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Opuscula

Annual of the Swedish Institutes at Athens and Rome

13
2020

STOCKHOLM

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Published with the aid of a grant from The Swedish Research Council (2017-01912)
The English text was revised by Rebecca Montague, Hindon, Salisbury, UK

Opuscula is a peer reviewed journal. Contributions to *Opuscula* should be sent to the Secretary of the Editorial Committee before 1 November every year. Contributors are requested to include an abstract summarizing the main points and principal conclusions of their article. For style of references to be adopted, see <http://ecsi.se>. Books for review should be sent to the Secretary of the Editorial Committee.

ISSN 2000-0898

ISBN 978-91-977799-2-0

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Printed by TMG Sthlm, Sweden 2020

Cover illustrations from Aiopoulou *et al.* in this volume, p. 48.

The New Swedish Cyprus Expedition 2019: Excavations at Hala Sultan Tekke (The Söderberg Expedition)

Preliminary results, with contributions by L. Recht, B. Placiente Robedizo, C. Eriksson, L. Andersson, M. Svensson, L. Avial Chicharro, S. Hermon, M. Polig & D. Kofel

Abstract

The tenth season of excavations at the Late Bronze Age city of Hala Sultan Tekke was carried out in four areas: City Quarter 1 (CQ1), CQ4, City Wall 1 (CW1), and Area A (Tomb RR). The excavations in CQ1 provided additional information on the pre-LC IIIA occupation of the city. Stratum 3 which can be dated to the LC IIC (13th century BC) was further exposed. For the first time in the city even older phases, Strata 4 and 5, were found. These are tentatively dated to the LC I–II (15th to 14th century BC). In CQ4 numerous storage areas were exposed, which belong to a large compound. There is also evidence of production of textiles and purple dye. All remains can be associated to the most recent Stratum 1 and can be securely dated in the LC IIIA, i.e. the 12th century BC. A test trench (CW1) was opened up 150 m to the south-east of CQ4, in an area where the magnetometer survey indicated a possible city wall with moat. A c. 2.5 m-wide man-made construction consisting of small stones intermingled with larger blocks of stones was found running north–south. Built against the interior of this structure is a copper-producing workshop as indicated by much slag, ash, and remains of a furnace, which is preliminarily dated to the 13th century BC. Tomb RR, which was partly excavated in 2018 and secured, was reopened and additional burials came to light. The total number of skeletons now stands at 37; these are associated with 74 complete/intact finds of mainly pottery vessels of which some contained food remains. The pottery comprises Cypriot-produced wares and Mycenaean imports, which indicate a LC IIB–C date of the burials. Other finds include a unique Minoan female figurine and a bronze knife with ivory handle.*

Keywords: Late Bronze Age, Cyprus, Hala Sultan Tekke, excavation, settlement, tomb

<https://doi.org/10.30549/opathrom-13-03>

Introduction

The present report is the tenth in a series of annually published preliminary reports of excavations at Hala Sultan Tekke under the direction of P.M. Fischer.¹ Essential background information will be recapitulated in order to facilitate the understanding of the project and its results without the need to consult previous publications.

One of the main aims of the project is the establishment of the total extent of the city and the interpretation of its layout. For this purpose, five geophysical surveys with georadar and magnetometers with ten sensors mounted on a 5 m-wide cart

* *Acknowledgements:* The expedition would like to express its gratitude for the proficient support of the Department of Antiquities of Cyprus (DAC), headed by the director Dr M. Solomidou-Ieronymidou, and its personnel including Dr D. Pilides, curator of antiquities, archaeological officer Dr A. Satraki, and the staff of the Larnaca Archaeological Museum. Mr P. Georgiou, a former employee of the DAC, and Mrs D. Georgiou admirably provided the necessary logistic support. Indispensable funding was once again gratefully received from the Torsten Söderberg Foundation. We are also much obliged to the Enbom's Foundation at the Royal Swedish Academy of Letters, History and Antiquities, and to the Institute for Aegean Prehistory (INSTAP) for their generous sponsorships. The board of the association of the Friends of the Swedish Cyprus Expedition lent their support. The team consisted of archaeologists, students, and other personnel, most from Sweden, others from Australia, Austria, Belgium, Cyprus, Germany, Israel, Italy, Jordan, Poland, Spain, the United Kingdom, and the United States. Among the team members are Dr T. Bürge, who acted as assistant field director, and M. Al-Bataineh who functioned as the architect, surveyor, and draughtsperson. Trench masters included Dr L. Recht, B. Clark and E. Peri. Other members of the team were C. Ahl Falkensjö, L. Andersson (osteology), L. Avial Chicharro, F. Dahlberg, G. De Hooghe, M. Dhami, S. Erhardt, C. Eriksson (osteology), G. Fanning (conservation), A. Follin, E. Gustavsson, A. Hewitt, D. Kofel (archaeobotany), M. Kokkinou, Dr T. Manolova, F. Palm, A. Petersson, B. Placiente Robedizo (osteology), A. Sjelvigren, M. Svensson, and J. Tracz.

¹ Fischer 2011; 2012; Fischer & Bürge 2013; 2014; 2015; 2016; 2017b; 2018a; 2019. See also the first final volume on CQ1 and CQ2: Fischer & Bürge 2018b.

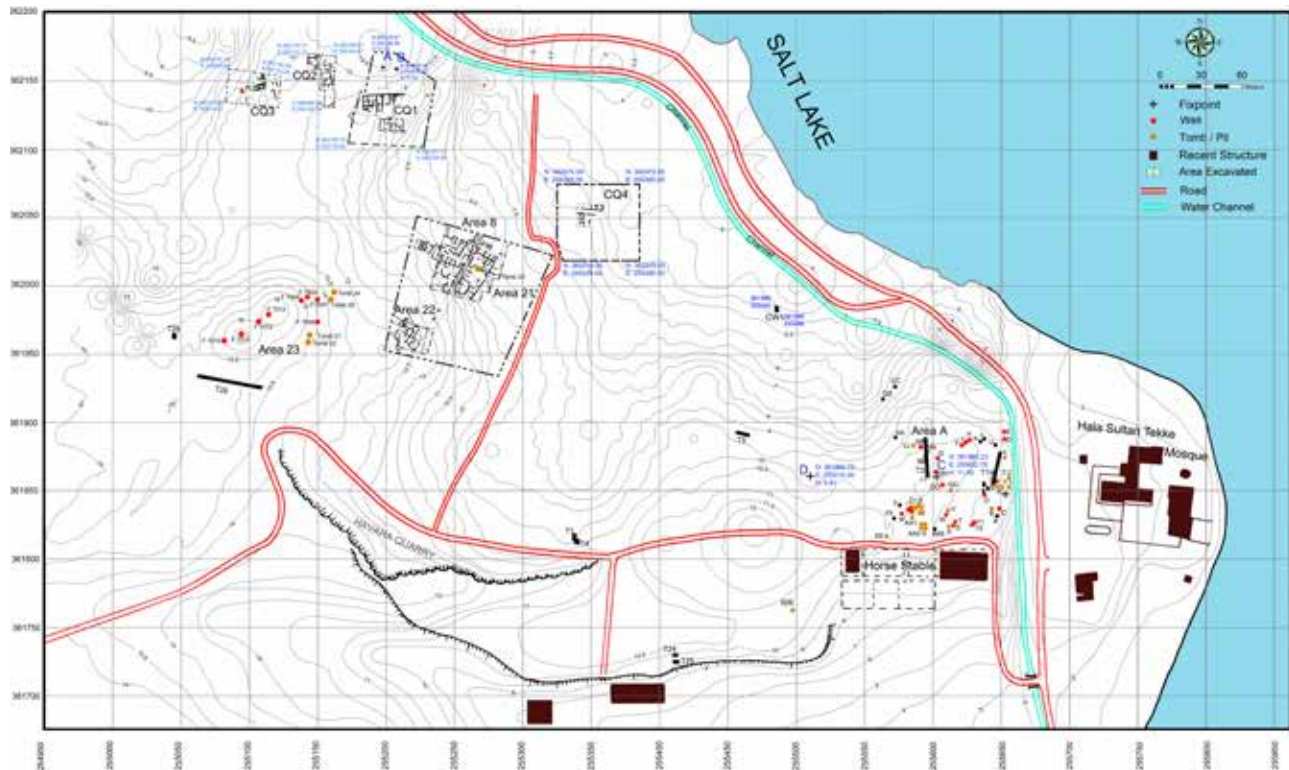


Fig. 1. Topographic map of Hala Sultan Tekke including CQ1, CQ4, CW1, and Area A (drawing by M. Al-Bataineh).

covering an area of 23 hectares were carried out (see the approximate surveyed area in Fig. 1).² This arrangement allowed the mapping of 23 hectares within a week, demonstrating man-made stone structures, including in CQ1–4, down to a depth of approximately 1.5–2 m. The magnetometer map suggests that at least the entire surveyed area was occupied and the centre of the city (14 hectares) surrounded by a city wall and possible moat (trench CW 1). In addition, these surveys lead to the discovery of a suburban area, Area A, with tombs, wells, and offering pits, approximately 600 m east of CQ1 and close to the mosque of Hala Sultan Tekke.³

Another aim of the project is the investigation of the complete occupational sequence, which includes relative chronology based on ceramic sequences and absolute chronology based on radiocarbon dates of short-lived samples. Our results demonstrated that the city flourished in the 13th and 12th centuries BC (LC IIC–IIIA) but there are plenty of finds which can be dated as early as around 1650 BC (MC III/LC I). This has been suggested especially by findings from Area A.

Two layers of destruction in the period from around 1200 BC to 1150 BC (LC IIC/IIIA–LC IIIA) could be recorded. These destructions occurred in the so called “crisis years” at the end of the Bronze Age in the Mediterranean. As the consequence of these findings and the receipt of an advanced grant by the Swedish Research Council to the director of the excavations,⁴ an additional objective became the integration of the material from Hala Sultan Tekke from its latest three phases of occupation (Strata 3–1) into the study of the “Sea Peoples Phenomenon” during years of a general crisis. This phenomenon should be understood as the effect of various factors which led to upheaval and migration in the second half of the 13th century BC and lasted some decades in the 12th century BC.⁵

Other aims include the study of economic activities, trade, and intercultural relations. The latter have been confirmed by finds from the Mycenaean/Minoan spheres of culture but also from Anatolia, the Levant, and Egypt. In addition, recently verified Sardinian imported tableware at Hala Sultan Tekke

² Trinks *et al.* 2018; Fischer & Bürge 2019.

³ Fischer & Bürge 2017c.

⁴ Swedish Research Council project 2015-01192: The Collapse of Bronze Age Societies in the Eastern Mediterranean. Sea Peoples in Cyprus? The project was carried out from 2016 to 2019/2020.

⁵ See e.g. Fischer & Bürge 2017a.

provides evidence for contacts with this central Mediterranean island some 2,200 km distant.⁶

Following the practice of the previous preliminary reports, the occupational phases are presented as excavated starting with Stratum 1 just below colluvial soil.⁷ In this report some important finds are listed with their identification numbers but are not illustrated due to restricted space. We consider their listing helpful because it offers the possibility to compare their preliminary interpretation with that presented in the forthcoming final report.

The tenth season of excavation lasted from 29 April to 31 May 2019. Excavations were carried out in CQ1 and CQ4, and a test trench was opened up in the area of the supposed city wall (CW1). The backfilled and fenced Tomb RR, which had been partly investigated in 2018, was reopened and further explored.

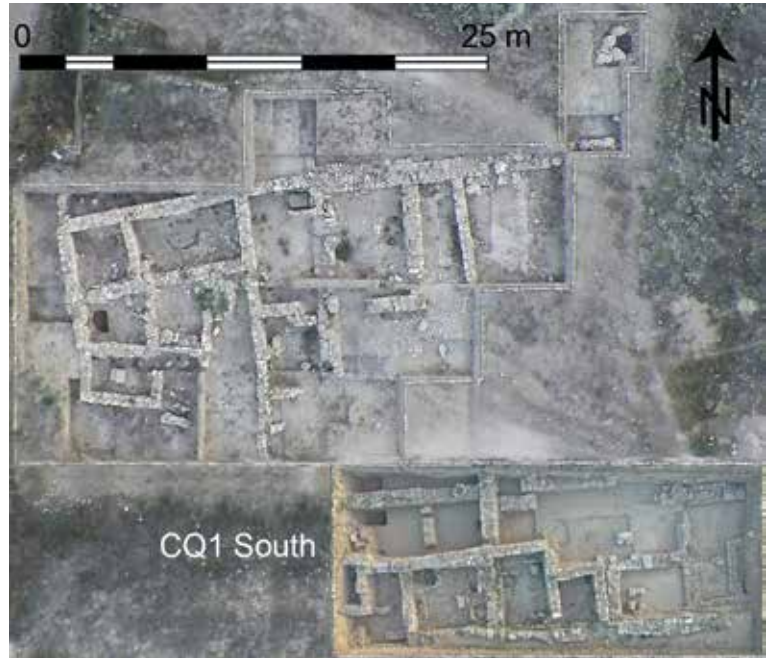


Fig. 2. Aerial photograph of CQ1 (by P.M. Fischer and T. Bürge).

Results of the 2019 excavations in the southern part of CQ1

By Peter M. Fischer, Teresa Bürge & Laerke Recht

CQ1 South (Fig. 2) is an area measuring 23 m × 10 m and comprises Trenches 7D, 24A–E, and 25A–C.⁸ The excavations continued to fully expose Strata 1–3, and to search for earlier occupation.

STRATUM I

In advance of the excavations, CQ1 was cleaned of vegetation and other debris. In the northern part among the stones of the threshold between Rooms 2 and 6 of Stratum 1,⁹ which were excavated in 2010 and 2011, an Egyptian pendant of light brown faience depicting a ram's head was found. It was obviously exposed during the heavy falls of rains in winter 2019 (N422; Figs. 3, 28:2).

The only remaining structure from Stratum 1 in the southern part of CQ1 is a roughly circular pit in Room 58 (Trench 25A; Fig. 4) with a diameter of c. 1.6 m (L610, L672, L903). This pit which was dug by the occupants of Stratum 1 de-

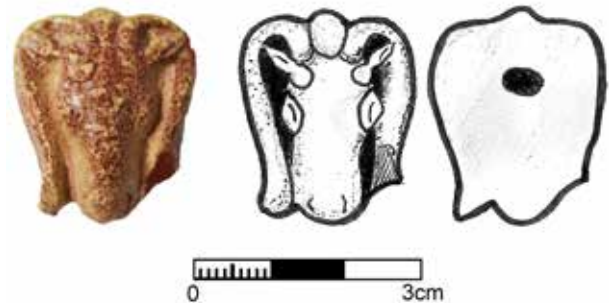


Fig. 3. Ram's head of Egyptian faience (N422), scale 1:1 (photograph by P.M. Fischer, drawing by E. Peri).

stroyed the corner of W101/102 of Stratum 2 (see Fig. 5) and affected even deeper layers. It contained a few animal bones¹⁰ and some pottery. Among the latter are fragments of wheel-made cooking pots of Coarse ware (L903-1, -2), the rim of a hand-made jug of Coarse ware (L903-3), the rim of a Plain White Wheel-made basin (L903-4), and the rims of a krater (L903-5) and a deep bowl (L903-6) of White Painted Wheel-made ware. All finds confirm the LC IIIA date of the pit.

⁶ Bürge & Fischer 2019/2020.

⁷ In the final reports the strata are presented chronologically.

⁸ See the previous excavation reports in Fischer & Bürge 2017b; 2018a; 2019; and the detailed description and discussion of the results from CQ1, 2010–2017, in Fischer & Bürge 2018b, 17–123.

⁹ See plan in Fischer & Bürge 2018b, 73–74, figs. 2.56a–b.

¹⁰ The faunal remains were processed by David Reese and Omri Lernau and will be presented in the forthcoming final report. For the faunal remains from the 2010 to 2017 seasons see Reese 2018 and Lernau 2018.

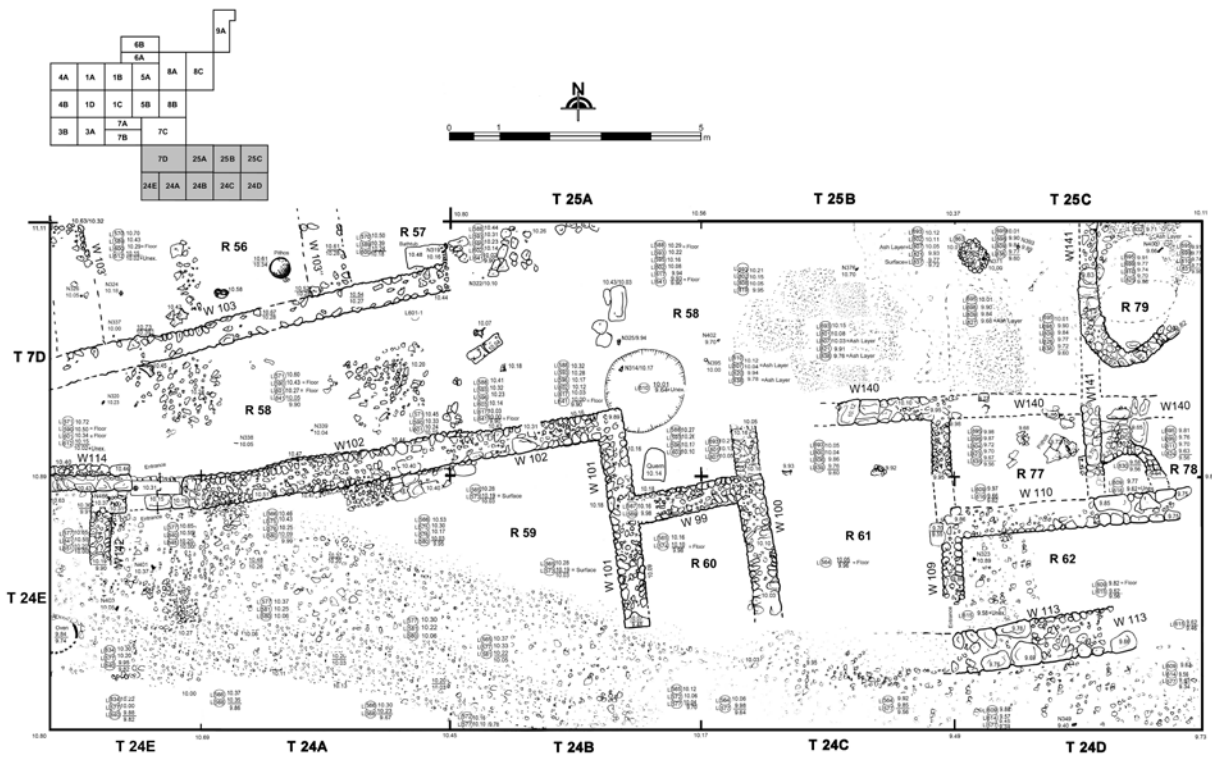


Fig. 4. CQ1, Stratum 1, Trenches 7D, 24A-E, 25A-C (drawing by M. Al-Bataineh).

