	AA-92625	2971 ± 39	1370-1053
Gegharot, 2010	T-21, l. 2	charcoal	AA-92626	2909 ± 42	1261-980
Gegharot, 2010	T-21, l. 12	charcoal	AA-92627	2943 ± 39	1291-1017
Gegharot, 2011	T-31, l. 41	charcoal	AA-95613	3094 ± 39	1439-1265
Gegharot, 2011	T-31, l. 7	charcoal	AA-95614	3039 ± 40	1413-1133
Gegharot, 2011	T-32, l. 54	charcoal	AA-95611	2960 ± 43	1368-1026
Gegharot, 2011	T-32, l. 20	charcoal	AA-95980	3015 ± 40	1392-1129

The eastern portion of the deposit (locus 3, 35cm thick), consisted of a charcoal rich soil with high densities of LB pottery and burnt bones, including a discoid pendant with a central hole made from a catfish (*Silurus glanis*) vertebra **(Fig. 15,21)**, as well as a collection of stone tools (pumice polishers, discoid objects, sharpening stones, etc.). The western portion of the lower level (locus 6) was part of a rectangular area (approximately 4.7 × 4.2 m), oriented to the west, with a well-preserved *in situ* assemblage. The northern and eastern walls of the room joined with natural outcrops of the substrate bedrock. The north wall (W2104) was 5.6 m long, defined by a series of stone masonry blocks; the surviving fragment of the east wall (W2106), 2.2 m in length and consisting of 2 courses of stone masonry (0.25–0.60 m) (locus 43), was built on a rock outcrop from large and small unworked boulders. The south wall of the room (W2103), which survived only to a length of 4.4 m, was set into an eroded section of the natural rock. The wall is composed of one line of medium sized (35 × 55 cm) stones and preserved in several courses of masonry (0.15 m). However, it is not entirely clear that W2103 was part of the described complex. It could be associated instead with a building complex excavated in operation T18 in 2006 that included a curvilinear wall (W1807), as well as, perhaps, W1806.

At a depth of 2292.79 m a.s.l. we uncovered a floor (locus 6) littered with *in situ* intact and fragmented vessels, including a ceramic form known as a "*manghal*", as well as stone and bone tools **(Fig. 13)**.[34] The floor was laid atop bedrock and cut by several pits (loci 37, 54, 55) except in a few areas where it overlay portions of an earlier EB floor (see above). Against the eastern limit of the shrine near the southeast corner, was a kidney-shaped "altar" (locus 22, 1.5 × 1.25 m), set on a bedrock ledge (locus 41). The perimeter walls of the baked clay "altar" were 5 cm wide clay bottom that may have been lined with small stones. Inside the "altar" were seven vessels, including a large storage jar (locus 12), bowls, a cup with knobs on the perimeter of the body, and a similarly decorated small jar (locus 23, inside this vessel was a bronze needle) **(Fig. 14,1–7)**. In the northern part of the "altar" was a stationary ceramic hearth (locus 4, 0.56 × 0.6 m). This vertical installation stood on a circle of small stones, and was covered with clay and baked throughout. At the bottom was set a flat round stone. Inside the chamber was a *manghal*. A second, larger *manghal* was located in the southern part of the "altar," to the right of the sta-

[34] In the archaeological literature of the South Caucasus, the term "*manghal*" (Arabic: *mankal*) is used to describe the portable hearths or braziers. However, not only is the specific function of these vessels unclear but even the exact orientation of their use is unknown. The *manghal* found outside the altar in the T-21 shrine was found installed vertically with the open side up. In contrast, the *manghal* found near the altar in the T-32 shrine was lying horizontally, although it is not clear whether this was its original position or if it had fallen during the destruction event. Almost all of the *manghal*s excavated in the South Caucasus derive from Middle Bronze to Iron 1 period settlements (i.e. Aragatsi Berd, Gegharot, Kuchak, Metsamor, Shirakavan, Tsaghkahovit, Uch-Tepe, Uzerlik-Tepe) and they are typically associated with either stationary ovens or concentrations of charcoal and ash. Some, though not all of the extant *manghal*s show evidence of severe burning. Three factors have led to a widely dispersed interpretation of *manghal*s as ritual paraphernalia: their repeated association with cultic complexes (e.g., sanctuary two at Metsamor and all three shrines at Gegharot), the discovery of small *manghal* models (a model from Kuchak was just 11 cm wide and 5.6 cm tall), and perceived morphological similarities to "censers"/"cult boxes". However, there are at least two reasons to be wary of the traditional view. First, the large number of *manghal*s found at Gegharot, where at least six examples have been documented (T-2E locus 218, T-27 locus 56, T-32 locus 16, T-21 locus 4, T-21 locus 21; T-21 locus 22) suggests they were not exceptional elements of the ceramic repertoire. Second, while censers from Gegharot and elsewhere (e.g., Lchashen; Petrosyan 2002) tend to be rather lavishly decorated and well made, *manghal*s are quite ordinary in appearance, made of poorly levigated clay with high densities of fine sand. Formally, then, *manghal*s appear to have been regarded as rather utilitarian objects, even if their prosaic function (perhaps baking bread?) was related, in some cases, to sacred institutions and practices.

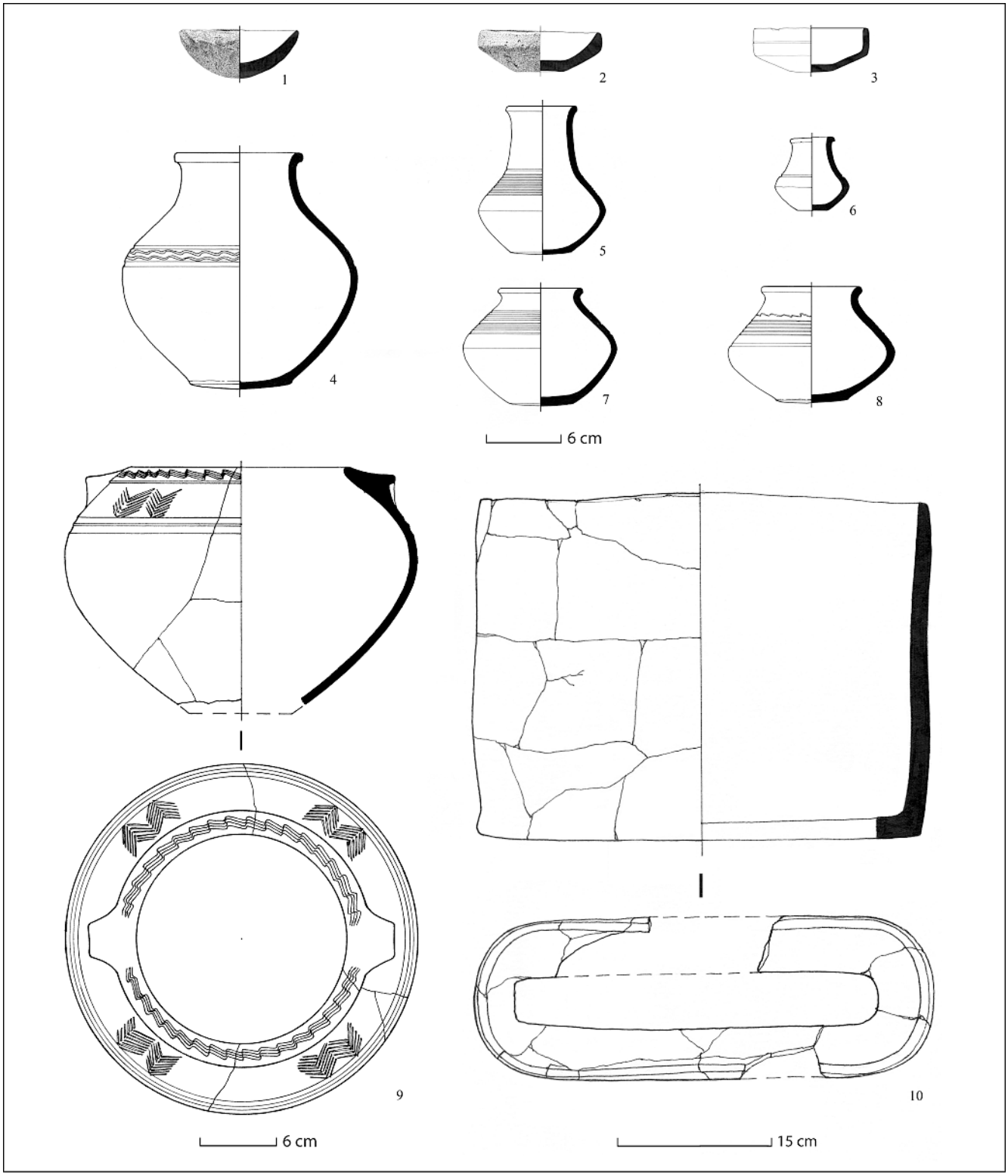

Fig. 13
Gegharot. T-21 LB materials from floor of Shrine 2

tionary hearth. Around this *manghal* was an assemblage of ceramic sherds, a clay model wheel, a large retouched obsidian blade, a triangular obsidian arrowhead with a notched base, fragments of obsidian flakes, as well as bones both charred and unfired.

To the south-west of the "altar", running underneath wall W2102, was a pit constructed in three sections. The large upper chamber divided into two distinct deeper chambers. The pits were dug into the bedrock to varying depths. The two deep chambers (chamber A, locus 37 to the east and chamber B, locus 54 to the west) have a depth of 1 m, while the shallower large upper chamber (C, loci 37, 54, 55) was 0.3 m deep. Chamber A (dimensions 1.2×0.95 m) was filled with a black burned soil rich in ash, charcoal, and small bones. The walls were plastered with clay, beneath which we uncovered two large boulders on opposite sides. At a depth of 2291.81 m a.s.l. we encountered a large LB storage jar (locus 45), a small bowl (locus 47) and fragments of three or four additional vessels, including two pots with ornamentation under the rim and a large bowl with vertical handles and a flat cut rim **(Fig. 14,8–12)**.

A second two-part pit (2×1 m) was found to the northeast of pit 1, demarcated by a double row of flat stones on its western edge. The pit was filled with charcoal, a few fragments of ceramics and a small faunal assemblage. 1.10 m west of pit 2 was a third large pit which may date to the first LB construction phase. LB ceramic fragments found in the pit were identical to those of the vessel recovered from pit 2 (locus 54) and the LB ceramics from under the floor of the upper LB phase. Inside the pit we recovered a relatively large faunal assemblage. Found *in situ* on the edge of the pit, amongst the rocks of W2105 (locus 38), we recovered a collection of 7 bone awls, 2 bone spindle whorls, 2 clay model wheels, and a retouched dacite tool,[35] all of which appear to belong to the lower LB horizon **(Fig. 15)**.

The western portion of the T-21 shrine was disturbed by construction of the upper LB occupation. Directly under topsoil we uncovered a fragment of a curvilinear wall (W2102) which represents this second LB phase. Wall W2102 is composed of a single line of stones set in 2–4 courses preserved to a height of 35–70 cm. The extant arc of the wall is 4.70 m long. In association with the wall, we excavated stone floor slabs covered with a clay coating at a depth of 2292.36 m a.s.l., which survived only in a few places. The material assemblages from this upper LB occupation included fragments of pottery as well as bone and stone tools. The stone tool inventory was relatively rich, including small mortars and pestles as well as fragments of grinding stones and pumice polishers.

The ceramic assemblage of the lower LB horizon which included both the floor and the "altar" was generally homogeneous, representing wares of the LB II phase dating to the end of the 14th through the first half of the 13th cent. BC.

The lower (initial) layer of LB construction detected in T-21 was also documented in a series of pits uncovered in the eastern half of operation T-26. The pits were cut into the granite bedrock substrate, tapering at the bottom. A portion of pit 1 (locus 20, 1.6×1.4 m, 0.97 m deep), extends under the edge of the northern baulk and wall W2603, a construction of the second LB phase. The pit was sealed by a clay floor and burnt fragments of charred beams (identified as *Betula*/birch;[36] loci 16, 19). Within the pit fill, we recovered sizable assemblages of fragmented LB ceramics, faunal remains, obsidian pieces, broken stone tools, and a discoid stone bead. Pit 2 (locus 22, $1.65/1.9 \times 1.1$ m, 0.96 m deep) was located to the west of pit 1 and also extended under the north baulk. The pit was filled with charcoal and organic matter along with a large collection of LB pottery fragments. Pit 3 (locus 23, 1.95 m in diameter, 0.9 m deep) was sealed by the construction of walls W2606 and W2608 during the 2nd phase of LB construction, as well as a clay feature (locus 17). The upper layer of the pit contained large pieces of obsidian, as well as two or three fragments of a single ceramic vessel. Within the deeper fill we recovered fragments of LB pottery, high densities of faunal remains, obsidian pieces, a fragment of a handstone, pumice polishers, a model wheel of unbaked clay, a spindle whorl with punctate ornamentation, a plummet, a cup with pressed nail decoration on the surface, and a large number of bone implements. The smallest of T-26's LB pits (0.60 m diameter, 0.35 m deep), pit 5 (locus 29), contained an almost complete LB vessel set on a semicircle of tuff stones.

The early LB occupation was also documented in operation T-28 where we uncovered architectural constructions, a series of pits, and fragments of large storage jars. Pit 1 (locus 8; 1.75×1.1 m, 0.75 m deep) extends under wall W2803. The ceramic remains from the pit were exclusively LB. The pit was sealed by a surface littered with charred beams. Pit 2 (locus 9, $0.8–0.9 \times 1.0$ m, 0.55 m deep) lay 30–45 cm south of pit 1. The bottom of

[35] Morphologically, the artifact more closely resembles a Paleolithic tool than an implement of the Bronze Age.

[36] Identification of wood species conducted by the Cornell Dendrochronology laboratory as part of an in-progress collaborative program of research, the full results of which will be detailed in a separate publication. Our thanks to Sturt Manning and Kate Seufer for the data described here.

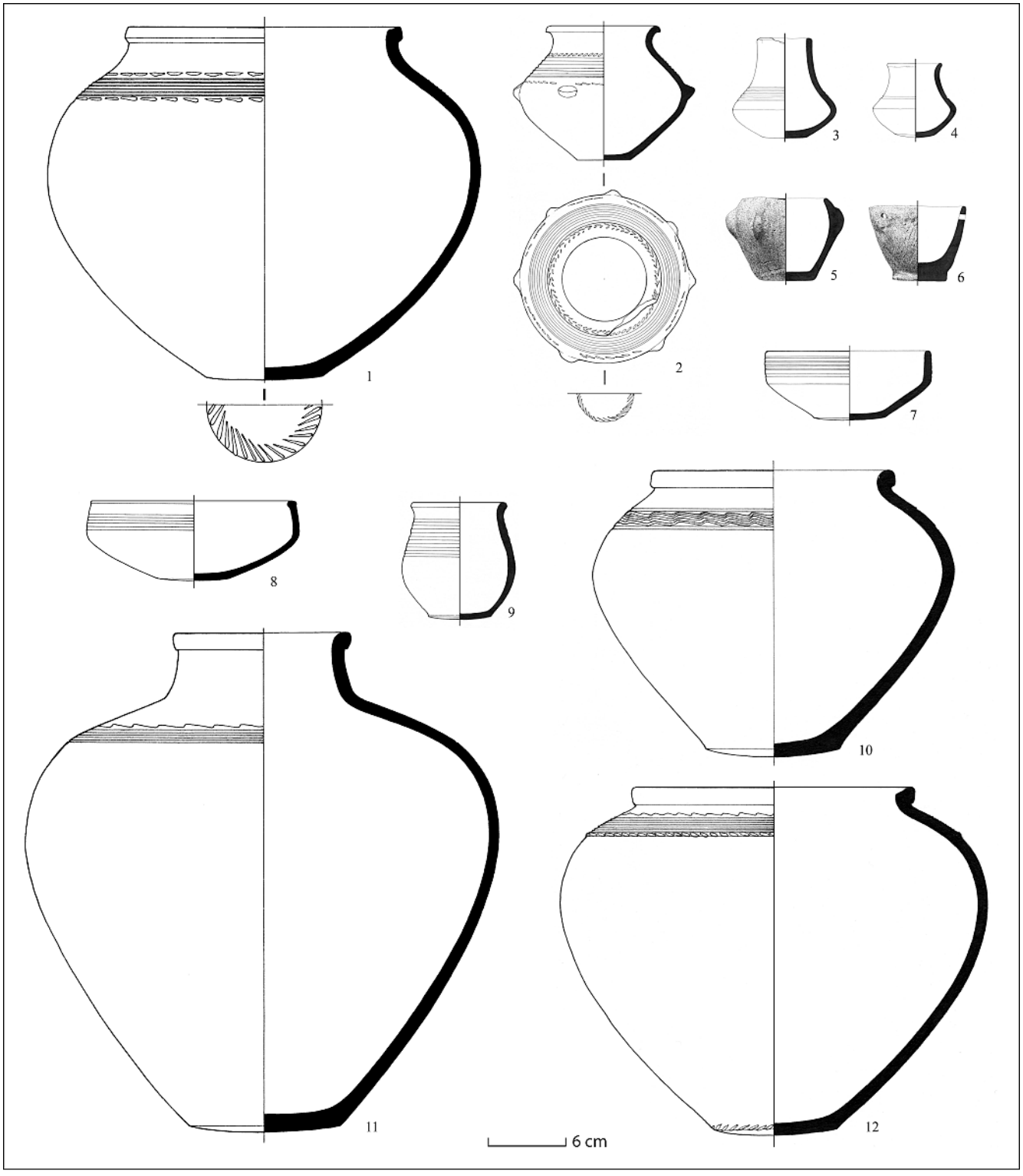

Fig. 14
Gegharot. T-21 LB materials from Shrine 2 altar (1–7) and pit (8–12)

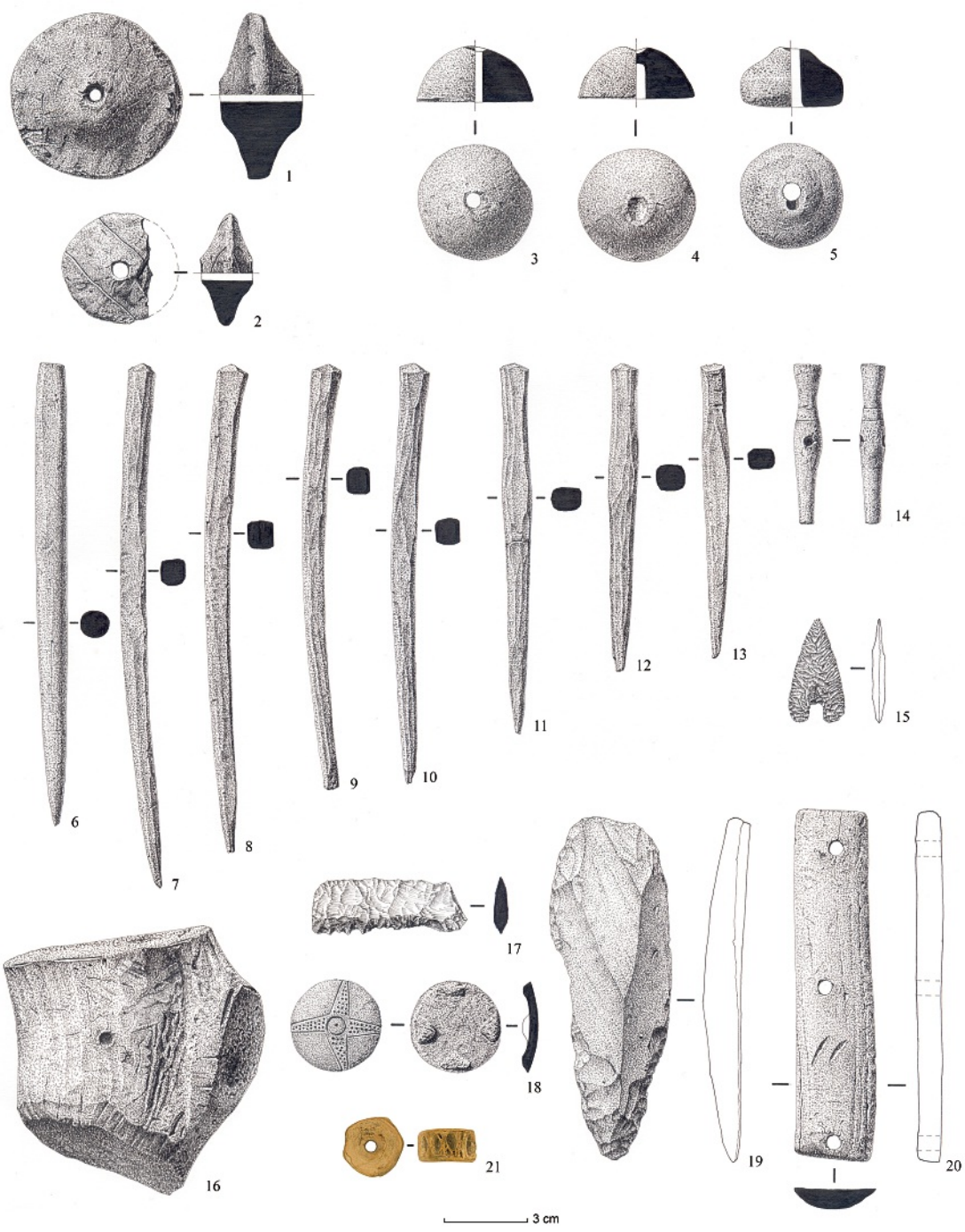

Fig. 15
Gegharot T-21 LB materials from Shrine 2. – 1–2 ceramic; 3–14, 18, 20 bone; 15 obsidian; 16 antler; 17 flint; 19 dacite; 21 *Silurus glanis* (catfish) vertebrae

the pit was filled with small packed stones set atop a thin layer of soil. The pit artifact inventory included a few fragments of LB pottery, two fragments of obsidian and a relatively large collection of faunal remains. T-28 Pit 3 (locus 24, 2 m diameter) was filled with three layers of tightly packed stones separated by layers of yellow clay, atop which sat a "stone box", that perhaps served as a post support. The northwestern perimeter of the pit was paved with small stones. On the south side of the pit was a 2–3 course stone wall (30 cm high) built of flat stones, including several reused hand-

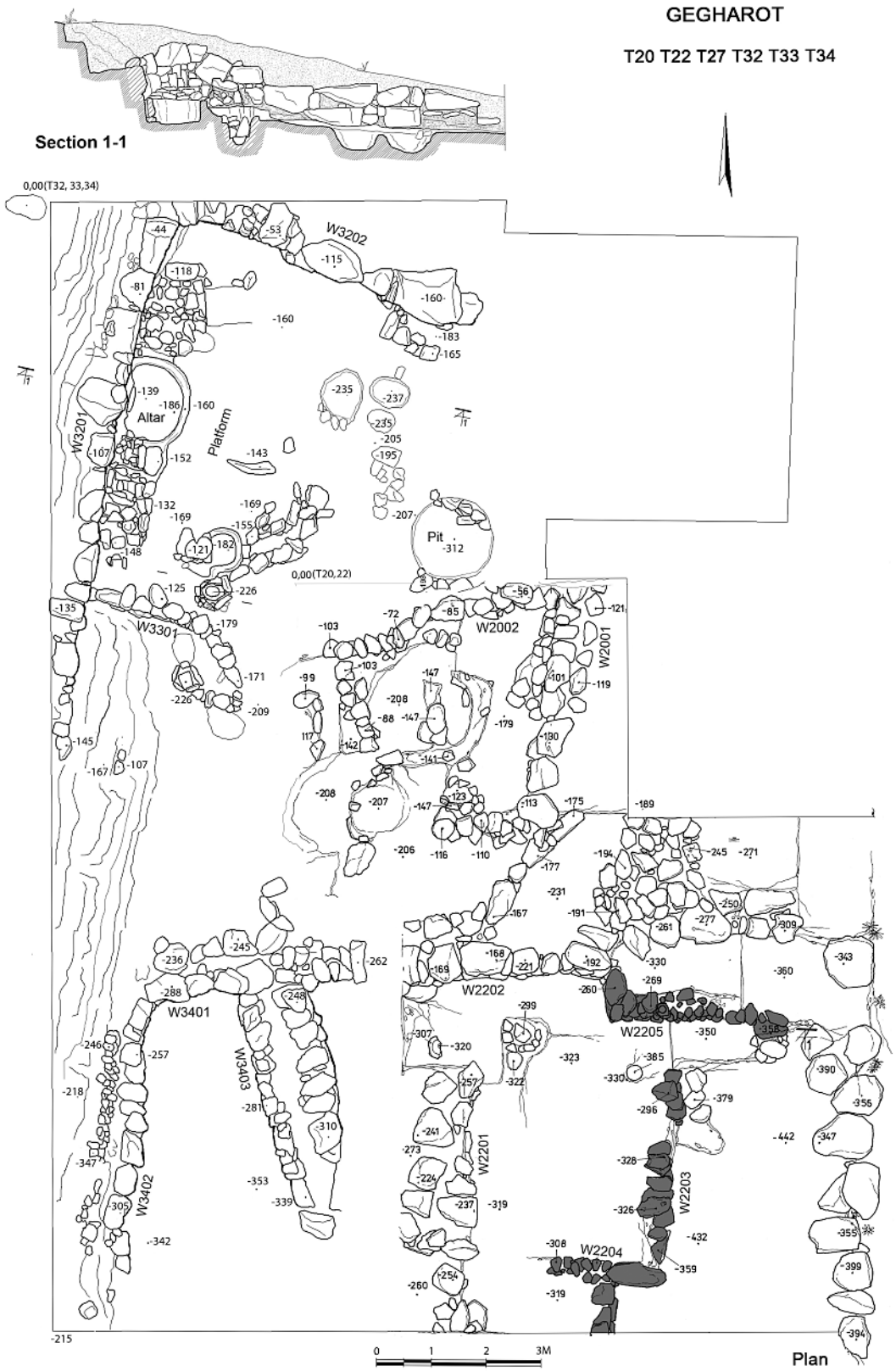

Fig. 16
Gegharot. Plan of east citadel operations T-20, T-22, T-27, T-32, T-33, T-34

Fig. 17
Gegharot. Photos of shrine 3. – 1 T-27 locus 5 and 11 from the north; – 2. T-32 platform and altar from the north

stones. Among the finds from the pit were fragments of stone implements, used as fill, as well as complete tools, including pestles, graters, and a mortar. Pit 4 (locus 40, 0.90 × 0.70 m, 30 cm deep) contained a model wheel, fragments of tuff weights, and a small tuff ball. Pit 5 (locus 43, 1.35 m in diameter, 50 cm deep) was filled with a high density of large animal bones, including astragali. In addition, the pit contained a small LB ceramic vessel and several stone tools, including a pumice polisher, a tuff disc, and flat basalt tools.

