

## Excavations at Mitathal, 2011-12

MANMOHAN KUMAR\*, AKINORI UESUGI\*\*, VIVEK DANGI\*\*\*  
VIJAY KUMAR\* AND TAKEKAZU NAGAE\*\*\*\*

The site of Mitathal is located in the Bhiwani district, Haryana (N28°53'34", E76°10'9") (Fig. 1). This site was discovered in 1915, when a hoard of Kushana and Gupta coins was found, and small-scale excavations were conducted in 1967 and 2007 (Suraj Bhan 1975, Shinde *et al.* 2008).

In recent years, the rapid destruction of the site has been under progress, but the site seems to have originally had an area around 25 hectares. Based on a contour map made in January 2009 (Fig. 2), the site is composed of three mounds. A high mound is located in the southern part of the site (MTL-1) measuring 125 m from east to west, 126 m from north to south and 2.8 m in relative height. Two lower mounds (MTL-2 and MTL-3) are situated to the north of MTL-1. MTL-2 has a size of 126 m from east to west, 101 m from north to south and 1.3 m in relative height, and MTL-3 measures 139 m from east to west, 105 m from north to south and 1.3 m in relative height. The site extends beyond these prominent mounds. In 2009, cultural deposits were observed in the area to the east of MTL-2, but this portion has been

totally removed. The area to the south of MTL-1 that was surveyed in 2009 has also disappeared. In January 2012, the southern half of MTL-1 was levelled down to the level of the natural soil.

This situation surrounding the site urged us to excavate the site and to document the basic features that are helpful for understanding of the site. In May 2011, the first excavation was conducted (Manmohan Kumar *et al.* 2011) and the second excavation was done in January and February 2012. In this paper, the results of the second excavation and the post-excavation works on findings will be reported. Some <sup>14</sup>C dates on samples from the first excavation will also be reported here.

### Cultural sequence and dating of the site

Before looking at the results of the second excavation, the cultural sequence and <sup>14</sup>C dates obtained in the first excavation are to be summarized. These facts are helpful for evaluating the results of the second excavation.

\* Maharshi Dayanand University

\*\* University of Wisconsin-Madison

\*\*\* Department of History, A.I. Jat H.M.P.G. College, Rohtak, Haryana

\*\*\*\*University of Toyama



Fig. 1: Location of Mitathal and distribution of Mature and Late Harappan sites

The first excavation in 2010-11 aimed at confirming the stratigraphy and cultural sequence of the site by laying out small trenches on three mounds (Fig. 2). Especially a trench of A4 SE on MTL-1 measuring 5 × 5 m provided us with a whole stratigraphy from the natural soil to the topmost level of the mound (Fig. 3 & 4). Based on the observation of structural remains and deposits, the cultural sequence of the site can be defined. This cultural sequence in trench A4 SE has also been commonly confirmed in trench A17 SW on MTL-2 and trench S2 on MTL-3.

#### Structural phases in the trench A4 SE on MTL-1

The level of the natural soil was observed at 205.5 m ASL, into which a pit had been cut (Fig. 3 & 4). Over the filling soil of this pit, a mud brick (Str.14) wall was built. This mud brick wall and its related deposits can be defined as Structural Phase 1. In a trench called A6 SE, 15 m north of A4 SE, the upper surface of the natural soil was confirmed at the same level and a shallow pit and occupational deposits were found on it.

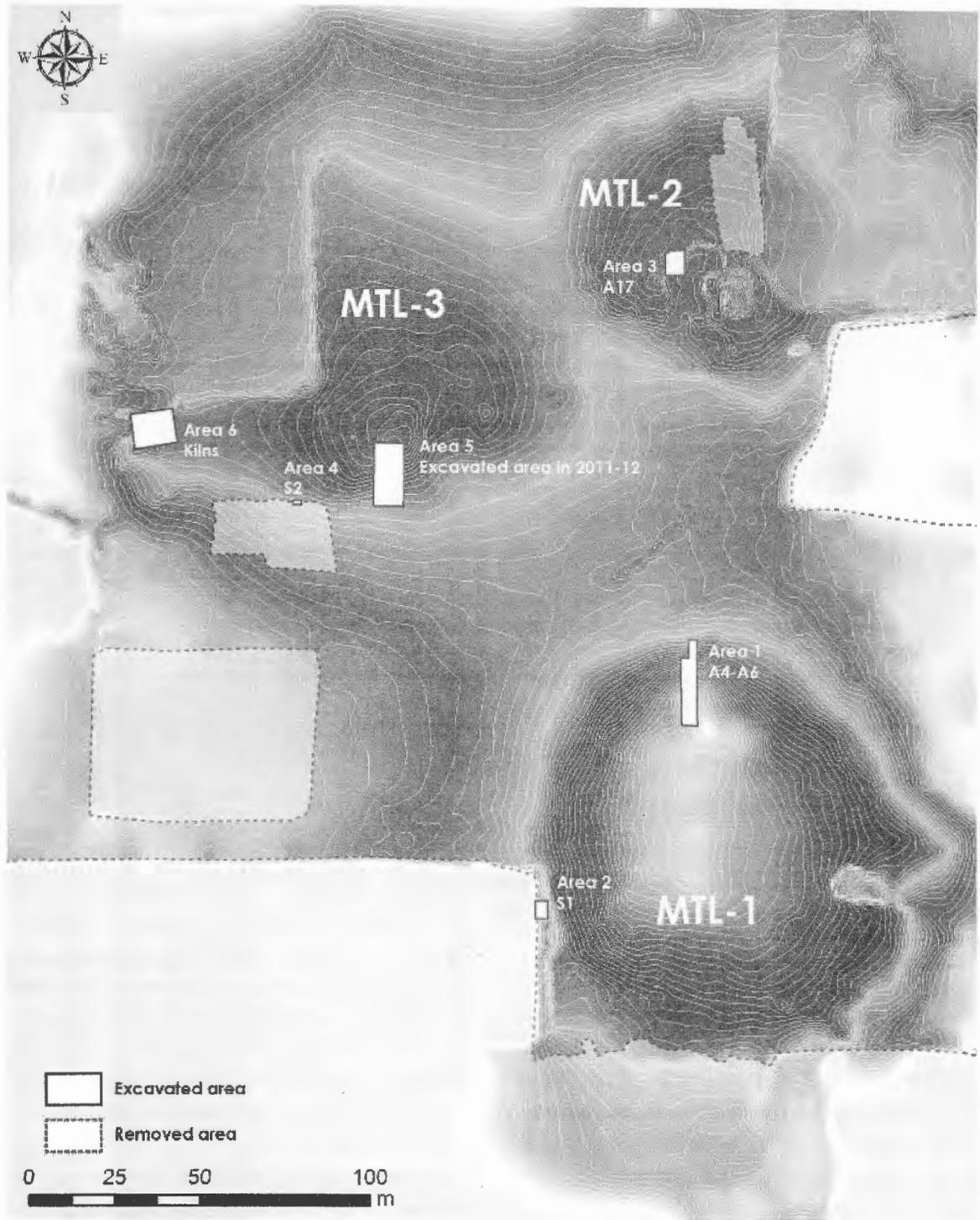


Fig. 2: Contour map of Mitathal with trenches

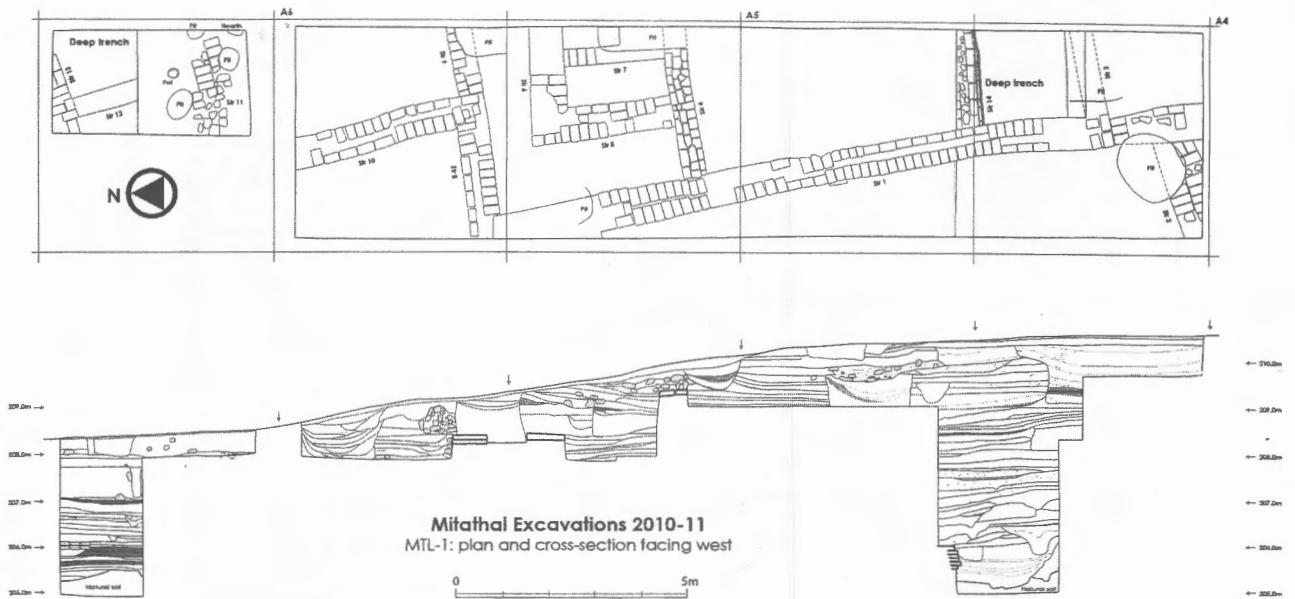


Fig. 3: Plan and cross-section of the trenches of A4, A5 and A6 on MTL-1

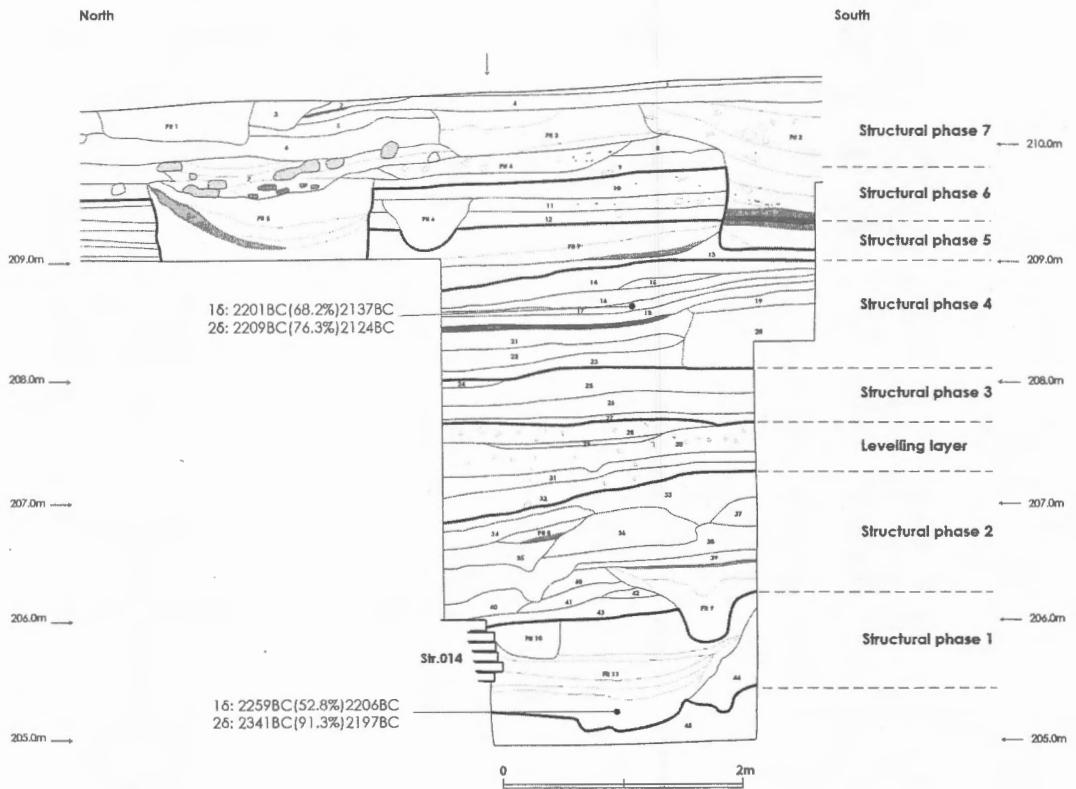


Fig. 4: Cross-section of A4 SE

In the trench A4 SE, a series of irregular deposits consisting of fine sand was deposited with a slope towards north. These deposits seem to have been artificial, as they contained burnt surfaces and pits. These deposits can be termed as Structural Phase 2. In the trench A6 SE, a mud brick structure was exposed with occupational deposits including floor-levels.

Above this level, deposits consisting of hard layers with tiny bits of potsherds and bones were observed at the same levels both in the trenches A4 SE and A6 SE, indicating that the deposits in these trenches were the same deposits. Based on the hardness, these deposits can be presumed as a levelling layer for preparing a flat surface over this area. Interestingly, also in a small trench called S1 placed on the western edge of MTL-1, deposits of the same nature was observed at the same level. It may be that the levelling activity covered a very wide area of MTL-1.

Above these leveling deposits, a series of regular occupational deposits including floor levels continuously occurred. In the trench A6 SE also, a brick-paved floor was exposed at the same level. This level is termed as Structural Phase 3.

A mud-brick structure was exposed in the trench A5 at the level of 208.10 m ASL. The deposits from this level to the basal level of a mud-brick wall (Str. 1) are defined as Structural Phase 4. The deposits consist of a series of regular occupational deposits with floor levels. In the trench A4 SE, a part of mud platform was exposed, although its exact nature was uncertain.

The mud-brick wall (Str. 1) was exposed for a distance of 15.5 m in the north-south direction. The basal level of this wall was 209.0 m ASL. This wall has two constructional phases, the basal level of the upper phase being at 209.40 m ASL. Based on these constructional phases, the deposits associated with the lower phase are defined as Structural Phase 5 and the ones with the

upper phase as Structural Phase 6.