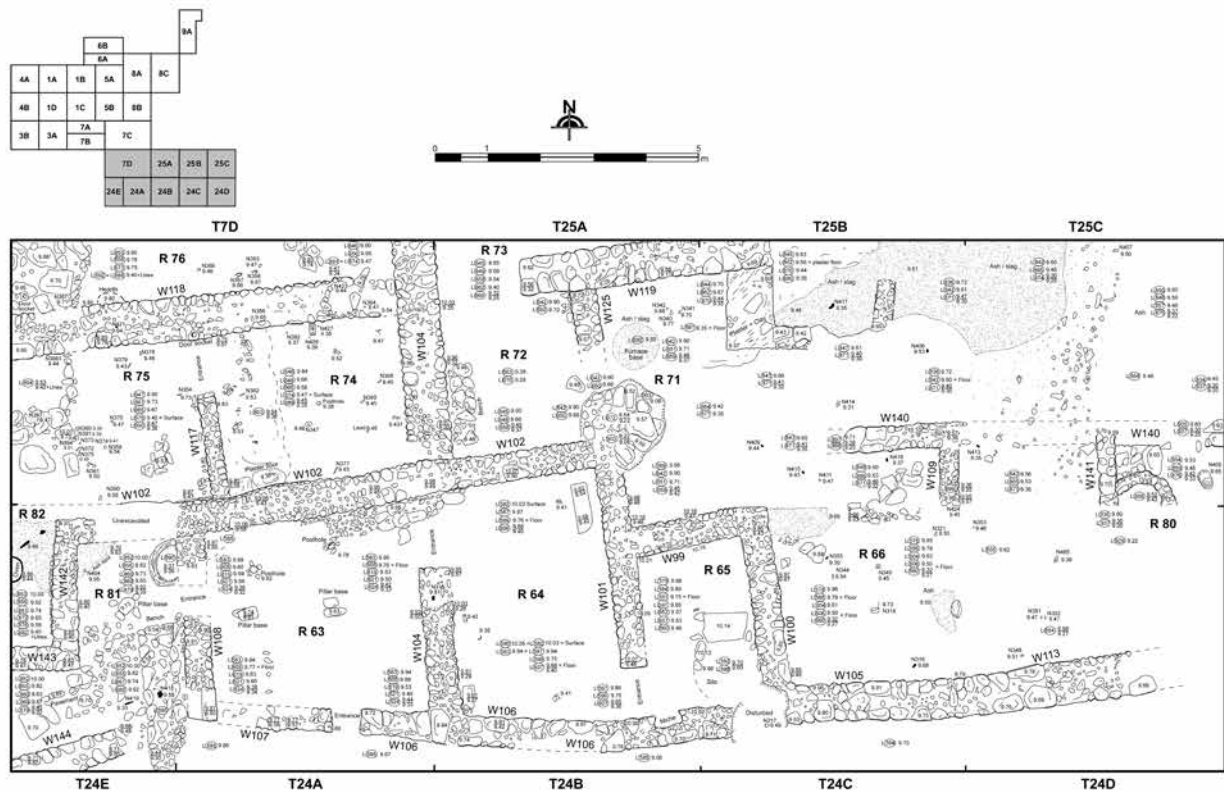


Fig. 6. Selected finds from CQ1, Stratum 2: 1. White Painted Wheel-made conical kylix L897-10, 2. Mycenaean open vessel with octopus L654-6/L935-1; scale 1:3 (photographs by T. Bürge).



STRATUM 2

The few remains of Stratum 2 (*Fig. 5*)¹¹ consist of layers of fill, mudbrick, ash, and some slag in Rooms 66 and 80 (L897, L898, L934, L935, L937) in Trenches 25B–C and 24D. Additional finds from Room 66¹² include a stone pestle (N424, L897), fragments of wheel-made cooking pots of Coarse ware (L897-1, -5), the handle of a Canaanite jar with a potmark (L897-7), a carinated bowl of Plain White Wheel-made ware (L897-8), and numerous fragments of White Painted Wheel-made ware, among them a carinated bowl (L897-2), the false spout of a stirrup jar (L897-3), the rim of a krater (L897-6), and the upper part of a conical kylix (L897-10; *Fig. 6:1*). Room 80¹³ yielded a loom weight of fired clay (N465, L935,

weight 87 g), a small undefined object of bronze (L935-2), and fragments of a Mycenaean cup or kylix with octopus motif (L935-1; *Fig. 6:2*), which match with sherds found in 2017 (L654-6).¹⁴ Considerable quantities of slag—23.3 kg from L937 and 4.5 kg from L935—further support the evidence of a copper workshop as discussed in previous reports.¹⁵

During cleaning at the beginning of the excavations finds were made which tentatively are ascribed to Stratum 2: two biconical spindle whorls of stone (from the surface, N421, weight 12 g; and from the top of W118 N423, L691, weight 10 g), as well as a folded lead object—possibly a weight (N426, L689, weight 3 g) and a bead of light greenish-blue paste (N427, L689) from Room 74.

¹¹ Stratum 2 was excavated mainly 2016–2018.

¹² See description of Room 66 and a list of finds in Fischer & Bürge 2018b, 66–68.

¹³ See description of Room 80 in Fischer & Bürge 2019, 298.

¹⁴ Bürge & Fischer 2018, 312, fig. 3.60:7.

¹⁵ Fischer & Bürge 2019.

STRATA 3A-C

Excavations continued in Room 69, the upper part of which had been exposed in 2017.¹⁷ The only wall which was used in all sub-strata of Stratum 3 is W123, which is the northern border of Room 69. In Stratum 3A (*Fig. 7*), this space is limited by W123, W120, and W121. W123 has a 0.8 m-wide passage through which Room 83 could be accessed. The eastern border of Room 69 has not been found; it might have been removed by the occupants of Stratum 2, or Room 69 might represent a partly open space connected to the area to the east (see below).

There is a plaster floor in this room (L936), on which, *inter alia*, two fragments of Mycenaean (LH IIIB) shallow bowls were found (L936-1, -2). In Stratum 3B (*Fig. 9*), the western border of this room is W152,¹⁸ which is only scantily preserved and located to the east of the more recent W120. Since also the southern border of Stratum 3A, the western part of W121, is more recent than Stratum 3B, it is unclear where the limits of this space were.¹⁹ Two superimposed plaster floors (L947, L955) can be assigned to this sub-phase. Finds include an ivory pommel (N412, L947),²⁰ a handle of a Plain White jug with an incised potmark (L947-1), and the base of a Mycenaean shallow bowl (L947-2). In Stratum 3C (*Fig. 11*), another plaster floor (L960) covered the space. In this sub-stratum, the western and eastern limits of the space are not clear, whereas the southern

¹⁷ Fischer & Bürge 2018b, 31. The contexts in this room are very difficult to interpret. We present here a possible interpretation of what happened in the three sub-phases. Further excavations may reveal additional evidence and lead to a revised interpretation.

¹⁸ This wall was preliminarily interpreted as column base in a previous report; see Fischer & Bürge 2018b, 30–32, figs. 2.19, 2.20. However, a secondary function as roof support in Stratum 3A cannot be excluded.

¹⁹ At present, this area is covered by two more recent walls, which hamper the understanding of the stratigraphy: W121 (western part) of Stratum 3A and W113 of Strata 1 and 2.

²⁰ It was found after a heavy rain in spring 2018 (see Fischer & Bürge 2019, 300, 302, fig. 13:8) and can now be attributed to Stratum 3B.



Fig. 8. Selected finds from CQ1, Stratum 3A: 1. Plain White Wheel-made bowl L906-1, 2. White Slip II mature bowl L906-5, 3. Mycenaean flask L895-10, 4. Mycenaean kylix L906-4, 5. Cypriot Common Style cylinder seal N428; scales 1:3 (1–4) and 1:1 (5) (photographs by T. Bürge and P.M. Fischer).

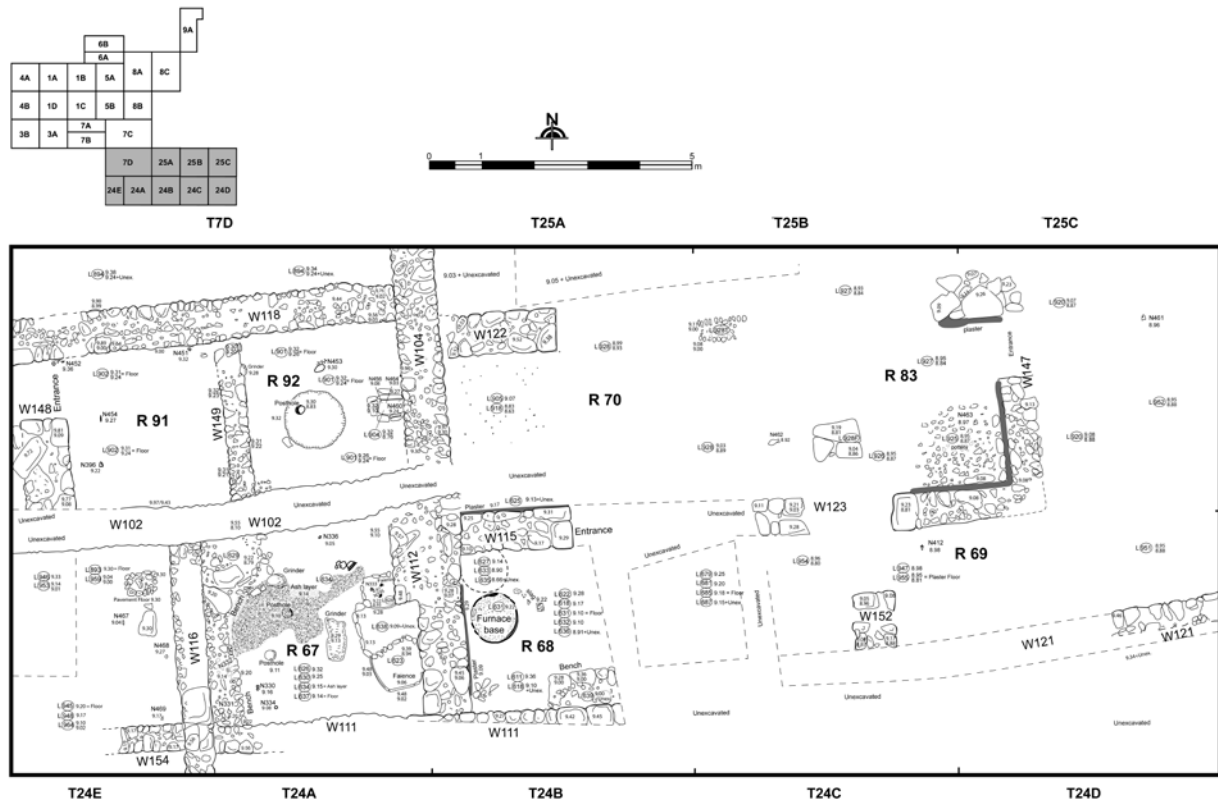


Fig. 9. CQ1, Stratum 3B, Trenches 7D, 24A–E, 25A–C (drawing by M. Al-Bataineh and L. Recht).

part may be limited by a structure (L960F), of which only one course of stones below the western part of W121 is preserved. The plaster linings in the eastern part of Room 69 may represent the remains of a basin or a similar installation and not the plaster of a wall.

The area east of Rooms 70/83 and north/north-east of Room 69 is only partly exposed. The space is bounded by W121 to the south and W147 to the west. The eastern limits have not been exposed so far. In Stratum 3A (Fig. 7), there is a levelling layer of pebbles in the northern part (L919) covering W150 from Stratum 4. To the south are L891, L920, and L942 which contained slag and the likely remains of a furnace, in total around 150 kg. In addition, pieces of clay, most likely parts of furnaces, with slag attached to them were found. In Stratum 3B (Fig. 9) there are fill layers (L951, L952) which yielded, *inter alia*, a loom weight of stone (N461, L920, weight 60 g). There is a significantly smaller amount of slag (11.5 kg) than in the subsequent Stratum 3A. Other finds of interest include a Plain White Hand-made jug with a potmark composed of two signs (L951-1), the lower part of a possibly Egyptian-imported jar (L952-2), and a partly preserved loom weight of clay (L952-1). In Stratum 3C (Fig. 11) there is a clay surface, L956, which is separated from the floor L960 in Room 69 by a plaster line connecting W123 and W121 and

continuing west–east along the southern façade of W123 and beyond. This clay surface yielded a fragment of a Mycenaean shallow bowl (L956-1), whereas the fill layer to the north (L931) contained no finds of specific interest.

Rooms 70 and 83 are bordered by W104, W122, W147, W123, and W115. The separation between these spaces is not clear and—as the situation in 2019 implies—it seems that these two rooms belong to one large space, approximately 10 m long and 3 m wide, which to the east is bordered by W147.²¹ The northern boundary of the room is not yet exposed. The inner façades of W147, W123 (eastern part), and W115 are covered by a thick white wall plaster. There is an entrance east of W115, through which the room to the south, Room 68,²² could be accessed. East of W122 is the possible base of a furnace (L677'), which can be assigned to Stratum 3A but there is another furnace base on approximately the same spot which was used in Stratum 2 (L650' in Fig. 5). The room was covered by several super-imposed plaster floors (L677, L899, L906,

²¹ In the previous report it was proposed that the border between Rooms 70 and 83 was a continuation of W120; Fischer & Bürge 2019, 299–300. However, further excavations in this area did not confirm this hypothesis.

²² For a description of Room 68 see Fischer & Bürge 2018b, 27–31.

Fig. 10. Selected finds from CQ1, Stratum 3B: 1. Base-ring juglet L928-1, 2. Mycenaean juglet L925-3, 3. White Shaved juglet N462; scale 1:3 (photographs by T. Bürge).



L907) together with another plaster floor and stone-packing in the north-western part of the room (L676, L686). The plaster floors continue to the east (L888, L887, L889). Finds from previous seasons belonging to this sub-phase include tableware of Plain White, Base-ring, White Slip II, and Mycenaean wares, as well as Canaanite jars, a fragment of a Mycenaean zoomorphic figurine, and around 40 kg of copper slag.²³ The most striking context from this space is L906, a thick plaster floor, where a large amount of animal bones and broken tableware, mainly Base-ring bowls but also bowls of Plain White (e.g. L906-1; *Fig. 8:1*) and White Slip II mature (e.g. L906-5; *Fig. 8:2*) wares were found. Among the few Mycenaean imports is the upper part of a kylix with stemmed spirals (L906-4; *Fig. 8:4*), which can be dated to the LH IIIA1. A fragment of gold leaf (N459, L906; see below, *Appendix 3*) also comes from this space together with an Egyptian faience vase (L906-7; see below, *Appendix 2*). Fairly centrally placed in Rooms 70/83 is a rectangular stone structure (L928F) which seems to have been a working table for possible cultic activities considering the associated large amount of bones and pottery and may represent an altar. Pottery from this area includes a Plain White basin (L907-1), a Mycenaean shallow bowl (L907-2), and another Mycenaean open vessel (L907-3).

A roughly circular ash pit (L883, diameter c. 1 m) just to the north of L928F contained a high concentration of burnt animal bones and three Mycenaean shallow bowls (L883A-9, -10, -11). There is a plaster-lined, roughly rectangular, ashy feature in the northern part of the room (L892, L900), which contained the rim of a White Painted Wheel-made bowl (L900-1). Other finds from Room 83 include a Base-ring bowl (L883/888-2) and a faience bead (N420, L888).

In Stratum 3B (*Fig. 9*) Rooms 70/83 display a pebble layer in its westernmost part, L905, which contained much pottery, mainly fragments of Plain White (hand- and wheel-made) bowls, basins, and jugs, in addition to some Canaanite jars, Base-ring bowls, and White Slip I and White Slip II (early and mature) bowls and a tankard. Centrally placed are two superimposed layers of hard, compact soil with patches of limestone plaster (L928), which contained large amounts of bones, and continue to the east (L927) where an ashy area (L926) was found south of L927 and close to the likely altar L928F: it seems that the proposed cultic activities which were carried out in Stratum 3A were also carried out in the previous Stratum 3B. An intact juglet of White Shaved ware (N462; *Fig. 10:3*) was found in L928, just west of the of the possible altar L928F. Additional finds include the lower part of a Base-ring I juglet (L928-1; *Fig. 10:1*). In the south-eastern corner of Rooms 70/83 is a pottery and stone platform (L925), which contained numerous large fragments of pithoi and Canaanite jars, in addition to a Plain White Wheel-made bowl with lug handle (L925-11), fragments of Minoan transport vessels (L925-4, -6, -7, -8, -9, -10) and some Mycenaean tableware, including a miniature piriform jar (L925-3; *Fig. 10:2*) and fragments of two chariot kraters (L925-1, -2). A loom weight of fired clay (N463, L925, weight 116 g) also comes from the area of the platform.