The initial LB occupation was thus represented by excavations underneath walls W2803, W2804, W2807, and W2808 and within the intervening spaces of the later constructions, where we uncovered fragments of 2–3 large storage jars. The blackened soil matrix for this deposit was rich in charcoal, ash, burnt bones and organic remains as well as large fragments of burned beams. This early LB layer extends west to the EB wall W2809 and south to wall W2805 (locus 19) where a light yellow clay LB floor directly overlies the EB surface.

Operation T-30 also revealed evidence of the initial LB occupation level at Gegharot, including several pits. Pit 1 (locus 24, 1.35 × 0.9 m in diameter, 1.12 m deep) contained two complete LB vessels (loci 25, 26), including a bowl which extended into the south baulk, and large fragments of burnt beams, covering a 3–5 cm layer of yellow clay. Pit 2 (locus 30, 1.25 × 0.6 m in diameter, 0.63 cm deep) contained only small fragments of pottery, obsidian flakes, and bone. Pit 3 (locus 31, 1.0 × 0.75 m in diameter, 0.72 m deep) located near the northeast corner of the operation, contained a large collection of faunal remains, a fragment of a bone awl, and a ceramic collection that contained a number of EB sherds alongside LB fragments.

The granite paving stones in the northeast sector of T-30 were set directly on bedrock. Atop the paving was an overturned LB bowl (locus 20). The paved surface was sealed by a 10 cm layer of burnt earth containing a large amount of charcoal and fragments of charred beams which separates the paved floor from the bottom course of masonry in wall W3002. The lower LB horizon recorded in the excavations of T-26, T-28, and T-30 was almost always sealed by a layer of burnt earth with fragments of charcoal and charred beams.

The upper LB occupation at Gegharot was represented in T-26 by constructions W2603, W2604, W2606, W2607, W2608, a hearth, and a yellow clay floor which sealed pits 1–3, and 5. This partially preserved yellow clay floor was rich in LB ceramics,

Fig. 18
Gegharot. Photos of shrine 3; – 1 T-32 altar and quern installation from the east; – 2 T-32 locus 18, overview of altar

including fragments of a *manghal* and crucible, as well as faunal remains, large pieces of obsidian, and stone tools (mortars, grinding stones, polishers, etc.). In the northeast corner, parallel to the north baulk, we uncovered a wall fragment – W2603 (locus 32, 2.25 m long, 0.35–0.45 m wide,

Fig. 19
Gegharot. Shrine 3 ceramics. Pots

Fig. 20
Gegharot. Shrine 3 ceramics. Cups, bowls, small jars, and other forms

Fig. 21
Gegharot. Shrine 3 ceramics. – 1–2 manghals: – 3–6 storage jars

0.3–0.55 m high), which intersected at an acute angle with an adjacent construction that consisted of two stone "boxes" set within a distinctly irregular linear feature made of small stones arranged in 2–3 layers (W2604, locus 33). The bottom of the western box was constructed of a large stone with a shallow depression in the center suggesting it was either a reused mortar and/or perhaps a post support. The architectural configuration of the later LB constructions in T-26 is difficult to understand. It is possible that walls W2603 and W2607 were portions of the same construction. However, these

Fig. 22
Gegharot. Shrine 3 and related materials. – 1 Mittanian common style cylinder seal from T-20; – 2 carnelian beads from shrine 3; – 3 paste beads from shrine 3; – 4–5 bronze arrowheads from shrine 3; – 6–7 stone pendants from shrine 3; – 8 ceramic stamp from T-30; – 9 ceramic stamp from T-32 shrine 3

fragments do not clearly articulate with other walls which might have composed a room.

Another wall of the upper LB horizon – W2606 (locus 35, 2.2 m long, 0.4 m wide) – was located along the southern baulk. Perpendicular to the W206 was an attached wall (W2808, locus 37, 1.10 m long, 0.35 m wide), preserved as 1–2 courses of masonry (0.5 m). In the small recess formed between W2606, W2607, and W2608, we excavated a rectangular clay feature (locus 17) that resembled a hearth, set into the center of the floor; however, the lack of evidence of fire in the feature suggests that it served a different function. In the southeast corner of the T-26 we opened a feature more clearly identifiable as a hearth (locus 4, 0.7 × 0.4 m), consisting of a rectangular stone laid flat and perpendicular to a cluster of small stones that was covered with clay. Inside the hearth was an ash matrix which contained the bottom of a pan, or perhaps *manghal*, impressed with the imprint of a woven mat as well as burned bones. In and around the hearth we also found charred pieces of twigs and charcoal.

Excavations along the northern edge of T-28 revealed a group of structures assigned to the later phase of LB occupation. Taken together, walls W2803, W2804 (loci 27, 28, 29), and W2807 form a narrow rectilinear structure (0.60 × 1.70 m) composed of small stones (18–30 × 10–20 cm, rarely 35 × 50 cm) with 2–3 surviving courses of masonry.[37] In addition, a small curvilinear line of stones (W2808) – better described as a partition than a wall, extended W2804 to the west curving into the northern baulk. As a whole, the constructions in the area were rather poorly made – and, perhaps, poorly preserved – which restricts our ability to provide a complete account of their layout or the function of the area they circumscribed.

Walls W3001, W3002 and W3004, may comprise the walls of a single upper phase LB room. Wall W3004 (locus 18, as excavated 2.8 m long, 0.45 wide, 3.2 m high) was built of fairly regular courses of stone masonry. W3005 abuts the east face of W3004 defining a small space between it and W3001.[38] The enclosed recess (locus 8) was distinguished by the presence of a yellow clay floor. In the northeast corner of the operation we uncovered a substantial wall fragment (W3002, locus 16, 2.2 m long, 0.45 m wide) built against bedrock. It was preserved in 4–6 courses of stone masonry (1 m). In front of W3002 and along the northern baulk was a dense packed clay floor (size 0.9 × 2.5, 15–20 cm thick). In the area adjacent to the small recess we uncovered a stone "box", similar to those from T-26, which consisted of a pit (30–35 cm in diameter, 60 cm deep) partially lined with stones. The entire floor area bounded by walls W3001, W3002 and W3004 (loci 3, 7) was filled with a matrix of blackened soil, rich in charcoal. The excavated material from T-30's upper LB level was quite varied, with LB ceramics, a range of clay objects (plummets, disks), faunal materials, and stone tools. Of particular interest was a round ceramic stamp (diameter 4.5 cm, height 4 cm), with a symmetrical cross in relief **(Fig. 22,8)**.

The third shrine at Gegharot, excavated in 2010 and 2011, was located on the eastern citadel, primarily within the boundaries of operations T-27 and T-32 **(Fig. 17–18)**. The shrine was a rectangular stone building set on a northwest-southeast axis that followed the contour of the outcrop. The eastern wall of the room was not preserved due to the natural erosion of the slope. The surviving western (W3201) and northern (W3202) walls of the room circumscribed an interior space of approximately 37.6 m^2. The masonry blocks of W3201 had been set directly into sculpted bedrock. Both W3202 and W3201 were constructed of large granite blocks (up to 1 m long × 0.5 m wide). The main interior feature of shrine 3 was a stone platform, covered with clay, atop which was set a symmetrically placed circular 'altar' (locus 18), 1,4 × 0,95 m built against W3201.

The floor of the shrine was constructed of packed clay and occupation surfaces throughout the room were overlain by a thick terminal destruction layer of ash, charcoal, and burned beams that sealed the underlying deposits. The beam remains included three primary tree specimens: *Populus* (poplar, 9 samples), *Pinus* (pine, 5 samples), and *Betula* (birch, 1 sample).[39] One sample included a joint with a tapered birch fragment wedged into a larger beam of pine. The floor of the shrine was littered with *in situ* artifacts and features related to a host of practices tied to LBA rituals of divination and devotion (Smith and Leon 2015). Several features appear to be linked to production activities. Near the southern wall of the building (W3301) was a large (50 × 45 cm) basalt quern, set into a stone pedestal covered with clay. A small clay basin below the eastern wall of the pedestal contained a large handstone, as if fallen from the quern. Adja-

[37] Similar trapezoidal constructions were uncovered elsewhere at Gegharot in operations T-2d, T-18, and T-34.

[38] A small irregular semicircle of stones connected the terminus of W3005 with W3001, however, this line was so poorly preserved that it remains unclear whether the area delimited by W3001, W3004, and W3005 was a recess or fully enclosed room. The very different floor matrices from within this recess and the adjacent paved area suggests it was at the very least a distinct space.

[39] Wood identifications thanks to Kathryn Seufer and Sturt Manning of the Malcolm and Carolyn Wiener Laboratory for Aegean and Near Eastern Dendrochronology at Cornell University.

cent to the north wall of the pedestal were two complete large jars and fragments of a third vessel (loci 50, 51, 52). Between W3401 and the basin was a stone paved conical depression (0.6 × 0.5 m and 0.55 cm deep), with a circular indentation on the bottom that may have once served as a stationary mortar.

The ceramic repertoire from the shrine was large and remarkably diverse, ranging from large storage jars to small cups and special purpose vessels, like censers. The central space of the room, between W3202 and a large pit near the eastern edge of the preserved living area, yielded approximately 45 discrete vessels **(Fig. 19–21)** including a large churn **(Fig. 21,6)** and a *manghal* **(Fig. 21,1)**. North of the altar, atop a platform was a large storage vessel or *karas*; just south of the altar was a *manghal*. Inside the altar were twelve complete vessels, including small pots, miniature jars, a censer **(Fig. 20,12)**, two ceramic potstands or 'idols'

Fig. 23
Gegharot. Shrine 3 materials. 1. Bone objects; 2. Pebbles from altar; 3. Idols from altar

with a flat base, four tapered sides, and corners pulled into 'horns' **(Fig. 23,3)**. The altar also contained an unusual collection of eighteen smoothed pebbles **(Fig. 23,2)**.[40] Two stone pendants of flat oval pebbles **(Fig. 22,6,7)** and a fragment of a copper bracelet were also recovered from within the altar. In addition, paste and carnelian beads **(Fig. 22,2,3)** were found both within the altar and in the immediately surrounding area. Amongst the shrine assemblage were also a sizable collection of stone and bone tools (including a weaving comb) **(Fig. 23,1)** and two bronze arrowheads **(Fig. 22,4,5)**. One of the most striking finds from the room was a ceramic stamp in shape of equilateral cross with a swastika design **(Fig. 22,9)**. We should also note the concentration of more than 20 cattle astragali recovered from around the quern pedestal and within the adjacent vessels of loci 50–52.[41] Lastly, the original inventory of the building likely included the Mittanian common style cylinder seal found in operation T-20 (locus 4) during the 2006 field season.[42] It is possible that the seal was redeposited as post-depositional formation process destabilized portions of the southern wall.

The ceramic assemblage from the east citadel shrine is typologically assigned to the period from the end of the 14th through the first half of the 13th cent. BC. Radiocarbon determinations largely confirm this dating of the final destruction event, which also razed the west terrace sanctuary in operation T-2E and the workshop in operation T-15.

A significant number of finds from the east citadel shrine echoes the assemblage recovered from the first shrine discovered on the west terrace, including ceramic potstands/"idols", ceramic stamps, censers, stone pendants, and a Mittanian common style cylinder seal[43]. In sum, excavations at the LB settlement at Gegharot have to date exposed three buildings which, based on their built features and artifact inventories, appear to have served as shrines.

Given the considerable social, political, and economic differences between the Early and Late Bronze occupations at Gegharot, it is somewhat surprising that the faunal assemblages are virtually identical in terms of the number of identified specimens **(Tab. 6)**. As in the EB settlement at the site, non-mammalian species are rare from LB levels; non-mammalian species represented in the LB faunal sample include toads, fish and birds of varying sizes. Altogether, these specimens make up less than 0.1% of the faunal assemblage. Among the specimens identified to genus, sheep and goats are most common, making up more than 50% of the assemblage, with cattle making up just under 40%. The only other type of animal that makes up more than 1% is equids, both domesticated horses and wild onagers. Small mammals (voles, souslik, and hares) are more frequent than in other samples, but many of these are likely to be intrusive and can be explained by the fact that the LB levels at Gegharot are closer to the surface than the EB deposits. Comparison of NISP between shrine contexts and between shrine and non-shrine loci suggests that there is no difference in the proportion of animals found within shrines and outside of them. Nor are there any recognizable differences between faunal assemblages from the west terrace, east citadel, and west citadel.

Past examinations of survivorship at Gegharot indicated that less than 25% of the herd was surviving until physical maturity.[44] These patterns were interpreted as a non-viable herding strategy, indicating that the inhabitants of Gegharot were being supplied with meat. An updated survivorship analysis, however, is noticeably higher with over 33% of the herd surviving until maturity (see **Tab. 3)**, a pattern that still appears to indicate a non-viable herding strategy. Thus, it seems that the LB inhabitants of Gegharot were being supplied with meat in some form. Sheep/goat survivorship also appears to differ between shrines and areas outside of the shrines. In Stage C, the age at which animals reach maturity, survivorship in the three shrines combined[45] is 22.45%, while in the non-shrine contexts survivor-

[40] The exclusive concentration of these pebbles within the altar, their absence in the cultural layer and their heterogeneous composition of andesite, basalt, basaltic andesite, siliceous mudstone, jasper, sandstone, dacite, quartz, limestone (analysis conducted by the Institute of Geological Sciences of Armenia) – indicates that they do not belong to the local geological substrate and were thus collected and intentionally relocated to Gegharot. Nine pebbles are undoubtedly polished artificially.

[41] All three shrines contained a large number of cattle astragali, many of which were striated on one side and occasionally burned. Smith and Leon (2015) note that in both shrines 1 and 3, a ratio of approximately 64% left astragali to 36% right astragali indicates a roughly 2 : 1 preference for curating astragali from the left side of the animal. A similar propensity for left astragali was found in shrine 2. The emphasis on left astragali from these contexts is all the more striking, when taken alongside the cattle astragali from non-shrine contexts where the ratio of left to right astragali was roughly 1 : 1. Clearly cattle astragali, and especially an asymmetrical ratio of left and right, played a role in the ritual activities associated with the shrines. Garth Gilmour (1997) and others (Koerper/Whitney-Desautels 1999, 74–75; Bejenaru *et al.* 2010) have noted that astragali in Near Eastern and Aegean contexts are often associated with ritual, where the rolling of the bones as dice would have functioned as a divinatory activity. Indeed divination appears to have been a critical aspect of devotional ritual at Gegharot.

[42] Badalyan *et al.* 2008, 72–73, Fig. 25a.

[43] Badalyan *et al.* 2008, Fig. 2,f,g,h; fig. 24,m,n; fig. 25,b; Fig. 23,i; Fig. 24-k,i.

[44] see Monahan 2012: Badalyan *et al.* 2008.

[45] Neither of the shrines on the terrace had a sufficiently large sample to reliably calculate survivorship, but the presumed similarity of their function seemed to suggest that they could be constructively compared to areas outside of the shrines.

ship is noticeably higher at 29.33%. It seems, then, that the shrines were more likely to have received juvenile animals, which may reflect not only their greater social and economic value, but also their augmented cultural importance as sites of religious and divinatory rituals. Body-part representation, however, within the shrines and outside of the shrines is the same, so the shrines were not getting different cuts of meat than the non-shrine areas.

Cattle were living longer than sheep and goats during the LB, with nearly 70% surviving until physical maturity. It is likely that cattle were more frequently used for their secondary products, such as milk and traction, than were sheep and goats, which were primarily a meat source. Differences also appear between shrine and non-shrine contexts, but they are the reverse of what is seen among sheep and goats. In shrine contexts 75.00% of the animals are surviving past Stage C, or into full physical maturity **(Tab. 7)**. In non-shrine contexts, just under 70% of the animals are surviving to the same age. As with sheep and goats, body part representation is roughly similar between shrine and non-shrine areas at the site, although there are more astragali in shrines as discussed above. Thus the picture presented by the LB fauna at Gegharot is complicated. The types of animals present and the body parts of these animals are more or less the same in the shrines and outside of the shrines, but the ages of the animals differ markedly in the two different areas.

The plant regimes of LB Gegharot appear to be broadly similar to those documented in the EB levels at the site **(Tab. 4)**. The main crops for LB Gegharot were: cultivated barley (*Hordeum vulgare*), common bread wheat (*Triticum aestivum* ssp. *vulgare*), and club wheat (*Triticum aestivum* ssp. *compactum*) as well as emmer (*Triticum dicoccum*) and rye (*Secale* sp.), two cereals that were less numerous in EB samples. The barley to wheat ratio for the LB samples is 75% to 25%. Two species well represented in LB samples but, to date, absent from EB layers are broomcorn millet (*Panicum miliaceum*) and grape (*Vitis vinifera*). It is important to note that both of these species prefer warmer temperatures (additionally, millet thrives in more humid climates) and thus cannot grow in high mountainous areas such as the Tsaghkahovit Plain. Their appearance at Gegharot thus in all probability is evidence of exchange relations with the Ararat Plain to the south. According to an earlier reconstruction,[46] millet appeared in the territory of Armenia during the Early Iron Age and spread widely

		Gegharot Late Bronze		
		NISP	% NISP	% NISP to genus
Bufonidae	Toads	4	0.01%	
Squamata	Snakes	0	0.00%	
Fish		2	0.00%	
Large bird		13	0.02%	
Medium bird		2	0.00%	
Small bird		2	0.00%	
Indeterminate		414	0.68%	
Large mammal		2954	4.87%	
Medium mammal		3081	5.08%	
Small mammal		277	0.46%	
Artiodactyl		1	0.00%	
Large artiodactyl		5	0.01%	
Medium artiodactyl		2	0.00%	
Bovid		42	0.07%	
Bos	Cattle	5167	8.52%	37.51%
Capra	Goat	275	0.45%	2.00%
Ovis	Sheep	1378	2.27%	10.00%
Gazella	Gazelle	16	0.03%	0.12%
Ovis-Capra-Gazella		20	0.03%	
Ovis-Capra		6528	10.76%	47.39%
Cervid		66	0.11%	
Cervus	Red deer	27	0.04%	0.20%
Dama	Fallow deer	2	0.00%	0.01%
Equus		157	0.26%	1.14%
Equus caballus	Horse	28	0.05%	0.20%
Equus asinus	Donkey	0	0.00%	0.00%
Equus hemionus	Onager	1	0.00%	0.01%
Equus asinus/hemionus		16	0.03%	0.12%
Sus	Pig	73	0.12%	0.53%
Carnivore		1	0.00%	
Canid		1	0.00%	
Large canid		1	0.00%	
Canis familiaris	Domesticated dog	20	0.03%	0.15%
Canis lupus	Wolf	3	0.00%	0.02%
Vulpes	Fox	17	0.03%	0.12%
Meles	Badger	2	0.00%	0.01%
Lepus	Hare	3	0.00%	0.02%
Rodentia		12	0.02%	
Microtus	Vole	15	0.02%	0.11%
Spermophilous	Souslik	35	0.06%	0.25%
Total		13914		

Tab. 6
Faunal assemblage for Gegharot LB contexts (2007–2011 field seasons) according to Number of Identified Specimens.

[46] Hovsepyan 2009.

	Stage A	Stage B	Stage C
Gegharot Late Bronze	87.00%	80.77%	69.84%
Tsaghkahovit Lower Town Late Bronze	95.00%	89.90%	63.49%

Tab. 7 Cattle survivorship percentages for Project ArAGATS Bronze Age contexts (2007–2011 field seasons)

only during the Urartian era. Thus the recent archaeobotanical investigations at Gegharot and Tsaghkahovit demonstrate that broomcorn millet was known to local populations of the South Caucasus at least as early as the LBA, even if it was not a high volume staple. Certain weed species, such as representatives of the Boraginaceae, Polygonaceae, Rubiaceae and Cyperaceae are well-attested in the LB layers of Gegharot.

Excavations at Aragatsi Berd

The Aragatsi Berd excavations follow the site's initial documentation by researchers from the Institute of Archaeology and Ethnography and Project ArAGATS.[47] Set atop a tall (80–100 m high, 2175.6 m. a.s.l.) conical outcrop, Aragatsi Berd is located 1.5 km north of the village of Alagyaz and 5.86 km southeast of Gegharot (the two sites are not intervisible, obscured by the western cliffs of the Sipan Canyon) along the Yerevan – Vanadzor road. It also sits several kilometers south of the southern entrance to the Spitak Pass that leads to the Spitak – Pambak Valley. In geological terms, the Aragatsi Berd hill is composed of folded palaeotypal andesite basalts with a base diameter of about 500 m and a total surface area of approximately 25 ha. The slopes of the hill are steeply graded (from 15–25%), while the crown has been cut by Bronze Age terraces and features excellent sight lines for several kilometers south along the Kazakh River, north through the Sipan Canyon, and southwest toward Tsaghkahovit Fortress and Mt. Aragats. On the north side of the hill, five terraces, each approximately 10 m wide, are visible. On the western, southern, and eastern sides of the hill two major terraces are visible, averaging between 10 and 20 m in width. The second highest terrace on the crown circumscribes the entire hill, largely uninterrupted, and constitutes the first visible terrace on every side save the northern. It is this "second terrace," on which all of the excavation units described below were located.

During the late Soviet Period a television relay antenna was installed on top of the site, which destroyed much of the architecture and cultural deposits visible in earlier aerial photographs of the 1.6 ha citadel,[48] although significant spoil heaps preclude a complete understanding of the damage. Surface collections during the ArAGATS pedestrian survey included ceramics from the Early and Late Bronze Age.[49] Excavations at four separate operations on the site's northern and eastern terraces in 2006 and 2008 revealed significant Early and Late Bronze Age occupations at the site.

The Early Bronze Age at Aragatsi Berd

While no *in situ* EB levels were exposed at Aragatsi Berd in 2006 or 2008, significant amounts of EB pottery were recovered in layers of colluvial overburden in all excavation operations. On the whole, these materials were typologically homogeneous, assignable to the "Karnut-Shengavit" group of the later EB. They included standard cups with tripartite bodies, hemispherical bowls, pots, jugs, and storage jars. The dominant ornamental style utilizes horizontal circumferential belts filled with geometric motifs. Two samples are particularly notable: (1) a body fragment of a large jar (AB4, locus 7), which held traces of bitumen on an upper horizontal, corrugated edge (see the discussion of bitumen from Gegharot above), and (2) a bowl fragment with a vertical handle that starts at the rim. The bowl sherd features a geometric pattern that extends along the entire handle. An analogous handle, featuring similar form and decoration, was recovered from Sos Höyük IVa.[50]

A single EB radiocarbon determination from operation AB1 (locus 6), the initial 4×4 m sounding at the site carried out in 2006, indicated a date range of 3100–2870 BC (2 sigma) **(Tab. 8)**. Based on the predominance of LBA artifacts in the operation however (see below), this date is most likely the result of EB deposits having been pulled into an LB space during terrace construction and use.

