INDIAN ARCHAEOLOGY 2013-14

– A REVIEW

INDIAN ARCHAEOLOGY 2013-14 – A REVIEW

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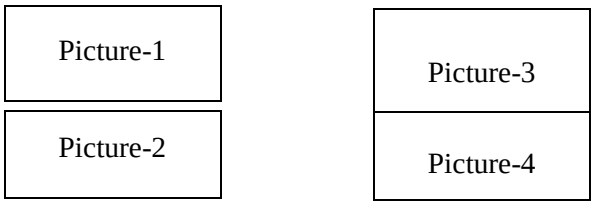

Front Cover**:** *1: Trial Excavation, Talagunda: Mahamandapa with lion balustrades*

2: Trial Excavation, Talagunda: Inscription on the south side

` ***Back Cover:*** *3 & 4: Viramgam: before and after conservation of Mansar Talav and Shrines*

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INDIAN ARCHAEOLOGY 2013-14 – A REVIEW

I. EXPLORATIONS AND EXCAVATIONS

BIHAR

1. EXCAVATION AT LAURIYA ARERAJ, DISTRICT EAST CHAMPARAN, BIHAR

The Excavation Branch, Patna of the Survey carried out excavation at Lauriya-Areraj under the direction of K.C. Srivastava assisted by J.K. Tiwari, Ashish Kumar, Niraj Kumar Mishra, S.P. Gupta, Raman Kumar, R.N. Yadav, Dhananjay Kumar and O.P. Panday. The site (26°33'0" N; 84°38'51"E) is situated about 138kms north of Patna, the state capital and 26km west of Motihari, the district head quarter of East Champaran. The village Lauriya is famous for Asokan Pillar containing I to VI Edicts of Asoka. The pillar is situated close to the east of the village and is locally called as Laur or Phallus of Siva and is worshipped as such. No antiquarian findings other than the pillar were reported earlier from this site. Hence, with a view to examine the cultural sequence and to unearth the structural or other remains, if any, the excavation was carried out in a very limited protected area.

All together twenty four trenches have been opened. A monastery has been exposed on eastern side of Asokan pillar. It consists of a central courtyard, surrounded by cells on all four sides and a platform in its centre. The opening of the cells is towards courtyard. North-south width of the monastery has been measured 17·8m; whereas east-west orientation being the length could be traced upto 16·8m only. Rest part is still buried under modern habitation extending beyond the boundary wall of the site. It has been exposed up to 09 courses of bricks above the working floor. Width of the wall is 90cm. Inner measurement of north-western cell is 4·8 x 3·2m, north-central cell is 4·75 x 3·20m, south-western cell is 4·8 x 3·65m, and south-central cell is 4·65 x 3·65m. Entrance to this monastery is on western side. The central chamber on the eastern wing is a small shrine with 1·2m wide passage all around. Inner dimension of this shrine is 2·90 x 2·00m having a pedestal with moldings on its eastern arm probably meant for an image. The courtyard measures 8·6m in east-west alignment and 7·5m in north-south alignment. In the centre of the courtyard, remains of rectangular platform measuring 4·3 x 2·5m are also found. The brick paved floor of monastery is covered with a rammed floor of brick jelly and surkhi.

Water from the courtyard was discharged through an under ground drain covered with bricks which passes through

the north- central cell. Approximately, seven meter long drain passes through trench K_3 Qdt. IV and K_4 Qdt.II. Width of the drain is 16cm, whereas the depth be 10cms. Foundation of the monastery has been traced up to 18 courses at trench J_3 Qdt.-III.

On western side of the Asokan pillar remains of a clumsy group of small structures in the form of cells, walls, brick paved floors, etc. have been noticed. Various sizes of bricks have been used in these structures *viz*. 47 x 29x 6cm, 45 x 29 x 6cm, 46 x 29 x 6cm and 34 x 29 x 5cm. These are left with three four courses only and even one course at few places. A circular brick structure with diameter of 5·5m and 13 courses has also been, revealed in trench A_5 Qdt. I and II. A well (outer dia 1·83m and inner dia 1·43m) has also been found in trench XA_5 Qdt.-III about 1·0m below the present ground level traced upto 5 courses. Interestingly, it is made of curved baked bricks having outer length 38cm inner length 31cm, breadth 18cm and thickness 12·5cm. These hazy structures are having hardly two to three courses below the paved floor and some times raised above the floor without foundation. It indicates that these were not meant for supporting heavy super structure and hence may be remnants of votive stupas or small platforms etc.

Potteries retrieved are predominantly red ware and red slipped ware while limited quantity of tiny sherds of black slipped ware and grey ware have also been found. Red ware potteries are both in plain and decorated variety. Decorations are executed on the outer surface of the potteries by punching or incising floral and geometrical pattern. As far as the shapes are concerned, vases, *handi*, bowls, storage jars, handled pots, lids and sprinklers are noteworthy. Black slipped ware and grey ware are too tiny to ascertain the shape.

The antiquities revealed from the excavation are quite meagre in number including terracotta snake hood, beads, wheels and sling balls etc. The ceramic industry as well as other associated cultural remains, suggest its date ranging from 1st century BCE to 3rd century CE.

Literary and archaeological evidences indicate that the site was on the trade route connecting Vaishali to Lumbini *via*. Kesariya, Areraj, Lauriya Nandangarh and Rampurva. The construction of Areraj monastic complex at Areraj during Sunga-Kushana period was probably due to proximity to the trade route, which was an important route during the time of Mauryan emperor Ashoka too as evident from the pillar installed by him at this spot (Pls. 1-6 & Fig. 1).

2. EXPLORATION IN DISTRICT NALANDA, BIHAR

The Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, Varanasi under the direction of Gautam Kumar Lama on behalf of the Centre of Advanced Study, with the assistance of Arun Kumar Pandey, B.K. Sinha and Pankaj Kumar carried out exploration at Nalanda and its vicinity.

Keeping the ruins of Nalanda as reference point more than 100 villages in the district and its vicinity were surveyed (Fig. 2-5). A brief report of the explored sites

having archaeological potential is given below:

Site Name	*Airial Distance in Meters*	*Mean Sea Level in Meters*
Ashathan (Ghosrawan)	14215.38	59.727
Begampur	1368.01	59.657
Chandi Mau	10462.88	73.947
Dhurgaon	20413.22	59.234
Dhurgaon 1	20688.34	53.483
Ghora Katora (Giriyak)	14844.24	80.871
Ghosrawan	14622.55	70.727
Giddhi Pokhar	2467.95	59.351
Juafer Deeh	1509.35	70.405
Kul	3064.8	64.986
Lodipur	2485.52	56.689
Nalanda Ruins	0	60.455
Nanan Gate	7751.3	65.411
Nanan 1	7936.85	69.757
Nanan 3	7959.23	58.88
Nanan 4	7328.36	55.629
Nava Nalanda Mahavihara	771.57	55.967
Rukhamani Sthan	1924.05	61.983
Xuan-Zang Memorial Hall	1557.35	60.238

Table-1: Measurements of different sites at Nalanda with reference to the Nalanda Ruins.

Site Name	*Airial Distance in Meters*	*Mean Sea Level in Meters*
Bimbisar Jail	15662.55	114.926
Bimbisar Palace	15753.9	117.784
Jivakamravana	15534.89	115.573
Maniyar Math	14979.22	96.489
Sonabhandar Caves	14808.36	88.416
Venuvan	13700.24	73.17

Table-2: Measurements of different sites at Rajgir with reference to the Nalanda ruins.

Plate 1

a

b

Lauriya-Areraj: a; General view of the site and b; General view of the site (western side).

Plate 2

a

b

Lauriya-Areraj: a; General view of the site (Eastern side) and b; Rammed floor on brick pavement.

Plate 3

a

b

Lauriya-Areraj: a; Pedestal in shrine chamber of monastery and b; Brick paved central platform in courtyard of monastery.

Plate 4

Lauriya-Areraj: Drain of monastery.

Plate 5

a

b

Lauriya-Areraj: a; Terracotta objects (Snake hood, beeds, sling ball and wheels) and b; Grey Ware and Black Slipped Ware.

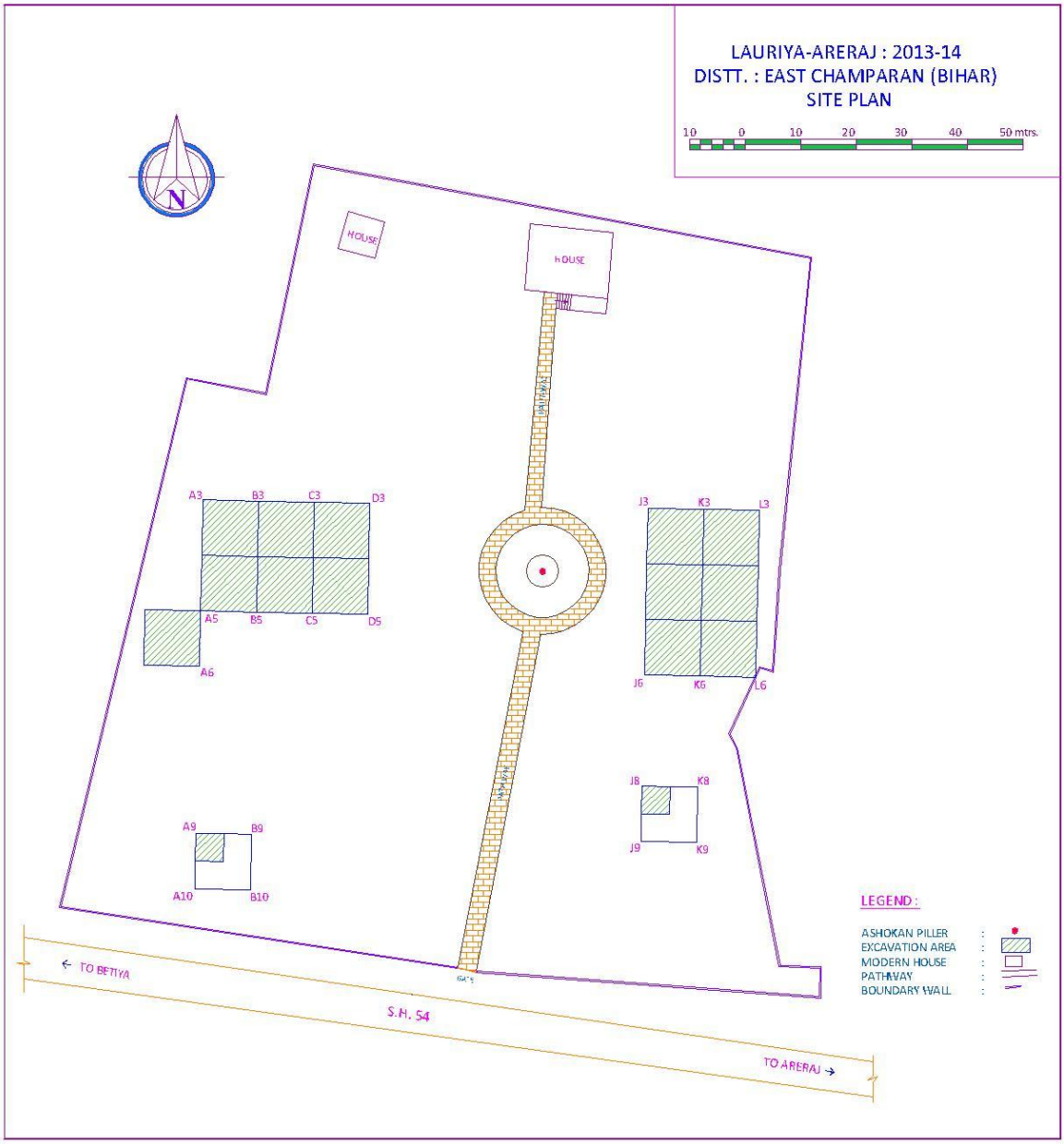
Plate 6

a

b

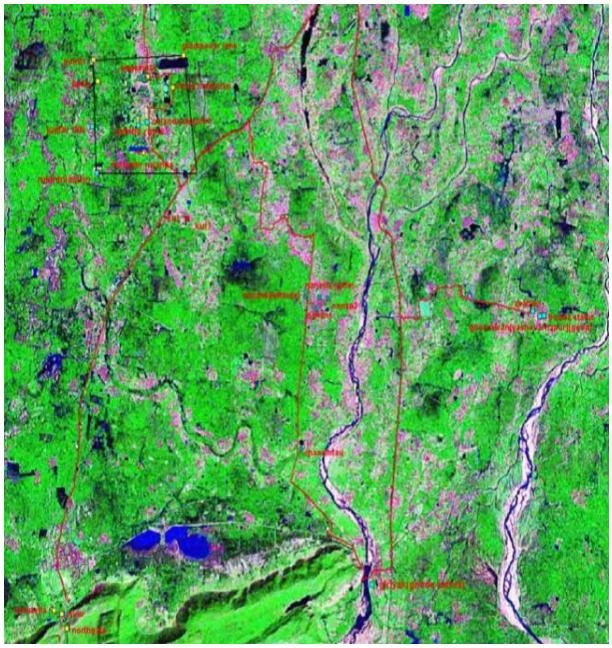
Lauriya-Areraj: a; Red Slipped War and b; Red Ware.

Fig. 1

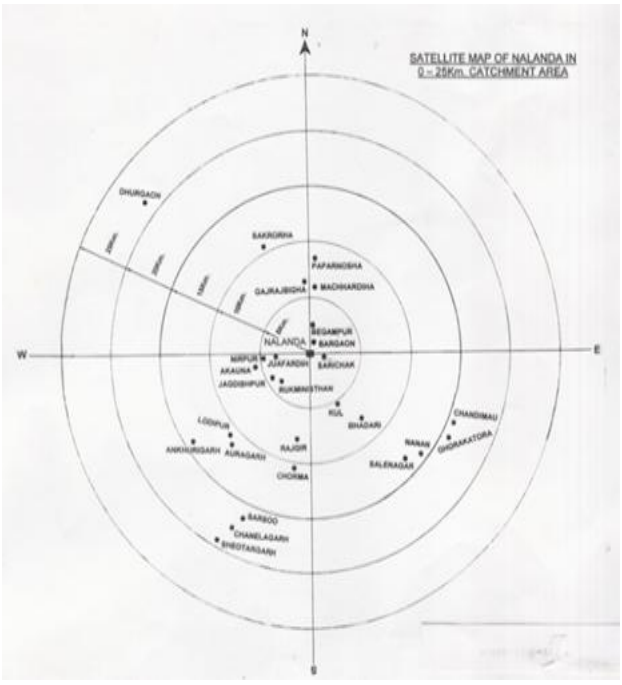


Lauriya Areraj: Site Plan.

Figs. 2-3

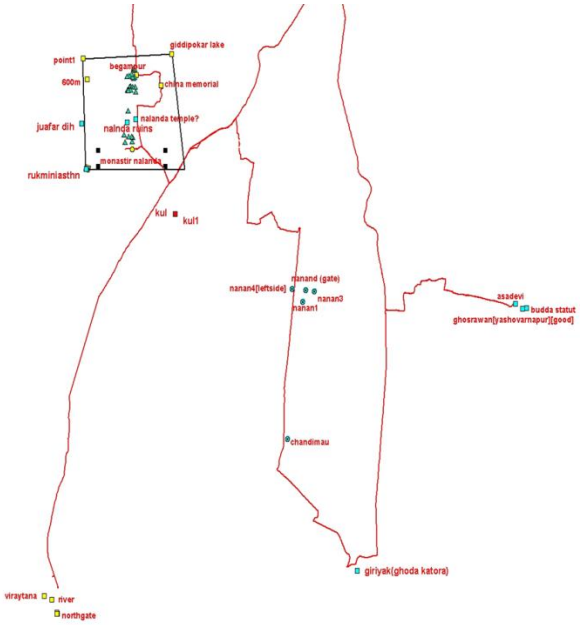


Nalanda: Satelite map and its vicinity.



Nalanda: Archaeological sites in and around.

Fig. 4-5



Nalanda: Map of ruins and its vicinity.

Nalanda: Map of Rajgir and its vicinity.

1. Afsadha (District-Nawadah): The site is located on the border of Nalanda and Nawadah districts. It is 40km south-east to the ruins of Nalanda and 42km south-east from the district headquarters of Bihar Sharif. The river *Sakri* flows 4km west to the village. The mound situated to the south of the village is extended into 60 x 50m with an extant height of 8m. Brick walls are noticed in the section of the mound. Several Brahmanic and Buddhist images are kept in Varaha Sthan, Shiva temple and Devi Sthan. Special mention may be made of an image of Varaha, an incarnation of Vishnu (Pl. 7a).

2. Atma (25°8' N; 85°19' E): The village Atma is 22km west from the ruins of Nalanda and 20km south-west from the district headquarter of Bihar Sharif. The river *Paimar* flows 1km east to the village. To the south of the village there is a mound extended into 50 x 60m with an extant height of 15m yielding Red, Black, Black Slipped and NBP Ware. To the east of the village a few Brahmanic sculptures made of black basalt are kept in a temple and at Radhe Shyam Thakurbari.

3. Aungari (25°12'N; 85°15' E): The site is located 34km north-west to the ruins of Nalanda and 33km west from the district headquarters of Bihar Sharif. The river *Nonai* flows about 1km south to the site. There is a Sun temple to the south-west of the village having a large number of Brahmanic sculptures made of black basalt such as Surya, Vishnu, Uma-Maheshwara, etc. Some of them are inscribed. A few Buddhist sculptures are also kept in the temple.

**4. Ayer (District-Garya): ***This site is located on the border of Nalanda and Gaya districts. It is 37km south-west to the ruins of Nalanda and 49km south-west from the district headquarter of Bihar Sharif. To the south-west of the village there is a hill having two natural caverns. To the west of the village a few Buddhist sculptures made of black and sand stone are kept at Devi Sthan. Mention may be made of a stone panel of Buddha on which the famous Buddhist creed- *"Ye Dhamma Hetuppabhava…."* is inscribed both on upper and lower portion (Pl. 7b). According to Xuan-zang's description during the journey from Bodh Gaya to Rajgriha Buddha stayed at *Buddhavana* which was about 10 km west to the *Jyeshthivana* (present Jethian) of Rajgriha, so Ayer may be identified with Buddhavana.

5. Begampur (25°8'25"N; 85°26'55"E): There is a huge mound towards south of the village Begampur located 1km north to the ruins. It is extended in 300 x 300m with an extant height of 5m from the surrounding plain yielding Red Ware pottery. Remains of brick walls are also noticed. The site was also excavated in 2007-08 by ASI, Patna Branch-III of the Survey.

6. Beswak (25°10'N; 85°14' E): The site is situated at a distance of 37km north-west to the ruins. There are two mounds in the village yielding Red, Red slipped, Black and Black slipped ware along with terracotta sling balls (Pl. 8a). A large number of Brahmanic and Buddhist sculptures have been kept at Thakurb, Goraiya Sthan and Mahadeva Sthan. Buddha in Bhumisparsha mudra with depiction of life events made of

Plate 7

Nawadah: Varah image of sand stone, Afsad.

Gaya: Inscribed pedestal.

black basalt is a unique image lies in open space (Pl. 8b).

7. Bhadari (25°6'39"N; 85°28'43"E): This is a small mound measuring 10 x 7m with an extant height of 4m, this village is about 1·5km east of Kool and 4·5km south-east of the ruins and 12km south from Bihar Sharif. It seems that it is a corrupt form of the word Bhadraarya which means auspicious. As referred in the Pali text *Mahavagga*, the first meeting of Buddha with Sariputra and Moggallana held here.

8. Bhui (25°10'97"N; 85°21'33"E): This village is situated about 12km south-west from the ruins of Nalanda and 21km south from the district headquarter of Bihar Sharif. The mound extended into 30 x 30m with an extant height of 5m is located to the south-east corner of the village. A Mosque is built by the present settlers on the mound. A few sculptures of black stone are kept in the Brahma Sthan, located to the north of the village. The river *Paimar* flows 1km south to the village.

9. Chandi Mau (25°5'44"N; 85°30'15"E): This village is located about 10km south-east from the ruins of Nalanda and about 14km south-west from Bihar Sharif. The mound is extended into 5 acres with an extant height of 6m and located south-east to the village. The river *Panchane* flows ½km east to the village. Ceramics of Red Ware, Black-and-Red Ware associated with NBPW were collected during exploration. To the south of the village there is a temple containing Brahmanical and Buddhist sculptures of Gupta and Pala period. In 2000-01 an area of 70 x 60sq.m was excavated and declared a single culture site of Pala period. Remains of brick-built Buddhist temple and votive stūpa complex were found along with stone sculptures of Brahmanical and Buddhist deities and terracotta plaques, sealings and votive stūpa.

10. Dhurgaon (25°14'N; 85°16' E): The site is situated at a distance of 30km north-west to the ruins and 28km west from Bihar Sharif. To the south of the village there is a mound extended in 40 bighas (Pl. 9a). A tank named Giddhi Pokhar is extended in 12 bighas towards south of the mound. A large number of fragments of black basalt are kept in an open space at Devi Stha. A few intact earthen pots of Red ware (spouted vase, lid, etc.) and some sculptures recovered by the villagers during digging the tank are presently kept in the High School (Pl. 9b).

11. Dumari (25°13'N; 85°19' E): This village is about 15km north-west from the ruins of Nalanda and 21km north-west from the district headquarter. The mound extended into 40 x 30m with extant height of 5m is located to the west of the village yielding Red Ware.

12. Ghorakatora (25° 2' N; 85°32'E): This village is located 18km south-east to the ruins of Nalanda and 23km south from the district headquarters of Bihar Sharif. There is a huge mound covering an area of 250 x 200m with an extant height of 15m situated on the eastern bank of the river *Panchane.* About 1km east to the mound the famous Indra Shila cave is located on the southern face of the Giriyak hill which was mentioned by Fahien and Xuan-Zang and

Plate 8

a

b

Beswak: a; General view of ancient mound (north-west) and b; Buddha in Bhumisparsha mudra.

identified by Broadly, Cunningham and Kittoe. It is said that here Indra had put 42 questions before the Buddha.

Year	*Archaeological Investigations*
1811-12	Francis. Buchanan
1847	Kittoe
1861-62	A. Cunningham
1872	A. M. Broadley
1940	Declared protected as Site of National Importance by the Survey Government of India in 1940
1987	K.K.Sharma
2007	P.K.Mishra

Table-3: Previous investigations at Ghorakatora

During exploration Pot-sherds of Red, Red Slipped, Black, Black Slipped, NBPW and Grey Ware along with terracotta balls and pottery discs were collected. Ring wells and remains of brick-walls are also noticed on the mound. A few Brahmanical sculptures made of black basalt are kept on the northern side of the mound. On the basis of the pottery and antiquities recovered from the site its antiquity may be dated earlier than 10^{th} century BCE.

13. Ghosrawan-Ghosrawan (25°6'N; 85°34'E): The site is situated at a distance of 16km south-east to the Nalanda ruins. There is a mound measuring 350 x 200 x 17ft. to the west of the village yielding Red and Black ware. Brahmanic and Buddhist images are kept in the temple of Asha Sthan located to the west of the village. Two inscribed Buddhist images needs special mention.

The Buddha image of Versiyawan is called Gachchfar Baba. The word *gachch* is used for a tree. Infact, the image was hidden between two trees. During a strong storm both trees were fell down and the image was exposed, so it is named Gachchfar Baba.

14. Kewaidih (25°13'N; 85°28'E): The village Kewaidih is 9km north from the ruins of Nalanda and 8km north- west from the district headquarter of Bihar Sharif. The tiver *Paimar* flows 2·5km west to the village. To the south of the village there is a mound presently used for agricultural purposes and locally known as Dihas. During exploration Red, Red Slipped, Black and Black Slipped Ware were collected from the mound.

Plate 9

a

b

Dhurgaon: a; View of the mound (North-west) and b; Red Ware.

15. Khirauti (25°14'N; 85°22'E): The village Khirauti is located about 15km north-west from the ruins of Nalanda and 04km north from Nishchalganj Bazar on Bihar Sharif-Ekangar Sarai Road. The *Nonai* river flows 3km west to the village. To the south of the village there is a mound extended into 100 x 70m with an extant height of 10m yielding Red Ware, Red Slipped Ware, NBPW, Black Ware and Black Slipped Ware. There is evidence of moat around the mound. Sculptures made of black basalt are kept at Vishnu Sthan and Mahadeva Sthan of the village.

16. Kool (25°6'76"N; 85°27'54"E): The village Kool is located about 3km south-east of the ruins of Nalanda and about 12km south-west from Bihar Sharif. The mound located in the village measuring 115 x 65m with an extant height of 3m is still vacant and used by villagers during harvesting. Several sculptural fragments are kept at different locations and are under worship. Red Ware was recovered during exploration. Scholars of Buddhism claim that Moggallana, one of the chief disciples of Buddha belong the village named *Kolita* and perhaps Kool is its corrupt form. The site needs to be excavated vertically to know the cultural sequence.

17. Korai (25°8'N; 85°29'E): This village is situated about 6km east from the ruins of Nalanda and 9km south from the district headquarter of Bihar Sharif. The mound locally known as Garh par extended into 100 x 70m with an extant height of 5m is located to the west of the village. Red, Red Slipped and Black Ware were collected from the mound. The river *Panchane* flows 1km east to the village.

18. Machhaldiha (25°10'N; 85°27'E): This village may be identified with *Machhalgama* referred in *Jatakas*, commentary of *Dhammapada* and *Sumangalavilasini*. It is situated on a small mound about 3km north of the ruins and 11km south-west to Bihar Sharif. There are some fragments made of black stone kept at Devi Sthan. One of them is a broken image of Buddha in *Abhayamudra* having an inscription of one line which is under decipherment.

19. Maniyawan (25°8'N; 85°29'E): The village Maniyawan is situated about 9km east from the ruins of Nalanda and 12km south-west from the district headquarter of Bihar Sharif. The *Paimar* river flows 2·5km west to the village, while the river *Panchane* flows 1/2km east to the village. The southern part of the village is situated on the mound yielding Red, Red Slipped, and Black Ware. A few fragments made of black basalt are kept in Mahadeva Sthan. Mention may be made of an image of Surya measuring 31' x 16.05'.

20. Mustafapur (25°8'N; 85°26'E): It is situated about 2km north from the ruins of Nalanda and 14km south-west from the district headquarter of Bihar Sharif. The mound having brick structures is extended into 30 x 25m with an extant height of 2·5m. There is an image of Buddha with Muchalinda Naga having an inscription of two lines on the pedestal which is under decipherment. The river *Paimar* flows about 7km west to the village.

21. Nanan (25°5'44"N; 85°30'15"E): It is situated about 3km south-east of Kul-Bhadari, 7km south-east from the ruins and 11km south from Bihar Sharif. The mound located in the middle of the village is extended into 5 acres with an extant height of 1·5m. Scattered potsherds of Red Ware and Black Ware indicates its archaeological importance. Fragments of sculptures are kept at Goraiya Sthan (east of the village) and at Shiva temple (north of the village). A few medieval remains are also noticed. The name Nanan may be identified with ancient *Nalakagama*, where Sariputra was born and eventually passed away. The river *Panchane* flows 1km east of the village.

22. Nona (25°7'N; 85°27'E): Located on a small mound it is 2km south from the ruins and 12km south-west from Bihar Sharif. Fragment of sculptures are kept in various places of the village.

23. Opa (25°13'N; 85°18' E): The village Opa is situated ahout 21km north-west from the ruins of Nalanda and 22km west from Bihar Sharif. The *Nonai* river flows 2km west to the village. To the south of the village there is a mound extended into 150 x 120m with an extant height of 10m. Potsherds of Red Ware, Black Slipped Ware and Black-and-Red Ware are found on the surface.

24. Paparnausa (25°8'86"N; 85°26'77"E): Settled on a small mound the village is located about 4·5km north of the ruins and about 10km south-west from Bihar Sharif. The mound is extended into 40 x 25m with an extant height of 4m yielding Red Ware and brick-bats. A few fragments made of black stone are kept at Jagdamba Sthan located in the south-west of the village near Kudwa Pokhar. The *Paimar* river flows 5m west to the village.

25. Parvati: This site is also located on the border of Nalanda and Nawadah districts. It is 34km south-east to the ruins of Nalanda and 38km south-east from the district headquarters of Bihar Sharif. The site was orignaly situated on the ancient bed of *Sakri* river but at present its course is shifted about 10km west to the village. To the south-west of the village an intact image of Buddha in *dharmachakra pravartana mudra* made of black stone is kept at Baba Sthan (Pl. 10). A hill known as Parvati having a natural grotto named Indra-Shila is located to south-west of the village. Pot-sherds of Red Ware and Kushana brick-bats are noticed on the hill. A newly built Ram-Sita temple is located on the hill.

26. Raitar (25°3'N; 85°32' E): The village Raitar is located about 15km south-east from the ruins of Nalanda and 17km south from the district headquarter of Bihar Sharif. The *Panchane* river flows 2km west to the village. To the west of the village there is a mound extended into 200 x 100m with an extant height of 4m yielding Red and Red Slipped Ware.

27. Rukministhan (25°6'N; 85°25' E): The mound of Rukministhan is located about 2km south-west of the ruins of Nalanda and 500m east from Jagdishpur mound covering an area of 90 x 50m with an extant height of 6m from the surrounding area. The eastern portion of the mound is comparatively higher than that of the other portion. Here, a modern temple had been constructed to enshrine a life-size image of Buddha

Plate 10

Nawadah: Buddha image, worshipped as Parvati.

Shekhapura: Image of Vishnu.

measuring 2·92 x 1·98 x 0·85m in *bhumisparsha mudra* made of black stone of Pala period. There is a depiction of the life-history of Buddha by intricate engraving on the outer surface of the image. One another image of Buddha is also found in the same posture but the head is broken.

28. Sahri (25°11'29"N; 85°22'21"E): This village is located about 15km north-west from the ruins of Nalanda and 15km south-west from the district headquarter on Bihar Sharif-Ekangarsarai Road. A few Brahmanical sculptures of black stone are kept in the Goraiya Sthan located to the east of the village. The river *Mohane* flows 1km west to the village.

29. Samas: This village is located on the border of Nalanda and Shekhapura districts. It is about 40km east to the ruins of Nalanda and about 31km north-east from Bihar Sharif. The river *Sakri* flows 15km south to the village. There is a mound to the south of the village near an ancient tank spread over on 26 acres. A large image of Vishnu in *Sthanakmudra* is kept in a temple nearby the tank. On the pedestal of the image an inscription of one line is inscribed which is under decipherment.

30. Saure (25°08'N; 85°24' E): The village Saure is situated about 7km west from the ruins of Nalanda and 16km south-west from Bihar Sharif. The *Paimar* river flows 1·5km east to the village. To the south of the village there is a mound extended into 70 x 50m which is presently used for agricultural purposes. Potsherds of Red Ware and Red Slipped Ware are found on the surface. Sculptures made of black basalt are kept at Devi Sthan, Mahavir Goraiya Sthan and Mahadeva Sthan of the village.

31. Shankar Garh (25°14'N; 85°21'E): The village Shankar Garh is situated about 25km north-west from the ruins of Nalanda and 22km west from Bihar Sharif. The *Paimar* river flows 8km east to the village. To the south of the village there are two mounds yielding Red, Red Slipped and Black Ware.

32. Silao (25°5'21"N; 85°25'71"E): Village Silao is situated about 8km south-east from the ruins of Nalanda and 16km south from the district headquarter of Bihar Sharif. The *Paimar* river flows 300m east to the village. To the south of the village there is a mound extended into 50 x 30m with an extant height of 7m yielding Red and Red Slipped Ware. To the north of the village, a few Buddhist and Brahmanical sculptures made of black basalt, among which some are inscribed, are kept in a temple known a Mahadeva Sthan. Special mention may be made of a standing image of Buddha and an inscribed broken sculpture of Buddha's chief disciple-Mahakashyap.

33. Tetrawan-Tetrawan (25°6'N; 85°36'E): The site is located at a distance about 16km east from the ruins of ancient Mahavihara. To the south of the village a large number of Brahmanical and Buddhist sculptures lie at Bhagvati temple. Mention may be made of a huge image of Buddha in *Bhumisparsha mudra* made of black basalt misinterpreted as Bhairava Baba (Pl. 11). There is a inscriptions on the lotus-petals and on broken halo of the image which are yet to be decipher.

Plate 11

Tetrawan: Buddha in bhumisparsha mudra.

34. Tulsigarh: The village is situated about 30km north to the Nalanda ruins and 27km north-west from Bihar Sharif. To the south of the village there is a mound extended into 70 x 50 x 16m yielding Red Ware only (Pl. 12a). The river *Mohane* flows ½km east to the village. A large number of stone fragments are kept at Goraiya Sthan (Pl. 12b).

These findings compelled us to reconsider about the antiquity and settlement history of Nalanda. It can be argued that the historicity of Nalanda can be pushed back at least 600 years due to presence of ceramics and other antiquities recovered from the recently explored and excavated sites in the vicinity of Nalanda but concrete valediction can only be confirmed through extensive excavations in the surrounding area of the ancient Nalanda Mahavihara.

CHHATTISGARH

3. EXCAVATION AT DAMRU, DISTRICT BALODA BAZAR-BHATAPARA

The ancient site Damru was excavated by the Directorate of Culture and Archaeology Government of Chhattisgarh under the direction of Shivakant Bajpai, and co direction of Rahul Singh, assisted by Vrasshottam Sahu, Yogesh Sahu, Shri Suresh Sahu, Chetan Manhare, Lalle Singh Netam and Pradeep Sahu.

The early historical mud fort site Damroo or Damru ($21^{o}43'10.60''$N, $82^{0}15'24.37''$E) located in the Baloda Bazar-Bhatapara District, Chattisgarh. Damru is located at a distance of 12km from its Tehsil and is about 84 km. from state capital Raipur. It is situated about 4.5km away from the right bank of river Seonath (Fig. 6). The site is surrounded by a rampart circular in nature, popularly known as *garh* measures roughly 430m north-south and 460 east-west with a maximum height of about 09m from the present surface (Fig. 7). The western part of the site is vandalized by the local inhabitants by excavating a pond. The main aim and objective of the excavation were; to trace the antiquity and nature of the mud fort site; to testify the cultural sequence of mud fort site other than Malhar; to conduct horizontal excavation to trace out the structural remains; and to ascertain the settlement pattern of this site.

The site was in continuous occupation from Kushan level to Gupta and late Gupta period (Pl. 13). The four fold cultural sequence is as given below: -

Period-I: Kushan Period
Period-II: Satavahna period
Period-III: Gupta period
Period-IV: Later Gupta /Sarabhpuriya-Somvanshiya or Panduvanshiya and Kalchuris.

Period-I: This cultural sequence is attested to by the findings of incurved bowls, stray findings of Kushan copper coin and other associated Material. The wares include black and red ware, red ware black-slipped ware with luster finish and some sherds of red ware. Among the important shapes mention may be made of incurved rim of dish, jar, bowl, miniature pot, spouted vessels, handles and lid (Pls. 14-15) besides the beads of Terracotta and semiprecious stone.

Period-II: This cultural phase is assigned to the Satavahan period. Earlier the evidences

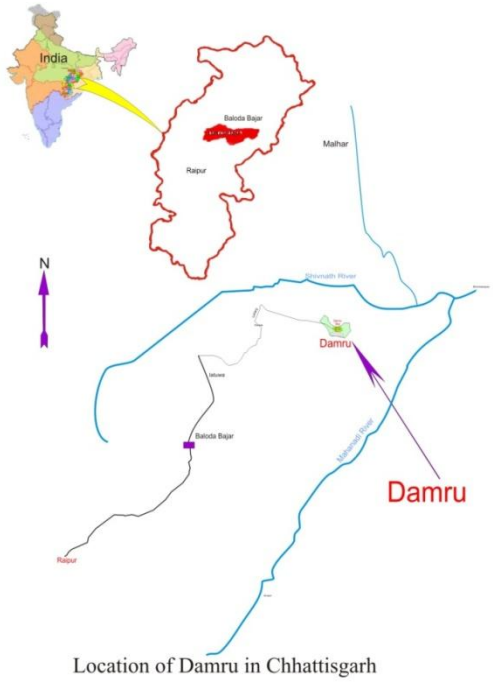
Plate 12

a

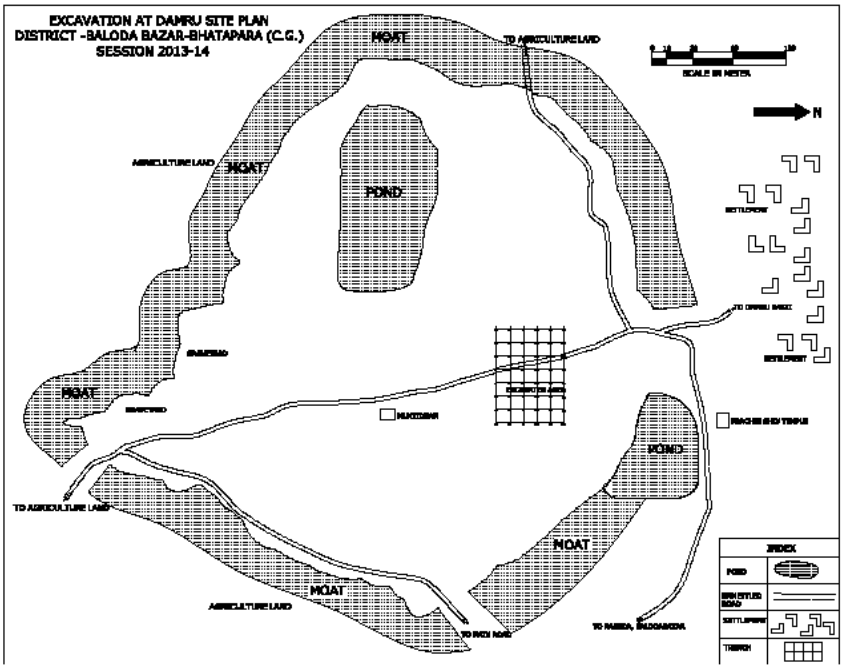
b

Tulsigarh: a; Ancient mound and b; Brahminical & Buddhist sculptures.

Figs. 6-7



Damru: Map showing the location.



Damru: Site plan.

Plate 13

Damru: General view of the site.

Plates 14-15

a

b

Damru: a; Black and Red ware full pot and b; Black and Red ware luster finish.

are traced out from the Mallhar and Tarighat. The findings of square copper coins which were very contemporary to Satavahan are also found. Some scholars defined these coins as Mallhar local series or elephant on deity type of coins and ascribed to 1st C.A.D. (Pl. 16). The associated findings comprised potsherds of black and red ware, black slipped ware, red ware and moulded terracotta's are unearthed. Besides number of seals and sealings of this period are traced out.

Period-III: This cultural phase roughly comprised to the Sarabhapuria dynasty of this region. Ceramic assemblage of this period identified with the typical Gupta stamped pottery (Pl. 17) of red ware and red slipped ware and lipped pots. Some interesting findings of this period are a juicer (Pl. 18) and terracotta rotary quern (*jata*) in red ware, its indicating the technical development of the Damru during the period. Besides that red ware mostly found in shapes of jar, *lota*, *handi*, deep bowl, spouted pot and variety of spouts etc.

Period-IV The excavation traced out some later Gupta evidences along with some other archaeological materials. The straight bowl with red ware and buff red ware and finding of Alauddin Khilji's coin suggest that the occupation became active from c. 3rd-2nd cent. BC. and remained till 13th cent. A.D.

A good number of antiquities have been recovered during course of excavation from the different cultural periods including ivory, bone, metal, stone objects and few coins. Besides that terracotta figurine included animal & human figurine are also noteworthy. Semi-precious stone beads and terracotta beads of various sizes and shapes like areca nut, cylindrical, *ghat* and circular shape have been retrieved. Terracotta hopscotch, sling ball are found in almost every trenches. Beautifully carved ivory comb is another interesting finding of the excavation. Finding of wheels with spokes and six handed tiny reposes metal image of goddess is also important. It is also noted that copper finger rings and Bengal fragments also recovered during the excavation. An important discovery of iron slag in huge quantity approximate 100 kg found in the excavation, is very surprising because it is not reported so far from any excavation in the region in the mentioned quantity.

The important discovery of this season is the number of terracotta inscribed sealings from stratified layers which is proving the pre Satvahana and Satvahana period. An important circular terracotta sealing bearing legend *"JAMDAS"* (Pl. 19) along with auspicious swastika symbol in early Brahmi character, it may be assigned to Mauryan/Sunga period. The evidences of Satvahana and Magha rulers has come in form of sealing bearing the legend "*RAYON ACHANTDASAS YOUGE*" (Pl. 20) in Satvahana Brahmi. This Brahmi inscription inscribed around the central monogram of Malhar symbol which is denoted by Brahmi character Ma or developed Nandipada or some scholars refer it as synonyms for Malhar or Mallaripattan. The excavation at Damru focuses on fresh light of the Satvahana and Magha settlements in the south Kosala. It is also

Plates 16-18

a

b

c

Damru: a; Coins of 1st cent. AD, b; stamped pottery and c; Juicer period IV.

Plates 19-20

a

b

Damru: a; Sealings from pre kushana character with legend Jamdas alogwith Swastik symbol and b; Terracotta sealing with legend Rayon Achantdasas yuge.

noteworthy here good number of typical box headed Brahmi character terracotta sealing are traced from excavation which pertained to Gupta- Vakataka period, even epigraphs of box headed Brahmi is commonly available in the region.

Number of terracotta sealing has been revealed in Damru excavation along with Brahmi inscription from 2nd cent. B.C to 5th cent, A.D. with typical box headed Brahmi. On the basis of above it seems that Damroo was another important but less known ancient seat of South Kosala other than Malhar.

The excavation yielded a unique type of structural activities which was very rarely known in archaeological site in the country. These structures are popularly known as circular stone structure. The above mentioned circular stone structures found in the set of four numbers or three numbers measuring from 2ft-6ft. The structures are made of slate stone which is locally available (Pl. 21). These circular structures are purposely made on a stone platform facing each other with passage.

A total of 14 circular stone structures were retrieved. Their basal portions are in good state of preservation but are dislodged at the top. Another big circular structure was found below the circular stone structures.

These circular structures are made of rammed brick bats and mud and its radius 9.5ft, surrounded by stone pavement (Pl. 22) .The purpose of its construction is yet to be ascertained firmly. These may pertain to period I -III. It seems that the circular stone structures may be votive stupa because they are always retrieved in groups and properly mounted over the platform. One more thing which supports this assumption is the fact that during the course of excavation no image of any Hindu god or goddess was found from these levels.

Besides these structures potters kiln and hearth made of brick and rooms made of stone are also traced in pd-II. It is very interesting over here regarding brick structures there is no separate bricks structures only few number bricks are used for making structures. All the structures of this period were made of calcareous stone which are plentifully available in the area. The digging could not reach the natural soil and further operations may reveal more details.

DELHI

4. EXCAVATIONS AT PURANA QILA

Delhi Circle of the survey conducted excavation at Purana Qila under the direction of Vasant Kumar Swarnkar assisted by Vishnukant, V. Muthu Kumar, Mohd Azhar Sabir, Sandhya Dwivedi and Vijimol P.K. Sudhir Kumar, G. Nageshwar Roa, and K.K. Verma, of Delhi Circle, Rakesh Kumar Sardhana, Baldev Singh, and Puran Chand Mukhya, from the office of Headquarter, and R.K. Jangir and K.L. Saini, from Jaipur Circle. The excavation was conducted with the objectives of (a) to expose the regular deposit of the Painted Grey Ware culture (b) to expose the structures of various cultural levels (c) to collect the fresh samples and (d) to impart

Plates 21-22

a

b

Damru: a; Votive stupa period I-III and b; Circular stone Structures, period I-III.

training to the students of the Institute of Archaeology in excavations.

Purana Qila or Old Fort (77˚12' N; 28˚ 38' E) also known as Pandavon-ka-Qila or Indraprastha is located on Western Bank of the river Yamuna, which now flows about 1km to its east. The ancient mound measures 710m (north-east) 350m (east-west) with a height of 11m from surroundings. The ramparts and other buildings were, however built over the ancient mound by Sher Shah Suri (1538-45 CE) after demolishing and re-modeling Dinpanah, a city founded by Humayun, also known as the sixth city of Delhi in about 1533 CE after his return from Persia in 1555 CE. Humayun also resided here till his death in 1556 CE.

PREVIOUS WORK: A trial digging in 1954-55 and further regular excavation of the site was conducted by the Survey from 1969-73 CE. Excavations revealed the evidence of various cultures from Mauryan to Mughal Period without any break. The significant antiquities from various periods included terracotta beads and toys of Mauryan Period, terracotta Yakshi figurine of Sunga Period, terracotta votive tank and copper coins of Kushan Period, seals and coins of Gupta Period, different types of beads of coral, crystal, carnelian and a sandstone image of Vishnu from Rajput Period, Glazed plates, coins of Sultanate period and Chinese porcelain with Chinese inscription, glass wine bottles and a gold earring of Mughal Period.

PRESENT EXCAVATIONS: With a view to obtain objectives stated above total 22 quadrants of 8 squares (10 x 10m) at the south-eastern slope were laid following the old layout system. The excavation further confirms the sequence of the earlier excavation except some material of British Period from surface. The details of each period are as under:

Period I:	Mauryan Period
Period II:	Sunga Period
Period III:	Kushan Period
Period IV:	Gupta Period
Period V:	Post Gupta Period
Period VI:	Rajput Period
Period VII:	Sultanate Period
Period VIII:	Mughal Period

Period I: Mauryan Period is represented by a terracotta ring well of 70cm diameter with a height of about 2·20m (Pl. 23). Total 18 rings are exposed. A drain running from west to east direction encased with terracotta tiles on either sides has also been unearthed.

Pottery of this period comprises of tiny shreds of NPBW (Pl. 24a), fragments of bowl/dish of Black-Slipped Ware, convex sided bowl, dish of Grey Ware and un-stratified pieces of Painted Grey Ware (Pl. 24b).

Red ware includes Ahhichhatra 10 A, collared rim vase, carinated handi, bowl with incurved rim, convex sided bowl, and chord impressed pottery, etc.

Among the antiquities terracotta sealing with symbols like hills, moon, etc., ghat shaped beads, ram with prominent curved horn (Pl. 25), disc, tiles, wheel, sling

balls, gamesmen, ear-studs and bone points are important.

Period II: The structures during this period were made of mud-bricks as well as rubble stones. Besides, few burnt patches has also been noticed.

Among the pottery, red ware consists of fragments of collared rim basins, bowls with incurved rim, storage jar with externally thick rim, variant of Ahhichhatra 10 A, grooved shoulder vase, vase with externally grooved rim, lid, ink pot typed lid, etc. Few pieces of grey ware and Black slipped ware also continue in this period. A few shreds of Painted Grey Ware have also been found but not from regular deposit.

Important antiquities of this period are copper coins; terracotta sealing, areca-nut-shaped terracotta beads, ghat shaped bead; terracotta plaques with male or female figurines, terracotta disc, wheel, sling ball, gamesmen (Pl. 26), stone weight, bone points, animal figures, iron and copper objects, semi-precious stone beads and shell beads.

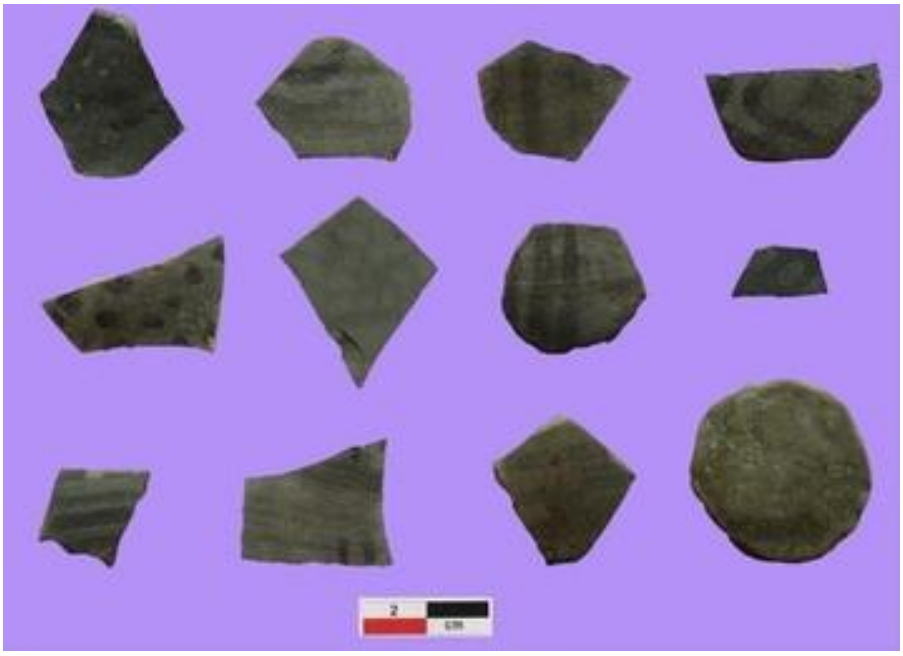
Period III: In this level a house consists of three rooms was exposed (Pl. 27). The walls are constructed with burnt bricks. Mud bricks have also been used for partition of rooms and for laying out the floor. The brick sizes varies from 39 x 27 x 6cm to 37 x 22 x 5·5cm and 33 x 22 x 5cm. Bricks are placed either header or stretcher wise. In one case, one row of header and other row of stretcher is found. A lane running east west laid with tiny piece of pottery mixed with earth was found.

Plate 23

Purana Qila: Ring well, Mauryan Period.

Plate 24

a



b

Purana Qila: a; Northern Black Polished Ware and b; Painted Grey Ware.

Plate 25

Purana Qila: Terracotta animals 1,2&8, Mauryan, Ram, Elephant and Horse, 3 Gupta Bird, , 4 Sunga Horse, 5 Sultanat Horse, 6 Post Gupta Bird, 7 Rajput Bull, 9 Kushan Bull.

Plate 26

Purana Qila: Miscellaneous terracotta objects, Sultanate; 1&6 skin rubber and weight; Kushan, 2&5 wheel and tablet; Sunga, 3 slling ball; Gupta 4,7&8 gameman, dice and stamp; Rajput, 9 spoon.

Period 27

Purana Qila: House, Kushana Period.

is found. A lane running east west laid with tiny piece of pottery mixed with earth was found.

Potteries from this period are red ware represented by fragments of sprinklers, ink pot typed lid, large to small sized bowls incurved rim with carinated exterior, small to medium sized vases decorated with impressed *triratna* symbol, vase with externally grooved rim.

Fragment of a lid, small carinated pot and small lid made of soap stone are also found from this period. These pots, probably may used for keeping the valuable.

The antiquities comprises of copper coins, terracotta sealings, areca-nut-shaped beads, stone weights, terracotta squaretablets, scrubber (skin rubber), disc, bone points, wheel, sling balls, animal figures, gamesmen, iron and copper objects, beads of semi-precious stones, glass beads, shell beads and ear-stud.

Period IV: During this period, Kushan bricks were re-used for construction of structures. In addition, brick-jelly floors have been exposed at two places, both belong to late phase of Gupta Period. Below the brick-jelly floor a wall made of brick-bats of earlier Phase is found (Pl. 28).

Pottery from this period includes bowls with **s**harp edged rim, bowls with footed base, moulded bowl, tortoise shell impressed potteries, red slipped ware vases, storage jars, Kushan potteries like sprinklers and incurved bowls also continue with some changes in shapes. Two miniature pots made of soap stone were also found from this period.

Among the antiquities inscribed terracotta sealings bearing *"Brahma varta"* in Brahami character and Sanskrit language are important finding of this period. Terracotta stamp), disc, wheel, sling balls, gamesmen, a dice, human and animal figurines, bird figurine, terracotta medallion of Gaja Laxmi (Pl. 29a), bone points, beads of semi-precious stones, glass beads, lion shaped faience pendant/ bead, shell beads, terracotta ear-stud, terracotta container with religious symbols (Pl. 29b) and carved brick-bat are important.

Period V: A wall running north-south direction measuring 2·04 x 0·40 x 0·10m made of robbed brick-bats is found from this period. The available evidence suggest that the wall may have belonged to potter's house. Another wall made of brick bats of size 3·50 x 0·40m running east-west belongs to phase II of this period has been exposed.

The important pottery are fragment of a sprinklers, rim with prominently flanged below with long conical opening and a spout, sharp edged rim bowls, vases with horizontally splayed out rim, checker pattern impressed pottery, mica dust slip decoration with bonbon design, etc. are found.

The antiquities comprise of terracotta dabbers, one of them has inscription in Brahmi, terracotta long barrel bead with a grooved line along the length, terracotta wheel, sling ball, terracotta female figurine, gamesmen, copper object and semi-precious stone beads have been recovered.

Plate 28

Purana Qila: Kushan, Stone ware, 1,2&4 lid, Carrinated pots and lid; Gupta, 3&5 bowls.

Plate 29

a

b

Purana Qila: a; Terracotta figuirines of gods and godess, Rajput,1 Vishnu; Gupta, 2 Gajalakshnai; Mughal, 3 Ganesh and b; Gupta, Terracotta tablets with religious symbols.

Period VI: This period is represented by a stone wall of semi-dressed stone exposed in square Q12. The unusual width of the wall suggests that this may be a fortification wall. A skeleton of goat has also been recovered from a pit near to the wall. Three random rubble masonry walls of different phases have been revealed in square P13 at slope. To the east of these walls a huge dump consisting of large quantity of Pottery including various sizes of knife edged bowls, dishes *handis*, vases, etc. are found.

Knife edged bowls of various sizes and string cut disc base in red ware are the main representative pottery of this period. In addition, dishs with horizontally splayed out rim, vases without turned rim, straight necked *lota*, spouted vessels nail headed basins in red ware and Black-slipped ware are also found.

Among the antiquities, stone weights, terracotta spoon, sling ball, gamesmen, animal figurine, iron objects, stone image of standing Vishnu (Vaikuntha Vishnu), beads of semi-precious stone beads and shell beads are noteworthy.

Period VII: Three walls made of random rubble stone have been found from this period. Another wall running east west and turns towards south at a right angle measure 3·75 x 75m and 1·80 x 75m respectively makes a corner of the room. Parallel to the latter, another wall with 5 courses have also been exposed. Traces of lime floors have been unearthed. Below this a stone rubble wall built with mud mortar in north-south directions of earlier level was exposed.

Pottery of this period is characterized by Glazed Ware. Both brownish to white sandy friable and terracotta cores glazed ware were the main industry. These are of medium to fine fabrics with both plain and decorated with geometrical and floral designs. Bowls and dishes have been found in majority. The ring base of the pot is one of the significant features of this period. Few pieces of vase of elongated body are also noticed. In addition, chillums in various sizes, decorated cup with perforation at the base and a smoke pipe in red ware are reported.

The antiquities comprise of stone weights, architectural members of stone, stone pestle, wheel, sling ball, terracotta human and animal figurines, beads, semi-precious stone beads, glass beads, shell beads, copper coins, iron and copper objects.

Period VIII: No structure of this period was traced during excavation under review, however, some material includes tiny pieces of blue and white porcelain, pieces with bluish-white and white surface potsherds and a few inscribed shreds using dotted are found. Fragments of green glass bottles, chillums, *huqqa* of red ware, spouted vessels, decorated red ware vase, black-slipped pots, etc. are also found from this deposit.

The noteworthy antiquities of this period are architectural members of stone, terracotta animal figurine, terracotta human figurine, small stone image of Ganesa semi-precious stone beads, glass bead and copper coins.

An important finding of this year is a

terracotta human head of British period collected from surface.

GUJARAT

5. TRIAL EXCAVATIONS AT BHARUCH, DISTRICT BHARUCH

The Excavation Branch–V, Vadodara of the Survey under the direction of Madhulika Samanta, assisted by R.N. Kumaran, Bipin Chandra, N.B. Soni, V.S. Rana, A.K. Rana, J.B. Makwana, B.M. Rohit, D.P. Modi, H.R.Tadvi, K.P. Parmar, N.M. Rawal, G.B.Varia and A.R. Mehta carried out trial excavations with the main aim to understand the nature of urbanity in India, basics of city formation and the impact of trade and commerce on urban formations during Early Historic times with special reference to Bharuch, Gujarat. In this process, the whole area of the Bharuch city up to the confluence of river Narmada into the sea was taken which comprises of nearly 1256sq.km was surveyed. The area was first divided in to 1km² grid which were further divided into 100m² and 10m² grids to document all the archaeological vestiges using the GPS. Trial excavations were conducted within the fortifications of the Old Bharuch city at Batuknath Vyamshala (the lowest point) (Pl. 30a) along the western bank of river Narmada and in the premises of Soneri Mahal Police Station (the highest point of elevation within the fortified settlement), Bharuch (Pl. 30b).

Devoid of structures, the trench at Batuknath Vyamshala is located at a strategic corner of the fortification wall which is under regular fluvial onslaughts. It has the possibility to acquire colluvial deposits from the mound area nearby and is in close proximity to the river. The excavation has unearthed ceramics constituted of red ware, red slipped ware, black ware, black slipped ware, black and red ware, glazed ware, porcelain and tiles, while the artifacts include terracotta beads and stoppers, semi-precious stone beads, glass bangles, iron and copper objects and lead ingots (Pl. 31). The excavators encountered with the ground water at a depth of 2·40m below the surface forcing the closure of excavations here.

Preliminary classifications of the sherds of every lot (10cm each) were done on the basis of the ware. While the sediment samples were collected from every lot were subjected to various test including Colour, Finger texturing and Grain Size Analysis through sieve, pH test, presence of Phosphate, Water and Organic matter content. The ceramic and fluvial study has revealed that the site is not in secondary context and the archaeological materials were not reworked by the floods of the Narmada.

The excavations at Soneri Mahal revealed an oval shaped water structure measuring 1·56m in length (EW) and 1·18m (NS). The height of the tank is 1·87m while its base is 1·65m wide (Pl. 32a) with an outlet along with a flight of 2 steps measuring 70 x 26cm and 70 x 24cm towards north while 6 steps measuring 70 x 22cm, 70 x 24cm, 70 x 22cm, 70 x 22cm, 70 x 22cm and 68 x 24cm descending towards the west. This tank was built of burnt bricks with lime mortar and was plastered with lime at the interior. Nearly 6 storage jars

Plate 30

a

b

Bharuch: a; View of excavated trench, Batuknath and b; Excavated remains, western bank of river Narmada and in the premises of Soneri Mahal.

Plate 31

a

b

Bharuch: a; Terracotta beads and b; Iron implements.

plastered with lime in the interior was noticed on the eastern surface adjacent to the tank (Pl. 32b). Apart from the above, a lime plastered floor, a floor provided with covered drain, brickbat platforms, walls running in east-west and north-south orientations were also exposed. As far as the ceramics are concerned, Red Ware predominates the whole assemblage followed by Red Slipped Ware, Black Ware, Black Slipped Ware, Black and Red Ware, Glazed Ware, porcelain, tiles and painted sherds. The artifacts mainly constitutes terracotta beads, animal and bird figurines (Pl. 33), Iron objects, glass beads and bangle pieces (Pl. 34), copper coins (Late Medieval local coins and one Portuguese coin) (Pl. 35), ivory objects, semi precious stone beads, etc.

The carbon samples retrieved from the excavations from the Soneri Mahal has been dated by conventional radiocarbon dating having an age of 230 ± 30 BP*.