The uppermost phase is represented by pits. In the southern portion of the trench A4 SE, a large pit measuring more than 4.0 m in diameter was encountered. The pits of this phase cut into the deposits of Phases 5 and 6, consequently disturbing the latter.

### **Structural Phases in the trench S1 on MTL-1**

The western portion of MTL-1 had been removed and levelled for making a cultivation field before January 2009, and consequently a vertical section was made at this point. As a result of clearance on this section, a mud brick wall with rammed earth extending for more than 40 m was revealed in 2010-11. This wall was presumed as a part of an enclosure wall of MTL-1 based on its unusual extension (Manmohan Kumar *et al.* 2011).

A small trench called S1 was laid out on this section in order to see the structural phases and cultural sequence at this point (Fig. 5). As a result of the excavations, the natural soil was encountered at the level of 205.80 m ASL. Over this natural soil, occupational deposits containing charcoal and burnt soil were accumulated, on which mud brick walls were built. However, the brick masonry of the wall was found very irregular with gaps, into which soils with charcoal and burnt soil penetrated. Although it is not a conclusive observation with any confidence because of the small-scale excavations in this trench, it may be possible that the wall collapsed due to some reason. Over this wall, very hard layers were deposited including tiny bits of potsherds, from the level of 207.30 m ASL to the level of 208.20 m ASL. The nature of these layers are similar to the levelling layer attested in the trenches A4 SE and A6 SE and its levels also correspond to that in these trenches. Therefore it may be that the levelling covered a very wide area over MTL-1. If this correlation can be accepted, the mud brick wall beneath the levelling layers can be equated

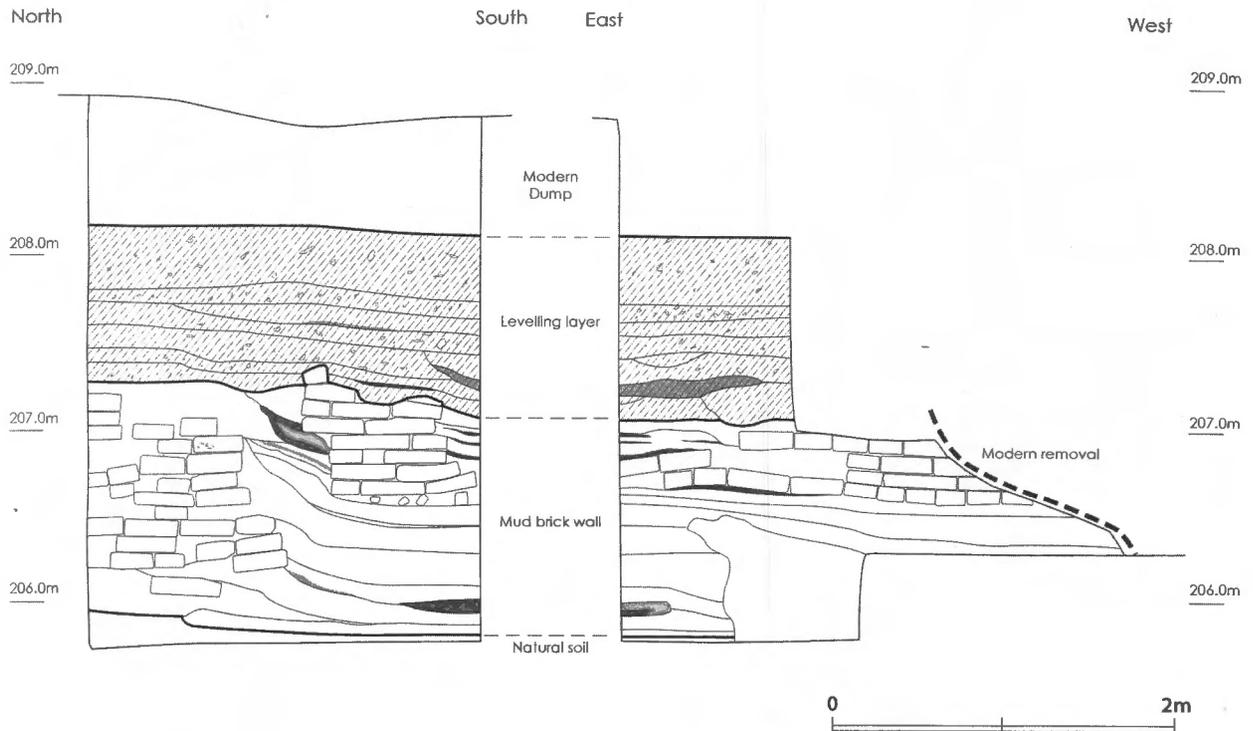


Fig. 5: Cross-section of the trench S1 on MTL-1

with Structural Phase 1 and 2 in the trench A4 SE. On the topmost level of this trench, modern dump was observed forming the present surface level.

#### Structural phases in the trench A17 SW on MTL-2

On MTL-2, a trench (A17 SW) measuring 7.0 m from north to south and 5.0 m from east to west m was laid out (Fig. 6). Although it is difficult to correlate the stratigraphy in this trench with the one in the trench A4 SE, the natural soil was encountered at the level of 206.0 m ASL, almost the same level as that in the trench A4 SE. The stratigraphy in this trench consists of regular occupational deposits containing floor levels as in the trench A4 SE, but the presence of a very few mud-brick structures in this trench makes it difficult to define structural phases. As clues for defining structural phases, a mud brick wall (Str.1), partially exposed on the basal

level of 206.25 m ASL and a water-borne deposit at the level of 208.20 - 208.35 m ASL. The latter water-borne deposit was found over the trench. The composition of this deposit of laminated thin layers indicates that this area was covered by water for a certain period.

Based on these features, the stratigraphy in the trench A17 may be divided into four structural phases. Structural Phase 1 is represented by deposits below the mud brick wall (Str.1). Structural Phase 2 consists of the mud brick wall and its related occupational deposits. Structural Phase 3 is defined by the deposits after the desertion of the mud brick structure. The water-borne deposit delimits this phase. As this phase measures 1.7 m in thickness and includes many floor levels, this phase may be further divided. Structural Phase 4 is represented by the occupational deposits above the water-borne deposit.

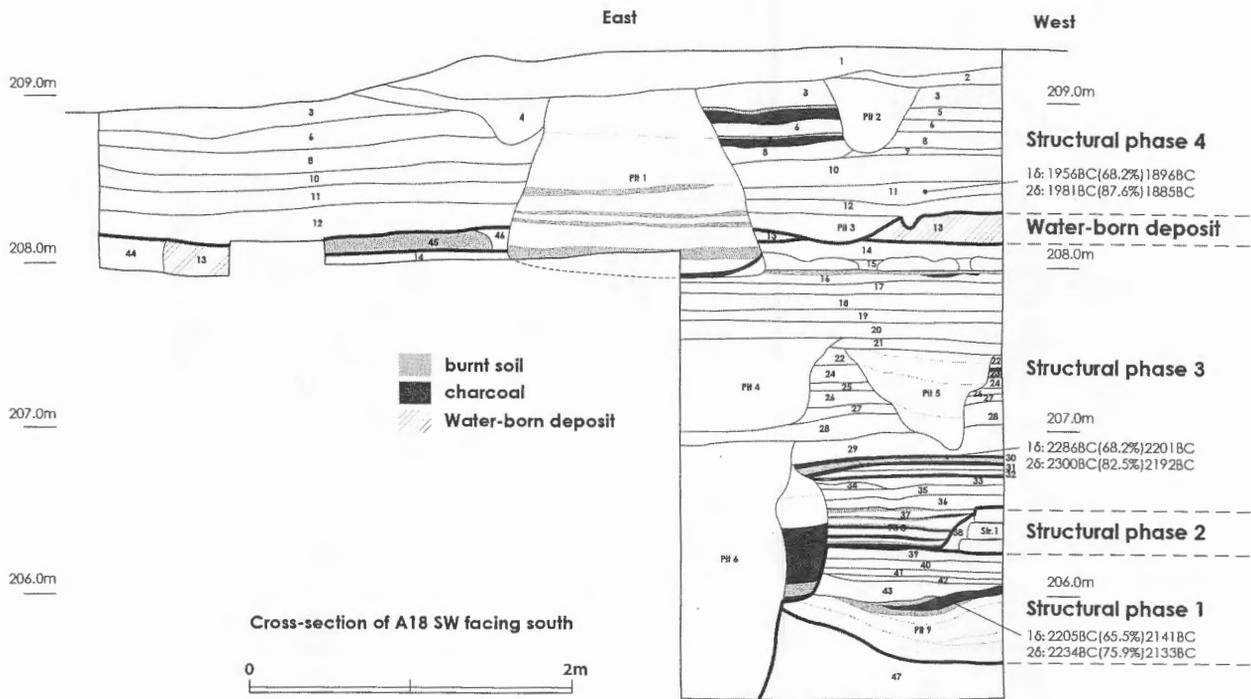


Fig. 6: Cross-section of A17 SW

A large pit with an overhung profile, which was encountered at the present surface level, belongs to the historical period, as it yielded historical pottery, most probably of the Gupta period, as well as the Bara potsherds. No occupational deposit of the historical period has been confirmed so far.

### Ceramic sequence

As discussed in detail later in this paper, three ceramic phases can be defined. Structural Phase 1 represents Ceramic Phase 1, Structural Phases 2 - 6 belong to Ceramic Phase 2 and Structural Phase 7 can be equated with Ceramic Phase 3.

Ceramic Phase 1 is distinguished by the local or Sothi-Siswal pottery, which shows features similar to that from Farmana, with a limited amount of the Harappan pottery. Ceramic Phase 2 is also characterized by the Sothi-Siswal and the Harappan pottery, but the

Harappan pottery in this phase is characterized by motifs that were not present in the previous phase. The new motifs include the ones that were not typical to the Harappan pottery but to the Sothi-Siswal pottery at Farmana, like hatched triangles and vertical bands. However, the overall features of ceramics of this phase are different from the Bara pottery. Ceramic Phase 3 is distinguished by the typical Bara pottery.

This ceramic sequence is commonly seen in the trench A17 SW (MTL-2). Structural Phase 4 in this trench is represented by the typical Bara pottery.

### Dating

Six charcoal samples from the excavation have been dated by the AMS determination (Table 1). The dating was conducted by Paleolabo, an archaeometric institute in Japan. The samples are all charred wood and dated by the AMS method after cleaning and pretreatments.

**Table 1: Radiocarbon age and calibrated age**

PLD No.	Location of sample	$\delta^{13}C$ (‰)	Conventional radiocarbon age (not rounded) (yrBP $\pm 1\sigma$ )	Conventional radiocarbon age (rounded) (yrBP $\pm 1\sigma$ )	Calibrated age	
					1 $\sigma$ range	2 $\sigma$ range
PLD-18932	Tr. A4 SE Str. Phase 4	-21.86 $\pm$ 0.13	3749 $\pm$ 21	3750 $\pm$ 20	2201BC(68.2%)2137BC	2275BC(3.3%)2256BC 2209BC(76.3%)2124BC 2091BC(15.7%)2043BC
PLD-18933	Tr. A4 SE Str. Phase 1	-12.41 $\pm$ 0.13	3813 $\pm$ 22	3815 $\pm$ 20	2287BC(15.4%)2271BC 2259BC(52.8%)2206BC	2341BC(91.3%)2197BC 2170BC(4.1%)2148BC
PLD-18935	Tr. A17 SW Str. Phase 3	-24.99 $\pm$ 0.14	3801 $\pm$ 23	3800 $\pm$ 25	2286BC(68.2%)2201BC	2332BC(0.5%)2327BC 2300BC(82.5%)2192BC 2180BC(12.4%)2142BC
PLD-18936	Tr. A17 SW Str. Phase 1	-24.16 $\pm$ 0.15	3767 $\pm$ 23	3765 $\pm$ 25	2265BC(2.7%)2261BC 2205BC(65.5%)2141BC	2285BC(16.2%)2247BC 2234BC(75.9%)2133BC 2082BC(3.4%)2060BC
PLD-18937	Kiln no.4 Layer: Floor	-15.53 $\pm$ 0.46	3571 $\pm$ 28	3570 $\pm$ 30	1952BC(68.2%)1886BC	2022BC(6.9%)1992BC 1983BC(83.0%)1877BC 1842BC(3.6%)1821BC 1796BC(2.0%)1782BC

The calibration of conventional radiocarbon age is based on OxCal 4.1.

Among them, two samples were obtained from the trench A4 SE. One sample from the lowest level gives a date of 1 $\sigma$ : 2259 cal BC(52.8%)2206 cal BC, 2 $\sigma$ : 2341 cal BC(91.3%)2197 cal BC. Another sample from Structural Phase 4 in this trench has been dated to 1 $\sigma$ : 2201 cal BC(68.2%)2137 cal BC, 2 $\sigma$ : 2209 cal BC(76.3%)2124 cal BC.

Among three samples from the trench A17 SW, one sample from a pit of Structural Phase 1 has been dated to 1 $\sigma$ : 2205 cal BC(65.5%)2141 cal BC, 2 $\sigma$ : 2234 cal BC(75.9%)2133 cal BC. The second sample from an occupational level of Structural Phase 3 gives a date of 1 $\sigma$ : 2286 cal BC(68.2%)2201 cal BC, 2 $\sigma$ : 2300 cal BC(82.5%)2192 cal BC. The third sample from an occupational level of Structural Phase 4 exhibits a date of 1 $\sigma$ : 1956 cal BC(68.2%)1896 cal BC, 2 $\sigma$ : 1981 cal BC(87.6%)1885 cal BC. The dates from the first and second samples are not consistent with each other, but their close dates may indicate that the deposits were

formed in a short period of time. The ceramics from Structural Phase 4 represents Ceramic Phase 3 or the typical Bara pottery.

One sample obtained from a charcoal layer at the bottom of Kiln no. 4 has been dated to 1 $\sigma$ : 1952 cal BC(68.2%)1886 cal BC, 2 $\sigma$ : 1983 cal BC(83.0%)1877 cal BC (Fig. 7). As this date is closer to a date Structural Phase 4 or Ceramic Phase 3 in the trench A17 SE, it is likely that the kilns were in use in the final stage of occupations at the site. This date is corroborated by the features of potsherds found in filling layers of kilns (Fig. 8).