Also of note for the EB investigations at Aragatsi Berd were the excavations in the eastern half of operation AB4, a 3×5 m unit located on the eastern portion of the second terrace **(Fig. 24,d)**. Loci 7, 11, and 14 in this sector of the operation encountered dense deposits of fallen wall cobbles and silty soil that permitted deeper excavation than in the western AB4 precincts, which all met bedrock (see below). The collected materials also featured higher frequencies of EB pottery than the western half of the operation and eventually gave way to undifferentiated EB cultural fill. A horn fragment

[47] Avetisyan *et al.* 2000, 30; Badalyan/Avetisyan 2007, 62–65; Smith *et al.* 2009, 281–286.

[48] Smith *et al.* 2009, Plate 42.

[49] Avetisyan *et al.* 2000:30; Badalyan/Avetisyan 2007, 62–65; Smith *et al.* 2009, 281–286.

[50] Sagona 2000, Fig. 17.7.

Site	Operation	Material	Lab Number	14C Date (BP)	Calibrated Date (BC) 95.4% Probability
Aragatsi Berd, 2006	AB1, l. 6	charcoal	AA-72050	4323 ± 51	3091-2878
Aragatsi Berd, 2008	AB2, l. 13	charcoal	AA-82791	3078 ± 35	1424-1265
Aragatsi Berd, 2008	AB3, l. 12	charcoal	AA-82792	3040 ± 35	1410-1209
Aragatsi Berd, 2008	AB3, l. 16	charcoal	AA-82793	3005 ± 36	1383-1128
Aragatsi Berd, 2008	AB3, l. 19	charcoal	AA-82790	3037 ± 50	1416-1129
Aragatsi Berd, 2008	AB3, l. 22	charcoal	AA-82794	2946 ± 35	1291-1027
Aragatsi Berd, 2008	AB4, l. 3	charcoal	AA-82795	3060 ± 40	1426-1213
Aragatsi Berd, 2008	AB4, l. 6	charcoal	AA-82788	2774 ± 66	1113-807
Aragatsi Berd, 2008	AB4, l. 6	charcoal	AA-86868	2958 ± 46	1369-1018
Aragatsi Berd, 2008	AB4, l. 6	charcoal	AA-86869	2877 ± 46	1212-922
Aragatsi Berd, 2008	AB4, l. 8	harcoal	AA-82789	2949 ± 51	1370-1008

Tab. 8
Radiocarbon determinations related to Aragatsi Berd Early and Late Bronze Age contexts from the 2006–2008 field seasons (calibrations by OxCal v. 4.1.7 Bronk Ramsay 2010)

from a zoomorphic EB andiron, similar to others collected from surface and colluvial strata at Aragatsi Berd, was recovered as well. An LB foundation wall (W401, locus 4) situated at a higher elevation in the operation's western sector, did not extend into this downslope area of the excavation, likely having eroded away. Thus, the depositional context closely resembles EB spaces uncovered on the Gegharot western terrace and citadel, which have been exposed immediately downslope and beneath eroded LB spaces.[51] Due to time constraints, the excavation of the eastern sector of AB4 was not completed during the period of excavations described in this report.

The Late Bronze Age at Aragatsi Berd

Excavations at all four operations at Aragatsi Berd revealed *in situ* architectural and material remains attributable to the Late Bronze Age and collected a significant amount of ceramic materials ($n > 600$). LBA pottery at the site is dominantly affiliated with the LB II and III periods. Only four potsherds, all from operations AB1 and 2, can be assigned to the LB I phase. The assemblage consists of short and tall-necked jars (often with high shoulders), globular pots, shallow bowls, basins, and larger storage vessels characteristic of the LB. The majority of the assemblage is decorated with incised, circumferential motifs consisting of lines, belts, bands, and oblique hatching and is dominated by black and gray reduced-fired wares. Significant proportions of buff and red pottery are also included, however. Sherds from special vessels such as mini jars, cups, censers, and *manghals* were also collected. Other LB materials of note include stone tools (basalt handstones, a variety of hammerstones, four partial obsidian projectile points, and one unifacial LB jewelry mold fragment), bone awls and punches, ceramic disks, and numerous incised and drilled astragali of cattle, in addition to large collections of paleozoological and paleobotanical material.

The materials from operation AB3, a 6×3 m excavation unit opened in a flat area on the northern extent of the second terrace, provide the most revealing and substantial information about the site's LB occupation. Surface architecture visible within the operation was confirmed to constitute several superimposed wall segments (W301 and W302, locus 4), forming two triangular architectural spaces positioned against the "outermost" built feature of the terrace **(Fig. 24,c)**. These terracing features were faced on the citadel side, where the excavation matrix consisted of silty ash with high frequencies of carbon particles. To the south of this tangle of built contexts, two LB features were uncovered.

The first was a 1.5 m meter deep pit positioned immediately south of the architecture (Pit 301, loci 18–24) and overlain by flat paving stones, burned beams, charred and darkened earth, a spiral bronze ring, a collection of striated and unstriated cow astragali, and a broken-in-place *manghal* **(Fig. 25,1)**.[52] Double-ended, ovoid ceramic objects, *manghals* are open on both (long) ends, like the censers recovered from the LB shrines on the Gegharot western terrace.[53] But while one orifice is wide and follows continuously from the vessel walls, the other end of the vessel features a narrower, slotted orifice. Also

[51] Бадалян/Смит 2008; Badalyan *et al.* 2008.

[52] The *manghal* from Aragatsi Berd is 41 cm wide at the base, 54.5 cm wide at the top, and 32.5–34.5 cm tall. The basal aperture is 30 cm long and 5 cm wide.

[53] Badalyan *et al.* 2008, 66 Fig. 21.

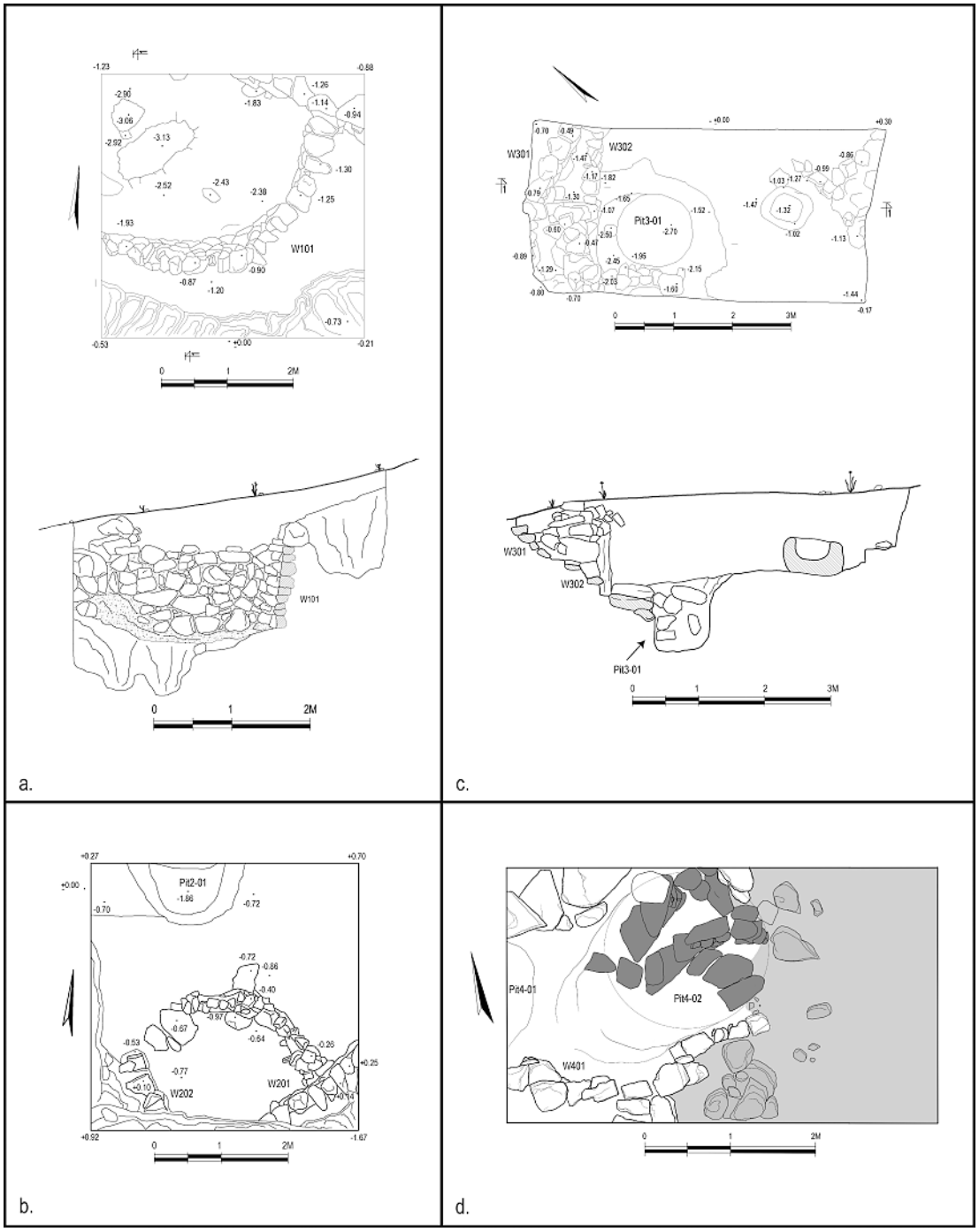

Fig. 24
Aragatsi Berd. Plan and section views of operations AB1–4

characteristic of these slab-built objects, but not always present, is a perforation halfway up each of the sides, so that air could fuel pyrotechnical activity or a cord or rod be inserted through the vessel lengthwise to support it, hang it, or suspend something inside of it. In addition to lateral perforations 2 cm in diameter 15 cm below each "rim", the Aragatsi Berd example features five pairs of impressed grooves on opposing sides. *Manghals* often feature additional evidence of pyrotechnical activity in the form of carbon smudges and clouds on both interior and exterior surfaces (see the two examples from

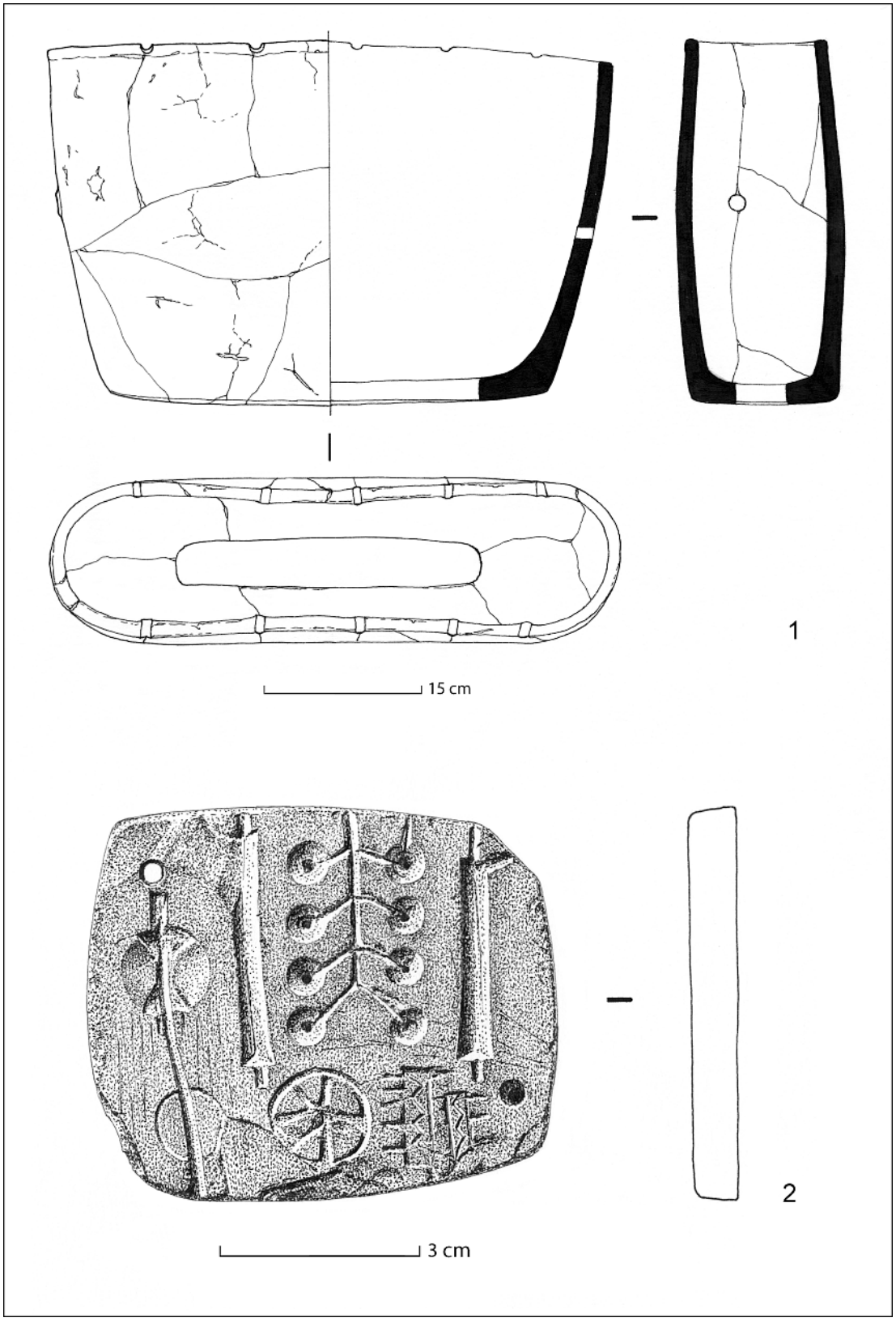

Fig. 25
Aragatsi Berd. 1. LB manghal; 2. unifacial jewelry mold recovered from Pit AB3–01

operation T-32 at Gegharot above, which feature almost identical smudging patterns to the Aragatsi Berd example).

The "paved" pit underlying this collection of materials, composed of inward-sloping bedrock faces, is a feature encountered in LB contexts excavated on the Gegharot western terrace and citadel.[54] Towards the center of the feature, the paving slabs (locus 17) slumped lower, having sunken from their original position at the lip over the millennia **(Fig. 24,c)**. The pit's silty ash matrix included moderate frequencies of bone, including additional cow astragali, the mandible and teeth of a single dog, horse vertebrae, a single pig tooth, obsidian debitage, LB ceramics, and a unifacial jewelry mold **(Fig. 25,2)**.[55] The mold was discovered with its non-engraved side up, approximately 10 cm away from a complete cow horn, and featured a perforation in one corner, likely used to either attach a cover or face plate to the mold or to position it during casting. A shallow divot in the opposite corner would have been used to more securely articulate the mold with a plate. In its design forms and size the Aragatsi Berd mold most closely resembles the mold recovered from operation T-15 in the Gegharot citadel,[56] although it appears to be made of argillite. The designs, including bars, spoked wheel shapes, a "tree" of circular beads, zigzag decorated cylinders, a bi-conical decoration, among others, find analogies in both the Gegharot T-15 mold and the Gegharot T-2E mold discovered in the western terrace excavations.[57] The Aragatsi Berd mold was discovered at an elevation where the sloping pit walls stopped their inward taper and began a near vertical cylinder. This cut continued down to the pit's base, between 20 and 30 cm in total cylindrical depth.

The second significant AB3 feature consisted of a level bedrock floor surface (locus 6) covered lightly by several millimeters of yellow clay, upon which sat a carved, freestanding basalt basin. Placed at the eastern edge of the floor, the basin measured 50 cm tall and 40 cm in diameter. Such installations, which could serve any number of working, grinding, or washing purposes, are common at LB fortresses on the Tsaghkahovit Plain and elsewhere throughout Southern Caucasia. Similar examples have been recovered from contexts at both Gegharot and Tsaghkahovit fortresses.[58] Three ground stone tools, as well as moderate quantities of LB ceramics were recovered in its immediate vicinity. The floor itself formed a continuous surface, reaching to the lip of the AB3 pit (301). Multiple lenses of black carbon and ash were distributed over the entire length of the floor, terminating in the burned beams sitting atop the Pit 301 pavement. Analysis of radiocarbon samples collected from both the floor and pit features in AB3 date the complex to the fourteenth century BC **(Tab. 8)**.

Operation AB4, a 5×3 m excavation unit on the eastern portion of the second terrace, revealed additional LB built features and activity areas **(Fig. 24,d)**. At the southern edge of the operation, an LB foundation wall (W401, locus 4) and paved floor (locus 6) were uncovered merely 50 cm below the surface. The wall location corresponded exactly to the placement of architecture suggested by surface rockiness and mounding and was composed primarily of rectangular, single-faced blocks, averaging 40 cm in length (the position of W401 against the southern operation baulk made it difficult to assess the presence of single- or double-faced blocks).

The paved floor was found to abut the foundation wall to the north, covered by a 2 cm layer of pasty, yellow clay. It did not host a significant amount of materials on its surface, but all of the diagnostic ceramic materials collected were associated with the LB. Analysis of carbon samples collected from the floor date the LB complex to the thirteenth century BC **(Tab. 8)**. The paving stones were subsequently removed in order to determine whether the floor represented merely the most recent level of site occupation, or the only (LB) occupation level in the western half of the operation.

Two pits were exposed beneath the paving stones: one against the western operation cut (Pit 401, locus 8 western sector), running into the baulk, and a second (Pit 402, locus 8 eastern sector) on the eastern side of a projection of crumbly, red bedrock, expanding eastward towards the center of the operation. Pit 401 contained silty, ashy loam and no artifacts of note; most of the feature appeared to lie within the operation's western baulk. The larger Pit 402 produced moderate amounts of ceramics and high frequencies of stone tools: seven in total, including hammer-stones, flat anvil-like slabs, and two basalt handstone fragments. A large, perforated, triangular bone object, perhaps a fitting or an irregular spindle whorl, was also recovered there. Most interesting, however, was the discovery of a mini LB jar in two halves, just north of W401. The bottom half was exposed approximately 20 cm southeast of the top portion. Such "mini vessels" have been recovered from contexts on the Tsaghkahovit and Gegharot terraces, as well as the Gegharot citadel (see above). Like

[54] See Badalyan *et al.* 2008, Figs. 5 and 9.
[55] The mold measures $7.0 \times 5.5–6.0 \times 0.7$ cm and weighs 45.2 g.
[56] Badalyan *et al.* 2008:64, Fig. 19.
[57] Badalyan *et al.* 2008:71, Fig. 24.
[58] Бадалян/Смит 2008.

the paved surface overlaying it, radiocarbon determinations associate Pit 402 with the thirteenth century BC **(Tab. 8)**. Due to time constraints, the excavation of this pit was not completed during the fieldwork described in this report.

Finally, operations AB1 and 2, adjacent 4 × 4 m excavation units on the northeastern side of the second terrace separated by a 1 m baulk, provided glimpses of the LB retaining walls and terracing architecture employed at the site, as well as artifact caches purposefully deposited when this sector of the fortress went out of use **(Fig. 24,1.2)**. Excavations in AB1 exposed a ten-course retaining wall (W101, locus 3) set on and against a carved bench of hillside bedrock and directly associated with a floor surface built of leveled bedrock. The curvilinear wall turned northeast at the operation's eastern edge, articulating with a shorter wall segment (W102, locus 11) oriented roughly west-east as it passed between the northern and eastern operation baulks, just at the terrace edge. The trajectory of these walls off the terrace suggested that the rest of the room had eroded off the side of the hill. The bedrock floor in AB1 (loci 6 and 14) featured a small *in situ* collection of artifacts purposefully placed beneath a boulder 50 cm in length, including groundstone tools, *manghal* sherds, a cache of astragali, ceramic disks, a spindle whorl, and a bone spatulate tool.

Excavations in AB2 confirmed indications from AB1 that the terrace architecture of Aragatsi Berd consisted of a configuration of curvilinear, s-shaped retaining walls built against hillside bedrock that is similar to the known LB terrace preparations at Gegharot and Tsaghkahovit.[59] Two wall segments were exposed (W201 and W202, loci 4 and 5), once again abutting the rear of the terrace **(Fig. 24,b)**. They sat on a prepared bedrock surface much like the floor in AB1. These wall sections likely connected to each other within the AB2 southern baulk and to the AB1 retaining wall across the operation's eastern baulk.

At the northernmost AB2 margin the bedrock floor gave way to a lower progression of cultural fill, an area subsequently identified as a pit approximately 1.75 m in diameter (Pit 201, loci 12 and 13). The bell-shaped feature contained articulated portions of a cow spine and legs approximately thirty centimeters below the lip. The pit fill included ceramic disks and most of the diagnostic pottery was associated with EBA. However, a single radiocarbon date from the pit **(Tab. 8)** has affiliated the matrix to the LBA, suggesting it was filled with EB debris, but last used in the LBA. The rather purposeful deposition of the cow suggests a ceremonial closure of the pit, perhaps associated with the abandonment of the room or its turnover to new uses.

The botanical remains from LB Aragatsi Berd also proved illuminating, although the total carpological sample recovered (162 units) is small for accurate statistical analysis. Therefore, the ratios of unidentified cereals, wheat, barley, and weeds presented here remain provisional. The highest concentration of archaeocarpological material was recorded for Pits 201 and 301. The cultigens-to-weeds ratio for LB Aragatsi Berd was 35% to 65%, and the wheat-to-barley ratio was 45% to 55%. Thus, preliminary data suggest that barley predominated over wheat during the site's LB occupation. Four cultivated cereals (Poaceae) are present in the Aragatsi Berd dataset: common bread wheat (*Triticum* cf. *aestivum* subsp. *vulgare*), club wheat (*Triticum* cf. *aestivum* subsp. *compactum*), round grained wheat (*Triticum* cf. *aestivum* subsp. *sphaerococcum*), and cultivated barley (*Hordeum vulgare*), at least a portion of which are hulled. Cereals are therefore the only field crops found at Aragatsi Berd, which is not uncommon among archaeobotanical investigations of Bronze Age sites in the region.

In addition to field crops, the composition of weedy flora recovered at Aragatsi Berd is generally common for Bronze and Iron Age Armenia. The only exception is the presence of *Asperugo* cf. *procumbens* — a boraginaceous ruderal and sometimes segetal weed, which is common for locations of human activity. Its presence at LB Aragatsi Berd marks the first instance of its documentation in the archaeoflora of Armenia. Cyperaceae family species (*Scirpus* and *Carex*) are also present at Aragatsi Berd and indicate the existence of nearby wetlands ecosystems/humid conditions during the LBA. Limited quantities of weed seeds belong to *Chenopodium*, Brassicaceae, Lamiaceae, and Poaceae families, suggesting possible dietary supplements in addition to cereals.

Like the paleobotanical collection, the Aragatsi Berd faunal sample is one of the smallest analyzed samples from the Tsaghkahovit Plain. In terms of the taxa represented, it is consistent with the other LB faunal samples from the Tsaghkahovit Plain, but in kill-off patterns, it seems to differ from them in important ways.

Among the specimens identified to the level of genus, the Aragatsi Berd sample is composed primarily of sheep and goats **(Tab. 9)**, as with all the other samples from the LBA Tsaghkahovit Plain. The proportion of sheep/goats is slightly higher than at other LB sites and the proportion of cattle is slightly smaller, but these differences are slight.

[59] Badalyan *et al.* 2008, Fig. 9; Smith *et al.* 2004, Fig. 6.