HARYANA

6. EXCAVATION AT BOHR MAJRA, DISTRICT ROHTAK

Site of Bohr Majra (BMR) located 5km east to Rohtak was excavated under salvage operation as the same was being destroyed due to development work. A team comprising Jitendra Sharma, Akshat Kaushik, R.K. Dalal, Vinod Kumar, Kapil Kaushik, Shiwang Gautam, of Chandigarh Circle of the Survey in overall direction of V.C.Sharma, conducted excavation at the site.

Total three trenches namely A1, XA1 and XA2 in defferent location of mound was taken up for excavation.

Excavation in quadrant 4 of Trench A1 revealed evidence of a hearth at the depth of 55cm from the ground level in the south-western part of the quadrant covered with a large inverted pot. An ashy layer was found in association with the hearth in the south-western part of the quadrant, while of rammed floor were noticed in the south-eastern part at the depth of 60cm. Remains of a brick wall (Str 1), running east-west direction comprising of 6 courses of bricks were found towards the north of the hearth. Evidence of wall was found at a depth of 60 which continued upto a depth of 91cm. Total length of wall was 1·70m.

A single coursed, semi circular brick on edge structure was found in the north-eastern part of the same Quadrant at a depth of 55cm from the ground level. Remains of floor were also visible in the southern section at the same level. At a depth of 2·12m remains of a floor in brick jelly was found and continued upto a depth of 2·45m from the ground level. Natural soil was encountered at the depth of 2·75m.

Ashy deposit noticed in the A1Q4 and A1Q3 was continuing in quadrant Q2 of the Trench XAI. Remains of a wall, running east-west direction was found in the northern section of this quadrant (XA1Q2). Total 37 courses of this wall were exposed. Southern part of the XA1Q3 was further taken for digging. An evidence of brick jelly floor which was in A1Q4, at the depth of 2·12m, was also encountered in this quadrant.

Plate 32

a

b

Bharuch: a-b; Oval shaped water structure, Soneri Mahal.

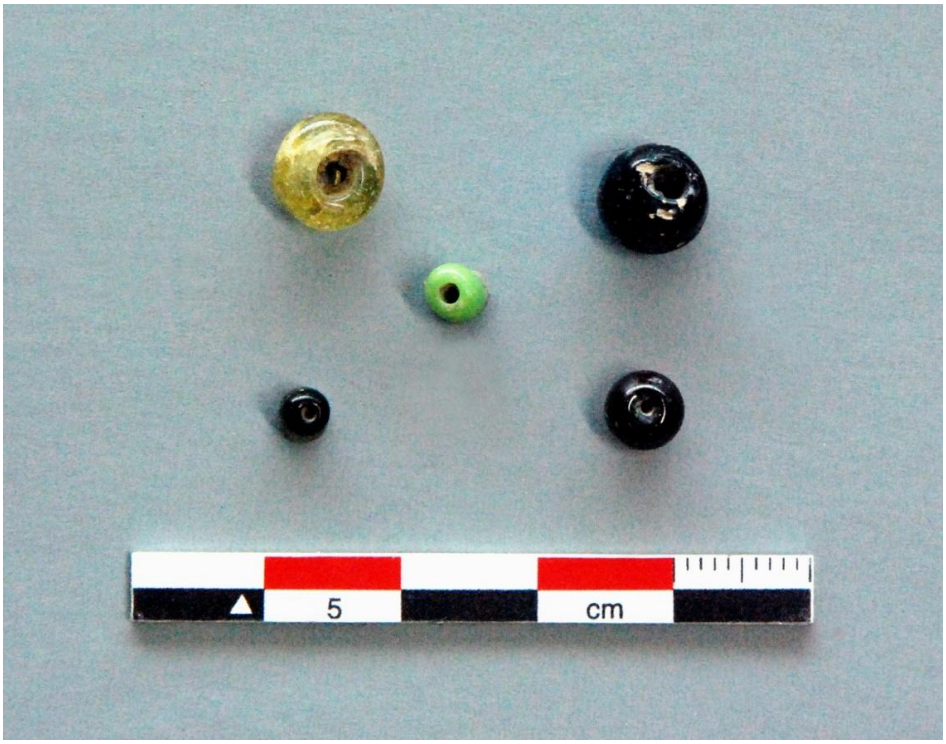
Plate 33

a

b

Bharuch: a-b; Terracotta head of animal and bird figuirine.

Plate 34



a

b

Bharuch: a-b; Glass beads and bangle pieces.

Plate 35

Bharuch: Copper coins.

Trench XA2 was laid in a low lying area at a depth of 1·26m from the top of the mound. Remains of a wall, comprising of 11 brick courses on east-west section was found in the Quadrant 4 turning north, in the western section and further entering into Quadrant 1 which further turned at right angle towards the east. A gate (No.1) was pierced in the centre of this wall in the Quadrant 4. Another arm of this wall was entering into Quadrant 3 of this trench where one more entrance gate (No. 2) was exposed. This wall was running continue in eastern section, where it was taking north turn and subsequently turning towards the west (in the walk), thus forming a complex.

Important finding of the excavation is comprises of hundreds of crucibles, coin moulds, moulds of beads, etc. On the basis of the structural remains, antiquities, the site is datable to the Gurjara-Pratihara period. Occurrence of crucibles and moulds in profusion suggest that the site was used as Mint.

7. EXCAVATIONS AT THEH POLAR, DISTRICT KAITHAL

In pursuance and compliance of the directions of the Hon'ble High Court, Punjab and Haryana, Chandigarh, a team comprising of Sameer Diwan, Jitendra Sharma, Akshat Kaushik, R.K. Dalal, Vinod Kumar, Ajaib Singh, R.K. Sapru and Kapil Kaushik, of Chandigarh Circle of the Survey under the overall direction of V.C. Sharma of Chandigarh Circle of the Survey, conducted excavation at the ancient site of

Theh Polar to ascertain the archaeological potential of the site.

Three trenches namely PLR-1, PLR-II & PLR-III were selected for excavation. PLR-I is located in the northern part of the village. Digging was undertaken in a controlled area of 2 x 2m and continued upto the depth of 4·70m till natural soil was encountered. Total nine habitational layers could be seen in the sections.

Among antiquities recovered from this trench including a terracotta stamp/seal with a vertical shaft, two terracotta dabbers, ahopscotch with prominent thread marks of the potter's wheel at the base and a terracotta figure of bull with a prominent conical hump and short tapering limbs was recovered.

In PLR-II-a controlled area of the 4 x 4m was dug upto a depth of 1·90m. Natural soil was encountered at a depth of 1·60m. Seven habitational layers were marked in the sections. A few antiquities were recovered from this trench. These include a frontal torso of a terracotta horse/deer (?) a torso of an unidentified animal and two terracotta animal figurines from a depth of 1·05m and 1·25m respectively.

Trench PLR-III was excavated to a depth of 0·67m. Six layers were observed in the sections. No antiquities were reported from this trench. However, at a depth of 0·49m below surface some structural activity was observed in the northern section. This structure/floor comprises of successive courses of burnt bricks and brickbats. The exposed remains do not exhibit perfect orientation and alignment. Successive floor levels of burnt bricks were exposed. This structure/floor rests on layer 4 and is sealed by layer 3. The structure is made of primarily reused bricks and brickbats including a few Kushana bricks.

HIMACHAL PRADESH

8. EXCAVATION AT LIPPA, DISTRICT KINNAUR

During earliar exploration, various burials sites were identified for excavation in the heart of village of Lippa and also on the steep slopes of the hills surrounding it. These burial sites are spread in an area of more than 5sq.km around the village (Pls. 36-37).

The archaeological sites of Lippa ($31^0$39'34"N; $78^0$22'58"E) is situated on the confluence of Kerangkhadd and Taiti stream at an altitude of 2745m in Pooh Mandal in Morang division of Kinnaur district, about 42km from district headquarter of Recong Peo. The Kerang Khadd meets Satluj river near Jangi. The village is snow bound for about three months in a year and is prone to heavy and recurrent landslides and earthquakes. It was observed that the burial sites were found heavily disturbed due to the cumulative effects of landslides, avalanches and earthquakes in the region.

The site of Lippa is situated on the junction of Trans and higher Himalaya and therefore, reflects the climate of the cold desert. As a result of it the vegetation is sparse with sporadic cover of bushes on the slope of the hills with trees lines of Chilgoza

(*Pinus gerardiana)* and Deodar (*Cedrus deodara).*

The geological formation around Lippa almost follows the same characteristic feature as seen elsewhere in the Satluj valley. Recent studies have found that the deposits between Lippa and Asrang, north of Kerangkhadd consist of the strata of granite and gneisses which has also resulted into the formation of china clay or kaolinite due to the rapid weathering of granite in the area. Besides this, metamorphic talc mineral or soapstone has also been reported near Asrang, 10km south of Lippa, but its quality and utility for making steatite beads is also being questioned.

Plate 36

Kinnaur: A general view of Lippa village showing burial sites.

Plate 37

Kinnaur: View of site for exacavation.

The excavation at Lippa was conducted by the Department of History including Ancient Indian History, Culture and Archaeology, HNB Garhwal University, Srinagar, Garhwal jointly with the Himachal State Museum, Shimla. The excavation was undertaken under the supervision of Vinod Nautiyal, R.C. Bhatt, Pradeep M. Saklani, Bhagat Panwar, Sudhir Nautiyal, Rom Bahudur, Nagendra S. Rawat, Kavita Bist, Satish Choudhary, Amita Gupta, Rakhi Burfal, and Ekta Singh. S.P. Sati, Department of Geology HNB Garhwal University and Hari Chauhan, Co-Director of the excavation, Rajesh Sehgal, Narendra Kumar, Surendra Kumar, Nisha and Hemlata from Himachal State Museum, Shimla. The human remains were examined at the site by Veena Tripathy Mushrif, Department of Archaeology, Deccan College, Pune.

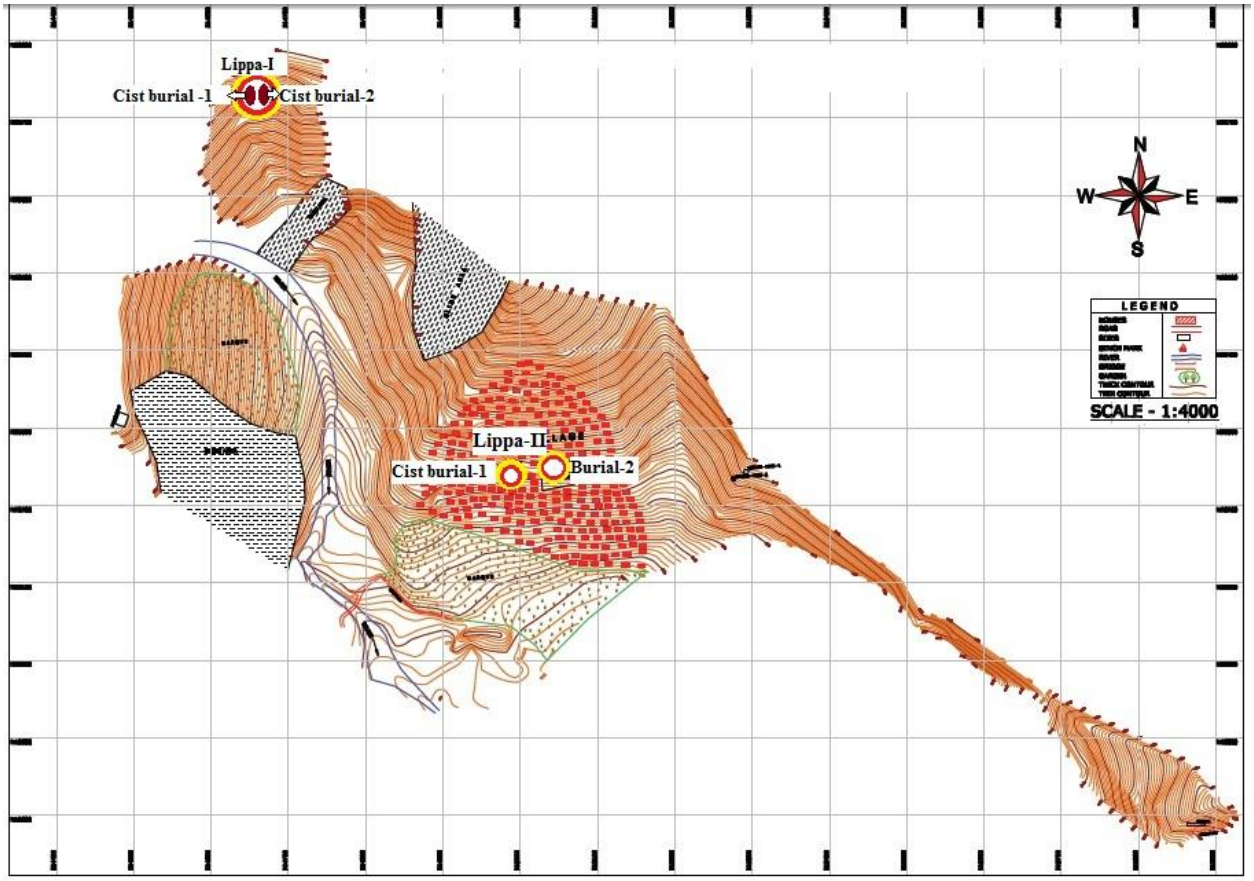
During the first session the excavation was taken up at different locations at Lippa, i.e. on the very steep slope of the hill (Lippa-I), towards west of village settlement and the second one (Lippa-II) located in the centre of the village as shown in the contour map of the area (Fig. 8).

The site is located on the west of the *Lippa* village on the steep slope of the hill facing east. The site was identified as the most potential for excavation as the owner of the land had found few skeletal remains and pottery which were thrown away by the labourers. Based on this information two trenches measuring 2 x 2m were laid on the steep slope of the hill.

The Cist burial was found laid in the east-west direction with 4 capstones at different levels. The capstones were found at the depth of 1·60m and 2·10m on the eastern and western side respectively owing to the steep slope of the site. The Cist chamber measures 1·74m long and 30 cm wide on the eastern end, 52cm wide on the western side and 42cm deep. The two capstones were placed on both the ends but the central part of the Cist was uncovered. The capstones are irregular in shape and size. On the eastern side, the capstones measured 83cm long and 27cm wide while on the western side it was 66cm long and 25cm wide. The interesting aspect of the architecture of the Cist was that instead of using the orthostats to make the Cist chambers it was made up of dressed stone wall measuring 42cm thick which was raised over a foundation of large sized stones laid horizontally. The southern wall of the Cist had four courses of finely dressed stones, while the northern wall had only three irregular sized stone at foundation level with three courses of dressed stone on the upper level. The construction of the Cists showed a fine masonry work.

After removing the capstones, the Cist was found filled with debris. Unfortunately no burial remains/funerary material are found inside the Cist. Only a few pieces of wood fragments identified as Himalayan deodar (*Cedrus deodara*) were found in a very fragile condition. It seems that Cist was constructed for some symbolic purpose and hence not used for burying the dead.

Fig. 8



Kinnaur: Contour map of the area, Lippa.

Cist-2 is located close to Cist burial-1 towards north at a distance of 5m. A trench measuring 2 x 2m was also laid out at the site. At a depth of 2·10m four large capstones oriented towards north-south were found overlapping each other measuring (i) 72cm long x18cm wide, (ii) 69 x 21cm, (iii) 35 x 9cm and (iv) 72 x 15cm respectively. It is not certain whether these capstones were arranged deliberately or got overlapped due to some natural process. After removing the capstones, the Cist chamber measuring 155cm long and 41cm wide towards north-west and 64cm towards southeast was found which was constructed by using four large rectangular stones of different dimensions placed vertically as orthostats and capped by a fine masonry work of five and six courses of dressed stones measuring between 25-30cm over the orthostats (Pl. 38a). However, it was most interesting to find that only the lower extremities of the human skeleton (a part of the pelvic girdle, Femur, Tibia and Fibula) were buried in the Cist chamber at a depth of 72cm (Pl. 38b). The lower extremity is 80cm long from one end of the pelvic girdle to other end the leg bone. While the left femur measuring (33cm) and Tibia (30cm) was almost straight, the right Femur and Tibia was slightly bent at the knee joint. The bones of both the foot (phalanges, metatarsals and tarsals) were completely missing. It is difficult to understand why only the lower extremity of the skeleton was buried in the Cist? At this stage of our excavation it is difficult to say whether it was done deliberately or it was a part of the ritualistic practice. The cut marks were not visible on the skeletal remain also. No other funerary material including pottery, metal objects, etc. were found with this skeleton at this site.

A thick deposits measuring 2·44m overlyin the Cist was a distinct stratigraphy which was divided into five different layers of deposition based upon their texture and colour. The most interesting feature of the deposition is a 46cm thick, hard dark greyish band of slate deposit (layer 3) separating the compact yellowish clay and silt deposit (layer 2) and cobble rich silt and mud deposit (layer 4and 5). This is the only burial site on the steep slopes at Lippa which has been found at such a depth. Efforts are underway to study the erosional pattern of the slope and their effect on the archaeological sites, particularly the burial sites in Kinnaur which are prone to landslides and glacial actions.

Another very small site was located in the centre of the village where the excavation was undertaken. Because of the limited area for excavation, a small trench measuring 2 x 2m was laid in east-west direction. A double Cist burial was excavated at the depth of 1·5m (Fig. 9). Though the upper Cist burial was partially damaged due to the construction of road but it looked like also rectangular in shape measuring 41cm long and 52cm wide oriented towards south-east direction. But the interesting part of the architecture of the Cist was a small chamber towards the north-west direction which in all probability might have been made for placing the head of the dead (Pl. 39a). It yielded some highly damaged disarticulated bones on the south-

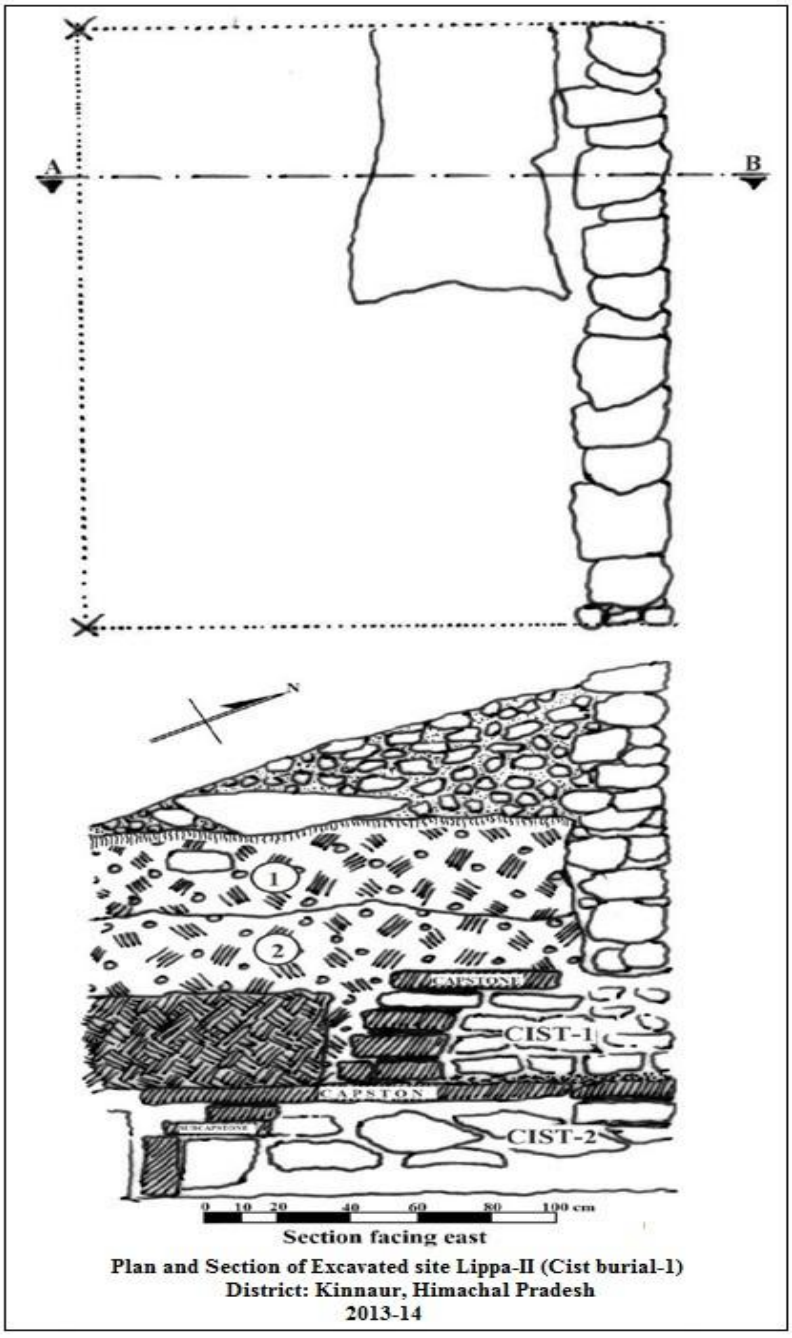
Plate 38

a

b

Kinnaur: a-b; Lower extremities of the human skeleton.

Fig. 9



Kinnaur: Exposed section of burial site, Lippa.

eastern flank of the Cist. Interestingly, another rectangular Cist burial oriented towards the same direction was found intact just below the upper Cist, however, the bones found inside the lower Cist were also highly degenerated because of the water seepage from surrounding area and road construction (Pl. 39b). Also this is perhaps the only double Cist burial site found in Trans-Himalayan region.

The funerary material includes a copper bowl and two perforated beads on turquoise and highly polished dark chocolate coloured carnelian. These turquoise and carnelian beads are very important finds from *Lippa* (Pl. 40a). At the present stage of knowledge it may be said that the beads are also not of local origin and, therefore might have reached at *Lippa* as a result of some widespread trade activity in this region.

Unfortunately the burial was damaged and there was no contextual evidence of skull. Two individuals were identified. Standard methodology was used for doing basic anthropological analysis. Skeleton is partially represented and in disturbed context. Most of bones are fragmented other than L(?) fibula. There is no orientation seen in body deposition. Outer table of all bones are damaged considerably because of constant dampness of the soil.

This is an adult individual. The sex identification is not possible as bones are very fragmentary and no sexually diagnostic bone present in the collection. Some osteoarthritic conditions are found in talus (Pl. 40b). The talus-tibia articular surface has developed extra bone development and there is evidence of squatting facet.

The length of fibula is estimated (32cm). The stature is calculated. If the individual is male he will be around 157·54 ± 3·29cm (5·2ft) and if its female then 153 ± 3·57cm (5·1ft).

The skeleton II in the lower Cist is preserved in fragments. The Cist burial was water logged and it was difficult to excavate bones. The outer tables of all the bones are damaged considerably. This individual is adult and sex identification is tentatively done and using only one criterion from crania. The nuchal crest is of grade 1 which belongs to female individual. Though it is suggesting female sex of the skeleton, it should be read with caution. No other sex diagnostic bone preserved in the collection. There are no pathological lesions observed on present skeletal remains.

Another site is also located north east of the Cist-burial-1 in the heart of the village which was undertaken for excavation during second session in September, 2014. A trench measuring 2 x 2m was laid out in north -west direction. Towards the north of the trench a partially broken high necked vase with a handle decorated with designs on its rim and body was found (Pl. 41a). However, the most interesting finds were a large number disarticulated human bones at the depth of 50cm and 1m respectively which seemed to have been jumbled up and confined only towards the north and south direction of the trench (Pl. 41b). However, some of the bones of rodent were also found along with the human bones at the upper level. It was intriguing to find that the

Plate 39

a

b

Kinnaur: a-b; Exposed burials, Lippa.

Plate 40

a

b

Kinnaur: a; Beads and b; Osteoarthritic talus (bone), Lippa.

Plate 41

a

b

Kinnaur: a; Decorated high necked vase and b; Skeleton remain, Lippa.

inhumation was not carried in the regular Cist chambers. The skeletal remains are under investigation to study their age, gender and other paleopathological features.

KARNATAKA

9. TRIAL EXCAVATION, TALAGUNDA, DISTRICT SHIMOGA

Bangalore Circle of the Survey under the direction of M. Nambirajan carried out trial digging at Pranaveswara temple complex, Talagunda. The excavation brought to light an interesting and hitherto unknown fact of Early History of Karnataka. This trial excavation was continued as a sequel to the finding of two sets of copper plates of Kakathiyas and thirteen gold coins of Ganga period and also to cross verify the Talagunda pillar inscriptional reference towards the antiquity of the place to the times of Satakarni's. The excavations yielded cultural sequence from Satavahana to Hoysala period (Pl. 42a). The Pranaveswara temple of Talagunda was an apsidal brick structure (Pl. 42b) constructed during the time of Satavahanas (*circa* 3rd century CE), which was further restored and expanded by the Kadambas by adding a square *mahamandapa* with lion balustrade steps in greenish grey schist stone at east and two lateral entrances at north and south. The first inscription found in the north side balustrade in all probability datable to 370 - 450 CE (Pl. 43). It is a seven lines Brahmi script written left to right in a slightly slanting nature. The use of Kannada words along with Sanskrit makes it a dual language inscription. The inscription records gifts of land to a boat man namely Vaji Naga [yya] who belonged to the Boygara family by a certain Halami of Pulindage. The second inscription found in the south side balustrade is perhaps a fair copy of the north balustrade inscription and refers to one "Chandraditya" and the temple Pranaveswara as "Mahadeva" (Pl. 44). The inscription is definitely dated to Early Kadamba period and is earlier to the Talagunda Pillar inscription of Shantivarman (c.450 CE).

These structural activities are buttressed with the finding of coins of the Kadamba, Satavahana and Ganga periods. The structural activities of the Kalyana Chalukyas were found in the form of floors and walls constructed by using reused bricks. Along with the structural evidences other cultural materials like pottery including Black and Red Ware, Grey Ware, Black Polished Ware and Red Ware, glass and terracotta beads, hopscotch, etc were recovered. Many fragmentary lithic records of *circa* 5th to 12th century CE were also found during the excavation.

10. GOSASA STONES, VILLAGE KATAGERI, TALUK BADAMI, DISTRICT BAGALKOT

S. Devroy of Dharwad Circle of the Survey discovered three Gosasa stones in the village pond at Katageri in Badami taluk of Karnataka. There Gosasa stones appear in a specific period of Karnataka history, i.e. it starts during the end of Badami Chalukya rule, reaches its zenith in the Rastrakuta period and slowly disappears in the Kalyani Chalukya period. The period of the Gosasa stones discovery in Katageri is roughly being identified with the period of Rashtrakutas. These stones do not have any inscription or any pictorial depiction on it. The shape, size, breadth and width help

Plate 42

a

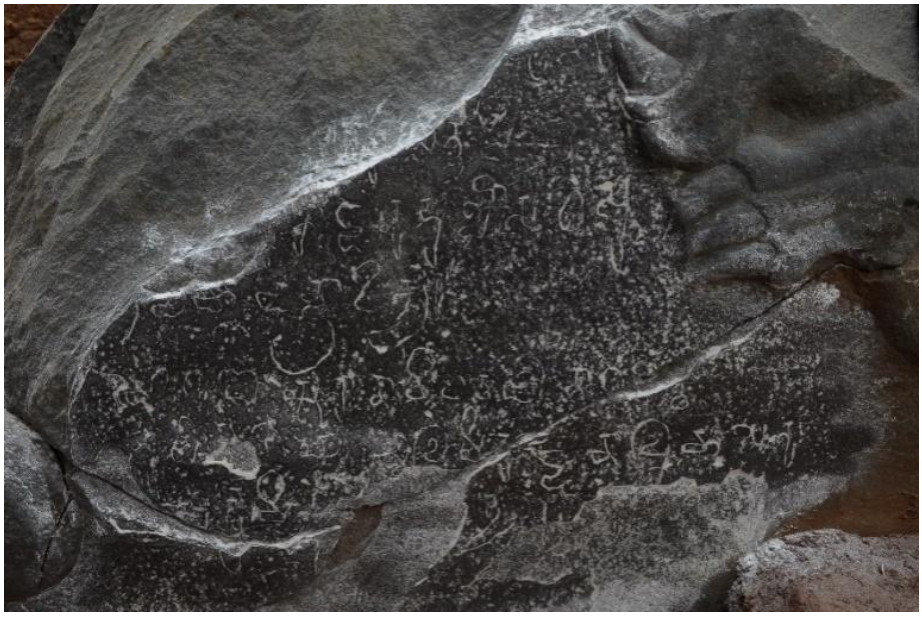
b

Talagunda: a-b; Excavated remains of mahamandapa.

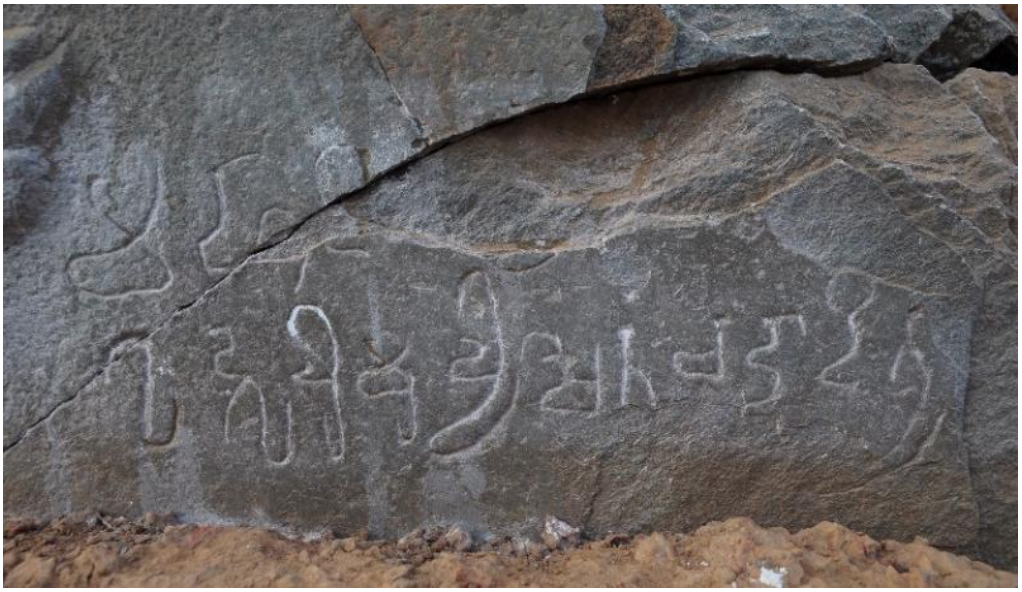
Plate 43

Talagunda: Close view of the exposed balustrades with inscriptions.

Plate 44



a



b

Talagunda: a; Brahmi inscription on the north side and b; Inscription on the south side.

us to identify them as Gosasa stones (Pl. 45).

11. HERO STONE AND MAHASATI STONE, VILLAGE MANGALURU, TALUK BADAMI, DISTRICT BAGALKOT

S. Devroy of Dharwad Circle of the Survey discovered the Hero Stone and Maha Sati Stone datable to 14-15th century situated in the agriculture land of Shri Veerabhakta Alappa Honnali in Mangaluru village on the bank of river Malaprabha. In Karnataka, large numbers of Sati stones were discovered and broadly classify into two categories with or without inscription. Hero stone in Mangaluru has two parts but without inscription on it. The Mahasati stone, which is also called as Anugamana stone has no sahagamana sculpture also devoted of inscription. Anugamana is the kind of sati who died listening to the news of her husband's death in the war (Pl. 46).

MADHYA PRADESH

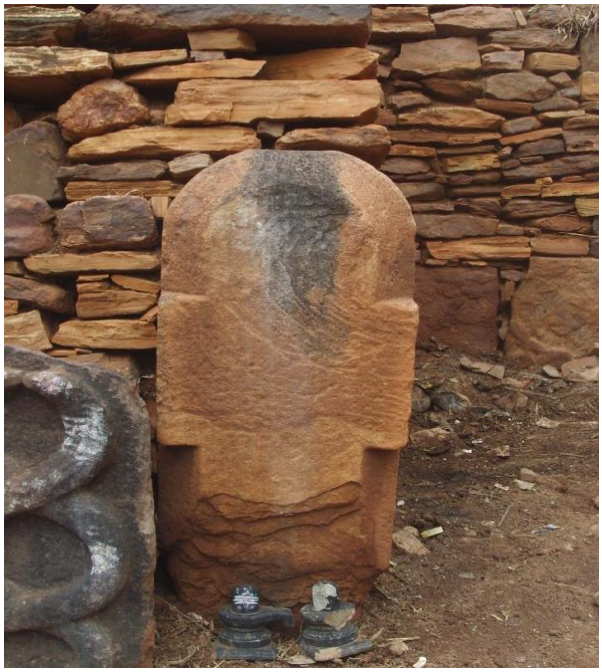
12. EXPLORATION IN THE GAWILGARH, DISTRICT BETUL

In continuation with the previous year's work, the Excavation Branch-I of the Survey under the direction of Nandini Bhattacharya Sahu assisted by Rajesh Kumar Mehar, Prashant Sonone and Prajnya Pratim Pradhan, Vijay Gedam, H.J. Barapatre, D.K. Kasbi and Snehmala Suple, B.V. Bhoyar and Pavitra Barik, R.G. Nagulwar, S.M. Khairkar, Shri Shahid Akhtar, D.A. Kamble, M.R. Kambe, R.G. Patil, Kartik Mudaliar, Balbhadur Ghale, Mehtab Alam, A.M. Tayade, K.M. Desai, K.P. Bhagat, S.R. Korde, P.R. Masram and Jarrar Hussain carried out exploration and documentation of decorated rock shelters in the Gawilgarh Hills of the Satpura mountain ranges under the revenue jurisdiction of Betul district.

During the period under review seventy one decorated rock shelters were explored, thereby taking the total to two hundred and twenty six (226) rock shelters in the Gawilgarh Hills, inside the Satkund and Dabka Reserve Forest areas of the Satpura range in the Atner and Multai tehsils of Betul district in Madhya Pradesh bordering the Amravati district of Maharashtra. The work was undertaken as part of the village to village archaeological investigations in the Tapti Purna Valley.

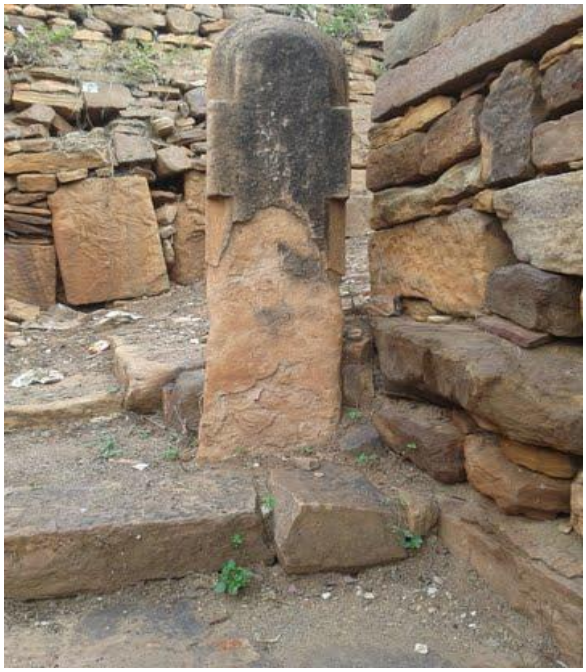
The decorated rock shelters spread across the Gawilgarh hills have been divided into twenty one groups, one group added during this year to existing twenty groups and their nomenclature derived from either the village nearby or any shrine or locally known landscape of the area. The groups so named are Ambadevi (ABD) group named after the present shrine - nineteen shelters; Agya Doh (AGD) - five shelter, Borkap (BKP) - three shelters, Ghodamma (GDM) - two shelter; Gaimukh (GMK) - twenty one shelters; Ghorpend (GPD) - twelve shelters, Jhunkari (JNK) - two shelters, Kosumb Gupha (KMG) - six shelters, Kund (KND) - seven shelters, Kukadsadev (KSD) - thirteen shelters, Lamgondhi (LGD) - one shelter, Mendhagarh (MDG) - seventeen shelters, Mungsadev (MSD) - one shelter, Pat (PAT) - twenty eight shelters, Pachmuh (PCM) - seven shelters, Pachumri (PMR) - twelve shelters, Ramgarh (RMG) - six shelters, Salbuldi (SBD) - twenty six shelters, Telkan (TKN) - sixteen shelters, Takira (TKR) -

Plate 45



a

b



c

Village Katageri, Bagalkot: a-c; Gosasa Stones.

Plate 46

a

b

Village Mangaluru, Bagalkot: a; Hero Stones and b; Mahasati Stones.

fifteen shelters and Ugum (UGM) - seven.

The decorations in the rock shelters of Gawilgarh Hills fall under two broad divisions, *viz*. Pictographs executed in different colours like green, white, black and different shades of red and Petroglyphs comprising bruising, pecking, engraving and cupules. The themes of decorations revolve around diverse forms of Nature, flora and fauna, hunting scenes, war scenes and abstract geometric patterns.

A summary of the decorated rock shelters, discovered in this field season (2013-14) is enumerated below:

Name of Shelter	*Geo-coordinates*	*Facing*	*Significant Decorations*	
			Petroglyphs	*Pictographs*
ABD 15	21° 24′ 22·3″ N 077° 56′ 45·9″ E	Northeast	------	Horse riders, Human figures
ABD 16	21° 24′ 15·9″ N 077° 56′ 48·5″ E	South and southeast	------	Green Paintings: Rabbit, Boar, Porcupine
ABD 17	21° 24′ 25·7″ N 077° 56′ 59·6″ E	South-west	Shallow and Deep cupules, Engraved deer's	-------
ABD 18	21° 24′ 20·2″ N 077° 57′ 05·6″ E	South-west	Engraved Antelope	Indistinct painting
ABD 19	21° 24′ 25·1″ N 077° 56′59·3″ E	West	-------	Dots arranged as motif
AGD 2	21° 23′ 58·3″ N 077° 54′ 15·2″ E	South-east	Shallow cupules in two rows and a cupule	Indistinct
AGD 3	21° 24′ 01·4″ N 077° 54′ 09·8″ E	North-west	Shallow cupules in rows at two places	
AGD 4	21° 24′ 06·7″ N 077° 54′ 16·3″ E	South south-east	Shallow cupules in 'P'shape arrangement	
AGD 5	21° 24′ 07·1″ N 077° 54′ 18·7″ E	South south-east	------	A flower vase
GDM 2	21° 26′ 12·9″ N 078° 02′ 52·4″ E	South-west	Shallow cupules, deep cupules and an animal figures	-----
GMK 19	21° 24′ 20·9″ N 077° 54′ 34·7″ E	North-west	Shallow cupules in rows	-------

GMK 20	21° 24′ 31·4″ N 077° 54′ 29·6″ E	North	Vulva and Palm	Indistinct
GMK 21	21° 24′ 31·3″ N 077° 54′ 21·6″ E	East south-east	Cupules	
GPD 6	21° 25′ 29·3″ N 077° 59′ 49·6″ E	West south-west	Deep cupules three nos. Geometrical design.	-------
GPD 7	21° 25′ 27·7″ N 077° 59′ 44·0″ E	East	Vulva	
GPD 8	21° 25′ 25·3″ N 078° 00′ 15·8″ E	North	Deep cupule	------
GPD 9	21° 25′ 21·7″ N 077° 59′ 53·4″ E	South south-west	Shallow cupule in rows	Dancing Human figures.
GPD 10	21° 25′ 20·2″ N 077° 59′ 44·0″ E	North	Cupules	-------
GPD 11	21° 25′ 21·0″ N 077° 59′ 42·6″ E	North-east	-------	Palms in pairs and singles.
GPD 12	21° 25′ 21·5″ N 77° 59′ 40·4″ E	North-west	Shallow cupules in rows	-------
KMG 6	21° 24′ 18·2″ N 077° 55′32·8″ E	South-east	Trees, Vulvas	Geometric motifs
KSD 10	21° 24′ 05·8″ N 077° 56′ 19·2″ E	South	-------	Reptile?
KSD 11	21° 24′ 07·3″ N 077° 56′ 41·2″ E	South-east	-------	*Godhani* and human figures.
MDG 11	21° 24′ 51.6″ N 077° 57′ 45·9″ E	West	--------	Herd of animals and palm prints.
MDG 12	21° 24′ 50·7″ N 077° 57′ 46·2″ E	South-west	-------	Frog
MDG 13	21° 24′ 52·0″ N 077° 57′ 44·3″ E	South	Animal figure, and deep cupule	
MDG 14	21° 24′ 55.0″ N 077° 57′ 46·0″ E	Northwest	Deep and shallow cupules	
MDG15	21° 25′ 00·7″ N 077° 57′ 32·6″ E	North-west	------	Indistinct
MDG16	21° 25′ 00·3″ N 077° 57′ 31·2″ E	North north-west	------	Indistinct
MDG17	21° 24′ 53·9″ N	South	Shallow cupules	--------

	077° 57′ 28·7″ E	south-west		
PAT 23	21° 24′ 56·3″ N 077° 57′ 25·6″ E	North north-west	Tools sharpening marks	Deer, tree and animal figures
PAT 24	21° 24′ 56.0″ N 077° 57′ 23·9″ E	North	------	Indistinct
PAT 25	21° 24′ 37·8″ N 077° 58′ 09·6″ E	North-west	Shallow cupules, sharpening marks	Indistinct motif
PAT 26	21° 24′ 22·5″ N 077° 58′ 17·2″ E	South-west	Vulva	----------
PAT 27	21° 24′ 22·8″ N 077° 57′ 15·9″ E	South south-east	-------	Horse riders, human figures
PCM 4	21° 26′ 12·5″ N 077° 58′ 57·3″ E	South-west	Trident and some other indistinct line drawings. Deep cupule.	Hut, (not clear), faint Godhni.
PCM 5	21° 26′ 10·7″ N 077° 58′ 54·5″ E	North	Deep and shallow cupules	Deer
PCM 6	21° 26′ 10·2″ N 077° 58′ 53·2″ E	West north-west	Single cupule	------
PCM 7	21° 26′ 06·5″ N 077° 58′ 48·7″ E	South	Phallus?	----------
PMR 6	21° 25′ 18·1″ N 077° 59′ 34·5″ E	West	Shallow cupules	Ornamental design
PMR 7	21° 25′ 15·2″ N 077° 59′ 31·3″ E	East	Deep cupules	---------
PMR 8	21° 25′ 15·1″ N 077° 59′ 31·6″ E	North-east	Deep and shallow cupules	------
PMR 9	21° 25′ 13·2″ N 077° 59′ 10·9″ E	South-East	Cupule	-------
PMR 10	21° 25′ 11·8″ N 077° 59′ 10·3″ E	South-east	Vulvas and shallow cupules	----------
PMR 11	21° 25′ 19·0″ N 077° 59′ 38·5″ E	West	Engravings	-------
RMG 4	21° 26′ 10·7″ N 078° 02′ 13·5″ E	West North-west	-------	Paintings in Black, human figures
RMG 5	21° 26′ 09·8″ N 078° 02′ 05·9″ E	South-east and north-west	Cupules in rows	------

RMG 6	21° 26′ 21·4″ N 078° 02′ 03·7″ E	North-west	Cupules in rows	
SBD 13	21° 25′ 42·8″ N 078° 00′ 55·5″ E	North	Chisel marks	
SBD 14	21° 25′ 42·7″ N 078° 00′ 55·9″ E	North-west	Chisel marks	----
SBD 15	21° 25′ 46.5″ N 078° 00′ 57·4″ E	North-west	Chisel marks	-----
SBD 16	21° 25′ 38·6″ N 078° 01′ 01·8″ E	North North-west	Humped bulls	-----
SBD 17	21° 25′ 38·5″ N 078° 01′ 02·4″ E	North-west	Vulva, deep & shallow cupules	Animal and human figures and hunting scene
SBD 18	21° 25′ 41·2″ N 078° 01′ 03″ E	North-west	Animal figures and cupules	---
SBD 19	21° 25′ 41·4″ N 078° 01′ 03·7″ E	North-west	------	Animals
SBD 20	21° 25′ 40.4″ N 078° 01′ 03·6″ E	West- North-west	Sharpening mark deep cupule	-----
SBD 21	21° 25′ 39·8″ N 078° 01′ 03·6″ E	West- north-west	------	Geometric motifs
SBD 22	21° 25′ 38·0″ N 078° 01′ 06·9″ E	North- north-west	----	Animal figures
SBD 23	21° 25′ 43·6″ N 078° 01′ 18·6″ E	East – north-east	----	*Toran* type motif
SBD 24	21° 25′ 38·3″ N 078° 00′ 59·5″ E	South- south-east	Cupules	------
SBD 25	21° 25′ 17·1″ N 078° 00′ 31·9″ E	South-east	Animals	Indistinct
TKN 12	21° 24′ 14·0″ N 077° 55′ 55·4″ E	North-east	Deep and shallow cupules	-----
TKN 13	21° 24′ 28·7″ N 077° 55′ 51·4″ E	South-east	Engravings of animal figure, human figure and vulvas	----
TKN 14	21° 24′ 01·7″ N 077° 56′ 00·7″ E	South		Human figures, turtle, deer
TKN 15	21° 24′ 58·8″ N 077° 56′ 05·7″ E	West	Shallow cupules	
TKN 16	21° 24′ 20·0″ N	South	-----	Human figure and

	077° 55′ 59·8″ E	south-east		Indistinct painting.
TKR 14	21° 25′ 18·4″ N 077° 54′ 32·2″ E	South	Cupules	Indistinct
TKR 15	21° 25′ 18″ N 077° 54′ 32″ E	South-east	Vulva	-
LGD 1	21° 25′ 15·3″ N 077° 57′ 06·6″ E	North-east	---	Geometric motifs
UGM 7	21° 24′ 55·8″ N 077° 57′ 22·0″ E	South-east	----	Honeycomb and Indistinct paintings.
UGM 8	21° 25′ 02.6″ N 077° 57′ 20·6″ E	South-south-west	-----	Indistinct painting

Various types of tools fashioned on cryptocrystalline materials like chert, chalcedony and agate have been collected from within the rock shelters and in the vicinity of some shelters also. The prominent tool types include blades, bladelets, borers, burin, geometric and non-geometric tools assignable to Upper Palaeolithic, Mesolithic and Chalcolithic periods. Two miniature pots of dull red ware were also reported from Ghodpend 5.

On the basis of the preliminary investigations of the styles of execution, superimpositions, colour scheme of the decorative elements coupled with the discovery of stone tools from and within the vicinity of the shelters, in the absence of chronometric dates, point to the fact that different decorated rock shelters were occupied right from the Upper Palaeolithic to the Historical period passing through the Mesolithic and chalcolithic stages.

To ascertain the surface findings, the petroglyphs and pictographs in the shelters, and owing to the paucity of time, trial excavation was undertaken in only one of the shelters, from the Gaimukh group, shelter no. 1 (GMK 1), which was identified as having only Chalcolithic paintings on the wall. Excavation was conducted mainly with an aim to corroborate the authors of the paintings on the shelter wall and also to ascertain the antique type of occupancy at the shelter. The very small scale and limited trial excavation yielded promising results, also proving that the shelter was used solely by the Chalcolithic folks and that the walls depicted only Chalcolithic paintings.

GMK 1 is located on the left bank of a river, locally known as *Gaimukh* river. The site can be approached either from Narha village or from Dharul village (a Gond village). It is located at a distance requiring about 45 minutes walk, in the N-E direction of Narha village.

The area for excavation in the shelter was selected very carefully and it was decided to take two trenches of 3 x 3m in north-south direction. They were named as GMK-I and GMK-II. Whereas GMK-I was

exactly below the overhanging ceiling of the shelter, GMK-II was outside the roof area of the shelter. GMK-I which was initially 3 x 3m later became 3 x 3·08m, as the cutting line in southern section was pushed by 8cm. In between the trenches there was a baulk of 50cm. GMK-I was almost 76edieva whereas GMK-II had sharp slope towards north.

GMK-I was excavated to a depth of 195cm and GMK-II to a depth of 114cm. At the natural level in both trenches only boulders were found one blade factory was exposed from where finished, unfinished blades and debitages were collected. Besides this, pottery, bones, pieces, riverine shell and one broken shell pendant were found. Total 5 layers were exposed out of these the first 4 layers yielded artefacts while the last one was devoid of any 76edieval.

Red ware, black ware and micaceous red ware were found during excavation. The pottery repertoire is ill to well fired having thin to medium fabric with evidence of tampering materials. Indistinct potsherds were more in comparison to the distinct ones. Very few rim parts were found. The shapes are *Lotā*, deep bowl and vase.

Artefacts comprise mainly microliths, especially blades and bladelets both geometrical and non-geometrical, borers and points etc. made of agate, chalcedony, chert, and quartz. In many cases retouching of the tools was also noticed.

One stone block size 102 x 64cm with an engraving of four concentric circles of 19 to 20cm dia. Carved by pecking method was exposed at the depth of 70cm on the surface of which microliths and debitages were found in good quantity.

Pieces of hematite yielding burnt-sienna colour used for painting were found in good quantity.

Bone pieces with cut-marks and also without cut-mark, reflecting upon the dietary habits of the shelter inhabitants, were also found. A few charred bone pieces were also found. One shell pendant with two holes was also reported.

Available evidances suggest that the inhabitants of the shelter started manufacturing tools in the later period. However, uses microliths with pottery, continued from the beginning till the end. The finding of raw sienna pigment proved its use for the paintings. From the findings and corroborated evidences it can be deduced that this shelter was inhabited by people who used both lithic tools and pottery and belonged to the chalcolithic period. Though they were not manufacturer of pottery but they seem to obtain this from their coeval habitation, probably in the plains. No metal object has been found from the excavation.

MAHARASHTRA

13. EXPLORATION, DISTRICT NAGPUR, BHANDARA AND CHANDRAPUR

The Prehistory Branch, Nagpur of the Survey under the direction of N. G. Nikoshey, assisted by Gajanan L. Katade, K. M. Girhe and N.K. Nimje conducted exploration in various districts of Maharashtra and brought to light the following sites of archaeological interest.

Site/Village	*Tehsil*	*Nature of remains*
Aregaon (21° 1' 16"N; 78° 44' 19" E)	Hingna	Temple ruins and fragmentary sculptures, late medieval period.
Akhewada (21° 7' 15"N; 78° 42' 47" E)	Katol	Late medieval mound
Asalwada (21° 6' N; 79° 20' E)	Kamthee	Siva temple of late nineteenth century CE and Late Medieval Mound.
Ashti (Nimji) (21° 10' 56"N; 78° 52' 8" E)	Kalmeshwar	Middle Palaeolithic
Bokara (21° 14' 10"N; 79° 2' 35" E)	Nagpur	Middle Palaeolithic
Bhugaon (21° 6' N ; 79° 31' E)	Kamthee	Siva Temple of late nineteenth century CE
Bharatwada (21° 13' 36"N; 78° 36' 53" E)	Katol	Microlithic
Bamgiri (21° 17' N; 78° 45' E)	Kalmeshwar	Middle Palaeolithic
Chargaon (21° 15' 12"N; 78° 44' 53" E)	Kalmeshwar	Middle Palaeolithic
Chakdoh (21° 16"N; 78° 46' E)	Kalmeshwar	Middle Palaeolithic
Dhanoli (21° 2' 22"N; 79° 15' 52" E)	Kuhi	Middle Palaeolithic
Dorli (21° 14' 27"N; 78° 5' 24" E)	Kalmeshwar	Late Medieval Mound
Gaurwada (20° 3' 23"N; 78° 43' 50" E)	Kalmeshwar	Microlithic
Gumthala (20° 11' 55"N; 78° 52' 10" E)	Kalmeshwar	Siva temple of late medieval period
Khapri (21° 1' 16"N; 78° 44' 19" E)	Nagpur	Mesolithic artefacts
Kaladongri (20° 3' N; 79° 6' E)	Nagpur	Middle Palaeolithic

Kalmeshwar (21° 14' 6"N; 78° 55' 34" E)	Kalmeshwar	Middle Palaeolithic
Kohli (21° 15' 29"N; 78° 47' 48" E)	Kalmeshwar	Middle Palaeolithic
Khursapar (21° 46' N; 78° 11' E)	Kalmeshwar	Middle Palaeolithic
Lakhori (21° 16"N; 78° 41' E)	Kalmeshwar	Middle Palaeolithic
Lonhara (21° 11' 35"N; 78° 50' 96" E)	Kalmeshwar	Middle Palaeolithic
Minai (21° 5' N; 79° 19" E)	Kamthee	Late medieval, red ware
Nimji (Ashti) (21° 47' 57"N; 78° 3' 14" E)	Kalmeshwar	Middle Palaeolithic
Panchgaon (21° 1' 4"N; 79° 9' 41" E)	Umred	Middle Palaeolithic and megalithic burial
Pardi (21° 10' 59"N; 79° 57' 47" E)	Kamthee	Middle Palaeolithic
Surgaon (21° 2' 13"N; 79° 4' 36" E)	Umred	Middle Palaeolithic and Late medieval mound
Selu (21° 48' 21"N; 78° 4' 12" E)	Kalmeshwar	Middle Palaeolithic
Sonkhamb (21° 16' 5"N; 78° 43' 40" E)	Katol	Middle Palaeolithic
Susandri (21° 17' N; 78° 48' E)	Kalmeshwar	Middle Palaeolithic and Mesolithic
Sabkund (21° 12' 12.5"N; 78° 35' 40" E)	Katol	Middle Palaeolithic
Tarabadi (21° 15' 27"N; 78° 42' 43" E)	Katol	Middle Palaeolithic
Titur (21° 3' 48"N; 79° 15' 5" E)	Kuhi	Middle Palaeolithic and late medieval mound
Ubali (21° 16' 36"N; 78° 55' E)	Kalmeshwar	Middle Palaeolithic, megalithic burial and late medieval mound

Ukharwahi (20° 56' N; 79° 14' E)	Umred	Middle Palaeolithic
Waroda (21° 17' 3"N; 78° 54' 42" E)	Kalmeshwar	Middle Palaeolithic
Walni (21° 14' 55"N; 78° 35' 23" E)	Katol	Middle Palaeolithic
Sawarla (20° 43' N; 79° 43' E)	Pauni	Middle Palaeolithic
Bikali (20° 39' N; 79° 36' E)	Nagbhir	Microlithic
Erwajhari (20° 40' N; 79° 34'E)	Chimur	Microlithic and Middle Palaeolithic

14. EXPLORATION FROM AIZWAL TO MYANMAR BORDER AND AROUND AIZWAL MIJORAM

Prehistory Branch, Nagpur of the Survey under the direction of N. G. Nikoshey, assisted by K. M. Girhe and R. K. Dwivedi has carried out exploration from Aizwal to Myanmar border and around the Aizwal in Mizoram brought to light the following sites of archaeological importance.

District	*Site*	*Nature of remains*
Aizwal	Falkawn (23°39'N; 92° 58'E)	Memorial Stone and Hero Stone
Champai	Khawzawl (23°32'N; 93°12'E)	Memorial Stone
Aizwal	Lunglong (23°41'N; 92°38'E)	Two natural caves and British style bungalow
Aizwal	Rulchawn (23°40'N; 92° 58'E)	Neolithic Celt
Aizwal	Tachip (23°38'N; 92°59'E)	Memorial Stone

15. EXPLORATION IN GOSIKHURD-NALGANGA PROJECT, DISTRICT AMRAVATI, AKOLA AND WASHIM

Gajanan L. Katade, Ravikumara J., Shilpa Rangari and Ku. Ekta Dharkar under the guidance of N.G. Nikoshey of the Survey carried out exploration in Amravati, Akola and Washim districts in the Gosihurd-Nalganga project under village-to-village Survey scheme.

Village	*Geocoordinates*	*Taluka*	*District*	*Findings*
Bori	20˚40’28·6”N; 77˚56’31·6”E	Chandur Rly	Amravati	Late medieval Garhi remains
Dhanaj khurd	20˚43’05·6”N; 77˚35’04·6”E	Karanja	Washim	Late medieval Garhi remains
Hadpa	20˚45’27·3”N; 77˚54’35·7”E	Chandur Rly	Amravati	Late medieval Garhi remains
Jawala	21˚40’28·5”N; 77˚57’59·1”E	Chandur Rly	Amravati	Late medieval Garhi remains
Kurum	20˚45’38·08”N; 77˚34’16·66”E	Murtizapur	Akola	Late medieval Garhi remains
Mogra	20˚39’49·9”N; 77˚58’36·4”E	Chandur Rly	Amravati	Late medieval Garhi remains
Nandgaon Khandeshwar	20˚40’49·4”N; 77˚49’55·7”E	Nandgaon Khandeshwar	Amravati	Hemadpanthi temple
Nawasal	20˚45’04·53”N; 77˚32’41·4”E	Murtizapur	Akola	Late 80edieval temple, sculptures
Phubgaon	20˚38’55·8”N; 77˚52’14·7”E	Nandgaon Khandeshwar	Amravati	Historical sculptures, medieval temple and garhi ruins
Pipri kalga	20˚36’28·8”N; 77˚53’40·9”E	Ner	Yeotmal	Late medieval Garhi remains, Hemadpanthi temple
Rahati	20˚41’21·2”N; 77˚36’28·5”E	Karanja	Washim	Late medieval Garhi remains
Rajnapur Khinkhini	20˚42’19·66”N; 77˚33’22·11”E	Murtizapur	Amravati	Historical temple, hero stone
Rajura	20˚42’08”N; 77˚55’41”E	Chandur Rly	Amravati	Late medieval Garhi remains
Ramtek	20˚42’04·93”N; 77˚37’20·04”E	Karanja	Washim	Late medieval Garhi remains
Siddhanathpur	20˚42’42·9”N; 77˚39’13·4”E	Nandgaon Khandeshwar	Amravati	Late medieval temple
Sivni Rasnapur	20˚37’56·9”N; 77˚51’03·1”E	Nandgaon Khandeshwar	Amravati	Late medieval Garhi remains
Sultanpur	20˚38’02·3”N; 77˚57’04·6”E	Chandur Rly	Amravati	Late medieval Garhi remains, Hemadpanthi temple

16. EXPLORATION IN UPPER AND MIDDLE WARDHA VALLEY

Prehistory Branch, Nagpur of the Survey under the direction of N.G. Nikoshey, assisted by Gajanan L. Katade K.M. Girhe, P.S. Pashine and N. Nimje conducted a village to village survey on the banks of Wardha river.

The main objective of the Survey was to explore the upstream and downstream of Wardha river to indentify ancient settlements of the region. The following sites of archaeological importance were explored.

