This appendix is an extract from the recently concluded excavation report prepared by the Department of Archaeology, University of Calcutta for publication. Since, I am one of the authors of the said report, I have been allowed to include the said excerpt in my thesis.

Excavation at Dihar was resumed in 2012-13 by the Department of Archaeology, University of Calcutta under the supervision of R.K. Chattopadhyay.

The Manasatala mound, which in the previous season (2008-09) unearthed significant evidence of metal working activities associated with early historic and early medieval as well as medieval ceramic assemblages has again been chosen for the present season. The search for metal-working activities in the EVF phases and the identification of the core and the peripheral zones of this ancient settlement encouraged us for further excavation at this particular mound.

The principal objectives of the present excavation have been enumerated below.

1. To investigate the nature of occupation and the habitational character of the Manasatala mound (DHR 3) and to identify the cultural sequence. 2. To identify the metal bearing occupational layers of the mound and to determine the distribution pattern and the characteristic features of metal working in different occupational layers. 3. To interpret the changing contexts of different occupational layers/deposits associated with BRW from the pre-metallic EVF phases to the historical period (Malla period). The layout of the trenches was made in accordance with the elevation of the mound as well as its gradient in relation to the ‘presumed palaeo-channel’. The horizontal method was followed and each trench measured 6m x 6m with 50 cm baulk on each side. Due to a limited time schedule and the scarcity of funds, excavation was restricted to one or two quadrants at all the trenches.

ZB1 was selected at the highest point of the existing mound as most of the north-western part of the mound has been encroached by modern habitation.

A1 was selected at the westernmost part of the existing mound.

D2 lies at the lowest elevated point of the mound almost touching the ground level. Hence, this trench was laid at the peripheral part of the mound.

C1 lies at the central part of the existing mound.

Excavation at the trench ZB1 was initially confined in the north-western (quadrant 1) and south-western (quadrant 4) quadrants. After the surface layer was cleared a layer of weathered hard clayey soil mixed with sand having habitational deposit was found. From the depth of 15 cm onwards, a clayey silty layer mixed with sandy soil had been noticed. Ceramics of the Late Medieval period viz. sherds of red ware, ill-fired with medium/thin
sections, were found in large numbers. Significantly, a matrix of ceramics containing a considerable number of sherds mainly of the central parts of vessels (apparently moderate in size) which outnumber those of the rim portions occurred here. A few pieces of brick bats and cut bones along with other left-outs of habitational refuse recorded at this level, added to the findings of the historical period.

From a depth of 38 cm onwards, the undisturbed deposits of cultural remains yielded several courses of occupational layers that were primarily related to metal working activities. Evidence of burnt earth in patches, large chunks of slags, relatively thick ashy layers suggesting a considerable duration of firing activities deserve special mention. The presence of charcoal and other associated findings also confirm large scale metal working activities (workshop). This essentially corresponded to what was encountered in the last field season at the concerned mound. The occurrence of decomposed soil in the same area, besides, habitational debris indicates that the metal workshop was attached to a habitational complex of the metal workers. An outline of a hearth was exposed on the eastern section of ZB1. Unfortunately, the plan of that hearth or furnace was partially recovered as it continued in the other trench which remained unexcavated. A large scale accumulation of slags and other findings related to metal working for a considerable period of time, besides, patches of burnt earth often coated with metal wastes were encountered at the western section. It may not be unwise to record that we have also identified another similar hearth, presumably associated with the said metal workshop. It is worth mentioning here that all these remains had association with BRW which first appeared in a large number from a depth of 20 cm onwards. The presence of sherds of red ware (of different shapes and fabrics) in all these cultural assemblages found in different layers is a noteworthy feature. Both BRW and red ware are the major ceramic types used in the above cultural successions. Interestingly, the coarse texture of the unique shapes in BRW hints to the fact that, these types were exclusively used for metal working.