Rooms 70/83 including L928F seem to have been constructed in Stratum 3C (*Fig. 11*). There is a similar pebble fill as in the later sub-phase in the western part (L918), which continues to the older Stratum 4 and contained very little pottery and bones and no other finds of specific interest. The eastern part of this space is covered with plaster floors (L939, L940, L941) on which a concentration of pottery and bones in two roughly circular areas were found: L941NE/L949 (diameter 0.9 m) contained many animal bones and

²³ See Fischer & Bürge 2018b, 31.

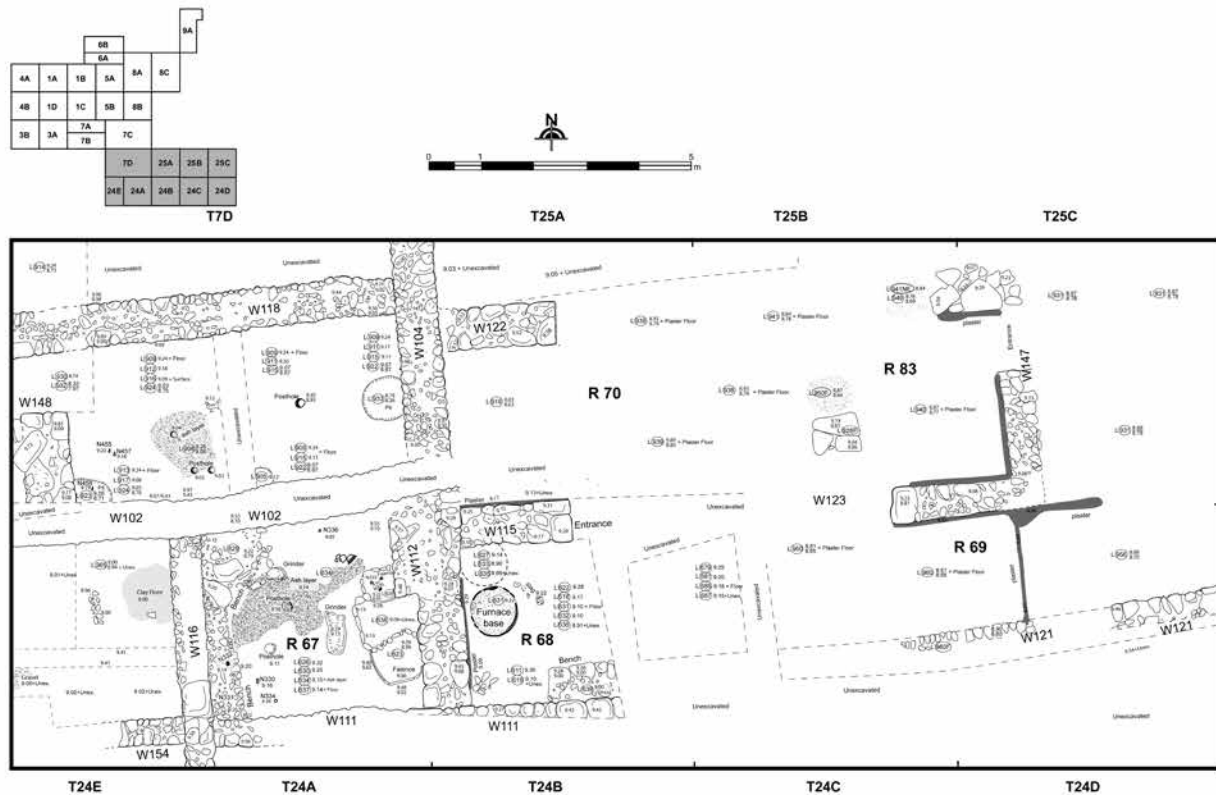


Fig. 11. CQ1, Stratum 3C, Trenches 7D, 24A-E, 25A-C (drawing by M. Al-Bataineh and L. Recht).

some pottery, *inter alia* a Plain White (L949-1; Fig. 12:1) and a White Slip II mature (L949-4; Fig. 12:2) bowl with bones inside, the upper part of a Mycenaean miniature juglet (L949-2; Fig. 12:3), and the lower part of another Mycenaean (or possibly Minoan) miniature juglet (L949-3). The other area, L950F (diameter 0.9 m) also yielded a large amount of animal bones, in addition to pottery, including Plain White (hand- and wheel-made) jugs (L950F-2, -3, -4, -5, -6), a hand-made cooking pot of Coarse ware (L950F-7), a fragment of a Base-ring bowl (L950F-9), and the lower part of a Mycenaean (LH IIIA2) kylix (L950F-1).

Room 90 (Trench 7D, west of Rooms 70/83) was partly exposed already in 2018.²⁴ The room, which is approximately 6.5 m × 3 m in size, is limited by W118 to the north, W104 to the east and W148 to the west. The latter has a 1 m-wide entrance. The southern limit is not clear and might be below W102 of Stratum 2 which has been left *in situ*.

The space is characterized by a number of superimposed floors. A plaster floor (L696, L697, L804) and a post hole represent the most recent occupation, Stratum 3A (Fig. 7). On the most recent plaster floor were several finds: a fragment of a bone beater (L813-2), a part of a wall bracket (L697-2), fragments of basins of Plain White ware (L697-5, L816-2), a cooking pot (L697-4) and the leg of a tripod cooking pot (L813-5) of Coarse ware, bowls of Base-ring (L697-3, L805-1), White Slip II mature (L697-7, L697-8, L822-1), Coarse Monochrome (L805-2), an almost complete White Shaved juglet (L813-3), a rounded bowl (L697-1), a deep bowl (L816-1), the base of a krater (L805-2) and a jar with basket handles (L813-1) of White Painted Wheel-made ware, and a shallow bowl (L697-6) and a cup (L813-4), both Mycenaean.

A somewhat earlier plaster floor, still assigned to Stratum 3A (L812, L895, L822), was further exposed and yielded a concentration of complete, almost complete, or large fragments of vessels, such as two White Shaved juglets (N425, N429, both from L895), numerous White Slip II mature bowls (N450, L895-1, -3, -4, -6, -8), two White Slip II late bowls (L895-5, -9), a Base-ring bowl (L895-2) and the foot of a likely Base-ring chalice (L895-7), a Plain White basin (L895-11) and a Mycenaean (LH IIIB) lentoid flask (L895-10; Fig. 8:3). Another important find is a Cypriot Common Style cylinder seal

²⁴ However, the area could not be excavated completely due to heavy rain; see Fischer & Bürge 2019, 299, n. 25.



Fig. 12. Selected finds from CQ1, Stratum 3C: 1. Plain White Wheel-made bowl L949-1, 2. White Slip II mature/late bowl L949-4, 3. Mycenaean miniature juglet L949-2, 4. Ivory disc L909-1; scale 1:3 (photographs by T. Bürge).

of haematite (N428, L812): it depicts two anthropomorphic figures, a horned animal and various other motifs (see *Fig. 8:5* and *Appendices 1* and *3*).

A division wall (W149) was built in Stratum 3B (*Fig. 9*) which splits the space between W148 and W104 into two rooms, each roughly 3 m × 3 m large: Rooms 91 and 92. This wall was removed in the next phase (Stratum 3A; see above). Finds from the floor of Room 91 (L902) include various textile production tools: a biconical spindle whorl of stone (N451, weight 26 g), an incised spindle whorl (or button?) of bone (N452, weight <1 g), a loom weight of fired clay (N396, weight 70 g), and a bone beater (N454). A post hole is located slightly off-centre in Room 92. From the floor of this room comes a necklace consisting of 28 pieces of a segments of tooth shells (*Antalis dentalis*; N453, L901).²⁵ A rectangular stone-lined feature (L904; possibly a sort of container) which is attached to W104 contained three finds: a bead of ivory (N456), a folded net weight of lead (N460, weight 19 g), and a disc-shaped spindle whorl or button of ivory (N464, weight 9 g).

W149 from Stratum 3B seems not have existed in Stratum 3C (*Fig. 11*). There is an area with ash (L908), where also three post holes were found. There are two pits: one is in the eastern part, next to W104 (L933) and the other in the south-west, next to W148 (L923). The pit in L923 contained, *inter alia*, a fragment of a White Slip II mature bowl (L923-1) and the base of a Plain White Wheel-made shallow bowl (L923-2), whereas the other contained no diagnostic pottery.²⁶ Another post hole is in the central/eastern part of the space. It is difficult to decide whether it was used in this phase of occupation or whether it was dug later. The floor (L909) yielded an ivory disc with incised decoration (L909-1; *Fig. 12:4*), besides numerous diagnostic pottery fragments, including a Plain White Hand-made jug (L909-5), an open vessel of White Painted ware (L909-2), a White Slip II mature bowl (L909-3), a Coarse Monochrome lamp (L909-4), a Canaanite jar (L909-7), and an open vessel of red-burnished hand-made ware (L909-6). Three loom weights of fired clay come from the area west of the ash (L913): N455 (weight 115 g), N457 (weight 116 g), and N458 (weight 113 g). The pottery from L913 comprises diagnostic parts of Plain White wares, Canaanite jars, Base-ring, White Slip II mature, hand-made cooking pots of Coarse ware, and a Mycenaean shallow bowl (L913-1).

Finds from the area north of W118, which were preliminarily assigned to Stratum 3B (*Fig. 9*), include, *inter alia*, diagnostic fragments of Plain White Wheel-made bowls

(L894-6, -7, -8), a Plain White juglet (L894-4) and a jug (L894-9), two bowls (L894-3, -5) and a jug (L894-2) of Black Slip/Monochrome ware, a Coarse ware lamp (L894-10), a White Slip II mature bowl (L894-1), and a fragment of a Bichrome Wheel-made vessel (L894-12). A test trench of 1.5 m width was dug in the north-western corner of the exposed area (L914) but did not yield any diagnostic pottery or other finds of relevance.

The reconstruction of the phasing of Trench 24E is difficult because the opened-up area is restricted to 5 m × 3 m. Consequently, room numbers have not yet been allotted. In Stratum 3A (*Fig. 7*) is a space limited by W146, W116, and another just visible wall to the south (no wall number yet). The northern limits are buried under W102 from Stratum 2. W145 seems to have divided this space into two equally large portions indicated by two similar floors, L886 and L884. There is a decorated biconical spindle whorl of stone (N470, L884, weight 8 g) and a broken fish-hook of bronze. Stratum 3B (*Fig. 9*) is represented by a space bordered by W116 and W154. Remains of a stone pavement survive in the north-eastern corner. Finds include a bone handle with a bronze pin, probably an awl (N467, L893), a biconical spindle whorl of stone (N468, L945, weight 11 g), and a loom weight of fired clay (N469, L948, weight 140 g). In Stratum 3C (*Fig. 11*) W154 and W116 were built. There is a surface of clay with some stones and much ash which may point to a working area.

STRATUM 4

The opened-up area in Trenches 25B/C and 24D is very small (*Fig. 13*). Consequently, the description of this phase is tentative. There is a 5.5 m-wide walled space bounded by W150, W155/157, and W151. The floor is covered by plaster (L963, L966), as is the inner façade of W151. A small post hole is just south of W150. This room yielded, *inter alia*, fragments of Plain White jugs and open vessels (L961-1, -2, -3, L963E-6, L963W-12), a hand-made cooking pot of Coarse ware (L957-2), two Coarse ware lamps (L957-9, L963E-4), four White Shaved juglets (L957-11, L961-4, L963E-2, L963W-13), a Monochrome bowl (L957-6), two Base-ring bowls (L961-6, L963W-8), a Base-ring juglet (L963W-9) and a jug of the same ware (L957-7), four White Slip II mature bowls (L957-4, L961-7, L963E-1, L963W-7), a White Slip I bowl (L957-5), two open vessels of Red-on-Red (L957-12, L961-8), and an open vessel of Red-on-Black ware (L963W-14). Imports include a fragment of a Mycenaean chariot krater (L957-1; *Fig. 14*), a Mycenaean shallow bowl (L957-3/L963E-3), two Minoan transport vessels (L957-8, -13), and two Canaanite jars (L957-10, L963W-11).

²⁵ Information on these scaphopods was thankfully received by D. Reese (email 13 September 2019).

²⁶ It is not clear whether this pit belongs to Stratum 3C or Stratum 4.

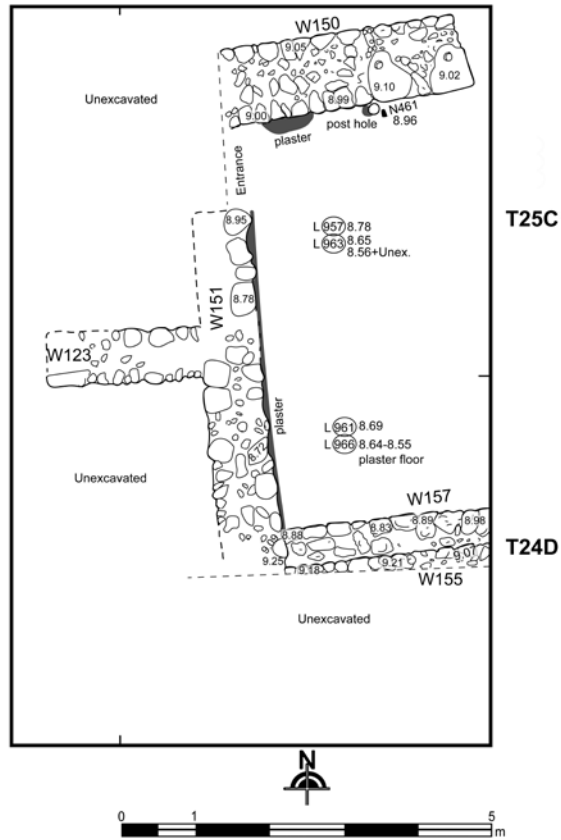


Fig. 13. CQ1, Stratum 4, Trenches 24D, 25C (drawing by M. Al-Bataineh and L. Recht).

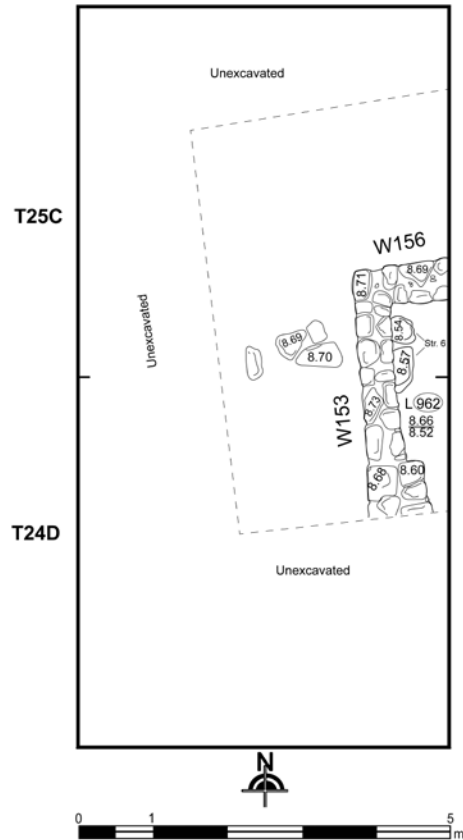


Fig. 15. CQ1, Stratum 5, Trenches 24D, 25C (drawing by M. Al-Bataineh and L. Recht).

STRATUM 5

Excavations in the easternmost area of Trenches 25C/24D exposed an even older phase of occupation (Fig. 15): a roughly north–south running wall, W153, which creates a corner with W156 to the north. Only a small part of the area enclosed by the walls and the trench border could be exposed so far. L962 is a fill layer, which contained only a few pottery fragments. Therefore, the dating of this phase is still unclear.

TEST TRENCHES

Below Stratum 3C, a test trench (L918, not shown on plan) in Trench 25A between W104 and W122 (see location of the walls in Fig. 11) revealed a layer of pebbles. Another test excavation north of W115/123 (see walls in Fig. 11) in Trench 25A–B exposed pebbles and mudbrick features (L950, not shown on plan). The pottery from these areas comprises fragments of open and closed vessels of Plain White ware (L950-14, -15, -16, -17, -18), a Pithos rim (L950-13), the handle of a Coarse ware cooking pot (L950-19), open and closed vessels of Base-ring (L950-21, -22, -23), and two bowls



Fig. 14. Mycenaean chariot krater fragment L957-1 from CQ1, Stratum 4; scale 1: 3 (photograph by T. Bürge).

of White Slip I (L950-24, -25), in addition to undiagnostic fragments of Monochrome ware, Canaanite jars, and a Minoan transport vessel.²⁷

²⁷ The two test trenches provided evidence of the earliest occupation in CQ1 and may be attributed to the architectural remains of Stratum 4 or—more likely—Stratum 5.

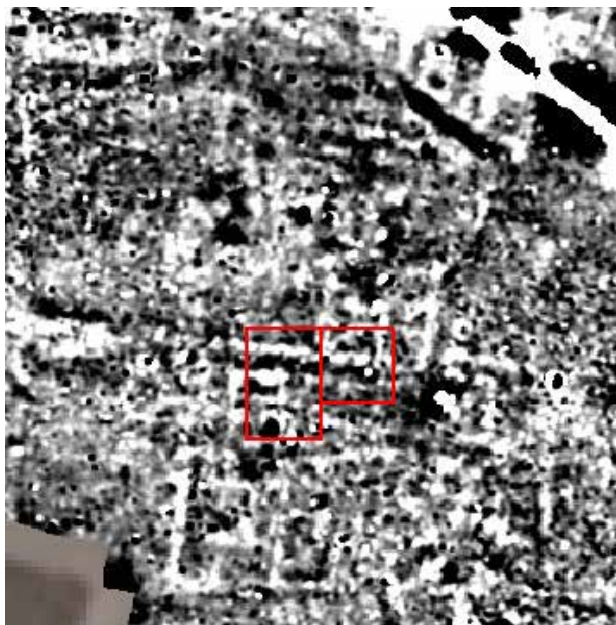


Fig. 16. Magnetometer map with central part of CQ4 (by P.M. Fischer).