Site/Village	*Tehsil*	*District*	*Nature of remains*
Arvi chhoti (21°13'N; 78°5'E)	Ashti	Wardha	Mesolithic
Ajnadevi (21°10'27"N; 78°22'35"E)	Karanja	Wardha	Mesolithic, Middle Palaeolithic and Late Medieval Mound
Bichhua (21°44'N; 78°18'E)	Multai	Betul	Middle Palaeolithic and Mesolithic
Bangaon (21° 34'N; 78°28'13"E)	Pandhurna	Chhindwada	Middle Palaeolithic and Mesolithic
Biroli (21°33'51"N; 78°26'13"E)	Pandhurna	Chhindwada	Middle Palaeolithic and Mesolithic
Banberda (21°10'47"N; 78°16'00"E)	Karanja	Wardha	Mesolithic
Botona (21°12'20"N; 78°17'16"E)	Karanja	Wardha	Mesolithic
Belora (21°15'49"N; 78°03'42"E)	Ashti	Wardha	Mesolithic
Borkhedi (21°12'50"N; 78°15'5"E)	Ashti	Wardha	Middle Palaeolithic and Mesolithic
Dahua (21°47'N; 78°19'E)	Multai	Betul	Mesolithic
Dehargaon (21°42'N; 78°15'E)	Multai	Betul	Mesolithic
Deoli (21°26'10"N; 78°26'31"E)	Narkher	Nagpur	Mesolithic, Middle Palaeolithic and Late Medieval Mound
Dongargaon (21°21'55"N; 78°9'49"E)	Ashti	Wardha	Mesolithic

Dalpatpur (21^{0}11'39"N; 78^{0}5'54"E)	Ashti	Wardha	Mesolithic and Middle Palaeolithic
Ganeshpur (21^{0}27'40"N; 78^{0}20'01"E)	Warud	Nagpur	Mesolithic
Hardui (21^{0}44'N; 78^{0}18'E)	Multai	Betul	Middle Palaeolithic and Mesolithic
Hardoli (21^{0}44'N; 78^{0}20'E)	Pandhurna	Chhindwada	Middle Palaeolithic
Hiwara (21^{0}30'44"N; 78^{0}27'25"E)	Pandhurna	Chhindwada	Mesolithic
Itawa (21^{0}36'N; 78^{0}23'E)	Pandhurna	Chhindwada	Middle Palaeolithic and Mesolithic
Jatlapur (21^{0}33'11"N; 78^{0}27'25"E)	Pandhurna	Chhindwada	Middle Palaeolithic and Mesolithic
Jamgaon (21^{0}25'26"N; 78^{0}24'44"E)	Warud	Amravati	Middle Palaeolithic
Jamthi (21^{0}28'31"N; 78^{0}23'44"E)	Warud	Amravati	Mesolithic and Late Medieval Mound
Jalalkheda (21^{0}22'59"N; 78^{0}24'48"E)	Narkher	Nagpur	Middle Palaeolithic, Mesolithic and Late Medieval Mound
Jolwari (21^{0}15'28"N; 78^{0}5'21"E)	Ashti	Wardha	Mesolithic
Kolhya (21^{0}44'N; 78^{0}20'E)	Multai	Betul	Middle Palaeolithic
Kondar (21^{0}43'N; 78^{0}33'E)	Multai	Betul	Lower Palaeolithic
Khambara (21^{0}42'N; 78^{0}25'E)	Multai	Betul	Middle Palaeolithic and Mesilithic
Karwar (21^{0}33'34"N; 78^{0}25'23"E)	Warud	Amravati	Middle Palaeolithic and Mesolithic
Khanbit (21^{0}15'N; 78^{0}3'E)	Ashti	Wardha	Middle Palaeolthic and Mesolithic
Lohana (21^{0}33'12"N ; 78^{0}27'27"E)	Pandhurna	Chhindwada	Middle Palaeolithic

Linga (21^{0}32'37"N; 78^{0}25'15"E)	Warud	Amravati	Middle Palaeolithic and Mesolithic
Malegaon (21^{0}45'N; 78^{0}18'E)	Multai	Betul	Mesolithic
Morshi (21^{0}24'4"N; 78^{0}26'3"E)	Warud	Amravati	Middle Palaeolithic and Mesolithic
Mendla (21^{0}30'42"N; 78^{0}21'53"E)	Narkher	Nagpur	Middle Palaeolithic and Mesolithic
Nimbhoti (21^{0}43'N; 78^{0}22'E)	Multai	Betul	Middle Palaeolithic
Patan (21^{0}39'N; 78^{0}16'E)	Patan	Betul	Middle Palaeolithic
Pipalghat (21^{0}23'11"N; 78^{0}25'5"E)	Warud	Amravati	Middle Palaeolithic and Mesolithic
Parghan (21^{0}25'45"N; 78^{0}25'46"E)	Warud	Amravati	Mesolithic, Middle Palaeolithic and Late Medieval Mound.
Pardi (21^{0}10'38"N; 78^{0}18'30"E)	Karanja	Wardha	Mesolithic and Middle Palaeolithic
Ranjni (21^{0}10'03"N; 78^{0}21'25"E)	Karanja	Wardha	Mesolithic
Sattudhana (21^{0}39'N; 78^{0}17'E)	Multai	Betul	Mesolithic
Thari Pauni (21^{0}24'40"N; 78^{0}21'03"E)	Warud	Amravati	Mesolithic
Thugaon-deo (21^{0}24'40"N; 78^{0}27'03"E)	Warud	Amravati	Mesolithic
Umtha (21^{0}28'34"N; 78^{0}24'36"E)	Narkher	Nagpur	Middle Palaeolithic and Mesolithic
Umarikala (21^{0}31'11"N; 78^{0}20'31"E)	Pandhurna	Chhindwada	Middle Palaeolithic and Mesolithic
Vaghod (21^{0}27'6"N; 78^{0}24'26"E)	Karanja	Wardha	Mesolithic
Waregaon (21^{0}32'12"N; 78^{0}27'22"E)	Pandhurna	Chhindwada	Middle Palaeolithic

17. EXPLORATION OF BORI RIVER IN AKKALKOT TEHSIL, DISTRICT SOLAPUR

Shivaji Dadaso Kshirsagar of Deccan College, Pune carried out exploration in Bhim river basin of Bori river in Akkalkot Tehsil of Solapur District. Exploration revealed Lower Palaeolithic and Mesolithic stone tools, microlithic and animal teeth fossils (Fig. 10). The raw material such as chalcedony, gate and chart for Microlithic tools and basalt for Lower Paleolithic stone tools were found. Animal fossil teeth and Paleolithic tools were found in the Dug-wells sandy Pebbly gravel in secondary context with the river conglomerate of Pebbly-Bolder of brownish colored gravel which spread in around the Dug-wells at Umbrge and Halalli village. The Dug-wells are found in the Paleochannel of Bori river. For the study of Paleochannel of Bori river Google Earth (Remote sensing), Old Topographic maps of Survey of India, Year 1916, scale 1 inch to 1 mile and new Topographic maps of Survey of India, Year 1974, scale 1cm to 50000cm (1cm to 0·5km) were used. Fresh Lower Paleolithic tools were found in the Bori river bed with the lose, unsorted, Sandy, Pebbly, Boulders gravel and alternative uneven layer of silt, silt-sand with calcium carbonate noodles found in the Dug-wells at Umarge and Halalli Village.

Fig. 10

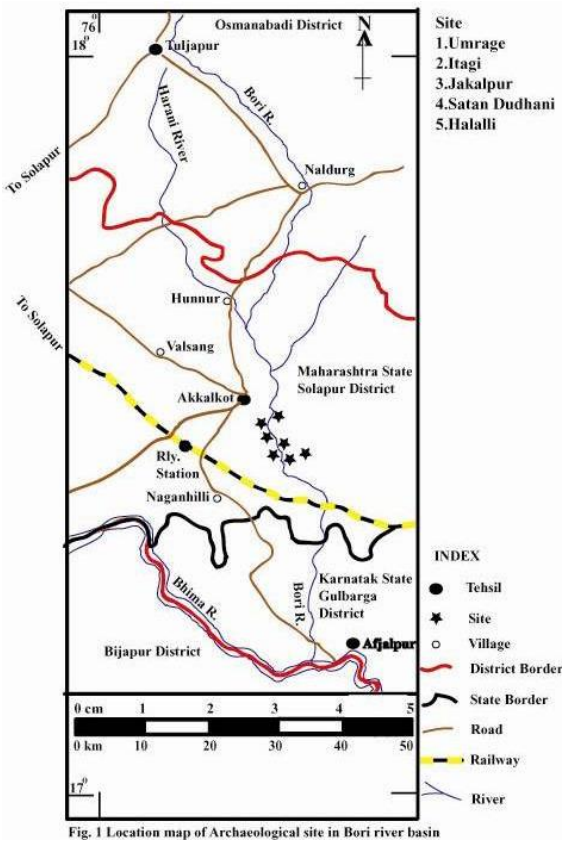


Fig. 1 Location map of Archaeological site in Bori river basin

Solapur: Location map of Archaeological in Bori river basin.

ODISHA

18. EXPLORATION AT KHURDA, DISTRICT KHURDA

The Excavation Branch-IV of the Survey under the direction of Dilip Kumar Khamari assisted by S.Panda, A.R.Sahoo, U.K.Bhoi, S.K.Khuntia and R.N. Sahoo carried out exploration on the right of river Daya in district Khurda. Details of the site explored by the team are as under: -

Location/Village	*Monument/Site*	*Antiquarian Remains*
Lingipur Tehsil- Bhubaneswar District Khurda	Harabhavani Temple ($20^0$12'33"N; $85^0$51'29"E)	Fragment of a Ganesa image and a male figure with folded hands.
Lingipur Tehsil- Bhubaneswar District Khurda	Radhakanta Temple ($20^0$12'34"N; $85^0$51'20"E)	Image of Trivikrama, Narasimha and Varaha being worshipped as *parsvadevatas.*
Nathapur Tehsil- Bhubaneswar District Khurda	Laterite wall on the river bed ($20^0$12'40"N;$85^0$50'48"E)	Remnants of an ancient laterite blocks built wall measuring about 10m length, 3m width and 4m height.
Nuagaon Tehsil- Bhubaneswar Distt- Khurda	Gopinatha Temple ($20^0$12'50"N; $85^0$50'18"E)	Images of Balkrishna, a four armed Vishnu and a Nandi.
Nuagaon Tehsil- Bhubaneswar District Khurda	Balunkeswar Temple ($20^0$12'56"N; $85^0$50'06"E)	Four armed Ganesa, Kartikeya, Parvati, votive stones depicting *linga*.
Bikipur Tehsil- Bhubaneswar District Khurda	Maa Kalyanimayee Temple ($20^0$12'30"N; $85^0$49'55"E)	Image of Ganesa, head portion of a Naga image and a hero stone.
Jaipur Patana Tehsil- Bhubaneswar District Khurda	Maa Nistaruni Temple ($20^0$12'13"N; $85^0$50'08"E)	Image of Kartikeya being worshipped as Maa Nistaruni.
Itipur Tehsil- Bhubaneswar District Khurda	Budhi Mangala Temple ($20^0$11'56"N; $85^0$50'17"E)	Image of *deulacharini* generally found at the *beki* portion of a typical *rekha* temple of Kalingan style.
Itipur Tehsil- Bhubaneswar District Khurda	Ranagouri ($20^0$11'48"N; $85^0$50'08"E)	Three miniature votive temples carved with scenes of *linga* worship.
Itipur Tehsil- Bhubaneswar District Khurda	Madan Mohana Temple ($20^0$11'55"N; $85^0$50'12"E)	Three pairs of Radha and Krishna images. The images of Krishna are made up of black chlorite stone while the Radhas are of *astadhatu*.

Itipur **Tehsil- Bhubaneswar** **District Khurda**	Jageswari Shrine-Svapneswara Siva Temple ($20^0$11'56"N; $85^0$50'10"E)	A female standing in *tribhanga* posture and a male figure holding a skull cup in the left hand and sword in the uplifted right hand.
Palashpur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Gopinatha Temple ($20^0$11'22"N; $85^0$49'45"E)	Four armed Varaha, fragments of a two armed Ganesa, eight armed Mahisasura Mardini and a *dopicha simha.*
Palashpur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Dulla Dei (Temple $20^0$11'28"N; $85^0$49'51"E)	Architectural fragments.
Palashpur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Charchika Temple ($20^0$11'20"N; $85^0$49'55"E)	Four armed dancing Chamunda, four armed seated Chamunda, four armed varaha image and a broken Vishnu image.
Basantapur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Narayanadeva Temple ($20^0$10'47"N; $85^0$49'34"E)	*Images of* Varaha, Trivikrama, amorous couple, a royal figure with folded hands, architectural fragments and Garuda. The presiding deity of the temple is a four armed Vishnu image. As per an inscribed stone piece found attached at the frontal portion of Jagamohana the temple was established on 1348 *sala* 10 *dina.*
Basantapur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Brahmheswara Siva Temple ($20^0$10'50"N; $85^0$49'32"E)	Images of four armed Ganesa, two armed Kartikeya, four armed Parvati, fragment of a *navagraha* slab, a *dopicha simhas* besides other architectural fragments.
Basantapur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Jageswari Temple ($20^0$10'39"N; $85^0$49'45"E)	Two armed *nagi* figure with nectar pot in hands, two armed Bhairava image and fragments of a *Simha bidala.*
Gangeswarpur **Tehsil- Bhubaneswar** **District Khurda**	Terracotta ring well and pottery ($20^0$10'01"N; $85^0$49'22"E)	Remains of a terracotta ring well and a *amlaka* stone.
Kalyanapur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Nrusinghanatha Temple ($20^0$09'52"N; $85^0$49'15"E)	Image of four armed *yogapata* Lakshmi-Narasimha, four armed Trivikrama, Garuda over a pillar

		base.
Kalyanapur Sasana. **Tehsil- Bhubaneswar** **District Khurda**	Jageswari Shrine ($20^0$09'46"N; $85^0$49'30"E)	Eight armed Mahisasura Maridini, two armed Bhairava, four armed Vishnu and Narasimha, *simha bidala, asva bidala* and architectural fragments.
Kalyanapur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Sahada Mundali Dhipa ($20^0$09'48"N; $85^0$48'32"E)	Chalcolithic mound.
Kalyanpur Sasana **Tehsil- Bhubaneswar** **District Khurda**	Pottery from agriculture land of shri Dujei Pradhan ($20^0$09'40"N; $85^0$49'28"E)	Potsherds of mostly red ware.
Sua Barei **Tehsil- Pipili** **District Puri**	Banadurga Shrine ($20^0$09'32"N; $85^0$49'30"E)	Man riding over a caparisoned horse holding sword in the right hand and a bowl in the left hand, a mutilated figure of eight armed Chamunda.
Tikarapada **Tehsil- Pipili** **District Puri**	Gramadevati Shrine Mangala and Ramachandi ($20^0$10'12"N; $85^0$49'36"E)	Image of Garuda and a male figure riding over an elephant.
Sua Barei **Tehsil- Pipili** **District Puri**	Sua Barei Mound ($20^0$09'14"N; $85^0$48'33"E)	Chalcolithic mound yielding celts, antler bone pieces, charred bones, potsherds of red ware varity, Black and red ware, etc.
Bindha **Tehsil- Pipili** **District Puri**	Khadeswara Mahadeva ($20^0$08'24"N;$85^0$48'50"E)	Ten armed Chamunda, two armed Bhairava, a kneeling devotee with nectar pot in hand, Nandi over a pillar fragment, rampart lion.
Arjunagada **Tehsil- Pipili** **District Puri**	Durga Shrine (Balunkeswara Mahadeva)	Defaced figure of Mahisasura Mardini , architectural fragments.
Balikuda **Tehsil- Pipili** **District Puri**	Baidyeswara Siva Temple ($20^0$07'50"N; $85^0$48'38"E)	Nava *graha* panel, *amlaka* stone.
Balikuda **Tehsil- Pipili** **Distt- Puri**	Satamana Huda/Bechhaparia Diha ($20^0$08'13"N; $85^0$48'18"E)	Chalcolithic mound totally under cultivation.
Dakhina Nuagaon **Tehsil- Pipili** **District Puri**	Brahmheswar Temple ($20^0$07'50"N; $85^0$47'58"E)	four armed Parvati, four armed Kartikeya, four armed Ganesa, four armed image of Vishnu, three

		dopicha simhas, half buried votive temple, pillar fragments, panel depicting royal procession etc.
Dakhina Nuagaon Tehsil- Pipili District Puri	Jageswari Temple ($20^0$10'39"N; $85^0$49'45"E)	Images of Ganesa, Gajalakshmi, Bhairava, female figure, *bhara bahaka* and terracotta animal figurines.
Samantarapur Tehsil- Bhubaneswar District Khurda	Baruniswara ($20^0$13'41"N; $85^0$50'20"E)	Four armed Ganesa being worshiped as *parsvadevata*.
Samantarapur Tehsil- Bhubaneswar District Khurda	Sukleswara ($20^0$13'41"N; $85^0$50'20"E)	Nabagraha panel and a Nandi image.
Samantarapur Tehsil- Bhubaneswar District Khurda	Surya Temple ($20^0$13'41"N; $85^0$50'20"E)	Pillar fragments, *amlaka* stones.
Sriramnagar Tehsil- Bhubaneswar District Khurda	Banadurga Shrine ($20^0$13'45"N; $85^0$50'08"E)	image of Maheswara, Ganesa, Nandi, *Makara*, Surya and Vishnu.
Kapileswara Tehsil- Bhubaneswar District Khurda	Jageswara Gramadevati Shrine ($20^0$13'48"N; $85^0$49'53"E)	Image of Garuda, broken image of a four armed Parvati, fragments of two Bishnu images, rampart lions, a four armed female deity and Naga-Nagi image.
Kapileswara Tehsil- Bhubaneswar District Khurda	Dulladei Temple ($20^0$13'50"N; $85^0$49'46"E)	Four armed Mahisasura Mardini, four armed Ganesa, Surya, a female playing with drums, *dopichha simhas* and a lower part of Parvati image.
Kapileswara Tehsil- Bhubaneswar District Khurda	Kapileswara Temple ($20^0$13'45"N; $85^0$49'38"E)	This temple said to have been built by Suryavamsi King Kapilendradeva (1435-1467 CE) in 15th century CE. The main temple stands in an axial alignment over a high plinth.
Kapileswara Tehsil- Bhubaneswar District Khurda	Surya Temple ($20^0$13'45"N; $85^0$49'38"E)	Surya riding on his chariot driven by seven horses and Aruna as the charioteer.
Kapileswara Tehsil- Bhubaneswar	Yamaraja Temple ($20^0$13'45"N; $85^0$49'38"E)	A siva *lingam* within a *yonipitha*.

District Khurda		
Kapileswara Tehsil- Bhubaneswar District Khurda	Chitragupta Temple ($20^0$13'45"N; $85^0$49'38"E)	A siva *lingam* within a *yonipitha*.
Kapileswara Tehsil- Bhubaneswar District Khurda	Sanischareswara Temple ($20^0$13'45"N; $85^0$49'38"E)	*Navagraha* panel.
Kapileswara Tehsil- Bhubaneswar District Khurda	Roshaghara ($20^0$13'45"N; $85^0$49'38"E)	Dancing male and female figure, Gajalakshmi.
Kapileswara Tehsil- Bhubaneswar District Khurda	Hajira Mandapa ($20^0$13'45"N; $85^0$49'38"E)	Two armed standing Karetikeya image, architectural fragment depicting seated image of Lakulisha besides a deface figure of *Naga* with nectar pots.
Kapileswara Tehsil- Bhubaneswar District Khurda	Somabara Mandapa ($20^0$13'45"N; $85^0$49'38"E)	Four armed Vishnu, Varaha, upper portion of a Vishnu image.
Kapileswara Tehsil- Bhubaneswar District Khurda	Jaleswara Temple ($20^0$13'45"N; $85^0$49'38"E)	A single *pidha* structure.
Kapileswara Tehsil- Bhubaneswar District Khurda	DakshinaKali ($20^0$13'45"N; $85^0$49'38"E)	Image of Trivikrama, Parvati and four armed Ganesa.
Kapileswara Tehsil- Bhubaneswar District Khurda	Bahakhia Mandapa/Beharana Mandapa ($20^0$13'45"N;$85^0$49'38"E)	Open pillared *Mandapa*.
Kapileswara Tehsil- Bhubaneswar District Khurda	Bhandara Ghara ($20^0$13'45"N; $85^0$49'38"E)	A single *pidha* structure.
Kapileswara Tehsil- Bhubaneswar District Khurda	Ditiya Kapileswara ($20^0$13'45"N; $85^0$49'38"E)	Siva *lingam* with its circular *yonipitha*.
Kapileswara Tehsil- Bhubaneswar District Khurda	Bhairava Temple ($20^0$13'45"N; $85^0$49'38"E)	Image of Parvati, four armed Ganesa and four armed Bhairava dancing over a corpse.
Kapileswara Tehsil- Bhubaneswar	Someswara Temple. ($20^0$13'45"N; $85^0$49'38"E)	A small *pidha* structure.

District Khurda		
Kapileswara Tehsil- Bhubaneswar District Khurda	Siddheswara Temple ($20^0$13'45"N; $85^0$49'38"E)	A single *pidha* structure.
Kapileswara Tehsil- Bhubaneswar District Khurda	Stepped well-1 ($20^0$13'45"N; $85^0$49'38"E)	A rectangular stepped well represented with the images of Nataraj, Parvati, Vishnu, Ganesa, *Matriaka* and Royal figures.
Kapileswara Tehsil- Bhubaneswar District Khurda	Stepped Well-2 ($20^0$13'45"N; $85^0$49'38"E)	Rectangular stepped represented with the images of *linga* worship by a royal figure and a four armed female figure.
Kapileswara Tehsil- Bhubaneswar District Khurda	Gateway of the Kapileswara Temple. ($20^0$13'45"N; $85^0$49'38"E)	Two ancient gateways leading to the temple.
Sundrapada Tehsil- Bhubaneswar District Khurda	Kalia Sani Gramadevati ($20^0$13'42"N; $85^0$48'52"E)	Naga-Nagi images architectural fragments.
Arokola-Botanda Tehsil- Jatani District Khurda	Mahabhoi Pokhari ($20^0$12'15"N; $85^0$48'35"E)	Ancient water body.
Kuha Tehsil- Jatani District Khurda	Rani Huda ($20^0$11'31"N; $85^0$48'11"E)	A high earthen bond measuring about 6km length with a width of 30m and height of 3m.
Pradhan Sahi Tehsil- Jatani District Khurda	Baghei Thakurani ($20^0$10'50"N; $85^0$47'29"E)	Images of Mahisasuramardini, Surya and fragments of a lion head.

RAJASTHAN

19. EXCAVATIONAT AT JAWASIYA AND SURROUNDING, DISTRICT RAJSAMAND

The Jawasiya Research Project (JARP) team conducted excavations at the site of Jawasiya and surrounding area led by Lalit Pandey (Rajasthan Vidyapeeth University, Udaipur) Prabodh Shirvalkar (Deccan College) and Teresa Raczek (Kennesaw State University, USA). The project investigates the occupations at the site of Jawasiya-Arni, located on a fossilized sand dune where the villages of Jawasiya (Rajsamand District), Arni (Arni District) and Gurjaniya (Chittorgarh District) meet. The site was previously identified as "Jawasiya" by Dasgupta in 2006. However, as the site spans the villages of Jawasiya and Arni, the JARP project team now refers to the site as Jawasiya-Arni.

The site is situated near the 22 hectare site of Gilund, the largest third

millennium permanent settlement on the Mewar Plain. Recent excavations at Gilund (3000 BCE-200 CE), demonstrated the presence of a stratified, robust artisan and farming community that built monumental architecture and engaged in local and long distance trade and exchange (Shinde 2010b; Shinde and Possehl 2005; Shinde et, al 2005).

On the surface, Jawasiya most closely resembles the site of Bagor, which is located approximately 40km to the northwest. Bagor was originally excavated by V.N. Misra (IAR 1967-68b, 1968-69, 1969-70; Misra 1970, 1971, 1973, 1982), and later by V. Shinde (Shinde 2010a; Shinde et, al 2004), and has been interpreted as a temporary camp site with occupation dates as early as 5500 BCE. The presence of pottery, beads, and copper arrowheads at Bagor suggest that the occupants engaged in an exchange relationship with nearby permanent settlements (Misra 1971, 1982). However, researchers differ on interpretations of other practices such as mobility levels, subsistence regime, and the relationship to farming communities (cf. Kashyap 2006, Lukacs 2002, Meadow and Patel 2002, Misra 1973, Possehl 2002, Possehl and Kennedy 1979, Raczek 2007, Khanna 1993, Shinde et al 2004, and Shinde 2010a, b).

The site is in grave danger from encroachment by the expanding agricultural activities. The residents have cut substantially into the dune with a bulldozer in order to make additional fields. This project is considered to be a salvage project in that it is designed to document an important archaeological site before it is destroyed.

The project addressed questions about chronology, foundations of Chalcolithic culture in Rajasthan and cultural continuity in Rajasthan. In addition, the project was interested in understanding how temporary occupations were utilized and how small sites were connected to wider networks of exchange and interaction that existed across the Indian subcontinent throughout time. As many important questions remain about this region and the numerous changes it has gone through over time, three major lines of inquiry were developed. The relationship between smaller sites such as Jawasiya and larger sites like Gilund?, the subsistence, economy, and mobility pattern of the Site's microlithic using occupants? and the site continuously occupied through multiple time periods or was there a break in occupation?

The site is located on two large sand dunes north of the Banas River. The excavations reported here took place on the Western most dune, which is comprised of a north and south deposit. The excavations took place on the north deposit. A permanent stone marker placed by the Government of India at the top of the northern part of the western dune marks the point where the three villages and two districts meet. That marker was used as the main site datum during excavations.

Total 8 trenches were excavated in three locations along the upper portion of the western dune. Trench 1 was located

south of the main datum. Trenches 2-7 were aligned in step formation, proceeding down the North side of the dune. Trench 8 was located to the West of the step trench. Trench 1 was 5 x 5m and all other trenches were 2 x 2m in size and aligned along a North-South axis. Trench 1 was excavated by quads, but as the other trenches were small, they were not further subdivided into quads. We excavated to a depth of 18cm to 91cm in various trenches.

10. EXCAVATION AT KARANPURA, DISTRICT HANUMANGARH

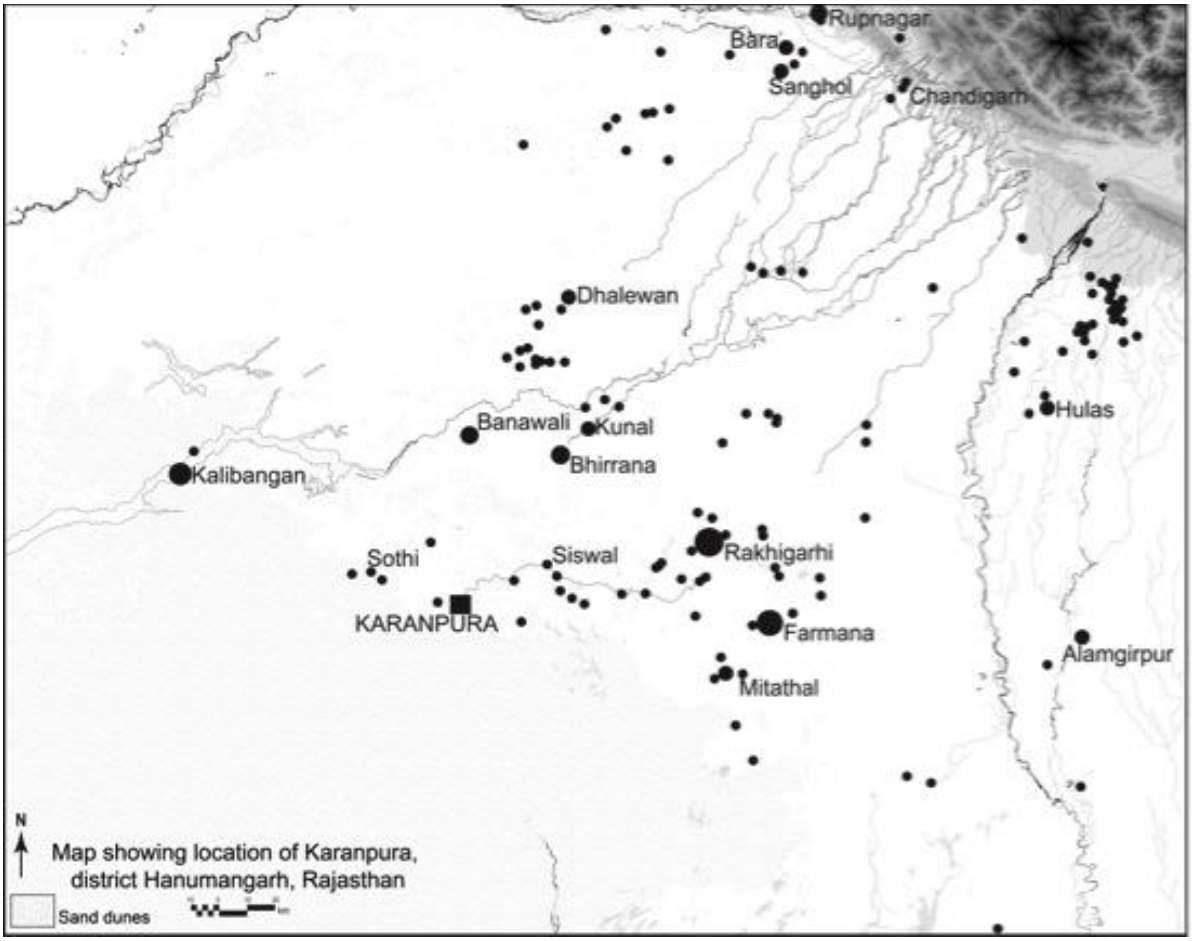
In continuation of previous season's excavation at Karanpura, the Excavation Branch II of the Survey resumed excavation at Karanpura under the direction of V.N. Prabhakar assisted by Bhupendra Fonia, Nidhi Gupta, C.S. Ambily, Vinay Kumar Rai, Subhash Chand, Preeti Shandilya. The students of the Institute of Archaeology are participated in excavation to received training in field archaeology.

The habitational remains at Karanpura (29º6'29"N; 75º5'50"E) is located adjacent to a brick kiln and in the midst of a heavily altered landscape on the Bhadra-Goga Medi road in district Hanumangarh, Rajasthan and a distance of 7km from Bhadra. The site is located on the right bank of now dried up channel of river Chautang (Chatrang or Chitrang Nadi as known locally), which is identified with river Drishadvati (Fig. 11). The river course is not clearly delineated in the present scenario of large scale leveling up of tracts of land, thereby altering the entire landscape. However, the surface contours clearly indicate a gradually depression towards the eastern side of the mound, which continues in a northwest to east-northeast direction.

The local traditions also attribute a vast sheet of water body accumulating if there is a continuous rainfall for 10-15 days and even after the rain ceases, pools of water accumulate in certain pockets generally corresponding to the river course. The local traditions also attribute the availability of sweet water all along the palaeo-channel and the water turn salty if one moves away from the river course. The local villagers of Karanpura also inform that at a depth of around 20-30 feet, black coloured silt deposit is encountered while digging operations were carried out. These factors clearly indicate the possibility of existence of river during the third millennium BCE. This is further strengthened by the presence of settlements all along the dried river course of river Drishadvati.

The other settlements that are located on river Drishadvati and close to Karanpura are Siswal (upstream, 42km), Sherpura (upstream 16km), Sothi (downstream, 27km), Nohar (downstream, 33km) all reported to have yielded evidence of Sothi-Siswal ceramic assemblage of the early Harappan phase. Karoti (downstream, 23km) from Karanpura is reported to have Harappan remains, but during the course of excavation the site was explored and it yielded only ceramics and other artefacts ascribable to Rangmahal culture. Another site with early Historic remains was noticed south of Bhadra near the village of Hathi Pura. It is to further noted that Bhadra is also located on the river Drishadvati and

Fig. 11



Karanpura: Map showing the location.

early Historic remains could be noticed near the Bhadra bus stand.

Thus, it can be observed that the area around Karanpura is studded with a host of settlements ranging from third millennium BCE to early Historic period. The possibility of more sites cannot be ruled out and as the engulfing sand dune deposits largely affect the entire area, it is difficult to discover the presence of these sites that too in an environment of large-scale surface modifications aided by irrigation and mechanised devises for agriculture. More and more sites are put into leveling due to the increased pressure of agricultural produce.

Reverting back to the environs of Karanpura, it also underwent large-scale modifications with large chunks of land to the east, south and west was removed for coping up with the levels of nearby irrigation canal. On an average approximately 1-1·5m of habitational remains have been removed, the area to the south of the main operation area is the most affected wherein nearly 2m of deposit was ruthlessly removed and cultural deposits lost for eternity. The local villagers still remember the removal of cultural deposits some 6 years back, when the irrigation canal was newly laid out and in order to reach its level for proper irrigation, the land owner started removing the deposits. The villagers point out findings such as complete pottery vessels, stone objects, a large stone slab, etc., from the removal of deposits. Looking back after two seasons of excavation and the emergence of a fortified settlement at Karanpura, it can now clearly assessed that at least 70% of the fortified settlement was destroyed due to the above mentioned operation. The entire habitation area at Karanpura is also topped by a deposit of wind blown sand with thickness varying between 0·2m to 2·5m. The western portion of the site is topped with a thick deposit of wind blown sand and at places, small-elevated sand dunes are noticed. The villagers, in order to carry out cultivation of *rabi* crops like wheat, mustard and horse-gram, have felt the necessity to remove this top soil of wind blown sand to reach a favourable ground. This leveling operation is also necessary for the waters from canal reach large area of cultivable land. Thus, the destruction started for the archaeological deposits in a large way and Karanpura suffered to a large extent.

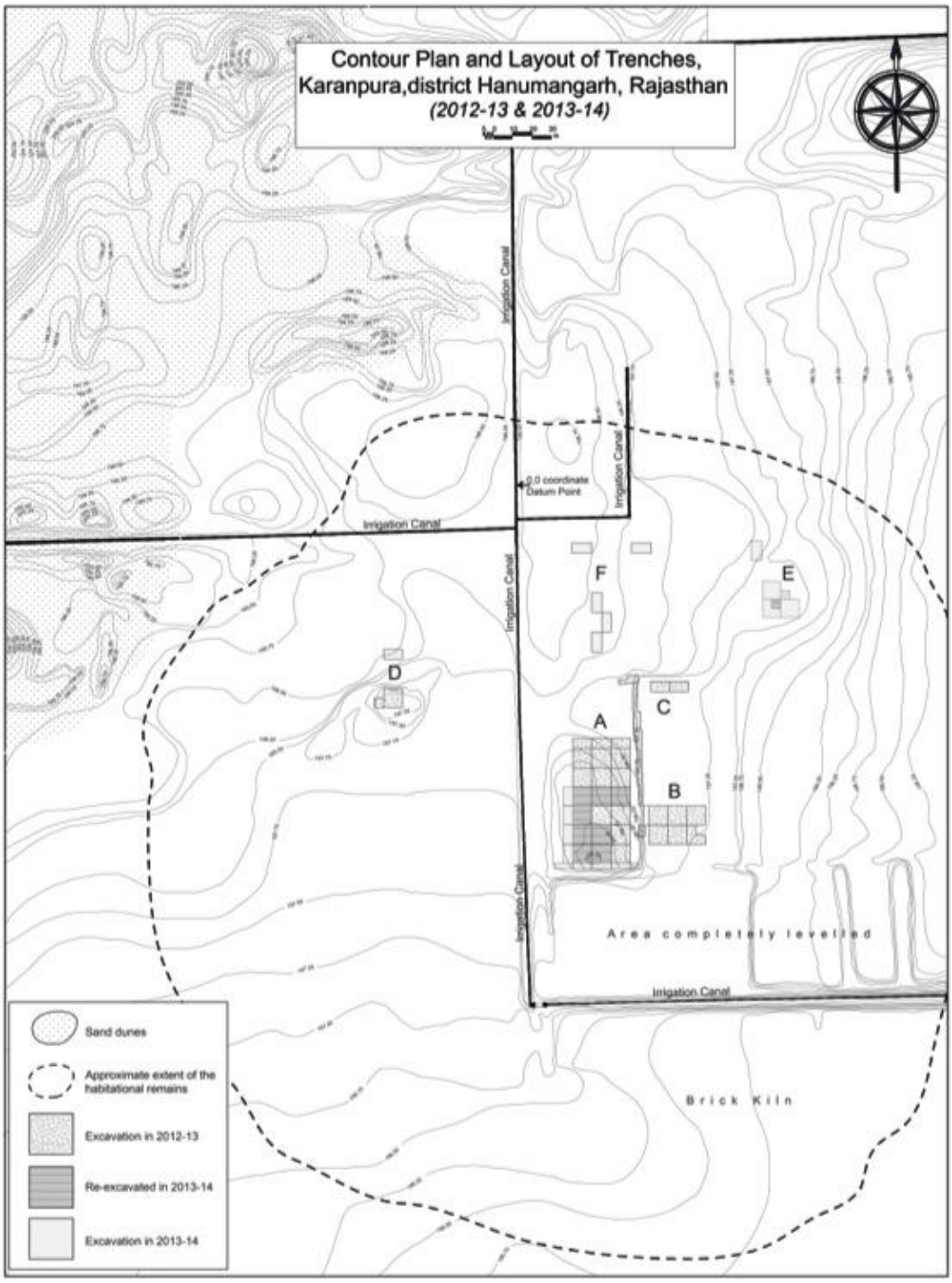
The excavation at Karanpura was carried out with the objectives (i) to investigate on the cultural sequence, settlement pattern, house plans in order to understand the ancient settlement at Karanpura in the right perspective, (ii) to further understand the early harappan tradition of Karanpura systematically in order to establish any transformation from early Harappan to mature Harappan tradition, (iii) to collect floral, faunal, charcoal and soil samples to carry out various scientific investigations, and (iv) to collect various other stone and metal samples to carry out scientific investigations. In order to have a workable layout plan and to extend the trenches in any direction, coordinate system of trench layout was adopted at Karanpura. A central 0,0 coordinate datum point was fixed at a permanent location along the irrigation

canal. Keeping this datum as the central coordinate the trenches were laid out in 10 x 10m squares, further sub-divided into four quadrants of 4·25 x 4·25m each. The northwestern peg was taken as reference peg of each trench and numbered depending upon the location and distance in relation to the datum point. Thus a trench 100m south and 120 east of central datum point is numbered as S100E120. This numbering system was very helpful in identification of their locations with mere mention of trench reference number in relation to the datum point.

During the first season's excavation 28 trenches were excavated and during second season's excavation 18 trenches were excavated out of which 8 trenches were re-opened for investigations. The operation areas at different locations of the habitation site were designated as A, B, C, D, E and F for clarity in reporting the findings (Fig. 12). The excavation in the above operation areas gave an idea of the nature of deposits of different cultural periods. While areas B and D exclusively yielded early harappan remains, area A has booth early and harappan period remains, areas C and E have exclusively Harappan remains and area F indicate a deposit of transitional phase from early to Harappan phase. This also gives a clear indication of the extent of early Harappan remains towards the southern portion of habitation site and extending in an east-west direction while the remains of Harappan phases extends towards the north and northeast of the early Harappan remains with the habitation of Harappan phase continued in area A. The extensive contour survey and plotting of surface remains for evidence of habitation and further strengthened by exploratory digs helped in understanding the approximate extent of the ancient habitation. On a preliminary evaluation, it has been understood now that the habitation remains extend 400 m (N-S) and 420m (E-W) thereby indicating its moderate size accounting to nearly 16·8 hectares. A site of 10 hectares and above up to 50 hectares can be placed under the category of a small town or small city (Kenoyer 1998: 49). Thus, Karanpura emerges as an important settlement in the lower Chautang valley under the category of a small city or town, while the upper Chautang valley already have settlements of this category like Farmana and Mitathal, while Rakhigarhi on the extreme north was a major city of Harappan times. The location of Karanpura on a route crucial for facilitating a network of acquisition and distribution of raw materials and other finished products might have helped in the prosperity of this site during the Harappan times.

The excavation brought to light occupational remains of early and mature Harappan periods of which the maximum deposit was found in area A from the trench S170E40 III. The natural soil was reached at a depth of 3·93m from the reference peg, of which early Harappan occupational deposit accounts to 2·53m while mature Harappan deposit accounts to 1·50m. A thin deposit of transitional phase between the early and mature Harappan periods was also encountered in this trench. Natural soil was also reached in S30E130 at a depth of 3·7m, which corresponds to both transitional phase and mature Harappan period.

Fig. 12



Karanpura: Contour plan and layout of trenches.

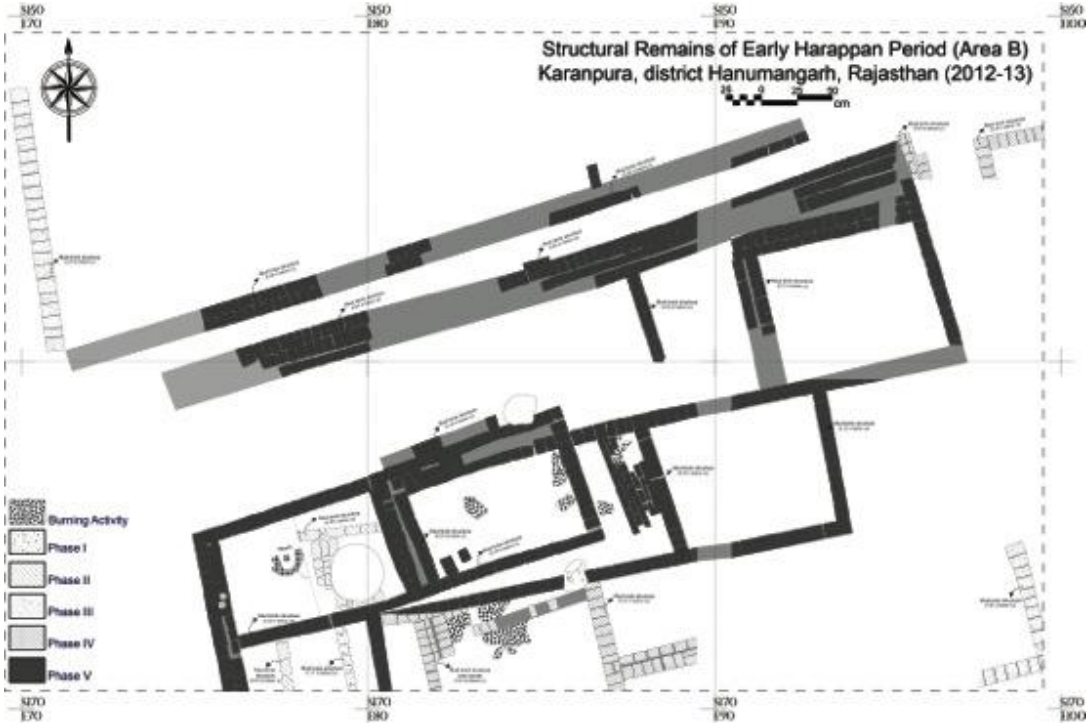
The early Harappan occupational deposit was found in the operation areas A, B and D. These remains indicate the spread of early Harappan occupation in an east-west orientation.

Remains in Area: The early Harappan remains from the area B is at a lower contour in comparison to area A and is located to its east. The area B is at a lower level due to the removal of over 1m of occupation deposit of later period by the land over in order to facilitate irritation. In this area, a total of 25 trenches of 4·25 x 4·25m were excavated. The important feature of this area is that the remains of early harappan habitation were found just below a deposit of top soil of 10cm, as the land owner as mentioned above removed the entire mature Harappan deposit. The natural soil was reached in one trench, *viz*., S160E70 IV at a depth of 2·82m from the reference peg (RL 197·42m). The excavation in Area B brought to light the exclusive remains of early Harappan period, which corresponds to the Sothi-Siswal cultural complex. The habitation remains are characterised by the presence of at least four structural phases of mud brick structures, both rectangular and circular on plan. The topsoil pertaining to nearly 10cm consist of a mixture of different deposits due to extensive ploughing and hence less reliable. Immediately below this deposit were unearthed the structural remains. The mud-bricks used in the construction are larger in size and having dimensions of 14 x 28 x 42cm (Fig. 13).

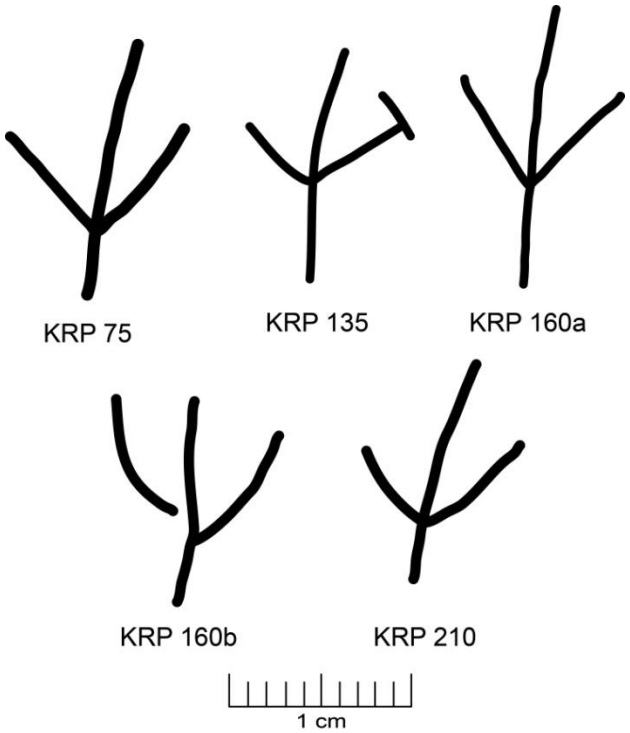
The floor levels of a large house complex were excavated in two trenches, *viz*., S160E70 II and S160E80 I. Two adjacent rooms of this complex were excavated in the above-mentioned trenches, which brought to light the remains of a "U" shaped hearth facing north as well as the extensive presence of burnt remains of probably reeds that could have formed part of roof. A large-scale conflagration had taken place towards the end of the early Harappan occupation, which is indicated by the presence of burnt layers in at least five trenches. The charred remains of what could be a wooden pole was also unearthed, completely burnt and fallen over the mud brick wall. This evidence indicates the extensive damage caused to the structure, which had burnt and collapsed along with the poles. The two rooms mentioned above are also important as it revealed the presence of at least five terracotta spindle whorls, with the same graffiti marks (Fig. 14). The area also had the presence of large number of micro steatite beads. The room mentioned in S160E80 I also brought to light a plenty of copper artefacts in the form of a broken spearhead, rings, bangles, etc. The deep trench excavated in S160E70 II brought to light the remains of a copper bar celt from the early Harappan levels.

Remains in Area D: This area is located to the southwest nearly 100m from the trenches laid out in area A. The area D was conducted to extensive levelling and digging operation by the landowner in order to remove the topsoil composed of windblown sand deposit. In this area, a deep trench for parking the tractor to load the excavated earth from either side was also located. In total, five quadrants were excavated in area D along with trimming of a long section

Figs. 13-14



Karanpura: Structural remains of early Harappan period from Area B.



Karanpura: Graffiti from early Harappan phase.

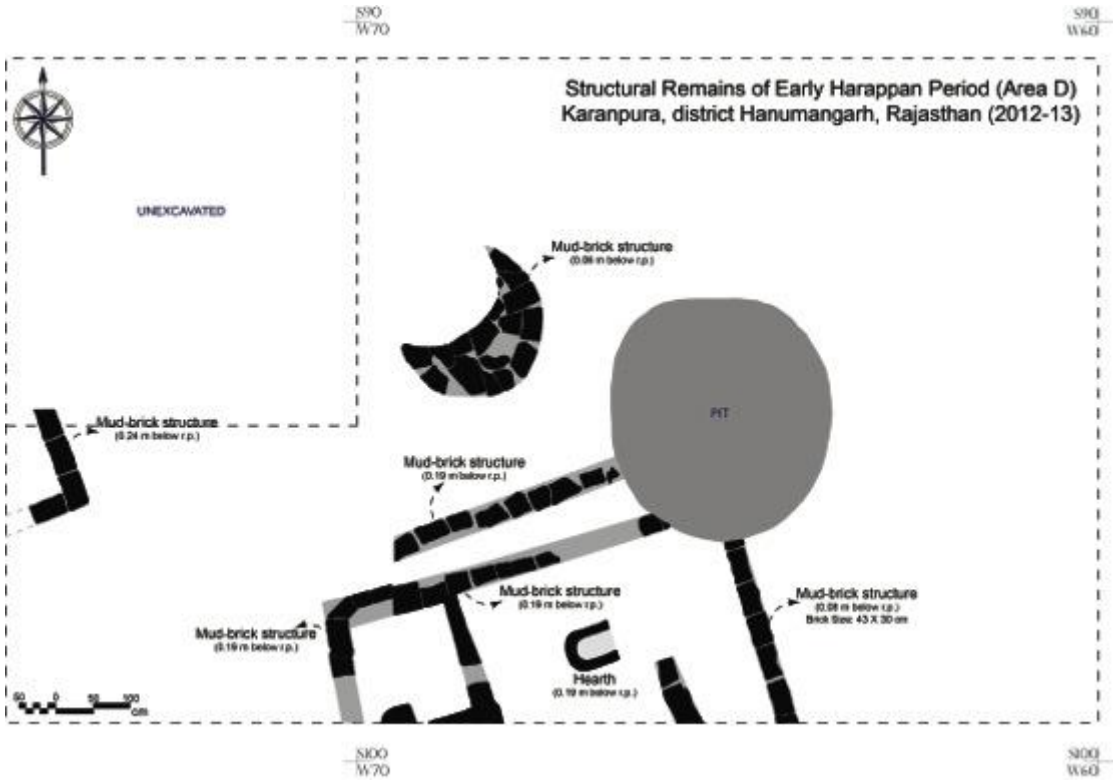
along the trench excavated by the land owner. The structural remains of Early Harappan period were encountered right from the surface as all the topsoil and accompanied cultural deposits were removed by levelling operation. The structural remains consist of portion of two house complexes and an enigmatic structured probably enclosed by a boundary wall (Fig. 15). These structures were constructed using mud-bricks of the ratio 1:2:3. The remains of the first house complex, which was brought to light in S90W70 III and IV and S90W80 III consists of two rooms, one larger and located towards the east and the smaller to its west. The larger room has remains of a hearth at its centre. The northeastern portion of the larger room is disturbed by pit activity of later period. The top surface of the walls is poorly preserved due to levelling activities and subsequent erosion.

Only one course of the structure is preserved. The mud-bricks used in these structures are distinct in colour and composition from the mud bricks noticed in upper levels of area B. The upper levels of area B are also assignable to early Harappan period. The colour of the mud-bricks is yellowish brown and very much distinct from other mud-bricks used in constructions from the site, which is often light grey, and merges with the surrounding deposits and very difficult to distinguish. An interesting find from this area is a structure, crescent-shaped and located to the north-northwest of above-mentioned structural remains. The structure is also constructed of yellowish brown mud-bricks and three courses of this structure could not be exposed. The exact purpose of this structure could not be determined and its shape is interesting. The mud-bricks used for the construction also belong to 1:2:3 ratio and belong to the early-Harappan period.

Excavation was renewed in area D during 2013-14 in order to understand the stratigraphy of upper levels, which were missing in the operation area of 2012-13 due to massive leveling. In order to ascertain the exact nature of the upper levels from this area, two quadrants I and II of S70W70 were excavated. The excavation brought to light highly mixed deposit of 0 3m at the upper levels corresponding to dump deposit by the local clearances. However, these upper levels brought to light a significant numbers of micro steatite beads. After the removal of these upper levels, regular stratified deposits came into existence and the deposits consisted of largely isolated pots of various sizes, some complete in nature, without any association of structural remains. The excavation was stopped at a depth of nearly 1m and no structural remains could be found here. The artifact remains consisted of micro steatite beads, grey coloured TC bangles with multiple grooves on the surface and rectangular in cross-section, spindle whorls, beads of lapis lazuli, etc. The pottery remains consist of early Harappan types of Sothi-Siswal ceramic tradition.

Remains in area A: The early Harappan remains in area A is best represented in S170E40III. This trench was excavated up to a depth of 1·13m during perious year. The trench was reopened

Fig. 15



Karanpura: Structural remains of early Harappan period from Area D.

to probe further and collect soil and charcoal samples. The total thickness of early Harappan occupational deposit is 2·43m and could be classified into five stages of occupation, with a considerable thickness of water borne deposit between Stages I & II and Stages II & III.

Stage I: The earliest occupation in this area started in Stage I of which the occupational deposit has a thickness of 0·66m. The lowermost deposit consisting of loci 074 to 076 belong to Stage I, which is very compact and mixed with a large number of calcium carbonate nodules. The evidence indicates that the area might have been compacted and leveled by the inhabitants before occupation. A large number of white coloured snails were also found along with the calcium carbonate nodules.

The pottery assemblage from this stage comprises of the Sothi-Siswal ceramic complex consisting of chocolate slipped ware, red coloured pottery with white painted motifs, grey coloured pottery. Some of the grey coloured potsherds preserve evidence of burnishing. The red coloured pottery also has shallow incisions on the exterior surface. Among the artefact remains, terracotta bangle fragments are quite interesting. Keeping in view of thousands of TC bangles found from Karanpura during the Harappan period, they are few in number during the early Harappan period. Further, the shape and decorations are distinct during the early Harappan period. The varieties of TC bangles were found i.e., Red one with circular section, Red one with black painted lines and circular section, Red one with lenticular section, Red one with black painted lines and lenticular section, Red one with roughly triangular in section and Grey one with lenticular section

Another interesting artefact remains is that of a faceted pestle. The evidence indicates that the faceted shape could have occurred due its constant use. The length of the pestle is 6·5cm. It is broken partially and evidence indicates that it was in use even after the breakage. The pestle is of quartzite and it clearly indicates the scarcity of the material in this area and hence it was in use even after its breakage instead of discarding. Another interesting find from this stage is a terracotta toy wheel, which measures 5cm in diameter. A weight made of stone also recovered from here, which is roughly circular in shape. Terracotta beads, steatite micro beads and pottery disc are the other artefact finds from this level.

The raw materials like quartzite, black sandstone and mica were also unearthed from this level. The presence of black sandstone indicates that the early settlers had interaction with the upper reaches of river Ghaggar, where such type of sandstones occurs.

Water borne deposit between Stages I and II: This is followed by a 0·14m thick deposit of sand layer comprising of loci 72 and 73 that separates Stages I and II in this area. The water borne deposit is composed of sand and silt deposit that could be a fluvial deposit caused by river Drishadvati. A very few pottery fragments, that too in a rolled and broken condition clearly indicates a breakage in the habitation for a brief period

due to fluvial activity. The artefact finds from this water borne deposit consist of a steatite bead, a terracotta bead and a TC bangle fragment. The bangle has finger impression and very crude in appearance with roughly rectangle section.

Stage II: The water borne deposit if followed by a slightly compact layer mixed with charcoal indicative of occupational deposit. The thickness of this deposit if 0·16m and comprises of loci 070 and 071. In the operation area restricted to only the southeastern portion of the trench, a high concentration of charcoal and a burnt patch was noticed. The pottery remains from this stage also belongs to the Sothi-Siswal ceramic complex and includes chocolate Slipped Ware, Incised Ware, Red and Grey Coloured Pottery. Bichrome Ware (red coloured pottery with white and black coloured painted motifs of Sothi-Siswal ceramic complex) was also found from this level. The painted designs include wavy lines, horizontal bands and intersecting lines.

Among the bases of bowls, three types were noticed, *viz*., contiguous, non-contiguous discoid and non-contiguous ring. The pottery shapes with contiguous bases dominate among the collection. Pottery with incised decorations in zig-zag patterns executed on the shoulder portion of small pots is found from this level. This type of pottery cannot be placed in the category of 'incised ware' of the 'Fabric D' of Kalibangan as they are very much distinct in terms of pottery forms and designs. This type of pottery with incised patterns, mostly executed with a sharp thin tool on the shoulder portion of small pots, are noticed unlike the 'Fabric D' which are basically basins and troughs with deep incisions on the interior portion. A complete pot with similar decoration and with a handle was discovered from a chance digging near area D wherein excavation was conducted during 2012-13.

Bangle fragments are the dominating artefact finds from this stage. The new variety yielded from here is red coloured bangle with triangular section. The varieties of bangles noticed are Red one with black painted design and triangular section, Red one with circular section, Red one with lenticular section and Grey one with circular section

A grinding stone fragment, steatite bead, two pieces of stone with traces of red ochre, etc., are the other prominent finds from this stage. The grinding stone is of quartzite generally found from the Kaliana hills in Haryana. The preference to Kaliana variety of quartzite from early Harappan levels indicates its suitability and popularity even during the early centuries of third millennium BCE.

Water borne deposit between Stages II and III: Stage II is again followed by thick water borne deposit composed of sand and silt and is again a fluvial deposit. The water borne deposit is 0·29m in thickness comprising of loci 067 to 069. The thickness of this water borne deposit when compared to the earlier one is also an indication of large-scale inundation of the area followed by Stage II. The pottery finds from this deposit is fragmentary and consist of chocolate slipped ware, bichrome ware,

grey and red coloured pottery. Another pottery variety, which is basically a variety of chocolate slipped ware with chocolate slip executed both on the neck and shoulders and executed with combed decorations on the shoulders when the slip was still wet, resembling the decorative patterns noticed in reserved slip ware, makes its appearance here. The number of such pottery increases considerable during later stages with elaborate decorative patterns executed in the style of reserved slip ware. The artefact finds include that of bangle fragments, steatite bead and TC bead. Fragments of animal bones were also retrieved from this water borne deposit.

Stage III: Immediately after the water borne deposit, the site was again re-occupied, as the fluvial deposit was a temporary phase in the occupational activity at this site. This deposit is slightly compact and it has the thickness of 0·44m comprising of loci 063 to 066. The pottery from this level includes chocolate slipped ware, incised ware, red coloured and grey coloured pottery. Among the grey colured pottery, few are burnished.

This stage is noticeable for the appearance of very shallow incised design on the outer surface of the pottery. This may be a precursor to the dominant incised ware noticed here particularly from the Harappan levels, even though incised ware is noticed from early Harappan levels at Kalibangan and reported from other sites like Sothi and Siswal. At Karanpura, pottery with incised decorations, chiefly consisting of wavy patterns executed only on the exterior surface, are noticed from the early Harappan levels, while the typical incised ware appears in the mature Harappan levels.

Among the pottery finds, an interesting find is a potsherd with *pipal* leaf motif (Fig. 16), which is painted in black on red coloured pottery, unearthed from this level. Some potsherds have cream coloured coating on the exterior surface.

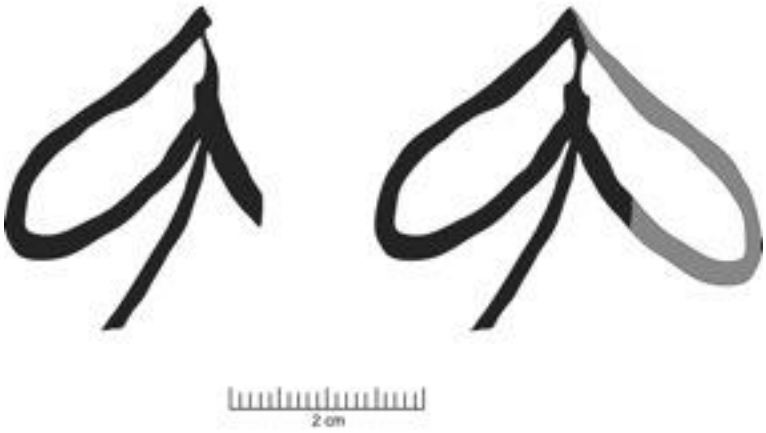
The plain base is the dominant variety but the contiguous discoid and ring varieties are also present. Among the artefact finds, terracotta bangles are the dominant one which can be categorised into eleven types according to the colour, shape and design. Interestingly, the grey conjoined bangles appear for the first time in this level. There are red one with black painted lines and lenticular section, red one with black painted lines and circular section, red one with black painted lines and triangular section, red one with triangular section, red one with lenticular section, red one with circular section, grey conjoined with 4 grooves, grey conjoined with 2 grooves, grey with circular section, grey with rectangular section and crude bangles with rectangle section (finger impression visible on it).