		Aragatsi Berd Late Bronze			Tsaghkahovit SLT Late Bronze		
		NISP	% NISP	% NISP to genus	NISP	% NISP	% NISP to genus
Bufonidae	Toads	0	0.00%		0	0.00%	
Squamata	Snakes	0	0.00%		0	0.00%	
Fish		0	0.00%		0	0.00%	
Large bird		2	0.16%		0	0.00%	
Medium bird		0	0.00%		3	0.06%	
Small bird		0	0.00%		0	0.00%	
Indeterminate		602	46.81%		145	2.69%	
Large mammal		130	10.11%		1229	22.81%	
Medium mammal		307	23.87%		732	13.59%	
Small mammal		20	1.56%		55	1.02%	
Artiodactyl		0	0.00%		0	0.00%	
Large artiodactyl		0	0.00%		0	0.00%	
Medium artiodactyl		0	0.00%		0	0.00%	
Bovid		2	0.16%		26	0.48%	
Bos	Cattle	49	3.81%	23.44%	1479	27.45%	46.52%
Capra	Goat	5	0.39%	2.39%	100	1.86%	3.15%
Ovis	Sheep	18	1.40%	8.61%	334	6.20%	10.51%
Gazella	Gazelle	0	0.00%	0.00%	1	0.02%	0.03%
Ovis-Capra-Gazella		5	0.39%		7	0.13%	
Ovis-Capra		122	9.49%	58.37%	1099	20.40%	34.57%
Cervid		9	0.70%		5	0.09%	
Cervus	Red deer	0	0.00%	0.00%	7	0.13%	0.22%
Dama	Fallow deer	0	0.00%	0.00%	1	0.02%	0.03%
Equus		3	0.23%	1.44%	73	1.36%	2.30%
Equus caballus	Horse	0	0.00%	0.00%	15	0.28%	0.47%
Equus asinus	Donkey	0	0.00%	0.00%	4	0.07%	0.13%
Equus hemionus	Onager	0	0.00%	0.00%	0	0.00%	0.00%
Equus asinus/hemionus		0	0.00%	0.00%	1	0.02%	0.03%
Sus	Pig	2	0.16%	0.96%	17	0.32%	0.53%
Carnivore		0	0.00%		0	0.00%	
Canid		0	0.00%		1	0.02%	
Large canid		0	0.00%		0	0.00%	
Canis familiaris	Domesticated dog	9	0.70%	4.31%	0	0.00%	0.00%
Canis lupus	Wolf	0	0.00%	0.00%	0	0.00%	0.00%
Vulpes	Fox	0	0.00%	0.00%	0	0.00%	0.00%
Meles	Badger	1	0.08%	0.48%	9	0.17%	0.28%
Lepus	Hare	0	0.00%	0.00%	0	0.00%	0.00%
Rodentia		0	0.00%		3	0.06%	
Microtus	Vole	0	0.00%	0.00%	31	0.58%	0.98%
Spermophilous	Souslik	0	0.00%	0.00%	10	0.19%	0.31%
Total		1286			3223		

Tab. 9 Number of Identified Specimens for Aragatsi Berd and Tsaghkahovit SLT LB contexts (2007–2011 field seasons)

However, among those specimens so identified, the sheep to goat ratio at Aragatsi Berd is 1.6:1, considerably lower than the other LB sites, which range from over 5:1 and never drop below 3:1. Without further information about the differences in the use of sheep and goats in the LB plain, it is not possible to definitively interpret this pattern. Outside of Aragatsi Berd, the lowest sheep to goat ratio is at the Gegharot citadel.

Survivorship of sheep and goats is also similar to that at other sites on the Tsaghkahovit Plain. Just over 40% of the herd reaches adulthood, a pattern which, at EB Gegharot has been interpreted as an example of localized production for localized consumption. Thus, it seems that the pastoralists at Aragatsi Berd were not pursuing a specialized production strategy, but rather practicing a generalized herding strategy for localized consumption.

There is a noticeable difference between the Aragatsi Berd sample kill-off curve and those of the Tsaghkahovit citadel and Gegharot western terrace, which are the only two assemblages with reliable samples. For both of the latter two contexts, more than half the herd was killed off by Stage D, which is the point at which animals reach maturity. In these samples, kill-off after this stage is very low. In the Aragatsi Berd sample, kill-off at stage D is 50 percent, leaving a greater proportion of the herd to live to maturity. To a limited extent, this pattern is also true for kill-off curves generated using epiphyseal fusion. In the first stage, at about one year of age, kill-off is noticeably less than in any of the other four samples. In the final stage, about three years of age, kill-off is slightly greater than the Tsaghkahovit Residential Complex, but lower than the other three samples. The Residential Complex kill-off pattern was originally interpreted as the single example of a self-sustaining herding practice. The low kill-off of young animals in the Aragatsi Berd sample suggests that this might also be an instance of a self-sustaining herd.

Despite these intriguing initial data, the Aragatsi Berd sample size remains too small to draw reliable inferences at present and all of the above trends should be noted as tentative and preliminary.

In summary, excavations to date at Aragatsi Berd have confirmed the EB and LB occupations of the site, identified their relative chronological sequence, and provided a detailed evaluation of the damage to the citadel. EB investigations, while restricted to levels of colluvium and cultural fill, have confirmed the existence of a chain of small EB settlements along the southern Pambak slopes that extended from Jarjaris to Gegharot. Their close placement and intense occupations indicate the high density of the plain's EB settlement. LB exposures suggest that the occupation of Aragatsi Berd in that period covered the entire upper portion of the hill and that the citadel and terraces were intensely occupied. The later dating of LB deposits in AB4 indicate that the eastern terraces, as well as immediately adjacent sub-divisions running along the first southern terrace, may have been constructed and occupied in the later LB, while the second northern terrace appears to have been occupied earlier. The destroyed fourteenth century room in AB3 exhibited many of the features and materials familiar from institutional ritual and storage contexts exposed at Gegharot and Tsaghkahovit, as well as more distant fortresses such as Metsamor in the Ararat Valley. Ongoing research with the materials from Aragatsi Berd is intended to delineate exactly how the fortress was incorporated into the broader political-economic rhythms of LB social life on the ancient plain.

Excavations of the Late Bronze Age Settlement at Tsaghkahovit

The monumentality and vertical relief of LBA fortresses such as Gegharot, with well-demarcated spaces of ritual practices and metal production, stand in marked contrast to LBA residential settlements. Excavations in 2010 and 2011 at the residential complex at the base of the Tsaghkahovit fortress, designated the Tsaghkahovit South Lower Town (SLT), advanced our overall goal of understanding the impact of new fortress-centered political institutions on grassroots populations. Additionally, the settlement's site structure uncovered during our 2003/2005 excavations[60] raised important questions about the potential for seasonal residential mobility of the occupants of the LBA settlement, which we have begun to resolve through a combination of a magnetic survey[61] and further intensive excavations. Overall, our results thus far demonstrate a substantial energetic investment in settlement architecture concurrent with repeated ephemeral (likely seasonal) uses of the settlement space. The evidence from site-structure and material culture resulting from our 2010/2011 investigations at SLT support an interpretation of a community engaged in a mixed farming and herding economy who spent portions of the year on the move but returned to the site repeatedly. In this sense, the Tsaghkahovit South Lower Town represents an important case study in the complex set-

[60] Badalyan *et al.* 2008.
[61] Lindsay *et al.* 2010.

tlement and subsistence patterns of mobile pastoralists.[62]

Our 2010 and 2011 excavations were especially focused on tracing the settlement architecture uncovered in 2005 to broaden our scope of the economic activities represented at the settlement and to trace the stratigraphic relationship between the primary LBA occupation and the subsequent Iron 3 occupation noted in portions of the settlement during prior field seasons. We therefore opened five large units to the south of our 2005 exposures; in 2010 we opened operations SLT 9 (7×7 m), SLT 10 (7×7 m), SLT 11 (5×7 m), and in 2011 we initiated operations SLT 13 (6×7 m), and SLT 14 (6×7 m) **(Fig. 26)**. Two other ancillary operations were conducted in the vicinity of the larger trenches; SLT 8 was a 2×2 m test trench excavated during the course of the 2008 magnetic survey,[63] and SLT 15 was a robbed Iron 3 tomb exposed while cleaning the baulk near the northwest corner of SLT 13.

The architecture uncovered in the five primary operations (SLT 9–11, 13, 14) offer further evidence of the LBA construction style of cutting into bedrock in preparation for building and using basalt outcrops in wall construction and for stationary mortars. Indeed, the perspective of four seasons of excavations suggests that LBA builders went to great effort in leveling the natural west-east grade of the settlement area into at least three distinct vertical elevations. Illustrating these descending levels of prepared surfaces, the prepared bedrock surface in the western-most operation of SLT 11 (locus 4) is 2142.1 m, the primary prepared surface in neighboring SLT 9 (locus 15) is 2141.0 m, and in SLT 13 (locus 10) is 2138.8 m; even with some unevenness in the bedrock surfaces, we can observe at least a 1 m drop between the prepared bedrock surfaces in SLT 11 and 9 to the east, and at least a 2 m drop between SLT 9 and SLT 13.

After this initial expenditure of energy preparing the space for construction, however, comparatively little formal planning appears to have been put into much of the architecture that might give one a sense of a sustained occupation. Indeed, one of the most striking aspects of the layout of the complex is the informality of the room plans. Rooms in the settlement are generally ovoid in shape, constructed of variably-sized, poorly worked basalt stones comprising walls that stand to a height of up to four courses or approximately 1.5 m (typically built against cut bedrock). In most cases, however, the walls are only one or two courses, likely servicing as foundations for an organic superstructure such as felt tenting or wattle-and-daub. Examples of the short, single- and double-course walls are visible around an oblong central space in operation SLT 14, another ovoid room spanning the southwest corner of SLT 9 into SLT 10 (walls labeled W1401, W0901, and W0101 in **Fig. 26)**, as well as rooms exposed in operations SLT 1 and 5.[64] The type of roofing material used to shelter these irregularly-shaped rooms is still unclear, but a series of small pits (20–50 cm in diameter) dug into the central floor space of SLT 9, including one lined with a ring of recessed cobbles, suggest they may have once supported structural columns or tent-posts.

In addition to the loose structure of the site plan, evidence for rearrangement of walls and stratified floor levels signal episodes of reoccupation within the LBA. In operation SLT 14, many of the basalt wall stones of W1401 are faced on one side, but the faces are jumbled, suggesting the walls stones were recycled from prior occupational phases. In addition, walls associated with different floor levels abut and overlap each other, reinforcing the impression of remodeling prior residential spaces to fit the changing needs of the group in subsequent occupations. In operations SLT 9, 10 and 14, stratified floor levels were visible in profile, alternating with thin layers of floor prep; in SLT 9, the floors thicknesses ranged from 2–5 cm separated by floor prep, while in SLT 14, the strata between floors were separated by larger intervals between 10 and 40 cm apart, perhaps indicating a longer interval between occupations. However, three radiocarbon determinations (AA-95623, AA-95624, AA-95626) from charcoal samples collected from three visible floor levels in SLT 14 all returned dates in the LB II phase between the last quarter of the 15th century and the mid-14th century BC **(Tab. 10)**, which suggests that the time between the floor layers can be measured in generations rather than distinct horizons. If this assessment is correct, it further supports our hypothesis that portions of the domestic complex were occupied intermittently by seasonally mobile groups.

When the settlement was in use, the features and artifacts recorded reinforce the domestic scale of production and consumption, while providing further insight into the range of subsistence activities represented in different rooms within settlement. For example, in operation SLT 9 features on the living surface include hearth features – common to many of the exposed rooms – but the most defining characteristic of this space is a series of

[62] *sensu* Barnard/Wendrich 2008; Hanks/Linduff 2009; Porter 2012.

[63] see Lindsay *et al.* 2010 for details.

[64] Badalyan *et al.* 2008, Fig. 28.

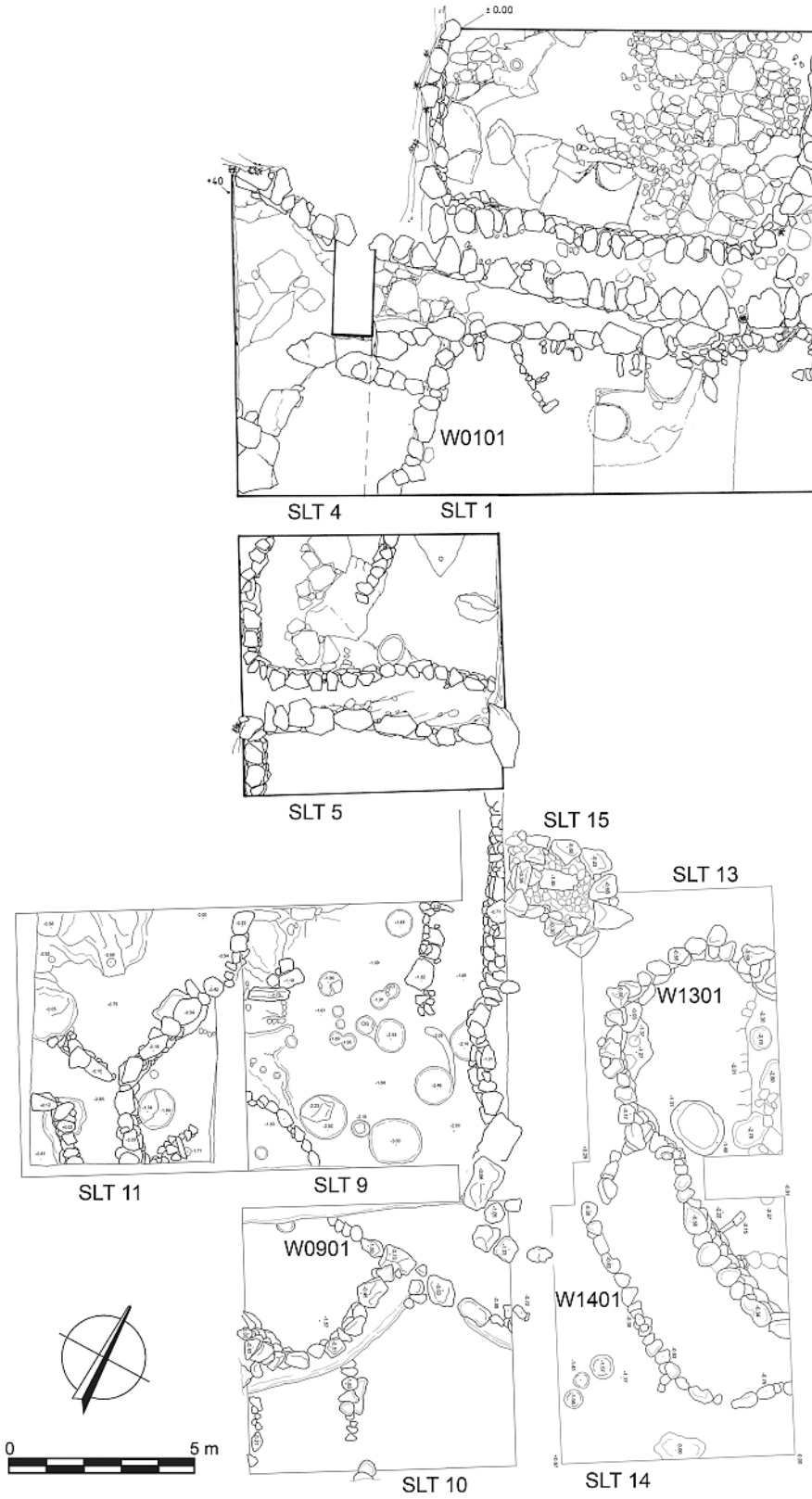

Fig. 26
Tsaghkahovit. Plan of South Lower Town residential complex, including operations SLT 9, 10, 11, 13, and 14, the primary units under discussion

Site	Operation	Material	Lab Number	^{14}C Date (BP)	Calibrated Date (BC) 95.4% Probability
Tsaghkahovit SLT, 2008	SLT8, l. 9	charcoal	AA-82785	2993 ± 44	1390-1058
Tsaghkahovit SLT, 2008	SS1, l. 6	charcoal	AA-82786	3231 ± 39	1608-1430
Tsaghkahovit SLT, 2008	SLT8, l. 12	charcoal	AA-82787	2883 ± 66	1290-900
Tsaghkahovit SLT, 2010	SLT9, l. 12b	charred pea seed	AA-92628	2647 ± 60	972-571
Tsaghkahovit SLT, 2010	SLT9, l. 13	charcoal	AA-92629	2651 ± 40	900-782
Tsaghkahovit SLT, 2010	SLT9, l. 21	charcoal	AA-92630	3080 ± 39	1434-1260
Tsaghkahovit SLT, 2010	SLT9, l. 35	charcoal	AA-92631	3067 ± 38	1426-1218
Tsaghkahovit SLT, 2010	SLT10, l. 14	charcoal	AA-92632	2702 ± 38	919-801
Tsaghkahovit SLT, 2010	SLT10, l. 14	charcoal	AA-92633	3111 ± 39	1491-1270
Tsaghkahovit SLT, 2010	SLT10, l. 16	charcoal	AA-92634	3102 ± 39	1448-1267
Tsaghkahovit SLT, 2010	SLT10, l. 19	charcoal	AA-92635	3110 ± 38	1490-1270
Tsaghkahovit SLT, 2011	SLT13, l. 13	charcoal	AA-95619	2353 ± 39	726-366
Tsaghkahovit SLT, 2011	SLT13, l. 15	charcoal	AA-95620	2885 ± 39	1211-934
Tsaghkahovit SLT, 2011	SLT13, l. 19	charcoal	AA-95621	2495 ± 39	787-417
Tsaghkahovit SLT, 2011	SLT13, l. 22	charcoal	AA-95622	3185 ± 87	1682-1262
Tsaghkahovit SLT, 2011	SLT14, l. 5	charcoal	AA-95623	3080 ± 51	1488-1210
Tsaghkahovit SLT, 2011	SLT14, l. 9	charcoal	AA-95624	3182 ± 41	1530-1386
Tsaghkahovit SLT, 2011	SLT14, l. 12	charcoal	AA-95625	3117 ± 40	1494-1294
Tsaghkahovit SLT, 2011	SLT14, l. 14	charcoal	AA-95626	3148 ± 40	1504-1316

Tab. 10 Radiocarbon determinations related to Tsaghkahovit South Lower Town from the 2008–2011 field seasons (calibrations by OxCal v. 4.1.7 Bronk Ramsay 2010 r. 5)

variably sized pits dotting the floor, including five very large pits on the order of 1–1.5 m in diameter by 1 m deep **(Fig. 27)**. Most of these pits contained grains of domesticated wheat, barley, and pulse recovered by flotation, from which we conclude that the occupants of the lower town engaged in grain production during the short summer growing season to augment their pastoral economy (see below). These pits were in addition to the smaller scale pits noted above that may have had a role in structural support.

The primary use of this space as a storage facility – encompassing operation SLT 9 and portions of SLT 10 and 11 – is supported by a notable lack of evidence for food processing and consumption; indeed, only two pieces of groundstone were recovered from operations SLT 9, 10, and 11. This is in contrast to findings of similarly sized operations just to the north – SLT 1, 4, and 5 – where we collected 15 pieces of large groundstone and two *in situ* cooking vessels, artifacts associated more directly with preparing and cooking food, in rooms that we interpreted as living spaces.[65]

The storage features that characterize SLT 9 also contrast with materials documented in SLT 13 to the east. This operation uncovered a large ovoid semi-subterranean room enclosed by a multi-course stone wall W1301 **(Fig. 28)**. The interior features of the room included a large stone basin on the bedrock floor measuring 1.5 m in diameter. The basin was propped up on its eastern side by cobbles where the bedrock floor was uneven; this attempt to level such a heavy basin may indicate it was used to hold liquid (perhaps water or oil) for household use. The basin's function remains something of a mystery, but it is nearly identical to a basin discovered on an LBA floor in operation SLT 5 excavated in 2005.[66] Other materials in SLT 13 included a stationary stone mortar carved into the bedrock outcrop at the western end of the room and seven pieces of groundstone, indicating a possible focus on food processing in this space. Although storage was not as dominant a characteristic as in neighboring SLT 9, we did encounter three substantial storage pits along the eastern baulk radiocarbon dated to the LBA (samples AA-95620 and AA-95622). Immediately overlaying the large LB pits was a clay floor with several burned areas radiocarbon dated to the mid-to-late 1st mill. BC (Iron 3 period, samples AA-95619 and AA-

[65] Badalyan *et al.* 2008.

[66] Badalyan *et al.* 2008, Fig. 28.

Fig. 27
Tsaghkahovit. Operation SLT 9, storage facility in the South Lower Town complex

Fig. 28
Tsaghkahovit. Operation SLT 13, semi-subterranean room in South Lower Town complex, looking west toward W1301

95621). The presence of LB pits below an Iron 3 context mirrors the stratigraphic situation in operation SLT 1 where an LB pit was filled in and paved over with an Iron 3 flagstone floor.

With larger ceramic samples from new exposures and a current total of 28 radiocarbon determinations analyzed between 2003–2011, we can conclude there was an initial occupation of the South Lower Town during the II phase of the LBA, followed by a second major reoccupation during the mid-1st mill. BC (Iron 3 period); the latter occupation is well-attested by three radiocarbon samples from SLT 1 and SLT 13, and a fourth from SLT 6 (a test trench located about 30 m to the south of operations discussed here), in addition to the ceramic sequences evident from the settlement.

An intriguing development related to the occupational sequence of the Tsaghkahovit South Lower Town is the mounting radiocarbon evidence for continued sporadic use of the settlement during the Iron 1 period; so far, six C14 determinations have returned dates from the turn of the 1st millennium BC, complemented by a small handful of sherds with diagnostic Iron 1 stylistic attributes. Though we lack a clear occupational level attributed to the Iron 1 period, it now appears that the SLT settlement area continued to be revisited – perhaps for the lush summer pastures on Mt. Aragats – long after the Gegharot and Tsaghkahovit fortresses were destroyed and abandoned.

The faunal remains from the SLT operations at Tsaghkahovit support the interpretation of the area as a community engaged in a mixed farming and herding economy **(Tab. 9)**. As with all of the other assemblages in the Tsaghkahovit Plain, the majority of the specimens identified to the level of genus were sheep and goats, although cattle in this sample are a close second. Equids (domesticated horses outnumber donkeys where they could be distinguished) are the only other taxon that makes up more than 1% of the sample. As usual, pigs are present in extremely low proportions, which does not rule out the possibility that at least part of the population was highly mobile.

Survivorship patterns also indicate production for the localized area rather than pursuit of a specialized economy or production for exchange. Survivorship of sheep and goats in Stage A is noticeably higher than in all other Late Bronze occupations on the plain and it remains as high in Stage B **(Tab. 3)**. Over 60 % of the herd reached physical maturity; a proportion that is more similar to cattle survivorship from other LB Tsaghkahovit Plain sites. This indicates not only a pattern of local production for local consumption, but may also suggest that the secondary products of sheep and goats, including wool and milk, were important to the inhabitants of the lower town. This is consistent with the suggestion that residents of the area may have been at least semi-mobile, since transhumant pastoralists tend to rely on these secondary products. Survivorship among cattle strongly resembles that from other sites in the Tsaghkahovit Plain, with over 60% of the herd living until physical maturity **(Tab. 7)**.

While the macrobotanical assemblages of crop and weed remains are broadly similar across the Bronze Age sites of the Tsaghkahovit Plain, the plant profile for the LB occupation at Tsaghkahovit is nearly identical to that of Gegharot **(Tab. 4)**. The Tsaghkahovit assemblage includes hulled barley (*Hordeum vulgare*, part of which belongs to six-rowed subspecies), common bread wheat (*Triticum aestivum* ssp. *vulgare*) and club wheat (*Triticum aestivum* ssp. *compactum*), emmer (*Triticum dicoccum*), rye (*Secale* sp.), and millet (*Panicum miliaceum*). The barley to wheat ratio is the same as for LB Gegharot: 75:25%. Prevailing weeds include species from Polygonace, Rubiaceae, Boraginaceae and Cyperaceae families.

Excavations of the Late Bronze Age Cemetery at Tsaghkahovit (Ts. BC 12)

In its 1998–2000 survey, Project ArAGATS took the first steps toward a systematic spatial investigation of a Late Bronze Age mortuary landscape, recording the location of burial clusters, estimating the number of tombs within burial clusters, identifying types of spatial relationships (or sub-clusters) between cromlechs[67] (e.g. lines, ribbons, densely packed, etc.), and noting morphological types when visible (e.g. standard, paved, spiral, etc.).[68] In order to further investigate these spatial relationships and mortuary practices, excavations were conducted in 2006 and 2008 at Tsaghkahovit Burial Cluster 12 (Ts BC 12). Ts BC 12 has one of the largest number of tombs per burial cluster (n = 160) in the Tsagh-

[67] Cromlechs refer to circular mound architecture constructed from stones placed in various arrangements; like "kurgans" they have an outermost ring that is also termed "cromlech," but unlike kurgans they do not have an earthen mound and are generally smaller than 10 m in diameter. Bayern (1882, 17) introduced the term "cromlech" to the Caucasus in order to distinguish these tombs from the "dolmen," that he had identified in Circassia. These dolmen are megalithic tombs with three or more upright walls supporting a large flat horizontal capstone and often with a "portal" in one wall. He noted that the cromlechs of the South Caucasus were not exactly the same as those in Europe, but that the term was appropriate since they were part of a cultic tradition dating to the Bronze-Iron transition.

[68] see Smith *et al.* 2009.

kahovit Plain,[69] which suggested to us that this particular burial cluster was a popular place for interring the deceased and may have been used either by a large number of people (or groups) over a comparatively long duration of time.