## Excavations in the season of 2011-12

### Layout of trenches

In the season of 2011-12, trenches were laid out on the top of MTL-3 (Fig. 9). On MTL-3, a very small trench called S2 was dug in 2010-11 revealing a part of entire stratigraphy of the mound. The level of the natural soil was found at 206.50 m ASL. In the portion where

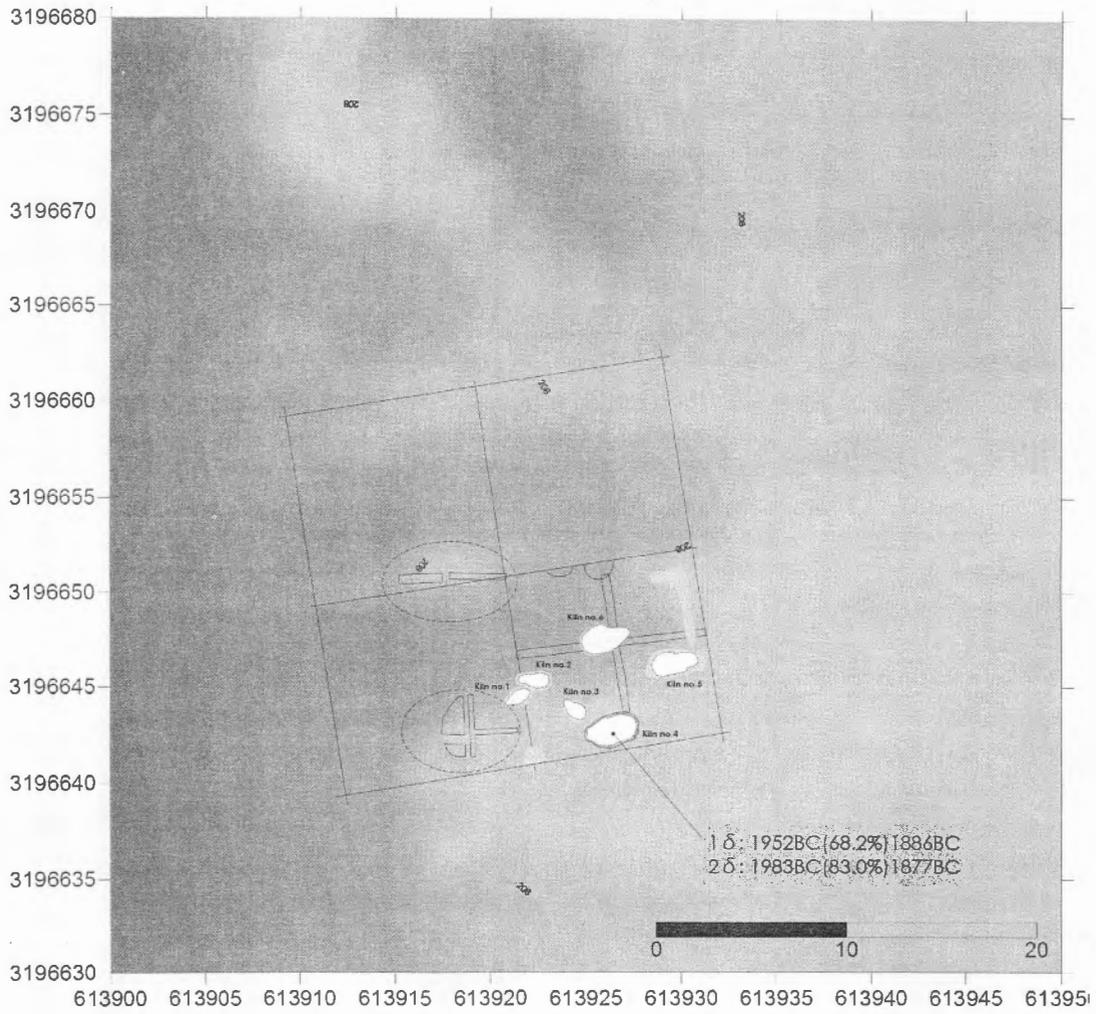


Fig. 7: Contour map with trenches on the western fringe of MTL-3

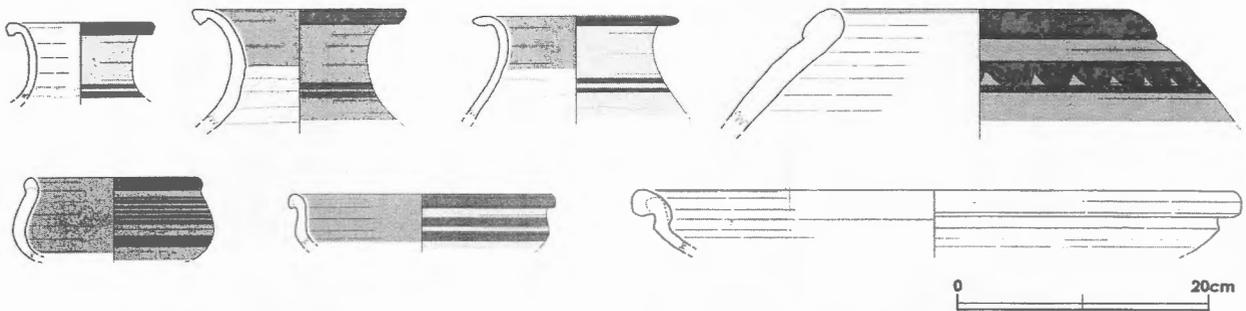


Fig. 8: Pottery from Kiln-no.4 (1:6)

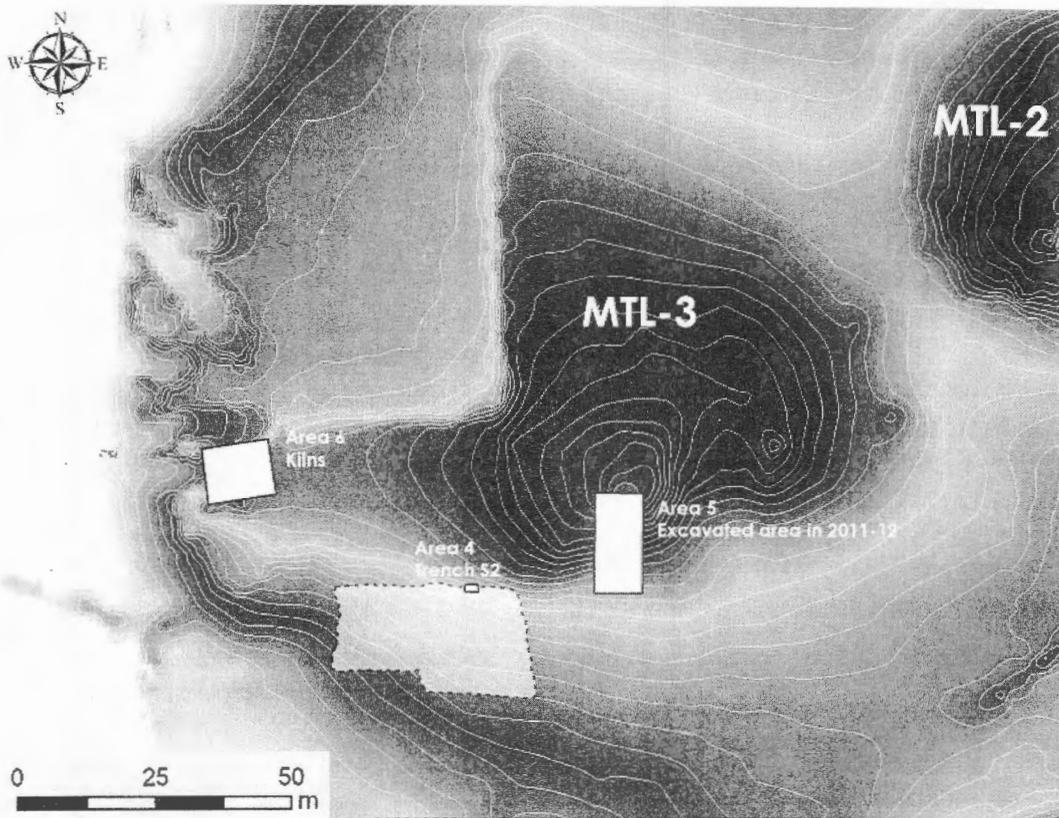


Fig. 9: Layout of trenches on MTL-3

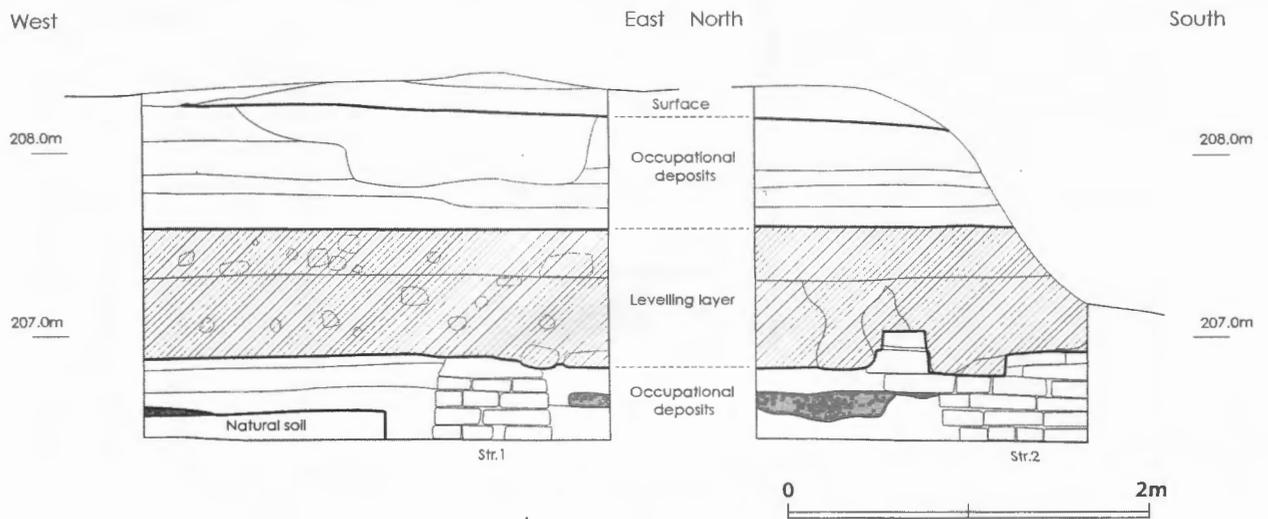


Fig. 10: Cross-section of the trench S2 on MTL-3

the trench was laid out, the present surface was located at 208.30 m ASL, but the top of the mound is situated at 209.50 m ASL. Therefore, this season's excavation aimed at revealing the entire stratigraphy and cultural sequence from the natural soil to the top of the mound. The trenches, which entirely measured 10 m from east to west and 20 m from north to south, were laid out on a gentle slope in the north-south direction. It was expected to reveal several structural levels.

Although it was desirable to set trenches based on the grid system (10 × 10 m) that was established in the last season, this season's excavation put a priority to cover the top of MTL-3 and did not follow exactly to the arrangement of the grid system. After setting them, the trenches were positioned by a total station from the datum point on MTL-1. Consequently the trenches fall in grid nos. I10, I11, J10 and J11.

### Stratigraphy in the trench S2

As noted above, a small trench was laid out on the slope of the MTL-3 mound in the season of 2010-11. Before the excavations, a large pit was dug by local villagers to a depth of 1.30 m from the present surface. The trench was set out on the section of this modern pit. As a result of the excavations, the natural soil was attested at the level of 206.60 m ASL and cultural deposits of 1.70 m in thickness were observed (Fig. 10).

Above the natural soil, mud brick walls (Str.1 and Str.2) were built and occupational deposits were made in

association with these structures. Over these walls, hard layers containing grey clay blocks were encountered. These layers can be presumed as levelling layers. The levelling layers were formed in two phases. Above these levelling layers, occupational deposits including floor levels were found.

### Stratigraphy in the trench 2011-12

The basic divisions of layers exposed by the excavations are as follow (Fig. 11).

Stratum 1 Surface soil

Stratum 2 Occupational deposits. A number of pits were found on the surface of this layer.

Stratum 3 Water-borne deposits

Stratum 4 Deposits after the desertion of mud brick structures. A very small part of this layer was intact, as this layer had been eroded by Layer 3.

Stratum 5 Occupational deposits associated with mud-brick structures. Several floor levels were observed.

Stratum 1 or the present surface soil was observed for 5 - 10 cm in thickness at the top of the mound, but it was almost absent on the slope. The limited formation of the present surface soil can be due to the scarce vegetation and repetitive erosion of the surface. On the slope, Stratum 2 or Stratum 4 was exposed directly to the surface.

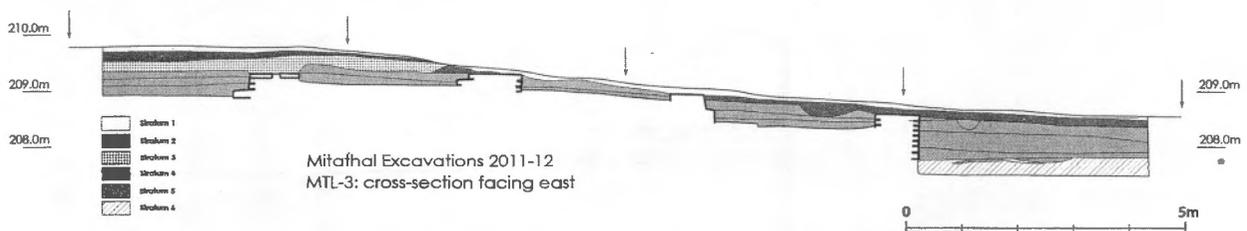


Fig. 11: Cross-section of Area 5 on MTL-3

Stratum 2 was also found mainly around the top of the mound. This layer contained potsherds and other artefacts as well as bones, and a number of pits were found cutting into this layer. On the slope, several pits cut into Stratum 5 and partially destroyed mud-brick-walls. Based on this evidence, it is obvious that the pits cut from Stratum 2 were dug after the complete burial of preceding mud brick structures.