The other artefact finds include a micro chert blade, ring and rod of copper, pottery disc, steatite beads and terracotta beads.

Structural Phase I: A structural phase was excavated above the Stage III and the occupational deposit corresponding to this phase is 0·1m comprising of loci 060 to 062. The structure was constructed using mud-bricks and the upper portion of the one

Fig. 16

Karanpura: Potsherd with pipal leaf motif.



Karanpura: Pipal leaf motif (left) and reconstruction (right) on a potsherd.

course structure is heavy eroded and exact thickness of the bricks could not be measured. The bricks otherwise measure 45 x 27cm (l x b), while the thickness is not fully available due to erosion. The evidence indicates compacting of the surface using calcium carbonate nodules before the structure was constructed. The structure consists of part of a room, but is excavated partly only and is oriented in north-south direction, and turns towards the east, the other portions entering the section and hence the exact plan could not be ascertained. The length of the wall is 2·44m while its width is 0·27m.

The occupational deposit corresponding to the structural phase yielded very little pottery, which includes chocolate slipped ware, grey and red coloured pottery. A few of the red coloured pottery is painted/incised. The artefacts include bangle fragments and one TC bead. The different varieties of bangle are grey one conjoined with 4 grooves, grey one conjoined with 3 grooves, red one with lenticular section and red one with black painted design and lendicular section

Stage IV: The occupational deposit of Stage IV of the early Harappan phase is about 0·24cm and comprises of loci 050 to 059. The prominent finds from this stage is in the form a floor level of an occupation along with a north-south oriented hearth, with its opening towards the south for adding fuel. The floor was compacted with clay and calcium carbonate nodules and with a thickness of 0·03m.

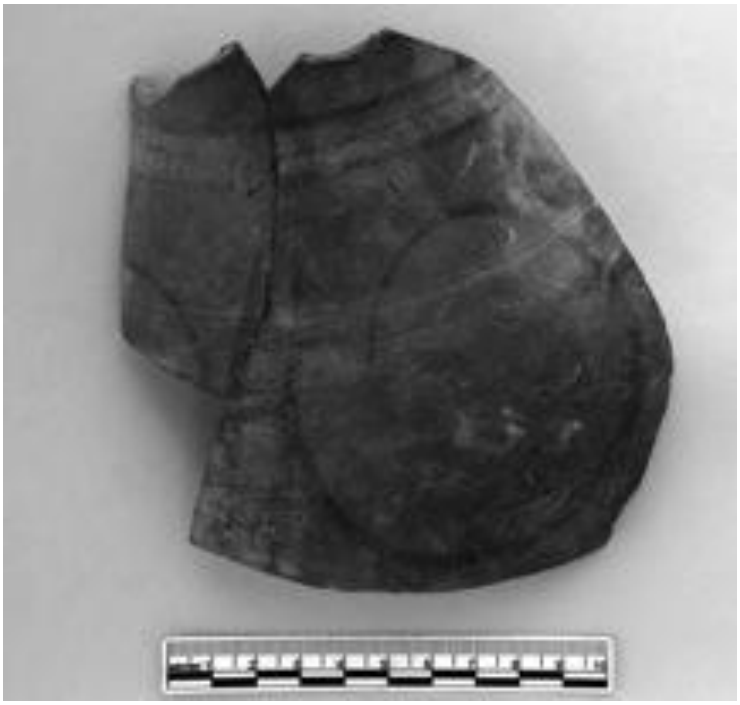
The pottery unearthed from here includes chocolate slipped ware, red and grey coloured pottery and bichrome ware of Sothi-Siswal ceramic complex. In terms of graffiti, this stage is very important as they starts to appear from here onwards. Some of the potsherds are also found decorated with simple cord impression on the shoulder level.

The artefact finds include bangle fragments, steatite micro-beads and pottery discs. The bangle fragments are the dominant artefact finds from this level. This level also witnessed the appearance of new styles in bangles. One type has twisted surface and the other type is red coloured one with conjoined and two grooves. The types of bangles noticed are red one with circular section, red one with black painted design and lenticular section, red one with coiled shape and oblate section, red one with triangular section, red one conjoined with two grooves and grey one conjoined with three grooves

Stage V: The total thickness of the deposit is 32cm and comprises of loci 043 to 049. This stage witnessed a considerable increase in the quantity of pottery types like chocolate slipped ware, red coloured pottery, pottery with combed decorative patterns and pottery with mud applique. However, a considerable decrease in the quantity of grey wares from this level onwards. The bichrome ware is also missing from this level.

One of the most interesting find from this level is a broken potsherd with partially preserved horned motif (Fig. 17). An increase in the number of potsherds with graffitti decorations is also noticed and the total number is 31 sherds. Most of the

Fig. 17



Karanpura: Potsherd with horned motif.

Karanpura: Reconstruction of horned motif on a potsherd.

graffitti signs are post-firing ones but a few pre-firing graffitti signs were also noticed. The graffiti signs are noticed on both the choclate slipped pottery and red coloured pottery.

This stage also witnessed a considerable increase in the quantity of animal bones. Among the bones, a complete antler was noticed. Along with the increase in animal bones, gastropod and bivalve shells are also noticed and there is a considerable percentage of soft shell clams from this level. These are edible and could have formed an integral role in the deitery system of the inhabitants.

The artefact finds from this stage includes micro steatite beads, grinding stone fragments, bone points, and a copper dagger, a bicone carnelian bead, fragment of a TC rattle, the latter decorated with concentric circles, TC bangles of various types. This level also yielded 125 pottery discs were recovered out of which 27 were retrieved from the same space. The size of the discs varies from 3·5cm to 0·9cm, which was finished out of broken vessels. Most of them have decoration in the form of either painted or incised designs.

These kinds of discs have parallels even in the present Karanpura village, wherein the children play a game with a set of pottery discs known as *pittu* stacked one upon another in the form of a small tower. The aim of the game is to break the tower and then rebuild it before getting hit by one of the opponents. The different types of TC bangles found from this level. There are red one with circular section, red one with triangular section, red one with black painted design and triangular section, red one has coiled shape with oblate section, grey conjoined with four groove, grey conjoined with three grooves and grey conjoined with two grooves

Transitional Phase: The transitional phase from early to mature Harappan phase in this trench is a very thin deposit, in which there is a considerable decrease in the ceramic forms while continuation of certain pottery types of Sothi-Siswal ceramic complex. The structural phase is already an outcome of the considerable increase in occupational activity noticed during Stage V of the early Harappan phase, which clearly indicate a sudden spurt in activities. During the transitional phase certain Harappan type items like TC nodules, steatite disc beads, start to appear.

Structural Phase I of Transitional Phase: The total thickness of the deposit corresponding to this structural phase is 0·05m and comprises of loci 042, 044 and 045. The total length of this mud-brick structure is 1·8m and is oriented in north-south direction, found towards the eastern portion of the excavated operation area. The upper portion of this structure is badly eroded and only one course is preserved. Hence, the thickness of the mud bricks could not be ascertained. However, it was observed that the bricks do not follow any standardized ratio or proportions and measures 39 x 33cm. The pottery finds from this level includes Chocolate Slipped Ware, Red and grey coloured pottery, the latter in very less numbers. The other pottery finds are pottery with combed decorative patterns, pottery with shallow incised decorations. This

structural phase also did not yield any bichrome pottery.

The artefact finds from this level include TC bangle fragments, steatite beads and copper ring, a lapis lazuli bead. Most of the TC bangle fragments are red in colour and circular in section.

The second structural phase of transitional phase is also with a thin deposit corresponding to 0·06m and comprises of loci 038 to 041. Two structures have been excavated in this phase and numbered as 39 and 39A, which might actually form part of a same structure. These two structures are found in the same level an erosional activity could have been washed off part of the structure at the centre. The structure 039 is oriented in an east-west direction and 039A in a north-south direction. These structures have the length of 2·47m and 0·97m respectively and have only one course of bricks. The eastern portion of the structure 039 is badly eroded. The top portion of the mud bricks is eroded badly and hence the thickness of the bricks could not be ascertained. The brick size of the mud brick structures is 38 x 28cm.

The pottery assemblage from this level includes chocolate slipped ware, red coloured pottery and few grey potsherds. A few bichrome sherds are also recovered from here, which, however are distinct from the typical Sothi-Siswal ceramic complex. Some potsherds have graffiti marks, which include arrow, triangle, star and 'W' signs. The pottery with shallow incised and painted designs was also unearthed from here. Another interesting feature is the appearance of TC nodules from this level. The matrix diagram (Fig. 18) gives a complete representation of all the loci excavated from the trench S170E40 III.

The artefact finds from this structural phase includes TC bangle fragments, stone pestle, shell bangle fragment, a highly ornate steatite button (Fig. 19) and pottery discs. The typical Harappan steatite disc beads starts to appear from this level onwards. Bangle fragments include terracotta and one shell bangle. The terracotta bangles are red in colour and circular in section.

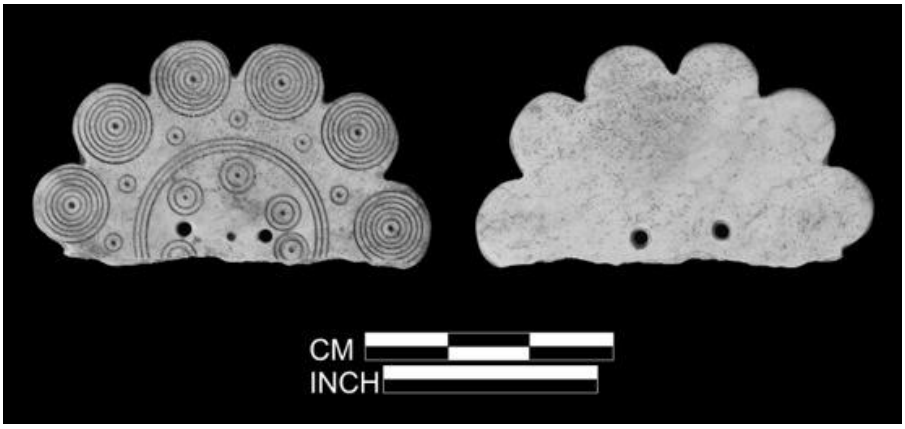
Mature Harappan Remains

The occupations remains of Harappan phase were found in areas A, C, E and F. The remains in the area F are devoid of the typical characteristics of mature Harappan phase and thus belong to a phase, which marks a transition from early to mature Harappan phase. A brief on the excavation of each of the areas is given below:

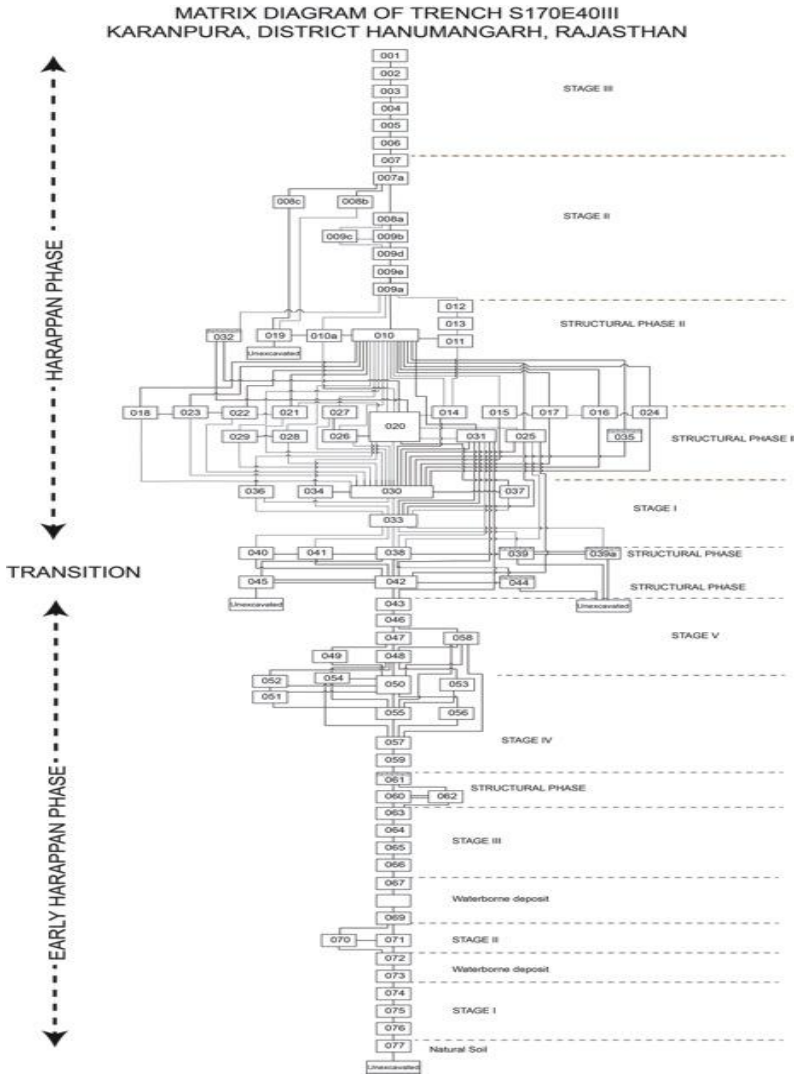
Excavation in Area A: The excavation was conducted in this area in order to probe the area extensively and to locate the structural remains, horizontally 18 trenches of 10 x 10m were excavated and half portion of three trenches of 10 x 10m was excavated. The natural soil was reached in five trenches, *viz*., S160E40 I, S150E40 I, S150E50 II, S130E40 IV, S150E40 II and S150E40 IV.

The natural soil in S160E40 I was reached at a depth of 2·94m below reference peg (RL 196·09m), while in S150E40 I, S150E50 II, S130E40 IV are 3·01m (RL 195·43m), 3·53m (RL 195·09m), 2·96m (RL

Figs. 18-19



Karanpura: Steatite button, transitional phase.



Karanpura: Matrix diagram of the excavated loci of trench.

195·82m), 3·21m (RL 195·69m) and 3·18m (RL 195·72m) below reference peg respectively.

The upper portion of the mound was largely disturbed for the agricultural purpose. The villager says that the height of the mound was further one meter above from the existing surface. The total thickness of the existing occupational debris of mature Harappan period is 150cm. The trench was excavated till 88cm from the surface in the season 2012-13. The data given bellow is the information revealed in the excavation 2013-14. The different stages of occupation and different structural phases can be observed in this period.

Among the above-mentioned trenches, S160E40 I brought to light the remains of a thick layer of burnt reeds and layers corresponding to locus 07 below which the Harappan type ceramics ceased to appear. The excavation in area A brought to light structural remains of mud bricks and at least seven house complexes were exposed. Further, the excavation also brought to light a northeast-southwest running massive wall with two courses of large sized mud-bricks not confirming to any ratio. This feature is described separately as it is a portion of fortification wall of the settlement in area A.

This massive wall separates the area A into two parts, *viz*., north and south. The southern part of area A is the most elevated portion in the entire site with the RL reaching to 199·25m while the northern portion is at a RL of 198m. The habitation remains are also rich in the southern portion. However, a major portion of the southern area is already obliterated and removed by the local villagers for agricultural purposes as mentioned above. The excavation carried out in the available area brought to light at least five house complexes while the northern portion beyond the massive wall revealed two house complexes.

The southern area also brought to light the remains of at least two cultural phases of the habitation, consisting of mature and early Harappan phases. The mature Harappan phase is characterised by the architecture of house complexes using mud-bricks in 1:2:4 ratio with the brick size of 8 x 16 x 32cm, while the mud-brick walls of early Harappan phase consisted of 1:2:3 ratio with brick size of 14 x 28 x 42cm. Further, the presence of typical mature Harappan pottery with painted motifs could be noticed during Period II.

The mature Harappan phase is best represented in S170E40 III, which was re-excavated during 2013-14. The occupational remains of this trench (Pl. 47) corresponding to mature Harappan phase is divided into three stages and three structural phases.

Stage I: The occupational deposit corresponding to Stage I of mature Harappan phase overlies the deposit of transitional phase in this trench, having a thickness of 0·08m and comprises of loci 030,033, 034,036 and 037. The Harappan elements in terms of pottery shapes, TC cakes of *mushtika* shape, steatite disc beads, etc., starts to emerge at this level. However, the ceramic traditions of Sothi-Siswal complex also continues in this level and upwards with modifications in terms of shape, size and decorative patterns. The

Plate 47

Karanpura: View of the section facing east.

chocolate slipped ware is much more elaborate from this level onwards with addition of loops of various patterns on the neck portion. Interestingly, the typical incised ware corresponding to 'Fabric D' of Kalibangan also appears from this stage. However, red coloured pottery with shallow incisions on the outer surface still continues. The chocolate slipped pottery with combin patterns executed in reserved slip technique also continues, with multiple decorative patterns. The vessels with non-contiguous ring foot are dominating in this level and few of them are with mud appliqué. The artefact finds include steatite beads, TC beads, pottery discs, stone pestle and TC bangle fragments. The TC bangles are red in colour with circular section. One terracotta spindle whorl yielded from here, is bicone in shape and has sets of parallel slanting lines on both sides as graffiti.

Structural phase I: The occupational deposit of Stage I is followed by a structural phase with a deposit of 0·22m and comprising the loci 014 to 018 and 020 to 029 and 031. The mud brick structure is located on the northwestern part of the quadrant. Only a portion of the structure could be excavated as a major portion was extending to the section. A portion of another structure corresponding to this level is partially preserved in the northern section. This level yielded eight postholes with few potsherds and terracotta nodules.

In one of the postholes, the potsherds found inside were inclined and in a vertical position indicating its use to tighten the post inside the posthole through ramming. All the potsherds recovered from this posthole are very small in size and fragmentary in nature. This level is also disturbed due to lot of pit activities. The remain of a hearth was also excavated from this level with a north-south orientation. The hearth is roughly in 'U' shape and the walls are made of mud and the opening is on the southern side for feeding fuel. This level yielded a large number of TC nodules.

The pottery from this level includes chocolate slipped ware, red coloured pottery of Harappan tradition, incised ware with deep interior incisions. The number of vessels with ring base is high in this level. The artefact finds from this level includes steatite disc and micro beads, sling ball,, TC bangle fragments, one grey TC bangle and a copper arrowhead.

Structural phase II: This is followed by another structural phase with an occupational deposit of 0·06m comprising of loci 010 to 013, 019 and 032. The mud brick structure of this level is located near the southern section and a total length of only 0·79m could only be excavation. This is a one course mud brick structure with an extant height of only 0·03m.

The pottery from this level includes chocolate slipped, red coloured pottery of Hrappan tradition, incised ware. The artefact finds include steatite disc beads, lapis lazuli beads and TC bangle fragments. Most of the TC bangle fragments are red in colour with circular section.

Stage II: The total thickness of the occupation deposit of this stage is 0.29 m comprising of loci 007 (a) to 009 (a). The pottery from this level includes chocolate

slipped and red coloured pottery of Harappan tradition. A large number of TC cakes of triangular and *mushtika* shapes were found from here. The artefact finds from this level include steatite disc beads, copper ring, sling ball and TC bangle fragments. The bangle fragments are red in colour and circular in section.

Stage III and Structural phase III: The occupational deposits of Stage III comprise the uppermost deposit in this trench, which was excavated during 2012-13 comprising of loci 01 to 07. This stage also corresponds to a number of structures to the north, east and west of the operation areas corresponding to structural phase III. All these structures are of mud brick in 1:2:4 ration with dimensions of 8 x 16 x 32cm. A complete house plan (Pl. 48) was also excavated in the quadrants I and II of the same trench and to the north of the operational area. This mud brick structure comprises of four rooms, the eastern portion of which were highly damaged due to pit activities of later phases. A complete unicorn seal was discovered from the northwestern room of this house complex.

Evidence of mud brick structures of the same ratio was also noticed in the form of a wall of a house complex, only the western wall of which could be exposed in this trench. This wall is in a northwest – southeast orientation, while another mud brick wall is running in a northeast-southwest orientation at the southern portion of occupation area. The pottery remains from this phase consists of typical harappan ware, a few with the typical harappan motifs and decorations, chocolate slipped ware with elaborate decorations, incised ware, red coloured pottery with decorations in the form of reserved slip technique, etc. The artefact remains consist of large number of TC nodues of circular, triangular, *mushtika* shapes, steatite disc beads, beads of semi-precious stones, copper rings and rods, bone points, etc.

Therefore, in order to assess the complete nature of the fortification, the trenches in which the traces were outlined during the 2012-13 were re-opened and the nature and extent of the fortification was ascertained. It was found that a 6 m wide fortification wall was running in a northwest to southeast and northwest to southeast direction with a northwest corner bastion. At present the northern and western arms of the fortification could be traced to a length of 30 m each, beyond with they are highly obliterated. The remains of the fortification were traced in the trenches S140E20 II&III, S140E30 I-IV, S140E40 I-IV, S150E20 II&III, S150E30 I-IV, S160E20 II&III, S160E30 I-IV, S170E20 II&III, S170E30 I-IV. It was also observed that the fortification was preserved only in the above trenches partially and large-scale erosion had taken place after the abandonment of the settlement and only extant traces here and there could be ascertained. The fortification could be found with only three courses which was exposed in S140E20 II and S140E30 I and resting on a 10 cm thick burnt layer. The fortification was constructed with various colours of mud-bricks in different portions. At least, five such portions of different constructions could be identified in the excavated area. The colour of mud-bricks varies from light

Plate 48

Karanpura: Complete house plan in trench.

yellow to pale brown, and even evidence of black coloured mud-bricks was also found.

Excavation in Area E: The area E lies to the north-east of area A and also forms part of the overall Harappan phase occupation at this site as revealed from the excavations conducted during the previous field season. The excavation was renewed in this area during 2013-14 in order to determine the overall structural activities as only a portion of a structural complex was identified during the previous season. The trenches excavated in this area are S10E120 II&III, S30E130 I-IV, S40E130 I-IV, S40E140 I-IV. The excavation brought to light Harappan phase occupation in the form of structural activities of at least five phases along a northwest to southeast running street of 2·5m in width. The structural complex along the northern edge of this street was excavated in a greater detail and it brought to light at least two house complexes located adjacent to each other, with variation in building materials in the form of mud bricks. The last phase of structural activity also coincided with the disturbances caused by the later period inhabitants of this area. The occupational deposits of the last inhabitants are not available which may be due to the large-scale erosion and post depositional erosional activities, but their activities are represented in the form of huge pits dug into the previous phase, i.e. the last phase of structural activity at present preserved at the surface. These pits were treasure of material remains and it brought to light literally thousands of terracotta nodules of various sizes and shapes, a majority of them broken. These pits also brought to light some near complete pottery remains including dish-on-stands, dishes of dish-on-stand, various types of jars and pots. These pits were also found with large number of animal bones, some near complete ones, which also included skull of two cattle and one buffalo. The southern wall of the structural complex extends all along the street and on this face, at least four phases of repair and construction of mud-brick walls could be clearly delineated. The mud-brick wall has at least five courses of bricks, even though eroded and highly pitted on the surface, which may be due to the post-depositional erosional activities.

A portion of the structural activities along the southern edge of the street could also be exposed, which has along the exposed surface contains at least four courses of highly eroded and pitted mud-bricks.

The natural soil was reached in S30E130 along the mud-brick structure at a depth of 3·7m from the reference peg and at a RL of 194·23m. Two more quadrants were also excavated in the trench S10E120 II&III in order to know the layout of the structural remains in this area, and also to ascertain the extent and orientation of the street noticed in S30E130. This trench also brought to light the remains of the street extending and along the northern and southern edges were noticed structural remains of mud bricks. This it confirms that this area was extensively occupied and proper planning and layout were made for the occupation.

Excavation in Area F: This area lies to the north of area A and west of area E and was not probed earlier. This area was selected for investigation in order to determine the

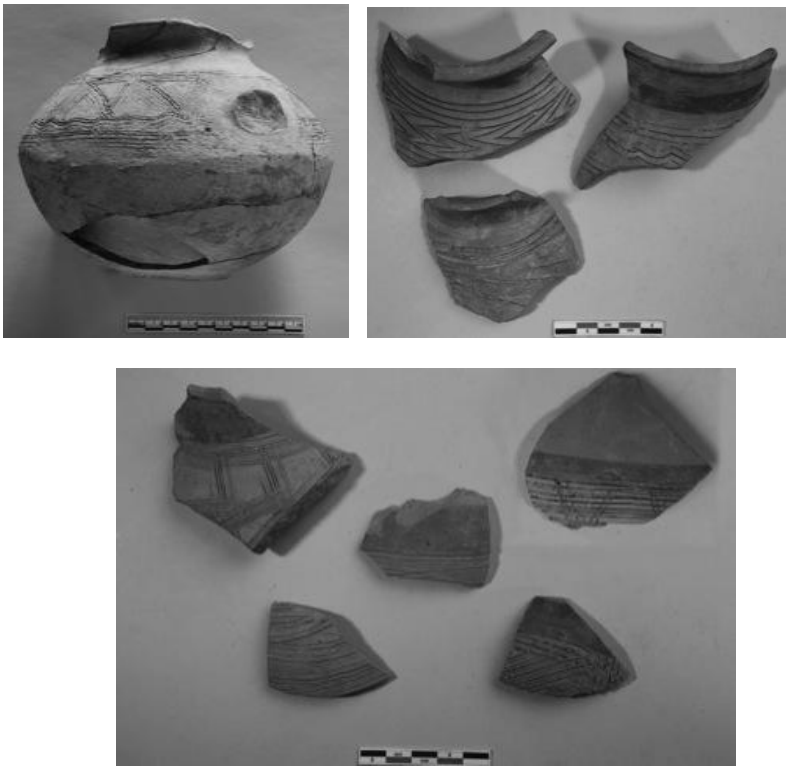
extent of Harappan occupation towards the northern direction as the area A already yielded a fortification and the exact nature of occupation beyond this fortification on the northern side could not be clearly ascertained. This area was also selected for imparting field archaeology training to the students of Institute of Archaeology. In total, ten quadrants of 4·25 x 4·25m were excavated in this area. The trenches excavated are S10E30 III&IV, S10E60 III&IV, S40E40 I&IV, S50E40 II&III and S60E40 III&IV.

The excavation in this area brought light the mixed nature of deposits at the top level corresponding to nearly 20 to 50cm varying in different portions. In particular, the trench S10E60 revealed evidence of deposition of ancient deposits over a recent one, clearly indicating a recent clearance nearby and re-deposition of ancient deposits. On enquiry with the local inhabitants, it was revealed that the agricultural land immediately north of S10E60 was leveled and the material disposed over this area. The excavation of this trench thus revealed ancient deposits at the top, followed by sand deposit of wind blown in nature followed again by ancient deposits.

The other trenches brought to light the deposit of wind blown sand at the topmost level varying in different trenches, the maximum deposit was noticed in S10E30 III&IV. The structural remains in this area consisted of highly disturbed mud-brick ones which were largely obliterated by later period pits of varying sizes. In particular, mud-brick structures were noticed in the trenches S40E40, S50E40 and S60E40. The trench S10E60 brought to light evidence of post-holes, at least 5 in number following an elliptical plan, which may represent the remains of a structure. Another notable feature of this structure is the presence of a hearth at its center and a large number of broken grinding stones of various sizes. In all the above trenches, except S10E60 and S60E40, large-scale reed and wattle daub impressions were recovered, which clearly indicates the nature of architecture in this area. While the reed impressions on mud may represent the nature of roofing used in this area, the wattle and daub impressions clearly indicate the usage in the architecture along with mud-brick architecture. The nature of mud-brick structures, pottery remains and other artefact remains from area indicates occupation of this area just prior to the mature Harappan phase and the arrival of Harappan might have prompted modification of the nature of settlement with the addition of fortifications, one portion of which could be traced in area A as mentioned above.

The pottery remains consist of Sothi-Siswal ceramic complex of the early Harappan period and typical Harappan pottery during Harappan phase with the continuation of pottery types of Sothi-Siswal varieties with elaboration in shapes and forms. The ceramic tradition of Sothi-Siswal types is represented by red coloured pottery with the typical chocolate slip on the neck and shoulder, red coloured pottery with shallow incisions on the surface, both wavy and angular in nature (Pl. 49a), bichrome ware with black and white coloured painted motifs on the red coloured pottery (Pl. 49b) and pottery type with decorations executed

Plate 49



a

b

Karanpura: a; coloured pottery with shallow incisions on exterior surface and b; Bichrome ware.

in the reserved slip variety (Pl. 50a), and grey ware (Pl. 50b).

The interesting nature of the external incisions is that it is noticed only on the exterior portion, unlike the typical incised ware of Fabric D variety of Kalibangan and other sites. At Kalibangan, the typical incised ware of Fabric D type is noticed only during the mature Harappan phase with a wide variety of shapes and decorations. Among the shallow incisions noticed on the exterior is a variety of pottery, which makes its appearance in the early Harappan phase, and even though it continues in the Harappan phase, the percentage drops remarkably. This type of pottery is characterized by angular incisions when the pot was still in a leather hard condition and it consists of a series of zig-zags. The decoration is often noticed in a handled pot, a complete specimen of which could be found from the surface where the early Harappan deposits were found. This pot can be stylistically placed in the early Harappan phase and is a very good example of shallow incised pottery. Among the painted motifs of early Harappan phase are two most important varieties, represented by *pipal* leaf and a stylized horned deity motif.

The Harappan phase is characterized by the typical red coloured pottery along with decorations in black colour. The Harappan pottery is found both painted and unpainted, and most interestingly, the local variety of pottery noticed during early Harappan phase continues with a wide variety of decorative forms and shapes. Among the painted motifs on Harappan ware, intersecting circles, fish scale pattern, *pipal* leaf, peacock (Pl. 51), etc., are the prominent ones. One particular sherd is interesting and it has a row of six stylized human figures holding each as though they are performing a traditional dance (Pl. 52a). Another potsherd has a depiction of animals in a circular fashion in a swift movement (Pl. 52b).

The excavation at Karanpura during the two field seasons have brought to light a large number of antiquarian remains of various categories and belongs to both early and mature Harappan periods. The antiquarian remains consist of seals of steatite; beads of steatite, terracotta, semi-precious stones, gold, lapis lazuli; bangles of terracotta, shell, copper; rings of copper, terracotta; spindle whorls of terracotta; bone points, copper spearheads, celt, arrowheads, etc.

Early Harappan period: The material culture of Karanpura is quite varied and indicative of long distance trade. The presence of various artefacts of materials likes copper, semi-precious stones like agate, lapis lazuli is a clear indication of long distance trade activities. Further, the presence of Delhi quartzite of Kaliana origin in the form of grinding stones is a further indication of acquisition and distribution network of these kinds of raw materials. The most prominent number of artefacts is in the form of steatite micro beads (Pl. 52c), which have been found in large numbers. The steatite beads make their appearance in the early Harappan levels and continue well into the Harappan period. The steatite beads found in the early Harappan levels are very small in size. The presence of one or two

Plate 50

a

b

Karanpura: a; *ware with decorations on shoulder executed in reserved slip and b; Grey ware of early Harappan phase.*

Plate 51

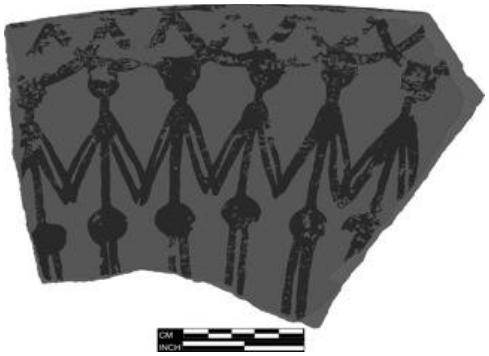
a

b

c

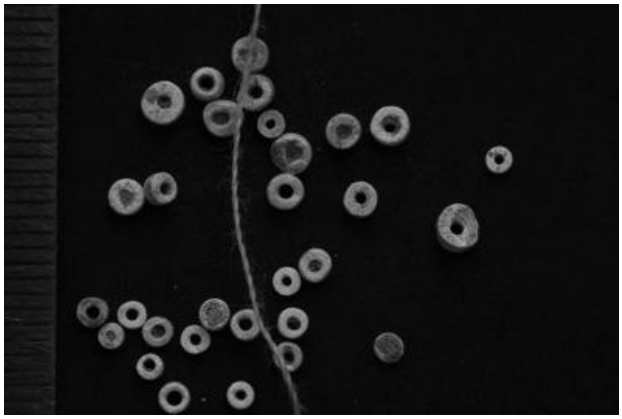
Karanpura: a; Intersecting circle motif, b; Pipal leaf motif and c; Peacock motif.

Plate 52



a

b



c

Karanpura: a; Row of human figures, b; Potsherd depicting animals and c; Micro steatite beads.

tubular steatite beads are also found, however they are very small in number when compared to the large presence of micro beads.

The presence of raw material sources of steatite in northern Rajasthan may indicate the closeness of inhabitants of Karanpura and their ultimate access, either in the form of direct mining, or getting raw materials through some intermediary sources and manufacturing them. However, there is no clear indication of any manufacture of steatite artefacts at the site. The discovery of a copper celt, a spearhead, arrowhead (Pl. 53) and other copper artefacts is also a clear indicator of the access of raw materials or finished products of copper by the people of Karanpura.

The presence of raw material sources in northern Rajasthan gives an indication that the inhabitants of Karanpura might have access to these sources. The scientific investigation may further clearly pinpoint the specific raw material source of copper and their exploitation, acquisition and distribution. Another category of artefact, which deserves special mention is the sizeable number of terracotta spindle whorls, some often with graffitti. In particular is the discovery of five spindle whorls from a floor of early Harappan house complex, which have the same graffitti symbol.

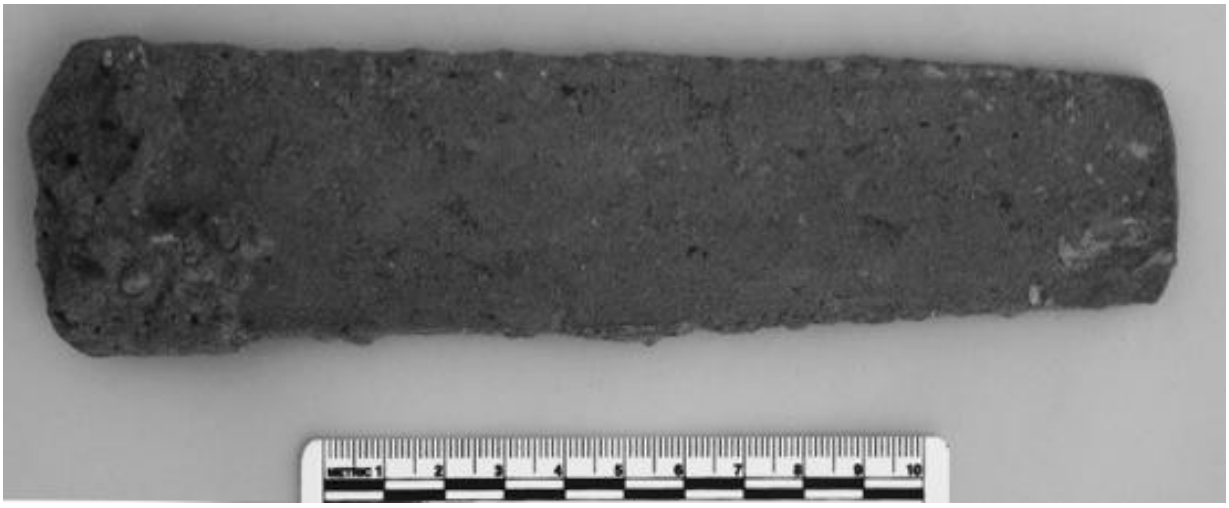
Another interesting feature of the artefacts from the early Harappan period is the considerable number of potsherds with graffitti symbols (Fig. 20), either on the rim or on the shoulders. A majority of them are post-firing ones and may either represent ownership records or very short inscriptions.

Mature Harappan period: The artefact record of the mature Harappan period is diverse and more in number when compared to the early Harappan period, and there is an increase in the new varieties of raw materials like amazonite, bloodstone, etc., and there is a considerable increase in number of stone beads also. The presence of the typical chert blades of Rohri chert is a clear indication of Harappan types. Further, etched carnelian beads appear in considerable number, which is another hallmark Harappan bead type. The other typical Harappan artefacts are the steatite seals, of which two examples have been found. The first one was discovered in a house complex located in the trench S170E40 and is a square seal with a boss at the back. The boss variety of this seal belongs to early mature Harappan variety, as there is no bipartite division on it. The surface of the seal clearly depicts a thick application of glazing material before putting into heating, which stabilises the glaze and presents a shiny and finished look. The seal also has evidence of sawing marks on all directions, on the first surface, back and as well as the rear. The delineation of the boss from the parent steatite block is also clearly indicated and the sawing cut some portion of the boss also. The various striation and saw marks provide insights to the finishing of these kinds of seals from the parent steatite block. Further, the presence of several cracks on the glazing surface also indicates the heating mechanism, due to which the glazing coating might have contracted and developing multiple cracks on the surface.

Plate 53

a

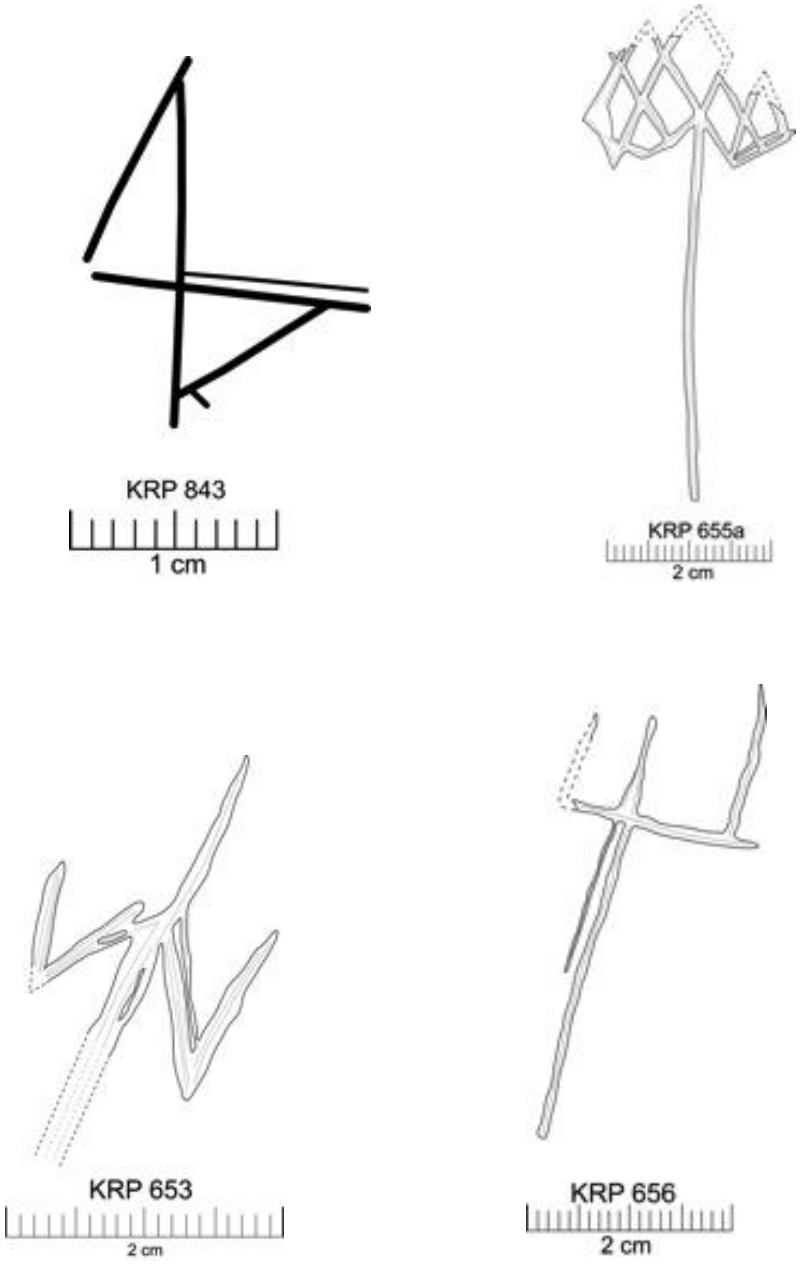
b



c

Karanpura: a; Arrowhead, b; Spearhead and c; Copper celt.

Fig. 20



Karanpura: Various graffitti motifs from early Harappan period.

The seal has the typical unicorn (Pl. 54) as the motif and there is a depiction of a *pipal* leaf, beautifully carved and depicted in front of the unicorn animal. The unicorn seal and other types of seals wherein an animal is depicted normally have a pitcher or a manger in front of the animal. The depiction of *pipal* leaf in front of the animal is clearly a novel feature of this seal. The only other parallel of this style of depiction is a sealing from Kalibangan, wherein, a *pipal* leaf is depicted in front of the unicorn as well as above it. The seal has a two-lettered inscription, a circle motif and a harvester tool motif.

The second seal was found from the trench S10E120 III in a street deposit. The seal was found in a broken condition during the discovery and was found in three pieces. However, the front portion is clear of any deformity and breakage except the lower right, wherein the pitcher is partially broken. The boss was separately found and later affixed. The seal has a depiction of an antelope. There is a single lettered inscription on the top of the animal depiction, which is a fish motif surrounded by four dots on four corners. At the lower right of the seal is the typical depiction of pitcher or the manger.

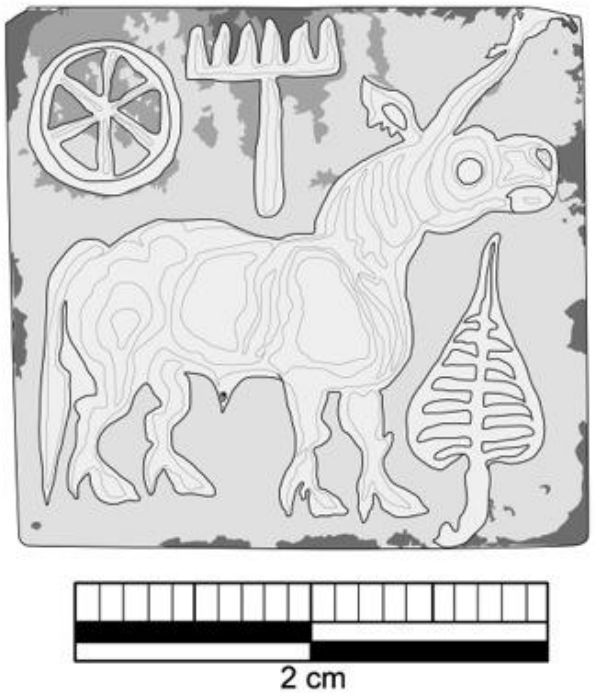
The surface portion of this seal also indicates the various remnants of sawing marks and the typical glazing material. The crackling surface of the glazing material is very much similar to the other seal find. The boss of this seal also belongs to the non-bipartite variety, which may belong to the early mature Harappan phase variety. The depiction of the fish motif is also clear and depicted with finesse. The overall manufacture of the seal, depiction of the animal motifs and other symbols are clear indication of the hallmark Harappan style of depiction and manufacture.

Another remarkable evidence of trade and commercial activities of the inhabitants of the Karanpura is the presence of a cubical chert weight (Pl. 55), weighing around 4·5gm, which is 1/3 rd of the mean Harappan weighing system. Examples of other mediums for manufacturing the weights cannot be ruled out, as indicated by the presence of a triangular weight and also weight like objects manufactured out of Delhi quartzite. These have to be very closely observed in order to determine the correct and exact weighing systems and whether it coincides with the other sites or not.

The presence of beads of various materials like agate, jasper, orbicular jasper, carnelian, amazonite, lapis lazuli, faience, are all clear indication of the diversification of materials and also the access to these kinds of beads, either in the finished form or some sort of manufacturing was also taking place at the site. However, at the present state of knowledge, it is very difficult to ascertain the manufacture of stone beads from the site, as there is no evidence of bead blanks or debitage associated with bead manufacturing. However, two evidences of stone blocks with clear marks of bead polishing might indicate the presence of this craft industry also, which has to be substantiated with other material evidence, which is at present lacking at the site. In any case, the present of sophisticated beads

Plate 54

a

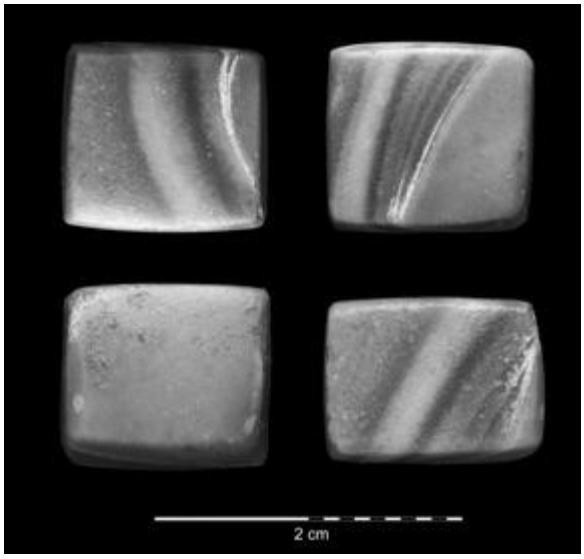


b

Karanpura: a; Steatite seal with unicorn and two Harappan signs and b; Sketch of the unicorn seal.

Plate 55

a



b

Karanpura: a; Steatite seal with antelope as motif and b; Multiple views of a chert cubical weight.

from raw materials which are not locally available is a clear indicator of long distance trade, and the participation of the inhabitants of Karanpura in some sort of trade mechanism, otherwise the presence of luxury items cannot be explained.

The presence of a large number of steatite beads continues well into the Harappan period. All the varieties of micro-beads of early Harappan type continue with the addition of the hallmark Harappan disc beads of steatite. These types of disc beads were also collected in groups lying in considerable number in a single location. One such retrieval consisted of 14 disc beads from a single location (Pl. 56). These steatite beads form part of a necklace with hundreds of beads, often thousands, if spacer beads are used. The presence of spacer bead is also found from Karanpura, which is a clear indication of these kinds of multi-stringed necklaces.

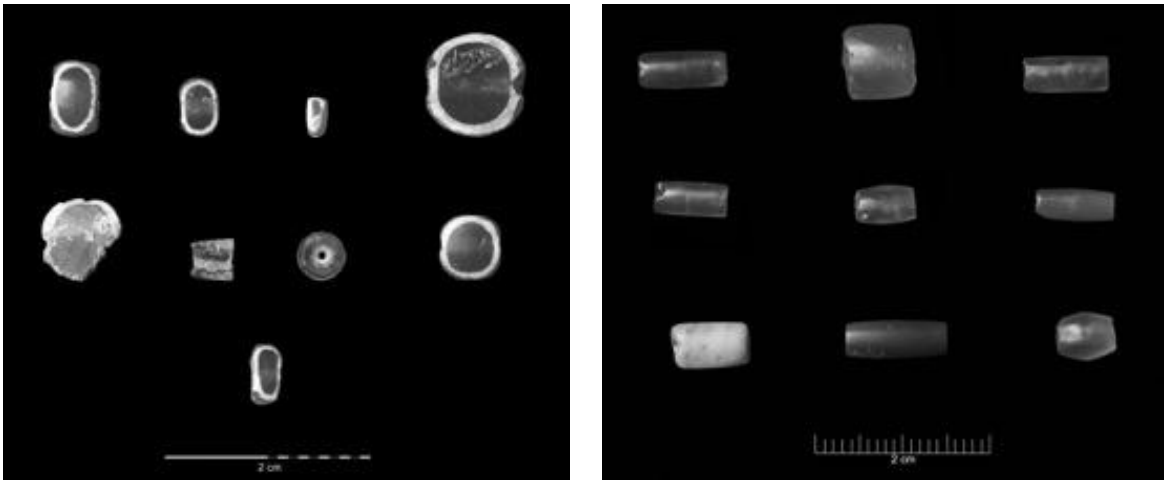
Another variety of steatite beads is the presence of central as well as lateral perforations, which gives a new dimension of necklace wearing or arrangement of beads in a necklace, laterally stringed, and a small pendant can be hung from the central hole. The profuse presence of steatite beads when compared to semi-precious stones is a clear indication of the preference of cheaper raw material to costlier material, as the procurement of semi-precious stones from a longer distance may prove costlier as the drilling technology itself is very tedious and the raw materials are only concentrated in a certain locality, i.e. Gujarat. The other varieties of steatite artefact consist of a button, elaborately decorated, half broken and with two perforations at the centre.

The copper artefacts consist of a mirror, arrowheads, rings and bangles (Pl. 57). The copper mirror is similar to other typical examples found from other Harappan sites, except with the fact that Karanpura example has a curved handle, and the mirror is also very thin when compared to other examples.

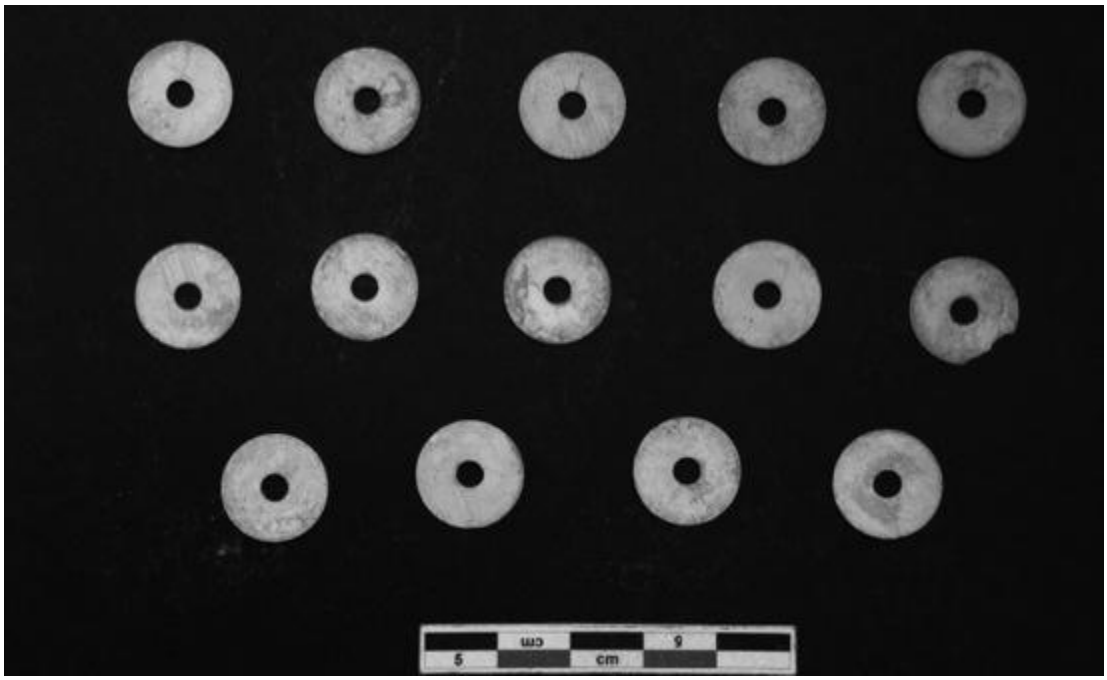
Other copper artefacts include rings, needles, antimony rods, spearhead, etc. The presence of copper right from the earliest levels is a clear indicator of the access to copper resources by the inhabitants of Karanpura. Further, the presence of a few copper slags during the mature Harappan levels also indicates the smelting industry.

Graffitti remains from the excavation: A total of 157 instances of graffitti was discovered from the excavation and the object types include that of potsherd, terracotta ring and spindle whorl. The break up of object type includes 1 on TC ring, 22 on spindle whorls and 134 on potsherd. While many of the graffitti are clear Harappan signs, some are abstract and complex patterns. A considerable percentage of the graffitti also belong to simple linear patterns, single, double or triple parallel strokes either on the upper, middle or lower portion of the rim. This type of graffitti is mostly noticed on the interior of the rim only. Out of the total 157 graffitti remains found from the site, one find is from the surface and hence its context cannot be clearly established. Hence, out of the remaining 156 instances, 99 belong to

Plate 56



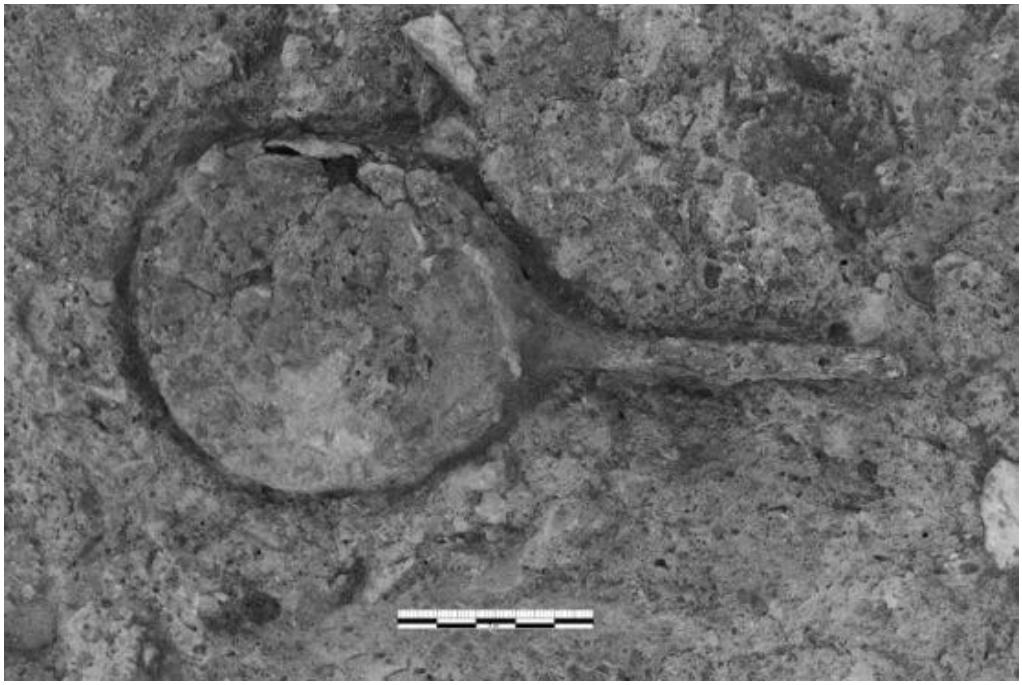
a



b

Karanpura: a; Carnelian (etched and plain) beads and b; Steatite disc beads.

Plate 57



a

b

c

Karanpura: a; Copper mirror from Harappan phase, b; Arrowheads and c; Copper bangles.

mature Harappan and the remaining 57 belong to the early Harappan period.

An interesting graffitti from Area F is that of a post-firing one with two animals standing face to face (Pl. 58) with their heads close to each other. The potsherd is broken and only the head of one animal is clearly visible. The graffitti is executed on the chocolate slipped ware potsherd.

The other category of antiquities, which have been found in thousands of numbers, is the terracotta nodules of various sizes and shapes. The terracotta nodules are found in triangular, circular, *mushtika* (Pl. 59a) and rectangular shaped. A majority of the nodules were discovered in pit or street deposits and they were in a charred condition. Some of the nodules were also found in association with hearth deposits. The exact function of the nodules is still eluding the archaeologists. However, the charred condition and the discovery of them in association with hearth deposits have indicated that they were heated and used as heat retainers in cold climates as the heated terracotta nodules radiate heat for a quite long time after removed from the source of heat and kept in pans or some open containers inside a room.

Terracotta bangles were also found in thousands of numbers and a rough estimate put the total number to around 50,000. The bangles were found in complete as well as fragmentary. The number of fragmentary bangles overwhelms the complete ones and may constitute 99% of the collection.

The other antiquities found of terracotta include toy cart frames, wheels, whistle, beads, spindle whorls, animal figurines (Pl. 59b), etc.

The presence of grinding stones (Pl. 60a) and other stone artefacts like mullers, pounders, etc., is a clear indication of processing food products at Karanpura. The raw materials were procured from Kaliana hills, Haryana, Ghaggar riverbed near the lower Siwaliks and Jhunjhunu deposits. The materials used for manufacture include quartzite, sandstone and granite. The presence of Kaliana quartzite from Karanpura as well as from many Harappan sites is a clear indication of the preference of such stones for manufacturing grinding stones. It is also interesting to note that Kaliana quartzite went as far as Harappa which is a clear indication of long distance trade for such stones for which Karanpura inhabitants would also have participated in a bigger manner.

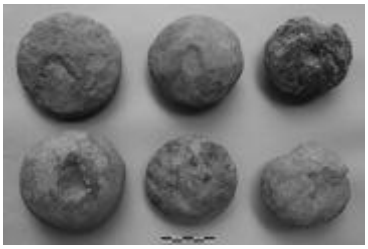
Faunal Remains: The analysis of faunal remains from Karanpura was carried out by Prof. P.P. Joglekar of Deccan College, Pune. The preliminary identification of faunal species from the excavation consists of domestic mammals like cattle (*Bos indicus*), buffalo (*Bubalus bubalis*), goat (*Capra hircus*), sheep (*Ovis aries*), and domestic dog (*Canis familiaris*). The wild mammals hunted / trapped were the nilgai (*Boselaphus tragocamelus*), spotted deer (*Axis axis*), sambar (*Cervus unicolor*), barking deer (*Muntiacus muntjak*), blackbuck (*Antilope cervicapra*), four-horned antelope (*Tetracerus quadricornis*), gazelle (*Gazella bennetti*), wild pig (*Sus scrofa*),

Plate 58

Karanpura: Post firing graffitti depicting two animals.

Plate 59

a



b

c

d

e

f

Karanpura: Terracotta objects, a-b; Triangular cakes, c; Mushtikas, d; Toy cart frames, e; Weels and f; Multiple views of bull figurine.