A third test trench in Trench 7D provided also evidence of an older occupation (L922, L924), which was tentatively assigned to Strata 4 and 5,²⁸ although there is—for the time being—no stratigraphic connection between the western and eastern trenches in CQ South. However, no architectural structures could be assigned to this phase. Diagnostic finds include fragments of Plain White Wheel-made bowls, Plain White Hand-made basins, Plain White jugs, a goblet (?) of Plain White ware, numerous Monochrome (Red- and/or Black-slipped) open and closed vessels, a White Shaved juglet, a hand-made cooking pot of Coarse Ware, a Canaanite jar, open and closed vessels of White Painted Hand-made wares, Base-ring bowls and a juglet, White Slip I bowls, a Bichrome Wheel-made closed vessel, bowls of Red-on-Red Ware, and the rim and handle of a Red Polished IV bowl (L924-4). The most recent datable sherds are two small fragments of White Slip II bowls, which, however, seem to be intrusive.

A fourth test trench of 1.5 m width was dug next to the western section of Trench 7D, between W118 and W148 (L930, L932) to gain more information on the early occupation of this area. Here, only very few sherds were retrieved. The only diagnostic fragments include the rim of a red-burnished bowl (L930-1) and the neck of a jug of Red-on-Red Ware (L932-1).

²⁸ For the time being, the loci of both test trenches in Trench 7D are shown on the Stratum 3C plan in Fig. 11. The material from these contexts, too, seems to reflect the earliest occupation.

Results of the excavations in CQ4

By Peter M. Fischer & Teresa Bürge

Based on the results of our large-scale magnetic prospecting of 2017 supported by georadar in 2018 an area measuring 10 m × 15 m (Trenches 27A–D, 28A–B) was opened up in CQ4 in 2018. The spot was chosen as large stone compounds intersected by streets are indicated on the magnetometer map (Fig. 16). This city quarter is located south-east of CQ1, north-east of Areas 8 and 21, and close to the Larnaca Salt Lake. The average height of the quite flat surface in this part of the city is approximately 5 masl, viz. several metres lower than CQ1.²⁹ The central part of the surveyed area, measuring 65 m × 60 m, was fenced off in 2018 in order to protect it from continued farming since the most recent structures corresponding to Stratum 1 are just 0.2 m below surface.³⁰ There are, however, many equally interesting structures outside the fence according to the magnetometer map.

Only Stratum 1 had been exposed in 2018. Ashlar blocks are incorporated in some of the very well-built walls, which distinguishes this quarter from the industrial and domestic quarters CQ1–3. One of the walled spaces is obviously a bathroom (Room 85) which is faced with ashlar slabs (both the walls and the floor).³¹ The plaster floor and lower wall lining together with an inlet and an outlet demonstrate an advanced hydro-technical construction. Among the finds from the floor of the bathroom is a cylinder seal of white paste (N385).³² To the north of the bathroom is a corridor (Room 84), at least 20 m long and 3 m wide, which contained numerous pithoi and smaller vessels. This corridor represents a storage area for mainly liquids such as water, wine, and olive oil. It could be reached from the north via steps built of ashlar blocks. In front of the steps was a double gate to which two door sockets belong. Just to the east of the gate is a stone installation with a thick layer of crushed murex shells. Burned mudbrick and ash confirmed earlier observations from CQ1–3 that this phase ended in a violent destruction after which the city was abandoned.

RESULTS OF THE EXCAVATIONS IN 2019

An area measuring 10 m × 10 m, Trenches 29A–D, was opened to the east of Trench 27 (Figs. 17–18). In addition, two areas from 2018 were further exposed: the storage cor-

²⁹ Metres above sea level. All heights in the present report, including the plans, are masl.

³⁰ According to a message from the Department of Antiquities dated 1 September 2019, the Ministry of Interior of Cyprus has decided to prohibit continued farming and fence the 14-hectares-large centre of the city.

³¹ Fischer & Bürge 2019, 306, fig. 21.

³² Fischer & Bürge 2019, 306, fig. 20:4.

ridor Room 84 and the open space east of Room 87 and west of W136 (Trench 28B).

Room 84, which has a width of approximately 3 m and is limited by W126/W139 to the north and W127 and W131 to the south, was further exposed to the east. Here, a feature built of stones appeared in the southern part of Trench 27B, which may represent the remains of a wall or a bench dividing the long corridor between W126/139 and W131 into two sub-spaces, Room 84 and Room 84'. Integrated in this feature are two larger stones, parallel to each other and roughly 0.4 m apart, which also run parallel to W126 and W131: they may flank a passage between the western and eastern corridor. Room 84 (L702) was further excavated and the vessels—mainly storage jars including pithoi—which were just visible at the end of the 2018 season, were exposed and removed.³³ A pendant of turquoise-coloured faience (N435; *Fig. 19:4*, see also *Appendix 3*) depicting a lion comes from L702, as well as a bronze pin (N434) and a pierced stone of oval shape, possibly used as weight (N433, weight 762 g). L730, which represents the floor of the corridor, contained seven dislocated ashlar blocks and among them fragments of a large stone basin together with some large bones near the 2 m-wide stepped entrance to the north. It is not excluded that the basin and the nearby murex shells³⁴ on the other side of W126 are related and may have served for the production of purple dye.

There is a stretch of moist fill exactly in line with the bathroom drain of L718 which appears to cut through or goes under W127, the northern wall of the bathroom. To the north of W127 are large patches of partly burned mudbrick and ash. It is most likely that they represent the remains of the superstructure of W127 of sundried mudbrick which had been exposed to fire.

Room 84' yielded only a few finds of specific interest. Among them are parts of a White Shaved juglet (N444, L723; *Fig. 19:1*) with a moulded face—most likely depicting a monkey—, which were found to the south of W139. In addition, there are three truncated pyramidal loom weights of fired clay (N443, L723, weight 114 g; N491, L733, weight 84 g; N492, L733, weight 64 g).

According to the magnetometer map, the compound with the south-western corner in Trench 29 appears to have the dimensions 17 m × 17 m. It consists of four major spaces and additional architectural subdivisions. As indicated on the magnetometer map, in Trenches 29A and B north of the corridor we exposed the south-western portion of a larger building which had been affected to a considerable extent by modern ploughing.³⁵ This is demonstrated by recently dislocated stones belonging to the upper courses of the wall founda-

tions belonging to Rooms 88 and 89 (L700, L722, L727, and L728). Three clusters of murex shells were exposed abutting the east façade of W160, which most likely are the remains of purple dye production.

Room 88 was entered from Room 84' via a 1.5 m-wide doorway in W139. The threshold is made of two flat stones each with a pair of rectangular cavities, clearly for some sort of gate which could be secured. Towards Room 88 is a pivot hole for a door on the eastern rectangular gate stone. This room is bordered by W138, W162, and W139. The northern boundary of the room has not been exposed but most likely is outside Trench 29A. The southern extent of the division wall W162, separating Room 88 from Room 89, is defined by a reused stone anchor. Attached to W162 is a feature which preliminarily is defined as a bench ("W161"). Finds from this room include a stone mould for a ring (N480, L727; *Fig. 19:3*), two truncated pyramidal loom weights of fired clay (N441, L722, weight 64 g; N445, L727, weight 57 g) and four pierced stones of oval or irregular shape, most likely used as weights (N442, L722, weight 106 g; N446, L727, weight 50 g; N447, L727, weight 92 g; N490, L727, weight 87 g), in addition to grinding stones, mortars and pestles. A large amount of pottery, including the upper part of a White Painted Wheel-made stirrup jar with scale pattern (L727-1), several Canaanite jars and other storage vessels, was found in this area.³⁶

Room 89, which is bordered by W162, W163, W160, and W139, has an area measuring 3.2 m × 3.2 m. There are two connected features in the eastern corner of the room, each forming a quarter circle, which are interpreted as storage facilities. A third possible storage facility is located in the south-western corner of the room, next to the doorway to Room 88. Finds from this space include a conical spindle whorl, most likely of steatite, with incised decoration (N448, L728, weight 11 g) and an elongated curved object of lead, which has wear marks on either ends and in the centre (N439, L722, weight 153 g; *Fig. 19:2*). In addition, there are 14 pierced stones of irregular or oval shape, which may have been used as weights (N436 from L700, weight 44 g; N437 and N438 from L726, weights 106 g and 238 g, respectively; N440, L722, weight 70 g; N449, weight 81 g; N481, weight 92 g; N482, weight 116 g; N483, weight 89 g; N484, weight 85 g; N485, weight 132 g; N486, weight 103 g; N487, weight 128 g; N488, weight 24 g; N489, weight 287 g; the latter are all from L728). This room, too, yielded a large amount of pottery including Canaanite jars and other storage vessels.

The space to the south-east (Trenches 29C and D), i.e. the continuation of the corridor Room 84' and the area to the south, has been much affected by modern agriculture. This

³³ The soil from this area was sampled for botanical analyses. The results can be studied in *Appendix 4*.

³⁴ See Fischer & Bürge 2019, 304, fig. 17.

³⁵ In general, it seems that the northern part of the exposed area was more affected by ploughing than the southern part.

³⁶ The pottery from CQ4 has not completely been processed, when the report was submitted. Therefore, only some ceramic finds will be mentioned in the text.

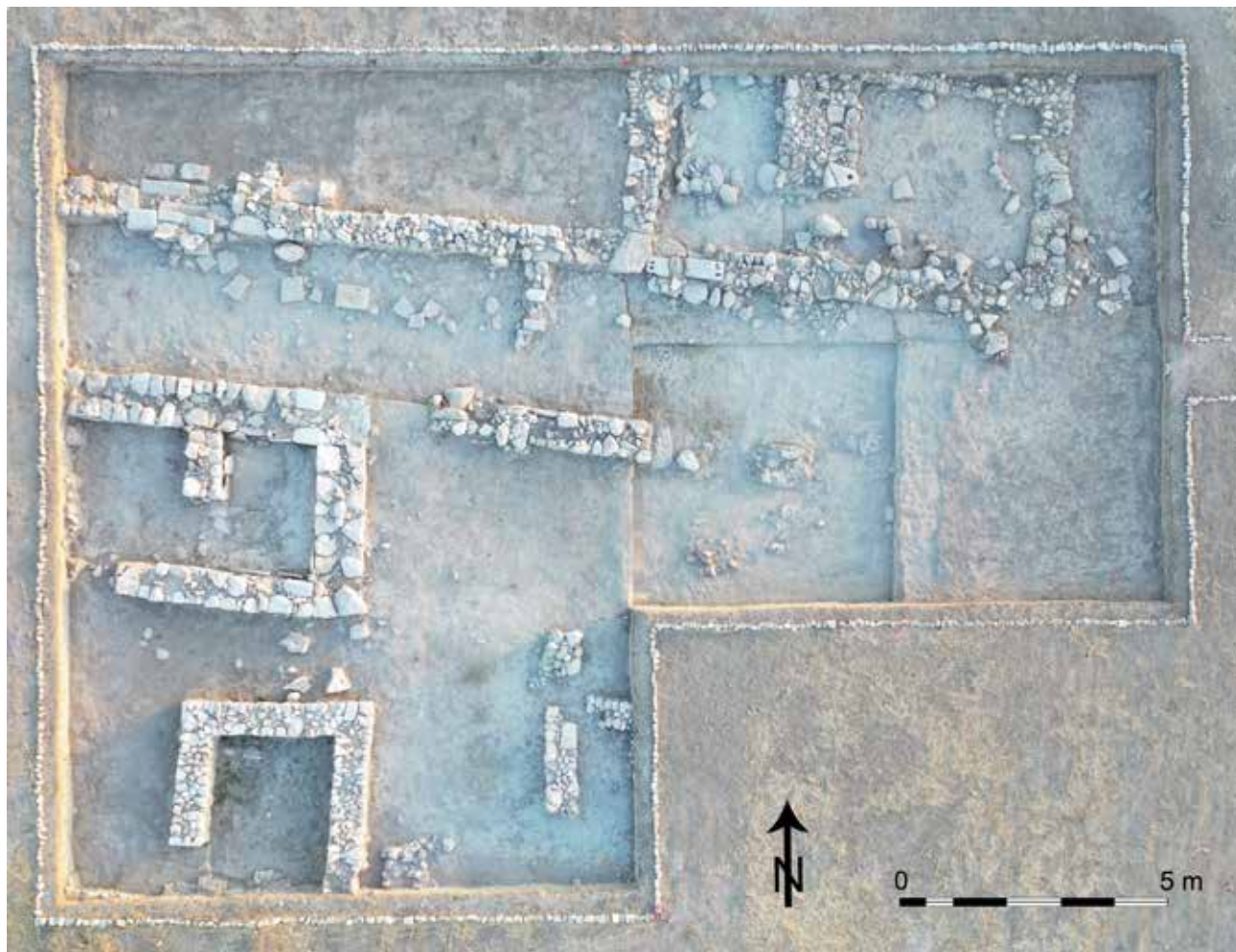


Fig. 17. Aerial photograph of CQ4, Stratum 1 (by P.M. Fischer and T. Bürge).

applies especially to the continuation of W131 to the east, which has obviously been (re-)moved by the plough.

In addition, the open space east of Room 87 and west of W136 (Trench 28B), which is approximately 3.3 m wide, was further investigated to reach the floor (L716). Finds from the previous season³⁷ include numerous vessels, *inter alia* a lentoid flask most likely imported from the Levant (L716-1), a Canaanite (L716-4) and an Egyptian imported jar (L716-2), a large jug of Plain White Wheel-made ware (L716-3), a Coarse ware cooking pot (L705-2), a White Shaved juglet (L705-3), and a small cup of White Painted Wheel-made ware (L706-4). Other finds include a sphendonoid object of bronze, most likely a balance weight (N383, L706, weight 13 g), a fragmented bone beater (L706-1), and the head of a Base-ring II bovine rhyton (L706-2). This area

yielded the richest botanical results in CQ4, which include mostly cereals, olive, grape, and some legumes.³⁸ Finds from the 2019 season comprise a White Painted Wheel-made carinated bowl decorated with vertical dotted lines, most likely imitating faience bowls³⁹ (L716-8), a Plain White Wheel-made basin (L716-17), a closed vessel of alabaster with a basket handle (L716-14), wheel-made Cooking pots of Coarse ware (L716-14, -15, -16), and a large tripod tray of Coarse ware (L716-13).

³⁷ Fischer & Bürge 2019, 303.

³⁸ Kofel in Fischer & Bürge 2019, 322–323.

³⁹ Bürge & Fischer 2018, 235–237.

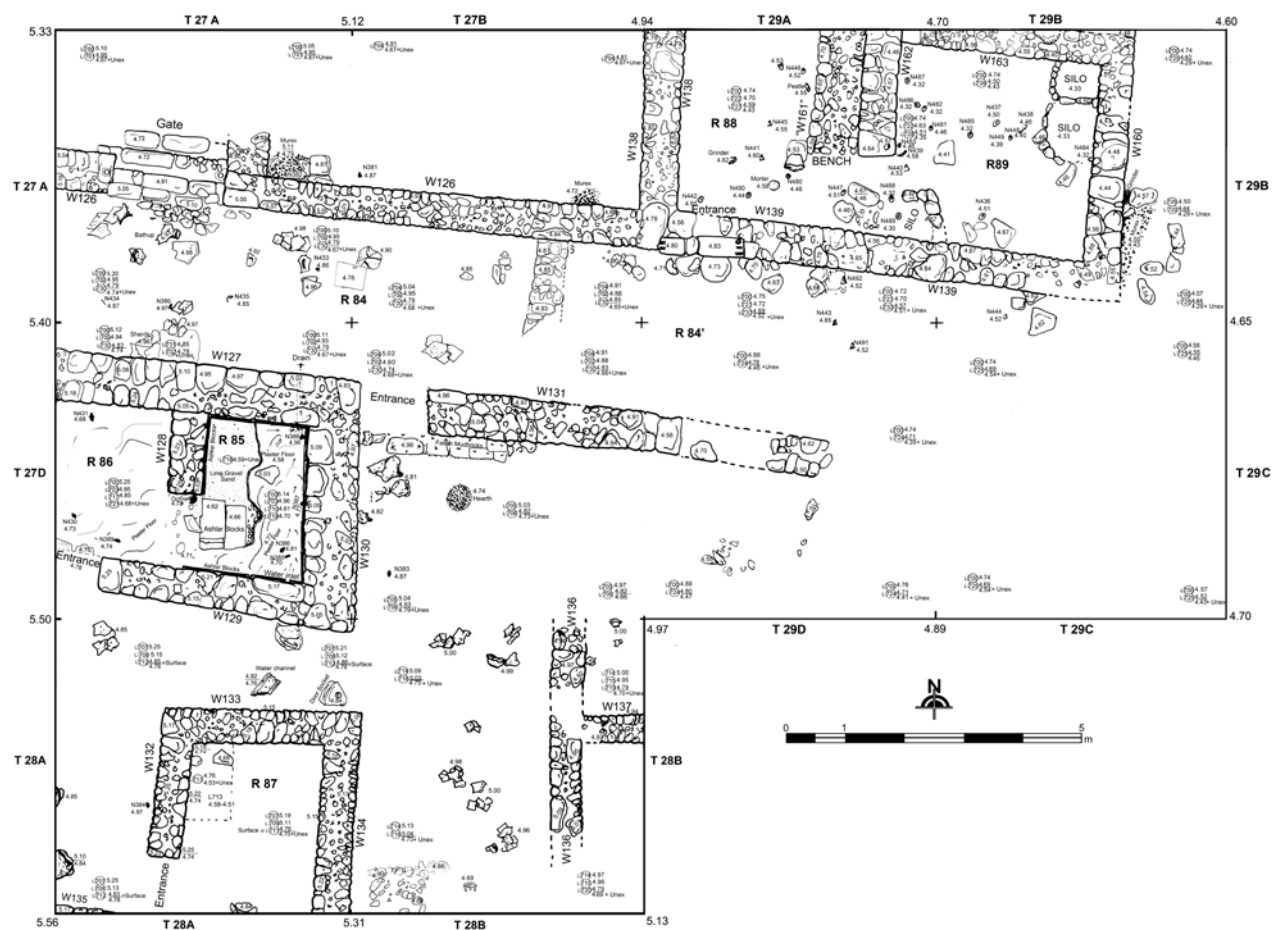


Fig. 18. CQ4, Stratum I (drawing by M. Al-Bataineh).