Stratum 3 was also limited to the top portion of the mound. The deposits consist of fine sand or silt and exhibit deposition of laminated thin layers, each of which measured less than 1 cm in thickness. Although it is not possible to determine the duration of the formation of this layer, it indicates that this area was covered by water for a certain period. It recalls the water-borne deposit of the same kind found in the trench of A17 SW.

Stratum 4 was observed in a very small portion as most of this layer had been eroded by Stratum 3 and later surface erosions. However, the presence of this layer indicates that mud brick structures of Stratum 5 was not destroyed by Layer 3, but before the formation of the water-borne deposit, the mud brick structures had been abandoned and buried by Stratum 4.

Stratum 5 consists of mud brick structures and other features with occupational deposits. A number of potsherds and other artefacts were found in these deposits. On floor levels, some pots and artefacts were found in primary conditions. This stratum was confirmed over the entire trenches.

Based on the observations above, it seems probable that the upper part of the mound has been eroded after the desertion of the site. Although it is difficult to determine the formation process of the mound, it appears that the shape of the mound which is currently visible does not represent the landscape of the settlement in those days, but it has been formed by the natural formation process, mainly by erosions.

## Structural Remains

### Mud brick structures from Stratum 5

Mud brick structures found in Stratum 5 (Fig. 12: left, Plates 1 - 6) belong to one structural phase. Nine rooms and two lanes were exposed. Several floor levels were encountered. The structures were arranged with a direction of N-14°-W.

Room 2 measures 4.0 m from east to west and 3.1 m from north to south. Room 1 was probably of the same size. On one floor level associated with Room 2 was found a heap of large potsherds of pots, bowls and jars (Plate 3). In Room 1, a circular pit (no. 24) was found.

Lane 1 runs from east to west to the south of Rooms 1 and 2. It measures 3.1 m in width. Although it was highly disturbed by pits that were dug from Stratum 2, mud brick pavement was partially exposed.

To the south of Lane 1, a lane-like narrow rectangular space was exposed, but it was closed by a wall on its western side. It indicates that this narrow space was not an open lane, but it is also clear by the presence of a drain that this space was not inside but outside of a house. This space is called tentatively Lane 2 here. The drain was found along the southern wall of Lane 2 (Plate 5). Three pipes were found to be connected to form a drain. The western end of this drain is represented by a circular pit with filling soil of a greenish colour. Among three pipes, one specimen is complete having a slightly tapered shape with a length of 51.5 cm and a diameter of 17.0 cm at the maximum diameter.

Six rooms were found to the south of Lane 2. Room 4 was partially excavated and its entire size was uncertain. Room 5 was a rectangular space measuring 4.8 m from east to west and 2.6 m from north to south. It may be that Room 4 has a similar size. Rooms 7 and 8 can be presumed to have a rectangular plan with a longer axis



Fig.12: Plan of structural remains in Area 5 on MTL-3

from north to south. Room 8 measures 2.9 m from east to west and more than 3.5 m from north to south. A wide mouthed bowl with a hole on its base was found in situ in the northwest corner of Room 8 (Plate 6). It is complete having a globular body and a wide mouth with an out-turned rim. Its base has a ring as well as a hole. The rim and body are painted with black bands. These features indicate the Harappan style.

Room 6 is also oblong with its longer axis from north to south. It measures 3.0 m from east to west and 4.3 m from north to south. A hearth was found on the centre of this room. Along the southern side of this hearth was exposed a large fragment of a stone quern. These evidence indicate that this room was a kitchen. On the northeastern corner of this room was found the lower portion of a vase. This vase also has a hole on its

ringed base. If this room was used as a kitchen, it may be possible that this vase was related in function to the cooking or storage. A pit was found in the southern half of this room. In Room 9, partially exposed, a hearth was found along the north wall of the room. In this room, a number of terracotta cakes were unearthed.

The ceramic evidence from Stratum 5 suggests that this level belong to Ceramic Phase 2.

### **Pits dug from Stratum 2**

After the desertion of mud brick structures, depositions of Stratum 4 and Stratum 3 occurred. Into Stratum 2, which was deposited over Stratum 3, a number of pits were found (Fig. 12: right). The sizes of pits were various and no regularity can be found in the arrangements of pits. As a general tendency, it can be pointed out that most of the pits were found in Trench no. 1, but it is difficult to define the distribution pattern of pits because of the erosion that modified the original landscape.

The sizes of pits (Fig. 13) are various ranging from a very small pit measuring less than 0.5 m in length to a very large pit with more than 3.0 m in length. Those with 1.0 - 2.0 m in length are dominant. The small pits may have been a kind of post-holes, whereas large pits could have been garbage pits.

Among them, Pit nos. 2, 18 and 20 were found containing a large amount of potsherds. Pit no. 18 can be regarded as a garbage pit because of a large amount of potsherds and animal bones in its filling soil. In Pit no. 2, yellow soil and blackish soil with charcoal were alternately deposited inside the pit; fragments of earthen crucibles with copper slag were unearthed with potsherds and animal bones. It is likely that copper smelting was conducted around this pit, although it is not clear whether this pit was directly used for smelting. Pit no. 20 was large and deep with alternate deposits

of charcoal, ash and yellow soil, measuring 2.40 m in diameter and more than 1.0 m in depth. A large amount of potsherds and animal bones were found. This pit may have been a garbage pit, but its discard and deposition pattern is different from that of Pit no. 18.

A hearth was found among pits in Trench 1 SW. It measures 1.4 m in length, 0.73 m in width and 0.1 m in depth. Burnt clay and ashes were observed inside the pit.

The pits found on the level of Stratum 2 may have been used for various activities. Although it is difficult to reconstruct the entire activities of this period, it is clear that the occupation of this period was not sporadic but substantial. The ceramic evidence from pits indicates the affiliation of this level to Ceramic Phase 3 represented by the Bara pottery. Thus this level can be presumed to be contemporary with Structural Phase 7 of MTL-1, Structural Phase 4 of MTL-3 and kilns on the western fringe of MTL-3. After desertion of mud brick structures, the life style of people at the site considerably changed, but it is apparent that various activities including craft production occurred at the site.

### **Findings**

In this section, ceramics and other artefacts from Mitathal will be overviewed based on the findings from the excavations in the season of 2010-11.

### **Ceramics**

#### **Stylistic classification of ceramics**

The ceramics from Mitathal can be broadly divided into two groups based on formal features and manufacturing techniques, i.e. the Harappan pottery and the local Sothi-Siswal pottery.

The Harappan pottery consists of pots, jars, beakers, bowls, dish-on-stands and dishes. It is distinguished

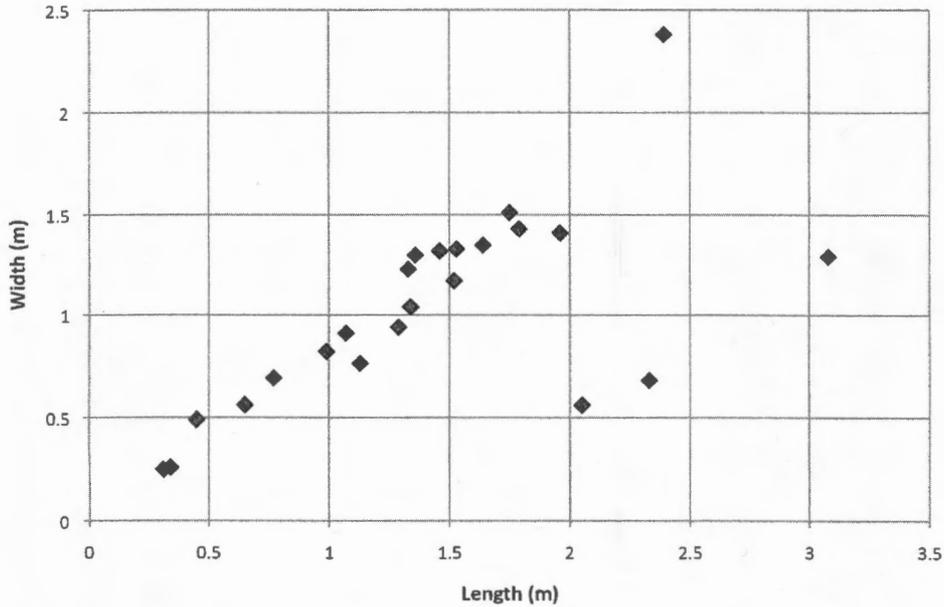


Fig. 13: Graph showing the size of pits of Stratum 2

by manufacturing techniques using a fast wheel. Smoothing and scraping techniques with fast rotation are distinctively used. Painted pottery is included having horizontal bands, figurative and geometric motifs. The Bara pottery is basically distinguished by features common to the Harappan pottery, but its formal features are different from those of the latter. Among the painting motifs of the Bara pottery, whereas some motifs are distinctive to the Harappan pottery, others are derived from the local pottery, like hatched triangles and vertical bands. Some local motifs are shared by the Harappan pottery and the local pottery. However, the distinction between the Harappan pottery and the Bara pottery is not easy because of the gradual change from the former to the latter. For example, some specimens with the Harappan shapes have painting motifs common to the Bara pottery. Some geometric painting motifs of the Bara pottery also occur in the local pottery in the levels where the typical Bara pottery did not appeared.

The local Sothi-Siswal pottery is distinguished by the manufacturing techniques using rotation and no rotation.

It seems that the primary modelling technique is hand-modelling and the rotational technique was used in the secondary modelling stage or in the finishing stage. In respect to the painting motifs, black bands, wide and narrow, and some simple geometric motifs like hatched triangles and parallel bands are distinctive. Motifs derived from the Harappan pottery never occur on the local pottery. Pots and bowls are predominant forms.

As a technique common to the Harappan, local and Bara pottery, the burnishing technique can be pointed out. Whereas in Ceramic Phase 1, the burnishing technique is almost absent, it becomes popular in Ceramic Phases 2 and 3.

#### Percentages of the Harappan pottery and the local pottery

Figure 14 exhibits the percentages between the Harappan pottery and the local pottery through structural phases. In this figure, the Bara pottery is included in the Harappan pottery because of the difficulty of clear

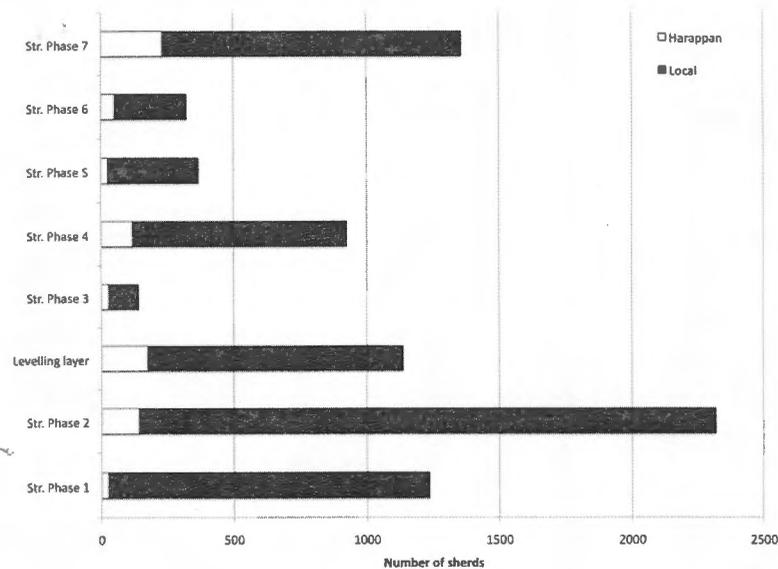


Fig. 14: Percentages of the Harappan pottery and the local pottery in the trench A4 SE

distinction between the two. Although it is difficult to make simple comparison among structural phases because the excavated area becomes smaller towards the lower levels, the local pottery is dominant, whereas the Harappan pottery is quite limited. Even in Structural Phase 7 where the typical Bara pottery makes its appearance, the local pottery keeps its predominant position. The predominance of the local pottery in the ceramic assemblage can also be observed in Structural Phase 4 in the trench A17 SW of MTL-2 and kilns on MTL-3.

### Chronological changes of the Harappan forms

By looking at formal changes of some representative forms, the ceramic change through times is to be examined. In order to clarify the formal change, the evidence from Farmana, which can be datable to the early part of the Mature Harappan period or 2500 BCE - 2300 BCE based on <sup>14</sup>C dates and artefacts (Uesugi 2011a, 2011b). In addition, some specimens of the typical Bara pottery from some sites are also illustrated here.

As for the Harappan pottery, pots, bowls and dish-on-stands are to be examined.

For pots (Fig. 15) from Structural Phase 1 of A4 SE, MTL-1, relatively short necks with a simple rim (Fig. 15: nos. 4, 5), beaked rims and disc bases (no. 8) can be identified. For painting motifs, parallel horizontal bands (no. 7) and plant-like motif (no. 6) can be found. Most of these features can be equated with the examples from Farmana (nos. 1-3).

In Structural Phase 2, relatively taller necks (nos. 9, 10) and roundly thickened rims (no. 11) make their appearance indicating a change from the previous phase. The disc base (no. 14) continues to appear. For paintings, parallel horizontal bands are common, but the number of bands increases (nos. 12, 13).