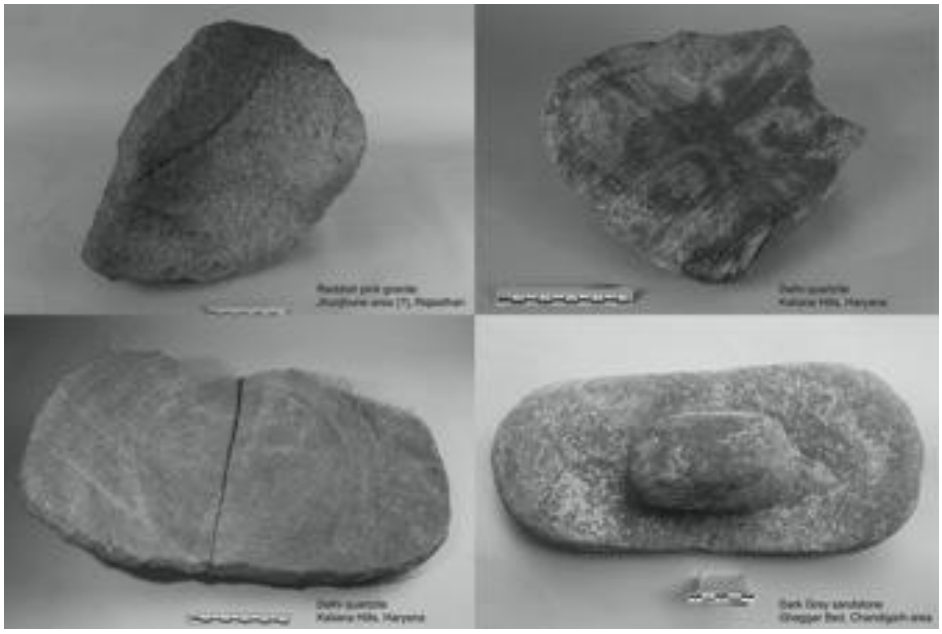
hare (*Lepus nigricollis*), porcupine (*Hystrix indica*) and mongoose (*Herpestes edwardsii*). Besides these skeletal elements of non-food species such as house rat (*Rattus rattus*) were also recovered. The non-mammalian species identified were domestic fowl (*Gallus domesticus*), Ganges soft shell turtle (*Trionyx gangeticus*), Indian mud turtle (*Lissemys punctata*), freshwater fish (*Labeo rohita*), and freshwater mussel (*Lamellidens* sp.). Further, four complete bones of rhinoceros (Pl. 60b) from the excavation is another interesting and important discovery, keeping in view of the climatic conditions and marshy environment these kind of animals thrive.

The excavation for two field seasons at Karanpura (2011-12, 2012-13) has brought to light two cultural phases, *viz*., early and mature Harappan with a transitional phase noticed some pockets. The excavation also brought to light a thicker deposit of early Harappan phase than the mature Harappan phase, and thereby providing enormous data in the understanding of the earliest phase of cultures in the lower Chautang/Drishadvati valley. As Karanpura is the only site in lower Chautang valley, which has been now excavated in a horizontal manner, more scientific analysis will help in better understanding of the evolution of culture, spread of Harappans during mid third millennium BCE. So far, the rough estimates place this site to around 16 hacters during mature Harappan period, while the settlement was smaller during the early Harappan period. The settlement during the early Harappan period was spread in a more or less east-west orientation and occupying roughly 150m in length in this direction. The exact area of occupation of early Harappans at this site is difficult to estimate, as the probing could not be done everywhere.

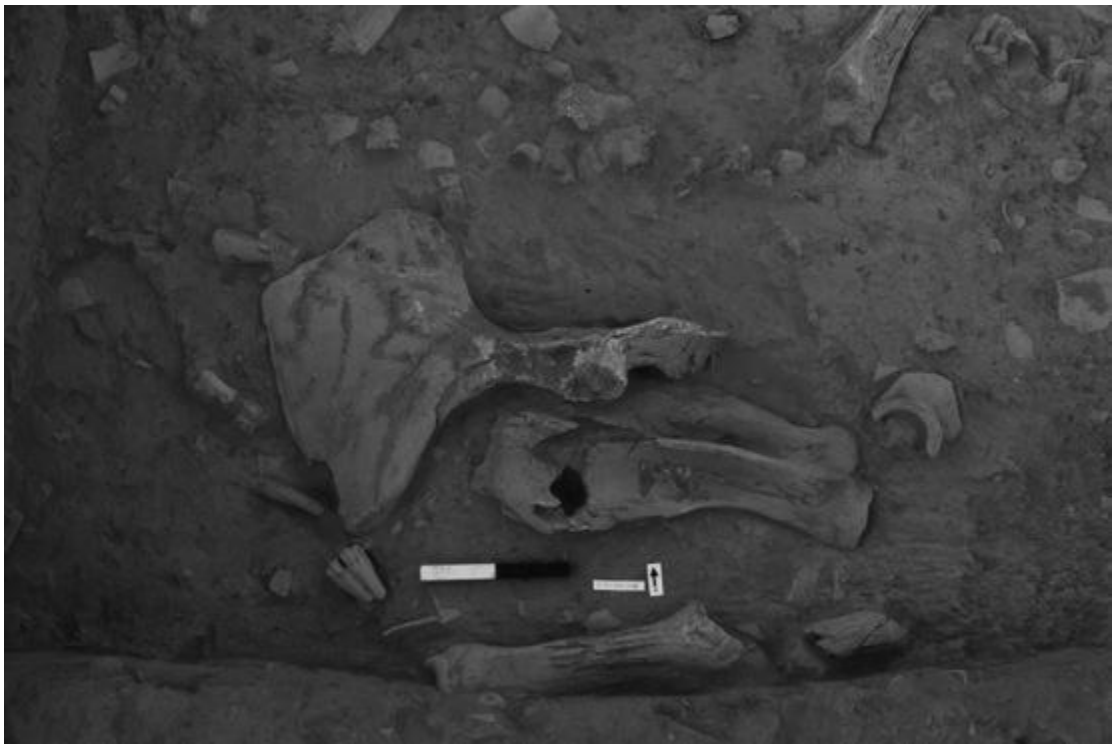
The early Harappans lived in mud-brick houses with mud-bricks of sizes in ratio 1:2:3. The normal size being 14 x 28 x 42cm even though structures with mud-bricks of not conforming to any standard size and proportion are also encountered. They were constructing large complexes as is evident from the excavation in area B and were using copper metallurgy in a bigger way. The kind of copper implements found at Karanpura is also a clear indication of procurement of copper artefacts right from the earliest levels. The ceramic industry during the early Harappan times consisted of Sothi-Siswal types represented by red coloured pottery with chocolate slip on the neck and shoulder, bichrome ware, red coloured pottery with combed decorations, grey ware, etc. The ceramic industry continued well into the Harappan period with the addition of new Harappan types and elaboration in painted motifs and designs. The early Harappans at Karanpura had access to a wide variety of semi-precious stone beads like lapis lazuli, agate, bloodstone, shell, etc., which is a clear indication long distance trade and contacts. A transitional phase is also noticed at Karanpura, wherein the Sothi-Siswal elements decreases or modified into newer varieties of ceramics while certain Harappan elements like TC nodules, steatite disc beads, ceramic forms start to emerge.

The arrival of Harappans at Karanpura

Plate 60



a



b

Karanpura: a; Grinding stones of various materials and b; Bones of rhinoceros in situ.

marked renewed planning and addition of fortification, the traces of which was found in area A. The planning consisted of bipartite settlement, with evidence of a fortification found for one division clearly. The planning include well laid out house blocks all along the fortification separated by a street running all along. The area E also revealed good planning as indicated by the location of houses along a street which extends to at least 40m in a northwest to southeast direction. The Harappan period at Karanpura is also marked with the arrival of typical Harappan ceramic forms and shapes, continuation of bead industry of steatite, with the addition of large disc beads, continuation of stone bead industry with the addition of new materials like amazonite, etched carnelian beads, etc. The addition of new raw materials for grinding stones like black sandstone is also a clear indication of usage and experimentation of new materials for manufacturing and using them to process food materials. The materials for grinding stones came as far from Kaliana Hills in Haryana (125 southeast of Karanpura) and lower Siwalik area (225km north-east of Karanpura) is a clear indication of long distance trade mechanism. Other evidences for long distance trade comes in the form of usage of exotic materials like lapis lazuli, agate, carnelian, jasper, amazonite, shell, etc. which are not available locally. The faunal assemblage at Karanpura is a mixture of both domesticated and wild varieties. The most prominent finding being the presence of four complete bones of a rhinoceros, which indicates a favourable climate for their existence during the end of third millennium BCE. The reasons for the end of Karanpura settlement is unclear at this point of stage as the upper levels corresponding to the late phase of mature Harappan period is not available, and as per the accounts of locals, nearly 1·5m deposit was removed for facilitating agricultural practices.

TAMIL NADU

21. EXCAVATIONS AT ARPAKKAM, DISTRICT KANCHIPURAM

In continuation of the previous season's excavations, the Department of Ancient History and Archaeology, University, Tanjavur carried out the excavation at Arpakkam in Kanchipuram Taluk under the direction of P.D. Balaji, assisted by technical staffs and Students.

A trench (ARP - 9) measuring 6 x 6m in north-south orientation was laid out in the Big street of the village. During course of excavation seven stratified layers to a thickness of 3·20m was exposed. The deposit was intact. On the upper level, a structural remain was found. The structure was in 'L' shape and was made out of seven courses of burnt bricks in lime mortar. Length of the structure is 6m in north-south. The bricks were square in shape having size of 21 x 14 x 3cm. No plastering found on the structure. The foundation of the structure is made out of rubbles and broken bricks.

Pottery like Black and Red Ware, Black Ware, Red Ware, Orange Slipped Ware and conical jar pieces were found during excavation. On the upper level chinese porceline sherds were collected endorsing trading link between China and

Tamil Nadu. Antiquities consisting of terracotta objects like wheel of a toy-cart, similar to Indus valley civilization, ear ornaments, smoking pipe, game men, votive lamps; semiprecious stone and glass beads, bangle pieces; iron object have been found. Presence of iron slags were also observed endorsing iron smithy activity.

A pragmatic study of the cultural vestiges and in situ of findings gleaned that the cultural deposit at Arpakkam can be divided into three cultural periods. As the Black and Red and Black Ware sherds are available just above the natural soil, the inhabitation of the site at Arpakkam had seemed to have been started during the iron age. Presence of semiprecious stone beads and terracotta objects mixed with Iron Age potteries, endorses this Period from I to 4th century BCE to 4-5th century CE. The Period II is found mixed with red slipped ware in association with glass beads and bangles. On the basis of the potteries and the antiquities found therein helps in dating the Period II to 4-5th century BCE to 12-13th century CE. The upper level is dated to Period III, wherein course red ware sherds are found. The reamins of 'L' shaped structure is assignable to this period and it dated to 12th-13th century.

22. EXPLORATION IN AND AROUND ATTIRAMPAKKAM, DISTRICT THRIUVALLUR

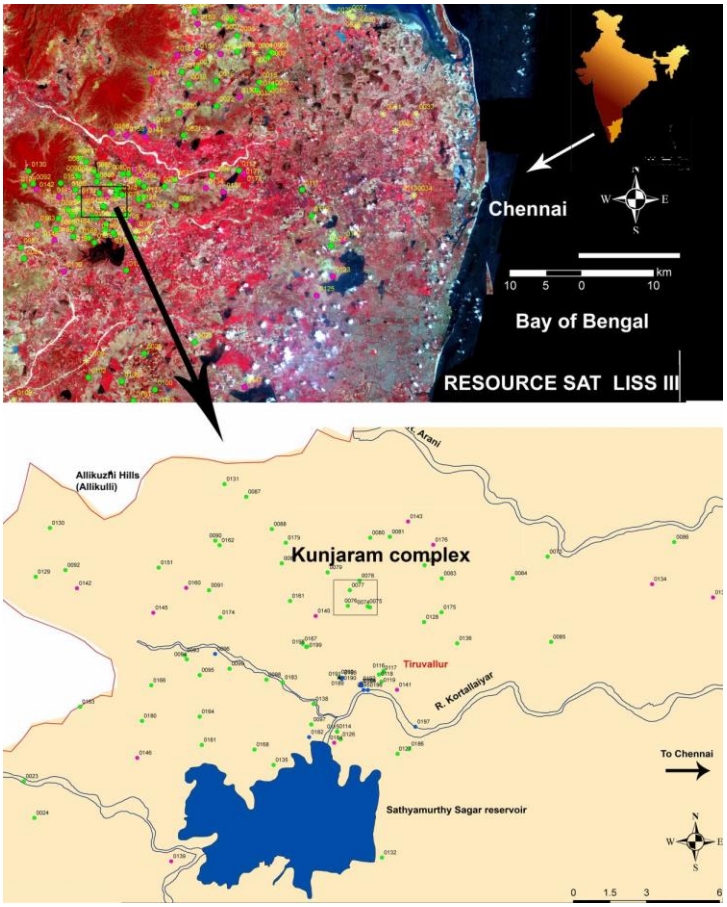
In continuation of previous year's work explorations in and around Attirampakkam was carried out under the direction to santi Pappu and co-guidence of Kumar Akhilesh form Deccan College, Pune.

During the course of exploration, it was observed that owing to quarrying, excellent sections were available for study at the site of Kunjaram locality (13˚15'38·681" N; 79˚53'24·129" E), was divided into three clusters to studied in detail (KJ1, KJ2, KJ3) located at differing elevations and obtaining a sample across the landscape. The site was of particular interest as it comprised artefacts which appeared to be a very late Middle to late Palaeolithic character, some microliths and was thus of interest in attempting to situate this within the context of debates on technological repertoire of modern humans in India, and to obtain some chronological controls over the site (Fig. 21).

In addition to field surveys, satellite data from ISRO/RRSC-South were utilized, lithic collections were made and partially studied. Sediment samples were collected and the stratigraphy was demarcated.

The stratigraphic sequence comprises of Late Pleistocene ferricrete gravel with very late Middle to Late Palaeolithic assemblages, which in someplaces rests directly on the Sriperumbudur shales (Pappu et, al., manuscript in preparation). In the section visible (Fig. 22), tools rest on a ferricrete facies comprising sandy and pebbly ferricreted gravel, occasionally indurated, which rests either directly on shales or on an older terricrete profile with Middle Palaeolithic artefacts. Compact, indurated rubefied sands are noted here and were dated to around 9 ka (Pappu et, al. 2009). They are noted to overlie late Middle Palaeolithic artefacts at Kunjaram-1.

Figs. 21-22



Thiruvallur: Location of the Kunjaram site complex.

Thiruvallur: Stratigraphic section, KJ-3.

For lithic assemblage raw material preferred was quartzites, obtained from cobbles in the vicinity of the site (but not available on-site). The assemblage may be categorized as a late Middle Palaeolithic with a continuum to a late/upper Palaeolithic, as seen in the assemblage typology and technology.

23. EXCAVATION AT PULICAT, DISTRICT THIRUVALLUR

The excavation at the Geldaria Fort, Pulicat was carried out by Chennai Circle of the Survey under the direction of G. Maheshwari assisted by K. P. Mohandas, V. P. Yathees Kumar, A. Subramaniyan, R. Ramesh, Prasannakumar and R.Vinayagam and J.Kuppusamy.

Pulicat (13º25'10"N; 80º18'59"E 3·10m above MSL) well known for its second largest lagoon in Asia, lies 55km north of Chennai on the way to Minjur. The fort was built in the year 1612 CE by Dutch and named it as Vastel Geldaria after Gelderland, one of the states in Holland. The fort is square in plan with bastions at the corners (Pl. 61). The curtain walls are built of bricks, laterite with lime mortar. Within the fort, the most impressive structure is the gate to the cemetery. The objectives of the excavation were to study the cultural sequence of the site and to identify the layout of fort Geldaria and its remains.

Total Six trenches were laid in east and south-western side of the fort *viz*. PLC-XF5, XE5, XE4, F1, F2, and ZF2. The first three trenches were (PLC-XF5, XE5, XE4 & XD4) laid on south-western side of the Fort, another three trenches (PLC- F1, F2 & ZF2) were laid on the eastern side of the Fort (Pls. 62-64).

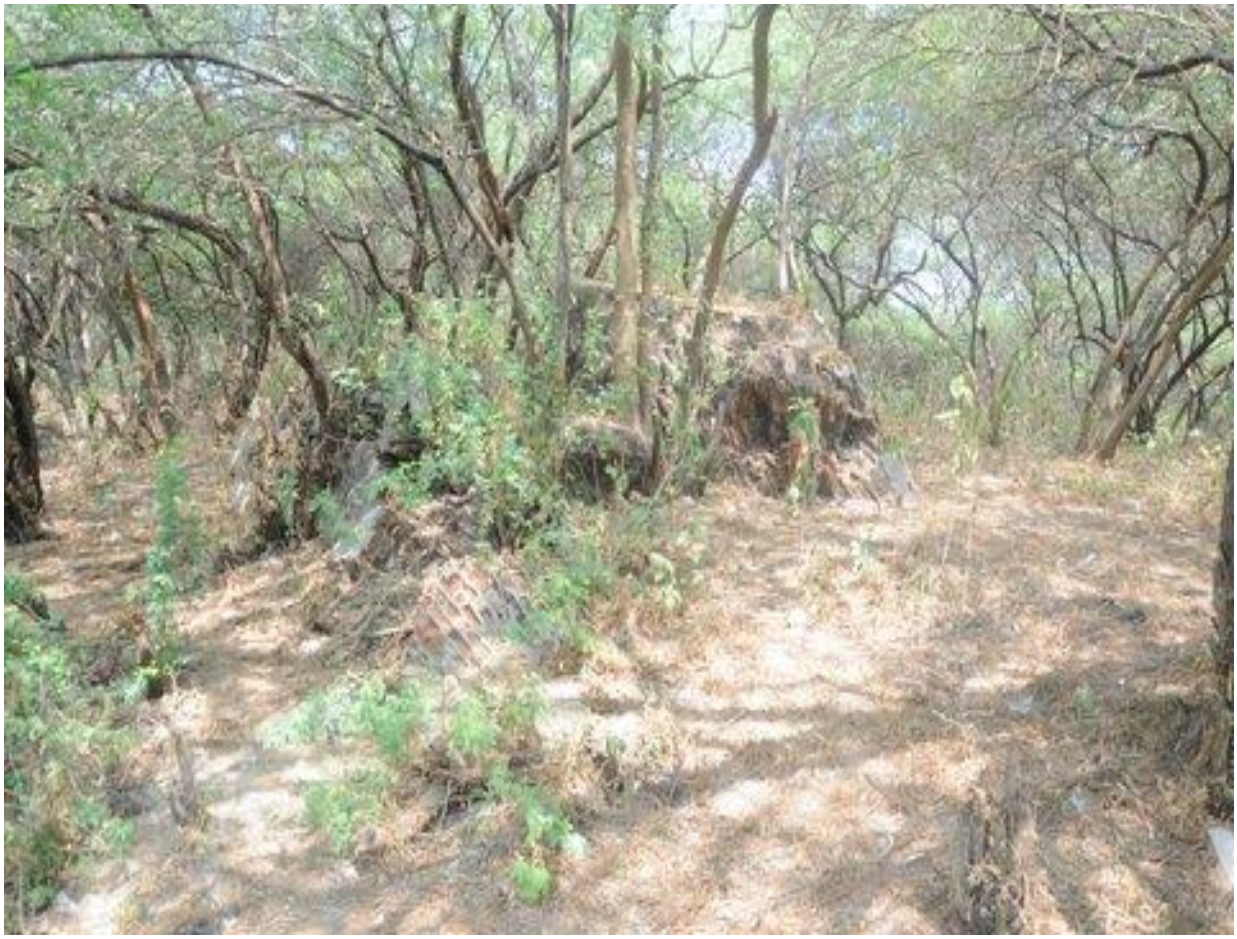
From the excavation, five layers were identified at a total depth of 2·5m. The first layer consists of brickbats in a compact clay deposit. The Sandy clay deposit was identified in layer no. 2, 3& 4. Clayey sand deposit was identified in 5th & 6th layers. Each layer has approximately 40cm thickness.

The brick structures were exposed in north-south orientation to understand the alignment and its nature. The length of the structure is 5·40m while breadth of 4·40cm. The northern main wall and southern wall are inter-locked at the south-west corner. The foundation is constructed out of bricks with sand middle part of the structure (14 courses) is constructed with bricks in lime mortar, and toped with 13 courses of laterite stone in lime mortar. The bricks are measure 4 x 12 x 20cm. Three steps are found in southern side of the structure. The exposed structure suggests that it would be a part of fort wall.

The brick structures are exposed in and around the Pulicat fort. The remains of Fort wall were traced in the North-South and East-West orientation. Most of the brick and laterite structures are continued from north-western corner to south–eastern corner and also identified trapeze shape corner of the Tennessee architecture like the Sadras fort. On the northern part of the moat three brick structures are identified, this may be continued around the moat.

A ring well was exposed on the northern side of the moat in trench F2

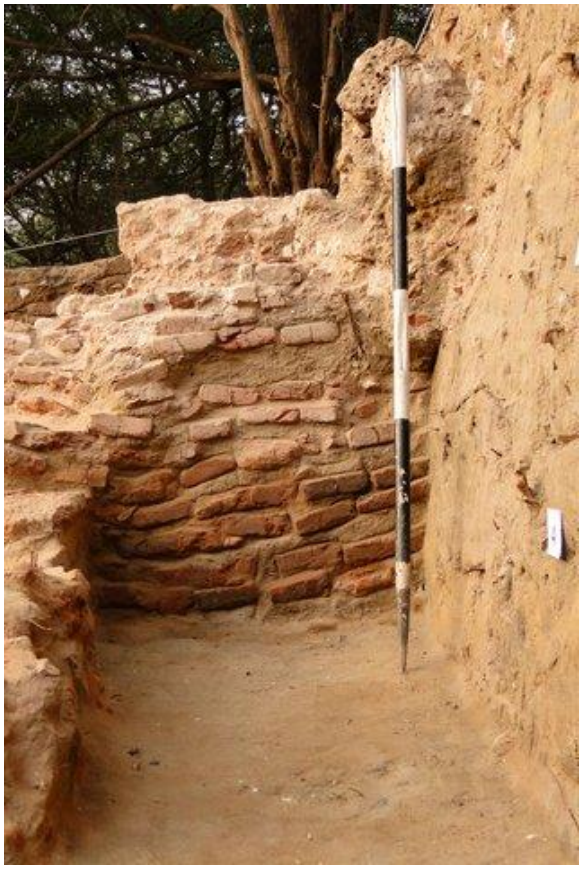
Plate 61



Pulicat, Thiruvallur: General view of fort Geldaria.

Plate 62

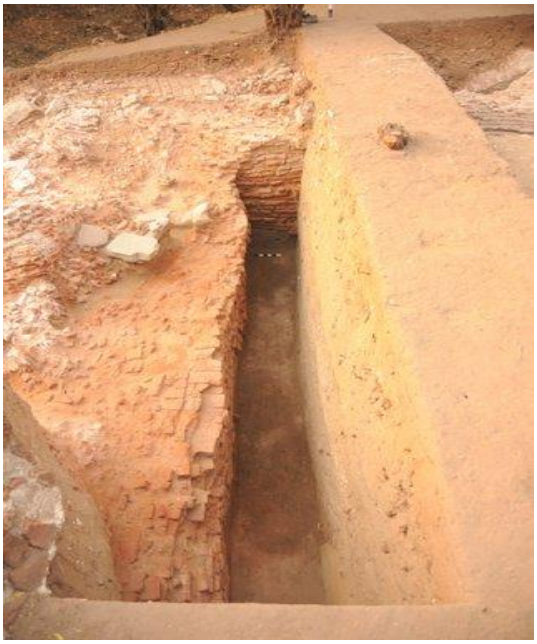
a



b

Pulicat, Thiruvallur: a-b; Remains of fort wall.

Plate 63



a

b

Pulicat, Thiruvallur: a-b; Remains of fort wall.

Plate 64

a

b

Pulicat, Thiruvallur: a-b; Close view of remains of fort wall.

(Pl. 65). It has three courses of terracotta rings, which measures 12 x 80 x 5cm and number of ring wells pieces are collected from northern side of the moat. Two Glass beads are collected near the ring well.

The pottery assemblage of Pulicat fort could be conveniently distinguished into two categories. The first category is in red wares (associated with thin variety of celadon ware) that are chronologically earlier in date found in layer 5 and 6. The second category are the foreign wares (imported from China, Thai and Arab countries) like Zhangzhou (Blue colour under glaze looks dark gray), Jindezhen (Bule and White), Guangdong, Fujian ware, and Islamic ware found in the first four layers (Pl. 66).

The antiquities recovered through limited excavation consist of 5 copper coins, ring, Terracotta lamp (Pl. 67a) nob of the lid, bell, bronze coat button and chain, broken pieces of iron, nail, terracotta figurine, spouts, hopscotch, smoking pipes (Pl. 67b) and glass bangles, beads and copper beads, etc., Important discovery of the excavation is imposed seal impression of foreign origin on the smoking pipes (China Clay).

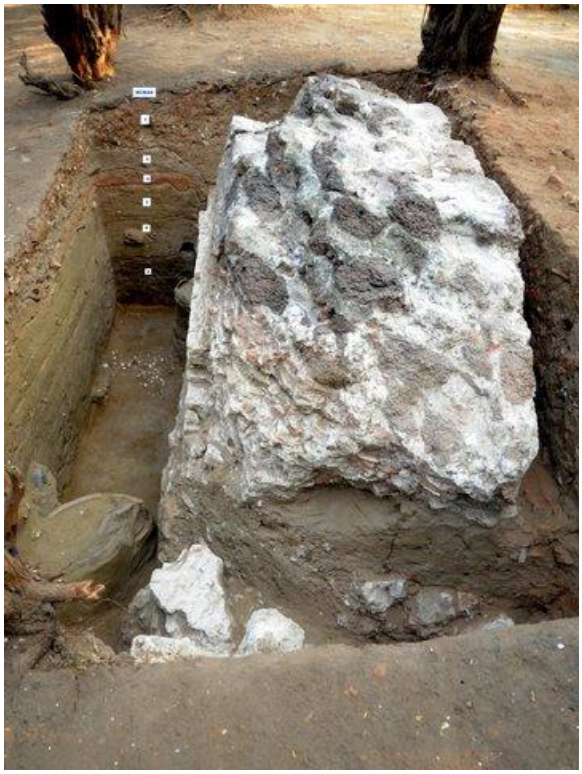
It is very clear from this ceramics and antiquities encountered from Pulicat which reveales that it was an important port town on Coramandal coast from the Medieval (11th Century CE) to Colonial period (19th Century CE). The materials recovered from the Fort area, suggests that it has multi-cultural (Medieval, late Medieval and early Morden period) deposit covering the period between 11th Century CE to 18th Century CE. Further excavation in other parts of the mound, may push back the date to early centuries.

24. EXPLORATIONS IN VAIGAI RIVER VALLEY COMPRISING TENI, MADURAI, DISTRICTS SIVAGANGA AND RAMANATHAPURAM

The Excavation Branch-VI, Bangalore of the Survey under the direction of K. Amarnath Ramakrishna, assisted by M. Rajesh and Veeraraghavan, N.V. Vedachalam, Epigraphic (Retd.) and R.P. Venkateswaran with G. Karthick, R. Manjunath of Gov. Arts College, Krishnagiri and V. Barandhaman, Thanjavur explored Teni, part of Dindigul, Madurai, Sivaganga and Ramanathapuram districts. The objective of the exploration was to explore archaeological sites and remains along Vaigai river valley and to identify suitable site for systematic excavation to understand the cultural transformation of Tamil Nadu occurred during various periods in general and southern Tamil Nadu in particular. The details of the explorations are as under:

The Vaigai river runs approximately of about 250km taking its origin from a number of jungle streams near Vellimalai in the Western Ghats and traverse through Teni, Dindigul, Madurai, Sivaganga and Ramanathapuram districts. In the upper reaches it resembles like an ephemeral stream and with the aid of its tributaries such as Suruliar, Kottakudi, Varahanadi, Marudanadi, Manjalar and Uppar it attains much bigger form in the lower reaches and again reduced to that of a small rivulet when it emerges from the Ramanathapuram tank and empties itself for namesake into the Bay

Plate 65



a

b

Pulicat, Thiruvallur: a-b; Exposed Structure.

Plate 66

a

b

Pulicat, Thiruvallur: a-b; Porcelain ware.

Plate 67

a

b

Pulicat, Thiruvallur: a; Terracotta lamp and b; Smoking pipes.

of Bengal at Attangarai near the early historic port city of Alagankulam. The work of Paripatal, one among the eight anthologies of Sangam literature vividly describes the greatness of this river as many as in eight long poems.

Barring some sporadic diggings during the pre-independence era made by Alexander Rea at Paravai and Anuppanadi (1888), at the suburban parts of Madurai city no concerted attempts were made to study the archaeological remains of the region. It was K.V. Raman, then at Southern Circle of the Survey in late 1950's undertook systematic village to village survey in Madurai, Tirumangalam, Melur and Periyakulam taluks and reported number of archaeological sites and remains. In the year 2006 K. Rajan and his team from Tamil University, Thanjavur reported good number of sites along the Vaigai valley particularly in its upper reaches subsequent to the discovery of inscribed hero stone datable to early centuries of Christian era at Thathappatti in Dindigul district and Pulimankombai in Teni district.

During the first phase particularly in the upper reaches of Vaigai river Teni, part of Dindigul districts were explored. The site of Vembur in Teni district strikes importance for the presence of numerous menhirs at a single spot probably marking a stone alignment. The earlier explorers reported scores of menhirs at the site but unfortunately many of them have not been traced due to rapid agricultural expansion. A detail observation shows that this site is perhaps the only existing example of stone alignment in Tamil Nadu. A careful examination of the menhirs shows that they are erected in equal distance in north – south and east-west orientation in a vast area. The presence of stone alignment is a rare feature in Tamil Nadu as they are known to exist only in Andhra Pradesh and Karnataka.

Next to this, one may cite the important habitation site of Dombicheri located on the left bank of Suruliar in Teni district. The famous punch mark coin hoard referred as Bodinayakanur hoard is supposedly retrieved from this site and not from Bodinayakanur proper. D D Kosambi who studied this hoard dates to early centuries of Christian era comparing the symbols found in the punch marked coins of North India. The site spread in an area of more than 15 acres is locally called as '*tantanmedu'* (*medu* = mound) referring to sound of metals come up whenever dug for earth. The vatteluttu inscriptions datable to *circa* 10^{th} century CE found earlier near the tank little away from the site refers the place as Tiruvadiyaputtur and donations to the Siva temple once stood here.

Similar to that of Dombicheri, another site that receive attention is that of Uttamapuram in Teni district known for the discovery of Roman coin hoard in 1997. But again, re-visitation to the habitation mound reported earlier was found to be completely converted into residential complex inflicting major damage to the site. However, one may presume that the above sites coupled with the recent path breaking discovery of Tamil Brahmi inscribed hero stones at Thathappatti and Pulimankombai show that this area was traditionally linked by ancient trade routes connecting Pandya and Chera countries.

This is further attested by inscriptional evidence datable to later Pandya kings (*circa* 13th-14th century CE) referring to the trade guild '*padinenvishayattar'* about the famous trade center Arikesarinallur i.e. present Sinnamanur.

Proceeding towards downstream within the lower reaches of Vaigai river, one may observe proliferation of habitation sites on its both banks as well as in the hinterland areas. Starting from the important habitation sites of Sittarnattam opposite to Jain Tamil Brahmi cave inscription site of Mettupatti, a centrally protected monument, Kannapatti, Kuruvitturai, Cholavandan, Tenkarai, Tiruvedagam etc such settlements could be observed along the river linking the Madurai city. Most of these sites have a continuous cultural continuity from Iron Age upto medieval period. The site of Sittarnattam could be cited as a perfect example where within the habitation complex itself is seen a hero stone inscription dated to *circa* 13th-14th century CE describing the bravery of an hero who killed the lion which caused death to the public passing through the highway called *'Cholakulantaka peruvazhi'*.

The middle reaches of Vaigai river valley were thoroughly explored during the second phase comprising Madurai Sivaganga and Ramanathapuram districts. The most important work done during this phase was the documentation of jewellery hoard found at Tenur, which is under the custody of District Collector, Madurai. The jewellery hoard contains inscribed gold bars having name of individual written in Tamil-Brahmi script datable *circa* 1st BCE – 1st century CE. This is the first instance in Tamil Nadu where such inscribed gold bars are found in a hoard.

In the celebrated city of Madurai due to rapid urban expansion and continuous occupation there is hardly any scope for excavation to ascertain the veracity of its past glory. Many of the reported sites within the present Madurai city either have been totally disappeared or occupied by modern settlements. The Jain cave sites with Tamil – Brahmi inscriptions dotting the landscape of suburban Madurai are the only connecting link to understand about its glorious past. Ironically, many of the Jain cave sites faces onslaught of stone quarrying activities within the protected limits thereby causing indelible damage to these veritable treasures.

Travelling beyond Madurai, good number of habitation sites continues to occur between Tiruppuvanam and Manamadurai taluks. One such important habitation site identified nearer to Madurai city along the Vaigai river was the site of Keeladi located about 12km south east of Madurai on the ancient highway (modern NH 49) leading to Ramesvaram *via*. Tiruppuvanam. Its associated burial site is located on the way to Kondagai village (i.e. *kuntidevi chaturvedimangalam*). The Tiruppuvanam and Manamadurai regions upto Partibanur seems to be a potential area where the fertile landscape favoured establishment of ancient settlements on either side of river banks.

The important habitation sites /centers identified in this area are Kaliyandur, Enadi, Sakkimangalam, Allinagaram, Tiruppachetti, Tuthai, Maranadu, Pacheri, Vembattur, Vagudi,

Alagapuri, Uruli, Rajagambeeram, Kattikulam, Sudiyur, Kallikkudi, etc. except that of Uruli, Sakkimangalam, and Alagapuri all are habitation sites spread in an extensive area having potential for large scale excavation. The site of Uruli is an extensive burial site noted for menhirs and numerous urn burials and Alagapuri is another interesting site to show evidence for terracotta coffin or sarcophagus (Pl. 68) in the southern part of Tamil Nadu.

From Partibanur to Paramakudi towards Ramanathapuram a series of ancient settlements including Buddhist and Jain sites all along the Vaigai river discovered are suggestive of trade centers proceeding towards the coastal area of Ramesvaram. The presence of Buddha images at Kizpartibanur, Jain images at Sudiyur, Arungulam (Pl. 69a), Kumarakurichi, etc. reflects this fact. This has further strengthened by discovery of the sites of Kallikkudi, Gandhi Nagar near Emaneswaram, Kamankottai where celadon and porcelain pot sherds were collected. Among the other settlements, the extensive sites of Sittarnattam, Maranadu (Pl. 69b), Allinagaram (Pl. 70a), Rajagambiram (Pl. 70b), Pandikanmay (Pl. 71) and Arasanagari deserve large scale excavation.

These ancient settlements could have not thrived for a longer period until and otherwise there existed much earlier active trade network in this area. To strengthen this fact, the sites of Valasai near Nayinar kovil and Landai near Ramanathapuram yielded much important evidence in the form of Roman rouletted and Arretine ware(?). The site of Landai yielded Rouletted ware along with Russet coated painted black and red ware. This is perhaps the first time that russet coated ware occurs in the southernmost tip of Tamil Nadu. In addition to the above, the site of Kizhsethai near Uttarakosamangai has also yielded Rouletted ware recently. All these evidences suggest that right from the early historic times these trade routes remained active on either side of Vaigai river connecting the port city of Alagankulam through hinterland centers upto the Pandyan capital city of Madurai and further beyond connecting the Chera country.

Thus the above facts has proved beyond doubt that the archaeological evidences coupled with literary sources could lead us to understand the cultural transformation that took place all along the Vaigai river valley right from prehistoric to medieval period. From the upper reaches of Vaigai and upto its end near Alagankulam near Bay of Bengal both of its bank are found to contain number of important archaeological sites. About 293 sites containing various forms of archaeological remains have been documented and among about 170 sites have been newly indentified (Fig. 23).

Inspite of its potent archaeological wealth none of these sites has been to systematically excavate till date barring the limited diggings at Alangankulam. A systematic excavation at these sites would shed valuable light for better understanding of historical setting of Tamil Nadu in general and southern Tamil Nadu in particular before these are eroded permanently.

Plate 68

a

b

Alagapuri: a; View of urn burial with broken lid and b; Sarcophagus burial.

Plate 69

Arungulam: Jain tirthankara.

Maranadu: View of habitation site with Buddha image.

Plate 70

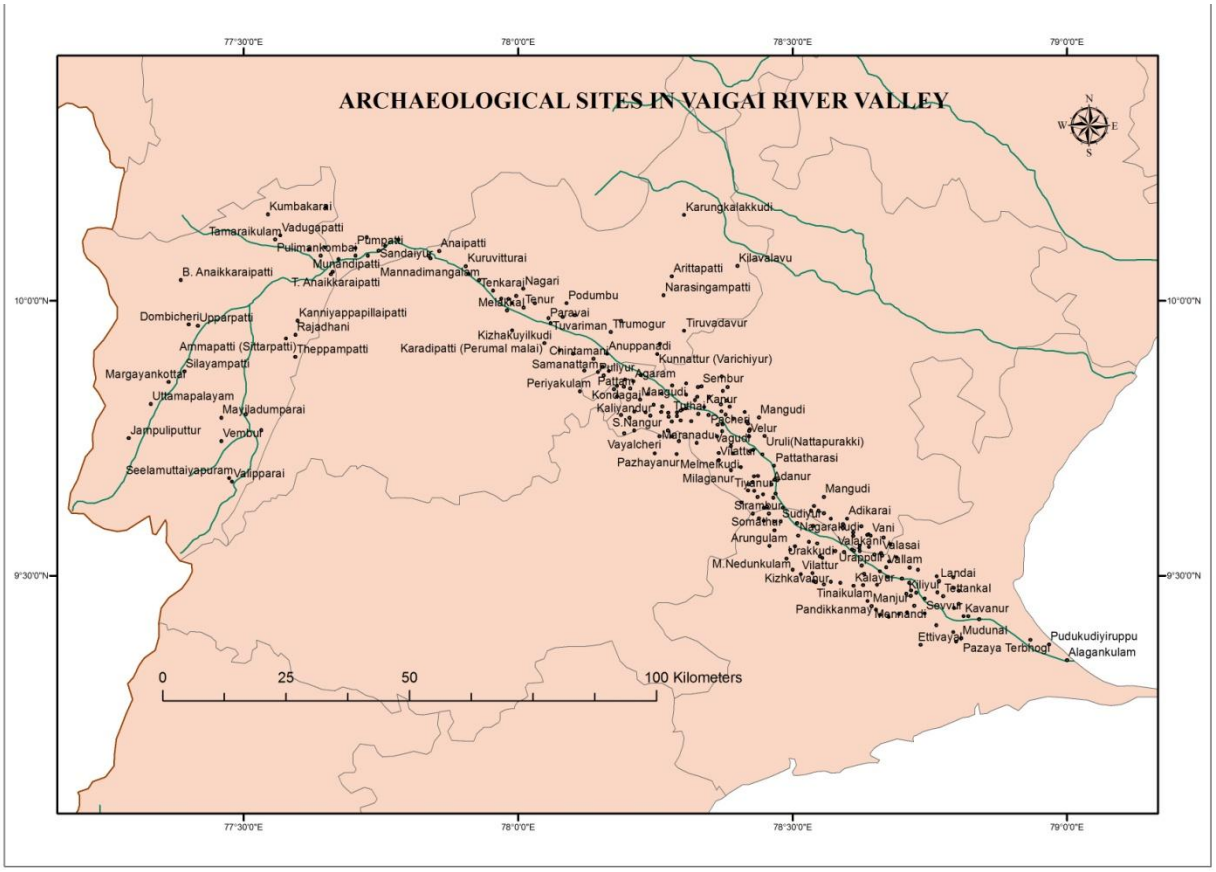
Allinagaram: View of habitation site.

Rajagambiram: View of habitation site.

Plate 71

Pandikanmay: View of habitation site.

Fig. 23



Madurai, Sivaganga and Ramanathapuram: Map on Vaigai river valley.

List of the explored Archaeological Sites in Vaigai River Valley, Tamil Nadu

Name of Site	Taluk	District	Coordinates	Nature of Remains
Valipparai	Andipatti	Teni	N 09° 40’ 26” E 77° 28’ 72’’	Urn burial cum habitation site
Seelamuttaiya Puram	Andipatti	Teni	N 09° 40’ 62” E 77° 28’ 41’’	Urn burial
Vembur	Andipatti	Teni	N 09° 44’ 68” E 77° 27’ 54’’	Menhir, Stone alignment
Jampuliputtur	Andipatti	Teni	N 09° 44’ 99” E 77° 17’ 42’’	*Circa* 15th CE Vishnu temple
Thangammalpuram	Andipatti	Teni	N 09° 45’ 86” E 77° 31’ 91’’	*Circa* 12th – 13th CE inscription, sculptures *Circa* 15th – 16th CE herostones
Mayiladumparai	Andipatti	Teni	N 09° 47’ 24” E 77° 27’ 54’’	*Circa* 12th – 13th CE Shiva temple
Kadamalaikund	Andipatti	Teni	N 09° 47’ 61”	Early historic cum

u			E 77° 30’ 23’’	medieval habitation site, *circa* 12th CE Siva temple
Uttamapalayam	Uttamapalayam	Teni	N 09° 48’ 72” E 77° 19’ 84’’	Centrally protected Jain reliefs. Early historic cum historic habitation site
Periyakulam	Periyakulam	Teni	N 09° 50’ 11” E 78° 06’ 75’’	*Circa* 12th CE Siva temple
Margayankottai	Uttamapalayam	Teni	N 09° 51’ 12” E 77° 21’ 75’’	Historical pottery
Silayampatti	Uttamapalayam	Teni	N 09° 52’ 26” E 77° 23’ 51’’	Early historic cum medieval habitation site
Theppampatti	Andipatti	Teni	N 09° 53’ 86” E 77° 35’ 60’’	Iron age – Medieval habitation site, *circa* 15th - 16th CE Vishnu temple
Ammapatti (Sittarpatti)	Andipatti	Teni	N 09° 55’ 87” E 77° 34’ 60’’	Urn burial, Early historic cum historical habitation site, Iron slags, Oil press
Rajadhani	Andipatti	Teni	N 09° 56’ 03” E 77° 35’ 65’’	Urn burial, *circa* 15th CE Shiva temple
Upparpatti	Uttamapalayam	Teni	N 09° 57’ 27” E 77° 24’ 97’’	Early historic cum medieval habitation site, *circa* 12th CE Siva, Vishnu temple
Dombicheri	Bodinayakanur	Teni	N 09° 57’ 42” E 77° 23’ 96’’	Early historic habitation site
Kanniyappapillai Patti	Andipatti	Teni	N 09° 57’ 84” E 77° 35’ 90’’	Historical pottery, Iron slags
Dharmattupatti	Periyakulam	Teni	N 09° 59’ 71” E 78° 01’ 08’’	Early historic habitation site
B. Anaikkaraipatti	Andipatti	Teni	N 10° 02’ 27” E 77° 23’ 01’’	Urn burial, Iron age cum historic habitation site
T. Anaikkaraipatti	Andipatti	Teni	N 10° 02’ 90” E 77° 39’ 05’’	Urn burial, Medieval pottery
Munandipatti	Periyakulam	Teni	N 10° 03’ 16” E 77° 39’ 70’’	Stone Circles, Urn Burial
Pudur (Kullapuram piruvu)	Periyakulam	Teni	N 10° 04’ 56” E 77° 40’ 37’’	Iron age cum historic habitation site
Pulimankombai	Periyakulam	Teni	N 10° 04’ 92” E 77° 42’ 02’’	Hero stone with Tamil Brahmi script, Urn Burial
Kullapuram - 1	Periyakulam	Teni	N 10° 04’ 95” E 77° 38’ 41’’	Early historic cum medieval habitation site, sculptures, hero stone, *circa* 12th CE Siva temple
Rangappa nayakanpatti	Andipatti	Teni	N 10° 04’ 95” E 77° 43’ 56’’	Urn burial, Early historic habitation site
Sittarnattam	Nilakottai	Dindigul	N 10° 04’ 95” E 77° 50’ 18’’	Iron age cum Medieval habitation site, *circa* 14th

				– 15th CE herostone
Sandaiyur	Nilakottai	Dindigul	N 10° 05’ 46” E 77° 44’ 71’’	Early historic habitation site
Kullapuram - 2	Periyakulam	Teni	N 10° 05’ 67” E 77° 37’ 17’’	Early historic habitation site
Pumpatti	Periyakulam	Teni	N 10° 05’ 75” E 77° 42’ 23’’	Stone Circle with cist
Bomminayakkan Patti	Periyakulam	Teni	N 10° 05’ 83” E 77° 38’ 09’’	Iron age pottery, *circa* 15th – 16th CE sluice
Thathappatti	Nilakottai	Dindigul	N 10° 05’ 97” E 77° 45’ 45’’	Hero stone with Tamil Brahmi script
Jayamangalam	Periyakulam	Teni	N 10° 06’ 00” E 78° 35’ 09’’	Iron age cum historic habitation site, *circa* 12th – 13th CE Vishnu temple
Tamaraikulam	Periyakulam	Teni	N 10° 06’ 07” E 77° 33’ 04’’	Early historic habitation site
Kannapatti	Periyakulam	Teni	N 10° 06’ 66” E 77° 46’ 88’’	*Circa* 12th – 13th CE Shiva temple
P. Viralipatti	Periyakulam	Teni	N 10° 06’ 95” E 77° 43’ 46’’	Stone circle
Vadugapatti	Periyakulam	Teni	N 10° 07’ 14” E 77° 34’ 00’’	Urn burial, *circa* 15th – 16th CE hero stones
Kumbakarai	Periyakulam	Teni	N 10° 09’ 43” E 77° 32’ 66’’	Early historic habitation site
Mungilanai	Periyakulam	Teni	N 10° 10’ 22” E 77° 38’ 97’’	Early historic habitation site
Pannaipatti	Andipatti	Teni	N 10° 60’ 12” E 77° 44’ 07’’	Cairn circle with urn
Sakkudi	Madurai East	Madurai	N 09° 51’ 89” E 78° 13’ 37’’	Early historic pottery, Remains of *circa* 13th CE Shiva temple, sculptures, Inscription of *circa* 15th CE.
Samanattam	Madurai	Madurai	N 09° 52’ 02” E 78° 08’ 73’’	Iron age cum historic habitation site
Vallanandapuram (Avaniapuram)	Madurai North	Madurai	N 09° 52’ 35” E 78° 07’ 20’’	c. 12th – 13th CE inscription, *circa* 16th – 17th CE inscriptions
Panaiyur	Madurai	Madurai	N 09° 52’ 78” E 78° 09’ 02’’	*Circa* 12 – 13th CE sculptures, *circa* 15th – 16th CE inscription
Chintamani	Madurai	Madurai	N 09° 53’ 67” E 78° 08’ 21’’	Urn burial, *circa* 15th – 16th CE hero stones, Sluice
Anuppanadi	Madurai	Madurai	N 09° 54’ 02” E 78° 09’ 72’’	Urn burial, *circa* 12th – 13th CE sculpture, *circa* 15th – 16th CE hero stone
Kunnattur (Varichiyur)	Madurai North	Madurai	N 09° 54’ 18” E 78° 15’ 21’’	Flake tools, Urn burial site, State protected Jain

				cavern with Tamil Brahmi inscription, and Rock cut temples for Shiva. Remains of *circa* 13th CE Shiva temple.
Pazhanganattam	Madurai North	Madurai	N 09° 54' 20" E 78° 05' 96''	Urn burial
Kizhakuyilkudi	Madurai North	Madurai	N 09° 54' 44" E 78° 02' 31''	Centrally protected Jain cavern with Tamil Brahmi inscription, Jain bas reliefs with inscription, *circa* 9th – 10th CE sculptures, *circa* 10th – 11th CE Jain temple. Iron age cum historic pottery
Madakkulam	Madurai North	Madurai	N 09° 54' 58" E 78° 04' 51''	*Circa* 12th – 13th CE inscription, Sluice, Historic habitation site, Iron age pottery
Karadipatti (Perumal malai)	Madurai North	Madurai	N 09° 55' 35" E 78° 02' 85''	Centrally protected Jain cavern with Tamil Brahmi inscription, *circa* 9th – 10th CE Jain sculpture. Iron age cum historic pottery, rock paintings, Iron slag
Tirumogur	Melur	Madurai	N 09° 56' 06" E 78° 10' 11''	*Circa* 10th – 11th CE Vishnu temple
Vilangudi	Madurai North	Madurai	N 09° 56' 52" E 78° 05' 27''	Iron age cum historic habitation site
Tiruvadavur	Melur	Madurai	N 09° 56' 70" E 78° 18' 14''	Rock painting, State protected Jain cavern with Tamil Brahmi inscription, c. 9th – 10th CE Shiva temple
Kongarpuliyan kulam	Madurai South	Madurai	N 09° 56' 77" E 77° 59' 35''	State protected Jain cavern with Tamil Brahmi inscription and bas relief. Flake tools, Early historic cum historic pottery, c.15th – 16th CE herostone
Tuvariman	Madurai North	Madurai	N 09° 57' 57" E 78° 03' 56''	Microliths, Stone celts, Iron age pottery
Anaimalai	Madurai North	Madurai	N 09° 57' 80" E 78° 11' 20''	State protected Jain cavern with Tamil Brahmi inscription, Rock cut temple for Kartikeya and Jain bas reliefs. Rock

				cut temple for Vishnu.
Sikandarchavadi	Madurai North	Madurai	N 09° 58’ 04” E 78° 06’ 16’’	Iron age pottery
Paravai	Madurai North	Madurai	N 09° 58’ 11” E 78° 03’ 31’’	Urn burial, *circa* 12th – 13th CE sculptures
Kovilpappakudi	Madurai North	Madurai	N 09° 58’ 22” E 78° 04’ 85’’	Urn burial, *circa* 12th – 13th CE sculptures, Sluice
Melakkal	Vadipatti	Madurai	N 09° 58’ 94” E 77° 58’ 77’’	Iron age cum historic habitation site
Tenur	Madurai North	Madurai	N 09° 59’ 28” E 78° 00’ 57’’	Iron age cum historic habitation site, Jewellery hoard with Tamil Brahmi inscription
Podumbu	Madurai North	Madurai	N 09° 59’ 71” E 78° 05’ 29’’	Iron age cum historic habitation site
Tiruvedagam	Vadipatti	Madurai	N 09° 59’ 71” E 77° 59’ 32’’	Iron age cum historic habitation site *circa* 10th - 11th CE Shiva temple
Tacchampattu	Madurai North	Madurai	N 10° 00’ 02” E 77° 58’ 92’’	*circa* 12th – 13th CE Shiva temple
Kachirairuppu	Madurai North	Madurai	N 10° 00’ 24” E 77° 58’ 16’’	*circa* 15th - 16th CE habitation site, Hero stones Iron slag
Nedunkulam	Vadipatti	Madurai	N 10° 00’ 54” E 77° 59’ 77’’	10th - 11th CE sculpture
Narasingampatti	Melur	Madurai	N 10° 00’ 61” E 78° 15’ 88’’	Stone circle with cist, Urn burial
Tirumalnattam	Vadipatti	Madurai	N 10° 00’ 92” E 78° 59’ 32’’	Iron age cum historic habitation site
Tenkarai	Vadipatti	Madurai	N 10° 01’ 12” E 77° 57’ 25’’	*circa*. 10th - 11th CE Shiva temple
Kottamedu	Vadipatti	Madurai	N 10° 01’ 17” E 78° 04’ 79’’	Early historic cum historic habitation site, Sculptures
Cholavandan	Vadipatti	Madurai	N 10° 01’ 20” E 78° 57’ 55’’	*circa* 11th – 12th CE Shiva temple
Nagari	Vadipatti	Madurai	N 10° 01’ 29” E 78° 00’ 55’’	Historic habitation site, c. 15th - 16th CE hero stone
Mannadimangalam	Vadipatti	Madurai	N 10° 02’ 27” E 77° 55’ 73’’	Iron age cum historic habitation site, c. 13th - 14th CE Shiva temple
Arittapatti	Melur	Madurai	N 10° 02’ 67” E 78° 16’ 79’’	Jain cavern with Tamil Brahmi inscription and bas relief. Early historic pottery, iron slags.
Ayyappanayakkan Patti	Vadipatti	Madurai	N 10° 02’ 91” E 77° 54’ 55’’	c. 15th - 16th CE Vishnu temple, hero stones

Kuruvitturai	Vadipatti	Madurai	N 10° 03’ 79” E 77° 54’ 25’’	Iron age cum historic habitation site, c. 10th - 11th CE Vishnu temple, c. 15th - 16th CE hero stones
Kilavalavu	Madurai South	Madurai	N 10° 03’ 80” E 78° 23’ 95’’	Centrally protected Jain cavern with Tamil Brahmi inscription, Jain bas reliefs, Historical pottery, Roof tiles
Mettupatti	Vadipatti	Madurai	N 10° 04’ 64” E 77° 50’ 37’’	Centrally protected Jain cavern with Tamil Brahmi inscription. Urn burial site, Graffiti sherds
Anaipatti	Vadipatti	Madurai	N 10° 05’ 44” E 77° 51’ 34’’	c. 15th - 16th CE Hanuman temple
Karungkalakkudi	Melur	Madurai	N 10° 09’ 37” E 78° 22’ 15’’	State protected Jain cavern with Tamil Brahmi inscription, Urn burial, Rock paintings, Iron age cum historic pottery, c. 15th – 16th CE pillared hall
Tirupparankunram	Madurai South	Madurai	N 12° 20’ 68” E 76° 36’ 45’’	Centrally protected Jain cavern with Tamil Brahmi inscription and Rock cut Shiva temple, Rock cut Kartikeya temple, Jain bas reliefs
Kamudakkudi	Ilayankudi	Sivaganga	N 09° 33’ 69” E 78° 31’ 76’’	Iron age cum historic habitation site, c. 10th – 11th CE inscriptions, c. 12th – 13th CE sculptures
Kumarakurichi	Ilayankudi	Sivaganga	N 09° 34’ 32” E 78° 36’ 60’’	Iron age cum historic habitation site, Ring well, c. 11th – 12th CE Jain image
Melperungarai	Ilayankudi	Sivaganga	N 09° 34’ 70” E 78° 36’ 60’’	c. 11th – 12th CE temple, c. 16th – 17th CE inscription
Mulliyarendal	Ilayankudi	Sivaganga	N 09° 35’ 19” E 78° 35’ 05’’	Iron age cum historic habitation site
Brahmanakurichi	Ilayankudi	Sivaganga	N 09° 35’ 42” E 78° 32’ 21’’	Iron age cum historic habitation site, c. 12th – 13th CE sculptures, c. 16th – 17th CE hero stone
Krishnapuram	Ilayankudi	Sivaganga	N 09° 35’ 62” E 78° 35’ 48’’	Iron age cum historic habitation site
T. Pudukkottai	Manamadurai	Sivaganga	N 09° 35’ 75” E 78° 30’ 45’’	Iron age cum historic habitation site, Ring well
Ayankurichi	Manamadurai	Sivaganga	N 09° 36’ 08”	Iron age cum historic

			E 78° 33’ 04’’	habitation site
Munaivenri	Manamadurai	Sivaganga	N 09° 36’ 21” E 78° 34’ 18’’	Iron age cum historic habitation site
Adikarai	Ilayankudi	Sivaganga	N 09° 36’ 21” E 78° 35’ 94’’	Iron age cum historic habitation site
M. Karisalkulam	Manamadurai	Sivaganga	N 09° 37’ 04” E 78° 26’ 84’’	Iron age cum historic habitation site
Sengottai	Manamadurai	Sivaganga	N 09° 37’ 04” E 78° 28’ 92’’	Iron age cum historic habitation site, Sculptures
Alambacheri	Manamadurai	Sivaganga	N 09° 37’ 10” E 78° 32’ 00’’	Urn age burial cum historic habitation site, Ring well, c. 19th – 20th CE milestone, herostone
Vannikudi	Manamadurai	Sivaganga	N 09° 37’ 51” E 78° 27’ 18’’	Iron age cum historic habitation site
Vaviyarendal	Manamadurai	Sivaganga	N 09° 38’ 50” E 78° 27’ 87’’	Urn burial site
Melpasalai	Manamadurai	Sivaganga	N 09° 38’ 57” E 78° 26’ 16’’	Iron age cum historic habitation site, Sculptures
Kizhpasalai	Manamadurai	Sivaganga	N 09° 38’ 87” E 78° 26’ 75’’	Iron age cum historic habitation site, c. 12th - 13th CE temple
E.Nedunkulam	Manamadurai	Sivaganga	N 09° 38’ 95” E 78° 28’ 13’’	Iron age cum historic habitation site, Boundary stone
Tiyanur	Manamadurai	Sivaganga	N 09° 39’ 24” E 78° 25’ 80’’	Iron age cum historic habitation site
Arimandapam	Manamadurai	Sivaganga	N 09° 39’ 29” E 78° 25’ 01’’	Iron age cum historic habitation site, Sculpture
Adanur	Manamadurai	Sivaganga	N 09° 39’ 98” E 78° 27’ 70’’	Iron age cum historic habitation site
Annavasal	Manamadurai	Sivaganga	N 09° 39’ 99” E 78° 25’ 20’’	Urn burial site
Kizhangkattur	Manamadurai	Sivaganga	N 09° 40’ 02” E 78° 25’ 65’’	Iron age cum historic habitation site, Sculptures
Arasanendal	Manamadurai	Sivaganga	N 09° 40’ 04” E 78° 28’ 29’’	Urn burial site
Panikkanendal	Manamadurai	Sivaganga	N 09° 40’ 45” E 78° 27’ 99’’	Iron age cum historic habitation site
Kizhamelkudi	Manamadurai	Sivaganga	N 09° 40’ 81” E 78° 25’ 75’’	Iron age cum historic habitation site
Ottavidu (Kizhamelkudi)	Manamadurai	Sivaganga	N 09° 40’ 87” E 78° 26’ 20’’	Iron age cum historic habitation site, ring well
Milaganur	Manamadurai	Sivaganga	N 09° 41’ 05” E 78° 23’ 26’’	Iron age cum historic habitation site
Melmelkudi	Manamadurai	Sivaganga	N 09° 41’ 84” E 78° 24’ 34’’	Iron age cum historic habitation site
Pattatharasi	Manamadurai	Sivaganga	N 09° 41’ 98” E 78° 27’ 96’’	c. 17th – 18th CE inscription

Kattikulam	Manamadurai	Sivaganga	N 09° 42’ 59” E 78° 21’ 92’’	Iron age cum historic habitation site
Seykalattur (Nedungulam)	Manamadurai	Sivaganga	N 09° 43’ 20” E 78° 26’ 67’’	Iron age cum historic habitation site
Pazhayanur	Tirupuvanam	Sivaganga	N 09° 43’ 24” E 78° 17’ 31’’	Iron age cum historic habitation site
Chokkanadiruppu	Tirupuvanam	Sivaganga	N 09° 43’ 33” E 78° 14’ 92’’	Iron age cum historic habitation site
Perumacheri	Manamadurai	Sivaganga	N 09° 43’ 33” E 78° 23’ 47’’	Iron age BRW pot sherds
Vilattur	Manamadurai	Sivaganga	N 09° 43’ 35” E 78° 21’ 92’’	Iron age cum historic habitation site, c. 9th – 10th CE sculptures
Rajagambiram (Kirungakottai)	Manamadurai	Sivaganga	N 09° 43’ 55” E 78° 25’ 31’’	Iron age cum historic habitation site
Kallarvalasai	Manamadurai	Sivaganga	N 09° 43’ 70” E 78° 25’ 70’’	Iron age cum historic habitation site
Vagudi	Manamadurai	Sivaganga	N 09° 44’ 14” E 78° 23’ 24’’	Iron age cum historic habitation site
Maranadu	Manamadurai	Sivaganga	N 09° 44’ 50” E 78° 19’ 50’’	Iron age cum historic habitation site, c. 11th – 12th CE Buddha sculpture
Acchankulam	Tirupuvanam	Sivaganga	N 09° 44’ 68” E 78° 17’ 53’’	Iron age cum historic habitation site
Velur	Manamadurai	Sivaganga	N 09° 45’ 02” E 78° 25’ 53’’	Iron age cum historic habitation site
Vadinattam	Tirupuvanam	Sivaganga	N 09° 45’ 18” E 78° 16’ 79’’	Iron age cum historic habitation site
Vellikkurichi	Manamadurai	Sivaganga	N 09° 45’ 18” E 78° 21’ 70’’	Iron age cum historic habitation site
Vayalcheri	Tirupuvanam	Sivaganga	N 09° 45’ 20” E 78° 15’ 42’’	Iron age cum historic habitation site
Uruli (Nattapurakki)	Manamadurai	Sivaganga	N 09° 45’ 21” E 78° 26’ 90’’	Urn burials, Menhir
Sembarayanendal	Manamadurai	Sivaganga	N 09° 45’ 77” E 78° 22’ 03’’	Iron age cum historic habitation site
Sriranganattam	Manamadurai	Sivaganga	N 09° 45’ 80” E 78° 25’ 23’’	Iron age cum historic habitation site
Vannikottai	Tirupuvanam	Sivaganga	N 09° 45’ 83” E 78° 16’ 35’’	Iron age cum historic habitation site
Kallarkulam	Sivaganga	Sivaganga	N 09° 45’ 95” E 78° 25’ 30’’	Iron age cum historic habitation site, c. 15th – 16th CE hero stone
Mazhavarayanendal	Tirupuvanam	Sivaganga	N 09° 46’ 47” E 78° 21’ 77’’	Iron age cum historic habitation site
Pathinettamkottai	Manamadurai	Sivaganga	N 09° 46’ 51” E 78° 22’ 31’’	Historic habitation site
Thekkur -	Manamadurai	Sivaganga	N 09° 46’ 56” E 78° 25’ 01’’	Iron age cum historic habitation site