What has been carefully noticed during the course of excavation is the occurrence of a substantial number of pigment ores found along with cultural assemblages recorded in different periods/phases. These pigment ores, in all probability, were locally procured. Moreover, the presence of pigment stains either on potsherds or on the working place associated with the potters’ workshops suggests pigment preparation activities. The discovery of extensive metal working (both copper and iron) activities in the same area established the relationship between the potters and metal workers. Iron ore was also used for the preparation of pigments. One must keep in mind that mere presence of evidence related to the extraction process of metals and the presence of large scale finished products
including the tools, crucibles and other objects, the site could be considered as being
definitely related to work shops of finished products (i.e., secondary metal working).
Unearthing of stone objects probably used for rubbing the smelted metals (finished objects)
also corroborate the same. Similarly, the presence of pigment ores suggests the preparation
of slips applied on different types of potteries. Furthermore, the large scale evidence
associated with habitation left-outs in the form of bone remains (cut bones, worked
bones, charred bones) and decomposed earth consisting of food refuse along with fodder
remains, in association with the above (i.e., metal workshops, pottery manufacturing,
ppigmentation work) apparently demonstrate that the ancient settlement was a well
integrated one (habitation area or unit along with workshops related to their subsistence
economy), at least at this stage. Other household objects like beads, metal ornaments, tools,
game objects, etc. recovered from the same area, substantiate the habitationaonal character.
At the depth of 53 cm, traces of rammed floor have been detected over an area of 1.55 m x
2.30m. However, active erosion possibly for a longer duration affected the evidence related
to the nature of occurrence of assemblages as well as the habitationaonal character of that
particular phase. The exposed area partially revealed a mud floor which was rammed with
husk, straw and occasionally with bits of potteries. Traces of cow dung coating also
suggest a day-to-day maintaing of the mud floor. In the north-eastern part of ZB1, a
concentration of sherds of red ware of different types and fabrics, besides the continuation
of sherds of BRW variety, cut and worked bones, slags and some other diagnostic types of
artefacts suggest their association with the pre-Gupta/Gupta period. A few sherds of red
ware unmistakably the pottery types of the Gupta period were recorded. However, C14
dates are required to confirm this tentative periodization.
At the depth of 58 cm, a pit had been detected at the northern section of the quadrant 1.
The pit was full of large sherds of BRW along with red slipped ware, grey ware and dull
grey ware. Other associated findings include terracotta, worked bones, besides, cut bones.
At the depth of 60 cm, a rammed floor covering an area of about 70 x 65 cm was detected
in the south-western corner of quadrant 4. The assemblages recorded here have similarities
with those found at a depth of 53 cm (mentioned above). After reaching the depth of 60
cm, we changed our excavation strategy and opted for brisk digging (‘deep digging’). The
digging work was continued after a depth of 60 cm at a single quadrant (quadrant 1) to get
a complete form of a habitationaonal floor. At this stage it was noticed that sherds of BRW
dominated the ceramic assemblage followed by red ware, black ware, etc. There are some
potsherds with stains of cow dung.
The evidence from the trench A1 has also betrayed the same features. Excavation at A1 was initially conducted in the south-eastern (quadrant 3) and south-western (quadrant 4) quadrants. The surface layer was found to be of weathered hard clayey soil having particles of manganese and sand, droplets of iron, besides, bits of potsherds and other occupational debris. At the depth of 32 cm, a compact clayey blackish layer with habitational remains was exposed. A heap of large sherds of BRW mixed with a few specimens of red ware was found in the south-western quadrant and probably this place was used as a dumping area. Evidence of burnt earth in patches, large chunks of slags, ashy layers, besides, a few finished objects made of copper and iron are the findings which suggest large scale metal working activities. This habitational matrix corresponded to what was encountered at ZB1, from about the same depth. A major difference noticed in this trench is that the finished objects in copper and iron outnumber those unearthed from ZB1.

At a depth of 42 cm, evidence of broken crucibles, burnt earth in patches, the remains of a hearth having a coating of smelted metals, large chunks of slags, besides, BRW, red ware, black ware and grey ware have been recorded from an area of 74 x 80 cm. Obviously, this area provided a complete picture of ancient metal working.