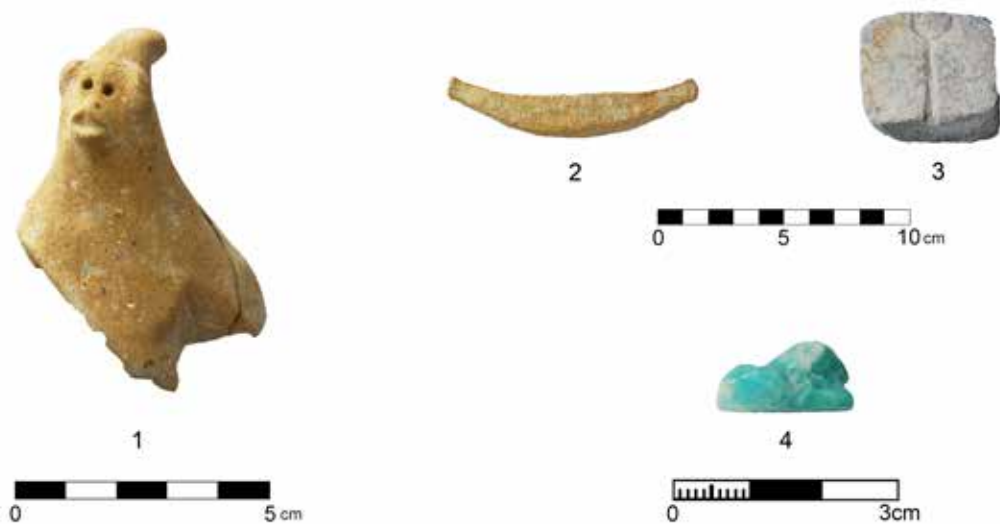


Fig. 19. Selected finds from CQ4, Stratum I: 1. White Shaved juglet N444 (scale 1:1.5), 2. Lead object N439 (scale 1:3), 3. Ring mould N480 (scale 1:3), 4. Lion pendant N435 (scale 1:1) (photographs by P.M. Fischer).

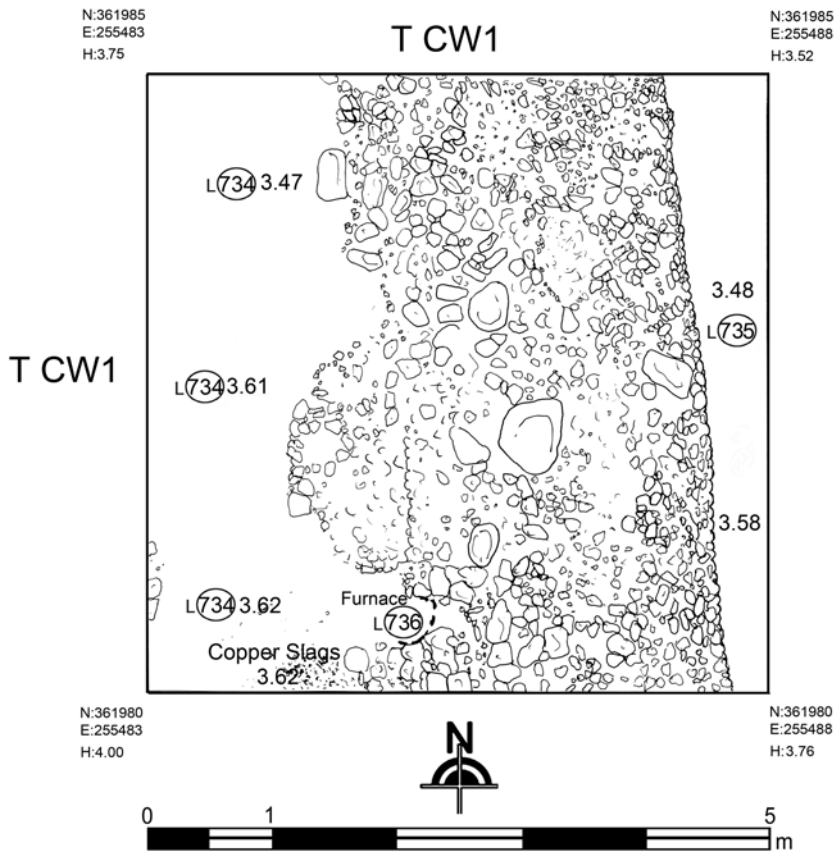


Fig. 20. Area of the city wall (CW), uppermost stratum (drawing by M. Al-Bataineh).

Results of the excavations in the area of the possible city wall (CW1)

By Peter M. Fischer & Teresa Bürge

On the magnetometer map from 2017 are indications of a structure surrounding the centre of the city, an area comprising 14 hectares.⁴⁰ This structure, which is indicated on the map as a strong magnetic anomaly was interpreted as a (city?) wall built of stones—in several areas destroyed by ploughing—attached to a possible moat.

In the easternmost extension of the magnetic anomaly, a 5 m × 5 m test trench (CW1) was opened up approximately 150 m east-south-east of the centre of CQ4 and 50 m south-west of the modern dust road along the Larnaca

Salt Lake (Fig. 20). CW1 is close to the north-western part of Area A.

The preliminary results confirm a stone wall, but instead of the expected large stone blocks there were small and medium-large boulders and just a few larger blocks of stones. The eastern façade of the structure (“exterior”) is fairly straight and against which is accumulated soil with just a few sherds, most of them from large discarded vessels. The western façade (“interior”) and the small exposed area west of the structure is totally different: a considerable amount of tableware was found intermingled with numerous pieces of copper slag and the likely remains of a furnace.

The small area exposed did not provide large quantities of diagnostic pottery. However, it is interesting to note that the area outside the structure (L735) yielded mainly fragments of Plain White vessels, Coarse ware cooking pots, pithoi, and Canaanite jars and in total only two fragments of decorated fine ware, i.e. White Painted Wheel-made vessels. In contrast, the area inside (L734) provided a wide range of wares, among them Plain White, Coarse ware, pithoi, Canaanite jars, White Shaved, Base-ring, White Slip, White

⁴⁰ This is somewhat larger than the calculated size of the walled city of Enkomi. The area inside the city wall of Enkomi is roughly 14 hectares of which 20–25% are excavated/opened up. At Hala Sultan Tekke, the area inside the city wall is roughly 14+ hectares, of which 5% are opened up but not completely excavated. See e.g. Dikaios 1969, pl. 1.

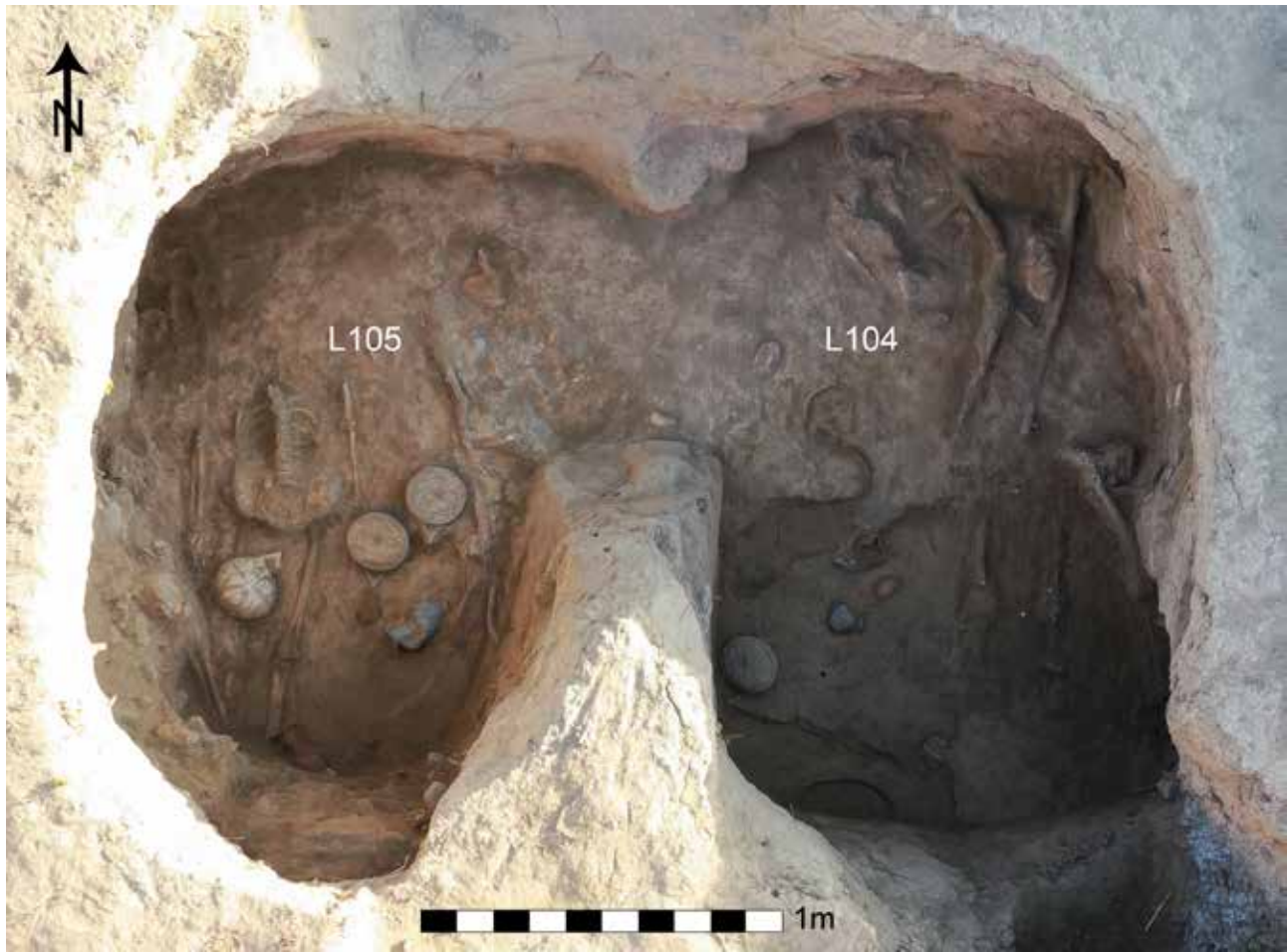


Fig. 21. Aerial photograph of Tomb RR during excavation (by P.M. Fischer and T. Bürge).

Painted Wheel-made, and Mycenaean imports. In particular the local and imported fine wares hint at a dating in the LC IIC. So far, no sherd which can be dated later than the LC IIC has been found in L734.

Our first impression is that we exposed parts of a copper-producing workshop attached to a man-made structure. At present it is not possible to declare with any certainty that this structure is part of a city wall since we have excavated down to only approximately 0.8 m on the exterior and 0.5 m on the interior of this structure (measured from scraped colluvial soil). The boulders may represent parts of a levelling superstructure on which a mudbrick wall was built which today has disappeared as a result of ploughing. Future exposure will confirm if this structure rests on larger blocks of stones which should be expected from a city wall.

Preliminary results of the excavations of Tomb RR in Area A

By Peter M. Fischer, Teresa Bürge, Bebelyn Placiente Robedizo, Cecilia Eriksson, Lina Andersson & Marcus Svensson

In order to understand the situation in 2019 a short summary of the results from 2018 will be presented. On the magnetometer map the tomb is indicated as a geophysical anomaly, viz. a “pit”.⁴¹ The roughly 8-shape of this anomaly resembles that of Offering Pit V and Tomb X excavated in 2016.⁴² Precisely above the centre of this anomaly, which later according to its true nature was named Tomb RR, is a possible tomb marker consisting of substantial sherds of a

⁴¹ Fischer & Bürge 2019, 307–314.

⁴² Fischer & Bürge 2017c.

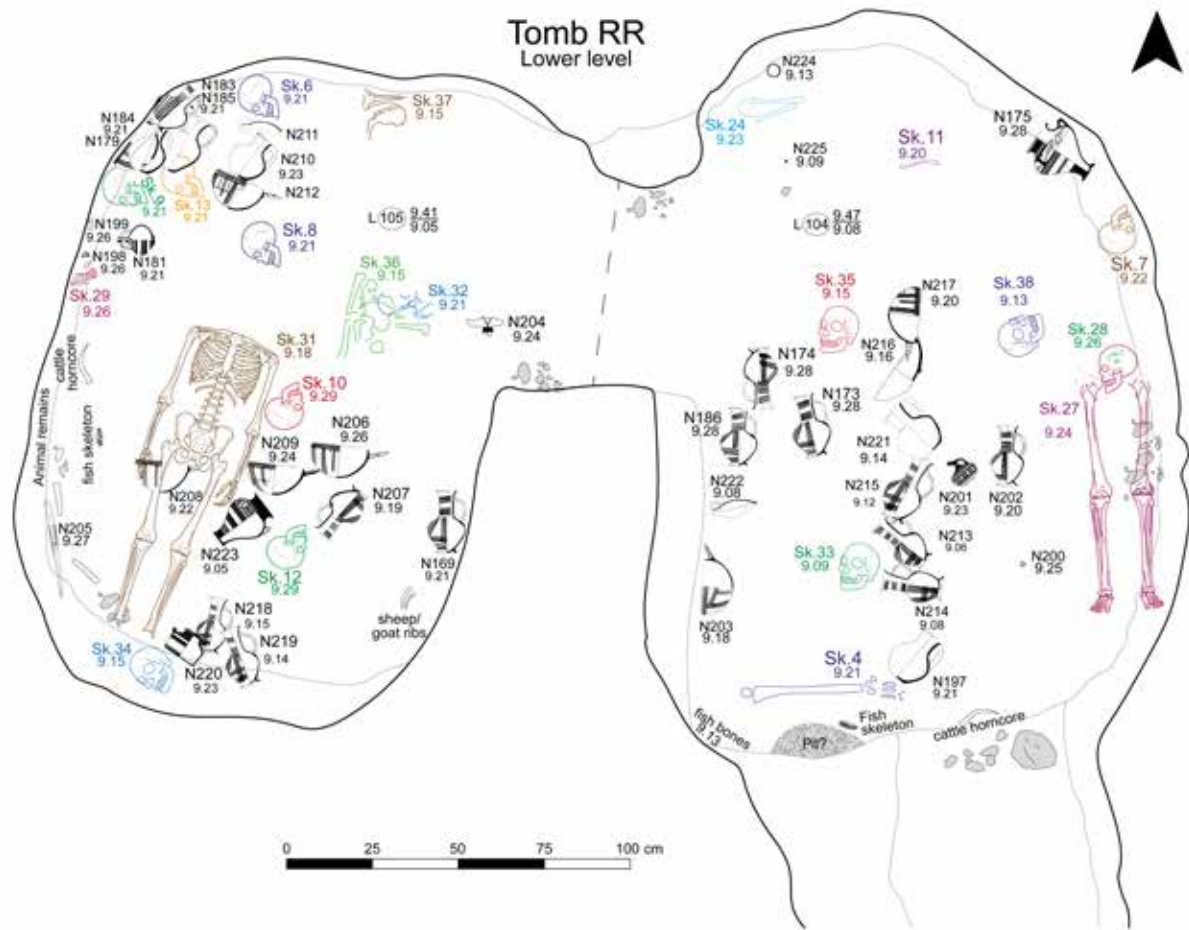


Fig. 23. Tomb RR lower level (drawing by L. Recht).

(see some in Figs. 24, 25). In terms of completeness, seven of the 37 individuals are virtually complete, 27 were incomplete, and three very fragmentary. In terms of preservation, seven were of good preservation, three moderate, 24 poor, and three very fragmentary.⁴⁵

Sampling procedures for paleoparasitological analysis⁴⁶ included the collection of soil from areas close to the crania, abdomens, hands, and feet, especially from more-complete skeletons. Soil from the area surrounding the skeletons was also sampled for micromorphological analyses. Each sample contained a minimum of 100 g soil. Additional soil samples, 15 litres each, from different locations in the tomb together with samples from the interior of intact vessels were collected for archaeobotanical and faunal analyses. Bone and dental

samples were collected for aDNA,⁴⁷ strontium isotope, and heavy metal analyses.⁴⁸ Carbonized botanical remains were sampled for radiocarbon dating. Samples from alloyed metals were taken in order to study provenance and production techniques.

AGE AND SEX ESTIMATIONS⁴⁹

Age estimation could be conducted on 19 individuals. In most cases, age estimation was based on the analysis of the dental remains which result in more accurate estimations in case of subadults, since they are less affected by growth-impeding

⁴⁷ For aDNA analyses preference was given to *partes petrosae*.

⁴⁸ The metals include lead, copper, antimony, and arsenic, all associated with the production of copper; see the evidence of urban metallurgy in this and previous reports.

⁴⁹ Height estimations were not carried out since the long bones could not be recovered intact.