Piramanur	Tirupuvanam	Sivaganga	N 09° 46’ 81” E 78° 16’ 78’’	Iron age cum historic pot sherds, c. 11th – 12th CE sculpture
Thekkur - 2	Manamadurai	Sivaganga	N 09° 46’ 82” E 78° 24’ 98’’	Iron age cum historic habitation site
Kottankulam	Tirupuvanam	Sivaganga	N 09° 46’ 84” E 78° 18’ 90’’	Iron age cum historic habitation site, Iron smelting centre
Mudhuvanthidal	Tirupuvanam	Sivaganga	N 09° 46’ 90” E 78° 17’ 73’’	Iron age BRW pot sherds
V.Pudukulam	Manamadurai	Sivaganga	N 09° 47’ 10” E 78° 23’ 47’’	Iron age cum historic habitation site
Ethiraimarichan	Tirupuvanam	Sivaganga	N 09° 47’ 24” E 78° 12’ 16’’	Iron age cum historic habitation site
Mangudi	Tirupuvanam	Sivaganga	N 09° 47’ 27” E 78° 26’ 30’’	Historic habitation site
Panayanendal	Tirupuvanam	Sivaganga	N 09° 47’ 34” E 78° 16’ 43’’	Iron age cum historic habitation site
Kondhikulam	Tirupuvanam	Sivaganga	N 09° 47’ 42” E 78° 17’ 36’’	Iron age cum historic habitation site
Kilrangiyam	Tirupuvanam	Sivaganga	N 09° 47’ 45” E 78° 14’ 44’’	Iron age cum historic habitation site
Karungkalikkudi	Tirupuvanam	Sivaganga	N 09° 47’ 54” E 78° 11’ 22’’	c.12th-13th CE Siva temple, historic habitation site
Tiruppachetti	Tirupuvanam	Sivaganga	N 09° 47’ 54” E 78° 20’ 79’’	Iron age cum historic habitation site, c. 9th – 10th CE inscriptions
Idaikkattur	Manamadurai	Sivaganga	N 09° 47’ 54” E 78° 20’ 79’’	c.12th-13th CE Siva temple, Iron age, historic pot sherds
Lakshmipuram (Valayarkudirupu)	Manamadurai	Sivaganga	N 09° 47’ 56” E 78° 22’ 69’’	Urn burials, Iron age cum historic habitation site
Tuthai	Tirupuvanam	Sivaganga	N 09° 47’ 66” E 78° 19’ 67’’	Iron age cum historic habitation site, c. 9th – 10th CE sculptures, hero stone
Vaviyarendal	Tirupuvanam	Sivaganga	N 09° 47’ 77” E 78° 16’ 40’’	Iron age cum historic habitation site, Iron slag
Allinagaram	Tirupuvanam	Sivaganga	N 09° 47’ 79” E 78° 13’ 92’’	Iron age cum historic habitation site
T. Parayankulam	Tirupuvanam	Sivaganga	N 09° 47’ 82” E 78° 17’ 35’’	Iron age cum historic habitation site
Thavalaikkulam	Tirupuvanam	Sivaganga	N 09° 47’ 83” E 78° 15’ 63’’	Iron age cum historic habitation site
Periyakottai	Manamadurai	Sivaganga	N 09° 47’ 86” E 78° 24’ 77’’	Iron age cum historic habitation site
Ambalattadi	Tirupuvanam	Sivaganga	N 09° 47’ 90”	Iron age cum historic

			E 78° 12’ 69’’	habitation site
Melrangiyam	Tirupuvanam	Sivaganga	N 09° 47’ 90” E 78° 12’ 69’’	Iron age cum historic habitation site
Pacheri	Tirupuvanam	Sivaganga	N 09° 47’ 93” E 78° 22’ 20’’	Iron age cum historic habitation site, c. 9th – 10th CE sculpture
T. Alangkulam	Tirupuvanam	Sivaganga	N 09° 48’ 00” E 78° 17’ 74’’	Historic habitation site, Medieval sculpture
Ladanendal	Tirupuvanam	Sivaganga	N 09° 48’ 13” E 78° 17’ 94’’	Iron age cum historic habitation site, Medieval sculpture
T. Pappankulam	Tirupuvanam	Sivaganga	N 09° 48’ 22” E 78° 18’ 30’’	Historic habitation site, Medieval sculpture
Kanur	Tirupuvanam	Sivaganga	N 09° 48’ 38” E 78° 20’ 32’’	c. 12th – 13th CE Siva temple, Iron age BRW pot sherds
Vembattur	Tirupuvanam	Sivaganga	N 09° 48’ 44” E 78° 23’ 01’’	Iron age cum historic habitation site, c. 12th – 13th CE Siva temple, Saptamatrka sculptures
Chichacheri (Tirupuvanam)	Tirupuvanam	Sivaganga	N 09° 48’ 47” E 78° 15’ 74’’	Iron age cum historic habitation site
Kaliyandur	Tirupuvanam	Sivaganga	N 09° 48’ 67” E 78° 14’ 08’’	Iron age cum historic habitation site
Kallurani	Tirupuvanam	Sivaganga	N 09° 48’ 71” E 78° 22’ 14’’	Iron age cum historic habitation site
Venkitinattam	Tirupuvanam	Sivaganga	N 09° 49’ 05” E 78° 19’ 55’’	Iron age cum historic habitation site
K. Alagapuri	Sivaganga	Sivaganga	N 09° 49’ 10” E 78° 22’ 08’’	Urn burial site
Karungkulam	Tirupuvanam	Sivaganga	N 09° 49’ 15” E 78° 19’ 31’’	Historic habitation site
Mangudi	Tirupuvanam	Sivaganga	N 09° 49’ 20” E 78° 13’ 29’’	Iron age cum historic habitation site
Melavellur	Tirupuvanam	Sivaganga	N 09° 49’ 29” E 78° 12’ 47’’	Iron age cum historic habitation site
Kannariruppu	Sivaganga	Sivaganga	N 09° 49’ 51” E 78° 20’ 87’’	Iron age cum historic habitation site, Iron smelting centre
Kattamankottai	Tirupuvanam	Sivaganga	N 09° 49’ 55” E 78° 10’ 81’’	Iron age cum historic habitation site
Kanakkankudi	Tirupuvanam	Sivaganga	N 09° 49’ 72” E 78° 18’ 36’’	Iron age pottery, c. 12th – 13th CE Shiva temple, c. 15th – 16th CE inscriptions
Tirupuvanam	Tirupuvanam	Sivaganga	N 09° 49’ 80” E 78° 14’ 02’’	c. 10th – 11th CE inscription, c. 12 – 13th CE Shiva temple
Madappuram	Tirupuvanam	Sivaganga	N 09° 49’ 84” E 78° 15’ 67’’	c. 9th – 10th CE sculptures, hero stone

P. Velankulam	Tirupuvanam	Sivaganga	N 09° 50’ 15” E 78° 22’ 35’’	c. 17th – 18th CE inscription
Pattam	Tirupuvanam	Sivaganga	N 09° 50’ 34” E 78° 10’ 43’’	Iron age cum historic habitation site
Mannarendai	Tirupuvanam	Sivaganga	N 09° 50’ 43” E 78° 12’ 22’’	Iron age burial site
Enadi -1	Tirupuvanam	Sivaganga	N 09° 50’ 58” E 78° 19’ 61’’	Iron age cum historic habitation site, graffiti, Tamil Brahmi inscribed sherds, British period inscription
Nattakudi	Tirupuvanam	Sivaganga	N 09° 50’ 60” E 78° 22’ 88’’	c. 12th – 13th CE Lakshmi Narasimha sculpture
Kondagai - Muniyandipuram	Tirupuvanam	Sivaganga	N 09° 50’ 61” E 78° 11’ 54’’	Iron age cum historic habitation site
Sembur	Tirupuvanam	Sivaganga	N 09° 50’ 64” E 78° 20’ 00’’	Iron age cum historic habitation site, Medieval period sculptures
Kondagai - 2	Tirupuvanam	Sivaganga	N 09° 50’ 68” E 78° 10’ 79’’	Urn burial site, skeletal remains, graffiti sherds, c. 12th – 13th CE Siva temple, Sculptures
Kottaipuvandhi	Tirupuvanam	Sivaganga	N 09° 50’ 72” E 78° 16’ 80’’	Iron age cum historic habitation site
Enadi - 2	Tirupuvanam	Sivaganga	N 09° 50’ 98” E 78° 18’ 36’’	Iron age cum historic habitation site, Iron slags, c. 12th – 13th CE sculptures
Agaram	Tirupuvanam	Sivaganga	N 09° 51’ 21” E 78° 12’ 58’’	Iron age pottery, c. 12 – 13th CE Jain, Hindu sculptures, c. 18th CE inscription
Keeladi	Tirupuvanam	Sivaganga	N 09° 51’ 40” E 78° 11’ 70’’	Iron age cum historic habitation site, c. 12th – 13th CE Siva temple, sculptures
Padamattur	Tirupuvanam	Sivaganga	N 09° 51’ 74” E 78° 22’ 26’’	Iron age cum historic habitation site
Puliyur	Tirupuvanam	Sivagangai	N 09° 51’ 86” E 78° 09’ 34’’	Urn burial cum habitation site
Pottapalayam	Manamadurai	Sivaganga	N 09° 52’ 33” E 78° 09’ 90’’	Iron age cum historic habitation site, c. 9th – 10th CE sculptures, c. 15th – 16th CE hero stone
Karuppukkal	Tirupuvanam	Sivaganga	N 09° 55’ 28” E 78° 15’ 46’’	Iron age cum historic habitation site, c. c. 12th – 13th CE Siva temple remains, sculptures c. 12th – 13th CE inscriptions

Alagankulam	Ramanatha puram	Ramanatha puram	N 09° 20’ 75” E 78° 59’ 96’’	Excavated Early historic site
Ettivayal	Ramanatha puram	Ramanatha puram	N 09° 22’ 43” E 78° 43’ 96’’	Iron age cum historic habitation site
Pudukudiyiruppu	Ramanatha puram	Ramanatha puram	N 09° 22’ 48” E 78° 58’ 00’’	Historic habitation site
Achutanvayal	Ramanatha puram	Ramanatha puram	N 09° 22’ 76” E 78° 47’ 88’’	Iron age cum historic habitation site
Pazaya Terbhogi	Ramanatha puram	Ramanatha puram	N 09° 22’ 98” E 78° 55’ 97’’	Historic habitation site
Mudunal	Ramanatha puram	Ramanatha puram	N 09° 23’ 14” E 78° 48’ 41’’	Iron age cum historic habitation site
Vannivayal	Ramanatha puram	Ramanatha puram	N 09° 23’ 80” E 78° 47’ 55’’	Iron age cum historic habitation site
Viravanur	Paramakudi	Ramanatha puram	N 09° 24’ 58” E 78° 45’ 71’’	Iron age cum historic habitation site
Toruvalur	Ramanatha puram	Ramanatha puram	N 09° 25’ 05” E 78° 49’ 25’’	c. 12th – 13th cent CE images
Kizambal	Paramakudi	Ramanatha puram	N 09° 25’ 07” E 78° 39’ 59’’	Urn burial site
Pullangudi	Ramanatha puram	Ramanatha puram	N 09° 25’ 25” E 78° 50’ 39’’	Iron age cum historic habitation site
Kizakkottai	Paramakudi	Ramanatha puram	N 09° 25’ 47” E 78° 40’ 50’’	Urn burial site
Karendal	Ramanatha puram	Ramanatha puram	N 09° 25’ 54” E 78° 49’ 17’’	Iron age cum historic habitation site
Kavanur	Ramanatha puram	Ramanatha puram	N 09° 25’ 55” E 78° 48’ 66’’	Historic habitation site
Muttuvayal	Paramakudi	Ramanatha puram	N 09° 25’ 77” E 78° 41’ 60’’	Iron age cum historic habitation site
Sevvur	Paramakudi	Ramanatha puram	N 09° 25’ 84” E 78° 44’ 42’’	Iron age cum historic habitation site
Arasanagari	Paramakudi	Ramanatha puram	N 09° 25’ 99” E 78° 42’ 49’’	Iron age cum historic habitation site
Perungalur	Ramanatha puram	Ramanatha puram	N 09° 26’ 09” E 78° 48’ 13’’	c. 17th – 18th cent CE temple
Mudalur	Paramakudi	Ramanatha puram	N 09° 26’ 12” E 78° 45’ 52’’	c. 12th – 13th cent CE image, c. 16th – 17th cent CE inscription
S. Karaikudi (Kurundarai Ayyanar Koil Thidal)	Mudukulattur	Ramanatha puram	N 09° 26’ 29” E 78° 39’ 11’’	Iron age cum historic habitation site
Kulattur	Paramakudi	Ramanatha puram	N 09° 26’ 49” E 78° 47’ 65’’	Iron age cum historic habitation site
Manjur	Paramakudi	Ramanatha puram	N 09° 26’ 66” E 78° 38’ 59’’	Iron age cum historic habitation site
Mennandi	Paramakudi	Ramanatha	N 09° 26’ 69”	Iron age cum historic

		puram	E 78° 43’ 26’’	habitation site
Pandikkanmay	Paramakudi	Ramanatha puram	N 09° 27’ 20” E 78° 38’ 19’’	Iron age cum historic habitation site, urn burial
T. Karungulam	Paramakudi	Ramanatha puram	N 09° 27’ 44” E 78° 36’ 26’’	Iron age cum historic habitation site
Periyanagachi	Paramakudi	Ramanatha puram	N 09° 27’ 48” E 78° 44’ 42’’	Iron age cum historic habitation site
Tettankal	Paramakudi	Ramanatha puram	N 09° 27’ 75” E 78° 46’ 42’’	Iron age cum historic habitation site
Kakkanendal	Paramakudi	Ramanatha puram	N 09° 27’ 79” E 78° 42’ 09’’	Iron age cum historic habitation site
Kamankottai	Paramakudi	Ramanatha puram	N 09° 28’ 00” E 78° 42’ 42’’	Iron age cum historic habitation site, Porcelain sherds
Gangaikondan	Paramakudi	Ramanatha puram	N 09° 28’ 13” E 78° 43’ 50’’	Iron age cum historic habitation site
Thyagavancheri	Paramakudi	Ramanatha puram	N 09° 28’ 16” E 78° 45’ 83’’	Iron age cum historic habitation site
Manjakulam	Paramakudi	Ramanatha puram	N 09° 28’ 33” E 78° 48’ 14’’	Iron age cum historic habitation site
Kollanur	Paramakudi	Ramanatha puram	N 09° 28’ 38” E 78° 42’ 92’’	Iron age cum historic habitation site
A. Panaiyur	Paramakudi	Ramanatha puram	N 09° 28’ 64” E 78° 47’ 63’’	Iron age cum historic habitation site
Kalayur	Paramakudi	Ramanatha puram	N 09° 28’ 88” E 78° 36’ 65’’	Iron age cum historic habitation site, Sculptures
Tinaikulam	Paramakudi	Ramanatha puram	N 09° 28’ 94” E 78° 37’ 70’’	Iron age cum historic habitation site
Pottisetti	Paramakudi	Ramanatha puram	N 09° 28’ 98” E 78° 39’ 23’’	Iron age cum historic habitation site c. 15th – 16th cent CE image
Kanjanendal	Paramakudi	Ramanatha puram	N 09° 29’ 00” E 78° 33’ 04’’	Iron age cum historic habitation site
Kizhakkulam	Paramakudi	Ramanatha puram	N 09° 29’ 04” E 78° 32’ 29’’	Iron age cum historic habitation site
Kiliyur	Paramakudi	Ramanatha puram	N 09° 29’ 09” E 78° 45’ 75’’	Iron age cum historic habitation site
Venkatankurichi	Paramakudi	Ramanatha puram	N 09° 29’ 21” E 78° 35’ 21’’	Iron age cum historic habitation site
Arasadivandal	Paramakudi	Ramanatha puram	N 09° 29’ 23” E 78° 42’ 74’’	Iron age cum historic habitation site
Pidariyendal	Paramakudi	Ramanatha puram	N 09° 29’ 28” E 78° 32’ 05’’	Iron age cum historic habitation site
Kizhkavanur	Paramakudi	Ramanatha puram	N 09° 29’ 34” E 78° 34’ 17’’	Iron age cum historic habitation site
Landai	Ramanatha puram	Ramanatha puram	N 09° 29’ 40” E 78° 45’ 99’’	Iron age cum historic habitation site, Russet coated ware, Rouletted ware

P.Siragikottai	Paramakudi	Ramanatha puram	N 09° 29’ 68” E 78° 41’ 93’’	Iron age cum historic habitation site, c. 12th – 13th cent CE temple remains
Chittur	Ramanatha puram	Ramanatha puram	N 09° 29’ 80” E 78° 47’ 55’’	c. 12th – 13th cent CE image
Kalliyadiyendal	Paramakudi	Ramanatha puram	N 09° 29’ 84” E 78° 40’ 40’’	Iron age cum historic habitation site
Nenmeni	Paramakudi	Ramanatha puram	N 09° 30’ 13” E 78° 38’ 47’’	Iron age cum historic habitation site
Perumalkovil	Paramakudi	Ramanatha puram	N 09° 30’ 15” E 78° 30’ 90’’	Iron age cum historic habitation site
Ariyanendal	Paramakudi	Ramanatha puram	N 09° 30’ 18” E 78° 37’ 80’’	Iron age cum historic habitation site, c. 12th – 13th cent CE image
Vilattur	Paramakudi	Ramanatha puram	N 09° 30’ 25” E 78° 32’ 17’’	Historic habitation site
Pakaivenri	Paramakudi	Ramanatha puram	N 09° 30’ 45” E 78° 39’ 52’’	Iron age cum historic habitation site
M. Nedunkulam	Paramakudi	Ramanatha puram	N 09° 30’ 62” E 78° 30’ 00’’	Iron age cum historic habitation site
Alagasrimadam	Paramakudi	Ramanatha puram	N 09° 30’ 62” E 78° 43’ 68’’	Iron age cum historic habitation site
S. V. Mangalam	Paramakudi	Ramanatha puram	N 09° 30’ 62” E 78° 43’ 68’’	Iron age cum historic habitation site, c. 12th – 13th cent CE inscription
P. Akkiramesi	Paramakudi	Ramanatha puram	N 09° 30’ 87” E 78° 42’ 78’’	Iron age cum historic habitation site
Vallam	Paramakudi	Ramanatha puram	N 09° 30’ 89” E 78° 40’ 24’’	Iron age cum historic habitation site, c. 13- 14th cent CE inscription
Melaikkudi	Paramakudi	Ramanatha puram	N 09° 31’ 09” E 78° 33’ 23’’	Iron age cum historic habitation site
Urappuli	Paramakudi	Ramanatha puram	N 09° 31’ 10” E 78° 37’ 52’’	Iron age cum historic habitation site
Kallikottai (Muthuvarnapuram)	Paramakudi	Ramanatha puram	N 09° 31’ 14” E 78° 38’ 15’’	c. 12th – 13th cent CE temple, c. 17th – 18th cent CE resting place
Karaimelkudiruppu	Paramakudi	Ramanatha puram	N 09° 31’ 54” E 78° 40’ 55’’	Iron age cum historic habitation site
Urakkudi	Paramakudi	Ramanatha puram	N 09° 31’ 84” E 78° 29’ 31’’	Urn burial site
Tadalatidal (Pallavarayanendal)	Paramakudi	Ramanatha puram	N 09° 31’ 99” E 78° 41’ 34’’	Iron age cum historic habitation site, Porcelain sherds, c. 18th – 19th cent CE inscription
Andakkudi	Paramakudi	Ramanatha puram	N 09° 32’ 10” E 78° 32’ 97’’	Iron age cum historic habitation site
Melliyanendal	Paramakudi	Ramanatha	N 09° 32’ 20”	Iron age cum historic

		puram	E 78° 39’ 77’’	habitation site
Kizayakkudi	Ilayankudi	Ramanatha puram	N 09° 32’ 29” E 78° 38’ 91’’	Iron age cum historic habitation site, c. 18th – 19th cent CE inscription
Valasai	Ilayankudi	Ramanatha puram	N 09° 32’ 46” E 78° 39’ 64’’	Iron age cum historic habitation site, Rouletted, pot sherds
Emaneswaram	Paramakudi	Ramanatha puram	N 09° 32’ 57” E 78° 35’ 58’’	c. 12th – 13th cent CE Siva temple
Pampuvilunthan	Paramakudi	Ramanatha puram	N 09° 32’ 68” E 78° 34’ 62’’	Iron age cum historic habitation site
Perumbacheri	Ilayankudi	Ramanatha puram	N 09° 32’ 70” E 78° 37’ 34’’	c. 12th – 13th cent CE inscriptions, sculptures, Iron age cum historic habitation site
Malayankudirup pu	Paramakudi	Ramanatha puram	N 09° 32’ 73” E 78° 36’ 66’’	Iron age cum historic habitation site
Vengalur	Paramakudi	Ramanatha puram	N 09° 32’ 78” E 78° 29’ 72’’	Iron age cum historic habitation site
Devendranagar (Emaneswaram)	Paramakudi	Ramanatha puram	N 09° 32’ 82” E 78° 36’ 48’’	Iron age cum historic habitation site
Mochiyendal	Ilayankudi	Ramanatha puram	N 09° 33’ 00” E 78° 37’ 31’’	Iron age cum historic habitation site
Elamanur	Ilayankudi	Ramanatha puram	N 09° 33’ 01” E 78° 38’ 34’’	Iron age cum historic habitation site, Ringwell
Vaniyavallam	Paramakudi	Ramanatha puram	N 09° 33’ 04” E 78° 40’ 67’’	Iron age cum historic habitation site
Gandhinagar (Emaneswaram)	Paramakudi	Ramanatha puram	N 09° 33’ 14” E 78° 36’ 48’’	Iron age cum historic habitation site, Porcelain sherd
Piyanendal	Paramakudi	Ramanatha puram	N 09° 33’ 18” E 78° 30’ 23’’	Iron age cum historic habitation site
Arungulam	Paramakudi	Ramanatha puram	N 09° 33’ 21” E 78° 27’ 45’’	Iron age cum historic habitation site, c. 12th – 13th CE Jain sculptures
Sundanendal	Ilayankudi	Ramanatha puram	N 09° 33’ 25” E 78° 37’ 35’’	Iron age cum historic habitation site, Ring well
Poduvakkudi	Paramakudi	Ramanatha puram	N 09° 33’ 49” E 78° 32’ 68’’	Iron age cum historic habitation site
Valakani	Ilayankudi	Ramanatha puram	N 09° 34’ 13” E 78° 39’ 09’’	Iron age cum historic habitation site
Vani	Ilayankudi	Ramanatha puram	N 09° 34’ 34” E 78° 38’ 53’’	Iron age cum historic habitation site
Kizhperungarai	Paramakudi	Ramanatha puram	N 09° 34’ 35” E 78° 30’ 59’’	Iron age cum historic habitation site
Alimadurai	Ilayankudi	Ramanatha puram	N 09° 34’ 41” E 78° 38’ 13’’	Iron age cum historic habitation site
Kottangkulam	Paramakudi	Ramanatha puram	N 09° 34’ 48” E 78° 38’ 28’’	Iron age cum historic habitation site, c. 17th –

				18th CE inscription
Idayar Kudiyiruppu	Paramakudi	Ramanatha puram	N 09° 34' 94" E 78° 27' 98''	Urn burial site, Boundary stone
Nagarakudi	Ilayankudi	Ramanatha puram	N 09° 35' 37" E 78° 37' 47''	Iron age cum historic habitation site
Sudiyur	Paramakudi	Ramanatha puram	N 09° 35' 87" E 78° 28' 69''	Iron age cum historic habitation site, Urn burial, c. 12th – 13th inscriptions, Jain image
Ponnakarai	Paramakudi	Ramanatha puram	N 09° 35' 95" E 78° 26' 85''	Urn burial site
Kizhpartibanur	Paramakudi	Ramanatha puram	N 09° 36' 02" E 78° 27' 94''	Iron age cum historic habitation site, Buddha sculptures
Kallikudi	Paramakudi	Ramanatha puram	N 09° 36' 22" E 78° 26' 29''	Iron age cum historic habitation site, c. 12th – 13th CE sculptures, Celadon ware
Somathur	Paramakudi	Ramanatha puram	N 09° 36' 76" E 78° 25' 66''	Iron age cum historic habitation site
Sirambur	Paramakudi	Ramanatha puram	N 09° 36' 78" E 78° 27' 04''	Iron age cum historic habitation site
Kizhnettur	Ilayankudi	Ramanatha puram	N 09° 37' 10" E 78° 32' 84''	c. 12th – 13th CE temple, Iron age cum historic habitation site
Ganapatiyendal	Ilayankudi	Ramanatha puram	N 09° 37' 41" E 78° 31' 24''	Iron age cum historic habitation site
Melnettur	Ilayankudi	Ramanatha puram	N 09° 37' 58" E 78° 32' 33''	Urn burial site, c. 12th – 13th CE temple, Sculptures
Chinna Kannanur	Paramakudi	Ramanatha puram	N 09° 37' 96" E 78° 24' 39''	Iron age cum historic habitation site, Urn burial
Mangudi	Ilayankudi	Ramanatha puram	N 09° 38' 06" E 78° 33' 41''	Iron age cum historic habitation site
M. Parayankulam	Tiruchuli	Virudunagar	N 09° 45' 52" E 78° 11' 57''	Iron age cum historic habitation site
S. Nangur	Tiruchuli	Virudunagar	N 09° 45' 85" E 78° 12' 68''	c. 9th – 10th CE sculptures

TRIPURA

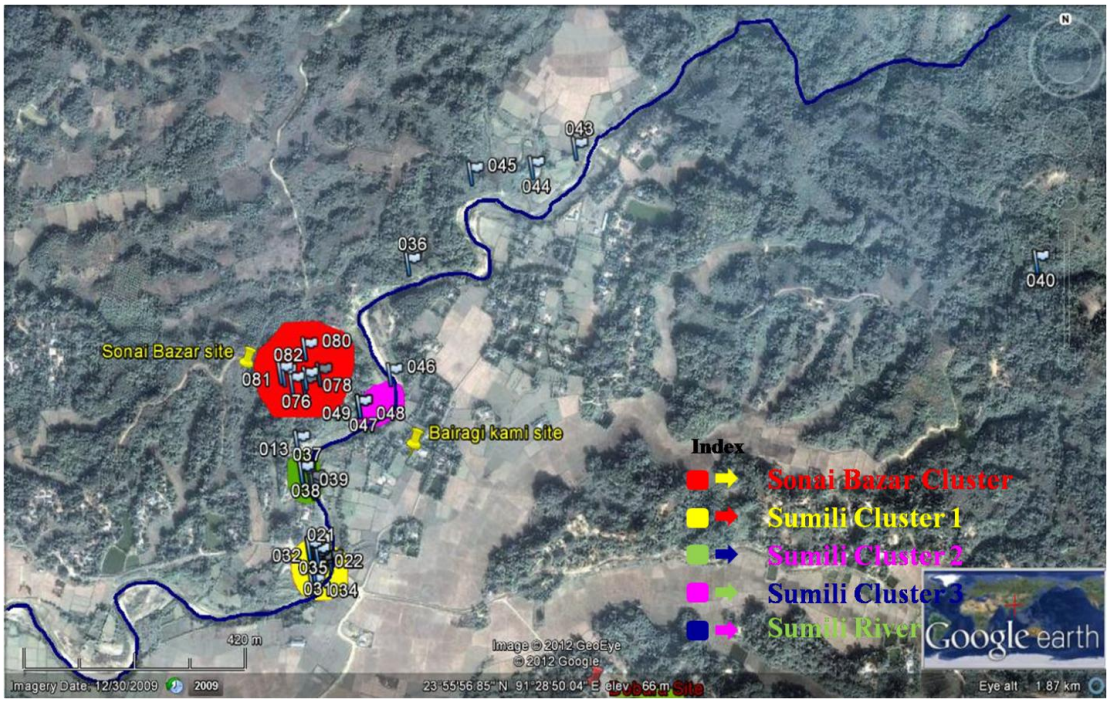
25. EXPLORATION AT SONAI, DISTRICT WEST TRIPURA

The site of Sonai (23º55·923'N; 91º28'537'E) was discovered by Biswajit Deb Barma under the supervision of Supriya Varma of Jawaharlal Nehru University and Parth R. Chauhan of Indian Institute of Science Education and Research, Mohali. The site is located approximately 40km by road from Agartala. The ancient remains the situated within the village periphery towards the north-west of the village *mandi* called Sonai Bazaar (Fig. 24).

The site is partly on the hill top and partly on the plain area. The area on the hill top is covered by trees and shrubs. The site seems to be disturbed at some places due to plantation of rubber trees and also due to the presence of inhabitants in and around. It was learnt that local residents have removed the top soil to clear the area for the construction of houses and road due to which about 2 to 3cm of fossil wood tools deposit has been disturbed in *mandi* area.

Systematic samplings of the area of investigation are generally approached in two ways: non-probabilistic (contextual) sampling and probabilistic (statistical or quantitative) sampling, which includes a variety of random sampling methods. In the systematic survey conducted at Sonai, a strategy was employed in making sampling collection of cluster sampling within which a simple randomized sampling was formulated. Cluster sampling is a procedure by which more than one individual in the population being sampled is taken at each randomized position. A cluster of elements is taken from each unit selected on a random basis. Cluster sampling includes any instance where the sample units are defined in terms of space rather than items. Any sample based on quadrants or test pits is a cluster sample not because of artefacts but the space or areas in which they are found are being selected. Clusters cannot be enumerated, whereas items within clusters can be counted and sampled directly. The spacing between sample units is random, but the spacing between elements within cluster is not random. Cluster sampling is essential in archaeological situations when the frequency distributions between elements are being measured over space.

Fig. 24



Sonai: Location map.

The more acceptable sampling approaches for probabilistic surveys under ideal conditions where 100 percent coverage is not feasible are based on random sampling and include simple random, systematic random, systematic unaligned, and stratified random sampling methods. The technique employed at Sonai can be described as a simple random sampling method. In order to use this technique the sampled population or data universe must be totally accessible. With this given assumption, the segment of the data universe (that is, *n* units out of *N* units are chosen; the ratio of *n*/*N* is the sampling ratio) is selected at random using a method that randomizes the selection procedure. The amount sampled is determined on the basis of how many observations one wishes to make and the size of the number of possible observations in the data universe. The purpose of randomizing the selection is to ensure that each sample unit has an equal chance of being selected.

The samples that were collected at Sonai consist of mostly tools made of fossil wood or in other words petrified wood. The remaining are tools made of quartzite stone. Most of the fossil wood tools can be slotted into categories such as celts, unfinished celts, knives, borers, chopping tools, adze, discoids, points, flake blades, polished celt, celt with notch meant for hafting, celt with protruded mid-rib meant for hafting, scrapers, burin, etc. The quartzite tools consisted of a heavy duty chopping tool weighing around 1,922 grams, hammerstones, choppers, and chopping tools (Pl. 72). Some river pebbles were also collected as samples from the site because there is a possibility that they were used for retouch purposes on some of the friable fossil wood tools. The methods employed to knap the fossil wood tools are either usually the Acheulian Bifacial technique or in some cases the Levallois technique.

Based on the systematic survey at Sonai, it would be appropriate to summarize that the tools were specifically knapped by the prehistoric humans in accordance with the landscape they inhabited. There is also evidence at the site of fossil wood boulders which were possibly used for knapping tools (Pl. 73). Most of the tools are made out of flakes, which appears close to flake-blades and are end struck. Most of the retouching is unifacial but some celt-like tools have also been bifacially retouched.

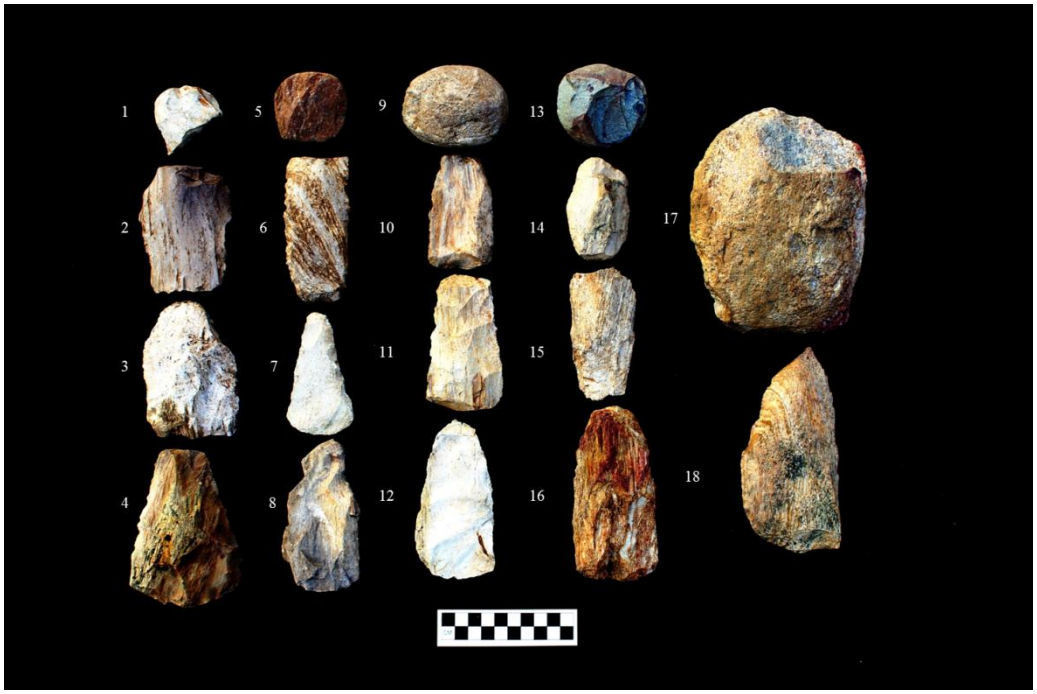
UTTAR PRADESH

26. EXPLORATION AT AHAR, DISTRICT BULANDSHAHR

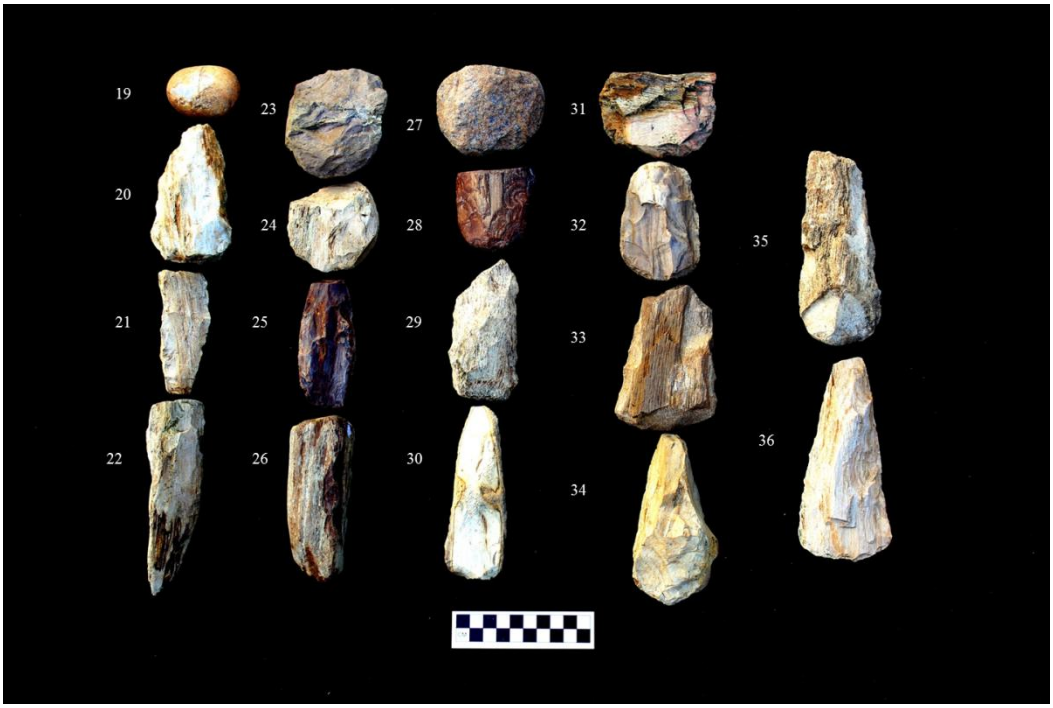
Exploration was conducted at Ahar (28^0 28’ 18.5” N; 78^0 14’ 64.3” E) by Aadil Zubair of Aligarh Muslim University, Deepak K. Nair, Biswajit Deb Barma, Ranjit Kumar, Mahmood Kooria and Ravi Kumar Perumalla of Jawaharlal University under the direction of Jaya Menon of Aligarh Muslim University. The survey team also includes research students from Aligarh Muslim University (AMU) and Jawaharlal Nehru University (JNU).

Ahar, a small town or a large village, is located about 17km north of Anupshahr and about 45km east of Bulandshahr, Uttar Pradesh. The present day habitation is perched on the top of a large

Plate 72



a



b

Sonai: a-b; Quartzite tools.

Plate 73

Sonai: Fossil wood boulders or chunks used as raw material for knapping.

mound and along its fringes on the right bank of the Ganges River. Ahar is a place of considerable historical and archaeological importance and the most impressive aspect of the site is its dynamic landscape and the material culture spread across it. The site stands unequalled in size and is one of the largest and structurally or topographically composite mounded archaeological sites in the area. The main mound of Ahar measures c. 740m (NS) x 825m (EW), about 10 – 12m high, and is almost completely inhabited except for certain portions, which are used either for agricultural purposes or as dumping places for trash or garbage as well as for drying and stacking cow-dung cakes.

To the south-west of the village or main mound lie a group of shallow mounds marked by an average relief of 3-4m above the surrounding plain and are generally covered by thick vegetation and grasses. Some of these mounds show structural activity with pottery and other archaeological material scattered on their surfaces while some appear to be natural formations devoid of any cultural material. Some of these smaller mounds are used by the locals as graveyards and for other ritualistic purposes. A shallow oval-shaped mound measuring 45m (NS) x 38m (EW) with a very low relief of 2m above the surrounding area lies to the south of the village along the road that connects Ahar with Anupshahr. This mound was excavated by M.S. Vats during the 1920s. Close to this mound is a large dried up water body, locally known as Rukmini Kund or Rukmini Taal. The area between these smaller mounds is divided into arable patches or parcels of land, which are subjected to intensive agricultural activities throughout the year.

Just outside of the village in the south-east direction is the famous Hanumangarhi Temple, situated at the top of a small circular mound. Around the temple, a large scatter of potsherds and brickbats can be seen lying around. There are two other famous temples at Ahar, that of Sid Baba and Avantika Devi, which are located quite far from the village in the floodplain area of the Ganges. The preliminary survey at Ahar, it was felt that the surface archaeology of the site, if studied in a detailed and systematic manner, could yield new and substantial information about the settlement as well as about the human utilization of the landscape in the past. A programme of systematic intensive surface survey was designed in order to generate a new dataset to answer several questions and overarching queries regarding the site and its environs. Some of the major objectives of the survey project were; to identify and understand the spatial patterning, density and distribution of surface material (ceramics and other artefacts or features) across the landscape as well as to gain an idea about various transformative processes that correspond to the patterning visible in the archaeological record and also to determine or assess the spatial extant of the site on the basis of the distribution of ceramic and artefacts scatter; to study and understand the relationship between the main settlement and the smaller mounds surrounding it; to establish and figure out how the site of Ahar relates to the larger landscape and the logic behind its

location along the bank of the Ganges, (iv) to ascertain the occupational or chronological sequence of the settlement of Ahar as well as the evolution of the site over time; and to measure the impact of current land use upon the site and problems posed by it for studying the surface archaeology at the site.

Sampling Strategies and Survey Methodology: Several important steps were taken into consideration prior to the fieldwork for the execution of the survey project. The first was to define the boundaries within which the survey would be conducted, which was done with the help of satellite imagery acquired from Google Earth and the Survey of India topo-sheets. The satellite imagery proved quite useful to get an idea about the polymorphous landscape and the general layout of the site, however, the toposheets were of very minimal use as they did not provide the required resolution. An area of 1.4km^2 encompassing the main settlement of Ahar and its immediate hinterland was selected for the survey.

Once the base map of the area to be surveyed was prepared, the area was measured on the ground either using tapes or by pacing. An arbitrary grid square was blocked out and all the four cardinal points were recorded and marked out using a handheld GPS unit. The resultant area was divided into four equal sized quadrats measuring 700 (NS) x 700m (EW), which were labeled as A, B, C, and D. Keeping in mind the logistical and financial constraints, certain important decisions were made regarding the survey coverage and intensity. As the aim was to generate new datasets and to get a vivid picture of the patterning and distribution of archaeological remains across the landscape, a slightly refined sampling strategy was formulated to produce a representative sample of the whole. Practically, it was not possible to cover the entire area or all the four quadrats at the same intensity. Therefore it was decided to survey one quadrat using systematic intensive sampling methods and the rest of the three quadrats using random sampling strategy.

Quadrat A was decided to be subjected to an intensive surface survey and collection on the premise that the quadrat covers all the smaller mounds in the vicinity of the main mound of Ahar as well as a substantial part of the main mound itself. The 700m^2 quadrat was gridded into 10 x 10m sampling units or grid squares and it was decided to cover fifty percent of the resultant sampling units in Quadrat A. The three other Quadrats B, C, and D were surveyed using a systematic random sampling technique. In each of these three quadrats a transect measuring 700 (NS) x 6m (EW) was randomly selected and was divided into 20 x 6m sampling blocks or units, which in turn facilitated the collection and recording process.

The survey started by covering Quadrat A at first for which the sampling units were first plotted on a graph sheet and were numbered sequentially. The survey units were then physically set up or established on the ground with the help of tapes, compasses and pin flags as boundary markers. A systematic sampling technique

was followed according to which every alternate unit or square in a row and a column was surveyed intensively, leaving the intervening unit unsurveyed. This selection strategy resulted in formation of a chess-board like pattern. The rest of the three Quadrats B, C, and D were surveyed using the sampling strategy discussed above, however, in the case of these quadrats, all the contiguous sampling units were intensively surveyed without leaving any gaps in between. Apart from surveying the stipulated number of sampling units in each of the three quadrats, the remaining area was explored, but in an unsystematic or random manner.

The sampling units in all the four quadrats were systematically surveyed and the details of each sampling unit surveyed were recorded in field notebooks. GPS readings were taken for each unit at an interval of 50m (NS) and also for all the ceramic scatters or other archaeological or architectural remains found. Architectural features or remains were documented in a detailed manner and were drawn or photographed. In order to reduce post-fieldwork analysis and processing, a systematic collection strategy was employed. Surface collections were made from every sampling unit, wherever found. The most ubiquitous of the artefacts encountered within the survey area was ceramics (pottery) and brickbats. Fragments of stone sculpture and some terracotta artefacts were also found during the survey. During the survey, ceramics, artefacts and small sculptural pieces were collected, while brickbats and large architectural remnants were not collected, but documented. The material collected was labeled and bagged accordingly and carried back for further analysis and documentation.

Section Scrapings: Some of the already exposed sections/profiles of the mound were surface scraped in order to understand the stratigraphy and occupational history of the site. Three sections/ profiles were selected in three different areas of the site at varying altitude and were labelled as Section I, II, and III. The three sections were taken up for the study in sequential manner and were documented, photographed and drawn to scale. The materials from the sections (ceramics and artefacts) were collected for further analysis. The following sections briefly discuss the three sections and the resultant information.

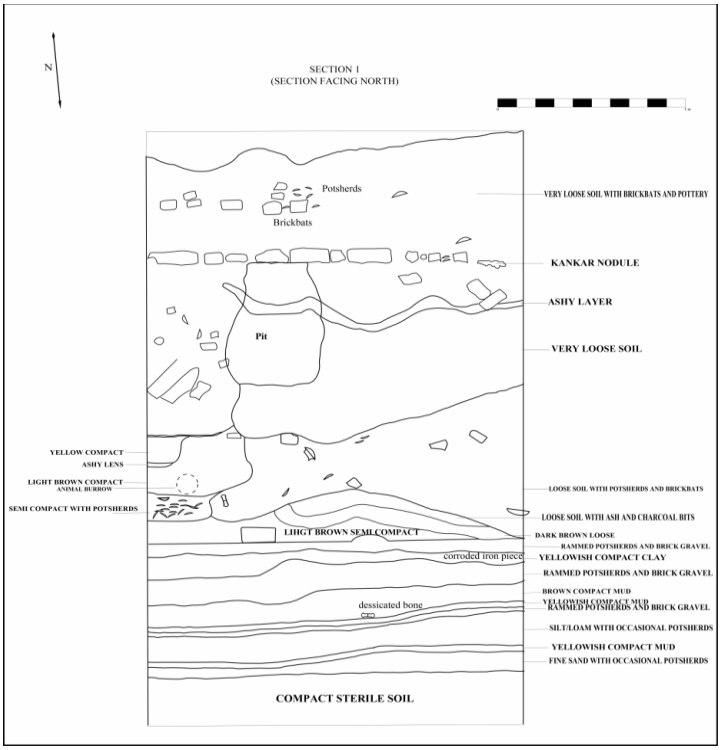
Section I: Section I is located on the right side of the brick-paved road leading to the Ganges River. The profile of the main mound with a gentle slope facing the floodplain area offered an ideal condition for scraping with archaeological material (brickbats and pottery) jutting out from it. A small strip measuring 3.30m x 2 m was selected and cleared of vegetation and overlying debris or run-off material. The upper portions of the section were difficult to scrape as it was fragile. Several strata or layers were exposed containing potsherds, artefacts and other architectural debris. A large number of brickbats and worn-out bricks along with ash were found in the upper strata (probably a collapsed structure), but it was not possible to determine the size of the bricks as not a single intact or complete brick was recovered. Apart from that, several layers comprising of rammed

potsherds and brick gravel separated by yellow compact mud or clay (possibly floor levels) were also exposed. Two desiccated bones and a corroded or rusted iron object was retrieved from one of these layers. The lower strata are composed of silt/ loam and fine sand containing stray potsherds and are followed by sterile compact soil, which possibly continues or goes down to the bottom of the mound. The original height or elevation of the mound in this area is about 13 to 14 m above the surrounding floodplain, but the stratigraphy revealed by scraping the section indicates that the cultural occupation or sequence starts from around 9 m from below onwards. The material recovered from the section includes ceramics, a terracotta marble, and 4 pieces of glass bangle (Fig. 25).

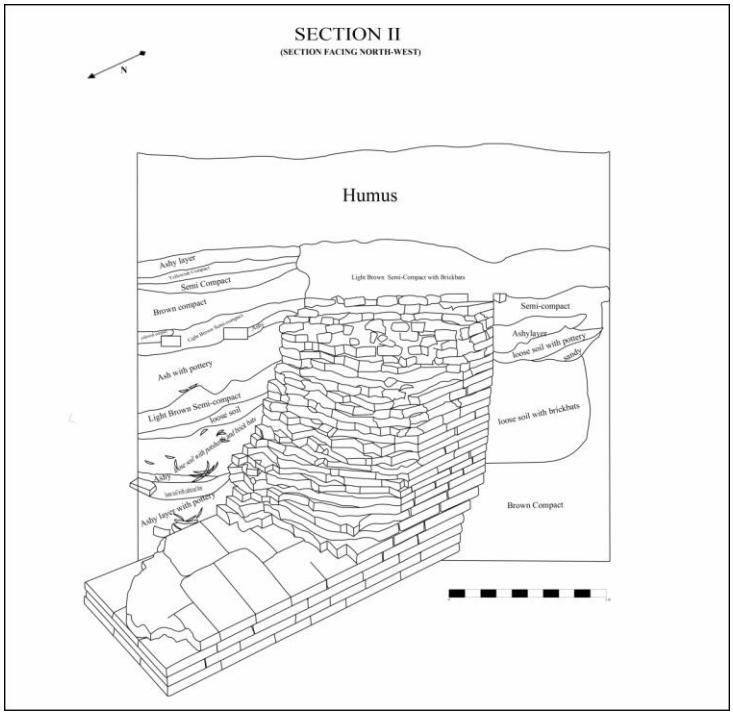
Section II: Section II lies to the north-west of the village on the right side of the Ahar-Aurangabad Taharpur road amid the agricultural fields. The area appears to be a part of the main mound, but has been flattened for agricultural activities. While going around the mound, a burnt-brick structure (wall), along with some pottery, was located at this place. The pottery had come up to the surface due to agricultural activities and a small drainage or irrigation channel flowing nearby. In order to get a better idea about the structure and other archaeological material lying around, a small swath measuring about 2.80 x 3m was selected for surface scraping. After removing the overlying vegetation and debris, layers containing pottery and other archaeological material were exposed. The most interesting find in this section was the brick structure showing two phases of constructional activity as is evident from the size of the bricks used. A total of 29 courses of bricks of varying dimensions were found with the upper 25 courses of bricks with dimensions 24/ 25 x 22/ 23 x 5/6cm and the lower 4 courses of the bricks measuring 38/39 x 25/26 x 6/6cm. There may be possibly more layers below the surface, which can be exposed only by excavating the area. Apart from the brick structure, the section revealed several strata bearing evidence or signs of cultural activity. The material recovered from the section consists mainly of pottery and a broken terracotta wheel was also found. The pottery mainly came from the lower layers (possibly a dump) and was mixed with ash. Most significantly, bricks measuring 38/39 x 25/ 26 x 5/6cm forming the lower four courses of the structure were not found in any other part of Ahar (Fig. 26).

Section III: Section III is located on the left side of the main road bisecting the main mound near Harijan Mohalla. This part of the mound is highly disturbed as people living there have dug-out the mound for clay and other building materials. These kinds of anthropogenic activities had exposed a substantial portion of the mound in which archaeological and architectural remains are clearly visible along with pottery scatters. The area is used as a dumping ground by the people as well as for open defecation. Just like the two other sections, a narrow strip measuring 3.50 x 3m was cleared. Removal of the vegetation and overlying detritus delineated several strata. A wall measuring 2.42m long and 55cm high with 11 courses of bricks, with dimensions of 33/34 x 24/25 x 5/6cm was

FigS. 25-26



Ahar: Stratigraphy of Section I.



Ahar: Stratigraphy of Section II.

exposed. Bricks with almost similar dimensions are found in different parts of the mound and also in one of the smaller mounds.

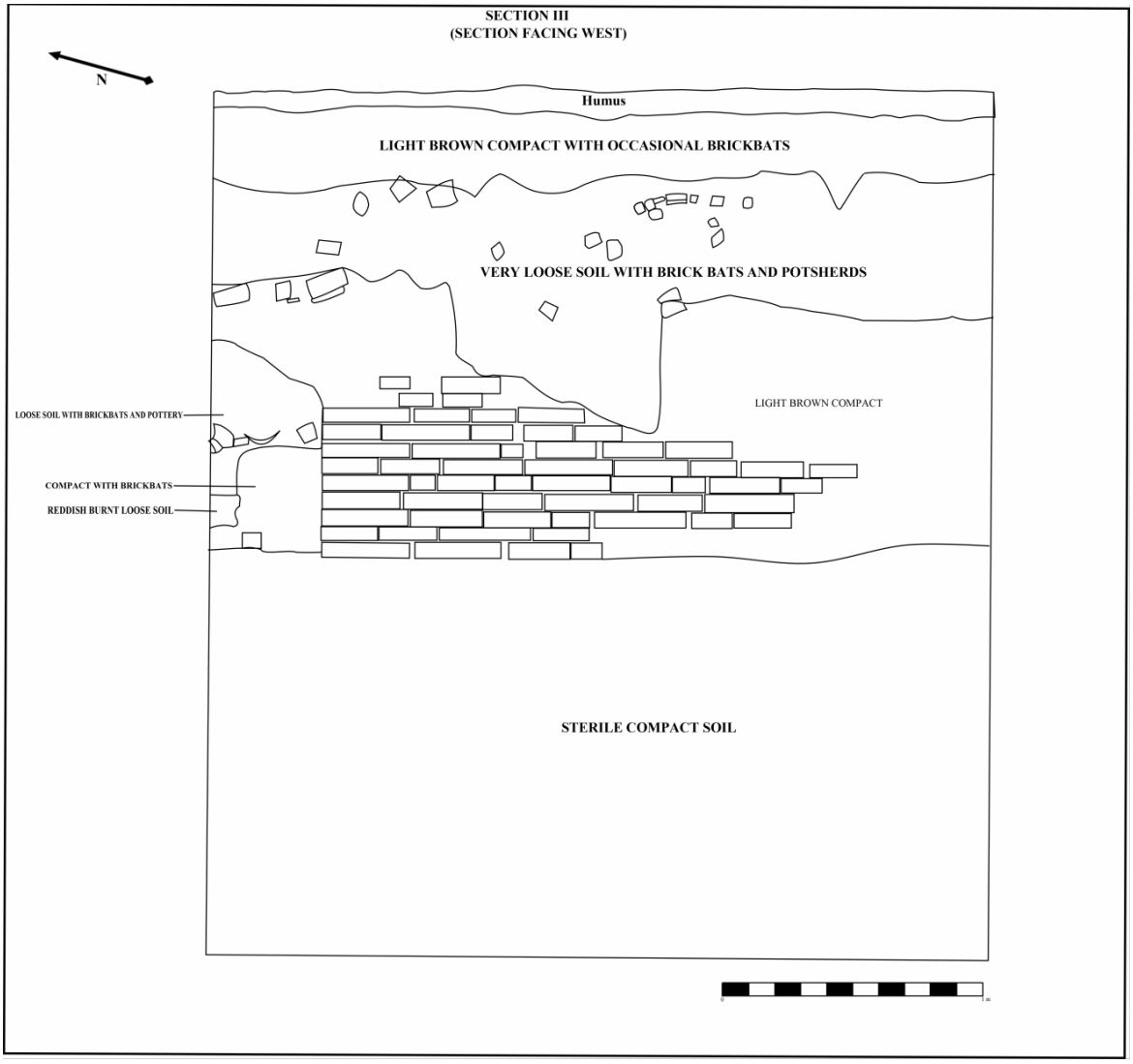
In one of the exposed sections of the main mound, bricks measuring 33/34 x 22/ 23 x 5.5cm were found and the bricks found on one of the smaller mounds on the right side of the main mound measure 38 x 23.5 x 6 cm and 33.5 x 22 x 5/6 cm. The material recovered from the section includes pottery and a broken terracotta animal figurine.

The systematic surface survey in and around the village of Ahar resulted for the first time in an intensive documentation of the cultural remains scattered across the area. The material recovered or collected during the survey can be broadly classified into ceramics (pottery), broken terracotta figurines, a dabber, a terracotta marble and fragments of stone sculpture along with a few pieces of glass bangles (Fig. 27).

The Ceramic Assemblage: Ceramics or pottery collected during the survey was systematically analyzed and studied. The whole ceramic assemblage was at first sorted out by separating diagnostics (rims, bases, lids, spouts, and so on), non-diagnostic (body sherds) and decorated sherds. The sherds were then grouped into different types and sub-types on the basis of certain physical attributes that are observable such as fabric, surface treatment, firing state (condition of the core), surface finish and colour as well as for the identification of tempers and other inclusions. Sherds were also counted and weighed and details for every individual sherd were documented. In the case of diagnostic sherds, certain additional attributes of vessel form and shape were recorded and also metric attributes like orifice diameters and base diameters of the sherds were also determined. Subsequently, decorated sherds were also classified using the above mentioned parameters and the designs were drawn and photographed. The documentation process was also facilitated by illustrations and photographs of the pottery.

General Characteristics of Ceramics: The picture that emerges from the analysis and classification of the ceramics collected during the surface survey at Ahar is that the ceramic assemblage can be divided into two broad groups i.e. "oxidised and reduced". The oxidised or Red Ware category dominates the assemblage followed by a small percentage of reduced sherds generally comprises of Grey Ware of medium fabric. The pottery is largely wheel- made and various types of marks on the surface of the sherds indicates that both fast-wheel and slow-wheel were in use. A small percentage of handmade vessels are also found in the assemblage. Sherds (both oxidised and reduced) exhibit different marks or traces such as presence of paddle and anvil marks, striations or rills, lutting marks, finger impressions, streaks or scraping marks and so forth, indicating the multitude of techniques involved or employed in the production of the vessels. Pottery (oxidised and reduced) comprises of unslipped, slipped and burnished/ polished sherds, which can be placed under coarse, medium and fine categories.

Fig. 27



Ahar: Stratigraphy of Section III.

The pottery is usually well-fired with a completely oxidised or reduced core, however, not all the sherds show uniform or perfect firing as a large number of sherds exhibit defects or inadequacies in firing technique. A few misfired or warped sherds were also found. Soot marks and fire-clouding was seen on a large number of sherds, generally on oxidised sherds, which might be the result of either deficiencies in firing techniques or the use of vessels for cooking activities. The visible inclusions or naturally present organic/ inorganic particles such as mica and sand is present in majority of the oxidised sherds. Apart from that husk/ chaff imprints were noticed on the surface of some of thick, handmade or sherds with coarser fabric. The presence of all these inclusions indicates either flaws in the clay refining techniques or deliberate additions by the potter as tempering material. Inclusions are mostly present in oxidised sherds, with a very small percentage sherds within reduced category showing such traits.