From a depth of 58 cm onwards, we encountered several courses of occupational deposits yielding evidence of burnt earth in patches and ashy layers with considerable amount of charcoal and worked bones and cut bones, besides, large potteries and traces of floor levels. There are definite indications of habitational activities. The eastern section of the trench exposed burnt earth in patches, remains of a furnace with a coating of smelted materials, besides, slags and ashy layer. It is quite apparent that this area was again associated with metal working activities. It has been observed that with a regular interval, such activities can be encountered. What is remarkable is that a few sherds of red ware (possibly the rim, body and base parts of the same vessel) were recorded from a depth of 58 cm at A1, and similar sherds were found from the dumping area of ZB1 (at the same depth of 55-58 cm). These particular sherds from both the trenches were subsequently reconstructed resulting in a medium sized tub that resembles the so-called marble vessel. This pottery is a unique find. In both the trenches, at about the depth of 58 cm, we apparently encounter the same occupational level associated with both habitational and metal smelting activities. The dumping area in the northern part of ZB1 was actually a part of this level.

After a depth of 74 cm, excavation was continued in a single quadrant (quadrant 3) only. Successive occupational levels yielded potsherds some of which bear cow dung stains, a
large concentration of slags, chunks of charcoal, worked and cut bones, beads, bone objects, antimony rods, etc. A fragile floor level bearing traces of coatings of cow dung, ashy patches and charcoal was detected.

From a depth of 100 cm onwards at ZB1, there is a marked decrease in the number of sherds of BRW, red ware, black ware, etc. Here, a habitational matrix was encountered in which sherds constituting the central parts of vessels/pots in BRW outnumbered the sherds of that of the rim portions. The occurrence of black slipped pottery of different types deserves special mention. This trend continued to a depth of 120 cm.

From a depth ranging between 121 and 130 cm, there is a definite decrease in the number of sherds constituting rim portions of different pottery types. Loose soil and meagre cultural remains indicate a change in assemblages. Another noticeable character of the occurrence of artefacts in form of assemblages between the depths of 70 cm to 130 cm is that the successive layers yielded a fixed pattern of findings comprising antimony rods, other copper and iron objects, beads of semi-precious stones, ground-stones, terracotta balls, bone tools and game objects in good numbers. Apparently, this pattern suggests the economic status of the period concerned and is a clue to consider the involvement of the settlement in the procurement network operating between the plateau and the plain and the eastern littorals.

At the depth of 130 cm, a substantial amount of mica was recorded from the south-eastern corner of the quadrant 1. Possibly, this mica was procured from the nearby areas by the potters for their use.

At A1, from the depth of 110 cm onwards, there is a definite decrease in the number of ceramics. Loose soil and meagre cultural remains indicate a change in the cultural layer. At the depth of 118 cm, traces of a rammed floor and a post-hole were detected. It appeared that the floor extended towards the southern part of the mound which remained unexcavated. The floor has the appearance of compact blackish soil with yellowish patches and exhibited in situ occurrence of a few ceramics and a basin in red ware. Between the depths of 118 cm and 141 cm, successive occupational levels yielded large amounts of charcoal, cut and worked bones, potsherds, a solitary specimen of iron object and a few beads.

The habitational remains of the pre-metallic EVF phase have been encountered from 144 cm below.

Besides the above, trenches D2 and C1 have also yielded similar evidence.
The composite stratigraphy of the Manasatala mound is based on the evidence found from trenches ZB1 and A1. This composite stratigraphy is as follows:

Layer 1, depth from top ranging from 3 cm (minimum depth) to 4 cm (maximum depth), humus/top surface, disturbed, apparently Late Medieval.

Layer 2, depth from top ranging from 12 cm (minimum depth) to 34 cm (maximum depth), Historical/Early Medieval.

Layer 3, depth from top ranging from 32 cm (minimum depth) to 82 cm (maximum depth), Historical/Early Medieval.

Layer 4, depth from top ranging from 61 cm (minimum depth) to 105 cm (maximum depth), Early Historical.