In the levelling layers, tall-necked pots of a medium size (no. 15), large pots with a roundly thickened rim (no. 17) and large pots with a beaked rim of a blunted profile (no. 16) can be found. The rounded disc base (no. 20) makes its appearance. This base type is distinguished

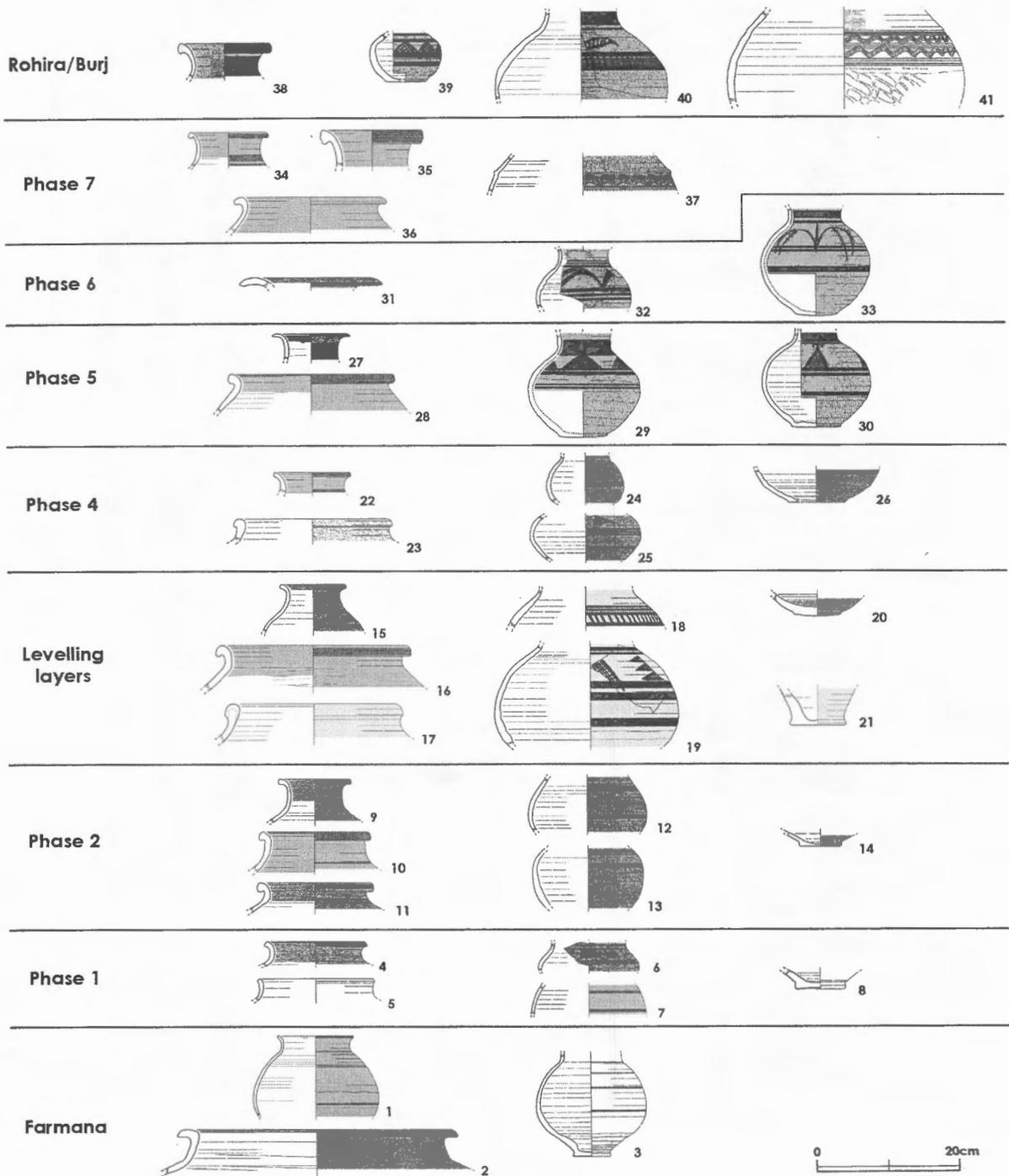


Fig. 15: Harappan pots from MTL-1 and other related sites

by its continuity into the Bara pottery. Hatched triangles (no. 19), which seems to have its origin in the local pottery, are painted on some examples. The vertical strokes in a horizontal register (no. 18) may also be an influence from the local pottery.

In Structural Phase 4, carinated body shapes and large pots with a beaked rim that is less projecting (no. 23) can be mentioned as new features. For paintings, parallel horizontal bands (no. 24) and animal motifs (no. 25) can be found. Some examples have parallel grooves on their body.

In Structural Phase 5, tall necked pots with a prominently out-curved or splayed-out rim (no. 27), large pots with a short neck (no. 28) and carinated body shapes are distinctive. Some examples have a globular body with a rounded disc base and hatched triangles (nos. 29, 30).

In Structural Phase 6, examples with a prominently out-curved rim (no. 31) are found. Several specimens with a globular body is painted with a plant motif that cannot be found in neither the Harappan pottery nor the local pottery in preceding phases (nos. 32, 33).

In Structural Phase 7, tall-necked pots with an out-curved rim (nos. 34, 35) can be seen. This rim shape is distinctive of the typical Bara pottery (no. 38). Another distinctive feature is a body sherd with parallel grooves in wavy and horizontal manners (no. 37). These types of grooves are also common to the typical Bara pottery (no. 41). The plant-like motif that is found in Structural Phase 6 and hatched triangles are also present in this phase.

In respect to the Harappan bowls, one example has a nail-headed-rim in Structural Phase 1 (Fig. 16: no. 5), but its shape is different from examples from Farmana (nos. 1, 2). Structural Phase 2 yields an example with a nail-headed rim (no. 7) and a shallow bowl with an out-curved neck (no. 6). The latter, possibly a dish-on-stand,

is a new type that develops into the Bara pottery. From the levelling layer, one example has a deep body and an out-curved neck (no. 9) and the other have a carinated body with horizontal bands (no. 8). In Structural Phase 4, one example with a nail-headed rim (no. 10) and one example (no. 11) similar to the one in Structural Phase 2 (no. 6) can be confirmed. Structural Phase 5 yields shallow bowls with an out-curved neck (no. 12, 14) and a bowl with a carinated body. In Structural Phase 6, an example with an out-curved rim (no. 16), an example with a squat globular body, roundly thickened rim and parallel bands with vertical strokes (no. 15), a small bowl with an out-turned rim painted with horizontal bands and oblique strokes, and a wide-mouthed bowl with a short beaked rim and horizontal bands. In Structural Phase 7, a large bowl with an out-curved neck (no. 18) and a medium bowl with a hemispherical body (no. 17) can be found.

For the Harappan dish-on-stands (Fig. 17), no example with its dish portion intact has been found. Examples from Structural Phase 4 (nos. 5, 6) have a shape similar to the Harappan types, but their shapes are clearly deeper than the typical Harappan type found at Farmana. One example (no. 5) is executed with burnishing. Structural Phases 5 and 6 also yield similar type (nos. 8, 10). The example from Structural Phase 6 (no. 10) becomes deeper than those from Structural Phase 4. In Structural Phase 7 both the shallow type (nos. 11-14) and the deep type are present, but their overall shapes are different from examples from Farmana.

Summing up the observations above, Structural Phase 1 yields the Harappan pottery that is similar to that from Farmana, but changes become clear from Structural Phase 2 onwards. Especially, the appearance of some elements that develop into the Bara pottery is significant in understanding the changes from the Harappan pottery to the Bara pottery. It can be stated that the Bara pottery gradually developed out of the Harappan pottery in shape. Structural Phase 7

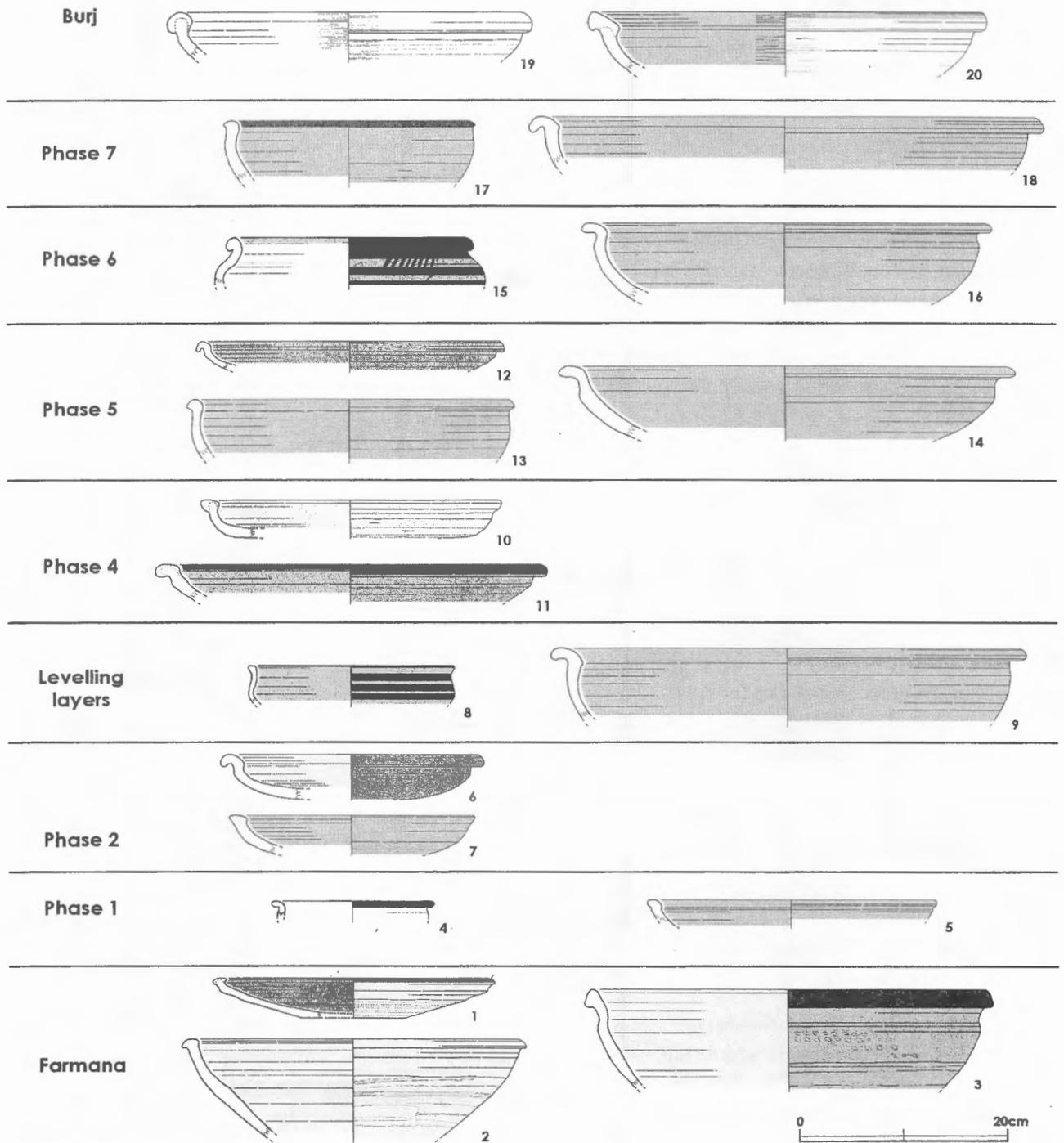


Fig. 16: Local pots from MTL-1 and other related sites

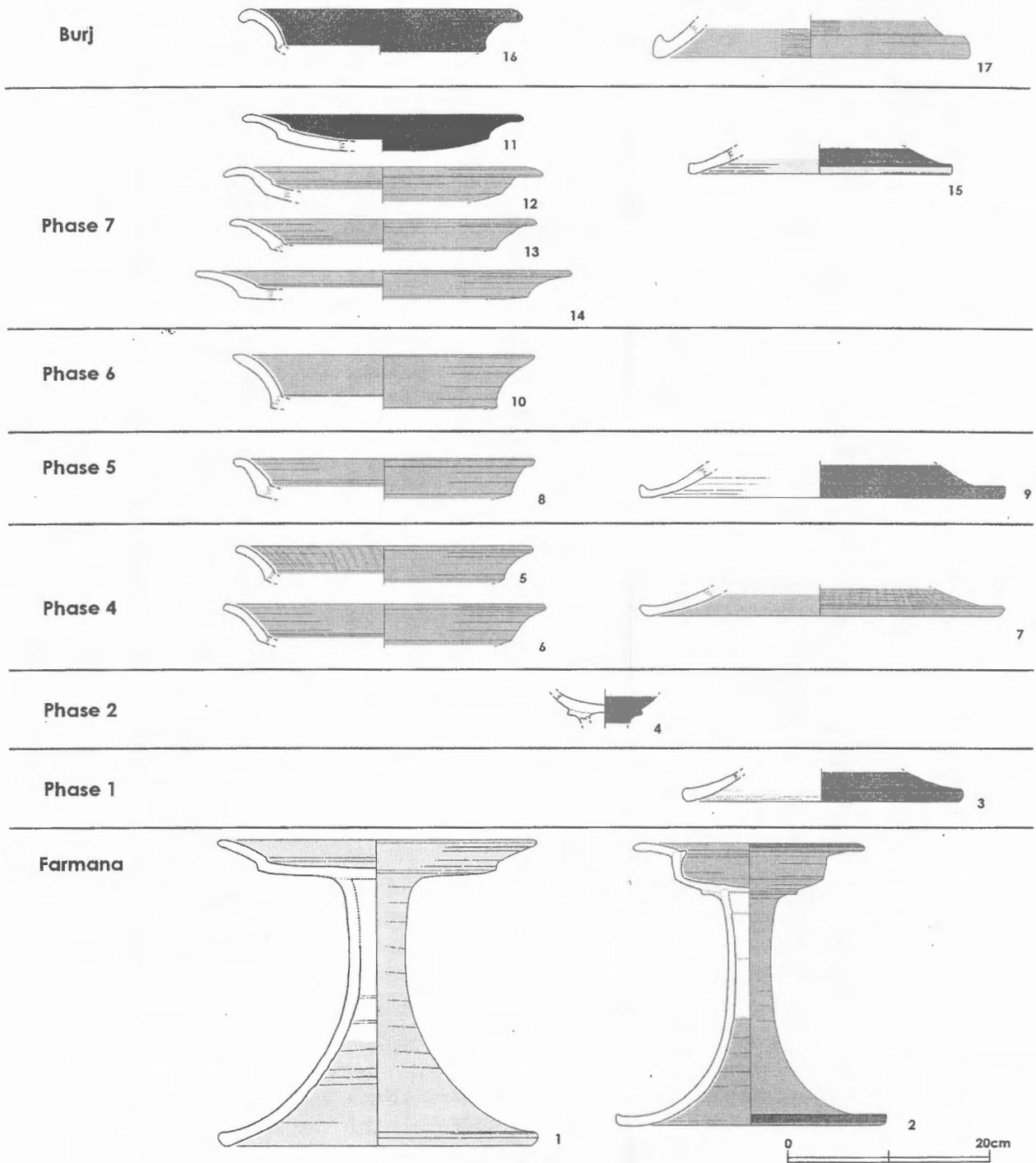


Fig. 17: Harappan dish-on-stands from MTL-1 and other related sites

represented by the typical Bara pottery can be dated to around 1950 BCE based on comparison of ceramics between MTL-1 and MTL-2 and a date from MTL-2. It means that the change towards the Bara pottery started around 2200 BCE towards 1950 BCE.