⁴⁵ Buikstra & Ubelaker 1994, 6–8; Mitchell & Brickley 2017, 7–9.

⁴⁶ See Anastasiou *et al.* 2014.

factors as compared to skeletal remains. There were two infants (birth–3 years), three children (3–12), two adolescents (12–20), eleven young adults (20–35), and one middle adult (35–50). The remaining consist of two possible young adults and 16 possible adults.⁵⁰

Preliminary sex estimation was carried out in the field on 14 adult individuals. There are three females, four probable females, one male, and six probable males, and 23 remained undetermined. In most cases, the estimation was based on secondary sex characteristics since the remains of many individuals mainly consist of cranial bones. Sex estimation of subadults was not conducted since these individuals lack sufficient sex characteristics.⁵¹

TRAUMA

Signs of traumatic lesions, viz. healed fractures of costae, lumbar vertebrae, fibula, femur diaphysis and coxae were found in seven individuals.⁵² Only one case of possible cranial trauma was recorded on Skeleton 5 but this could also be the result of *post-mortem* pressure from the soil. The most drastic evidence of traumatic lesions was observed on Skeleton 17: a healed fracture resulting in a severely deformed right fibula, healed and slightly deformed ribs, and a severely depressed and deformed lumbar vertebrae.

PATHOLOGY

Pathological changes were observed on 20 individuals. The changes were mainly restricted to teeth and jaw bones: caries, periodontitis, periapical abscess, linear enamel hypoplasia,⁵³ and *ante mortem* tooth loss. Several individuals had substantial calculus. Other pathological changes include cribra orbitalia, periostitis, osteoarthritis, osteomyelitis, and scoliosis.

NON-METRIC VARIATIONS

In addition, fused cervical vertebrae along with enlarged foramina are present in two individuals.⁵⁴ Bilateral septal aperture—a relatively common variant in human distal humerus—has also been observed in two of the individuals.⁵⁵

CONTEXTS AND ASSOCIATED FINDS

One of the most important observations in Tomb RR is that some human remains were partly burnt, others were covered with traces of soot. Several animal bones were also exposed to fire, some even to high temperatures. A number of stone concentrations could be associated with individual skeletons.

Personal belongings are represented by four finger rings, three of which are of bronze (Skeletons 5, 24, and 26) and one of silver (Skeleton 27), and a bronze bracelet (below the disarticulated bones of Skeleton 24). There were also many disc-shaped beads of faience and one cylindrical bead of bronze belonging to a necklace (Skeleton 29). Remarkable finds are an incomplete large Minoan hollow figurine with painted decoration (N204; *Fig. 25:5*; associated with Skeletons 32 or 36)⁵⁶ and a knife of bronze with an ivory handle (N205; *Fig. 25:6*; length 27.5 cm, associated with Skeleton 23). Pottery was often placed around the crania (e.g. Skeleton 34) or between the legs (e.g. Skeleton 14).

The pottery consists of Cypriot-produced wares (*Fig. 24*) and Mycenaean imports (*Fig. 25: 1–4*). The former includes Base-ring I and II, White Slip II, White Shaved, Bucchero, Plain White Wheel-made, and a lamp of Coarse Monochrome ware. The latter include a stirrup jar, a juglet, an alabastron, and a piriform jar.

Noteworthy are the contents of some of the vessels:⁵⁷ a White Slip II bowl (N212) contained the fragments of cattle pelvis and a Plain White Wheel-made jug (N210; *Fig. 24:2*) was filled with fish bones. Additional fish remains were next to some of the skeletons. Notable is an almost-intact fish, where the scales were still visible: it was placed close to the southern wall of L104. Articulated fish vertebrae of a Nile perch were also found close to Skeleton 2/25 in the south-western part of L105. Other animal remains include horns and bones of cattle, caprine and vole bones, and murex shells often integrated in the stone concentrations and close to the human remains. There were also concentrations of seeds, some of them burnt and placed inside a pouch of decomposed organic material.

⁵⁰ Buikstra & Ubelaker 1994, 9; Brothwell 1981; White & Folkens 2005, 363–369; Schaefer *et al.* 2009, 94–95, 264; ADBOU 2015, 12–13.

⁵¹ Buikstra & Ubelaker 1994, 16–21; Steckel *et al.* 2019, 409–414.

⁵² Ortner 2003, 119–177; Lovell 2008.

⁵³ Often the result of nutrition deficiencies and/or high fever during childhood; see Fischer & Norén 1988.

⁵⁴ Ortner 2003; Mann & Hunter 2013.

⁵⁵ Cf. Early Bronze Age skeletons in Parras 2004.

⁵⁶ To the best knowledge of the authors this type of Minoan figurine may be the first ever found on Cyprus.

⁵⁷ The botanical contents of the vessels can be studied in *Appendix 4*.



Fig. 24. Selected finds from Tomb RR: 1. Plain White Wheel-made bowl N216, 2. Plain White jug containing fish bones (see upper right corner) N210, 3. Base-ring II jug N202, 4. Base-ring bowl N195, 5. White Slip II mature bowl N209, 6. White Slip II late bowl N192, 7. White Slip II mature bowl N203; scale 1:3 (photographs by P.M. Fischer).



Fig. 25. Selected finds from Tomb RR: 1. Mycenaean piriform jar N223, 2. Mycenaean stirrup jar N189, 3. Mycenaean straight-sided alabastron N220, 4. Mycenaean juglet N201, 5. Minoan figurine N204, 6. Bronze knife with ivory handle N205; scale 1:3 (photographs by P.M. Fischer).

Summary, discussion, and conclusions

By Peter M. Fischer & Teresa Bürge

CQ1

This city quarter is the first where the excavations exposed five main phases of occupation (see *Figs. 3–15*). Preliminarily, these strata are suggested to correspond to a time span covering the 15th to the 12th centuries BC, a situation which is replicated in the cemetery in Area A.⁵⁸ Nevertheless, residual pottery from the end of the Middle Cypriot period (17th century BC) has frequently been found in the most recently excavated areas. Although the exposed area with the remains from Strata 5 and 4, the so far oldest from the city, is very limited, the walls seem to be virtually intact and we hope for more or less undisturbed find contexts. We would like to stress that the following chronological divisions are very preliminary because the information from the oldest strata is limited due to the small exposed area.⁵⁹

Stratum 5 (see plan in *Fig. 15*)

The exposed area in Trenches 25C/24D where architectural remains were found is very limited but the material from the four test trenches belongs to the earliest occupational phase so far unearthed in CQ1. The most recent datable fragments from these contexts include White Slip I, early Base-ring, Monochrome, and a Minoan import. Therefore, a LC IB date (15th century BC) is suggested. If this date is correct, the sherd of a likely juglet of White Painted Pendent Line Style (WPPL), as well as numerous Red-on-Red, Red-on-Black, and Red Polished fragments should be considered residual.

Stratum 4 (see *Figs. 13–14*)

Among the chronologically reasonably indicative ceramics including Mycenaean and Minoan imports are sherds of bowls of White Slip I and White Slip II mature, Base-ring, and Monochrome together with obviously residual sherds, for instance, Red-on-Red and Red-on-Black. As a preliminary date LC IIA–B⁶⁰ (14th century BC) is suggested.

Stratum 3 (see *Figs. 7–12*)

We divided this phase of occupation into 3C–A according to architectural sub-phases supported by other alterations. There are spaces for storage, copper and textile production, and other domestic purposes. Of these, Rooms 70/83 with a rectangular stone structure (see L928F in *Figs. 9, 11* which we designated a likely altar) seem to have been used for cultic activities in connection with the consumption of food and drinks indicated by considerable heaps of animal bones and broken tableware, mainly Base-ring bowls but also bowls of Plain White and White Slip II mature. Imported material is Egyptian (faience vase, Tuthmoside period; see *Appendix 2*), Minoan (transport vessels), and Mycenaean of LH IIIA1–2 date. A cylinder seal of Cypriot Common Style including an ingot motif has parallels in LC II contexts (see *Appendix 1*). The preliminary time span covered by all sub-phases is LC II(A/B)–C (14th–13th centuries BC).

Stratum 2 (see *Figs. 5–6*)

Finds from complementary exposure confirm a date in the beginning of LC IIIA (around 1200 BC). The end of Stratum 2 certainly has to be placed in the LC IIIA period (first half 12th century BC).

Stratum 1 (see *Figs. 3–4*)

This phase is firmly anchored in LC IIIA. An Egyptian pendant of brown faience depicts a ram's head which most likely is related to Amun of the New Kingdom.⁶¹

CQ4 (SEE *FIGS. 16–19*)

All finds from this city quarter belong to Stratum 1, LC IIIA (first half 12th century BC). Structures include a bathroom, a long corridor for the storage of vessels next to a gate to which steps are leading, and the south-western corner of a compound which—according to the magnetometer map—should have the dimensions 17 m × 17 m.

CWI (SEE *FIG. 20*)

On the magnetometer map are indications of a roughly 1 km-long structure surrounding 14 hectares, i.e. the centre of the city, which preliminarily was interpreted as a city wall, possibly with moat. We exposed parts of a copper-producing workshop attached to a man-made structure which may represent

⁵⁸ Fischer & Bürge 2017c.

⁵⁹ The generally accepted principle that “the most recent sherd dates a context” should be considered with caution because it does not take in to account single intrusive sherds which, for instance, were deposited in older layers by animals.

⁶⁰ See discussion in Fischer & Bürge 2018b, 604.

⁶¹ This information was thankfully received by email from M. Bietak on 21 May 2019.

the uppermost part of a city wall. The pottery from the inner part includes White Slip, Base-ring, White Shaved, White Painted Wheel-made, and Mycenaean imports suggesting a date not later than LC IIC (13th century BC).

AREA A:TOMB RR (SEE FIGS. 21–25)

After reopening the sealed Tomb RR from 2018 which had already revealed 13 skeletons and numerous tomb gifts including the unique “Swordbearer Krater”, another 24 skeletons, both complete and fragmentary, and additional tomb gifts represented by 74 more or less complete and intact objects were found in this year. There were two infants, three children, two adolescents, eleven young adults, one middle adult, two possible young adults, and 16 possible adults. Sex estimations could be carried out on a restricted number of adult individuals and resulted in three females, four possible females, one male, and six possible males. Trauma and pathological changes could be verified. One of the most important observations in Tomb RR are human but also animal bones which were exposed to high temperatures, some of them heavily burnt others with traces of soot. So far, there has not been any evidence of cremation burials on Cyprus before the early Iron Age, i.e. the 11th century BC.⁶² It seems, however, that combustion was involved in connection with the burials of Tomb RR.⁶³

The tomb gifts included Cypriot (selection in *Fig. 24*) and Mycenaean-imported wares (selection in *Fig. 25:1–4*), some of them containing the remains of food stuff (see also *Appendix 4*). Other finds were rings and bracelets of silver and bronze and a knife of bronze to which an ivory handle was attached by rivets (*Fig. 25:6*). A remarkable find is an incomplete large Minoan hollow figurine with painted decoration (*Fig. 25:5*), possibly the first of this type found in Cyprus. The burials can be dated to the later part of LC IIA–B, possibly beginning LC IIC.

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⁶² E.g. Keswani 2012, 318, esp. n. 143 with further references.

⁶³ See also similar observations regarding Tombs X and LL: Fischer & Bürge 2018 a, 57–58, 60–61. Further studies are ongoing to determine possible patterns and draw conclusions on the mortuary practice.

Appendix I

A note on the cylinder seal from CQI

By Teresa Bürge

DESCRIPTION AND CONTEXT

N428: Cylinder seal of haematite (*Fig. 8:5, Appendix 3*), intact, slightly worn; height 2.8 cm, diameter 1.0 cm, diameter of hole 0.5 cm, weight 6 g.⁶⁴

The seal was found on a plaster floor (L812) in the north-western part of Room 90 (T7D) close to the entrance between W148 and W118 to the west. Finds from the same context, which represents the floor of Stratum 3A, include numerous complete and almost complete White Slip II mature (N450, L895-1, -3, -4, -6, -8) and White Slip II late (L895-5, -9) bowls, White Shaved juglets (N425, N429), a Base-ring bowl (L895-2) and the foot of a likely Base-ring chalice (L895-7), a Plain White basin (L895-11), and a Mycenaean lentoid flask (L895-10). The pottery, specifically the White Slip II late and the Mycenaean (LH IIIB) lentoid flask of vertical type, provides a relative date in the LC IIC, i.e. the 13th century BC (*Fig. 8*).

The seal depicts two anthropomorphic figures, one larger and the other smaller, and a horned animal, most likely a caprine, between them. There is an ingot-like symbol to either side of the larger anthropomorphic figure and in total four circles with a central dot, which are on top and below either ingot-like symbol. Additional filling motifs consist of eight wedges, most of them on top and next to the caprine animal.⁶⁵

STYLE AND PARALLELS

Based on the relatively simple, schematic and linear engraving and the set of motifs this seal can be attributed to the group of Cypriot Common Style, as defined by Edith Porada in analogy to the Mitannian styles of seal carving.⁶⁶ Seals with similar motifs and carving styles are among the most common on Cyprus and are usually made of steatite, serpentine, or haematite.⁶⁷ In fact, the Cypriot Common Style incorporates a variety of motifs and styles, which make further subdivisions necessary. Our seal corresponds to Stefania Mazzoni's Class A⁶⁸ and Beate Salje's Cypriot Group 1 <Z(L)1>

⁶⁴ XRF analyses carried out at Cyprus Institute, Nicosia, by Sorin Hermon and Svetlana Gasanova ascertained that the seal is of haematite.

⁶⁵ For the discussion of the 3D scan of the seal and suggested carving tools and techniques see *Appendix 3*.

⁶⁶ Porada 1948, 196–197.

⁶⁷ Salje 1990, 128.

⁶⁸ Mazzoni 1986, 176, pl. 33.

(“*Flüchtig Linearer Stil*”)⁶⁹—which, again, comprise various sets of recurrent motifs and carving styles. The most detailed subdivision is still that by Porada, where our seal can be placed in her Group XI.⁷⁰ The most common motifs on these seals include anthropomorphic figures—most frequently standing and sometimes sitting—, various quadrupeds—mainly caprine but also bovid animals, often only depicted as bucrania—, birds and stylized snakes, (palm) trees, and circles with central dots, crosses, ingot-shaped objects, and wedges. Typically, the different elements of composition seem scattered and not in any relation to each other.

Besides numerous parallels, which come almost exclusively from Cyprus⁷¹—with the exception of one seal from Tell Abu Hawam⁷²—two seals from Hala Sultan Tekke, Area A should be mentioned. The first comes from Tomb 1,⁷³ the finds of which were dated to the LC IIB–IIC.⁷⁴ It shows a standing anthropomorphic figure, a palm tree, a bucranium next to the anthropomorphic figure, an oblique cross with dots on each end on top of the bucranium, a larger ingot-shaped motif on the other side of the anthropomorphic figure, and two circles with central dots above and below the ingot. Next to the head of the anthropomorphic figure are two small ingot-shaped symbols⁷⁵ on either side. Other motifs include wedges, v-shaped lines, and pairs of lines. The second parallel from Hala Sultan Tekke was found in Tomb X⁷⁶ and is almost identical to the former. It depicts a standing anthropomorphic figure, a palm tree, a bucranium, an ingot-shaped symbol, and various lines and wedges.

However, the closest parallels to our seal regarding the motifs include two most likely from the area around Kourion,⁷⁷ and one from the Enkomi region.⁷⁸ While the two seals from Kourion show one anthropomorphic figure with an ingot and two dotted circles on either side and a caprine animal, the latter depicts one anthropomorphic figure with an ingot and two dotted circles on either side, a caprine animal, and another anthropomorphic figure next to the animal. Hence, the

arrangement of anthropomorphic figures, ingots, and dotted circles is identical. In addition, a number of wedges possibly functioned as space fillers, as on our seal.

CHRONOLOGY AND DATING

Besides the limited chronological potential of Cypriot cylinder seals and the problems related to their often unknown and insecure contexts, e.g. tombs with multiple burials used during longer timespans, and the fact that these objects could circulate during a long time, the seals of the present type come mostly from LC II contexts, which matches the context of our N428 well.

POSSIBLE INTERPRETATIONS

Among all motifs on Late Cypriot seals it is perhaps the ingot-shaped symbol which has attracted the most attention.⁷⁹ Although it also occurs on seals of the Elaborate and the Derivative Style,⁸⁰ it occurs most frequently on Common Style seals. Its identification as an oxhide ingot is *communis opinio*,⁸¹ accordingly, the anthropomorphic figure on the seals is often interpreted in the context of copper industry. While Porada identified the latter as a deity connected to copper production,⁸² Bernard Knapp suggested an identification of the figures as ingot-bearer.⁸³ According to Jennifer Webb the motifs rather express broader ideological concepts, in which the figure symbolizes the man's role in the copper industry.⁸⁴ However, the stylized figures and symbols, and the lack of attributes, distinct dresses, or gestures on our seal and, in general, all seals belonging to this group, make an interpretation difficult. As mentioned above, the elements are scattered and appear unrelated to each other. Nevertheless, as demonstrated above, the arrangement of the motifs and the special relation to each other is not random but seems to follow specific conventions. Therefore, it is perhaps not appropriate to interpret the motifs on the seals as referring to certain events or as narrative scenes⁸⁵ but may rather have a symbolic value—possibly as talisman or in connection with rituals.⁸⁶

⁶⁹ Salje 1990, 128–129.

⁷⁰ Porada 1948, 193–194, pl. XI: nos. 47–49.

⁷¹ See e.g. the compilations by Porada 1948, pl. XI: nos. 47–49; Kenna 1967, 573, figs. 32–37; Mazzoni 1986, pl. 33; Salje 1990, pl. XXIII: nos. 406–408; Graziadio 2003, 28–35, nos. 1–24.