Ts BC 12 is located 350 m southeast of Tsaghkahovit Fortress on a spur of Mt. Aragats overlooking the southern edge of the Tsaghkahovit Plain. The burial cluster covers an area of approximately 5.5 hectares, encompassing two facing slopes of a small valley oriented northeast-southwest. Based on the map we generated in 2008 **(Fig. 29)**, each slope has approximately the same number of tombs (76 and 84), but the tombs on the northern slope are more densely packed in a smaller area. In particular, sub-group[70] 1 is the most densely packed with approximately 56 cromlechs in 274 square meters and with 80% of these cromlechs overlapping each other. In contrast, only 35% of the cromlechs overlap in sub-group 2 and 23% overlap in sub-group 3. Instead of overlapping, several of the cromlechs in sub-group 3 appear to be evenly spaced out along horizontal lines. Thus, there appear to be distinctions in surface architectural construction and placement of tombs that distinguish areas within the burial cluster. Excavations were thus undertaken in order to investigate whether there is a correlation between the spatial distribution of tombs within the burial cluster (i.e. sub-clusters) and any of the following elements: surface tomb construction, sub-surface tomb construction, chronology, artifact inventories, post-mortem treatment of the deceased, number of individuals present (MNI), age, sex, or any other biological information.[71]

In 2006, we selected four cromlechs (B01, B02, B03, and B04) for excavation that appeared to be in a horizontal "line" on the southern slope. In 2008,[72] we randomly selected cromlechs from the more densely packed cromlechs from subgroup 1 (B09 and B10) and subgroup 2 (B06 and B07; B11 was excavated with B07) on the northern slope.[73]

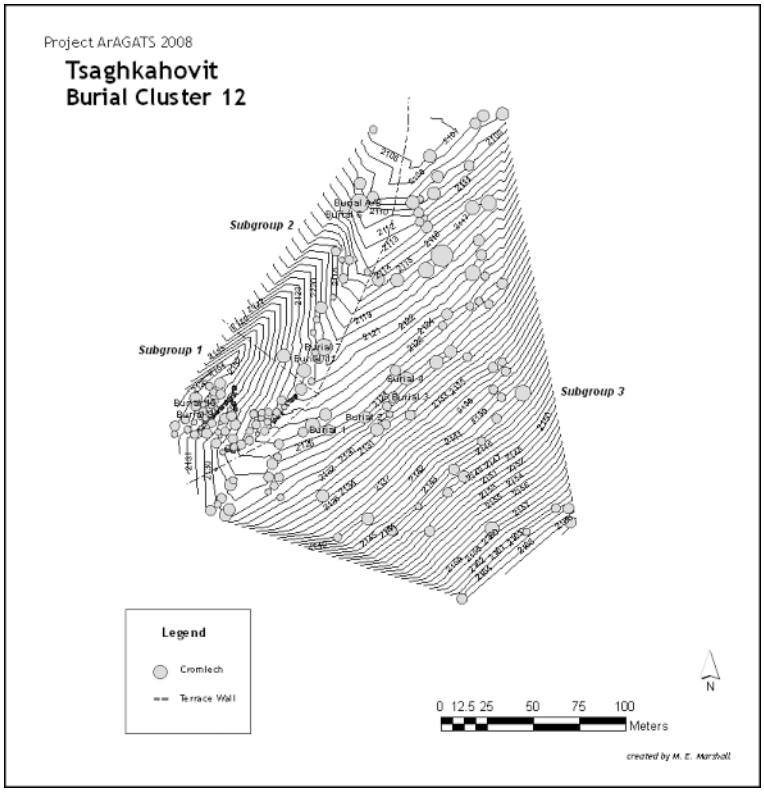

Fig. 29
Tsaghkahovit BC 12. Topographic map of Ts BC 12 with cromlech tombs shaded in gray

Three of the tombs on the southern slope (B02, B03, and B04) were dated to the LBA and shared several architectural and interment features.[74] All three of these tombs consisted of primary fully-articulated interments in which the deceased were placed within earthen pits that were sealed with large basalt capstones and covered over with basalt stones in a "standard" cromlech design (see **Tab. 11** for architectural details). In particular, B02 and B03 had very similar interment styles; within these tombs, a single individual was placed in a flexed position on the right side with ceramic vessels surrounding or in articulation with the deceased's body **(Fig. 30)**.[75] Both individuals were adult males and 35–49 years old at the time

[69] An estimated 91 tombs were counted during the survey, but the mapping project revealed a higher estimate of 161.

[70] Three sub-groups were identified within Ts BC 12 based on topography as well as differences between elements of form and construction (see Smith *et al.* 2009,190).

[71] Due to the limitations of space, this report briefly describes the results of the excavations. A more detailed discussion and analysis of these features, including bioarchaeological analyses, is available in Marshall (2014).

[72] The 2008 excavations were supported by a Fulbright Hays DDRA grant.

[73] Visible cromlechs in each subgroup were assigned numbers and then local excavation team members randomly selected a tomb from each subgroup. Two cromlechs (see Avetisyan *et al.* 2000) had already been excavated from subgroup 2 in 1998.

[74] B01 was distinct from the other excavated tombs on the Southern slope in terms of its surface architecture – a spiral design – and the lack of interred materials. It is thus likely that B 01 was a cenotaph, but without any associated materials the construction cannot be securely dated to the LBA.

[75] However, on the floor of B02's pit were three sheep (*Ovis*): an articulated male 6–12 months old and the partial remains of a female and male each 2–6 months old. This placement is similar to the Western Chamber of Gegharot Kurgan 1; however, the ceramics suggested a transitional late Middle Bronze Age assemblage and no human remains were recovered from the chamber (see Badalyan *et al.* 2008: 59–61). All faunal remains were analyzed by Dr. Belinda Monahan.

Burial #	Period	Location	Sub Group	Surface Architecture	Diameter (m)	Capstones	Capstone Length (m)
1	N/A	South Slope	3	Spiral	5.92	1	1.5
2	LB I	South Slope	3	Standard	6.98	1	1.75
3	LB I	South Slope	3	Standard	4.9	3	2.5
4	LB	South Slope	3	Standard	6.15	4	2.05
6	LB II	North Slope	2	Paved	4.83	2	1.75
BA	LB II	North Slope	2	n/a	n/a	1	1.55
BB	LB II	North Slope	2	Paved	9.3	2	1.7
7	LB II	North Slope	2	Stepped	10.1	3	1.75
9	LB II	North Slope	1	Standard	3.7	1	0.85
10	LB II	North Slope	1	Standard	4.5	2	2.05
11	LB II	North Slope	2	Paved/Bud	2.96	2	1.38

Burial #	Subsurface Architecture	Length (m)	Width (m)	Height (m)	Orientation	Preparation	Courses
1	Earthen pit	1.8	1.5	1.58	NS	n/a	n/a
2	Earthen pit	1.84	1.44	1.52	EW	n/a	n/a
3	Earthen pit	1.64	1.63	0.95	NESW	n/a	n/a
4	Earthen pit	2.93	1.8	0.96	EW	n/a	n/a
6	Stone Cist	2.78	1.35	1.49	NWSE	Shaped	2 to 3
BA	Stone Cist	1.7	0.9	1.15	NESW	Worked	2 to 3
BB	Stone Cist	1.75	1.05	1.1	NWSE	Worked	2
7	Stone Cist	2.42	1.46	1.65	EW	Worked	2
9	Stone Cist	1.05	0.8	0.57	EW	Worked	1
10	Stone Cist	1.3	1.15	1.15	NWSE	Worked	2
11	Stone Cist	0.58	0.52	0.56	EW	Worked	1 to 2

Tab. 11
Tsaghkahovit BC 12. – surface architecture of excavated tombs; – subsurface architecture of excavated tombs

of death.[76] The ceramic vessels that surrounded these individuals were mostly complete undecorated bowls and jars.[77] The vessels from these two tombs suggest a LB I period assemblage. While B04 was similar to B02 and B03 in terms of architectural features, two younger adult (30–45 and 20–35 years old) males were placed in the tomb fully-articulated in flexed positions on their right sides, facing in opposite directions, and with their feet and legs overlapping. No ceramic vessels were placed in the tomb; however, based on a bone toggle pin found near the ribs of one of the individuals, B03 can be attributed generally to the LBA.

In contrast to the tombs on the southern slope, the five tombs that we excavated on the northern slope all proved to be stone-walled cist chambers, containing only decorated ceramic vessels, and, based on the ceramic assemblages, attributable to the LB II period. However, they also demonstrated a greater diversity in surface architecture morphology (cromlech type), post-mortem treatment of the deceased, placement of vessels, and construction techniques for the cist walls. For example, B06 was a paved oval shaped cromlech with interlocking capstones **(Fig. 30)** that covered a cist chamber incorporating basalt bedrock to make up the southwestern wall. Here, the fully articulated human remains[78] were placed in a flexed position on the right side with the arms extended down to the legs and five vessels (four bowls and one jar)

[76] Skeletal age and sex were determined according to Buikstra and Ubelaker *et al.* 1994. The human remains of the individual interred in B03 were not well preserved and could have been older than the 35–49 estimated.

[77] B02 contained seven whole vessels and one large *karas* fragment, while B03 contained four whole vessels, one of which (B03.09) had decorative elements.

[78] The human remains were that of an adult, but were not well preserved due to the fact that they were covered in a clay matrix that filled the chamber.

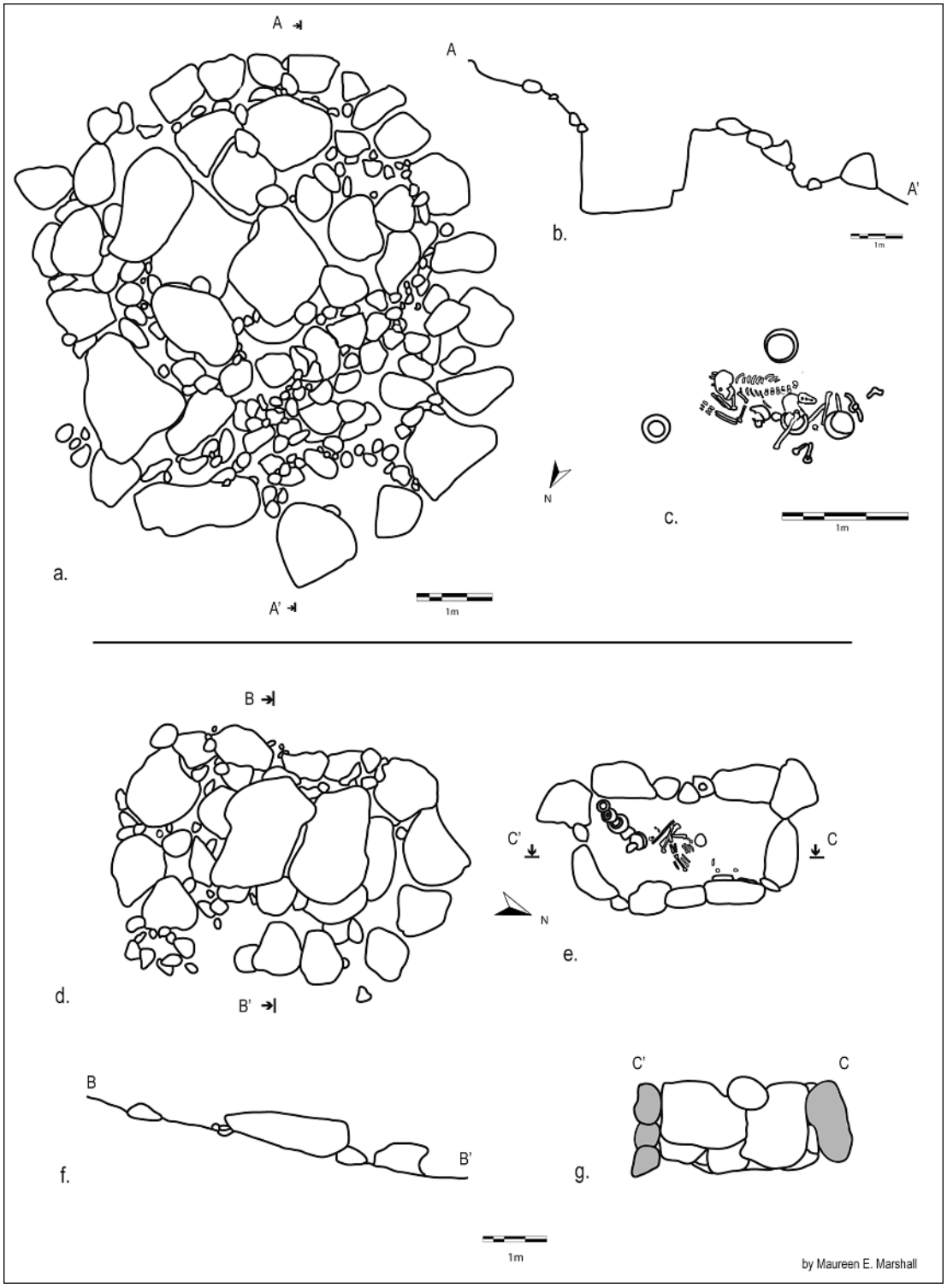

Fig. 30
Tsaghkahovit BC 12. Plan and section views of cromlech tombs; – a–c Burial 02; d–g Burial 06

were stacked in the southern corner.[79] In contrast, the surface architecture of B07 was a large stepped cromlech with three large basalt capstones covering a large cist chamber in which a complete bowl was placed in one corner[80] and the remains of the deceased were disarticulated and scattered on the floor. B11, a small "bud" cromlech that overlapped B07, contained no human remains at all. One bowl and four jars were placed on the floor of the chamber; three of these vessels contained faunal (medium mammal/sheep/goat) and/or botanical remains (cereal grains, one pulse seed, and weeds).[81] B09 and B10 both had standard cromlech architecture[82] and actually shared some of their surface stones. Yet they differed in terms of subsurface architecture and interment styles. B09 was constructed on a basalt bedrock floor and one individual, 12 years old $\pm$ 30 months, was placed on this floor fully articulated in a flexed position on the right side. The deceased was wearing a bronze bracelet around the left arm and a bronze earring was found near the skull. The individual's legs, feet, and part of the pelvis were covered by a large black jar that contained cultigens[83] including an emmer grain that was boiled prior to charring, a number of medium mammal ribs and sheep/goat remains that may have been from a butchery unit, and a fragment of obsidian. A two tanged gray obsidian arrowhead with retouching on both faces was also deposited in the tomb. In contrast, B10 contained comparatively few material objects; two bowls, one of which contained medium mammal faunal remains, were placed in the southern corner of a cist chamber. B10, however, was distinct from B09 and the other excavated tombs in terms of the construction of its walls: the northwestern wall was constructed from several small basalt stones that were stacked on top of each other.[84] The chamber contained two interments, one a partially articulated adult male 22–32 years old and one infant (birth $\pm$ 2 months). The adult male was placed in the tomb in a very tightly flexed position on the right side, perhaps originally leaning against the southeastern wall. While the majority of bones were present, this individual was missing the skull and may have been "bundled" after death and secondarily interred. The infant was placed between the adult and the northeastern wall.

While the excavations at Ts BC 12 in 2006 and 2008 were small scale, they have contributed to our understanding of the history of mortuary practices in the Tsaghkahovit Plain. In particular, they have suggested parallel distinctions between location, surface architecture, subsurface architecture, ceramic forms and decorative elements, and placement of vessels. For example, on the southern slope the excavated tombs were either standard or spiral types and had earthen pits sealed with capstones that were embedded or covered with additional stones. Three of these tombs contained primary interments of fully articulated adult individuals and two of the tombs included ceramic vessels placed around the body. The majority of these vessels were undecorated (80%) bowls (70%) and dated to the LB I period. In contrast, the excavated tombs on the northern slope demonstrated greater variation in cromlech architecture and were all stone-lined pit chambers covered by several capstones that formed part of the surface architecture. Greater variation in post-mortem treatment was also observed on the northern slope with the interment of fully articulated primary interments, a partially articulated body without the skull, and the interment of select disarticulated or excarnated body parts. The deceased also included an infant and a subadult as well as adults. Vessels tended to be placed in corners or along walls, but there was at least one example of placing vessels around and on top of the deceased's body. The majority of the vessels in this ceramic assemblage were decorated (92%) jars (60%) and dated to the LB II period.

While these associations could be influenced by the small sample size of excavated tombs, the present evidence suggests two possible interpretations. The first is that these overlapping distinctions reflect temporal changes in mortuary style and practices that may also be associated with a changing socio-political context. In this interpretation, the

[79] Two of the bowls contained faunal remains (sheep and cattle) that may have formed units of meat (e.g. the shoulder of a sheep).

[80] A gap in these capstones as well as materials recovered from the fill of the chamber indicate that Burial 07 was disturbed and looted, although the eastern part of the chamber may not have been disturbed as there was still a capstone above this area and human remains. The human remains included: a right tibia and fibula that were in correct anatomical relation, a right ulna, a thoracic vertebra, and a left fibula. The epiphyses, or articular surfaces, had been removed from the long bones.

[81] Paleobotanical analysis in 2008 was conducted by Dr. Roman Hovsepyan.

[82] Although, B09 had one small capstone and small gap or empty space in the center of the cromlech; a second capstone could have originally covered this area, or it could represent a burial form that has no central capstone.

[83] The large black jar, locus 5, contained bread wheat, emmer, hulled cultivated barley, as well as unidentified cultivated cereals, unidentified wheat, tetr- or hexaploid wheat, and cultivated barley. The jar also contained several weeds and wild rose. Three other jars and one bowl were placed around, or in articulation with, the deceased; one of the jars (locus 6) also contained macrobotanical remains (wheat, barley, and weeds).

[84] This chamber construction is very similar to that described by Bayern (1882) for the majority of tombs at Redkin Lager. Bayern hypothesized that these walls were originally the entrance, and that once the body and accompanying goods had been lowered into the chamber through a dromos, the entrance was sealed off with smaller rocks

tombs would have first been constructed on the southern slope, followed by a shift to the northern slope during the LB II and possibly culminating in the construction of terrace walls that marked off the densely packed sub-group 1. It is difficult to compare this construction history with construction at Tsaghkahovit Fortress due to its depositional history, but it is worth pointing out that the LB I to LB II transition at Gegharot was marked by a superimposed rebuilding phase.[85] The second interpretation attributes the distinctions to different mortuary traditions. The different slopes or subgroups could have been used by different social (kin-based, political, economic, or religious) groups within LBA society. In this case, different ways of placing the deceased and material objects, of constructing subsurface chambers, and of arranging cromlechs may have been part of different traditions of practice and may have served to distinguish group membership and assert socio-political claims related to identity, status, or resources.

Conclusions

In sum, the ongoing investigation of Project ArAGATS in the Tsaghkahovit Plain of central Armenia are shedding new light on the social practices and historical processes that shaped communities in the South Caucasus during the Bronze Age. The combination of systematic survey data and detailed large-scale excavations have established the region as a critical location for defining material sequences, establishing regional chronologies, defining paleoeconomies and tracking key shifts in socio-political dynamics. As we continue our investigations in the coming years, our emphasis will be on expanding into adjacent regions, such as the Aparan Valley, in order to better define variation within Bronze Age communities and fill in critical temporal gaps in Tsaghkahovit Plain occupation, including the Middle Bronze Age and the Iron 1 period.

Appendix 1. Chemical composition and Lead Isotope Analysis of metal objects, 2002–2010.

By K. Meliksetian and E. Pernicka

This contribution presents a summary of archaeometallurgical investigations of metal artifacts recovered by the investigations of Project ArAGATS in the Tsaghkahovit Plain, including Gegharot, Aragatsi Berd, and Tsaghkahovit. It will focus on the chemical composition and some lead isotope ratios of EB and LB copper based artifacts. A possible relationship of the artifacts to Armenian and other regional copper ores in the region is also discussed. Two electron microprobe analyses (EMPA) of Iron 1 period metal objects from Mantash, published earlier,[86] are also used for discussion and comparison.

Samples and analytical techniques

Altogether, 40 EB and LB samples were analysed for chemical and trace element composition, and a selection of 17 were analysed to determine their lead isotope abundance ratios. Energy dispersive X-ray fluorescence analysis (EDXRF) was used to determine the major and trace element composition of the artifacts, using methods described in detail by Lutz and Pernicka.[87]

Isotopic analyses were performed with inductively coupled plasma-mass spectrometry with a VG Elemental AXIOM, a double focussing magnetic sector-based multiple collector inductively coupled plasma mass spectrometer (MC-ICP-MS) using the protocol defined by Niederschlag *et al.*[88] All analyses were continuously compared with certified international analytical reference materials. The results of the EDXRF analyses are given in **Tab. 12**, while lead isotope abundance ratios are available in **Tab. 13**. All analyses were performed at the Curt-Engelhorn-Center for Archaeometry in Mannheim, Germany.

EB metal objects

Altogether 16 EB metal objects from Gegharot were analyzed for their chemical composition. Some of them were also examined by lead isotope analysis and some exceptionally interesting high arsenic alloys were also subjected to metallographic analysis by optical microscopy and scanning electron microscopy (SEM). Based on the compositions determined by EDXRF, analysis of the metal artifacts were classified into four chemical groups: pure copper (3 objects), copper-arsenic alloys (10 objects), copper-arsenic-lead alloys (3 objects) and a single tin bronze dated to the late "Karnut-Shengavit" phase of the EB. These groups are listed in **Tab. 12** and an overview of their relative abundances is given in **Fig. 31**.

[85] Badalyan *et al.* 2008; Smith *et al.* 2009.

[86] Tedesco 2006.

[87] Lutz/Pernicka 1996.

[88] Niederschlag *et al.* 2003.