### Chronological change of the local forms

For local pots (Fig. 18), examples with taller and shorter necks (nos. 5-7) were found in Structural Phase 1. They are painted with either a wide or a narrow black band. In overall, they are similar to the examples from Farmana (nos. 1-4). In Structural Phase 2, clear differences cannot be observed (nos. 8-10). In the levelling layer, examples with a carinated body (no. 13) appear as a new element. They are decorated with post-firing incised whirls on the black band. The reserve slip techniques are found at Farmana, but those from Farmana are executed before firing. An example is painted on its body with short vertical strokes, which can be found in the Harappan pottery in the same phase. One example is vertically burnished. In Structural Phase 3, the globular body with a round base (nos. 14-16) can be found. At Farmana, the ring base is predominant, but at Mitathal, the round base becomes common from Structural Phase 3 onwards. The globular body may also be a new element, as the elliptical body shape is common at Farmana. It is also noteworthy that the narrow rim band becomes dominant while the wide band decreased. In Structural Phase 7, one example is painted with a plant-like motif (no. 32), which can be found on the Harappan or Bara pottery in the same phase.

Regarding the local bowls (Fig. 19), a type with an out-turned neck (nos. 1, 4, 5) is dominant with fewer occurrences of hemispherical bowls with a straight mouth (nos. 2, 3) at Farmana. The similar types can be found in Structural Phase 1 at Mitathal (nos. 6 - 11). In Structural Phase 2, a new type with a carinated body (no. 14) makes its appearance. No. 14 has a ridged carination on its body and a shortly out-turned rim, and is painted

with vertical strokes on the upper part of the body. From the levelling layer onwards, the hemispherical bowl with an open mouth becomes dominant, associated with carinated bowls. In Structural Phase 4, a post-firing incised whirl occurs on a carinated bowl (no. 20). In Structural Phase 7, a bowl with a notched appliqué band (no. 30) can be found with the hemispherical type and the carinated type.

Thus, in the local bowls, a change from the type with an out-turned neck to the type of hemispherical shape can be presumed. The carinated type is a new type that is not attested at Farmana.

The ceramic assemblage at Mitathal consists of the Harappan and the local types as attested at Farmana, but the formal features including paintings at Mitathal are quite different from those of Farmana. Taking the dates of both sites into consideration, it is apparent that these differences reflect the chronological change of ceramics from the early part to the later part of the Mature Harappan period. It is significant that the gradual change from the Harappan pottery to the Bara pottery has been attested and that the local elements are also incorporated into the Bara pottery. Further studies on the ceramics can reveal not only the ceramic change in detail but also the process of transformations from the Mature Harappan period to the Late Harappan period.

### Artefact assemblage

Terracotta, stone, faience, bone, shell, copper and gold artefacts have been unearthed from the excavations. Figure 20 exhibits the variety and number of artefacts in trench-wise. On MTL-1, the trench A4 SE yields the largest number of artefacts, and the number decreases towards the trench A6 SE. This is influenced by the volume of deposits in each trench. Except for gold and shell objects that have been found in a limited number, the percentage of each material is almost stable in each trench. Terracotta and faience are dominant, followed by