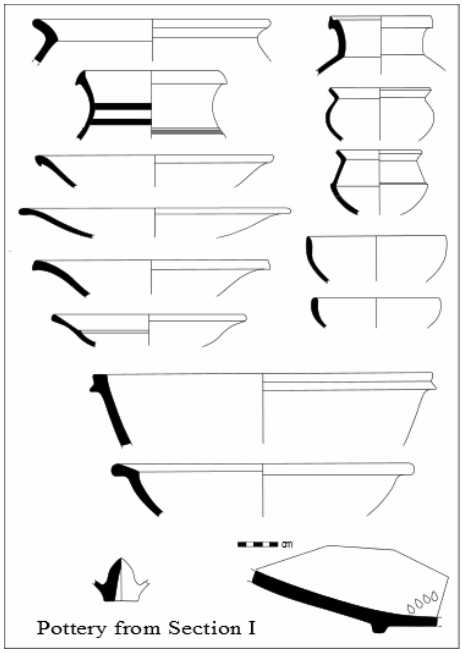
A large number of oxidised sherds (both diagnostics and non-diagnostics) exhibit varied decorative patterns or designs. The decorations are usually present on the external surface of the vessels, whereas, on inner surface, it occurs in limited quantities. Decorations mainly include black painted bands and streaks, incised, applique, chequered- impressed, grooves, mica bands and mica dusting, moulded and so forth. In case of reduced sherds, only incised and applique designs are present. A large number of sherds with scratches/ cuts are also present in the assemblage, but these probably is a result of various cultural and natural transformations to which sherds are subjected and cannot be reckoned as a decorative element. A very small percentage of glazed sherds fall within the oxidised category and are of medium and coarse fabric. Most of the sherds are glazed on inner surface with a few sherds glazed on external surface. The quality of the glaze is not good and most of the sherds bear a crackled, non-shiny or matt surface glaze. However, some specimens have a very shiny and lustrous glaze along with floral and geometric designs in white and turquoise blue paint. The glaze is generally opaque except for a few sherds which contain a thin veneer of glaze and on some of the sherds, the glaze shows signs of peeling, crazing and spalling.

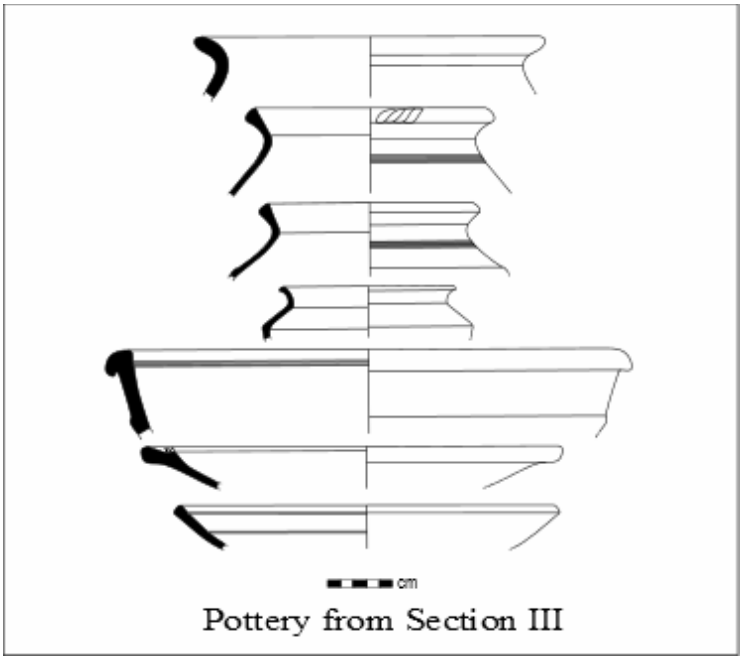
The main diagnostic shapes (both oxidised and reduced) from the site include pots, jars/ vases, bowls, dishes, basins, lids, spouts and base sherds having varied attributes and features. Following are some of the specimen drawings/ illustrations of the diagnostic shapes collected during the survey from the four quadrats and the section scrapings (Figs. 28-34).

Apart from ceramics (pottery), two broken terracotta figurines, a broken terracotta wheel, a terracotta marble, a broken dabber, and a few pieces of glass bangles were collected during the survey. Apart from that a few fragments of stone sculpture were also recovered from the survey area. No other artefact or material was found or collected during the survey.

Chronology: In order to make a chronological assessment of the site on the basis of the surface material collected and

Figs. 28-30


Pottery from Section I


Pottery from Section III

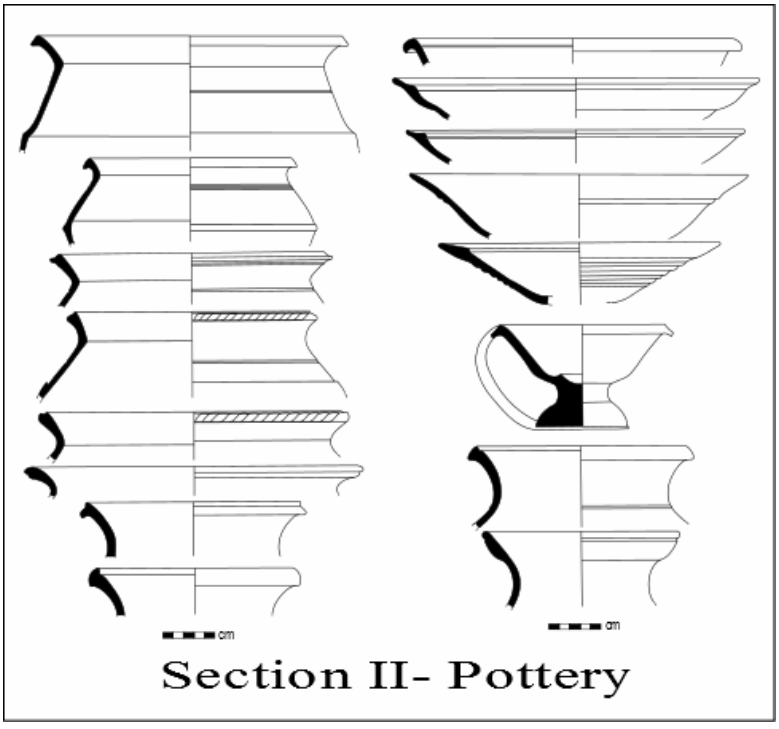
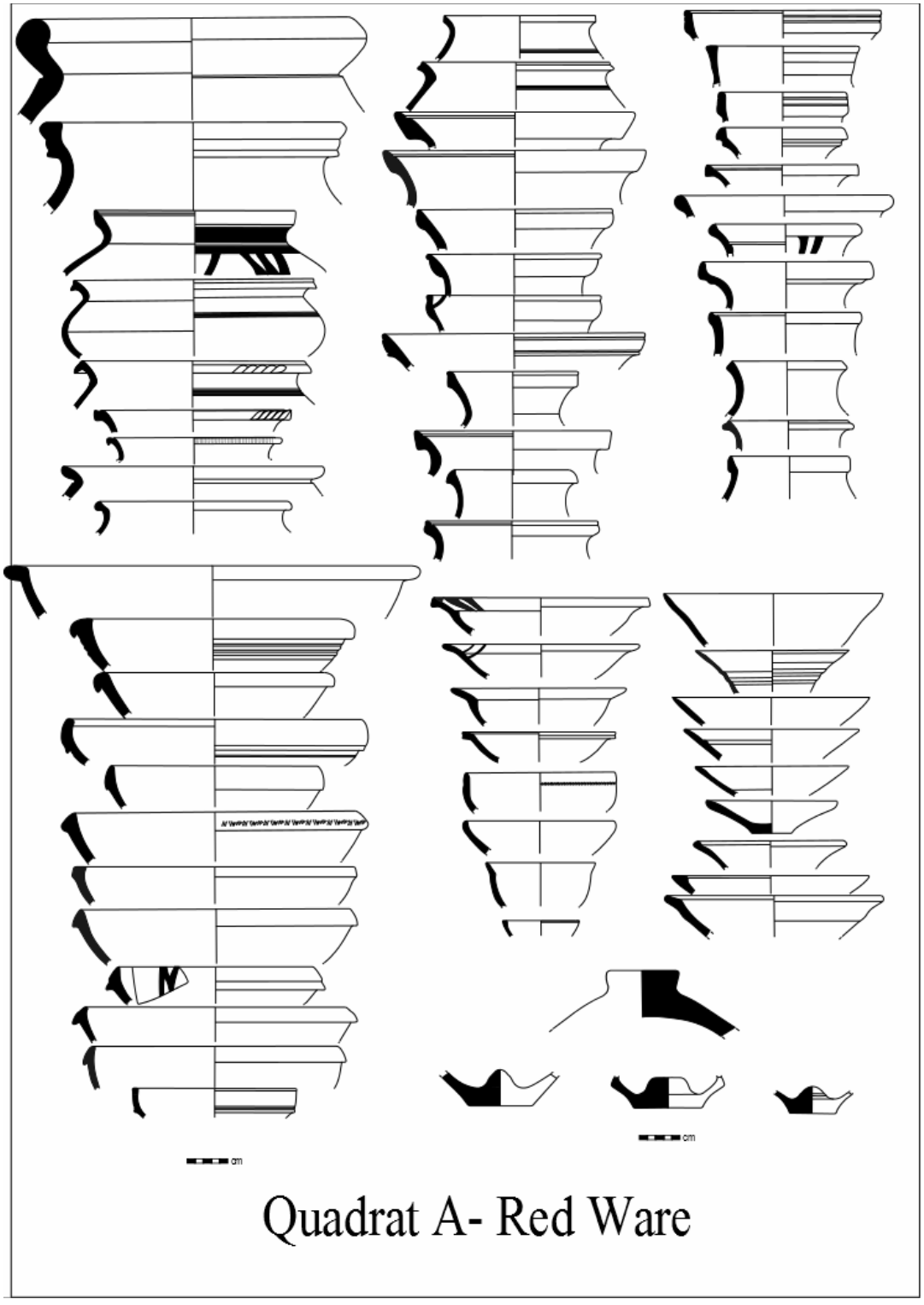
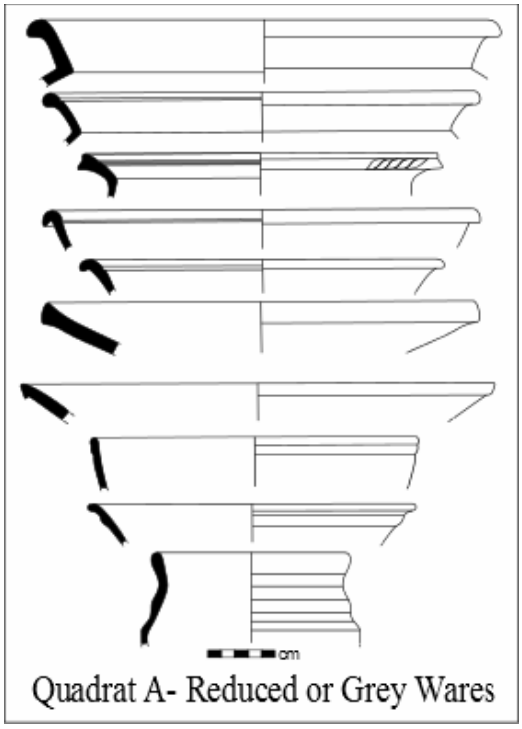
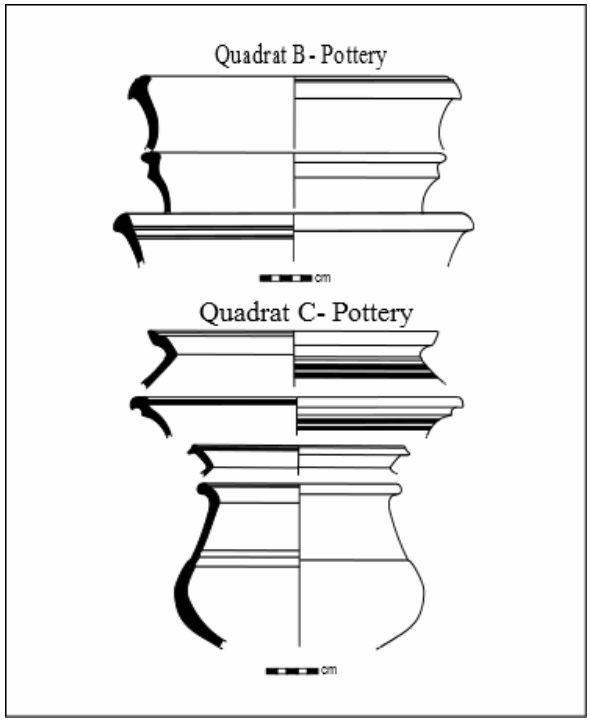

Section II- Pottery

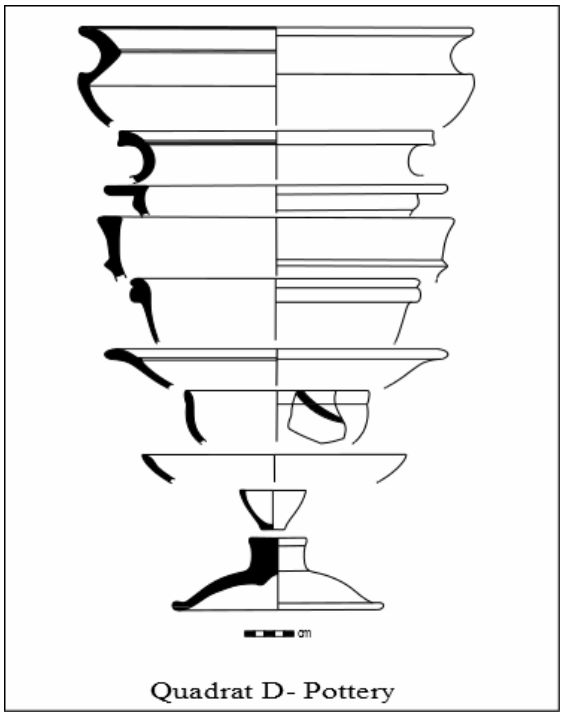
Fig. 31



Figs. 32-34


cm
Quadrat A- Reduced or Grey Wares


Quadrat B - Pottery
cm
Quadrat C- Pottery
cm


cm
Quadrat D- Pottery

recorded by this survey project, the ceramics were systematically analyzed and were compared with the ceramics from several excavated sites in the region such as Ahichhatara, Hastinapura, Sonkh, and Purana Qila. From the analysis of the pottery and comparative study with ceramics from other well-known sites, it appears that the pottery from Ahar can be assigned to Gupta, Post-Gupta, Early Medieval and Medieval levels. Typical or characteristic pottery shapes akin to Sunga-Kushana period such as incurved bowls, sprinklers, inkpot lids, or pottery bearing stamped designs were not found during the survey. Pottery belonging to Post-Gupta, Early Medieval and Medieval period is well represented in the assemblage with a few examples of pottery from Gupta period levels. The inferences that can be drawn on the basis of ceramics collected during the survey project suggest that the occupational sequence at Ahar starts from Gupta or Post-Gupta period onwards and continues up to the late Medieval levels.

However, various sizes of bricks found at Ahar create a slight confusion in understanding the actual occupational sequence at the site. During the survey remains of several architectural features with varied brick dimensions were found in different parts of Ahar. For example, in Section II, two types of bricks were noted with dimensions 24/25 x 22/23 x 5/6cm and 38/39 x 25/26 x 5/6cm. In Section III, a wall made of bricks measuring 33 x 24 x 5.5/6cm was found. Bricks measuring 33 x 22.5 x 5.5cm were found in an exposed section at the main mound of Ahar and in a modern structure a single re-used brick measuring 37 x 24 x 5cm was also found. Similarly, two bricks measuring 38 x 23.5 x 6cm and 33/34 x 21/22 x 5.5cm were also found in one of the smaller mounds at the outskirts of the village.

This variation in the size of the bricks at Ahar makes it difficult to establish the chronological sequence at the site. Most of these brick sizes are very similar to brick sizes found from the Kushana levels at various excavated sites in north India, but on the other hand the ceramics collected from the site during the survey shows completely absence of the Kushana period pottery shapes and designs. The only conclusion one can draw from this enigmatic situation is that there might have been either a very flimsy Kushana period occupation and the bricks from the structures have been re-used during the subsequent periods or the pottery from the Kushana levels is absent from the surface data. If the latter, it indicates the limitations of surface surveys and hence the necessity of sub-surface investigations.

27. EXCAVATION AT AHICHHATRA, DISTRICT BAREILLEY

The Bhubaneswar Circle of the Survey under the direction of Bhuvan Vikrama assisted by Sushri Mishra Vikrama, N.K. Swain and D.N. Bhoi, Rakesh Kumar, has taken up excavation at Ahichhatra (Ancient site, Qila Ramnagar), District Bareilley with an objective to understand the PGW culture in general and its settlement pattern in particular. The excavation has been taken up at eastern mound located in the eastern most corner of the site along the fortification wall and central mound. Two trenches viz. have been excavated in the

eastern mound and five trenches in the central mound.

The excavation has revealed the mud structures like walls, ghost walls, rammed floors, and post holes etc. belonging to PGW Period. In trench no. B x 89 x 91 a circular mud wall with a thickness of 20 to 25cm was exposed. Since the structures are made of mud lumps and highly disturbed, it was difficult to identify their shape and the nature. Ashy patches and burning impressions at places were also seen. Besides, the excavation has yielded a series of terracotta ring wells and circular wells without outlines. Vertical sand channels are noticed in the trenches on the entire mound.

The pottery repository of the site comprises PGW, few sherds of NBPW, Black slipped ware, Red ware, Gray Ware etc. Dish and bowls are the predominant shapes in the PGW. The preliminary study of the pottery indicates that the PGW has paintings in black which comprises dots, dashes, circles, wavy lines, loops etc.

Among the notable antiquities reported from the excavation, mention may be made of variety of beads of terracotta, semi precious stone and copper, bone points, antimony rods, tools of iron and copper, variety of animal and human terracotta figurines discs, ball, hopscotch, wheels of toy cart, amulet, bangle pieces, etc. The shape of the terracotta beads includes arecanut, ghata shape etc. The copper coins have been recovered from pits and dumps. Besides, the trenches have also yielded charred grains and charcoals.

From the excavation so far a tentative sequence of cultural periods can be proposed is from top to bottom, Mitra Panchal, PGW and formative PGW.

Neither OCP nor the Gupta artefacts were encountered during current excavation the present periodisation matches well with the one already proposed in previous years excavation.

28. EXCAVATIONS AT DWARKAPUR, DISTRICT SANT RAVIDAS NAGAR

The Centre of Advanced Study, Department of Ancient Indian History, Culture and Archaeology, Banaras Hindu University, conducted a limited excavation at Dwarkapur under the direction of Ashok Kumar Singh assisted by Shiv Kumar, Barun Kumar Sinha, Ravi Shankar & Harsh Ranjan Kumar.

The main objective of the excavation was to obtain a complete culture-sequence of the site and to work out the relationship, if any, with Agiabir and also with a view to impart field training to the students of archaeology.

The ancient site of Dwarkapur ($25^0$38'22"N; $82^0$14'0"E) is located on the left bank of the river Ganga. The site is easily accessible by road as well as train. The nearest railway station is Katka on Varanasi-Allahabad section of northern railway, which is located 1·5km. north-west direction. Katka is situated 38km west of Varanasi on the Varanasi-Allahabad GT road. Agiabir, a Chalcolithic settlement, is situated nearby in Mirzapur district. The ancient mound of Dwarkapur covers an area of 300m from east-west and 500m from

north-south and rises to a height of 3m from the present ground. A major portion of the mound was eroded by the river Ganga. The western portion of the mound was occupied by the present Dwarkapur village. Major portion of this site is levelled to make the land available for agriculture.

A total nine trenches measuring 3 x 3m size were excavated on the eastern and southern portion of the mound (Pl. 74a). The trenches of the southern side were found to be disturbed as compared to eastern side. Of these, the section looking south clearly shows that there is an evidence of large scale disturbances shown by several pits cut upto natural soil. The section looking east and north appears to be least disturbed. The excavations revealed following culture-sequence:

Period I : Chalcolithic Culture

Period II : Pre - NBPW with Iron

Period III : NBPW Culture

Period I: The deposit of earliest habitation was represented by about 45cm. These deposits were recovered in the layer (3) and (4) of trenches 3, 5and 8 which have light, yellowish and ashy in character. These layers have yielded ceramics of Black-and red ware, black slipped ware, red slipped ware and red ware. The potteries are generally wheel-made and range from fine to coarse variety. The principal types of these wares are bowls, basins, vases, storage jars, footed bowls and perforated legged vessels. Ceramic industries and pottery types associated with this phase are comparable well with Waina, Bhunadih, Lahuradeva, Narhan, Khairadih, Agiabir, Jhusi, Tokwa and Raja-Nala Ka Tila, Malhar, etc. in Uttar Pradesh andChechar-Kutbpur, Senuwar and Chirand in Bihar.

Besides the ceramic assemblage, the small finds of this period include 13 net sinkers, 10 terracotta beads, 02 beads of agate (unfinished), 04 bone points and arrow heads and 27 pottery discs.

The first settlers at this site used to live in huts made of wattle-and-daub as it suggested by the discovery of burnt clay lumps with reed and bamboo impressions and a few post holes. The excavation revealed one regular floor level. This floor is made of rammed earth, burnt clay and potsherds (Pl. 74b). The inhabitants are subsisted on agriculture, hunting and fishing. Aechaeo-botanical samples have been collected and their study is under process. A large number of animal bones were collected from various strata. These have been carefully labelled and a detailed study of these osteological remains will supplement the data not only on the fauna of the period but also on the economy.

Period II (Pre-NBPW with Iron): The cultural deposit of this period is about 50cm. This period is marked by the presence of black slipped ware and red ware but there was total absence of Black-and red ware. Main types in the black slipped ware are knife-edged bowls, dishes and flat pedestal bowls. In red ware dishes with incurved rim, knife edged bowls, vessel with tumbler-shaped base and vases with different types were recovered.

Plate 74

a

b

Dwarkapur: a; General View of the excavated trenches and b; Rammed floor made of burnt clay and potsherds of Period I.

The small finds comprise of 02 beads of semi-precious stones and 14 terracotta beads, 19 iron and copper objects, 06 bone points and arrowheads, 37 pottery and 17 terracotta discs. Mention may be made of 07 net sinkers of terracotta alongwith 16 iron nails recovered from the trench no. 3 of southern portion of the mound. It shows that the inhabitants of this period belong to fisherman community. The inhabitants of this period continued to live in wattle-and-daub houses. Traces of burnt floors, reed marks and ovens have been recorded. An almost circular oven of 20cm. diameter was noticed in this period which was full of ash and charred bones. They subsisted mainly on agriculture and animal domestication. However, hunting of wild animals and fishing were also practised to a certain extent. Deposits of this period yielded large number of animal bones bearing cut marks and occasionally charred bones indicating that meat was an important component of their diet. Remains of charred bones were collected by flotation technique.

Period III (NBPW): This period is marked by an occupational deposit of 50-60cm only. Current excavation revealed only the early phase of NBP while its late phase is conspicuous by its absence. It is suggested that due to menace of the river, the inhabitants of early phase of NBP period migrated to the nearby site at Agiabir and they settled there for a longer period. The pottery complex remains more or less the same and retains the same feature as noted in the preceding period II. The only exception being the introduction of distinctive NBPW. The ceramic assemblage comprises of NBPW, Black Slipped Ware, Grey Ware and RED WARE. Among the characteristic types mention may be made of corrugated flanged bowls, bowl with sharpened rim, nail-headed rim, dishes with vertical featureless rim, incurved featureless rim, lipped basins, carinated *handi*, pear-shaped vases and variety of vases. Here, special mention may be made of the occurrence of a few highly lustrous sherds of NBP in silvery, steel blue and black shades. As compared to Agiabir, the frequency of NBPW is much less at this site. In the black slipped ware, besides the continuation of earlier shapes, certain new shapes emerged and dish formed an important type of this ware. Another important find of this period was a complete globular vessel (probably ritual *Kalash*) of NBPW with engraved symbols of *Nandipad*, leaf and *dhwaja* like motif (Pl. 75a). Besides, a completely new shape recovered at Dwarkapur from period III is 38·5cm long jar of red ware with short closing mouth, expanding neck and tumbler-shaped sagger base. It was recovered alongwith a button-shaped open mouth lid which was a part of this vessel (Pl. 75b). At the top and the neck, the jar has a diametre of 12cm and 19·6cm respectively. Because of the acute taper the diameter is reduced to 5·7cm towards the base. The lower portion of this jar is very sturdy. This vessel was probably used after closing its mouth with the lid for the preparation of medicines/liquor.

Iron is found throughout the deposit of the period. Twenty three iron objects were recovered from this period which include spearhead, fragments of chisels, nail, etc. Thirteen beads and pendants of semi-precious stones, 17 terracotta beads, 04

Plate 75

a

b

Dwarkapur: a; Globular vessel and b; Long red ware pots alonwith lid, Period III.

copper objects, 10 terracotta animal figurines, 14 bone points and arrowheads are some other finds of this period (Pls. 76-78). Discovery of unusually large number of 338 terracotta discs found in the limited excavations is another remarkable find. Mention may be made of two terracotta animal figurines (one dog and one horse) with incised painted decoration. Similar kind of animal figurines were reported from Sarai Mohana and Jakhera.

The inhabitants of this period lived in wattle-and-daub houses. Remains of reed marks, burnt floors and ovens were recorded. A large rectangular-sized kiln (90 x 95cm) was noticed in trench No. 8 which was full of ash. The actual purpose of this kiln could not be decided. Among other structural activity of this period, mention may be made of two terracotta ringwells, partially excavated with seven and eight rings intact. A large number of animal bones were collected from this period the detailed study of which will supplement the data on the fauna of this period.

There is no any evidence to suggest that the settlement of Dwarkapur extended during the NBPW period. As compared to Agiabir the total occupational deposit of NBPW period at Dwarkapur is less than one metre thereby suggesting that duration of this period at the site was much shorter. Evidence related to the prevalence of any craft and industry is lacking. In the light of above evidences it may reasonably be presumed that Dwarkapur remained as a small village settlement during Period III and served as satellite settlement of Agiabir from the beginning of this period.

29. EXCAVATION AT DAUNDIA KHERA, DISTRICT UNNAO

Lucknow Circle of the Survey, under the the direction of Praveen Kumar Mishra, assisted by Indu Prakash, O.D. Shukla, Rajendra Yadav, Shamoon Ahmad, S.B. Shukla, S.K. Arora, Pranav Sharma and Ravishankar Saxena, undertook a trial excavation at the ancient site, Daundia Khera, Sangrampur, District Unnao. Two trenches i.e. XA2, Qdt. III and YB1, Qdt III have been excavated in limited area. The trench XA2 is located on the south-eastern direction of the trench YB1 in the slop towards the northern side while trench YB1 is situated on the elevated surface on the north-western side of the previous one. The western half (4·25 x 2·10m) of the Qdt. III of trench XA2 has yielded 6·10m thick cultural deposit and Qdt. III (4·25 x 4·25m) of the trench YB1 has yielded 5·93m thick cultural deposit.

The finding of excavation includes two cultural periods; period I belongs to early historical period and period II is assignable to late medieval period. The evidence of two hearths has also been noticed during the excavation. Besides, the pot sherds of different periods, antiquities consist of iron nails, ghat-shaped and areca nut shaped TC beads, one stone bead, fragments of glass bangles, hopscotches and bone points have also been reported from the site.

The cultural deposit reported from the site may be tentatively dated to 1st millennium BCE to the late medieval period.

Plate 76

Dwarkapur: Stone beads of Periods I, II & III.

Plate 77

a

b

Dwarkapur: a; Terracotta beads and b; Bone points and arrowheads, Periods I, II & III.

Plate 78

a

b

Dwarkapur: a; Copper objects and b; Iron objects, Period III.

UTTARAKHAND

30. EXPLORATION ON THE BANK OF SOLANI RIVER AND ITS CATCHMENT AREA, DISTRICT HARIDWAR

The Department of Ancient Indian History, Culture and Archaeology, Gurukul Kangri University, Haridwar under the direction of Prof. Devendera Kumar Gupta, Assisted by Dilip Kumar Kushwaha and Satyendera Singh has carried out the exploration on the bank of Solani River and its Catchment Area. The exploration brought to light several ancient sites assignable from occur colour pottery culture to Late Medieval period. The details of the explored sites are as under:

Site/ village	Nature of settlement seems	Nature/period of remains
Daluwala kalan – I **N 30^0 01' 36''** **E 77^0 57' 37''**	Village	Occur coloured pottery and early historical period ceramics.
Daluwala kalan -II **N 30^0 01' 271''** **E 77^0 57' 17''**	Village	Early historical to early medieval
Dauwalla Kalan – III **N 30^0 00' 76''** **E 77^0 56' 77''**	Village / camp	OCP and late historical ceramics
Ahmadpur grant –I **N 29^0 52' 97''** **E 78^0 01' 30''**	Town/city	NBPW to medieval period
Ahamadpur Grant - II (khem ka dera) **N 29^0 51' 99''** **E 78^0 02' 66''**	Town/ city	Early medieval & late medieval
Sahadevpur **N 29^0 51' 46''** **E 78^0 00' 50''**	Village	Medieval pottery
Nau gaja pir **N 29^0 44' 45''** **E 77^0 56' 07''**	Village	Painted Grey Ware and Grey Wares are more in quantity
Bhikar tila **N 29^0 44' 77''** **E 77^0 56' 73''**	Village	Medieval ceramics
Kathapir **N 29^0 47' 39''** **E 78^0 04' 40''**	Town/city	Early medieval and late medieval ceramics

Kutubpur **N 29^0 56' 55''** **E 77^0 59' 87''**	Village / town	OCP and early historical period
Ajmeripur **N 29^0 57' 85''** **E 77^0 58' 82''**	Village / town	Early medieval and medieval ceramics
Jaharbir goga mahadi **N 29^0 58' 78''** **E 78^0 00' 60''**	Village	OCP and early historical period
Anneki **N 29^0 58' 23''** **E 78^0 00' 87''**	Camp	Ceramics of early historical to early medieval period
Randhanwala –I **N 29^0 57' 40''** **E 77^0 53' 43''**	Village	Ceramics of late Gupta and medieval period
Randhanwala – II **N 29^0 57' 36''** **E 77^0 53' 16''**	Village / camp	Late Gupta and medieval ceramics
Paloni (Nangal) **N 29^0 57' 78''** **E 77^0 52' 35''**	City	Early medieval period ceramics
Sisona **N 29^0 57' 68''** **E 77^0 48' 12''**	Village	OCP and late Historical ceramics
Belaki Masai **N 30^0 00' 05''** **E 77^0 52' 89''**	Village	Occur colour ware
Redewala Ashram **N 29^0 45' 68''** **E 77^0 50' 95''**	Village / town	Early medieval ceramics
Jathedi **N 29^0 43' 70''** **E 77^0 48' 48''**	Village	Early medieval ceramics
Piran Kaliyar **N 29^{0}55'** **E 77^{0}56"**	Village/town	Sunga-Kushana and medieval period
Panchevali **N 29^{0}44'29''** **E 78^{0}5'33''**	Village/town	Sunga-Kushana ceramics

Sunehthi **N 30^{0}80'30''** **E 77^{0}41'45''**	Village	Early medieval ceramics
Khurampur **N 30^{0}10'36''** **E 77^{0}42'47''**	Village	Early medieval ceramics
Pirbani **N 29^{0}43'** **E 78^{0}04'**	Village/town	Medieval ceramics
Kunehri pir **N 29^{0}46'** **E 78^{0}06'**	Village	Grey ware and medieval ceramics

31. EXPLORATION IN ALMORA, DISTRICT OF KUMAUN REGION

A stone idol of Umā-Maheshwar dated circa 9th century CE was found in village Jaurasi near Sialdye in tehsil Bhikiasen. Grace fully and aesthetically carved out Umā and shiva sitting side by side on high seat measures 28cm in height and 20cm in width. There are Ganesa Kartikeya, Nandi and the Lion depicted on the lower part of the image. An standing stone image of three faced Vishnu measuring 60cms high and 27cm wide dateable to *circa.* 9th century CE was discovered in Seri village of Bhikiasen Tehsil. The three faces of the God are Varāh, Narsimha and the Human. Iconographically such type of vishu icon is known as Baikunth-Vishnu and one of very few statues reported in the region.

A broken septmatrika panel dateable to *cicra*. 10th century CE is found in village Takulti near, Bhikiasen Tehsil. It measures about 1m in length and 29cm in width. The image is in two picos one is found in village seri, while the other part is kept in village Takulti. The sapt-Matrika panel consists the image of Brahmāni, Māheshwari, Kaumari, Vaishnavi, Vārāhi, Indrāni and Chāmundā goddesses.

A copper plate measuring 25·05cm and 20cm having fifteen lines inscribed in Devnāgari script and Kumauni language was brought to light in Palyuda village, situated near Tadikhet in Ranikhet Tehsil. The plate is bearing sake 1373 (CE 1451) and the name of Bhārati Chand a king of Chand Dynasty who ruled Kali-kumaun region from 1444 to 1455 and again 1468 to 1499 CE with his capital at Champawat.

WEST BENGAL

32. EXCAVATION AT KANKANDIGHI

Department of Archaeology, University of Calcutta, under the direction of Durga Basu, assisted by R.K. Chattopadhyay, Kaushik Ganguly, Munmun Mondal carried out excavation at Kankandighi (Pilkhana mound), South 24 Parganas with a view to expose the structural remains for understanding its nature and character and to ascertain the

cultural sequences and antiquity of the region. The site was excavated for the first time by the department.

Kankandighi is located in the District of South 24 Parganas under the jurisdiction of Raidighi Police station, on the bank of river Mani (Fig. 35). Kankandighi lies at a distance of about 12km south-west of Mathurapur railway station of the south section of the Sealdah Lakshmikantapur branch line.

The site was reported for the first The Antiquities of Khari "in Annual Report of Varendra Research Society, 1928-29 mentioned time by late Kalidas Dutta who in his article "the importance of the site. Subsequently, D.K. Chakravarty, N. Mukhapadhyay and other scholars reported the significance of the site and mentioned the archaeological remains collected from the site and its adjoining areas. Late, the Directorate of Archaeology and Museum, Government of West Bengal conducted exploration at this site.

Located on the river valley of Mani the region was once covered with dense forest and it was an inaccessible land during British period. But in due course this forested land became a well connected habitable region. Raidighi is also known as the Gateway of Sundarban.

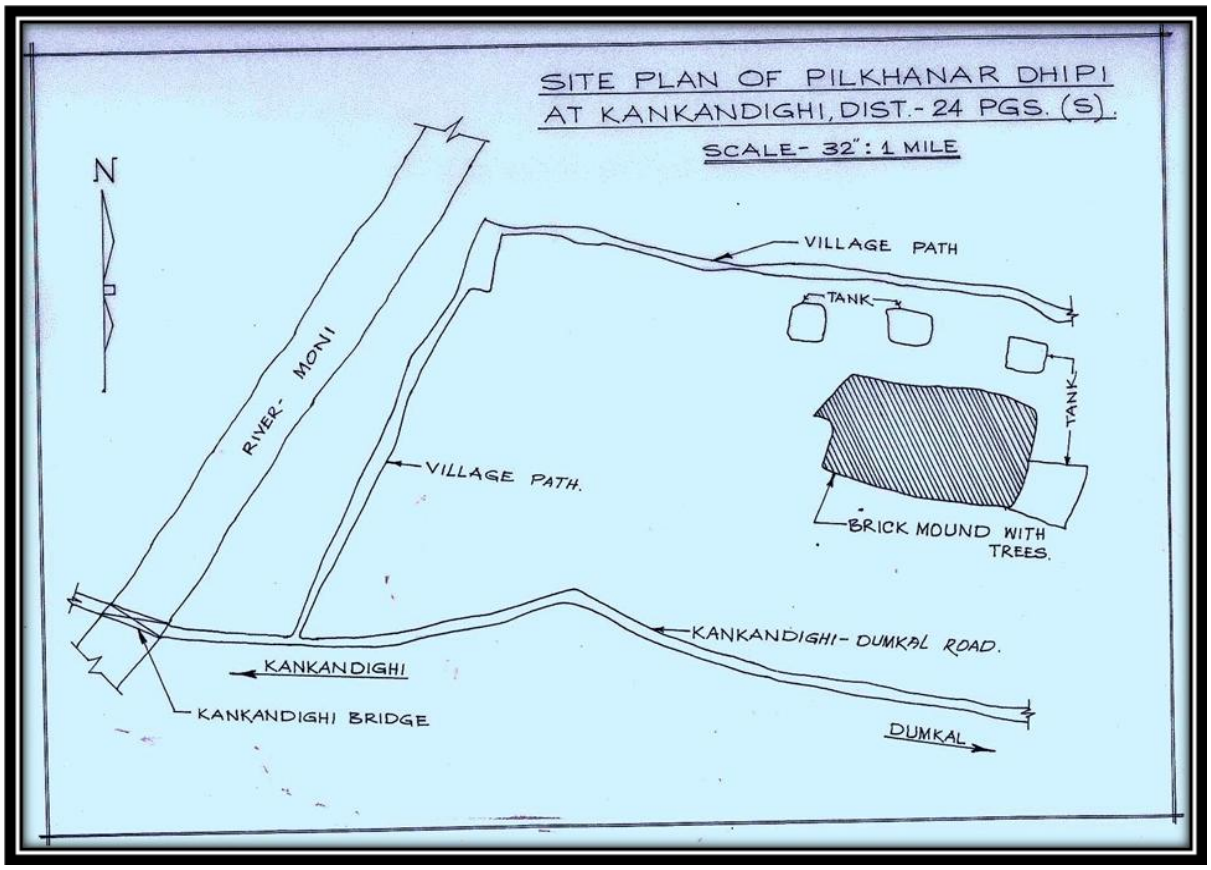
The village Kankandighi is mainly divided into two major parts *viz*. Uttar Kankandighi and Dakshin Kankandighi. From archaeological point of view Uttar Kankandighi is more important than the Dakshin Kankandighi. Mounds in northern part of Kankandighi are rolling and these are locally known as Danga. A number of mounds are visible in different parts of Kankandighi. Among these mounds, Pilkhana mound (Fig. 36) in Mondalpara has revealed structural mound (Pl. 79) which had been excavated by the Department of Archaeology.

Since the basic aim was to expose the structural remains during the period under review the trenches were laid out in horizontal met hod (Pl. 80). Excavation was undertaken in nine trenches of 6 x 6m. each. In each quadrant, structures were exposed except B_1 and ZA_1. The trenches at Pilkhana mound were excavated either partially or fully to different depths. These trenches are A_1, B_1, C_1, D_1, XA_1, YA_1, ZA_1, XB_1, YB_1. Among these trenches XA_1 was taken as index trench (Fig. 37 & Pl. 81).

In trench A_1, structure is represented by a north south oriented wall with a rammed floor (Pl. 82a). In trenches C_1 and D_1 a square platform with four courses of brick alignment has been unearthed (Pl. 82b). The structure was built over a mud filling. The brick platform is 4·75 x 4·75m square in plan with 4cm. projection at each side. The total height of the structure is 80cm. The trench XA_1 was excavated up to a depth of 4·29m and it has revealed a massive north south oriented wall of 5·01m. in length. The excavation was carried out up to a maximum depth of 4·29m without reaching the natural soil. The wall has exposed thirty courses of brick alignment in the present digging. (Pl. 83a). It was made of burnt bricks (26 x 18 x 6cm). The large size of wall indicates a plinth of a super structure.

Figs. 35-36

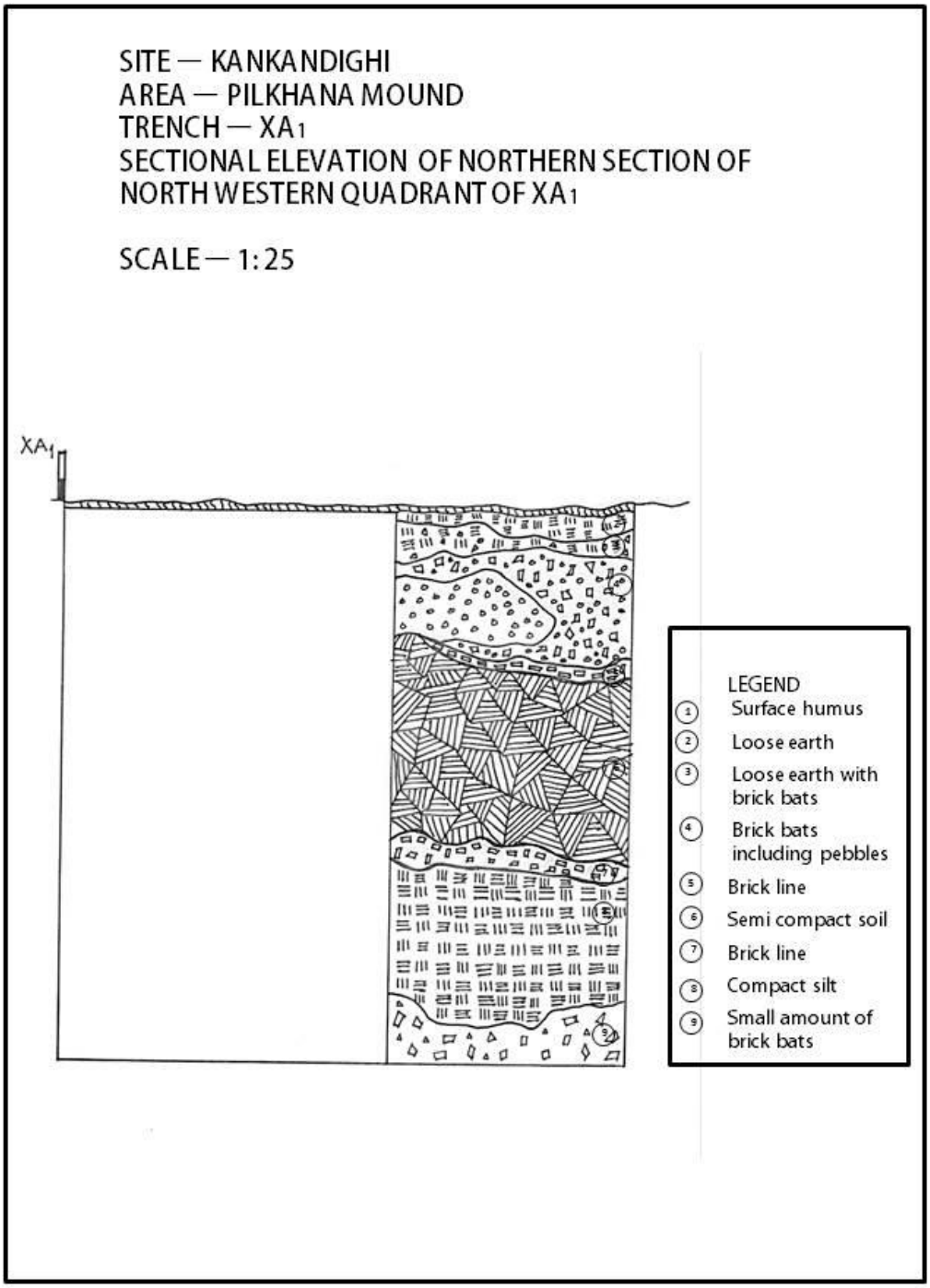
a



b

Kankandighi: a; Satellite imagery of the area and b; Site plan.

Fig. 37



Kankandighi: Stratigraphy of trench XA_1 of Pilkhana mound.

Plate 79

a

b

Kankandighi: a-b; General view of the Pilkhana mound.

Plate 80

Kankandighi: General view of excavated trenches of Pilkhana mound.

Plate 81

Kankandighi: Stratigraphy of index trench XA_1 of Pilkhana mound.

Plate 82

a

b

Kankandighi: a; Walls with rammed floor in trench no A_1 and b; Remains of square platform in C_1 and D_1, Pilkhana mound.

The next important structure exposed in trenchYA_1 where a number of small cells were unearthed (Pl. 83b). Some of these structures were made with reused bricks. The shapes and the alignments of these structures indicate that these were used as small cells. Sometimes the structures were plastered with stucco material.

Ceramics are dominated by red ware followed by black ware, grey ware, black and red ware and buff ware (Pl. 84). Different shapes and sizes of handis, bowls, dishes are found. Pottery have revealed impressed designs, like basket impression, cord impression, floral motifs, etc. Potteries are found from very fine quality to the coarse variety. A large in situ storage jar is exposed in trench XA_1. Other important antiquities include lamps, shells and caurie, iron nails and terracotta image of Jambhala and decorated bricks.

On the basis of cultural materials and structural remains with moulded bricks, it may be presumed that the whole structural complex had its prime period from ninth/ tenth centuries CE to twelfth/ thirteenth centuries CE.

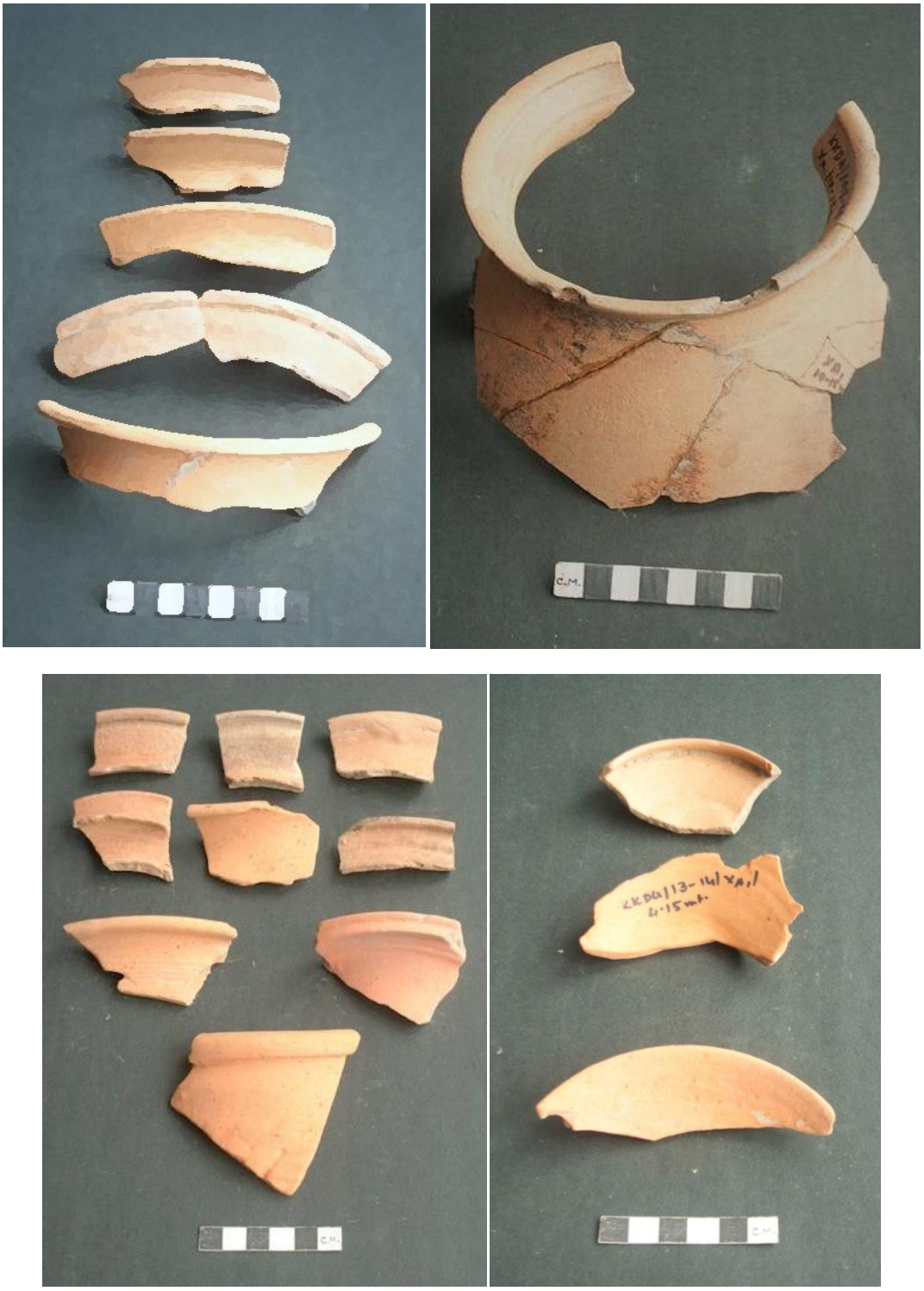
Plate 83

a

b

Kankandighi: a; View of brick wall in trench No XA_1 and b; Close view of wall of a cell in Trench YA_1 and YB_1, Pilkhana mound.

Plate 84



Kankandighi: Red Ware from Pilkhana mound.

II. EPIGRAPHY

Sanskritic and Dravidic Inscriptions[1]

ANDHRA PRADESH

1. BRAHMI INSCRIPTION, GOTUR, DISTRICT KADAPA

This inscription is engraved on a rock boulder found in the fields of C. Venkata Subhareddy in the village. It is in Prakrit language and Brahmi characters of 3rd century CE. It refers to the memorial pillar of Bapanana son of *Mahakamika* (chief labourer) Magilana (Pl. 85).

2. INSCRIPTION OF EASTERN-CHALUKYA, VAIDANA, DISTRICT PRAKASAM

It is engraved on a grayish-white granite slab, lying in the premises of a ruined Ramalingesvarasvami temple. This inscription is written in Telugu language and Telugu-Kannada characters is datable to 9th century CE on palaeographical grounds. It records the gift of 50 *putlu* of land to the temple. There is also an imprecatory portion at the end of the inscription.

3. INSCRIPTION OF VELANATI CHIEF, KOLASANAKOTA, DISTRICT PRAKASAM

It is engraved on a granite architectural column, lying in the premises of a ruined Sivalayam. This inscription is written in Telugu-Kannada characters, and dated in the Saka 1019 (1097 CE). It records that the king *Sri Manmahamandalesvara* Kulottunga Gonka (Gonka I) made a gift of certain *Khanduka* of land from an agricultural field of Gadadachadara village. The donor is not known and there is a small imprecatory portion at the end of the inscription.

4. STONE INSCRIPTION, JAGANADHAPURAM, DISTRICT EAST GODAVARI

This Telugu inscription is engraved on a slab, found in a mango-grove in the village, it is dated in Saka 1175 (1253 CE). It records the gift of land to the god Pochamma in Gontta by Sangaraju, son of *Srimanmahamandalesvara* Santughanddikota Jeyaraju. Further, it mentions Mallinayaka and *sthanapati* Yerramanayaka.

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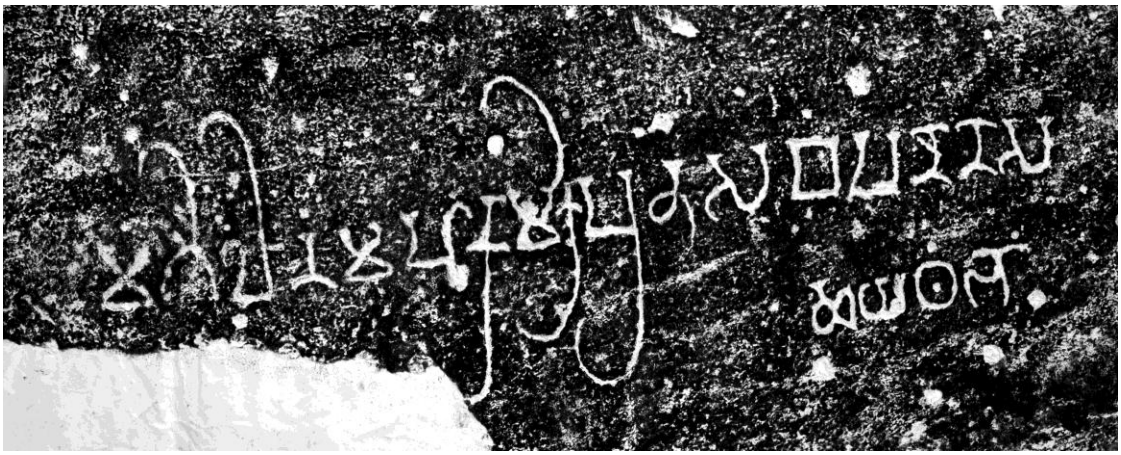
[1] Information from T.S. Ravishankar, assisted by D.M. Nagaraju, Jai Prakash, S. Nagarjuna, K. Karuppaiah, K. Munirathnam, K. Paneerselvam, S. Nagarajappa, R.V. Anil Kumar, Meka V Raghavendra Varma, M. Yesubabu, Alok Rajan, and Krishnamurthy of the Epigraphy Branch, Mysore, Southern Zone, Chennai and Northern Zone, Lucknow.

Plate 85



Gotur: Early Brahmi Inscription (no.1).

5. TELUGU INSCRIPTION, TALLAPAKA, DISTRICT KADAPA

This Telugu inscription is engraved on a stone slab found in the field of Ramireddy in the village. It is in Telugu language and characters of 15th century CE. It records the gift of 11 *guntas* of land to the god Tiruvengalanatha in Tallapaka by Aparachinattala Pedachakraraju.

6. TELUGU INSCRIPTION, NALLAPUREDDIPALLI, DISTRICT KADAPA

This inscription engraved on a slab, fixed at the entrance of the steps of an agriculture well in the village. It is written in Telugu characters and language and dated in Saka 1619 (1697 CE). It records the construction of a well *(Nadabavi)* near Kodandaramapuram dedicated to the god Venkateswaraswami by a certain individual named Venkatadri, son of Channa Reddi, grandson of Malreddi Bajireddi.

BIHAR

7. THREE INSCRIPTIONS, MUNDESVARI, DISTRICT BHABHUA

These three inscriptions engraved on different stone slabs and kept near the staff room in the Mundesvari temple premises are in Siddhamatrika characters and Sanskrit language datable to about the eighth century CE. All the three inscriptions seem to record obeisance to the (goddess Mundesvari). The first one records obeisance by Bhoja, son of Acharya. Also mentions a mason *(silakutta)*, son of Yashanaga. Second inscription, records obeisance by [Di]vakaracharita, Chi[tra]bhoja and Alabha. The third inscription refers to obeisance made by Rupaditya.

8. NAGARI INSCRIPTION, KUMAITHA, DISTRICT LAKHISARAI

This inscription, engraved on a stone slab fixed on a platform built in the premise

of the Indradamanesvara Mahadeva temple is assignable 10th-11th century CE on palaeographical grounds. It is in Nagari characters and Sanskrit language. It records the construction of a temple *(Kirti)* by Bharata, son of the merchant Dameka, belonging to Bhallipati for accruing merit (Pl. 86a).

9. BUDDHIST IMAGE, KUMAITHA, DISTRICT LAKHISARAI

Engraved on the pedestal of a Buddha image datable to 10th-11th century CE. This inscription is in Nagari characters and Sanskrit language. It records the Buddhist creed *(Ye Dharma*, etc.*)* and states that the image is the gift of *Thakura* Hemadeva (Pl. 86b).

KARNATAKA

10. WESTERN GANGA INSCRIPTION, MYSORE, DISTRICT MYSORE

This Kannada epigraph is engraved on an epitaph, kept in the premises of the Department of Archaeology, Museums and Heritage. It is written in Sanskrit and Kannada language and characters. On palaeographical grounds it can be assign to 10th-11th century CE. Originally this was found in the excavation conducted at Talakad, Mysore district. It belongs to the reign of Irmmadi Permanadi, who is identified with Marasimha II. It refers to Kundanasomi, the elder sister of *Nolambakulantaka* Irmmadi Permmanadi, who consecrated a *Nisidhi* in memory of Balachandramuni.

11. KALACHURI COPPER-PLATE INSCRIPTION, TALAGUNDA, DISTRICT SHIMOGA

This copper-plate inscription was discovered in the course of excavation conducted near Pranavesvara temple, Talagunda near Banavasi, Shimoga district. The charter is engraved in Nagari characters and Sanskrit language. It belongs to the Kalachuri king Sankama and dated in Saka 1102 (CE 1180). It records the grant of the village Sthanaguta (with boundaries defined) to the Brahmanas belonging to various gotras by the king Sankama. The inscription states that while camping at the eastern direction of the village Sthanuguta situated at Banavasi-desa, the king made the grant along with other officials and *Dandanatha* Krishnakesava, after offering worship to the god *Pranamanatha* granted the village Sthanuguta, along with all its oppertunances to the Brahmanas who were proficient in all the *vedas*, *vedangas*, *tarkka* and *vyakarana* (Pl. 87).

12. BALUSTRADE *(SIMHA KATANJANA)* INSCRIPTION, TALAGUNDA, DISTRICT SHIMOGA

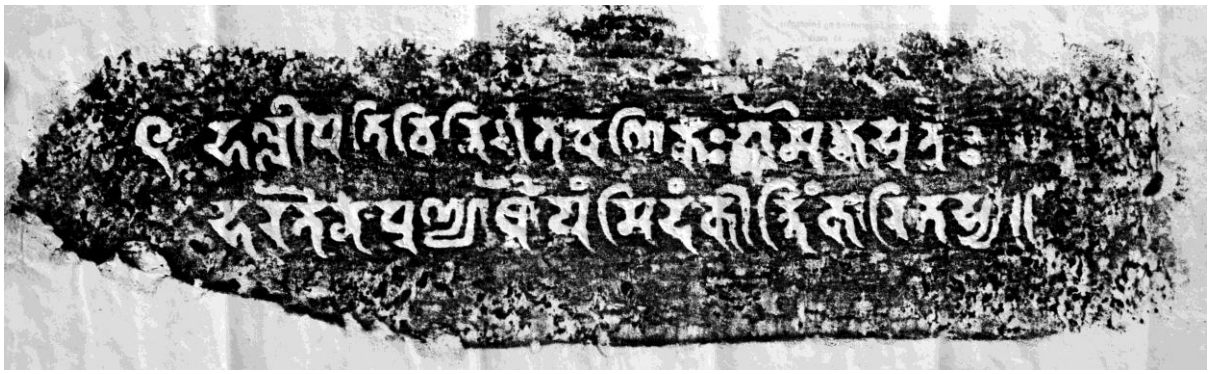
The present undated, fragmentary and worn out inscription is found engraved on the left side balustrade *(Simhakatanjana)* of the Pranaveshvara temple. It is written in Kannada language and archaic variety of Kannada script. It seems to record the gift of land to a boats man namely Vaji Naga[yya], who belonged to the Boygara family by a certain Halami of Pulindage.