	Site	Provenance	Description	XRF sample	Chemical group	Cu %	Fe	Co	Ni	Zn	Pb	Bi	Sn	As	Sb	Se	Te	Au	Ag	Total
			EBA																	
1	**Gegharot 2002**	**T-2d/c-5**	spiral bead	**FG-030653**	**Cu**	99	<50	<50	140	<1000	400	<50	<50	10300	350	<50	<80	200	120	100
2	**Gegharot 2002**	**T-2d/c-5**	double-voluted pendant (cooper colored-A)	**FG-030654**	**Cu+As**	95	<50	<50	<100	<1000	200	<50	<50	46000	100	140	<80	<100	110	100
3	**Gegharot 2002**	**T-2d/c-5**	double-voluted pendant (silver colored-B)	**FG-030655**	**Cu+As**	94	<50	<50	<100	<1000	<100	<50	<50	61000	<50	130	<80	<100	400	100
4	**Gegharot 2002**	**T-2d/c-5**	cilindircal bead with relief	**FG-030656**	**Cu+As**	84	<50	<50	<100	<1000	300	<50	<50	158000	750	<50	<80	<100	130	100
5	**Gegharot 2002**	**T-2d/c-5**	barrel shaped bead	**FG-030657**	**Cu+As**	81	1200	<50	<100	<1000	<100	<50	<50	186000	250	<50	<80	<100	210	100
6	**Gegharot 2002**	**T-2d/c-5**	bead with notches	**FG-030658**	**Cu+As**	80	<50	<50	<100	<1000	600	<50	<50	194000	<50	60	<80	<100	200	100
7	**Gegharot 2002**	**T-2d/c-5**	teardrop-shaped biconical bead	**FG-030659**	**Cu+Pb+As**	85	<50	<50	<100	<1000	91000	<50	<50	32000	250	270	<80	<100	120	97
8	**Gegharot 2002**	**T-2d/c-5**	teardrop-shaped spherical bead	**FG-030660**	**Cu+Pb+As**	87	800	<50	120	<1000	37000	<50	<50	82000	450	80	<80	100	250	99
9	**Gegharot 2006**	**T-17-104**	spear head – a	**MA-071538**	**Cu+As**	98	200	<100	<100	<2000	<100	<100	20	17200	30	<50	<50	<100	320	100
10	**Gegharot 2006**	**T-17-104**	spear head – b	**MA-071539**	**Cu+As**	98	200	<100	<100	<2000	<100	<100	50	17200	<50	<50	<50	<100	289	100
11	**Gegharot 2006**	**T-20-4**	awl	**MA-071540**	**Cu+Sn**	96	<200	<100	550	<2000	2340	<100	26800	9500	750	<50	<50	<100	230	100
12	**Gegharot 2006**	**T-2E-656**	dart blade (?)	**MA-071541**	**Cu+As**	96	<200	<100	180	<2000	<100	<100	80	38000	50	<50	<50	<100	220	100
13	**Gegharot 2008**	**T-21-39**	awl	**MA-082086**	**Cu+As**	95	<200	<100	100	<2000	180	<100	<50	52000	260	<50	<50	<100	1090	100
14	**Gegharot 2008**	**T-20-103**	awl	**MA-082087**	**Cu+As**	97	<200	<100	240	<2000	<100	<100	60	34000	<50	<50	<50	<100	140	100
15	**Gegharot 2010**	**T-29.4**	pendant	**MA-110580**	**Cu+Pb+As**	85	<200	<100	99	<2000	18800	<100	<50	130000	181	95	<50	<100	340	100
16	**Gegharot 2010**	**T-22.115. M 02**	bead	**MA-110581**	**Cu**	100	340	<100	215	<2000	730	<100	370	2470	125	117	52	<100	124	100
17	**Gegharot 2010**	**T-22.115. M 01**	bead	**MA-110582**	**Cu**	100	200	<100	126	<2000	680	<100	56	2410	203	108	<50	<100	102	100

Tab. 12
Chemical composition of the analyzed artifacts determined with EDXRF. Cu concentrations of all samples are given in weight percents, all others in ppm

	Site	Provenance	Description	XRF sample	Chemical group	Cu %	Fe	Co	Ni	Zn	Pb	Bi	Sn	As	Sb	Se	Te	Au	Ag	Total
			LBA																	
18	**Gegharot 2003**	**T-2E-6**	pin	**FG-050605**	**Cu+Sn**	89	500	70	1300	<1000	6300	<50	100000	4400	490	80	<80	190	240	100
19	**Gegharot 2003**	**T-2E-9**	bracelet	**FG-050606**	**Cu+Sn**	96	1100	130	800	<1000	11300	70	21400	1960	430	<50	<80	100	380	100
20	**Gegharot 2005**	**K1-9a**	"dagger"	**MA-071542**	**Cu+Sn**	95	390	490	768	<2000	140	<100	45000	6800	208	97	59	<100	65	100
21	**Gegharot 2005**	**K1-9b**	arrowhead	**MA-071543**	**Cu+As**	97	<200	<100	250	<2000	160	100	260	26000	900	<50	<50	<100	160	100
22	**Gegharot 2006**	**T-16-117**	awl	**MA-071548**	**Cu+Sn**	99	<200	<100	770	<2000	3600	100	9200	100	250	<50	<50	<100	30	100
23	**Gegharot 2006**	**T-18-10**	bracelet	**MA-071544**	**Cu**	99	<200	<100	540	<2000	2020	100	2710	660	570	<50	<50	300	370	100
24	**Gegharot 2006**	**T-19-7**	arrowhead	**MA-071545**	**Cu**	99	<200	<100	540	<2000	2080	100	3500	740	850	<50	<50	180	250	100
25	**Gegharot 2006**	**T-20-19**	bead	**MA-071546**	**Cu**	99	200	<100	<100	2189	960	<100	700	<100	7300	<50	64	338	101	100
26	**Gegharot 2006**	**T-20-2**	button	**MA-071547**	**Cu**	99	200	<100	<100	<2000	890	<100	1320	225	1850	<50	<50	732	264	100
27	**Gegharot 2006**	**T-20-5**	fragment	**MA-071549**	**Cu+Sb**	81	4200	<100	<100	<2000	1300	<100	51	1060	18000	<50	<50	374	340	100
28	**Gegharot 2008**	**T-21-49**	pin (?)	**MA-082088**	**Cu+Sn**	96	<200	<100	830	<2000	8600	100	28900	1330	170	<50	<50	<100	80	100
29	**Gegharot 2008**	**T-21-23**	pin/needle	**MA-082090**	**Cu**	99	1900	210	920	<2000	4300	150	2260	3600	180	<50	<50	<100	500	100
30	**Gegharot 2010**	**T-19.506**	button	**MA-110587**	**Cu+Sn**	82	430	195	600	<2000	740	<100	173000	7800	420	51	<50	<100	81	100
31	**Gegharot 2010**	**T-27.56. M 02**	fragment	**MA-110586**	**Cu+Sn**	87	550	<100	690	<2000	3800	<100	118000	3200	420	69	<50	<100	350	100
32	**Gegharot 2010**	**T-27.56. M 01**	arrow head	**MA-110588**	**Cu+Sn**	97	<200	143	1450	<2000	2900	<100	23200	<100	177	50	<50	<100	263	100
33	**Gegharot 2010**	**T-27.11. M 01**	arrow head	**MA-110589**	**Cu+Sn**	97	1410	180	710	<2000	1640	<100	23000	740	150	50	<50	<100	310	100
34	**Gegharot 2011**	**T 30.03.M.01**	awl	**MA-120958**	**Cu+Sn**	94	2300	100	600	<2000	7500	200	42000	1200	200	<100	100	<100	400	100
35	**Gegharot 2011**	**T 30.03.M.02**	awl	**MA-120959**	**Cu**	99	1900	400	900	<2000	2500	400	<100	900	<100	<100	<100	<100	400	100
36	**Gegharot 2011**	**T 31.33.M.01**	fragment	**MA-120960**	**Cu**	99	100	<100	500	<2000	400	300	1030	200	2300	<100	<100	<100	400	100
37	**Gegharot 2011**	**T 52.20.M.01**	bracelet	**MA-120961**	**Cu**	99	700	<100	600	<2000	1400	100	<100	2500	1200	<100	<100	<100	300	100
38	**Aragatsi-Berd 2008**	**AB-2-1**	hook (?)	**MA-082091**	**Cu**	100	<200	<100	580	<2000	350	100	80	100	50	<50	<50	280	150	100
39	**Aragatsi-Berd 2008**	**AB-3-13**	spiral ring	**MA-082092**	**Cu**	99	<200	<100	520	<2000	670	100	2560	7700	1160	60	<50	450	240	100
40	**Tsakhkahovit 2008**	**TS-B-09-07**	bracelet	**MA-082093**	**Cu**	99	<200	<100	550	<2000	310	100	2790	3500	1380	<50	<50	140	230	100
41	**Tsakhkahovit 2008**	**TS-B-09-11**	earring (?)	**MA-082094**	**Cu**	97	<200	<100	1770	8500	1700	100	8000	1560	80	340	<50	5200	6700	100
			Iron 1																	
42	**Mantash 2000**	**tomb no.3**	dagger		**Cu+Sn**	94	1500	–	780	–	900	–	50000	–	–	–	–	–	310	100
43	**Mantash 2000**	**tomb no.3**	mace head		**Cu+Sb**	97	10	–	100	–	1080	–	3300	2860	21600	–	–	–	680	100

Tab. 12 continued

Sample	Orig sample No	Site	Description	Alloy type	Dating	$^{208}Pb/^{206}Pb$	$^{207}Pb/^{206}Pb$	$^{208}Pb/^{204}Pb$	$^{207}Pb/^{204}Pb$	$^{206}Pb/^{204}Pb$
FG-030653	GE-T-2d/c-5-Gegh-1	Gegharot	necklace beads	Cu	EBA	2,07940	0,84045	38,5890	15,5970	18,5580
FG-030654	GE-T-2d/c-5-Gegh-2	Gegharot	necklace beads	Cu+As	EBA	2,07160	0,83517	38,6860	15,5970	18,6740
FG-030655	GE-T-2d/c-5-Gegh-3	Gegharot	necklace beads	Cu+As	EBA	2,06920	0,83507	38,7240	15,6280	18,7140
FG-030656	GE-T-2d/c-5-Gegh-4	Gegharot	necklace beads	Cu+As	EBA	2,07290	0,83669	38,7200	15,6280	18,6780
FG-030657	GE-T-2d/c-5-Gegh-5	Gegharot	necklace beads	Cu+As	EBA	2,07520	0,83752	38,7090	15,6230	18,6530
FG-030658	GE-T-2d/c-5-Gegh-6	Gegharot	necklace beads	Cu+As	EBA	2,07060	0,83399	38,7370	15,6030	18,7080
FG-030659	GE-T-2d/c-5-Gegh-7	Gegharot	necklace beads	Cu+As+Pb	EBA	2,09520	0,85139	38,2890	15,5590	18,2750
FG-030660	GE-T-2d/c-5-Gegh-8	Gegharot	necklace beads	Cu+As+Pb	EBA	2,09080	0,84836	38,3630	15,5670	18,3490
MA-071540	GE-T20-4	Gegharot	awl	Cu+Sn	Late EBA	2,08300	0,84428	38,5930	15,6430	18,5280
MA-071547	GE-T20-2	Gegharot	button	Cu	LBA	2,08720	0,84697	38,5340	15,6360	18,4610
MA-071548	GE-T16-117	Gegharot	awl	Cu	LBA	2,06060	0,83095	38,9100	15,6910	18,8830
MA-071545	GE-T-19-7	Gegharot	arrowhead	Cu	LBA	2,08490	0,84576	38,5600	15,6420	18,4940
MA-071546	GE-T-20-19	Gegharot	bead	Cu	LBA	2,07460	0,83866	38,7200	15,6520	18,6630
MA-071542	GE-K1-9a	Gegharot	tanged blade	Cu+Sn	LBA	2,05880	0,82906	38,9460	15,6830	18,9160
MA-071543	GE-K1-9b	Gegharot	arrowhead	Cu+As	LBA	2,06900	0,82885	39,2200	15,7110	18,9560
MA-071544	GE-T-18-10	Gegharot	bracelet	Cu	LBA	2,07600	0,83890	38,6470	15,6170	18,6160
MA-071549	GE-T-20-5	Gegharot	fragment	Cu+Sb	LBA	2,08570	0,84495	38,6230	15,6470	18,5180

Tab. 13 Lead isotope abundance ratios of analyzed artifacts

A spearhead from Gegharot was sampled at two different locations (MA-071538 and MA-071539), the shaft (a) and the blade (b) respectively, but as expected the composition of both parts is identical, with only minor differences.

Of particular interest is the necklace of Gegharot **(Fig. 32)** consisting of 99 metal (total weight 144.5 g), 88 chalcedony and 217 talc beads.[89] In the metal beads of the necklace three types of alloys were identified:[90] double volute beads consist of arsenical copper with 4.6–6.1% As; conical and spherical teardrop-shaped beads consist of leaded arsenical copper; and, finally, cylindrical and barrel-shaped beads are made of a copper alloy with extremely high As contents ranging between 15.8% and 19.4%. These beads are mainly characterized by a gray "silvery" color, sometimes with a yellowish "bronze" tint. We assume that the ancient craftsman used alloys with different colors to give the necklace an extraordinary, "precious" appearance. Lead isotope analyses of objects from the necklace of Gegharot show a considerable variation in the different alloys. In particular, the Cu+As alloys are clearly different from Cu + As + Pb ones **(Fig. 34)**. Therefore, we assume that more than one ore source was used for the production of these alloys.[91]

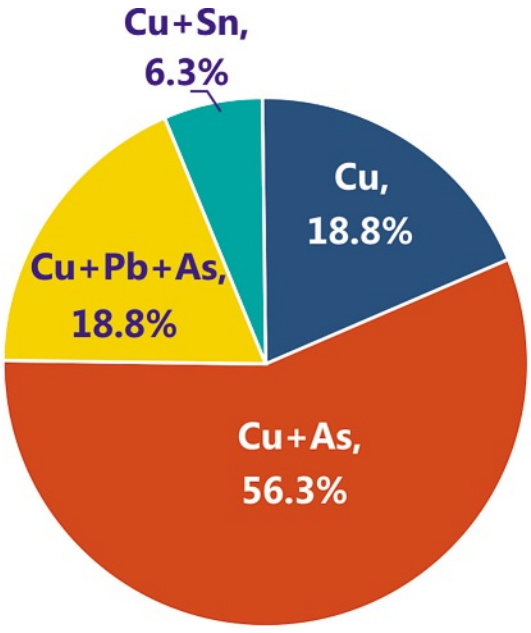

Fig. 31 Gegharot. Statistical distribution of the alloys used for EBA artifacts. Most of the objects consist of Cu+As alloys and unalloyed Cu

The SEM examination of one of the beads of the Gegharot necklace with high arsenic content revealed an eutectic microstructure, which is responsible for the silvery gray color of the beads.[92] It should be mentioned that it is difficult to produce

[89] Smith *et al.* 2004; Hayrapetyan 2005.
[90] Meliksetian *et al.* 2009.
[91] Meliksetian *et al.* 2009.
[92] Meliksetian *et al.* 2011b.

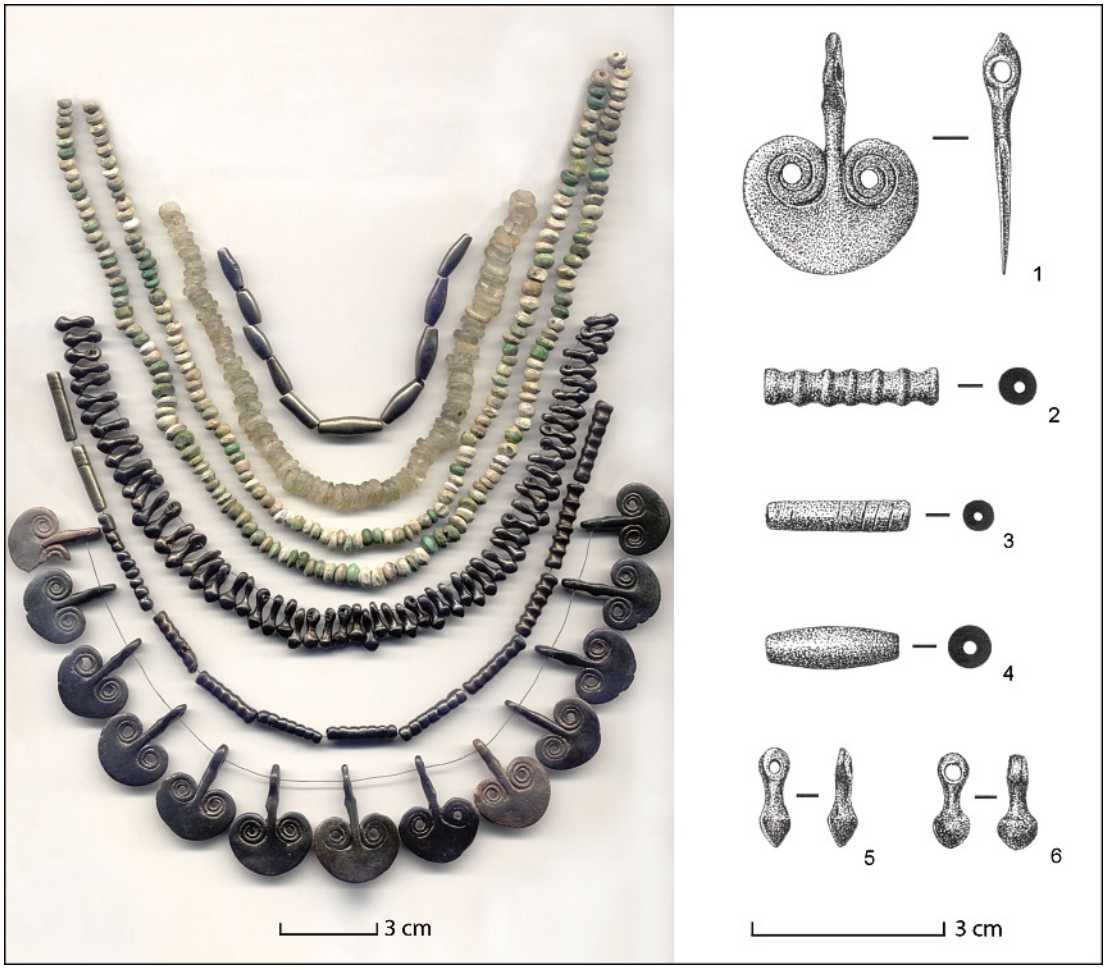

Fig. 32
Gegharot, EB necklace. Photo (left) and drawings of individual bronze elements (right). – 1 Double-voluted beads (FG-030654, FG-030655); – 2 Cylindrically shaped bead with raised transversal rims (FG-030656); – 3 Cylindrically shaped bead with parallel oblique cuttings (FG-030658); – 4 Barrel-shaped bead (FG-030657); – 5–6 Two types of teardrop-shaped beads: conical and spherical (FG-030659, FG-030660)

such copper–arsenic alloys, because arsenic is in the vapour state at the melting temperature of copper (1085 °C). But the SEM analyses revealed that some eutectic microstructures are present with a much lower melting point such as the mixture of 79% Cu + 21% As that represents the copper-arsenic eutectic point at 685 °C. This is still higher than the sublimation point of arsenic (615 °C) but obviously it is much easier to achieve in a small crucible by combined melting of copper with an arsenic-rich material, possibly native arsenic. A more detailed paper discussing the chemical, lead isotope, optical microscopy and SEM analyses of high arsenic (15–28%) alloys from Gegharot and from Lori Berd is now in preparation.

It is known that the addition of arsenic makes copper brittle but changes the color of the metal to a silvery and dark-silvery color with a unique shine. Considering the fact that a high arsenic content (7% and more) is related primarily to EB decorative objects and jewelry in Armenia, rather than tools

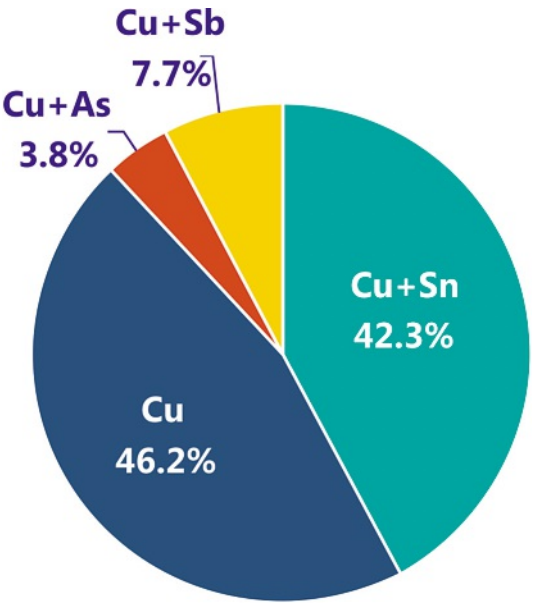

Fig. 33
Statistical distribution of the alloys used for LBA artifacts from Gegharot, Aragatsi Berd, Tsakhkahovit and Mantash. Most of the objects consist of Cu+Sn alloys and unalloyed Cu

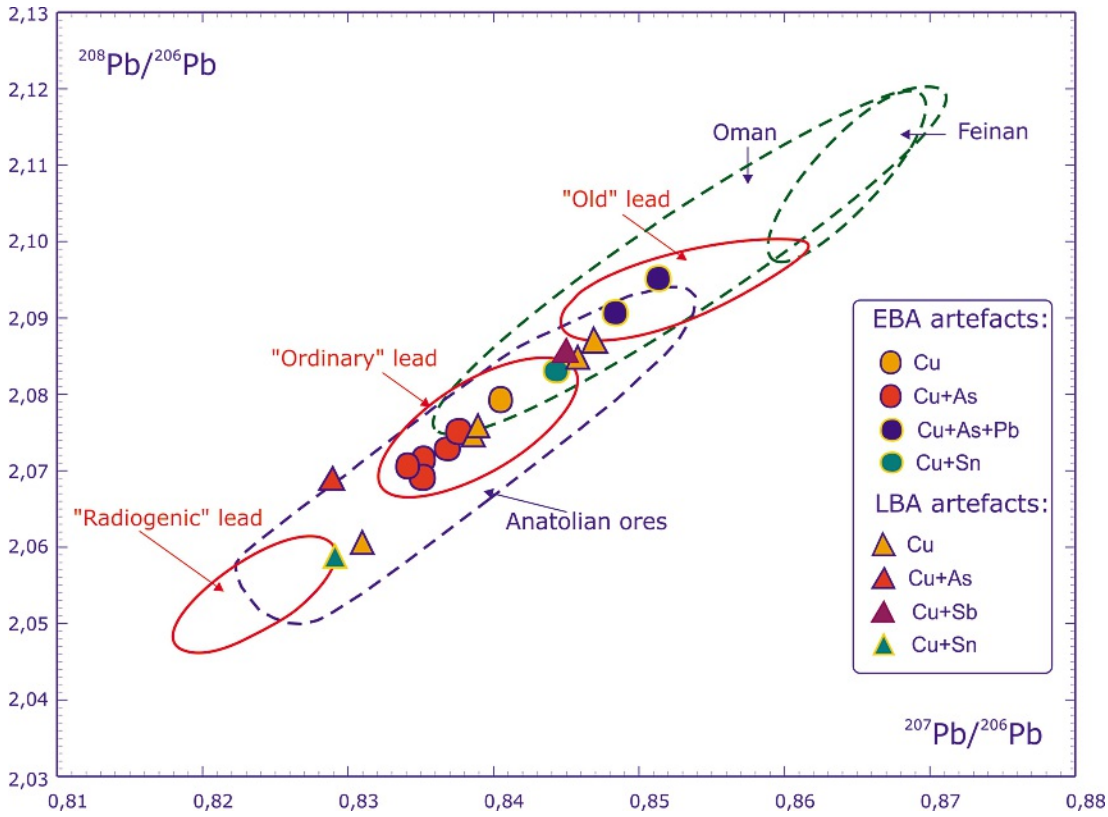

Fig. 34
Diagram of 207Pb/206Pb vs. 208Pb/206Pb in EBA and LBA artifacts from Gegharot combined with the isotope compositional fields of Armenian ores: "Radiogenic" lead, "ordinary" lead and "old" lead. Dotted lines show the lead isotope fields for ores from Anatolia, Oman as well as from Feinan, Jordan

and weapons,[93] we consider that an attempt to achieve this distinctive appearance (bright shine, silvery color) for decorative objects and jewelry was the major reason for the intentional production of copper alloys with high arsenic contents in prehistoric times.

Another interesting type of alloy used at EB Gegharot was a copper-arsenic-lead alloy (3 objects, FG-030659, FG-030660, MA-110580). In Armenian Early Bronze Age contexts, such tertiary alloys are known also from Harich.[94] Lead is a frequent trace element in copper based artifacts, as it is a common minor component in copper ores. However, because the concentration of lead in the Gegharot artifacts ranged from 3.7 to 9.1%, we assume an intentional addition of lead.

During the EB, the alloying of copper with lead is uncommon but has been supposed for some artifacts in the Aegean and other regions of Mediterranean.[95] However, Aegean copper-lead alloys are not high in arsenic.

As noted above, three objects from Gegharot represent unalloyed copper (about 99% Cu), with other impurities comprising about 1% or less. Such a composition is widely distributed during the EB in Anatolia, the Middle East[96] and in the South Caucasus.[97]

A single tin bronze is represented by an awl dated to the "Karnut-Shengavit" phase of the EB and marks the period when tin began to replace arsenic as the most important alloying component. It should also be mentioned that this object contains about 1% arsenic and also high Ni (550 ppm) compared with other objects. But, in general, none of the artifacts can be classified into a high nickel-silver group, such as that revealed for some EB artifacts from Gyumri and Talin.[98]

As for the silver contents, only a single object (MA-082086), an awl with 5.2% arsenic, was relatively high in this metal, containing 1090 ppm Ag; all other EB objects from Gegharot contained just 100–400 ppm.

[93] Meliksetian *et al.* 2009; Meliksetian/Pernicka 2010; Meliksetian *et al.* 2011b.
[94] Meliksetian/Pernicka 2010.
[95] Pernicka *et al.* 1990.
[96] Tylecote 1976.
[97] Геворкян 1980; Meliksetian *et al.* 2010.
[98] Meliksetian/Pernicka 2010.

LBA and Iron 1 metal Objects

20 metal objects excavated from the LB Tsaghkahovit Plain were analyzed by EDXRF, including 16 from Gegharot, 2 from Aragatsi Berd, and 2 from Tsaghkahovit. Analyses of two objects from Mantash were taken from the PhD dissertation of Laura Tedesco. The chemical compositions and groups of these LB artifacts are given in **Tab. 12** and do not reveal any surprises. Most of the objects were composed of unalloyed copper and tin bronze; one copper-antimony and one copper-arsenic object were also present. An overview of the relative abundances of the chemical groups of LB objects from Gegharot is provided in **Fig. 33**.

These chemical groups are consistent with other Armenian LB artifacts analyzed during the last six years.[99] The chemical composition of LB objects indicates that in the Tsaghkahovit Plain, tin was widely in use. But one can also assume that the abundant presence of unalloyed copper, some antimony-copper alloy, and arsenical copper likely indicates that tin was expensive and rare.

It is noteworthy that an arrowhead (MA-071543), the single copper-arsenic alloy (2.6% As), could easily be a natural alloy since arsenic is a common minor element in copper ores of Armenia, or alternatively, the composition is inherited from recycled earlier metal.