⁷² Hamilton 1935, 64, pl. XXVI: no. 415. The seal was found in Stratum V, which was dated to 1400–1230 BC by Hamilton.

⁷³ Porada 1976.

⁷⁴ N41: see context in Karageorghis 1976, 71–78.

⁷⁵ Here, too, one of the symbols rather resembles an oblique cross. See also Porada 1976, 101.

⁷⁶ N73: see Fischer & Bürge 2017c, 193, fig. 28:2. The tomb was used for a long period from LC IB to IIC, roughly the second half of the 16th century to c. 1200 BC.

⁷⁷ Cesnola 1903, pl. CXXI: 1, 2; also quoted in Mazzoni 1986, A22, A23 and Graziadio 2003, 33–34, nos. 21, 22.

⁷⁸ Cesnola 1882, pl. XIII: 31; also quoted in Mazzoni 1986, A24 and Graziadio 2003, 40–41, no. 50.

⁷⁹ Knapp 1986a, 37–42; Webb 1999, 276–283; Graziadio 2003; Papa-savvas 2009, 90–93; Spigelman 2012, 135–136.

⁸⁰ Graziadio 2003, 42 with further references.

⁸¹ A few examples, such as on our seal appear in the shape of an x or an oblique cross. One explanation of the different renderings of these symbols on the same seal might be the lack of space. This seems also applicable to the different dimensions of the anthropomorphic figures. In contrast, Lubsen Admiraal 1982, 43, no. 35, suggested that these x-shaped symbols could be altars or folding chairs.

⁸² Porada 1976, 102.

⁸³ Knapp 1986a, 41.

⁸⁴ Webb 1999, 276.

⁸⁵ Knapp 1986a, 41.

⁸⁶ See also Webb in Courtois & Webb 1987, 29.

These seals are usually interpreted as non-élite items⁸⁷ due to their simple carving style, possibly owned by copper and bronze workers.⁸⁸ In this respect the find context of our seal, just west of Room 70 with clear evidence of copper production, is notable and might further suggest a connection of these specific motifs on the seal and the importance of copper production at Hala Sultan Tekke.

Appendix 2

A note about an Egyptian faience vessel from CQ1

By Lucía Avial-Chicharro

The presence of luxurious objects represented by imported Egyptian faience vessels dating to the 16th–14th centuries BC are significant for the study of contacts between Cyprus and Egypt in this period.

CONTEXT, DATE, AND PROVENANCE

The rim fragment of a faience vessel (L906-7; *Fig. 26*) was excavated in Stratum 3A, Trench 25A of CQ1 (see plan in *Fig. 7*).⁸⁹ Locus 906 contained numerous animal bones, some of them burnt, and many fragments of tablewares, mainly Base-ring and White Slip. The context is associated with ritual feasting and commensality.

The fragment—most likely a goblet—is 7.3 cm high, 7.9 cm wide and the walls are 0.82–0.89 cm thick. The paste is greenish-white and the decoration black, depicting dots framed by five horizontal lines and a series of fine vertical lines. The interior is completely black. The sherd belongs to a group of other faience vessels from Stratum 3A in CQ1.⁹⁰ The

preliminary date of this phase of occupation is LC IIC (13th century BC). Related vessels come from nearby Kition.⁹¹

In principle, faience vessels from Cyprus are Egyptian or Near Eastern imports, or locally produced.⁹² Non-destructive analyses of objects of faience from elsewhere in Cyprus demonstrated that most of them are Egyptian imports.⁹³ The shape and decoration of our vessel point to an Egyptian product of the Tuthmoside period.⁹⁴ Petrographic and chemical analyses are planned.

FAIENCE IN CYPRUS AND CONTACTS WITH EGYPT

The objects of faience from Cyprus derive from various mortuary, domestic, and industrial contexts. As regards the former, the best examples are from Kition (Tomb 9)⁹⁵ and Enkomi (British Tomb 66).⁹⁶ Vessels and fragments of faience from domestic and industrial contexts are recorded in Enkomi, Kition, Myrtou-Pigadhes, Maa-Palaeokastro,⁹⁷ and Hala Sultan Tekke.⁹⁸ It has been shown that in the 13th century BC, objects of faience are found mostly in industrial and domestic contexts, while during the 12th century BC we find them in industrial, ceremonial, domestic, and work contexts.⁹⁹ Our fragment was found in a cultic context.¹⁰⁰

Trade relations between Cyprus and Egypt began already in the Middle Kingdom¹⁰¹ and were the most intensive in the New Kingdom. Egypt exported products such as gold, ivory, ostrich eggs, alabaster vases, faience, and jewellery including scarabs.¹⁰² Once the Hyksos were expelled and the New Kingdom began, the Egyptians started a series of aggressive military campaigns with the aim of obtaining military and economic control over most of the Levant and possibly Cyprus (Alasiya).¹⁰³ During the 18th Dynasty the Egyptian empire grew and received annual tributes from this area.¹⁰⁴ In this

⁸⁷ This interpretation is not unproblematic, since the evidence of cylinder seals from clearly non-élite contexts in Late Bronze Age Cyprus does not seem strong enough. A simpler carving style does not necessarily point at a lower value of the seal itself, especially considering the effort and know-how required to carve a material like haematite, which is among the hardest material used for seals (5.5–6.5 on the Mohs scale).
⁸⁸ Porada 1976, 102; Knapp 1986a, 42; Webb 1999, 276–279; Grazia-dio 2003, 63; see though Papasavvas 2009, 92, who suggested that copper workers should have had access to seals of higher quality.

⁸⁹ I would like to thank P.M. Fischer for the opportunity to participate in the excavations at Hala Sultan Tekke and for the permission to study this material. Also, I would like to thank T. Bürge for the photographs of the sherd and L. Recht for all the support and the help. Thanks are also due to K. Watt and K. Sowada for helpful advice concerning Egyptian faience objects.

⁹⁰ Fischer & Bürge 2018b, 463–466.

⁹¹ Peltenburg 1985, 272.

⁹² Egyptian or Egyptian faience objects are monochrome (the most common) but also polychrome with a variety of shapes and styles. Most of them can be dated between the end of the 14th and the 13th centuries BC. Near Eastern objects are usually polychrome, i.e. brown, white, blue, and yellow, commonly covered by a layer of transparent glaze. Peltenburg 1972, 133.

⁹³ Maniatis *et al.* 2008, 126.

⁹⁴ Communication between M. Bietak and P.M. Fischer, July 2019.

⁹⁵ Karageorghis 1974, pls. LXIV, LXV, CXLIX; see also Peltenburg 1974.

⁹⁶ Knapp 2013, 428.

⁹⁷ Knapp 2013, 462.

⁹⁸ Fischer & Bürge 2018b, 463–466.

⁹⁹ Knapp 2013, 462.

¹⁰⁰ See Stratum 3 in the main report.

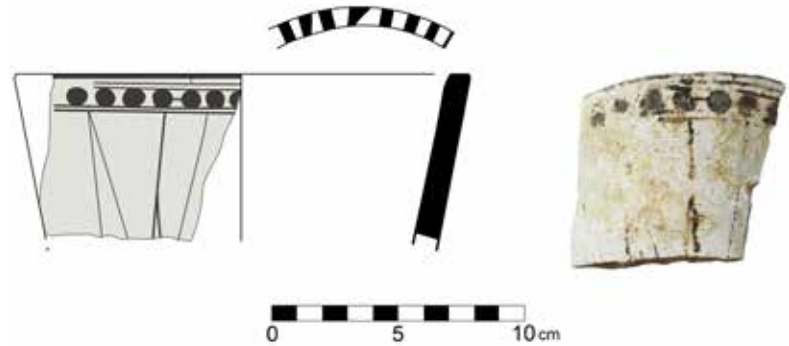
¹⁰¹ The first reference to Cyprus in Egyptian sources is from the reign of Amenemhat II with the description of a commercial transport of copper and other metals. Peltenburg 2007, 383.

¹⁰² Hikade 2012, 838, 842.

¹⁰³ Karageorghis 2004, 40–41.

¹⁰⁴ Mumford 2014, 74.

Fig. 26. Egyptian faience vessel L906-7 from CQ1, Stratum 3A (drawing by L. Recht, photograph by T. Bürge).



period, Egyptian merchants settled in the Near East and Cyprus, which allowed a wide range of merchandise and cultural influences which are reflected in mortuary,¹⁰⁵ domestic, and cultic contexts.¹⁰⁶ In the 14th and 13th centuries BC a series of settlements in southern Cyprus gained greater political and commercial control, which allowed trade with Egypt.¹⁰⁷

The location of Hala Sultan Tekke with its well-protected harbour contributed to the city's economy.¹⁰⁸ There are numerous Egyptian finds pointing to trade between Hala Sultan Tekke and Egypt. Among these are, for instance, the blue faience sceptre with the cartouche of Horemheb,¹⁰⁹ scarabs with the cartouche of Thutmose III¹¹⁰ and Ramesses II,¹¹¹ and many other objects of faience, alabaster, glass, and pottery, especially storage vessels.¹¹²

Appendix 3

General considerations on 3D-based analyses of artefacts from Hala Sultan Tekke

By Sorin Hermon & Martina Polig

INTRODUCTION

The main purpose of the 3D-documentation campaign in 2019 was primarily to investigate the potential contribution of such a method for the reconstruction of the objects'

chaîne opératoire,¹¹³ with a particular focus on how objects were produced and used.¹¹⁴ The fundamental assumption being that analysis of the geometrical shape of objects,¹¹⁵ and characterization of their surface reveal aspects related to the production and use of such objects. Other potential uses of the acquired 3D models were the contribution of 3D scientific visualization and shape analysis for stylistic¹¹⁶ and classification studies.¹¹⁷

The 3D-data acquisition method obtained a 3D model, capturing with the highest possible resolution the geometric and shape characteristics of each artefact. For this purpose, we have chosen to use a structured light scanner, which is particularly suitable for high resolution scanning in the sub-millimetre range. This type of optical scanner works by projecting a light pattern onto an object and calculating the 3D surface from the deformation captured by cameras. We have deliberately decided to avoid documenting colour information, which, in our opinion, may negatively influence the scientific visualization and interaction with the 3D model.

The following diagram details the steps taken for obtaining an accurate and high-resolution 3D model of each of the documented artefacts (Fig. 27): the process of obtaining an accurate 3D model is rather complex¹¹⁸ and should be performed by well-trained researchers to ensure high data quality. The analysis process is a cognitive-interpretative one, where the researcher interacts with the 3D model through the application of a series of scientific visualization algorithms (e.g. changing light and its interaction with the surface topology of the 3D model) that emphasizes various aspects of their geometry, extraction of cross-sections, profiles or geometric features of interest, topology measurements, and surface characterization. These may indicate traces of use, recurrent patterns of manufacture, or highlight features helping in a more accurate typological classification.

¹⁰⁵ Van Wijngaarden 2012, 67.

¹⁰⁶ Mumford 2014, 77.

¹⁰⁷ Peltenburg 2007, 384; Knapp 1986b, 43–45.

¹⁰⁸ Fischer & Bürge 2018b, 606.

¹⁰⁹ Fischer & Bürge 2018b, 616.

¹¹⁰ Fischer & Bürge 2017c, 174.

¹¹¹ Eriksson 1995, 200.

¹¹² Eriksson 1995, 200.

¹¹³ Hermon *et al.* 2018.

¹¹⁴ Hermon 2016.

¹¹⁵ Pintus *et al.* 2016.

¹¹⁶ Scalas *et al.* 2018.

¹¹⁷ Vassallo *et al.* forthcoming.

¹¹⁸ Menna *et al.* 2016.

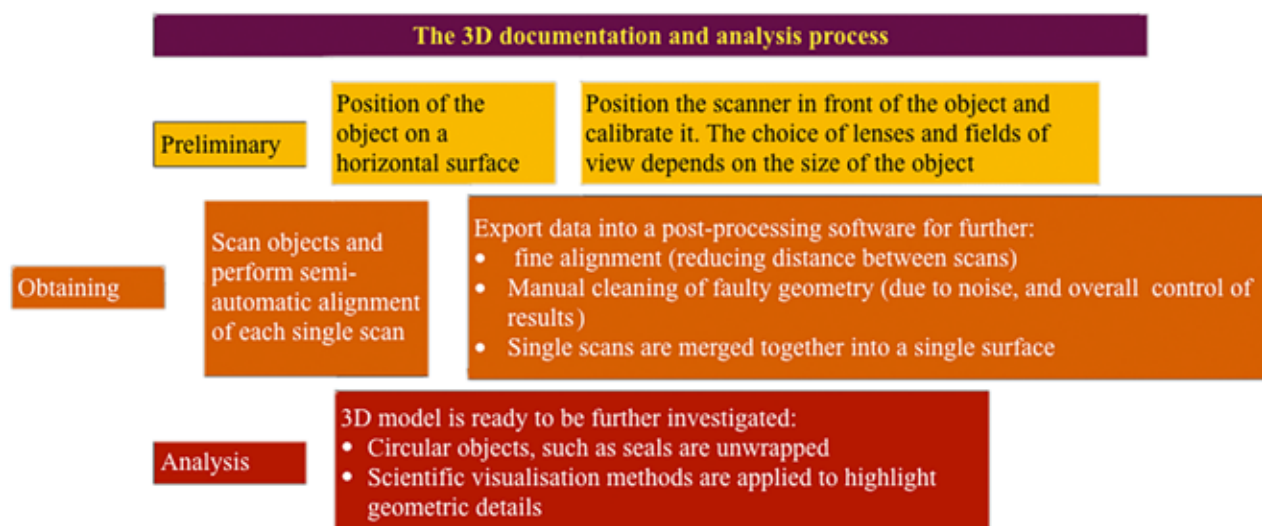


Fig. 27. Details of the main steps of a 3D documentation and analysis.

OPERATIONAL DETAILS

Four objects from the 2019 excavations at Hala Sultan Tekke were chosen to be 3D documented, as a test-case for evaluating the added-value of a 3D approach to the investigation of specific artefacts. The 3D scanner used is the Aicon 3D systems smartSCAN equipped with a 5.0 megapixel camera and which was used with a set of close-range lenses featuring a field of view of just 60 mm.

For each of the scanned objects, we have chosen an instrument configuration that enables the highest possible recording of data while at the same time maintaining a file size manageable on computers requiring an average computation power and graphic performance. As such, each object was captured at a resolution of 0.02 mm. With the set of lenses used up to 14 scans were necessary to cover the entire surface of each object and to document it entirely. The post-processing was performed on external software to the 3D scanner, using Geomagic Wrap (proprietary) and Meshlab (open-source). The semi-automatic post-processing to minimize any possible alignment errors achieved an average distance between scans of 0.003 mm. The final resolution of the 3D models at the end of the post-processing pipeline, measured as the mean distance between points (part of the 3D point cloud defining the 3D model), is of 0.03 mm.

RESULTS

CQ1: N459, gold leaf (Fig. 28:1)

The small gold leaf (14 × 10 × 1 mm) has irregularly broken and fringed edges. It may have covered the surface of an unknown object as a decorative element. By investigating

its 3D digital replica through various scientific visualization methods, such as applying rendering functions (e.g. Radiance Scaling), changing light directions and shading, we were able to speculate over the possible decorative element on which the gold leaf was attached (Fig. 28:1). An apparent geometric element pointing to the function as a decorative element is discernible more or less in the centre of the leaf (highlighted in purple), while one of the leaf's end was bent over a border at c. 85° (in pale red) and the other end was wrapped around an apparent sharp arched edge (in red).

CQ1: N422, faience appliqué (Fig. 28:2)

The faience object (28 × 23 × 17 mm) is almost complete. A small hole (6 mm in diameter and 4 mm deep) was punched on the reverse side, at c. 6 mm from one of its ends, corresponding on the other side to the forehead of the depicted animal and between its horns and at equal distances from its edges (c. 8 mm from each side). The inside walls of the hole seem abraded, probably due to use. Apart from the broken end of the right elongated horn, the object does not display other signs of damage. The shape of the object with the hole at the back suggest that it was used as an appliqué.

A close-up on the 3D model show apparent manufacture marks of the elongated and curved horns, i.e. small tool marks (c. 0.5 mm wide). The same marks are discernible along the area of the ears and in general it seems that whenever carvings needed to be performed, they were done with a very small tool, using repetitive motion.