Layer 5, depth from top ranging from 115 cm (minimum depth) to 144 cm (maximum depth), Metallic EVF.

The presence of metal working activity at the mound of Manasatala is well attested by the evidence, unearthed from the previous as well as the present excavations. However, one may encounter certain difficulties while unfolding the occurrence (in its proper context) related to metal smelting (both primary and secondary). The process of converting iron rich ore to an ingot and finally into a workable object requires a series of steps. Each function at least partially modified the previous equipment set up. Thus the evidence associated with earliest stages of the process is certain to be blurred, if not totally obliterated by later steps. In fact, it will be the very last part of the whole process which will alone remain as evidence. The smelting process itself may result in significant damage to the furnace. Conversely, the waste products from smelting, i.e., slags will survive for a prolonged duration without marked changes. It is quite certain that, the present evidence is not an exception to this. As mentioned earlier, several occurrence in form of burnt clay with coatings of smelted wastes, ashy soil, charcoals, profuse quantities of slags and terracotta crucibles with in situ occurrences of metal artefacts have been recorded during the present excavation. The finished objects encountered during excavation include rings, antimony rods, pieces and nodules besides a few indeterminate objects, made of copper. The iron objects/artefacts recorded during the course of the present digging work comprise pieces of iron nails, clams, lumps/nodules of iron and a few unidentified iron objects. However, the corroded condition of most of the iron objects recovered so far is a major constraint to understand their probable use. At the present stage of understanding, especially in absence of technical studies of metal artefacts, it is really difficult to give any positive remarks on 1) the probable sources of raw materials from which metals, particularly copper was
2) techniques employed in the extraction of metals and the quality of metals extracted. 3) The process employed for the production of usable artefacts from the extracted metals in form of ingots. However, in the present discourse, some general observations have been made on the morphological character of metal tools and their contexts. However, the location of Dihar amidst raw material bearing areas leads us to believe that the locally available raw materials were exploited by the metal workers of Dihar. Iron fragments and slags and obviously profuse number of metal droplets along with fragile evidence of furnaces hardly suggest the presence of a rudimentary form of iron working activities. One is bound to feel that the occurrence of a finished tool at the depth of 166 cm (from the reference peg) i.e., 136 cm from the surface, may push back the antecedent stage of metallic EVF phase. Since, during the previous season of excavation, metallic EVF phase has been dated to 1400/1300 BCE (on the basis of the C14 date of 1300 BCE±168) and charcoal samples were collected from the depth of 109 cm.

However, we ourselves in face of the incompleteness of the record would not dream of suggesting whether the use of iron noticed at Dihar was due to diffusion or the technology was independently achieved. There is obviously much more for us to learn about the findings of the eastern Indian plateau and its adjoining areas of Mahanadi valley and south Bihar plateau-plain which had a wide distribution of the so called Asura metal working sites. The evidence of iron workings at several excavated and explored sites of the Kaimur hills, the Chhotanagpur plateau, the Mahanadi valley and the Damodar-Dwarakeswar valley suggests the tradition of metal working activities which continued for generations in the plateau region and the plateau-plain interactive zones. Dihar was definitely a significant part of the said development. The contribution of plateau environment, forest folks and their archaic metal working tradition in the woodland areas (easy accesses to the iron ore bearing zone and availability of fuel) certainly influenced and guided the Dihar situation.

1. A broken specimen of indeterminate use exhibiting skilled workmanship was recorded from trench A1 at the depth of 1.60m (from reference peg). It can be identified as a tool (looks like a hook) used for harvesting aquatic plants or for bush clearance. This corroded specimen has considerable thickness. The tang portion is broken and the diameter of the specimen is 5.6 cm. The morphological character and the context of this specimen require some discussion. Its weight and shape suggest one to identify it as a ‘heavy-duty’ tool. Only a skilled metal worker would be able to produce such an elaborate tool (Antiquity No. 307).
2. An unidentified specimen was reported from trench C1 at the depth of 67 cm. The working edge is flat and thin. This could be identified as a broken chisel of which the tang portion is broken. The length of the extant portion of the specimen is 3.4 cm (Antiquity No. 279).