Most of the tin bronzes are also relatively high in nickel (600–1500 ppm). A high silver content is typical only for the earring from Tsaghkahovit (6700 ppm). This object also exhibits an unusually high gold content, about (5200 ppm), as well as zinc (8500 ppm) and tin (8000 ppm). Such a composition may indicate the use of polymetallic sulphide ores.

Lead Isotope Analysis

Lead isotope geochemistry, introduced in archaeometry,[100] is an important fingerprinting method for relating artifacts to their ore sources. Natural lead is usually found in copper ores, occurring as a mixture of ^{204}Pb and three radiogenic isotopes ^{206}Pb, ^{207}Pb, ^{208}Pb, which are products of the radioactive decay of ^{238}U, ^{235}U and ^{232}Th respectively. So lead isotope abundance ratios, such as $^{208}Pb/^{206}Pb$, $^{207}Pb/^{206}Pb$, $^{208}Pb/^{204}Pb$, $^{207}Pb/^{204}Pb$, $^{206}Pb/^{204}Pb$ are important geochemical fingerprints of ore deposits of various geological ages and metallogenic formations. It is important to note that during smelting, lead has a tendency to concentrate in the metal rather than in the slag and metallurgical processes do not affect the lead isotope signature.

Table 13 contains lead isotope analyses of selected EB and LB objects from Gegharot. They are quite variable in the beads from the EB Gegharot necklace as discussed above.[101] The analytical results for both Cu + As and Cu + As + Pb alloys **(Fig. 34)** lead us to conclude that more than one ore source was used in the production of the necklace. Lead isotope ratios of four Cu + As beads from the necklace, a single EB, and two LB unalloyed Cu objects match the "ordinary" lead compositional field in Armenia, which is partially overlapped by the Anatolian field. These data suggest that the raw material for these artifacts was derived from a local source while artifacts which exhibit wider variations, matching "old" lead compositional field and Anatolian compositional fields, relate to more distant parent ores.

As for the tin bronzes from Gegharot, none exhibit an unusual lead isotope signature, suggesting that all can be matched to local ore sources. That unusual pattern is typical for most of EBA tin bronzes from Talin,[102] from Troy,[103] and sites in the Aegean,[104] the Persian Gulf [105] and Dagestan.[106] Thus, we can assume that imported tin was mixed with local copper to produce the artifacts from Gegharot, since lead isotopes indicate the copper source rather than the tin source.

Conclusions

In this contribution, a brief summary of archaeometallurgical investigations of metal artifacts recovered by the investigations of Project ArAGATS in the Tsaghkahovit Plain, including Gegharot, Aragatsi Berd and Tsaghkahovit was discussed. In EBA artifacts four chemical groups of metal can be distinguished: pure copper (3 objects), copper-arsenic alloys (10 objects), copper-arsenic-lead alloys (3 objects) and a single tin bronze dated to the late "Karnut-Shangavit" phase of EBA. Some of the beads of the Gegharot necklace have extremely high As contents between 15.8% and 19.4% They were subjected to special metallographic investigations that revealed an eutectic microstructure,

[99] Meliksetian *et al.* 2011a.
[100] Gale/Stos-Gale 1982.
[101] A brief discussion of Bronze Age isotopic data from artifacts found in Armenia generally, including those of Gegharot, is available in Meliksetian *et al.* 2009 and Meliksetian *et al.* 2011a. In addition, a comparison of lead isotope ratios for EB artifacts from Armenia analyzed prior to 2006 with local and regional ores is available in Meliksetian/Pernicka 2010.
[102] Meliksetian/Pernicka 2010.
[103] Pernicka *et al.* 1990.
[104] Begemann *et al.* 1992; Pernicka *et al.* 1990; Stos-Gale *et al.* 1984.
[105] Weeks 1999.
[106] Weeks 2002.

which is responsible for the silvery gray color of the beads. Lead isotope analysis of the beads from Gegharot suggest that more than one ore source was used for the production of these alloys.

LBA and EIA metal objects mostly consist of unalloyed copper (12 objects), tin bronze (11 objects), as well as copper-antimony (2 objects) and copper-arsenic alloys (1 object). The chemical composition of LB objects indicates that in the Tsaghkahovit Plain, tin was widely used as alloying metal. But one can also assume that the presence of unalloyed copper, some antimony-copper alloy, and arsenical copper likely indicates that tin was expensive and rare.

Lead isotope ratios of the analyzed LBA artifacts match Armenian and Anatolian isotope compositional fields, and we can assume a local or regional origin of the copper in these artifacts.

Appendix 2. The Early Bronze Age pottery from Gegharot

By S. Haroutunian

The most abundant archaeological artifact in Gegharot, pottery, is a material of first importance for the study of the Kura-Araxes Culture. Pottery has long played a critical role in investigations of the Kura-Araxes, serving as a chronological marker and an index of cultural identity within settlements and across regions.

During the last few decades, our knowledge of the Early Bronze Age in the South Caucasus has increased considerably thanks to new research projects that allow us to define a new understanding of Kura-Araxes society and its chronology.

The excavations at Gegharot have brought to light a significant corpus of EBA pottery. The study of this material allows us to better understand the modalities of occupation of the site, to clarify the chronological divisions of the settlement's history, and to define the evolution of Kura-Araxes Culture within the Tsaghkahovit Plain. It also allows us to examine the relationships between Gegharot and other sites in the region.

Pottery inventory

The six field seasons, conducted between 2003 and 2011 at Gegharot by Project ArAGATS, recovered 26,919 sherds of EBA pottery, comprising 53% of the total ceramic corpus from the site, excluding indeterminate ceramics whose period could not be identified with certainty. The size of the EB ceramic assemblage indicates a dense occupation during the EB period, especially on the western and southwestern slope and the base of western slope of the hill, extending to the present village of Gegharot.

Among the EBA pottery discovered at Gegharot, a sample of 1417 sherds was selected for closer examination,[107] and incorporated into a digital database of EBA pottery. Priority was given to the material from stratified levels with diagnostic interest (recognizable profile, presence of decoration, tracks of fabrication techniques, etc.). Also, the goal is to include in the corpus a selection of pottery which are as much as possible representative of the totality of EBA pottery from Gegharot. Approximately 45% of the studied corpus has an identifiable profile and recognizable morphological type. This corpus also contains 27 complete vessels discovered *in situ*. The form and the morphology of all the Early Bronze pottery has been thoroughly examined to establish a chrono-typological classification.

Production technique and surface treatment

The Early Bronze Age pottery from Gegharot was manufactured by techniques characteristic of Kura-Araxes culture. Visual inspection of the fragments indicates that they were mostly hand-made, using the coiling technique, streaks of which are clearly visible to the naked eye. Petrographic analyses of Gegharot pottery[108] have revealed inclusions of different rocks (basalt, granite), minerals (quartz, plagioclase, biotite, apatite, epidote, chalcedony) and volcanic glass (obsidian). The size of the inclusions fluctuates between 0.2 mm and 1.5 mm, with few exceptions where the inclusions are very irregular and exceed 2 mm. However, the dominant size of the inclusions is between 0,2 and 0,5 mm, and almost the half of them are regular and well sorted. The vessels are generally burnished or smoothed. They have generally uniform colors, with some exceptions where dark colors are mixed with stains of light colors. The colors of the interior or exterior surfaces were obtained by controlling the variations of the firing atmosphere[109] (reducing for dark colors and oxidizing for light colors).

[107] This study is part of my Ph.D. thesis that I am preparing in Paris-Sorbonne University (Paris IV), under the joint supervision of professor Jean-Yves Monchambert (Paris-Sorbonne University) and professor Ruben S. Badalyan (Institute of Archaeology and Ethnography, Academy of Sciences, Republic of Armenia).

[108] Hayrapetyan 2008. For comparative data on petrographic analyses of Kura-Araxes pottery, see for example Mason/Cooper 1999; Batiuk 2000; Iserlis *et al.* 2010; Kibaroğlu *et al.* 2011.

[109] Yon 1981, 61; Balfet *et al.* 1998, 66.

Decoration

Elar-Aragats group pottery from Gegharot is largely undecorated, except for a few schematic parallel or perpendicular lines and a few dimples. In contrast, Karnut-Shengavit group vessels were highly decorated, typically with schematic geometric forms (spirals, parallel or perpendicular lines, triangles, rhombi). Typically, bands of geometric forms were made on the vessel neck, while large spirals and other complex patterns were set on the body and shoulder. We can differentiate four different decoration techniques.[110]

Incised decoration: Decoration created by removing the vessel surface clay using a sharp tool. The distal end of the incising tool is maybe circular or linear. This type of decoration is generally found on the vessel neck. It is also used to hatch geometric designs. The line thickness is typically between 0.5–1.5 mm.

Micro-incised decoration: Partly similar to the previous technique, this decoration was created by a very sharp tool able to cut lines less than 0.5 mm thick. This decoration is sometimes not visible with the naked eye from a certain distance.

Relief decoration: These decorations were made by the addition of modeled material to the surface of the vessel. This technique was especially used to model large spirals or other geometric forms on the body of the vessel.

Plastic decoration: These forms were directly modeled on the surface of the vessel, without the addition of additional material. The forms were created using a tool or fingers.

Typology

In order to complete the study of the Gegharot EBA pottery, it was essential to establish chrono-typological classification, based on the criteria of form, color, decoration, and handle type, taking as a reference the pottery classification scheme described by Jean-Claude Gardin.[111] The typology of Kura-Araxes pottery has already involved many scholars since the late 1960s who created complete or partial typologies of Kura-Araxes pottery.[112] Studying the typology of vessels, we can distinguish seven main categories of vessels, which are subdivided into several types and variants. Each group, determined by its profile, corresponds to a category of use.

Jars. There are several type of jars from Gegharot. There are small high-necked jars, triple-handled, with elliptic or globular body **(Fig. 35,1–4)**. This type of EB II jar is decorated **(Fig. 35,3–4)**. Another type of jar is the small elliptic jar **(Fig. 35,jars 2)** with a wide biconic **(Fig. 35,jars 3a)** or elliptic **(Fig. 35,jars 3b)** body. Some of these jars are two-handled **(Fig. 35,10.12)** or have a ledge handle **(Fig. 35,6.9.11)**. The third type of jar is the large storage jar, which can be subdivided into two categories: large jars with biconic bodies **(Fig. 35,11.12)** and large jars with ovoid bodies **(Fig. 35,13.14)**.

Bowls. These are open vessels of varying dimensions. We can distinguish large bowls with a maximum diameter of more than 30 cm **(Fig. 36,15–18)**, medium size bowls, with a diameter between 20–30 cm **(Fig. 36,19–25)** and small bowls with a maximum diameter of less than 20 cm **(Fig. 36,27–38)**. The bowls can have flaring **(Fig. 36,15.18)** or hemisphere-truncated **(Fig. 36,19–25)** bodies, with an exterior bead **(Fig. 36,19–25,35–38)** or a square **(Fig. 36,17–18.31–34)** rim. One of the small bowls has a tripod foot **(Fig. 36,26)**.

Dishes. These are large vessels with a flattened base. The maximum diameter is at least three times more than the height **(Fig. 36,39–41)**.

Goblets: A large number of goblets have been found at Gegharot. With a maximum diameter of less than 20 cm, these vessels are characterized by biconic or spheric bodies and high flaring rims **(Fig. 37,43–53)**. This type is widespread at Gegharot and represents 35% of the totality of vessels in the sample. It can also have a handle on one side **(Fig. 37,42–44)**, or lugs **(Fig. 37,52)**. The neck may have an incised decoration composed of alternately hatched geometric motifs. Sometimes, the body is decorated with complex motifs (double spirals, polygons with angular edges, etc.).

Cups: This is a unique form **(Fig. 37,54)**, which represents a vessel whose height is at least twice as large as the mouth diameter. It has a handle in one side (broken).

Mugs: These are small containers with vertical walls and flattened base **(Fig. 37,55–58)**. The height is greater than the maximum diameter. One of the vessels **(Fig. 37,56)**, is equipped with a handle

[110] For detailed descriptions of pottery decoration techniques, see Yon 1981, 23, 85; Balfet *et al.* 1998, 85, 111; Lorenzi *et al.* 2000, 18.

[111] Gardin 1976.

[112] For example, Khanzadyan 1967; Kushnareva/Chubinishvili 1970; Sagona 1984; Palumbi 2008; Marro 1997; Smith et al. 2009; Gopnik/Rothman 2011.

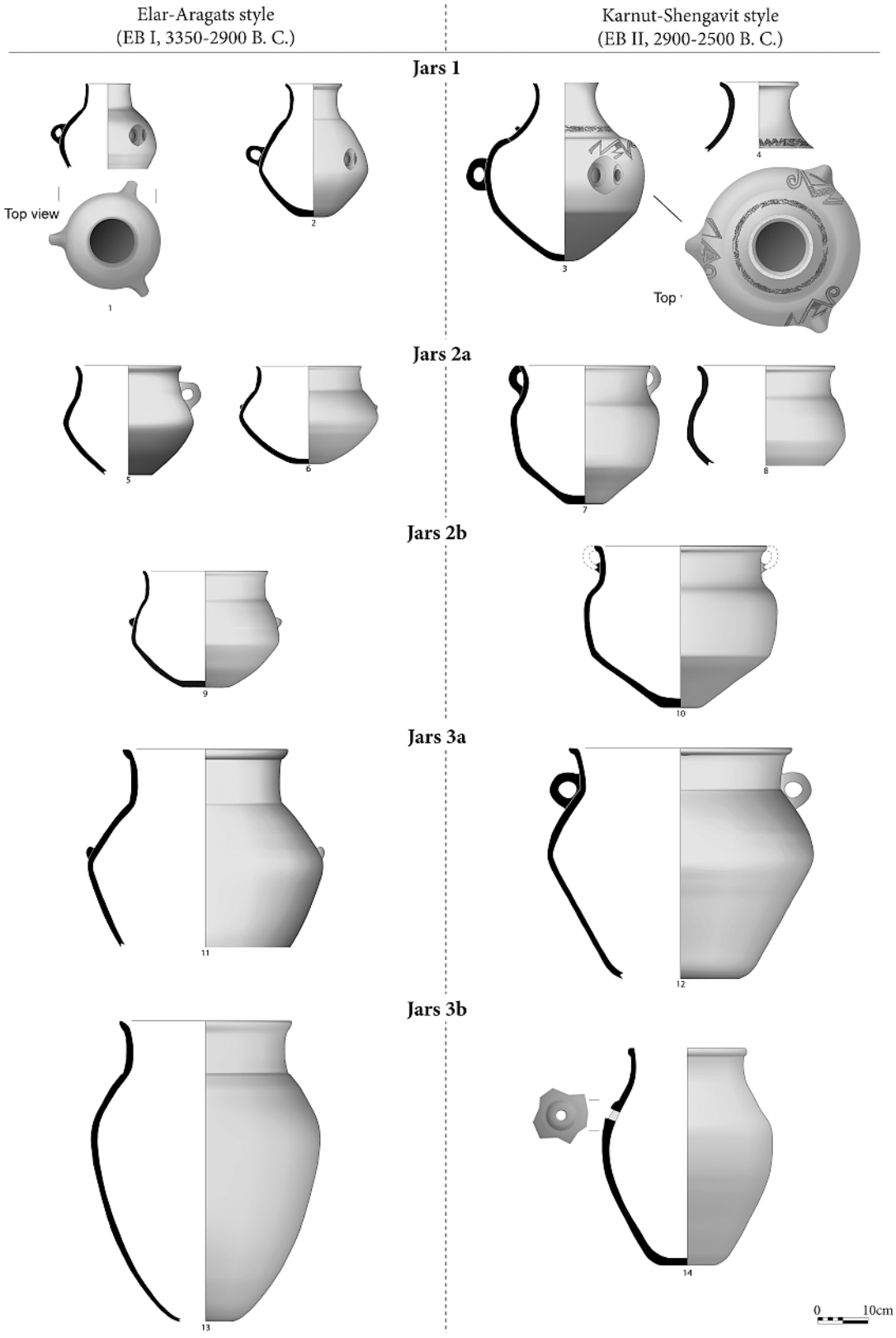

Fig. 35
Gegharot. Brief chrono-typology of EBA pottery: jars.