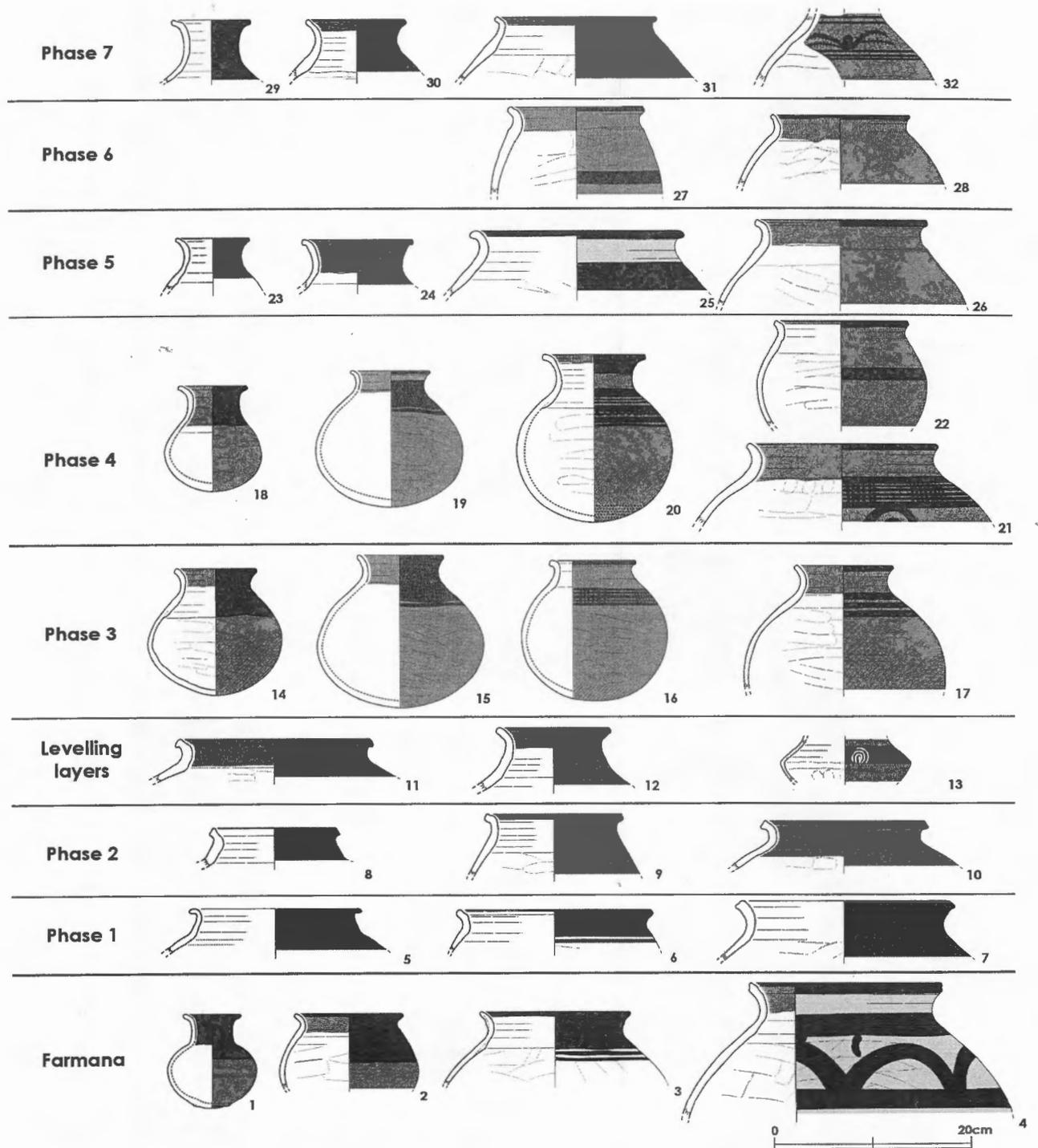


Fig. 18: Local pots from MTL-1 and other related sites

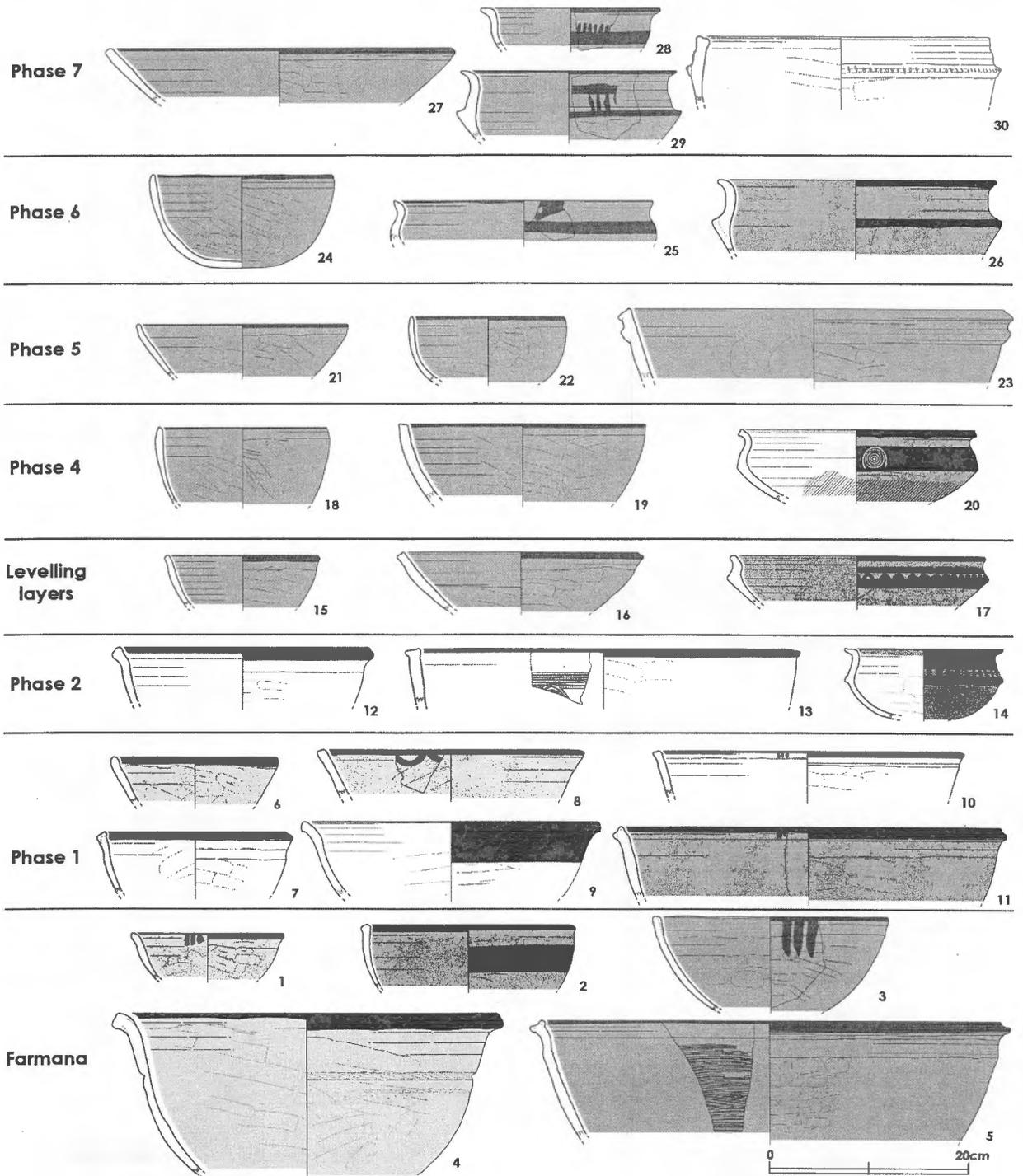


Fig. 19: Local bowls from MTL-1 and other related sites

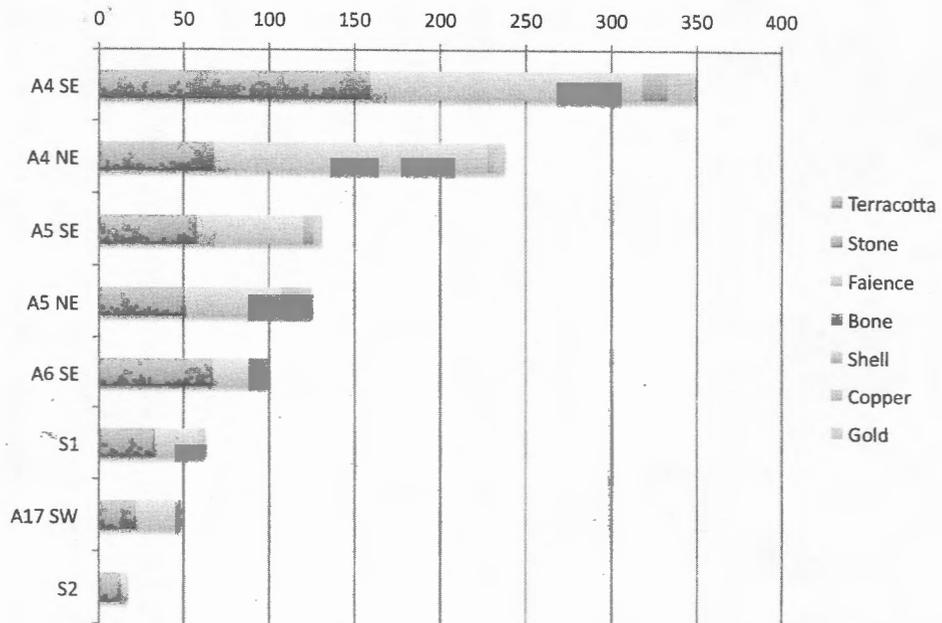


Fig. 20: Trench-wise distribution of artefacts

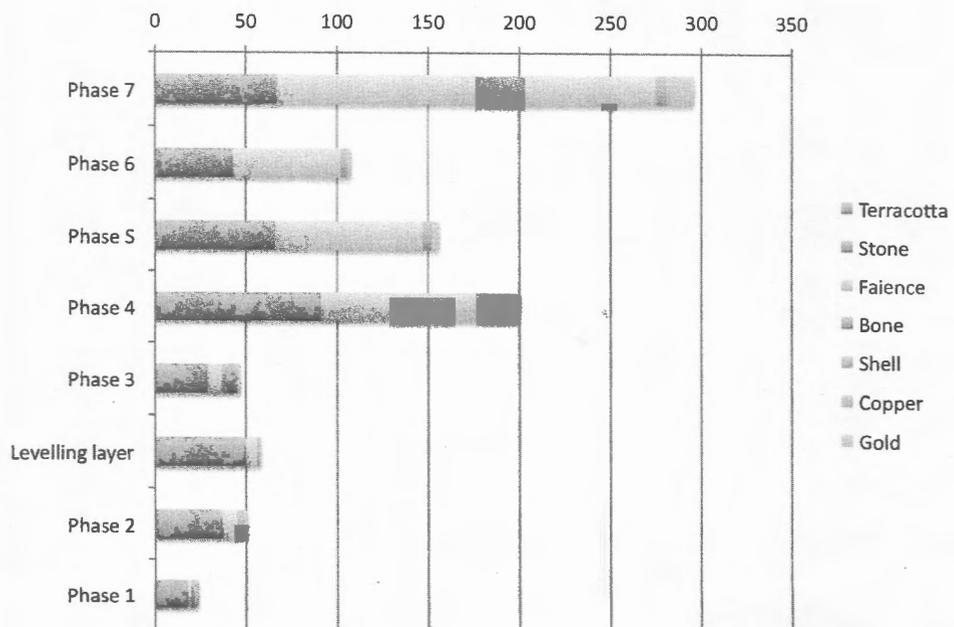


Fig. 21: Phase-wise distribution of artefacts in MTL-1

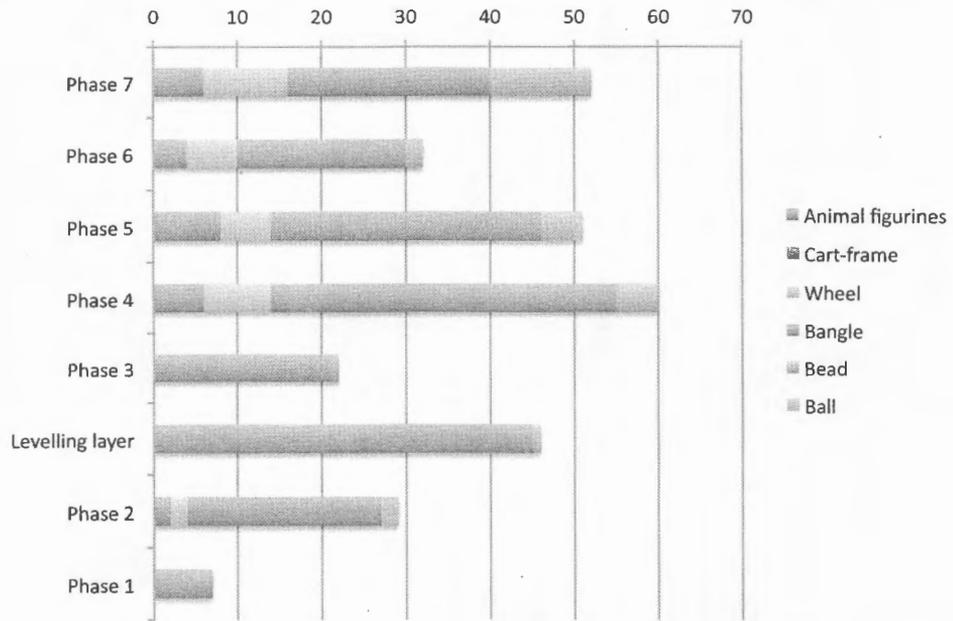


Fig. 22: Phase-wise distribution of terracotta objects in MTL-1

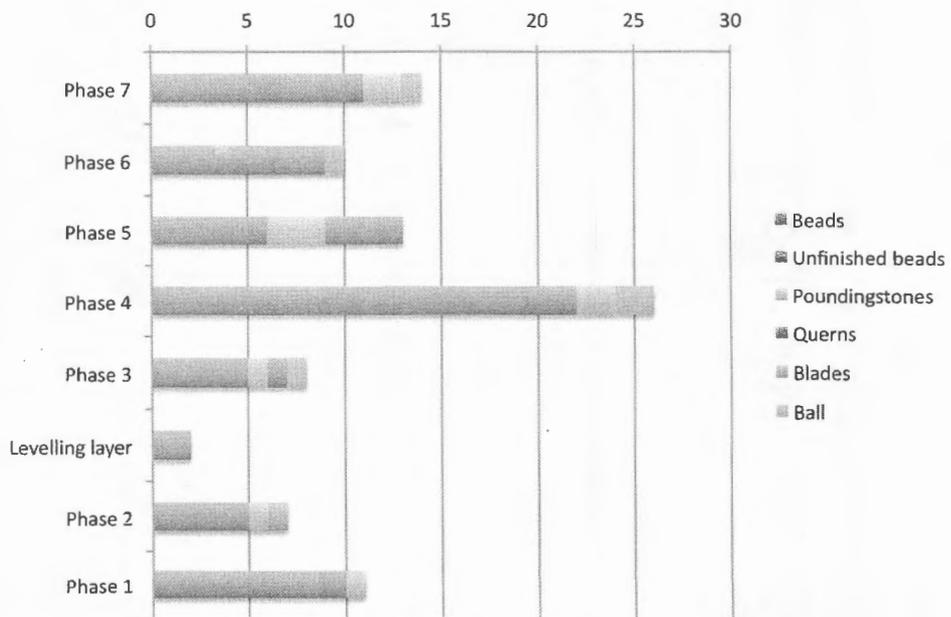


Fig. 23: Phase-wise distribution of stone objects in MTL-1

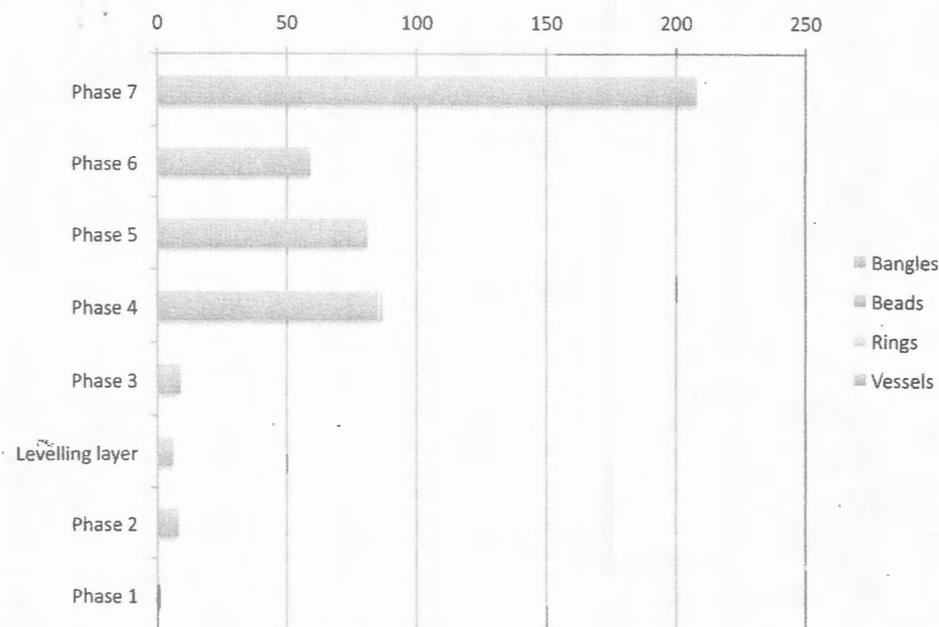


Fig. 24: Phase-wise distribution of faience objects in MTL-1

stone. Bones and copper objects are limited in number. In the trenches S1, S2 and A17, the total number of artefacts is small, but the predominance of terracotta, faience and stone objects can be commonly observed.

Looking at the number of artefacts in phase-wise in the trenches A4, A5 and A6 (Fig. 21), terracotta, faience and stone are dominant through structural phases, but the number of faience objects increases in percentages from Structural Phase 4 onwards, and they rise to 70% in Structural Phase 7. Although the numbers of artefacts shown here are the numbers of fragments including tiny ones, the fragmentary condition of artefacts is not confined to the faience objects but to every kind of artefacts. Therefore, it can be said that the outnumbering of faience objects in the upper phases is apparent.

### Terracotta objects

Terracotta objects consist of animal figurines, cart-frames, wheels, bangles, beads, balls, etc. Bangles are

dominant through phases in trenches on MTL-1 (Fig. 22, Fig. 25: top). The bangles (Fig. 23: nos. 7 - 11) include the single ring type and the multiple ring type, and many specimens are painted in black. The animal figurines have been found from the levelling layer upwards, and two types have been identified, i.e. the type with four legs (no. 3) and the type with a hollow globular body (no. 4). The latter type outnumbers the former. Some specimens of the latter type are painted in black. The cart-frames (no. 5) occur from Structural Phase 2 upwards, but are limited in number in general. The wheels defined by a disc with a single hub (no. 6) include many specimens painted in black. The beads consist of two types, i.e. truncated biconical (no. 1) and truncated globular (no. 2). The ball is very limited in number.

### Stone objects

Stone objects are composed of beads, poundingstones, querns, blades and balls (Fig. 23, Fig. 25: bottom). The

beads dominating through structural phases consist of carnelian, agate, steatite and jasper. The carnelian beads (Fig. 25: no. 28) are represented by small ones with a short truncated biconical shape, the agate beads (no. 30) by barrel-shaped, and the steatite (no. 29) by disc and short and cylindrical. A few unfinished beads and debitage have been identified in carnelian and agate (nos. 31 - 34). These specimens indicate that some bead production using nodules was conducted at the site. Pounding stones of sandstone are spherical and oval in shape. Querns are made of sandstone and have a shallow concave working surface on one side. Only one blade of tan-grey chert (no. 35) has been discovered from Structural Phase 2. It is large in size and retains sickle gross along both longitudinal edges with minute flaking. The balls are made of sandstone and limited in number. Most of sandstone artefacts are distinguished by pinkish surface suggesting a possibility that they were brought from the Kalyana hills, 35 km to the south of the site.

### **Faience objects**

For faience objects, bangles, rings, beads and vessels have been identified (Fig. 24, Fig. 25: middle). As noted above, the number of faience objects increases from Structural Phase 4 upwards, though a few specimens occur in the lower levels. The bangles are predominant through phases and the rings and vessels are limited in number.

The bangles (Fig. 25: nos. 23 - 27) are represented by the thin type and broad type, among which the latter shows a prominent increase from Structural Phase 4 upwards. The broad type is commonly decorated by various incised patterns. In regards to their plan, the heart shape (no. 27) is present along with the circular one.

As to beads (Fig. 25: nos. 12 - 22), various shapes like barrel-shaped, cylindrical, short biconical, truncated globular, floral-shaped or notched around the edge,

compartemented, faceted, V-shaped and disc with vertical and lateral holes have been attested. Most of specimens are blue-green in colour, but a few specimens are red, white, and banded with blue-green/white or red/white. The banded type may have been an imitation of banded agate beads.

The shapes of vessels are indeterminate due to their poor intactness, but some rim fragments have been attested.

### **Bone objects**

Bone objects are represented by points and knives or spatulas. The points are predominant. Whereas some specimens are well polished with a smooth surface, others are roughly finished retaining scraped surfaces. Some specimens are equipped with a tang.

### **Shell objects**

Only three shell objects have been unearthed only from Structural Phases 6 and 7 on MTL-1. All of them are bangles.

### **Copper objects**

As most of copper objects are highly fragmentary in nature, their forms and shapes cannot be ascertained. A few specimens can be identified as chisels, adze and wires (Fig. 26). An object consisting of a sheet and a number of nails is noteworthy, although it is fragmentary in nature. On its reverse side, impressions of wood fibre are intact. The analyses on chemical composition and manufacturing technique have been conducted and their results are reported later in this paper.

### **Gold objects**

Only four gold objects have been identified and all specimens are tiny beads.