The artisan who prepared the mould used to manufacture the object did not pay too much attention to symmetry

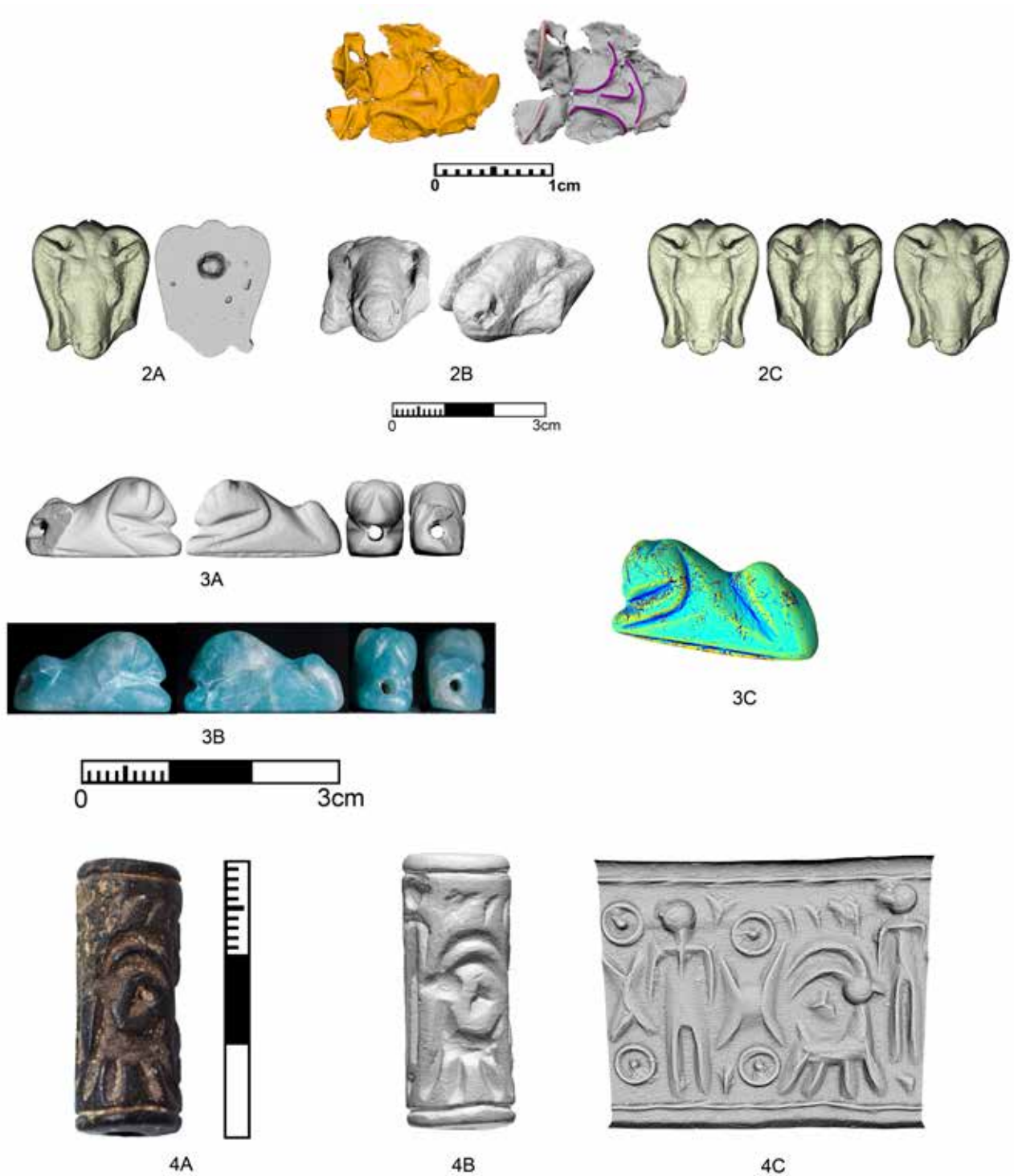


Fig. 28. 3D documentation of various objects from 2019 excavations: 1. N459: snapshots from the 3D model; 2. N422: A) orthographic view, B) manufacturing marks on the object, C) symmetry comparisons (mirroring the left side, mirroring the right side, original); 3. N435: A) snapshots from the 3D model, B) photograph, C) curvature analysis of the object's surface; 4. N428: A) photograph, B) snapshot from the 3D model showing the uneven ends of the seal, C) seal impression obtained from inverting the z values of the unwrapped 3D model.

aspects—a comparison between the left and the right sides of the object (virtually cut along its central vertical axis) shows differences in practically every detail observed: the shape and orientation of ears, the delineation of the face, shape and position of the eyes, the nose, and others.

CQ4: N435, lion pendant of turquoise (Fig. 28:3)

A small lion-shaped pendant, with a 2 mm-diameter hole crossing longitudinally the item and starting from its mouth, has been examined. Its dimensions are $18 \times 7 \times 10$ mm. The back side is smoothed. The right leg is missing, probably broken in antiquity.

The 3D-scan of the figurine helped identifying various manufacturing features, suggesting that the item was shaped using a sharp tool, which was used to delineate the desired features and then carve them. A possible change in the design plan can be discerned on the left side of the object, where an apparent line following the shape of the leg's hip may indicate an earlier (failed) attempt to delineate the bent leg.

In order to visualize mathematically the smoothness of the object's surface, a curvature analysis was performed (Fig. 28:3C). The result clearly shows areas that have been carved (dark blue), edges that project out (red areas), and smoothed parts (depicted in azure colour), which form the bulk of the object's surface. Areas with a slight yellowish-green colour may represent abrasions of the original surface of the stone.

CQ1: N428, cylinder seal of haematite (Fig. 28:4)

The cylinder seal (Fig. 28:4A) is 28 mm long, has a diameter of 10 mm, and a hole of 4.6 mm diameter. The main purpose of the 3D analysis was to identify possible surface marks as a result of manufacture and use. Consequently, the 3D model was unwrapped and the height values were inversed, in order to create a reconstruction of the impression it made once rolled (Fig. 28:4C). The high-accuracy 3D documentation enabled a more detailed description of the scene depicted (described separately in *Appendix 1*). The faces of the anthropomorphic figures and the circle decorations were probably delineated and carved using the same instrument, having very similar diameters of less than 4 mm. The entire scene is framed, obtained from the incision of a less than 1 mm-wide and *c.* 0.5 mm-deep irregular channel around the cylinder at its two ends.

The reconstruction of the object's *chaîne opératoire*, based on the 3D scientific visualization of its digital model shows that both ends are not symmetrical (Fig. 28:4B), but with a regularly located central hole at 2.6 mm distance from the edges of the cylinder. Rounded features were probably carved using the same instrument measured with a compass (or similar), given their very similar diameters (3.6 mm). Once the

figures and the ingot-like elements were carved, their internal faces were smoothed. Incisions were made at an average depth of *c.* 1 mm, with values ranging from 1.5 mm for the more clearly incised features, such as the delineation of the contours of the human and animal figures and the ingot-like signs, and 0.5 mm for the other signs. These were performed probably with a sharp and narrow chisel, first delineating the desired shapes on the surface of the stone.

Once the 3D model was obtained, we could extract its impression, following a simple procedure of virtually unwrapping the cylinder¹¹⁹ using the Meshlab filter of smoothing, fairing, and deformation—geometric cylindrical unwrapping and inverting the *z* values. Thus, we have obtained an accurate 3D model of the impression left by the seal if rolled over a modifiable plastic surface. It is independent on the pressure applied when rolling the real object and is not affected by the material upon which a real cylinder would be pressed.

SUMMARY

In this report we have examined the potential contribution of 3D documentation and related scientific visualization to the analysis of archaeological artefacts, in particular small objects. One of the outcomes of this preliminary study is the importance of defining a clear method for data acquisition, where one can assess the quality of the 3D outcomes based on which kind of further analyses one might wish to perform on the 3D models. Consequently, our current study confirmed previous ones, suggesting that in order to perform a thorough *chaîne opératoire* analysis of artefacts based on 3D shape analysis, a model of the highest possible accuracy is required. Such a model is obtainable following a rigorous procedure for data acquisition and post-processing (described above), while the analysis itself is based on principles of scientific visualization, where the 3D model is interrogated through mathematical manipulations affecting the quantity and quality of visual information presented, high-detailed geometry analyses of surfaces and curved shapes and interaction of light sources with the varying geometries of the investigated object.

¹¹⁹ Zhang *et al.* 2011.

Appendix 4

A note on the vessel contents in CQ4 and Tomb RR

By Dominika Kofel

INTRODUCTION

Archaeobotanical investigations assist archaeologists in verifying the usage of vessels. Vessel contents from the 2019 season of excavation at Hala Sultan Tekke were sampled in order to shed light on the diet of the inhabitants of the settlement, and possible rituals and the nature of tomb offerings.

MATERIAL AND METHOD

In total, the contents of 37 vessels were sampled in order to determine possible plant macro remains. Most of the samples were retrieved from Tomb RR (27 samples), two came from CQ1, and seven from CQ4 both from vessels and soil underneath containers or fragments thereof.

A manual bucket flotation system was used. Each soil sample was dispersed in water and then gently stirred to release the botanical remains. Thereafter, the watery solution from the upper part of the bucket was poured through two sieves (0.5 mm and 0.25 mm mesh size). The next step was to pour fresh water onto the soil remains at the bottom of the bucket and the operation was repeated until no more soil was left. Sieves retained both the heavy and the light residues after silts and other particles smaller than 0.25 mm were rinsed through. Residues were dried and the heavy elements were separated from the lighter ones. Thereafter, they were sorted using a low-powered binocular microscope at 6.4–40× magnification. The macroscopic remains were identified based from morphological features. In order to make an accurate determination, identification keys and atlases were used as well as reference collection.

Twelve soil samples from Tomb RR and six samples from CQ4 yielded material for archaeobotanical analysis. All material was charred and in some cases in a very fragmented state of preservation. The plant remains from Tomb RR and CQ4 can be studied in *Table 1*. Information on the contexts of the samples is provided in the main report (see also plans in *Figs. 18, 22, 23*).

RESULTS FROM CQ4

Room 84, Pithoi (L702)

Two groups of pithoi from the storage corridor Room 84 were analysed: one comes from the central-western part, the other from the central-eastern part. No significant differences in mate-

rial were noted between the two groups. There are two fragments of olive (*Olea europaea*) stones, one complete and fragmented common grape vine (*Vitis vinifera*) pips, one seed of common fig (*Ficus carica*), and fragmented indeterminate legume (Fabaceae indet.) species and some pieces of organic slag.¹²⁰

Room 84', rim of Canaanite jar (L733)

One sample was collected from the rim of a Canaanite jar containing fragmented olive (*Olea europaea*) stones.

Room 88, pithos base (L727)

The content of a large pithos base was sampled. The material contains fragmented common grape vine (*Vitis vinifera*) pips and pieces of organic slag.

Room 89, pithos base (L728)

One sample was collected from a base of a storage vessel. The material consists of fragmented olive (*Olea europaea*) stones and a piece of organic slag.

Room 89, beneath Canaanite jar (L728)

One sample was taken from the area of darker soil below the fragments of a Canaanite jar. The material consists of one grain of barley (*Hordeum vulgare*), one grain of wheat (*Triticum* sp.), fragments of indeterminate cereal grains, and one seed of lentil (*Lens culinaris*). Additionally, there were one grain of brome grass (*Bromus* sp.), grains of indeterminate grasses (Poaceae indet.), and fragments of indeterminate seeds and/or grains.

RESULTS FROM AREA A, TOMB RR

The results are listed according to their find position in the eastern (L104) and western (L105) chambers of the tomb.¹²¹ The vessel contents from the eastern chamber are from a Base-ring II jug (N202) and includes fragments of seeds and/or grains of indeterminate plant species, small fragments of charcoal, and organic slag. A White Slip II mature bowl (N203) contained a grain of rye brome grass (*Bromus secalinus*) and pieces of charcoal and organic slag, whereas another bowl of the same type (N217) yielded a fragment of a seed or grain of indeterminate plant species. Among the contents of a Plain

¹²⁰ See for instance Kofel 2018: organic slag is an undefined organic matter that could represent remains of fruit pulp, debris of cooked food, including bread-crumbs, or highly charred charcoal.

¹²¹ See main report.

Area		CQ4						Area A											
Sample no.		69	71	96	95	91	89	118	122	5	124	112	129	3	4	121	143	110	142
Context		Room 84		Room 84'	Room 88	Room 89		Tomb RR											
Locus		702		733	727	728		104						105					
Vessel info		pithoi central-western part	pithoi central-eastern part	rim of Canaanite jar	pithos base	beneath Canaanite jar	pithos base	N202 (BR II jug)	N203 (WS II mature bowl)	N216 (PWWM bowl)	N217 (WS II mature bowl)	N221 (PWWM jug)	N222 (White Shaved juglet)	N194 (PWWM juglet)	N206 (WS II mature bowl)	N208 (WS II mature bowl)	N210 (PWWM jug)	N218 (BR II jug)	N220 (Mycenaean alabastron)
Grains	barley (<i>Hordeum vulgare</i>)					1													
	wheat (<i>Triticum</i> sp.)					1fr.													
	cereal (<i>Cerealia</i> indet.)																		
	*grain					8fr.													
Other economic plants	lentil (<i>Lens culinaris</i>)					1													
	olive (<i>Olea europaea</i>)		2fr.	13fr.			2fr.												
	almond (<i>Prunus dulcis</i>)															1fr.			
	common grape vine (<i>Vitis vinifera</i>)	1	1fr.		3fr.							2fr.			1fr.				
Grasses, herbs, and weeds	common fig (<i>Ficus carica</i>)		1									2							
	rye brome (<i>Bromus secalinus</i>)							1											
	brome grass (<i>Bromus</i> sp.)					1fr.													
	cornflower (<i>Centaurea cyanus</i>)												1						
	speedwell similar pale (<i>Veronica</i> cf. <i>cymbalaria</i>)								1										
	feather grass (<i>Stipa</i> sp.) awn								1fr.										
	grass (<i>Poaceae</i> indet.)					4fr.										1fr.			
	legume (<i>Fabaceae</i> indet.)	1fr.																	
	indeterminate					2fr.		3fr.			1fr.			1fr.				1fr.	3fr.
	indeterminate husk											1fr.							
	charcoal							x	x			x							
	organic slag	3fr.			1fr.		1fr.	2fr.	1fr.	5fr.		6fr.			1fr.		5fr.	1fr.	

Table 1. Plant remains from Tomb RR and CQ4. fr. = fragment(s), x = present.

White Wheel-made bowl (N216) a seed of speedwell similar to pale species (*Veronica* cf. *cymbalaria*), a fragment of feather grass (*Stipa* sp.) awn, and organic slag could be identified. A Plain White Wheel-made jug (N221) contained common grape vine (*Vitis vinifera*), two seeds of common fig (*Ficus carica*), a fragment of indeterminate husk, and pieces of charcoal and organic slag. The material from a White Shaved juglet (N222) comprises one seed of cornflower (*Centaurea cyanus*).

Analysed contents from the western chamber include that from a Plain White Wheel-made juglet (N194), which consists of a fragment of a seed or grain of indeterminate plant

species. In contrast, a White Slip II mature bowl (N206) yielded fragments of common grape vine (*Vitis vinifera*) and pieces of organic slag, whereas in another White Slip II mature bowl (N208), a fragment of almond (*Prunus dulcis*) shell and a grain of indeterminate grass species could be identified. A sample taken from a Plain White Wheel-made jug (N210), which also contained numerous fish bones,¹²² consists only of pieces of organic slag. Another Base-ring II jug (N218)

¹²² See main report.

contained a seed or grain of indeterminate plant species and a fragment of organic slag. Similarly, the contents of a Mycenaean alabastron (N220) revealed three fragments of indeterminate plant species.

DISCUSSION AND CONCLUSIONS

CQ4

Most interesting material derives from the soil collected underneath the sherds of Canaanite jar from L728 in Room 89. It consists of a mixture of crop grains, lentil, and indeterminate fragments of grass grains. Interestingly, no remains of organic slag were discovered in the assemblage. The botanic remains point to a prepared meal, maybe a type of stew made by mixing cereals with lentils. The presence of uncultured species of grasses such as brome grass and other uncultivated species does not come as a surprise since it is well-known that they are ground and eaten together with cereals.¹²³

Another interesting find derives from a rim of another Canaanite jar from L733 in Room 84, where fragmented olive stones were identified. It seems that during the destruction of the building followed by a conflagration the vessel collapsed and the olives that were stored inside, either raw or mixed with oil, became charred.

Material from the corridor (Room 84), where numerous broken pithoi were found, probably points to semi-processed and processed products or unprocessed fruits. As the pithos fragments belong to more than one vessel, the botanical material most likely represents the contents of several vessels. However, some products could also have been stored unprocessed. Olives could have been stored as olive oil, grapes as semi-processed wine, and figs dried. The organic slag could represent remains of fruit pulp or some other indeterminate processed food.

Regarding the material from the two pithos bases, one from Room 88 and the other from Room 89, the interpretation is ambiguous. Although in both cases the material is homogeneous suggesting that in one pithos olive-related and in the other grape-related products were stored, it should be highlighted that the identified plant remains could have been redeposited during the sedimentation processes.

In agreement with earlier analyses in CQ4¹²⁴ it can be demonstrated that parts of the area were used for storage: both unprocessed and processed products along with semi-processed and processed meals and possible beverages were kept there.

Tomb RR

The material from Tomb RR reflects activities carried out in connection with burials. Cornflower found in the White Shaved juglet N222 is valued for its aroma and bioactive compounds, used in the production of a blue dye,¹²⁵ and as a medicine to relieve fever or eye problems.¹²⁶ Material from the Plain White Wheel-made bowl N216, namely a seed of pale speedwell bearing white flowers¹²⁷ along with a fragment of feather grass awn that could have both practical and ritual meaning¹²⁸ may be associated with a non-food related offering. Likewise, the find of a rye brome grass grain in the White Slip II mature bowl N203 might indicate food leftovers, since brome grass might have been consumed in prehistoric times,¹²⁹ but it might also represent the remain of some sort of burial-related activity. The contents of the Plain White Wheel-made jug N221 and the two White Slip II mature bowls N208 and N206 probably represent a debris of some sort of beverages, ointments, or simply food.

In the case of the remaining vessels, the state of preservation of the macroscopic remains does not allow any further interpretation due to high fragmentation and burning temperature. It may only be noted that all of the vessels contain debris of an organic material.

To sum up, it seems that most—but not all—of the offerings or possibly the leftovers of some burial feast were burnt. It remains, however, unclear, whether these were burnt, for instance in connection with rites of passage and the belief in fire as a medium for purification. In addition, the offerings had most probably practical—e.g. medicines, dyes, and food—and ritual meanings, such as those associated with aroma, burning, and smoke.

¹²³ Lityńska-Zajac 2005, 45.

¹²⁴ Kofel in Fischer & Bürge 2019.

¹²⁵ Wright 2001, 121.

¹²⁶ Kandeler & Ullrich 2009, 3297.

¹²⁷ Bojnanský & Fargašová 2007, 619.

¹²⁸ Bieniek & Pokorný 2005, 300.

¹²⁹ Lityńska-Zajac 2005.

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