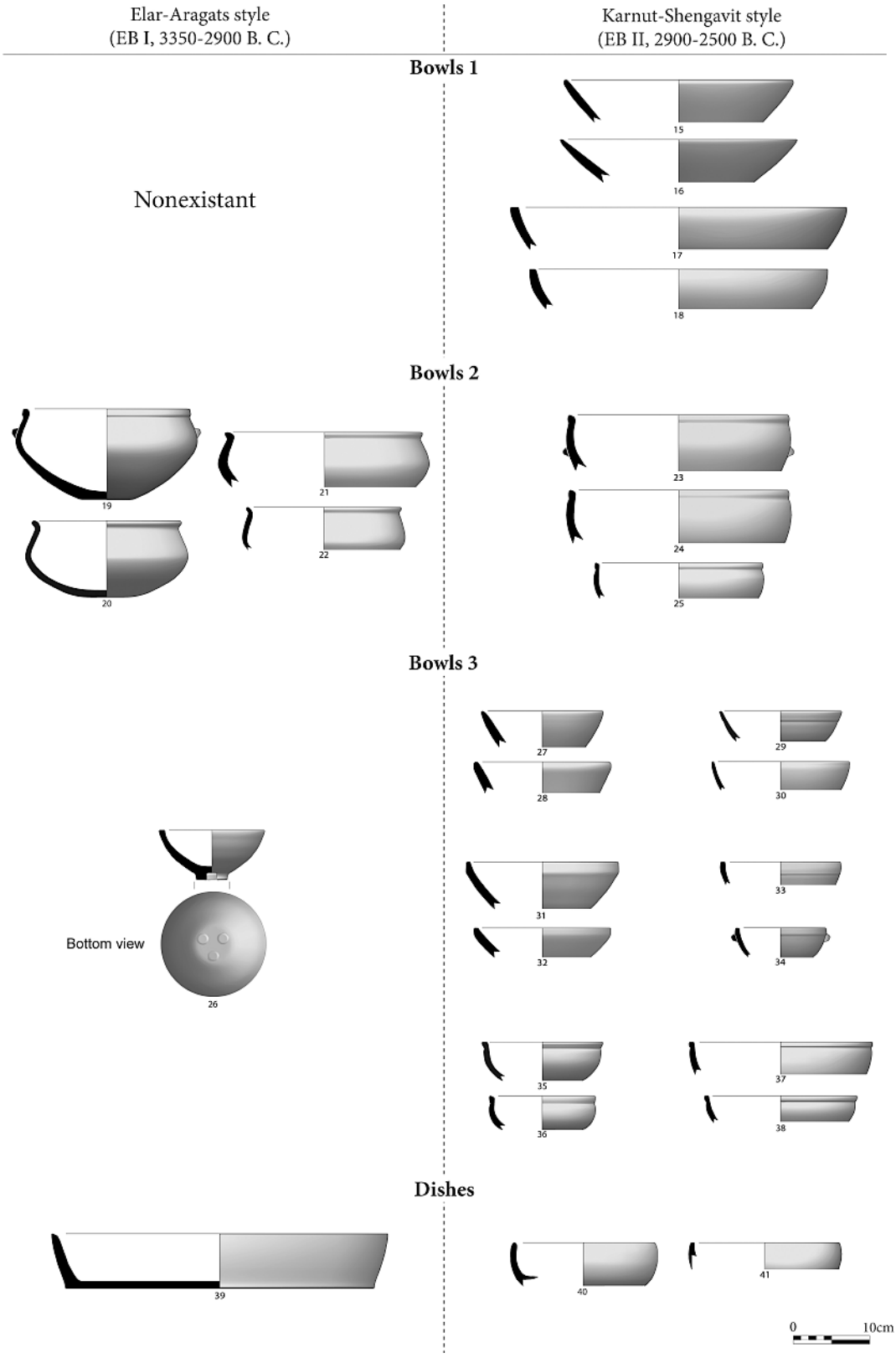

Fig. 36
Gegharot. Brief chrono-typology of EBA pottery: bowls and dishes

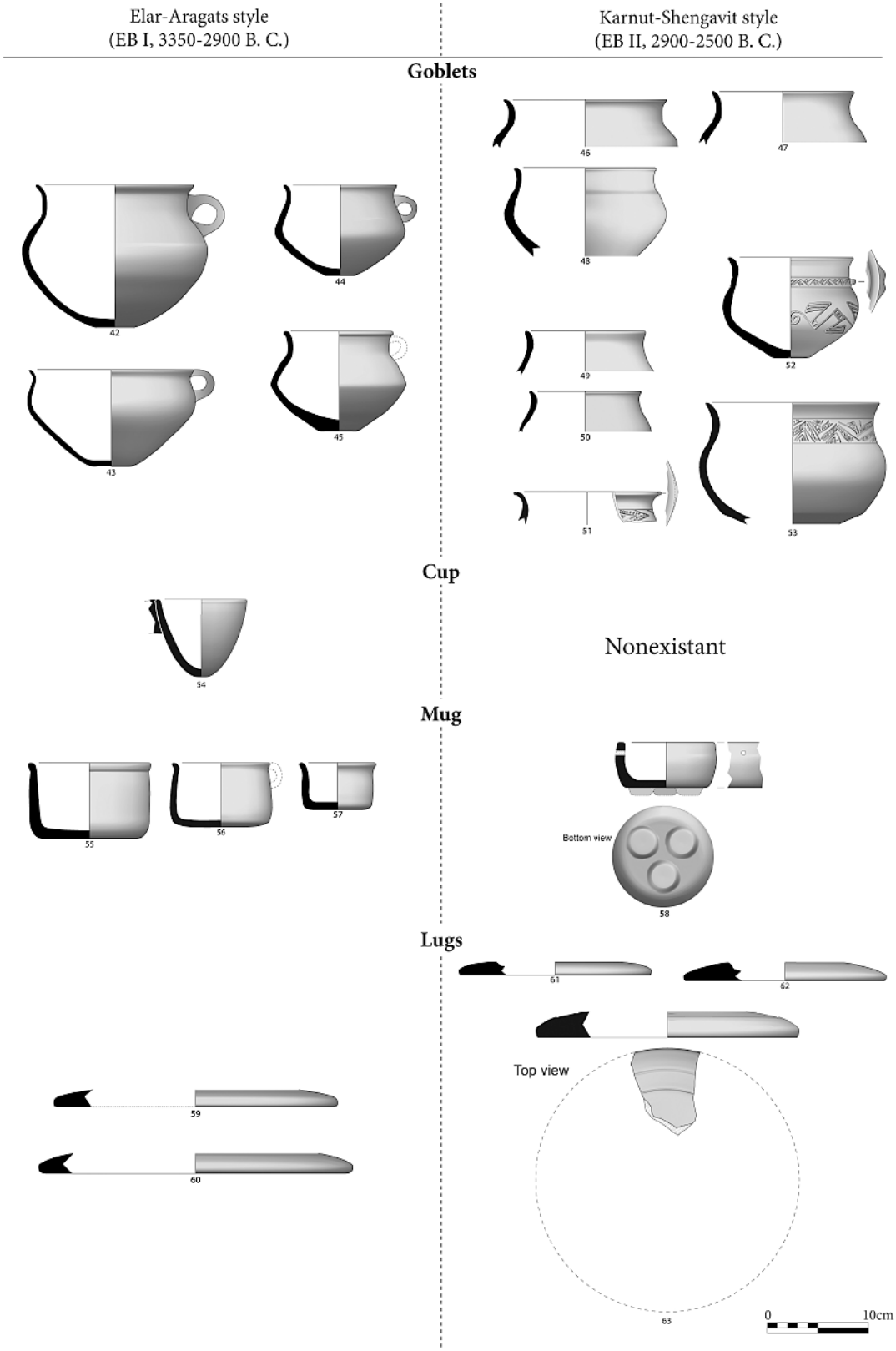

Fig. 37
Gegharot. Brief chrono-typology of EBA pottery: goblets, cup, mugs, lugs

N°	Location		Measurements					Height				Color (after Musell soil color charts)		Core	
	Trench	Locus	Ø min. (mm)	Ø max. (mm)	Ø rim (mm)	Ø base (mm)	thick. body (mm)	base (mm)	body (mm)	neck (mm)	rim (mm)	Exterior	Interior	Sand	Sorting
1	T12	2	88	192	90	/	8	7	/	140	46	7.5YR 6/4 - light brown	7.5YR 6/4 - light brown	medium	poorly
2	T18	32	93	390	108	60	10	87	108	70	12	7.5YR 6/4 - light brown	7.5YR 6/4 - light brown	medium	poorly
3	T20	9-10	77	130	/	52	14	102	151	/	/	GLEY1 2.5/N - black	5YR 4/3 - reddish brown	very coarse	poorly
4	T2E	610	119	/	157	/	10	7	/	/	126	5YR 3/1 - very dark gray	5YR 4/3 - reddish brown	very coarse	poorly
5	T18	32	200	260	210	/	10	13	/	143	26	5YR 5/4 - reddish brown	5YR 5/4 - reddish brown	very coarse	poorly
6	T18	13	202	276	210	61	8	39	106	41	7	5YR 5/4 - reddish brown	5YR 5/6 - yellowish red	very coarse	poorly
7	T2E	553	244	295	260	77	12	6	65	150	65	GLEY1 2.5/N - black	5YR 5/4 - reddish brown	/	/
8	T5	3	254	314	273	/	12	10	/	132	63	GLEY1 2.5/N - black	5YR 5/6 - yellowish red	medium	poorly
9	T2E	662/671	137	294	248	94	8	9	93	81	56	GLEY1 2.5/N - black	5YR 5/4 - reddish brown	/	/
10	T18	37	209	275	209	64	9	60	94	47	6	GLEY1 2.5/N - black	2.5YR 5/6 - red	/	/
11	T18	32	396	468	328	/	11	20	/	270	106	GLEY1 2.5/N - black	5YR 6/4 - light reddish brown	coarse	poorly
12	T10A	3	399	529	444	237	11	12	151	226	81	GLEY1 2.5/N - black	5YR 6/4 - light reddish brown	very coarse	poorly
13	T18	32	315	456	342	/	12	18	/	408	107	5YR 3/2 - dark reddish brown	5YR 5/4 - reddish brown	fine	poorly
14	T15C	2	222	340	233	126	14	159	204	89	12	GLEY1 2.5/N - black	2.5YR 5/6 - red	coarse	poorly
15	T23	1	/	/	300	/	9	4	/	/	4	5YR 5/6 - yellowish red	2.5YR 5/4 - reddish brown	medium	poorly
16	T12	3	/	/	309	/	12	/	/	/	/	7.5YR 3/2 - dark brown	7.5YR 3/2 - dark brown	fine	poorly
17	T2E	526	/	/	440	/	10	8	/	/	8	GLEY1 2.5/N - black	GLEY1 2.5/N - black	fine	poorly
18	T2E	110	/	/	390	/	11	28	/	/	28	GLEY1 2.5/N - black	GLEY1 2.5/N - black	fine	poorly
19	T12	2	217	237	218	68	7	12	40	68	12	5YR 5/6 - yellowish red	5YR 5/6 - yellowish red	fine	poorly
20	T2E	662/674	188	213	196	69	9	7	23	55	21	GLEY1 2.5/N - black	2.5YR 5/6 - red	/	/
21	T2D	3	253	276	259	/	12	9	/	62	9	5YR 3/1 - very dark gray	5YR 5/3 - reddish brown	medium	poorly
22	T2E	659	197	212	203	/	6	7	/	37	20	GLEY1 2.5/N - black	5YR 5/6 - yellowish red	fine	well
23	T21	36	288	293	290	/	10	11	/	/	11	GLEY1 2.5/N - black	10YR 4/2 - dark grayish brown	fine	well
24	T21	36	287	294	288	/	9	11	/	53	15	GLEY1 2.5/N - black	10YR 4/2 - dark grayish brown	fine	well
25	T16	114	217	222	220	/	7	8	37	/	/	GLEY1 2.5/N - black	GLEY1 2.5/N - black	very fine	well
26	T18	32	/	/	138	46	8	4	12	40	4	10YR 4/2 - dark grayish brown	10YR 4/2 - dark grayish brown	/	/
27	T8	1	/	/	160	/	11	/	/	/	/	5YR 4/2 - dark reddish gray	5YR 5/3 - reddish brown	very fine	poorly
28	T16	114	/	/	180	/	12	8	/	/	/	7.5YR 5/4 - brown	7.5YR 5/3 - brown	medium	poorly
29	T12	3	/	/	160	/	7	13	/	/	13	5YR 3/1 - very dark gray	10YR 6/2 - light brownish gray	very fine	poorly
30	T16	114	/	/	180	/	4	10	/	/	/	GLEY1 2.5/N - black	10YR 5/2 grayish brown	very fine	poorly
31	T2D/c	3	/	/	198	/	10	/	/	/	11	5YR 5/6 - yellowish red	2.5YR 5/4 - reddish brown	fine	poorly
32	T19	2	/	/	178	/	10	/	/	/	11	GLEY1 2.5/N - black	5YR 4/2 - dark reddish gray	fine	well
33	T21	1	156	/	156	/	6	16	/	/	/	GLEY1 2.5/N - black	7.5YR 5/4 - brown	very fine	well
34	T6	1	152	/	158	/	8	9	/	41	9	GLEY1 2.5/N - black	10YR 4/2 - dark grayish brown	fine	poorly
35	T16	114	/	/	120	/	6	10	/	/	/	GLEY1 2.5/N - black	7.5YR 4/2 - brown	medium	poorly
36	T12	1	138	/	138	/	7	9	/	31	9	2.5Y 3/1	10YR 5/3 - brown	very fine	poorly
37	T18	6	236	/	240	/	7	7	/	/	/	GLEY1 2.5/N - black	7.5YR 5/3 - brown	very fine	poorly
38	T20	24	194	/	200	/	7	7	/	/	16	GLEY1 2.5/N - black	7.5YR 5/4 - brown	very fine	well
39	T18	32	/	/	448	404	13	15	54	/	/	7.5YR 5/2 - brown	7.5YR 5/6 - strong brown	medium	poorly
40	T12C	1	/	/	185	/	8	8	/	38	8	7.5YR 6/4 - light brown	7.5YR 6/4 - light brown	very fine	well
41	T20	104	/	/	194	/	9	/	/	/	/	7.5YR 6/2 - pinkish gray	5YR 6/4 - light reddish brown	very fine	poorly
42	T17	109	142	182	156	38	7	39	64	27	8	2.5YR 4/4 - reddish brown	5YR 4/4 - reddish brown	/	/
43	T17	110	155	165	162	14	5	30	55	/	9	5YR 5/4 - reddish brown	2.5YR 5/6 - red	/	/
44	T18	26	105	128	111	28	7	22	26	41	6	7.5YR 5/3 - brown	5YR 4/2 - dark reddish gray	medium	poorly
45	T2E	662/672	100	133	107	42	5	4	17	58	23	5YR 3/2 - dark reddish brown	5YR 5/3 - reddish brown	fine	poorly
46	T2D/b	5	151	182	160	/	7	3	/	38	24	7.5YR 5/3 - brown	5YR 5/2 - reddish gray	fine	poorly
47	T2D/b	5	131	171	140	/	6	3	/	50	30	5YR 4/2 - dark reddish gray	2.5YR 5/4 - reddish brown	fine	poorly
48	T8	3	134	160	140	/	7	4	/	46	21	GLEY1 2.5/N - black	5YR 5/6 - yellowish red	medium	poorly
49	T2	24	114	/	118	/	4	12	/	/	39	5YR 3/2 - dark reddish brown	5YR 3/2 - dark reddish brown	fine	poorly
50	T21	05	105	131	110	/	4	4	/	/	23	5Y 4/1 dark gray	10YR 4/2 - dark grayish brown	very fine	well
51	T16	104	127	140	/	/	/	/	/	/	9	GLEY1 2.5/N - black	10YR 5/2 grayish brown	very fine	poorly
52	T2E	571	114	133	122	38	7	28	40	30	3	10YR 4/2 - dark grayish brown	10YR 4/2 - dark grayish brown	/	/
53	T21	35	159	183	170	/	7	/	/	70	38	GLEY1 2.5/N - black	10YR 2/2 - very dark brown	fine	poorly
54	T17	104/108	/	/	90	15	7	/	15	61	0	5YR 5/4 - reddish brown	5YR 5/4 - reddish brown	medium	poorly
55	T17	104	116	118	120	101	9	13	53	/	8	7.5YR 5/4 - brown	7.5YR 5/4 - brown	medium	poorly
56	T18	33	101	109	105	100	6	6	15	49	6	7.5YR 5/4 - brown	7.5YR 5/4 - brown	medium	poorly
57	T17	104/111	69	70	75	62	7	6	6	34	6	7.5YR 5/3 - brown	7.5YR 3/2 - dark brown	coarse	poorly
58	T2E	564	/	100	96	83	9	2	8	30	6	5YR 5/6 - yellowish red	5YR 5/6 - yellowish red	coarse	poorly
59	T17	102	/	/	280	/	/	/	/	/	/	7.5YR 3/2 dark brown	7.5YR 3/2 - dark brown	very coarse	poorly
60	T12C	1	/	/	128	/	/	/	/	/	/	5YR 5/6 - yellowish red	5YR 5/3 - reddish brown	coarse	well
61	T10A	1	/	/	190	/	/	/	/	/	/	2.5YR 6/4 - light reddish brown	GLEY1 2.5/N - black	medium	poorly
62	T8	1	/	/	200	/	/	/	/	/	/	7.5YR 6/4 - light brown	5YR 5/4 - reddish brown	medium	poorly
63	T8	4	/	/	260	/	/	/	/	/	/	5YR 5/6 - yellowish red	GLEY1 2.5/N - black	fine	poorly

Tab. 14
List of Gegharot EB pottery integrated in the brief typology

(broken). An EB II cup has a tripod foot (broken) and two faced holes situated 1 cm below the lip **(Fig. 37,58)**.

Lids: Lids of various diameters were discovered in Gegharot **(Fig. 37,59–63)**. These covers are mostly equipped with a handle in the center. The exterior surface of some of them is decorated with incised lines.

Indeterminate groups: Some of the forms, which are recognizable, cannot be included in any of the previous groups. These groups are composed of bases, which can be flat, where the entire surface touches the support or the bases are concave, where the central part is not in contact with the ground, and coarse pottery, which is composed of very irregular and coarsely hand-made pottery.

Among the vessels studied in classification corpus, approximately 13% are decorated.

Conclusion: comparative analysis

The analysis of typology and the comparison of two horizons of Kura-Araxes culture highlights some specific points.

Evolution of existing forms: One of the problems of Kura-Araxes culture in the region and particularly in the Tsaghkahovit Plain is its evolution and the relationships between two cultural horizons of the Early Bronze Age. In fact, in spite of a local hiatus between these two periods of occupation at Gegharot, we see an evolution of forms which is clearly visible if we compare the typology of the two horizons. The three-handled jars, very characteristic to Kura-Araxes pottery, became larger in EB II, with incised decoration on their shoulders. The handles, coarse and thin, are developed to a larger, regular and symmetric handle.

Continuance of some forms: However, some particular forms are used in both EB I and EB II. One of these forms is the biconic body which concerns both EB I **(Fig. 35,5.11)** and EB II vessels **(Fig. 35,12)**, but also special features like the tripod foot **(Fig. 36,26; Fig. 37,58)**, which is used during both EB I and EB II.

Change of forms: We can observe the extinction of some type of pottery which existed in EB I. The cups with vertical walls and the mug are used especially during the EB I period. In contrast, in EB II we assist to the development of large **(Fig. 36,15–18)** and small **(Fig. 36,27–38)** bowls with opened shape and high flaring rims which does not exist during EB I.

New decoration techniques and motifs: One of the particularities that we can remark is the presence of new decorations during the EB II. These new modes are visible not only in decoration techniques, but also in decoration motifs, which become more and more complex.

Change of surface colors: The dominant colors during EB I were generally light colors (7.5YR 6/4, 5YR 5/6, 7YR 5/2, etc.), while those during the EB II are darker (GLEY1 2.5N, 5YR 3/1, 7.5YR 3/2 etc.). This evolution could be a result of improvements of firing techniques during the EB II, which gave the possibility to control the firing atmosphere.

The Early Bronze Age pottery from Gegharot reveals certain homogeneity of forms and manufacturing techniques. The recent excavations in Gegharot brought forth an occupation stratigraphy of two phases of the Kura-Araxes culture and allows to draw up a continuous chronological sequence of the Early Bronze pottery and to build up its evolution in the plain of Tsaghkahovit.

Also, the EBA pottery from Gegharot provides a starting point for a larger typology of the cultural area which can clarify the regional interactions. However, the typological approach of the Kura-Araxes pottery has its limits and for a better understanding the interactions we need also to confront the typology of EB pottery with a complete technical analysis of *chaîne opératoire*. Future research will certainly help to fill knowledge gaps about many problems of the Kura-Araxes culture.

Catalogue of ceramics

Fig. 3 **1** ext. black, Gley 1 2.5/N; int. very dark gray, Gley 1 3/N; – **2** ext. very dark gray, Gley 1 3/N; int. dark gray 2.5Y 4/1, very dark gray, Gley 1 3/N (rim); – **3** ext. gray, Gley 1 5/N; int. light brownish gray 2.5Y 6/2, dark gray, 2.5Y 4/1 (rim); – **4** ext. black, Gley 1 2.5/N; int. dark gray, 2.5Y 4/1; – **5** ext. very dark gray, Gley 1 3/N, pale brown, 10YR 6/3 (rim); int. polish lines – very dark grayish brown, 10YR 3/2, reddish yellow, 5YR 6/6; – **6** ext. gray, Gley 1 5/N; int. grayish brown, 10YR 5/2; – **7** ext. yellowish red, 5YR 4/6, 5/6, black, Gley 1 2.5/N; int. yellowish red, 5YR 5/6, very dark gray, Gley 1 3/N.

Fig. 5 **1** ext. black, 2.5Y 2.5/1, light brownish gray, 2.5Y 6/2; int. grayish brown, 2.5Y 5/2; – **2** ext. black, Gley 1 2.5/N, dark gray, Gley 1 4/N; int. grayish brown, 2.5Y 5/2; – **3** ext. black, Gley 1 2.5/N, dark gray, Gley 1 4/N; int. dark gray, 2.5Y 4/1, grayish brown 2.5Y 5/2 (neck); – **4** ext. black Gley 1 2.5/N dark gray, Gley 1 4/N (neck); int. dark grayish brown, 10YR 4/2; – **5** ext. black, Gley 1 2.5/N; int. very dark gray, Gley 1 3/N, very dark brown 10YR 2/2 (rim); – **6** ext. black, Gley 1 2.5/N, yellow-

ish red 5YR 4/6 (neck); int. dark gray, 7.5YR 4/1, strong brown 7.5YR 4/6; – **7** ext. black Gley 1 2.5/N; int. dark grayish brown, 10YR 4/2, very dark grayish brown, 10YR 3/2 (rim); – **8** ext. black, Gley 1 2.5/N; int. very dark grayish brown, 10YR 3/2; – **9** ext. black, Gley 1 2.5/N; int. black, 2.5Y 2.5/1, brown, 7.5YR 4/3 (spot on the neck); – **10** ext. black, Gley 1 2.5/N; int. dark gray, 7.5YR 4/1, brown 7.5 4/2; – **11** ext. black, Gley 1 2.5/N; int. very dark gray Gley 1 3/N, dark brown, 7.5YR 3/2 (rim); – **12** ext. black, Gley 1 2.5/N; int. neck (lines): grayish brown, 10YR 5/2, very dark gray, 10YR 3/1; body (spots): very dark gray Gley 1 3/N, brown 10YR 5/3; **13** ext. black, Gley 1 2.5/N; int. very dark gray, Gley 1 3/N, brown, 7.5YR 4/3 (rim)

Fig. 6 **1** ext. black, Gley 1 2.5/N; int. brown 7.5YR 4/3, 4/2, dark gray 10YR 4/1; – **2** ext. black, Gley 1 2.5/N; int. reddish yellow, 5YR 4/4; – **3** ext. black, Gley 1 2.5/N, brown, 7.5YR 4/4; int. dark gray, 10YR 4/1, yellowish brown, 10YR 5/4 (spot); – **4** ext. dark reddish brown, 5YR 2.5/2 (neck), very dark brown, 10YR 2/2 (body); int. dark reddish brown, 5YR 3/3, grayish brown, 10YR 5/2 (body); – **5** ext. black, Gley 1 2.5/N; spot on the rim: brown, 7,5YR 4/3; int. reddish brown, 5YR 4/3 (neck), dark gray, 2.5Y 4/1 (body); – **6** ext. black, Gley1 2.5/N; int. dark grayish brown, 10YR 4/2, dark gray, 10YR 4/1; – **7** ext. black, 10YR 2/1, black, Gley 1 2.5/N; int. reddish brown, 5YR 4/4, weak red, 10YR 5/4; dark gray, Gley 1 4/N; – **8** ext. black- Gley 1 2.5/N, pale brown, 10YR 6/3; int. grayish brown, 10YR 5/2, dark gray, 10YR 4/1; – **9** ext. black, Gley 1 2.5/N; int. dark gray, 10YR 4/1, brown, 7.5YR 5/3, 4/2; – **10** ext. black, Gley 1 2.5/N; int. grayish brown, 10YR 5/2, dark gray, 10YR 4/1.

Fig. 7 **1** ext. gray, 2.5Y 5/1; int. gray, 2.5Y 5/1; – **2** ext. brown, 7.5YR 4/4, dark gray, 7.5YR 4/1; int. strong brown, 7.5YR 5/6 (neck), black, Gley 1 2.5/N; – **3** ext. dark grayish brown, 10YR 4/2, dark gray, 10YR 4/1; int. strong brown, 7.5YR 5/6 (neck & rim), dark gray, 10YR 4/1; – **4** ext. very dark gray, Gley 1 4/N, brown, 10YR 5/3 (rim); int. grayish brown, 10YR 5/2; – **5** ext. dark gray, 10YR 4/1; int. light yellowish brown, 10YR 6/4; – **6** ext. dark gray, Gley 1 4/1; int. dark grayish brown, 2.5Y 4/2; – **7** ext. brown 7.5YR 5/4, very dark gray, 7.5YR 3/1; int. brown, 7.5YR 3/1; – **8** ext. black, Gley 1 2.5/N; int. very dark grayish brown, 10YR 3/2, dark grayish brown, 10YR 4/2; – **9** ext. gray, Gley 1 5/N; int. grayish brown, 2.5Y 5/2; – **10** ext. dark gray, Gley 1 4/N; int. grayish brown, 2.5Y 5/2; – **11** ext. black, Gley 1 2.5/N; int. brown, 10YR 5/3; – **12** ext. black, Gley 1 2.5/N, very dark gray, Gley 1 3/N; int. black, Gley 1 2.5/N; – **13** ext. brown, 7.5YR 4/3, dark brown 7.5YR 3/2; int. brown, 7.5YR /4; – **14** ext. black, Gley 1 2.5/N – dark grayish brown 10YR 4/2; int. very dark gray, 10 YR 3/1, brown, 7.5YR 5/4; – **15** ext. dark gray, Gley 1 4/N; int. dark gray, gley 1 4/N, yellowish brown, 10YR 5/4; – **16** ext. gray, Gley 1 5/N, dark gray, 2.5Y 4/1 – dark grayish brown, 2.5Y 4/2; int. black, Gley 1 2.5/N, dark gray 2.5Y 4/1.

Fig. 9 **1** ext. black, Gley 1 2.5/N; int. gray, 7.5YR 5/1; – **2** ext. spots: brown, 7.5YR 4/3, black, Gley 1 2.5/N; int. brown, 7.5YR 5/3; – **3** ext. black, Gley 1 2.5/N; int. red, 2.5YR 4/8, brown, 7.5YR 5/2; – **4** ext. black, Gley 1 2.5/N; int. grayish brown, 10YR 5/2, dark grayish brown 10YR 4/2 (polish rim and neck), dark gray Gley 1 4/N (bottom); – **5** ext. black, Gley 1 2.5/N; int. grayish brown, 10YR 5/2, dark grayish brown 10YR 4/2 (polish rim); – **6** ext. black, Gley 1 2.5/N; int. brown, 10YR 5/3, grayish brown, 10YR 5/2; – **7** ext. dark gray Gley 1 4/N, gray Gley 1 5/N (neck); int. dark grayish brown 10YR 4/2 (polish rim and neck), gray 10YR 5/1. – **8** Stone.

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Summary

This report presents the results of the collaborative archaeological field investigations undertaken between 2008 and 2011 under the auspices of the joint Armenian-American Project for the Archaeology and Geography of Ancient Transcaucasian Societies (Project ArAGATS). Here we focus our discussions on investigations into the Bronze Age communities of the Tsaghkahovit Plain of central Armenia. In particular, we detail here the results of excavations at the Bronze Age complexes at the sites of Gegharot, Aragatsi Berd, and Tsaghkahovit. At the settlements of Gegharot and Aragatsi Berd, investigations uncovered well-preserved occupations of the Early Bronze Age (Kura-Araxes culture) and the Late Bronze Age. At Tsaghkahovit, where excavations explored both settlement and mortuary contexts, our research was focused on the remains of the Late Bronze Age community. Study of the Early Bronze Age levels at Gegharot revealed stratified layers of occupation representing discrete phases of the Kura-Araxes horizon defined by unique ceramic complexes. The Early Bronze Age occupations at Gegharot indicate an agro-pastoral village organized around a generally egalitarian and minimally differentiated social order. Late Bronze levels at Gegharot have uncovered three contemporary shrines, dating to the late 14th through first half of the 13th centuries B.C. In contrast, investigations at the base of Tsaghkahovit indicate a residential complex, perhaps representing seasonal occupations around the fortress. Excavations at sites across the region have documented episodes of dramatic conflagration during the second half of the 2nd millennium B.C. Taken together, the collective research of Project ArAGATS reported here provides detailed new understandings of life and death during the Bronze Age in the South Caucasus.

Zusammenfassung

Vorliegender Bericht fast die Hauptergebnisse der Arbeiten zusammen, die durch die armenisch-amerikanische Expedition im Rahmen des Projektes ArAGATS 2008, 2010, 2011 in den mehrschichtigen Fundstellen der Bronzezeit Gegharot, Aragatsi Berd und Tsaghkahovit, Tsaghkahovit-Ebene (Republik Armenien) realisiert worden sind.

Auf den Siedlungen Gegharot und Aragatsi Berd wurden Schichten der Frühen Bronzezeit (Kura-Araxes Kultur) und Spätbronzezeit, in Tsaghkahovit – eine Siedlung und ein Gräberfeld der Spätbronzezeit – untersucht. Die stratigraphische Reihe der frühbronzezeitlichen Schicht von Gegharot hat diskreten Charakter der Kura-Araxes Schicht, welche durch isolierte Horizonte repräsentiert ist; jeder davon charakterisiert einen spezifischen keramischen Komplex.

Die frühbronzezeitliche Schicht von Gegharot stellt eine landwirtschaftliche Siedlung dar, dessen Konstruktionen spiegeln die egalitäre und funktionell schwach differenzierte Lebensweise der Bevölkerung wieder.

Die spätbronzezeitliche Schicht der Siedlung Gegharot ist vor allem durch spezifische Komplexe gekennzeichnet, und zwar durch drei synchrone (Ende 14. – erste Hälfte 13. Jh. v. Chr.) Heiligtümer mit, im Allgemeinen, analogem Innenbereich und Inventar, die eine einheitliche Struktur des Fundortes zeigen.

Durch die Ausgrabungen der Siedlung ist eine Reihe von Episoden dramatischer Art dokumentiert, die die Siedlung in der Tsghkahovit Ebene während der zweiten Hälfte des 2. Jt. v. Chr. geprägt haben: sie zeugen von einer totalen Zerstörung dieser Komplexe und teilweise Rekonstruktion von manchen davon.

Резюме

Настоящий отчет представляет основные результаты работ, проведенных армяно-американской экспедицией в рамках Проекта ArAGATS в 2008, 2010, 2011 гг. на многослойных памятниках бронзового века Гехарот, Арагаци берд и Цахкаовит в Цахкаовитской равнине (Республика Армения). На поселениях Гехарот и Арагаци берд исследовались слои раннего бронзового (куро-араксская культура) и позднего бронзового веков, в Цахкаовите – поселение и могильник ПБВ. Зафиксированная раскопками РБ слоя Гехарота стратиграфическая колонка отражает дискретный характер куро-араксского слоя, представленного двумя по существу

изолированными горизонтами, каждый из которых характеризуется специфичным керамическим комплексом. Раннебронзовый слой Гехарота представляет сельскохозяйственное в своей основе поселение, постройки которого отражают достаточно эгалитарный и функционально слабо дифференцированный образ жизни населения. Позднебронзовый слой поселения Гехарот представлен прежде всего комплексами весьма специфичного характера – тремя синхронными (конец XIV – первая половина XIII вв. до н.э.) святилищами с аналогичным в целом интерьером и набором инвентаря, определяющими уникальный облик памятника. Раскопками поселения документирован ряд драматических эпизодов, имевших место в Цахкаовитской равнине на протяжении второй половины II тыс. до н.э. и выразившихся в тотальном разрушении этих комплексов и частичной реконструкции некоторых из них.