3. An indeterminate specimen has been reported from trench D2 at the depth of 65 cm. The working edge of the specimen is thin and flat and could be identified as a chisel. The length of the specimen is 5.3 cm (Antiquity No. 175).

4. An iron object of indeterminate use was recorded from trench C1 at the depth of 75 cm. It has a flat appearance and can be identified as the broken part of a chisel (Antiquity No. 394).

5. A weathered specimen of nail has been unearthed from trench D2 at the depth of 80 cm. The head portion is flat with a trapezium shaped section and the point is very tiny and sharp. However, it is quite probable that this specimen was reused a number of times, as a result of which the original shape became distorted. The length of the specimen is 6.6 cm (Antiquity No. 202).

6. A weathered specimen of nail has been recorded from trench ZB1 at the depth of 26 cm. The head portion is thick with a roundish cross section and the point is broken. The specimen gradually broadens towards the head. The length of the specimen is 4.6 cm (Antiquity No. 4).

7. Yet another weathered specimen of a nail was found from trench ZB1 at the depth of 38 cm. Its head portion is thick and broad and the remaining portion gradually becomes narrower towards the point. However, the point is not sharp. The upper portion of the specimen is slightly bent. The length of the specimen is 5 cm (Antiquity No. 45).

8. Two specimens of iron nails have been recorded from trench D2 at the depth of 65 cm. Object 1: It is a weathered specimen of nail. The head portion is broken. Thus, the shape of the cross section of the head is difficult to determine. The specimen is quite straight and the point portion is slightly bent. The length of the specimen is 7.3 cm. Object 2: This is a complete specimen of a nail. The broad head of the specimen has a roundish cross section. The remaining portion is much thinner than the head. However, the remaining portion has maintained more or less a similar thickness with an oblong section. The point is slightly bent. The length of the specimen is 5.9 cm (Antiquity No. 177).
9. A corroded specimen of nail was unearthed from trench D2 at the depth of 37 cm. The specimen has a squarish cross section. The head and point are broken. The length of the specimen is 5.8 cm (Antiquity No. 94).

10. A specimen of indeterminate use was found from trench ZB1 at the depth of 49 cm. This broken weathered specimen of oblong shape is quite broad and thick and was probably the upper portion of a spear head (Antiquity No. 79).

11. A weathered specimen of iron rod with a roundish cross section has been reported from trench D2 at the depth of 46 cm. The length of the specimen is 19.5 cm (Antiquity No. 117).

Besides, three specimens of indeterminate use have also been reported.

**Descriptions of selected potsherds illustrated below:**

**Black and Red Ware:**

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<th>Sl. No.</th>
<th>Description</th>
<th>Drawing</th>
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<tr>
<td>1.</td>
<td>DHR/A/1/42cm(Historical /Early Medieval): BRW; fragment of a bowl; incurved rim with a groove on the exterior surface; slightly thickened on the neck portion; medium fabric, well-fired; Traces of cow dung on both the surface; red slip on the exterior surface, black slip on the interior surface.</td>
<td><img src="image1.png" alt="Drawing" /></td>
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<tr>
<td>2.</td>
<td>DHR/ A/1/42cm( Historical /Early Medieval): BRW, fragment of a storage vessel; out-turned rim; concave neck with pronounced carination; flaring mouth; evidence of groove both on the interior of the rim and on the neck portion; coarse fabric; medium fired; slip on both surfaces.</td>
<td><img src="image2.png" alt="Drawing" /></td>
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3. DHR/ZB/58cm (Historical/Early Medieval): BRW; Fragment of a Shallow bowl; short in-turned rim with the evidence of grooving on the interior surface; convex flaring sides; medium fabric; medium fired; section shows the traces of husks; red slip on the exterior surface; traces of cow dung on both the surfaces.

4. DHR/A/58cm, (Historical/Early Medieval) BRW; fragment of a miniature pot; splayed out rim with rounded edge; convex sides; carination on the neck portion; grooving on the interior portion of the rim; coarse fabric; well fired; chocolate coloured slip on the exterior and black slip on the interior surface.