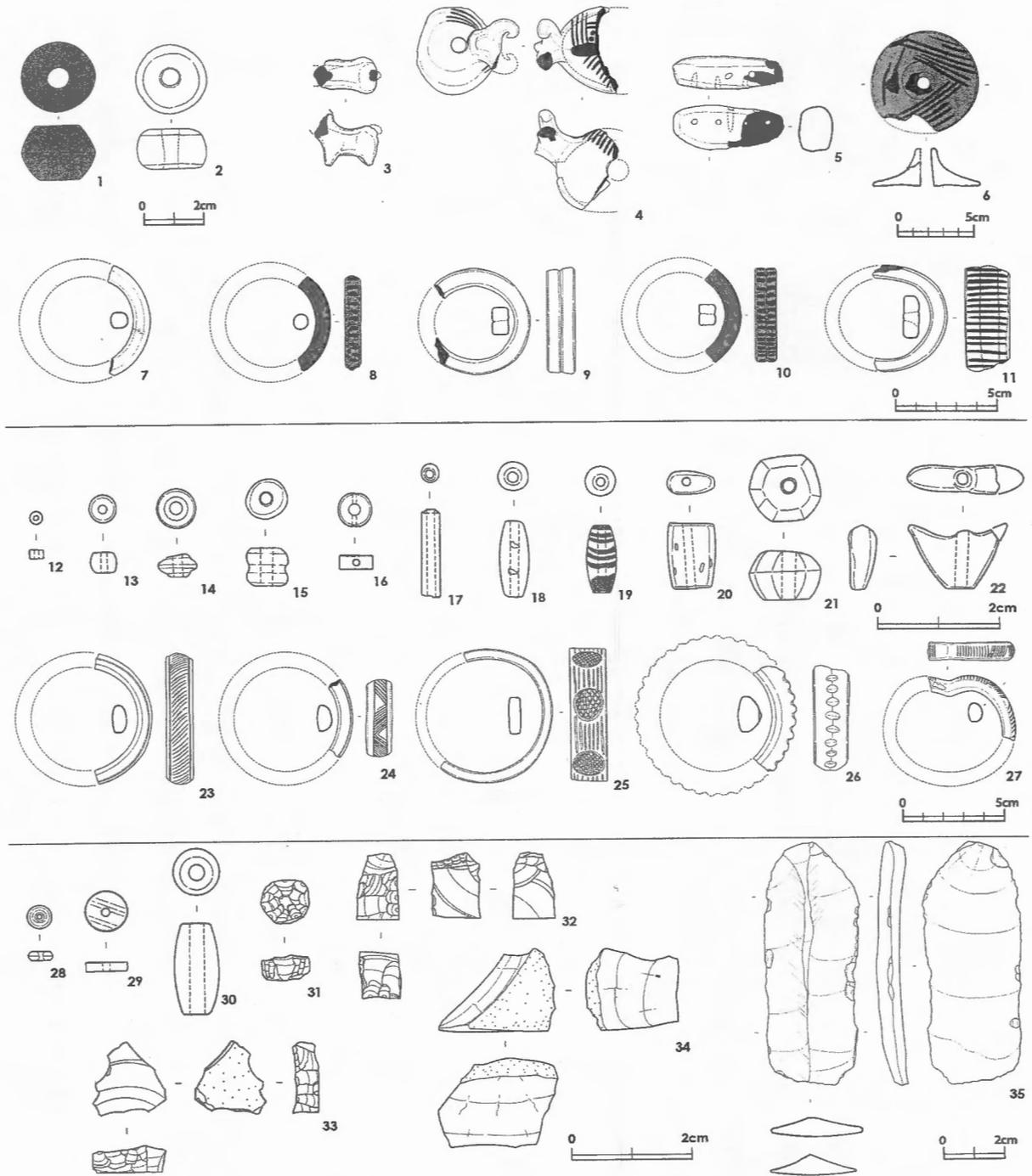


Fig. 25: Representative types of artefacts from Mitathal

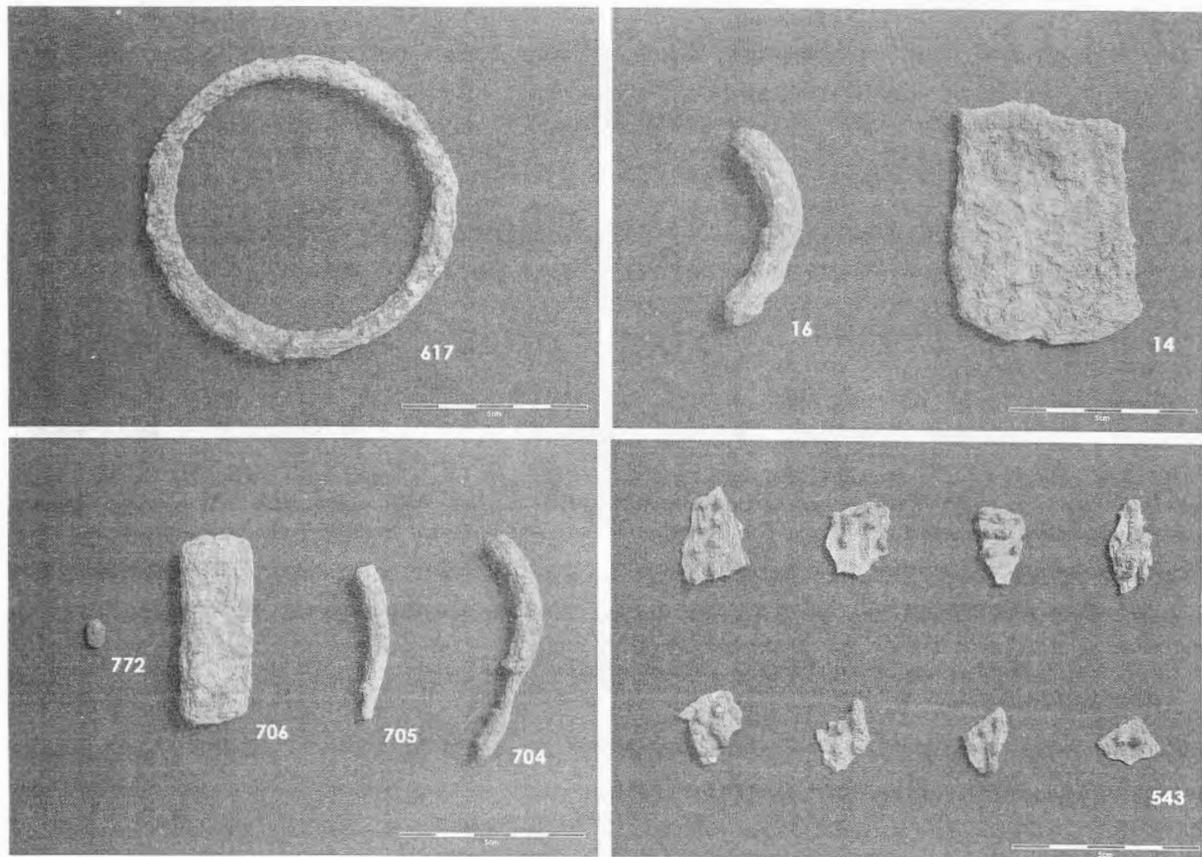


Fig. 26: Representative specimens of copper objects (the numerals are the register no.)

### Metallurgical analysis of copper objects

Copper wares which were excavated from the Mitathal sites have been subjected to chemical analysis and metallographic observation.

### Experimental methods

The objects for analysis were 30 pieces excavated from Mitathal. They are one rod, one axe, 19 bangles, one blade, one chisel and seven indeterminate samples. A small piece was cut from the interior of these objects to observe the uncorroded metal region. These samples were mounted in resin and their surfaces were polished to remove all scratches. The resulting mirror-like surfaces were etched using a solution of

60 ml of ethanol, 10 ml of hydrochloric acid, 30 ml of distilled water and 2 g of ferric chloride. Samples for metallographic observation were examined by optical microscopy (OM) and scanning electron microscopy (SEM). Chemical compositions were quantified by electron probe micro analyzer (EPMA). Quantification analysis was conducted to randomly determined 5 points for each sample.

### Chemical compositions

The major chemical compositions determined by EPMA analysis are shown in Table 2. Most of analyzed samples are made of arsenic bronze containing impurity such as sulfur or iron.

**Table 2:** Chemical compositions of the excavated samples at Mitathal

Reg. no.	Object	Chemical composition ,mass%							note
		S	Fe	Cu	As	Sn	Pb	O	
3	rod	0.2	0.4	97.2	2.1	0.03	0.10	-	
14	axe	0.6	0.5	96.1	2.5	0.02	0.14	-	
16	bangle	0.1	0.5	96.9	2.3	0.02	0.13	-	
20	bangle	0.3	0.5	96.8	2.3	0.03	0.11	-	
21	bangle	0.7	1.4	96.0	1.9	0.02	0.03	-	
22	bangle	0.3	0.5	96.0	3.2	0.01	0.02	-	
23	bangle	0.3	0.1	96.3	3.1	0.01	0.09	-	
24	bangle	0.1	0.7	94.2	3.9	0.01	1.09	-	
25	bangle	0.3	0.1	98.2	1.3	0.02	0.05	-	
26	bangle	0.2	0.2	96.1	3.6	0.01	0.02	-	
27	bangle	0.3	0.1	96.7	2.9	0.02	0.05	-	
28	bangle	-	-	-	-	-	-	-	corroded
29	bangle	0.1	0.3	99.1	0.4	0.03	0.07	-	
30	bangle	0.0	0.1	94.7	3.1	0.02	2.09	-	
31	bangle	0.1	0.4	97.4	1.8	0.02	0.16	-	
33	bangle	-	-	-	-	-	-	-	corroded
35	bangle	0.6	1.1	96.0	2.2	0.02	0.02	-	
37	bangle	0.5	0.6	95.8	3.0	0.01	0.04	-	
40	indeterminate	-	-	-	-	-	-	-	corroded
41	indeterminate	-	-	-	-	-	-	-	corroded
43	indeterminate	-	-	-	-	-	-	-	corroded
45	indeterminate	0.2	0.5	99.2	0.0	0.02	0.03	-	
86	indeterminate	-	-	-	-	-	-	-	corroded
704	bangle	1.0	0.4	94.2	4.3	0.01	0.08	-	
705	bangle	1.0	0.1	94.6	4.2	0.02	0.11	-	
706	indeterminate	-	-	-	-	-	-	-	corroded
950	blade	0.1	0.3	96.8	2.6	0.23	0.02	-	
1112	chisel	-	-	-	-	-	-	-	corroded
1113	indeterminate	-	-	99.5	-	-	0.03	<0.47	re-analysis is needed
1214	bangle	0.5	4.1	93.6	1.8	0.01	0.05	-	

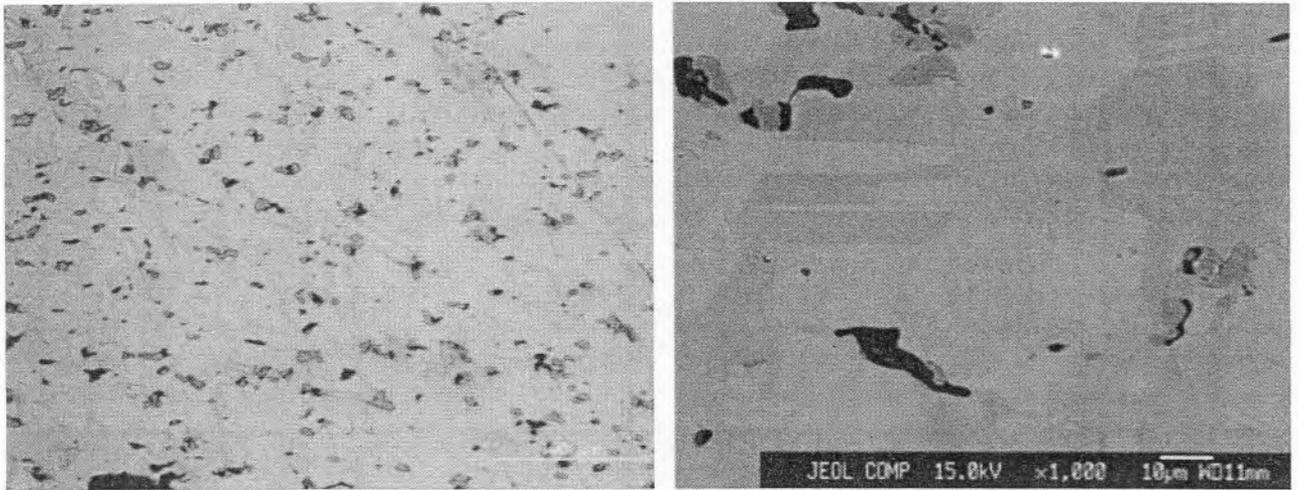


Fig. 27: Optical micrograph (left) and SEM micrograph (right) of the bangle, No.705

<i>Mitathal</i>			<i>Farmana</i>		<i>Harappa</i>
MTL 1	MTL 2	MTL 3	Settlement	Cemetery	
					Period 5 ca. 1800 BCE
					Period 4 ca. 1900 BCE
		ca. 1900 BCE			
Str. Phase 7	Str. Phase 1	Stratum 2			
Str. Phases 2 - 6	Str. Phases 2-3	Stratum 5 ca. 2000 BCE			Period 3C ca. 2200 BCE
Str. Phase 1	Str. Phase 1	ca. 2200 BCE	ca. 2300 BCE	Phase 4	
			Phase 5	Phase 3	Period 3B ca. 2450 BCE
			Phase 4	Phase 2	
			Phase 3	Phase 1	Period 3A ca. 2600 BCE
			Phase 2		
			Phase 1 ca. 2500 BCE		
					Period 2

Fig. 28: Tentative chronological chart of Mitathal and other sites

### Microstructure and fabrication processes

Microstructure observations to determine the fabrication process were carried out. Figure 27 shows the microstructures of the bangle No. 705. The matrix was a polygonal  $\alpha$ -phase with annealing twins. The granular phases correspond to  $\text{Cu}_2\text{S}$ , due to the presence of sulfur as an impurity. This bowl was made by forging a cast metal plate and subsequent annealing.

### Summary

At Mitathal where the cultural deposits are still intact for more than 10 hectares in spite of ongoing destruction, the excavated area is too small to reconstruct the overall picture of the site. However, the results that have been obtained from the excavations can provide basic facts of the site and foundation for further research. The following points can be summarized as hypothetical observations at the site.

1. The occupation at Mitathal started around 2200 BCE and continued to 1900 BCE or some later date (Fig. 28). These dates for the occupations at the site suggested by  $^{14}\text{C}$  dates can be corroborated by stylistic and typological studies on artefacts. The dates and features of artefacts point to the occupation period later than the settlement at Farmana, which can be dated to the early part of the Mature Harappan period or 2500 BCE to 2300 BCE. For example, the ceramics from Mitathal exhibit the later developments of the Harappan and local pottery compared to that of Farmana and the developments leads to the Bara pottery which is generally placed in the Late Harappan period.
2. It is likely that the mound of MTL-1 was enclosed by mud-brick walls (Manmohan Kumar *et al.* 2011), although enough work has not been conducted. However the presence of the levelling layer over mud brick walls, which is similar to the levelling

layer attested in the trenches A4 SE and A6 SE, may indicate that the enclosure walls were destroyed by this phase or that the walled area were extended from the original area. Further work should be conducted in order to reveal the relations between the enclosure walls and occupational activities.

3. The excavations in 2011-12 have revealed two phases of occupations, among which the lower occupation level is represented by mud brick structures and the upper level is distinguished by the absence of mud-brick structures. Only pits were exposed at the upper level. The same pattern of change in structural remains was partially confirmed in MTL-1 as well. Based on these evidence, it can be presumed that mud brick structures arranged with streets and lanes formed an urban settlement until around 2000 BCE, but such urban settlement came into disuse by 1900 BCE due to some reason. It indicates a fundamental change of life style of people at the site and of the nature of the settlement.
4. As indicated by the increase of faience ornaments in the upper levels, a change in material of ornaments from stone to faience can be presumed. Taking into consideration that the stones used for ornaments were not available in the vicinity of the site but were imported from distant sources (Law 2011), the increase of faience ornaments may suggest that the trading networks may have changed in the late phase of the Mature Harappan period towards the Late Harappan period.

### Acknowledgements

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