5. DHR/A/58cm, (Historical/Early Medieval), BRW, fragment of a carinated handi; out-turned rim; carination just below the neck; bulging body probably with a rounded base; medium fabric; medium fired; red slip on the exterior surface.

6. DHR/ZB/58cm, (Historical/Early Medieval); BRW; fragment of a jar; out-turned rim with grooving; carination just below the neck portion; medium fabric; medium fired; red slip on the exterior surface.

7. DHR/ZB/58cm (Historical/Early Medieval); BRW; fragment of a jar; out-turned externally thickened rim; grooving on the rim; medium fabric; medium fired; red slip on the exterior surface.
8. DHR/D2/85cm (Early Historical); BRW, fragment of a deep bowl/tumbler; everted featureless rim; flaring mouth; a ridge on the interior part of the neck portion; flat base; medium fabric; well fired; slip on the exterior surface.

9. DHR/D2/85cm (Early Historical); BRW, fragment of a deep bowl/tumbler; everted featureless rim with rounded edge; flaring mouth; a ridge on the interior part of the neck portion; flat base; medium fabric; well fired; slip on the exterior surface.

10. DHR/ZB1/140 cm (Metallic EVF), BRW, fragment of a bowl, featureless rim with rounded edge; flaring convex sides; groove on the interior part of the rim; medium fabric, well fired; slip on both the exterior and the interior surfaces; painted designs comprising strokes arranged in four rows are depicted on the interior surface.

Red ware:

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1. **DHR/D2/65cm (Early Historical)**; red ware; fragment of a jar; externally thickened beaked rim; medium fabric; medium fired; red slip on the exterior surface and the interior rim portion; mica is visible on the interior surface of the jar.

2. **DHR/A1/90 cm (Early Historical)**; red ware; fragment of a shallow bowl; thickened out-curved rim; with the evidence of grooving on the interior surface just below the rim portion; fine fabric; medium fired; red slip on the exterior surface and the interior rim portion; mica is visible on the interior surface of the jar.

3. **DHR/D2/110cm (Early Historical)**, red ware; fragment of a bowl; featureless rim probably with sagger base; medium fabric, well fired; slip on both the exterior and the interior surfaces; painted design comprising three line is depicted vertically from rim to base.

4. **DHR/A1/118cm (Metallic EVF)**; red ware; fragment of a basin; out curved rim and flaring sides; course fabric; medium fired; two incised lines occur below the neck portion; mica appears on the exterior.
surface.

5. DHR/A1/128 cm (Metallic EVF); red ware; fragment of a carinated handi; constricted neck and beaded rim; medium fabric; well fired; five incised lines and a design on the shoulder portion; traces of cow dung on both the surface; red slip on the exterior surface.

Black Ware:

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<tr>
<td>1.</td>
<td>DHR/A1/58cm, (Historical/Early Medieval); black ware; fragment of a carinated dish; externally bulbous rim with pronounced carination; fine fabric, well fired; both the exterior and interior surfaces have slip.</td>
<td><img src="image1.png" alt="Drawing" /></td>
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<tr>
<td>2.</td>
<td>DHR/ C1/ 88 cm (Early Historical), black ware; fragment of a miniature bowl; featureless rim with convex sides; flat base; fine fabric; well fired; presence of mica on both exterior surface and the interior surfaces.</td>
<td><img src="image2.png" alt="Drawing" /></td>
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<tr>
<td>3.</td>
<td>DHR/ C1/ 88 cm (Early Historical); black ware; fragment of a dish; incurved featureless rim; convex sides with uniform thickness; medium fabric; well fired; burnished on both the surfaces.</td>
<td><img src="image3.png" alt="Drawing" /></td>
</tr>
</tbody>
</table>
4. DHR/ A1/ 136 cm (Metallic EVF): black ware; fragment of a miniature pot, beaked out rim (out-turned rim) convex sides and sagger base; medium fabric; well fired; black slip on the exterior surface; traces of cow dung on both the surfaces.