KERALA

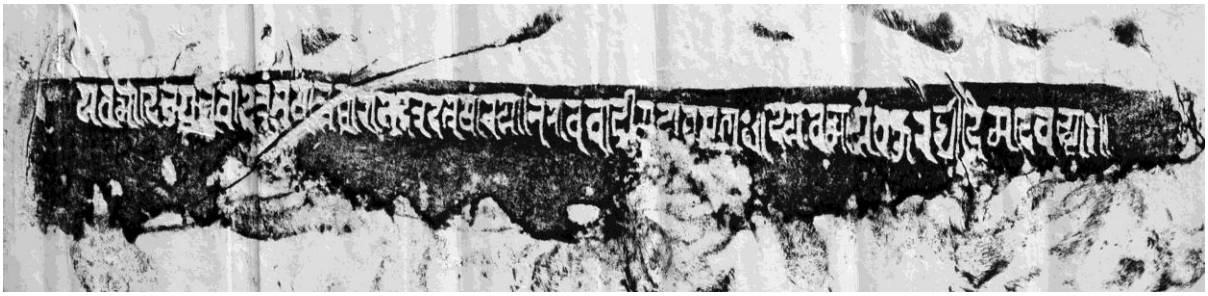
13. TAMIL BRAHMI INSCRIPTION, MUZHIYAN, DISTRICT KASARAGODU

This Tamil Brahmi inscription is found engraved on a latarite bed rock at the

Plate 86



a

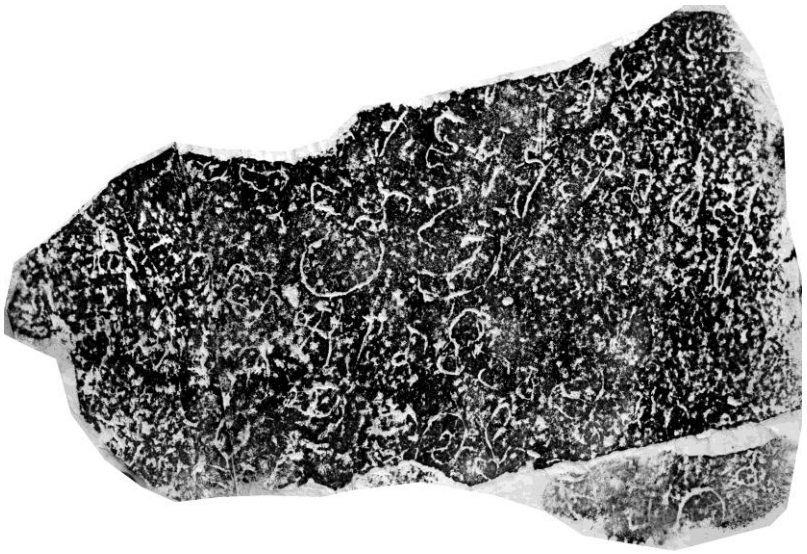


b

Mundeswari: a; Nagari inscription from Kumaitha (No.8) and b; Buddhist creed inscription from Kumaitha (No.9).

Plate 87

a



b

Talagunda: a; Kalachuri copper-plate inscription (No.11) and bEarly Kannada inscription (No.12)

top of a hill, Muzhiyar, in a Karadukka forest range. It contains only one line and it refers to a certain Charuma, son of a Pattan a (native) of Kalakora. On palaeographical grounds it can be assigned to 2nd-3rd century CE.

MADHYA PRADESH

14. COPPER PLATE INSCRIPTION OF RULER OF VALKHA, BHOPAL, DISTRICT BHOPAL

This single copper plate charter is engraved in late Brahmi characters and Sanskrit language presently in the possession of a businessman in Bhopal. On palaeographical grounds, the inscription can be assigned to 5th century CE. It belongs to the reign of *Maharaja* Rudradasa, dated in the regnal year 17. It records the grant of a village by the king, situated in Chitpitapratyayakshetra, after converting it as *Brahmadeya* to Brahmana named Guhila, belonging to the *Kasyapagotra* and Vajasaneya sakha.

15. PEDESTAL INSCRIPTION, KHAJURAHO, DISTRICT CHHATARPUR

Engraved on the pedestal of an image the inscription datable to about the tenth century CE palaeographically. This fragmentary inscription in Nagari characters and Sanskrit language, records that the image was caused to be made by Jahlaka.

MAHARASHTRA

16. SILAHARA INSCRIPTION, KIRAVALI, DISTRICT THANE

This inscription is found on a loose stone slab lying near a Siva temple. It is engraved in Nagari characters and Sanskrit language mixed with local dialect dated in Saka 1170 (1248 CE). It belongs to Silahara dynasty of the king (name lost) with the epithet, *Mahamandalesvaradhipati, Rayapitamaha Konkana chakravarti*. It records the gift of lamp, probably to the temple of Siva by Anantadeva. It also mentions *Sri Karana* (Accountant) Nagaprabhu Simhadeva who also made some benefaction to the temple. The inscription ends with an imprecatory verse (Pl. 88a).

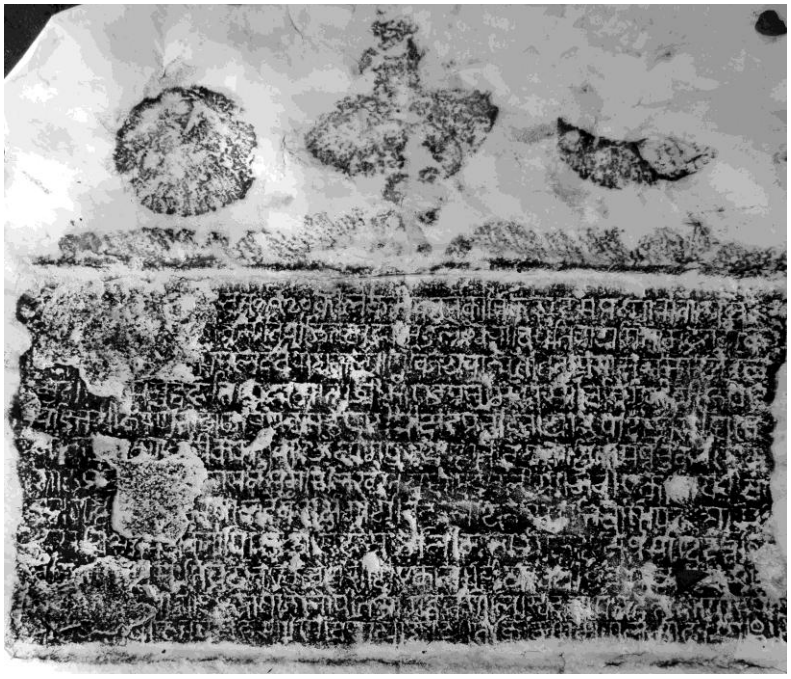
17. SILAHARA COPPER-PLATE INSCRIPTION, KALYAN, DISTRICT THANE

This copper-plate inscription is in Sanskrit language and Nagari characters belongs to the reign of the Silahara king Chittaraja dated in Saka 941 (CE 1019). It records the grant of a village Kokumvadaha by the King Chittaraja to a learned Brahmana of Jamadagnya Vatsa *gotra* called Ramba pandita for the performance of religious rites. The details recorded in the grant provide a fascinating glimpse into the socio-religious life and administration in the Deccan region. The present Kalyan copper-plate grant fills the gap between the Thane plates of King Arikesari (CE 1017) and the Bhoighara plates of King Chittaraja (CE 1024) confirming the fact that Chittaraja had certainly ascended the throne by 1019 CE (Pl. 88b).

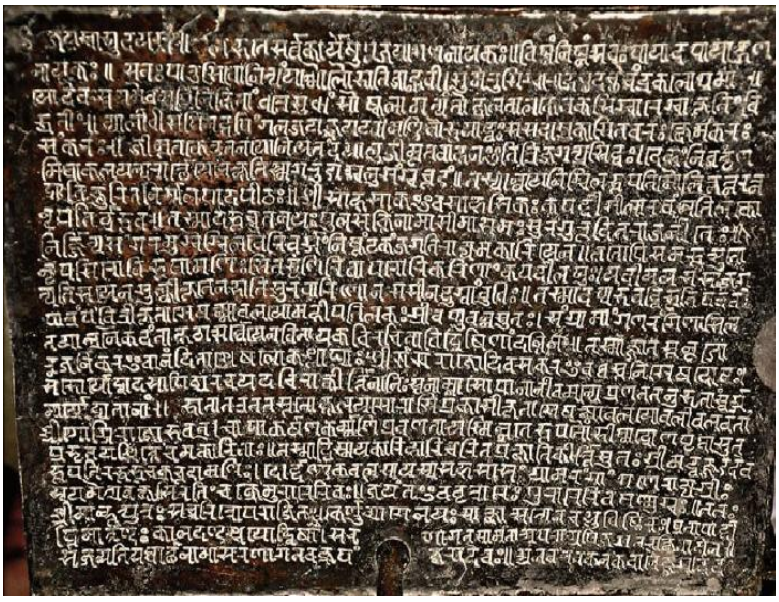
18. NAGARI INSCRIPTION, PIMPRI KALAGA, DISTRICT YAVATMAL

This inscription is engraved on a beam of the *mukhamandapa* of a Siva temple, in Nagari characters and corrupt Sanskrit language datable to about the 11th-12th century CE. It records some pious act

Plate 88



a



b

Kiravali: a; Silahara inscription (No. 16) and b; Silahara copper-plate inscription (No. 17).

made for the temple of Somanathadeva by Navasigha Nayaka, son of Go[ksh]ahapa Nayaka.

TAMIL NADU

19. VIJAYANAGARA COPPER-PLATE INSCRIPTION, CHENNAI, DISTRICT CHENNAI

This copper-plate charter belongs to the reign of Sri Viravenkata Devamaharaya and it is engraved in Telugu language and characters dated in Saka 1640 (1718 CE). It records the grant of the villages Yadayamgolam and Vunnamgolam, situated in Nattupuram, lying south of Tirunelveli, attached to Madhurai-samsthanam in Pandya-mandalam by Visvanathanayani Vijayaranga Chokkanathanayaka to *smriti* Srinivasadikshita belonging to *Kasyapagotra*. The donated land consisted of dry and wet lands, mango-groves etc., to be enjoyed by the donee.

20. CHOLA INSCRIPTION, VIRALUR, DISTRICT KANCHIPURAM

This inscription is found engraved on a stone slab planted on the right side of the main road of Viralur to Venmani near the Siva temple. It is in Tamil language and characters. Dated in the 3rd regnal year it records the construction of the temple of Kailayamudaiyar on the leveled surface made of mud by one Eran Kailayamudaiyan, a resident of Viralur. He also donated a gold coin for the purpose of burning *Asttasandhi vilakku*.

21. TAMIL BRAHMI INSCRIPTION ON GOLD BAR FROM TENUR, DISTRICT MADURAI

This inscription in Tamil language and Brahmi characters, is engraved on valuable gold bars, consisting of seven in numbers. Paleographically, this may be assigned to 2nd century BCE to 2nd century CE. All the above gold bars contains only one name *viz.*, *Pokui-Ekundri-Kothai*, probably referring to a person named Kothai, who seems to have donated these gold bars to the nearby temples.

22. TAMIL INSCRIPTION, MADUKKULAM, DISTRICT MADURAI

This inscription in Tamil language and characters and is engraved on a stone slab, locally called Devaradiyar-kal erected on the bank of the tank near Ayyanar temple. On palaeographical grounds this may be assigned to 9th century CE. It refers to construction of a tank and its channels by a person named Endisai-Natteri-vira-Ganattan (Pl. 89).

23. TAMIL INSCRIPTION, MADUKKULAM, DISTRICT MADURAI

This inscription is found engraved on a water measurement stone *(nirmattakkal)* planted near a sluice known as Ponmenimadai. It is written in Tamil language and characters. This charter may be assigned to 17th century CE on palaeographical grounds. It records the construction of a sluice known as Tiruvalai-vayan-Madukkallu by Arya-putra-Kanakku-Nayan Pillai, the son of some higher official, a resident of Tiruvalaivasi.

24. TAMIL INSCRIPTION, MADUKKULAM, DISTRICT MADURAI

This inscription is engraved in Tamil characters and found engraved on the stone

Plate 89

Madurai: Early Tamil Inscription from Madakkulam (No.23).

slab erected on the main street of the same village. It contains neither the date nor the name of the king. But on palaeographicalgrounds, this may be assigned to 17th century CE. It refers to naming of a street as "Rangalmeetan big street" *(Perunteru)* in the place called Karuppukkal *alias* Azhiya-viratangonda nallur, a *devadana* village of the temple Sri Nayanar-Azhagiya-Chokkanar.

25. TAMIL INSCRIPTION, VALLANDAPURAM, DISTRICT MADURAI

This inscription in Tamil language and character is engraved on a stone slab erected before the Hanumar temple. It refers to the installation of the deity Hanumar in memory of a person called Muthiappa-Naickar by his daughter Mangammal, a resident of Avaniyapuram and donated two *ma* of land, probably for its maintenance.

26. VATTELUTTU INSCRIPTION, TIRUPPUVANAM, DISTRICT TRUPPUVANAM

This inscription in Tamil and Vatteluttu characters, is engraved on a stone fixed into the sluice of the tank of the same village. This charter was issued in the 12th regnal year of the king Rajendra-Chola I, records most probably the construction of a sluice during his reigning period. On palaeographicalgrounds the record can be assigned to 11th century CE.

III. IMPORTANT DISCOVERIES

TAMIL NADU

1. JEWELLERY HOARD FOUND AT TENUR MADURAI

The Excavation Branch-VI of the Survey during exploration on Vaigai river valley discovered various antiquarian remains including jewellery hoard consisting of inscribed gold bars from Tenur village.

The Tenur village (09°59'28"N; 78°00'57"E) is located of about 12km north-west of present Madurai city near Cholavantan in Madurai North Taluk of Madurai district on the left bank of river Vaigai. During the year 2009 the village attracted attention of archaeologists for the accidental discovery of a jewellery hoard containing gold bars and beads kept in a small pot.

In view of its rare archaeological importance, the village and its surroundings was subjected to thorough exploration which revealed that the village itself stands upon an elevated mound. The northern part of the village called Vadakkutheru (i.e. northern street) seems appearing to be the highest part of the mound yielding fine varieties of pottery like Black and Red Ware, Black Ware, Red Slipped Ware, Red Ware, etc. scattered all over the surface. It is note worthy that the hoard of jewellery was found in the same area. Interestingly village is finds mentioned with the same name in the Sangam literature Aingurunuru (54, 55, 57) and later referred in the early Pandya inscriptions datable to *circa* 8th-9th century CE as Peruntenur (i.e. Big Tenur).

The jewellery was kept in a small pot of red ware with a lid. The details of hoard are as under (Pl. 90a):

Name of object	Quantity	Weight
Gold bars	7 nos	661.200 gms
Collared beads (big)	21 nos	81.100 gms
Disc beads (small)	33 nos	7.700 gms
Pendant	1 no	5.350 gms
Total	**62 nos**	**755.350 gms**

All the objects are of gold and display varying degree of craftsmanship. The irregular shapes of the bars or lump suggest that it could have been melted either from individual object or from a large singular object which later on made into separate pieces. Among the other objects, these bars importance as each of the piece

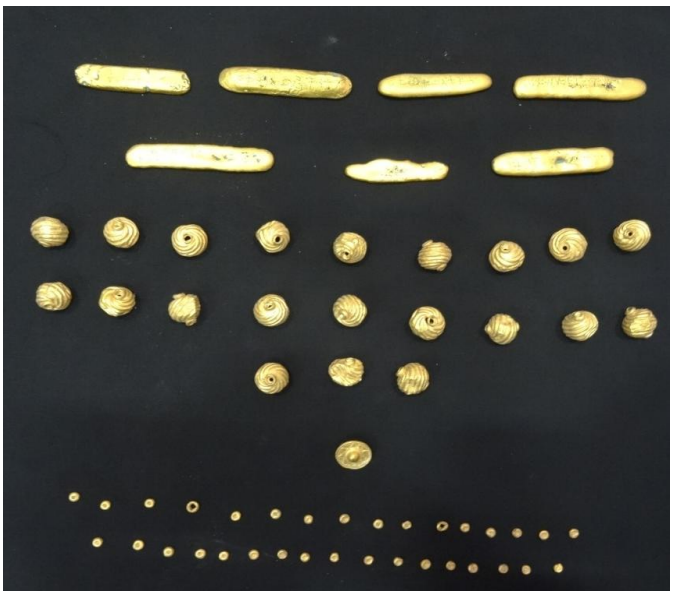
are of great contains inscription written in Tamil-Brahmi script. Unlike that of other inscriptions in other mediums which are normally inscribed in a continuous stroke, the letters in the bar are rather executed in 73 series of dots resembling each letter.

All the bars uniformly bear the name of an individual probably native of a certain village. The inscription altogether contains eleven letters written in Tamil-Brahmi script (Pl. 90b). The *language of the* inscription is invariably Tamil. The text of the inscription is as follows:

Meaning: *Kotai*, (belonging to the individual) of *'pokui kunri'* or *'pokui kunru'* i.e. *Pokui* the hilly village or surrounded by hill (*kunru* = hill). In one of the bar the word '*e*' resembles that of letter '*ma*' and if it is taken as '*ma*' then the reading shall be '*ma kunri*' (i.e big hill). The word 'kotai' invariably refers to an individual. Interestingly, the word 'kotai' draw parallels similar to that of the names found in the Sangam age coins presumably issued by Chera kings such as *'makkotai'* and *'kuttuvankotai'*. The meaning of the inscription could be interpreted that both the bars and the entire jewellery, wherein, the private possession of an individual or referring to the owner to whom the objects were given as a valuable present. But in the context of the findings as a hoard kept in a pot, it is probable that the objects were the possession of above individual.

Among the jewellery hoards in Tamil Nadu and other finds, the present find is considered to be unique of its kind for the occurrence of labeled inscription on gold. Although such type of labeled inscriptions in different mediums including metal are reported especially from Karur (Tamil Nadu) region, inscription in gold bar are not forthcoming anywhere from Tamil Nadu till date. Hence this find should be considered first of its kind shedding light a precious the mode of writing in solid metal i.e. gold, a practice hitherto unknown in the history of Tamil Nadu**.** A comparison with the Tamil – Brahmi inscriptions in the caves in and around Madurai and other materials, on palaeographical grounds these inscribed bars could be assigned to *circa* 1st BCE - 1st CE. The archaeological vestiges found during the exploration at Tenur village support this fact.

Plate 90



a

b

Tenur: a; Jewellery hoard and b; Inscribed gold bars found in Tenur hoard.

IV. PALAEOBOTANICAL AND POLLEN ANALYTICAL INVESTIGATIONS

Birbal Sahni Institute of Palaeobotany, Lucknow, during the period under review carried out study on the botanical remains recovered from the excavations of ancient site at Khirsara, district Kachchh, Gujarat and Kampil, the capital city of ancient south Panchala in district Farrukhabad, Uttar Pradesh. Systematic floatation recovery of botanical remains from the sites was put into effect by Anil K. Pokharia and Chanchala Srivastava respectively. The details of investigation are as under:

GUJARAT

1. KHIRSARA, DISTRICT KACHCHH

In continuation to the previous year's work carried out on the botanical remains from Khirsara, further investigations taken up added considerable understanding of the exploitation of botanical resources by ancient settlers at the site from 2500-2000 B.C. In addition to the crops already reported (*Hordeum vulgare*, *Triticum aestivum*, *Sorghum bicolor*, *Pennisetum typhoides*, *Macrotyloma uniflorum*, *Vigna radiata*, *Sesamum indicum* and *Gossypium arboreum/herbaceum*) the remains of *Triticum sphaerococcum* (dwarf wheat), *Eleusine coracana* (ragi millet), *Setaria italic*a (Italian millet), *Panicum miliaceum* (proso millet), *Pisum arvense* (field pea), *Lathyrus sativus* (grass pea), *Cicer arietinum* (chick pea), *Luffa* sp. (sponge gourd), and *Linum usitatissimum* (linseed), were new finds. Remains of weeds & other wild taxa encountered, have been identified as belonging to *Setaria* sp., *Celosia* sp., *Trianthema triquetra*, *Abutilon* sp., *Sida* sp., *Asphodelus* sp., *Scleria* sp., *Scirpus* sp., *Rumex* sp., *Polygonum* sp., *Cyperus* sp., *Indigofera* sp., *Indigofera* cf. *hirsuta*, *Ipomoea* sp., *Trigonella occulta*, *Solanum* sp., and *Ziziphus nummularia*.

UTTAR PRADESH

2. KAMPIL, DISTRICT FARRUKHABAD

Morphological investigation of seed and fruit remains collected from ancient site of Kampil from the cultural horizon of pre-P.G.W. (Ochre-Colored Pottery) and Painted Grey Ware (c. 1500 BCE - 800 CE), Northern Black Polished Ware (c. 800 BCE-200BCE), Sunga-Kushana (c. 200 B.C.- 300 A.D.) and Gupta up to Medieval times (c. 300 CE - 800 CE) were carried out. The studies reveal field-crop finds belonging to **Cereals** - barley (*Hordeum vulgare*), rice(*Oryza sativa*), bread wheat (*Triticum aestivum*) and dwarf wheat (*Triticum sphaerococcum*); minor crop Job's tears (*Coix lachrymal-Jobi*); **Millets** of sawan (*Echinochloa crus-galli*), Italian millet (*Setaria* sp.) and *Panicum* sp.; **Pulses** - lentil

(*Lens culinaris*), khesari/grass-pea (*Lathyrus sativus*), field-pea (*Pisum arvense*), green-gram (*Vigna radiata*), black- gram (*Vigna mungo),* gram (*Cicer arietinum*), horse-gram/kulthi (*Macrotyloma uniflorum* Syn. *Dolichos biflorus*), aconite/moth-bean (*Vigna aconitifolia*); etc. Seeds of **fiber yielding plants** - silk-cotton (*Salmalia malabarica*) and cotton (*Gossypium arboreum/herbaceum*); oil-seeds like sesame (*Sesamum indicum*), linseed (*Linum usitatisimum*) and **Fruit remains** - jujube (*Ziziphus* sp.), grape pips (*Vitis vinifera*) and emblic (*Emblica officinalis*) have also been recovered. Both winter and summer season crops with their associates are recorded, reflecting on the advanced agriculture pattern practiced by the ancient settlers. The dominance of Jujube and Emblic/Anwala fruit-stones, of high medicinal value is recorded from nearly all phases.

[1.] Contributed by Chanchala Srivastava and Anil K. Pokharia, Birbal Sahni Institute of Palaeobotany, Lucknow-226 007.

V. MUSEUM

BHOPAL

1. ARCHAEOLOGICAL MUSEUM, CHANDERI DISTRICT ASHOKNAGAR

Cultural notice board on black granite ground with engraved golden letters were prepared both in Hindi and English language and fixed on stone masonry pedestal at the entrance of the museum. The painting work in the miscellaneous gallery and Anandam gallery has been completed. The work of construction of permanent ticket counter at entrance gate is being taken up. Museum Day, Museum Foundation Day, World Heritage Week, Independence Day, Republic Day was celebrated to create awareness for cultural heritage among the students, teachers and local community.

2. ARCHAEOLOGICAL MUSEUM, KHAJURAHO, DISTRICT CHHATARPUR

The documentation of antiquities has been taken up and is in progress. Website designing for Archaeological Museum Khajuraho is also in progress. Brochure on Vaishnav sculptures was prepared. The work of repairing and upgrading of old sale counter for publication is in progress. Museum day was celebrated on 18th May.

3. ARCHAEOLOGICAL MUSEUM, GWALIOR, DISTRICT GWALIOR

Drinking water facility and seating arrangement for the tourist have been provided with proper signage. The work of preparing gypsum board, false ceiling and displaying of two sculptures of gateway alongwith preparation of steel text/caption for describing their brief history were taken up. Painting work of gallery no.1 and 2 has been completed.

LUCKNOW

4. 1857 MEMORIAL MUSEUM, RESIDENCY, LUCKNOW

Museum galleries were re-painted after removal of old and dead layers of paint. The old and damaged wooded table showcases, translides fixed in the walls have been prepared in seasoned teak wood and re-fixed. New brass chain-links have been provided around the Model of Residency displayed in the Gallery A.

In view of the safety and security in the museum, CCTV cameras and fire extinguishers have been fixed in the museums at appropriate location.

VI. ARCHITECTURAL SURVEY

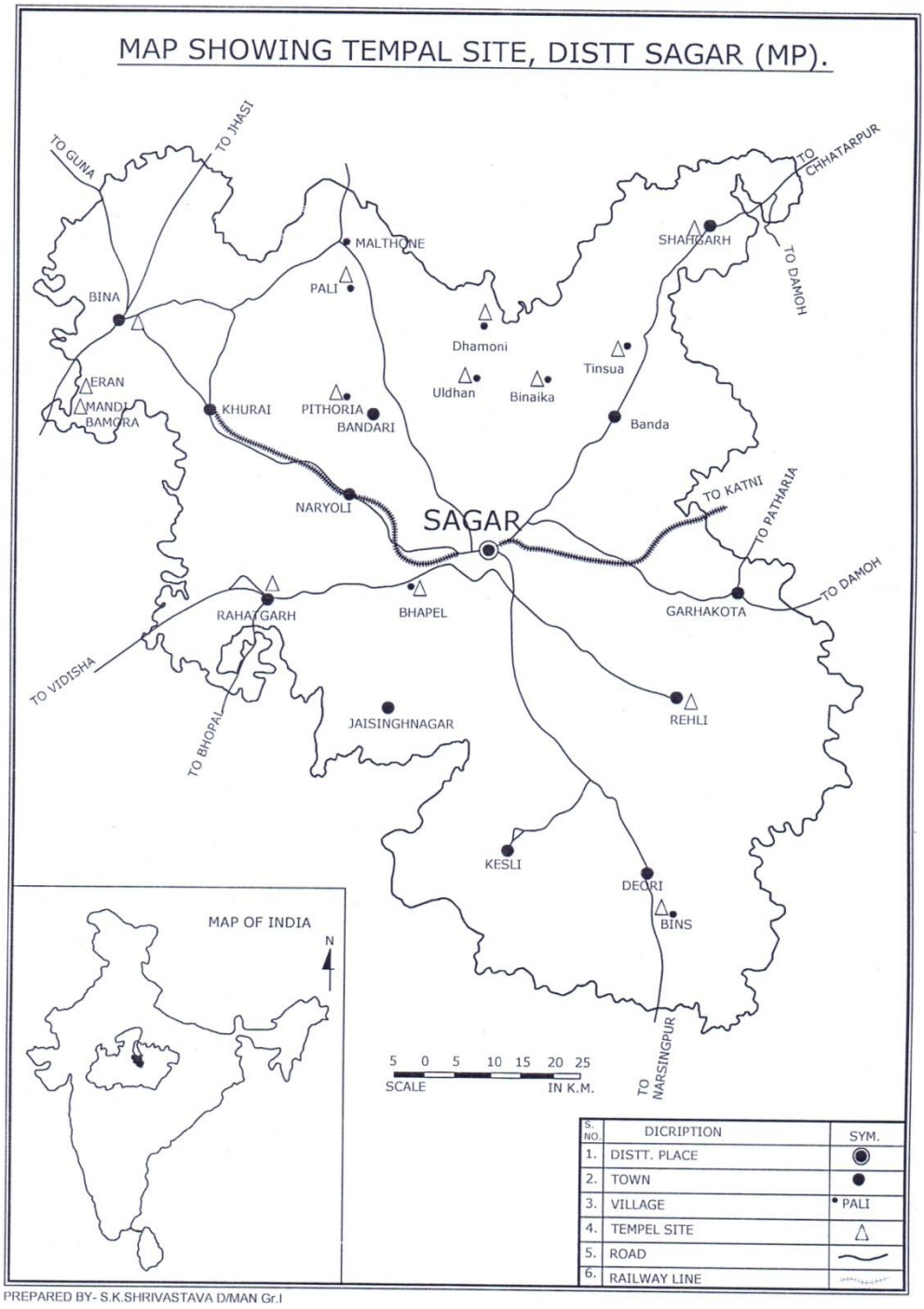
NORTHERN REGION

Architectural survey of temples in Sagar district of Madhya Pradesh was carried out under the direction of S.S. Gupta assisted by M. C. Joshi, L.K. Bhagchandani, S. K. Srivastava, and K.R. Malviya of the Survey with the aim to make an inventory of the temples including their documentation and study their art and architecture in all its manifestations. In a nutshell, a data bank of the temples (Unprotected /Centrally Protected/ State Protected) pertaining to the Sagar district has been prepared.

1. Siva Temple, Pali

Village Pali is located at a distance of 30.4 km north of Sagar on Khurai-Jhansi road contain a 9^{th}-10^{th} century CE temple of the Chandella is dedicated to lord Siva (Pl. 91a, Fig. 38). Facing east it is *pancharatha* in plan consists of a square sanctum and a porch in front with roof now missing. The sanctum has plain ceiling and its roof is supported on four corner columns. It enshrines a Siva-*linga* over a pedestalled *yoni-pitha*. The *panchasakha* doorway (Pl. 91b) of the temple is elaborately carved with lord Siva along with goddess Parvati embracing each other. Parvati's right arm is held at the neck of Siva. Faces of both the deities are chopped off. Siva stands in *tribhanga* posture while goddess Parvati is standing in cross legged and holds a snake in her left hand. The cardinal ends of the *sirdal* are occupied by standing Chaurdharini in a niche pedestal below which a male figure seated with their attendants is shown whereas the recesses are shown in two registers displaying Navagrahas in the upper register and Saiva devotees in two row in the lower register in which some of the devotees hold snake in their one hand. The architrave on the upper most part portray the figures of Brahma on the right cardinal end and probably Vishnu on the left now badly disfigured while Sapta Matrikas along with Ganesa and lord Siva in *tribhanga* posture in the middle. Below the architrave a thin band is also provided with the figures of flying Vidhyadharas. The *panchasakha* doorway is composed of *naga sakha, manava sakha, vyala sakha, mithuna sakha* and *vyala sakha.* River goddess Ganga and Yamuna are depicted along with their attendants at the left and right *pedya* respectively in the doorway. The doorsill is adorned with a central *mandaraka* flanked with a couple of Udadhikumaras along with elephants and lions at the ends. Further, it has a beautiful *chandrasila* which has been found in broken condition. The temple is stands a high *jagati* and approached through a flight of steps in the front. The *jangha* is resting upon a *jadyakumbha pitha* above which *khura, kumbha, kalasha* and *kapota* mouldings

Fig. 38



Pali: Map showing temple sites.

Plate 91

a

b

Pali: a; Siva temple and b; Doorway of Siva temple.

form the *vedibandha* portion. Sculptures are shown in single register. However, all the niches of *bhadra rathas* are empty. In some cases *prati rathas* as well as *karna rathas* contain sculptures of Dikpalas which include Agni, Vayu, Varuna, etc. *Sikhara* of the temple is missing.

3. Patneswara Mahadeo Temple, Rehli

The temple locally known as Patneswara Mahadeo is located about 25km from Sagar on Sagar-Reheli road towards south eastern direction. The temple is datable to 18^{th}-19^{th} century CE is now renovated. However, some of the sculptures kept under a tree (Pl. 92a) certainly reflect the early historic affiliation of the temple. These sculptures such as human, Chaurdharini and male deity may be datable to 10^{th}-12^{th} century CE.

4. Siva temple, Tinsua

The temple (Pl. 92b) is located about 45km north-east of Sagar in village Tinsua on a high hill originally seems to be of 9^{th}-10^{th} century CE probably of early Chandella period. Facing east the temple has a square sanctum with a short curvilinear *sikhara* having four corner miniature shrines. The door entrance preserves a figure of Siva seated over Nandi on *lalata*, Brahma-Vishnu_-Mahesh on the architrave above the *lalata* and river goddess Ganga-Yamuna at the *pedya* while the *lalata* figure is accompanied by Brahma at the right and Vishnu at the left cardinal ends. The temple stands on a low *jagati* having a high *bhitta* surmounted by a *jadyakumbha pitha* followed by usual vedibandha mouldings i.e. *khura, kumbha, kalasha* and *kapota Jangha*. It contains only one *bhadra* niche on all three sides displaying the figure of Ganesa on the south, Surya on the west and Kartikeya on the north.

5. Durga Temple, Tikitoria, Raheli

Village Tikitoria is located at a distance of 39km from Sagar on south-east direction in Raheli tahsil contains a temple known as Ma Durga (Pl. 93a), which having domed *sikhara*. However, the earlier references mention an old temple of Tiki Toria erected by Gopal Rao a Maratha at Reheli. Remains of earlier temple are exist here. It is quite possible that said temple is constructed on this plinth level as this temple retains the traces of *lakhori* bricks on its wall. Two ancient sculptures including four armed Vishnu and Brahma have been placed in the sanctum with modern paint.

6. Temple at Binaika

Village Binaika is located 38km north of Sagar. There is a temple datable to 10^{th}-11^{th} century CE. Facing, it is *pancharatha* in plan (Pl. 93b, Fig. 39). It contains a single row of sculptures on its *jangha*. The temple had a *mandapa* earlier which is now completely disappeared. The sanctum is without deity and the broad doorsill preserves a central *Mandaraka* flanked by Uadhikumaras along with lions on the cardinal ends. The temple stands on a plain *pitha* over which the *vedibandha* mouldings include *khur, kuabha, kalasha* and *kapota* stands. The sculptures in the temple display the various forms of deities such as Andhaksura Vadha, Trivikrama, Nrisimsha and Siva-family. Besides, the Dikpala

Plate 92

Rehli: Loose sculptures under a tree, Patneswara temple.

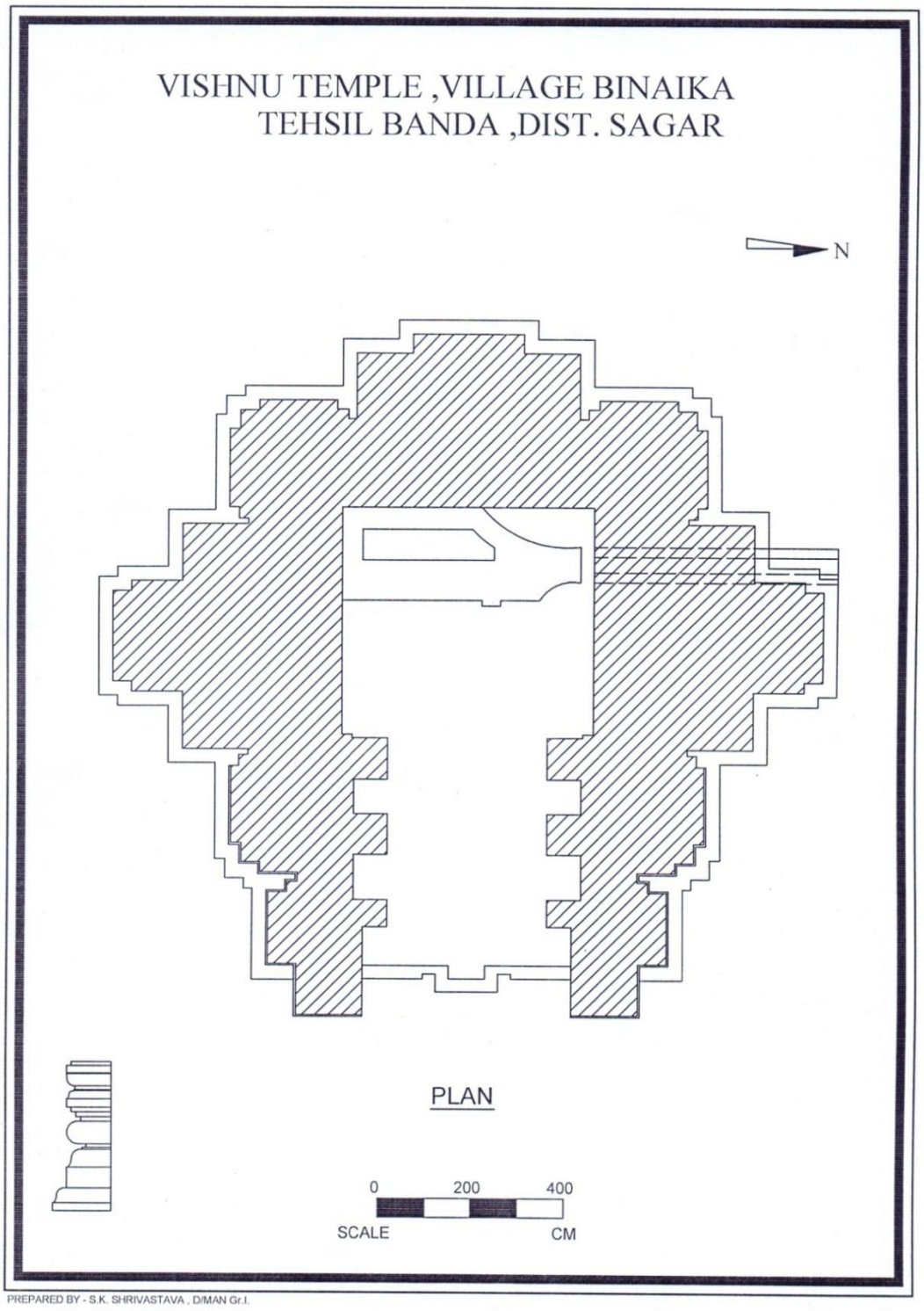
Tinsua: Siva temple.

Plate 93

Raheli: Durga temple, Tikitoria.

Binaika: Temple facing east.

Fig. 39



***B**inaika**:** Plan of temple.*

figures include Indra, Agni, Yama, Vayu, Kuber and Naikas as well as Viyalas.

7. Temples at Village Pithoria

Village Pithoria is situated 20km north-west of Sagar have three old temples (Pl. 94a) datable to 9th-10th century CE raised in a row on east-west orientation. The larger one (Pl. 94b) standing on the extreme west end consists of a *garbhagriha* and closed *mandapa* which seems to be provided in later period. *Garbhagriha* is approached through a narrow entrance having plain doorway. There is an image of Surya at right side of the doorway. The curvilinear *sikhara* of the temple has multiple projections all around which culminate up to the *amalaka*. Interestingly, four niches have been provided to the lower face of the *sikhara* on all four sides. The *stupi* over the *amalaka* is still extant. To the east of this temple a pillared *mandapa* (Pl. 95a) of same period is found which is in dilapidated condition. Its roof is damaged. The pillars having octagonal shaft bear the pot and foliage motifs. In the extreme east another temple (Fig. 40) dedicated to Saiva is located which consists of a square *garbhagriha* and a pillared *mandapa*. There is no deity inside the sanctum but a miniature Ganesa figure is noticed on the *lalata*. The doorway has three *sakhas*, including the inner most *Pushpasakha*. The *mandapa* is rectangular provided with three pillars at the front and two pilasters at the rear. The base of the pillar is composed of *khura, kumbha, kalasha* and *kapota* mouldings. The temple stands on the *jadyakumbha pitha*. On stylistic ground the temple may be datable to 9th-10th century CE. Besides, a small temple locally known as Mariha is located on south east corner of the village. It is simple in plan and consists of a square *garbhagriha* and closed *mandapa* along with domed *sikhara* without any deity inside.

8. Temples at Sahagarh

A village Sahagarh in tehsil Banda is situated 68km north-east of Sagar. It contains a few temples datable to 18th -19th century CE. The region was under the patronage of Gond rulers in 15th century CE. It came in to the possession of Bundelas in 18th century CE. There are three temples in this village. Presently, they are also called as Math. The notable among them is larger one (Pl. 95b). Its sanctum is octagonal in plan which displays the beautiful mural paintings (Pl. 95c) on its wall. The temple facing east is of *sandhara* type. The roof of this temple has parapet wall which is decorated with miniature cupolas. The temple has globular domed *sikhara.*

9. Temples at Dhamoni

Village Dhamoni imbued with a rich historical past is located 46·4km north of Sagar. It has a mediaeval fortress and 19th century Jaina temples but the architectural survey suggests that structures appear to be memorial temples. In absence of Jaina figure, they cannot be ascertained to Jaina pantheon.

10. Jaina temple No 01

This is a single story (Pl. 96a, Fig. 41) building consisting of a square sanctum with a short curvilinear *sikhara*, open verandah and an arched entrance in front. It is made of *lakhouri* bricks. The walls of the

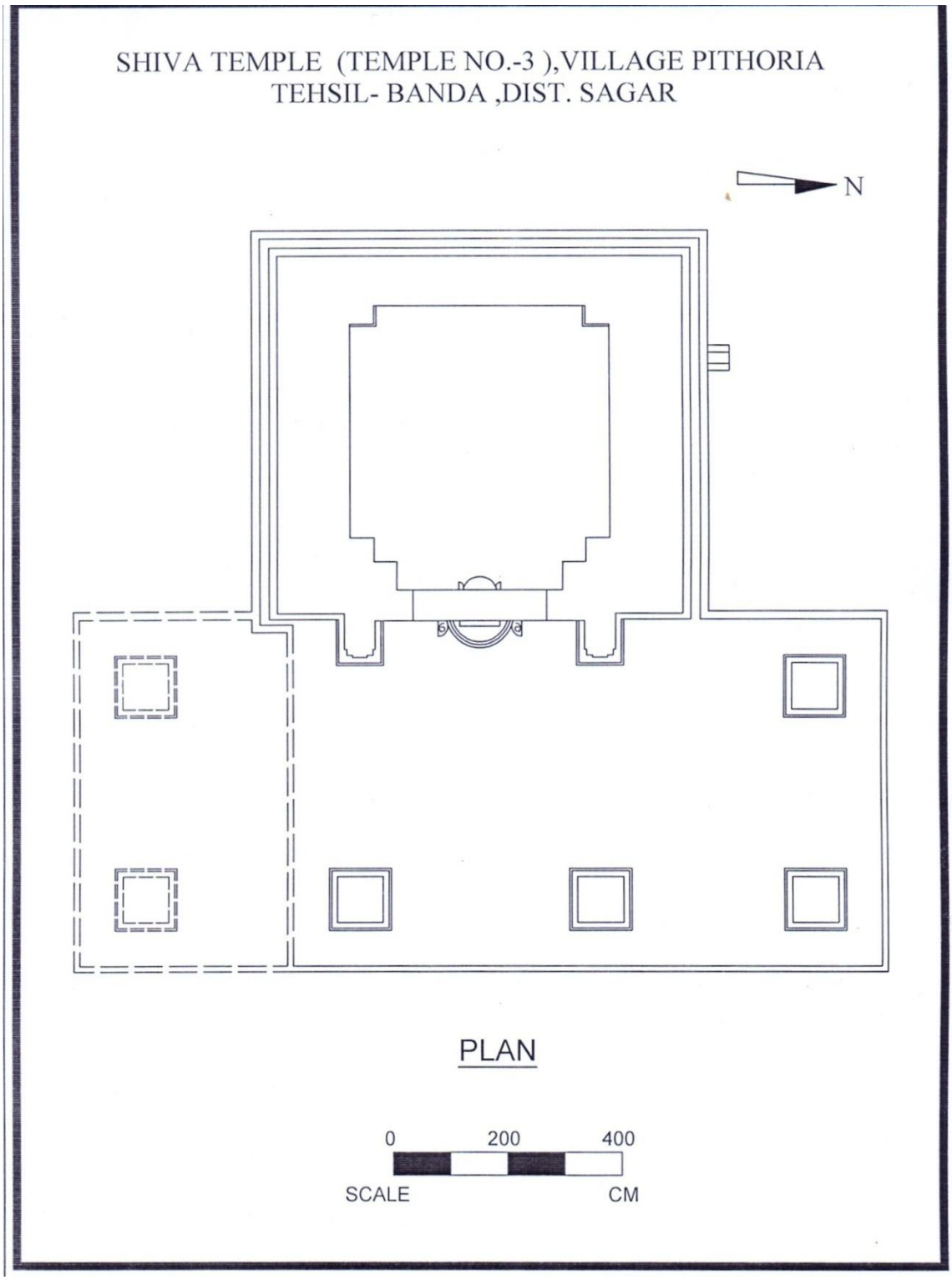
Plate 94

a

b

Pithoria: a; Complex and b; Larger temple.

Fig. 40



Pithoria: Plan of temple No. 3.

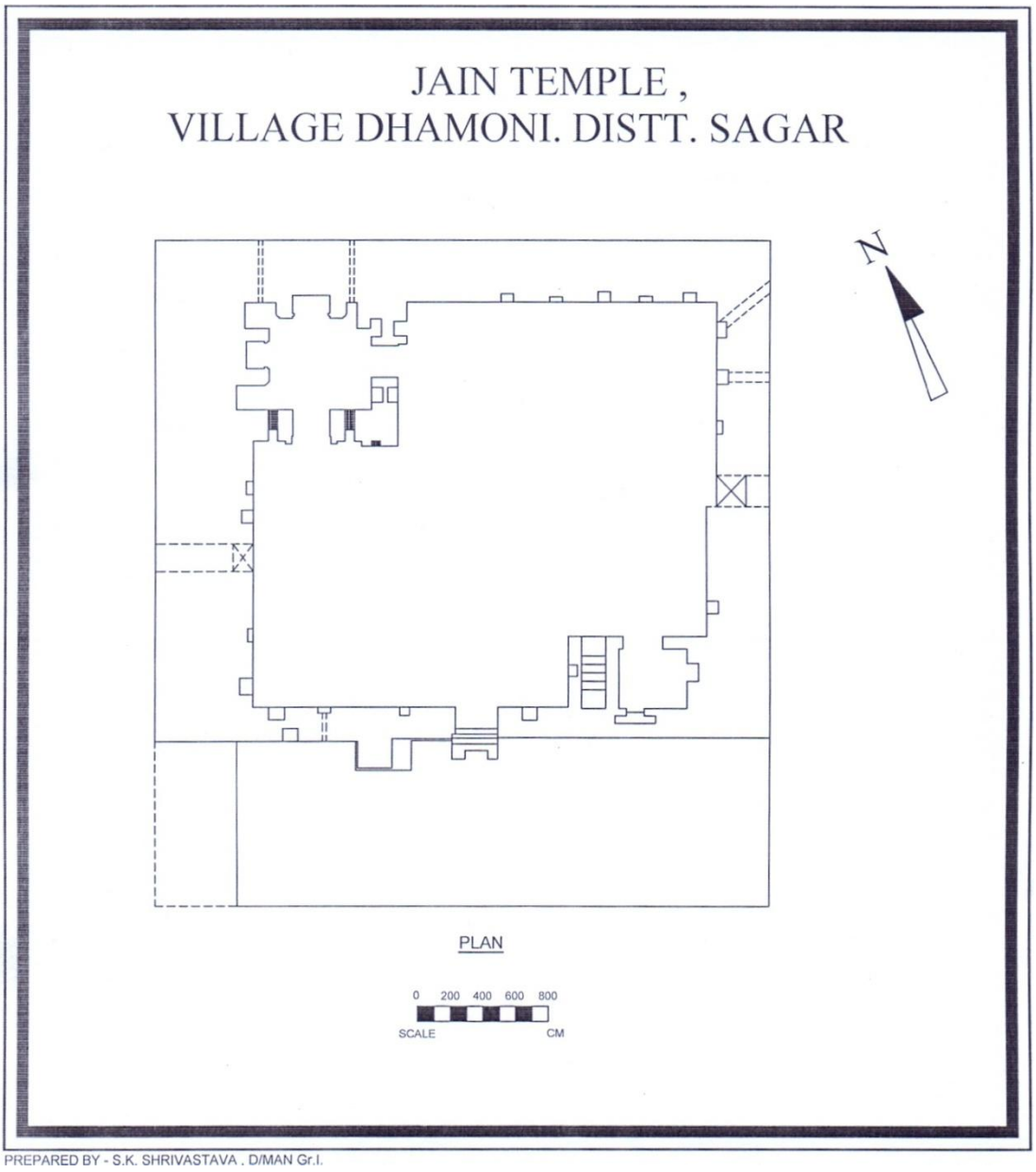
Plate 95

Pithoria: Mandapa near larger temple.

Sahagarh: Temple, north-west side.

Sahagarh: Paintings, temple.

Fig. 41



Dhamoni: Plan of Jain temple No 1.

sanctum possess a screen of three blind arches above which the bracketed *chhajja* has been provided at the *varandika* level. The sanctum has an arched opening on the east while the northern wall of it is provided with a deep niche which has cusped arch. The base of *sikhara* is octagonal which has four corner copulas. Besides, the corner projections of the *sikhara* have arched niches.

11. Jain Temple No. 02

Facing east, it stands on a high stone platform. The temple made of *lakhouri* bricks (Pl. 96b) is consisted of square chamber and an open verandah in front. An arched entrance gives the way to the *garbhagriha.*

12. Temple at Sesai

The village contains a 19th century temple known as Radha-Raman temple now completely renovated.

13. Temple at Eran

There is an ancient site located 25 kms from Banmora railway station of Central Railways at the junction of the Beena and Reuta Rivers. It contains a Vishnu temple of Gupta period along with a colossal figures of Bhuvaraha, Trivikrama, two huge Dwaja stambhas and various loose sculptures. The Vishnu temple (Pl. 97a) facing east is consisting of a *garbhagriha*, an *antarala* inside and a pillar porch .A colossal Vishnu image is placed in the sanctum. In plan it is Tri-*ratha* temple. A miniature figure of lord Vishnu over Garuda is carved on *lalata.* The *trishakha* doorway is composed of *nagaakha, pushpaakha* and *patraakha*. River goddess Ganga-Yamuna are displayed door-sill is depicted with dwarf pilasters at the middle and the cardinal ends in which middle one is decorated with a full blown lotus flanked by beautiful ducks on both the side while the recesses are adorned with *kirtimukhas*. The cardinal ends are adorned with mythical figures such as half human and half animals along with elephant and birds. The *mandapa* is composed of two pillars and two pilasters at the rear. Its roof is flat.

14. Mariha at Mandi Bamora

A Ma**r**iha (Pl. 97b), locally know as Kush Mariha is located about 800m north-east of Siva temple of Mandi Bamora. Facing north the shrine is dilapidated and made up of large stone blocks. Its *sikhara* is missing. There are sculptures on *jangha* including Vishnu-Lakshmi, Kubera, Siva and Vinayaka. All the sculptures are heavily weather worn.

Besides, there are some notable loose sculptures including *Varaha, Kirtimukha,* human bust, architectural fragments and an *amalaka* kept under a tree.

Plate 96

a

b

Dhamoni: a; Jaina temple No 01 and b; Temple No. 02 (north-west corner).

Plate 97

Eran: Vishnu temple.

Mandi, Bamora: Mariha facing north.

VII. PRESERVATION OF MONUMENTS

MONUMENTS OF NATIONAL IMPORTANCE

BANGALORE CIRCLE

KARNATAKA

1. KEERTINARAYANA TEMPLE, TALAKAD, DISTRICT MYSORE

The work of reconstruction of the eastern *mukhamandapa*, *ardhmandapa* and the *garbhagriha*, including erection of pillar bases, capitals, beams and roof slabs have been completed (Pl. 98).

2. VAIDYESWARA TEMPLE, TALAKAD, DISTRICT MYSORE

The Dwaragopura, Srivimana and parapet have been given colour toning in two courses of requisite snowcem. The uneven stone flooring in the northern and western sides of inner courtyard have been re-laid to avoid stagnation of rain water. The decayed plastering of ornamental floral designs on the northern side of the parapet wall has been carefully restored in traditional mortar and given suitable colour toning (Pl. 99).

3. FORT, LARGE MASONRY ELEPHANTS, MADIKERI, DISTRICT COORG

Lime motar plastering on top surface of the fort wall have been re-laid in the disturbed area of the battlement inside the fort to stop seepage.

4. STATUE OF GOMMATESHWARA, KARKALA, DISTRICT UDUPI

Reconstruction of compound wall in laterite stone masonry at Jain statue complex of Gommateshwara, has been completed (Pl. 100).

5. RAMALINGESHWARA TEMPLE, AVANI, DISTRICT KOLAR

The disturbed stone flooring around the temple has been removed and re-laid in lime mortar as per original.

6. KESHAVA TEMPLE, BELUR, DISTRICT HASSAN

The old damaged rubble flooring behind the Ranganayaki temple has been removed and re-laid with new schist stone flooring after proper dressing and side cutting.

7. PARSHWANATHA BASADI, HALEBIDU, DISTRICT HASSAN

The leaky roof of the Basadi has been repaired after carefully removing the damaged and decayed weathering stones and re-laid with fresh lime concrete and finished by using traditional mortar plastering with necessary gradient to drain out of rain water (Pl. 101).

8. SHANTHINATHA BASADI, HALEBIDU, DISTRICT HASSAN

Plate 98

a

b

Talakad: a; before and b; during conservation of Keertinarayana temple.

Plate 99

a

b

Talakad: a; before and b; after conservation of Vaidyeswara temple.

Plate 100

a

b

Karkala: a; before and b; after reconstruction of compound wall of statue of Gommateshwara.

Plate 101

a

b

Halebidu: a; before and b; after conservation of Shanthinatha basadi.

The leaky roof of the Basadi has been repaired after carefully removing the damaged and decayed weathering stones and re-laid with fresh lime concrete and finally finished by using traditional mortar plastering with necessary gradient to drain out of rain water.

9. RANGANATHASWAMY TEMPLE, SRIRANGAPATNA, DISTRICT MANDYA

The damaged stucco figures over the entrance of *gopura* at east were restored to their original shape as per the available evidence with specially prepared lime mortar and finished with suitable colour toning to match the aesthetics of the monument. A stainless steel pipe barricade inside the temple has been erected to regulate the movement of tourists (Pl. 102).

10. GUMBAZ, SRIRANGAPATNA, DISTRICT MANDYA

The exterior and interior surfaces of the Mosque and Khan Khana have been given suitable colour toning as per original (Pls. 103-104).

11. DARIA DAULAT BAGH, SRIRANGAPATNA, DISTRICT MANDYA

The old and damaged GI sheets have been removed and fresh galvanized sheets were provided to prevent leakage of rain water to the paintings of wooden ceiling (Pl. 105).

12. PANCHALINGESWARA TEMPLE, GOVINDANAHALLI, DISTRICT MANDYA

The work of dismantling the out-of-plumb *bhitti* portion of the temple shrines of Eswareshwara and Purusheswara, has been completed after proper documentation. Resetting of the same is in progress (Pl. 106).

13. HARIHARESHWARA TEMPLE, HARIHARA, DISTRICT DAVANGERE

The sunken stone flooring in front of Lakshmi shrine has been dismantled and replaced as per original. The platform has been provided with schist stone flooring. The Keeli Anjaneya temple has been restored with available stones and the stone flooring in the rear side of the temple has also been replaced as per original (Pl. 107).

BHOPAL CIRCLE

MADHYA PRADESH

14. TOMB OF NADIR SHAH AND COMPOUND AT BURHANPUR, DISTRICT BURHANPUR

Conservation of the terrace was taken up by way of providing RR masonry in lime mortar and stitching of stone masonry and providing of flag stone were completed while the underpinning in lime mortar is in progress.

15. BIBI SAHIB'S MASJID AND COMPOUND AT BURHANPUR, DISTRICT BURHANPUR

In continuation of previous year's work, underpinning, stitching in brick masonry along with fixing of MS grill was completed. The work of applying lime plaster and laying lime concrete up to the slab level is in progress.

16. MUMTAJ BEGUM HAMAM BURHANPUR FORT, DISTRICT BURHANPUR

Plate 102

a

b

Sriranagapatna: a; before and b; after conservation of Ranganathaswamy temple.

Plate 103

a

b

Srirangapatna: a; before and b; after conservation of Gumbaz.

Plate 104

a

b

Srirangapatna: a; before and b; after conservation of Gumbaz.

Plate 105

a

b

Srirangapatna: a; before and b; after conservaiton of Daria Daulat Bagh.

Plate 106

a

b

Govindanahalli: a; before and b; after conservation of Panchalingeswara temple.

Plate 107

a

b

Harihara: a; before and b; after conservation of Harihareshwara temple.

Flagstone flooring on the lime base mortar was provided on all exposed surface.

17. TOMB OF SHAH NUMA, ASIRGARH, DISTRICT BURHANPUR

The work of laying stone slab flooring on exposed surface over lime concrete base is in progress.

18. DOME OF SHAH NAWAZ KHAN, BURHANPUR, DISTRICT BURHANPUR

The work of providing flag stone to the outer pathway and plinth protection of the tomb has been completed. C.R. masonry work to the boundary wall of the monument is in progress.

19. SHIV TEMPLE AT ASIRGARH FORT, DISTRICT BURHANPUR

The works of underpinning and stitching in stone masonry and exposing of underground structures in the *baodi* of the temple were taken up and work is in progress.

20. DAI-KI-CHHOTI BEHAN KA MAHAL, MANDU, DISTRICT DHAR

In continuation of the previous year's work repairs to the structural remains in front of the monument were completed.

21. CARVAN SARAI AT MANDU, DISTRICT DHAR

Chain link fencing around the monument was provided in view of safety and security.

22. GADA SHAH'S PALACE, MANDU, DISTRICT DHAR

The work of providing and fixing chain link fencing around the monument and RR stone masonry works are in progress.

23. RANMUKTESHWAR TEMPLE, KUKKARAMATH, DISTRICT DINDORI

The works of providing dwarf wall in C.R. masonry along with MS grill and stone coping as well as laying of lime concrete apron around the temple, fixing of dressed stone over lime concrete base on pathway and pointing were taken up. The surrounding area of the monument is also being developed for beautification.

24. CAVE NO.2, BAGH, DISTRICT DHAR

The work of drawing including plan and elevation, section and condition mapping of the cave is in progress.

25. ANCIENT SITE, PAWAYA, DISTRICT GWALIOR

Recessed pointing on the outer periphery of the wall is in progress.

26. IMAGES LOCALLY KNOWN AS SADA BHADA, DISTRICT JABALPUR

Sculpture shed was provided with boundry wall for safety and security. Besides cement concrete flooring inside the shed was also provided.

27. MAHAKALEHSWARA TEMPLE NO.1, UN, DISTRICT KHARGONE

Pointing, watertightening, underpinning and replacing of old and weaken stones of the platform of the temple with dressed stones matching to the original were taken up and work is in progress.

28. MAHAKALESHWARA TEMPLE NO.2, UN, DISTRICT KHARGONE

The work of constructing CR masonry wall to the east side of the monument is in progress.

29. BRHAMANICAL ROCK-CUT TEMPLE, DHAMNAR, DISTRICT MANDSAUR

The work of repair of *chajjas*, filling of cracks, underpinning, watertightening, lime plastering were taken up. The work of fixing the MS grill over the compound wall, pointing and plastering work on the walls of store room were also taken up (Pl. 108).

30. BUDDHIST CAVES NO. 1 TO 51, DHAMNAR, DISTRICT MANDSAUR

Stone masonry work in lime mortar with laterite stone and the work of filling the cracks with laterite pack technique including lime mortar were taken up. The other conservation works like underpinning, watertightening and the construction of boundary wall in laterite blocks are in progress.

31. SHIV TEMPLE (KAKANMATH), SUHANIA, DISTRICT MORENA

The work of providing and fixing of stone slab flooring over lime concrete base along with the work of recessed pointing in the east side of *Mandapa* and on main steps of the platform were carried out. While the work of excavation, leveling and dressing of the open area around the monument for landscaping is in progress.

32. GROUP OF TEMPLES, BATESAR, DISTRICT MORENA

In order to prevent the rain water on the structures concrete in the foundation and sand mortar in the walls were provided. RR stone masonry was provided in the drain wall so as to prevent rain water from hill top to temple area and drain out the rain water through the wall from the outer side. The work of resetting the stone slab over the pre-laid lime concrete base have been completed while the work of dry stone pitching for laying them alongside of stairs at Dhonda Math temple is in progress.

33. TEMPLES 1-22, NARESAR, DISTRICT MORENA

The work of desalting of the *baodi*, removing of heavy stones from drain and collection of usable material for further use was carried out. The work of resetting the missing portion of ashlar stone masonry was also taken up.

34. SCULPTURE SHED, AJAIGARH, DISTRICT PANNA

Construction of dwarf wall in CR masonry for purpose of safety and security of the sculpture is in progress.

35. RAISEN FORT, RAISEN, DISTRICT RAISEN

The fortification wall was restored by providing RR masonry and resetting with fallen material. Underpinning within Badal Mahal was carried out to stabilize the overhead structure. Watertightening at adjoining *burj* and wall and stone pitching work between Baradari and Bhopal Gate and cleaning of vegetation are in progress.

Plate 108

a

b

Dhamnar: a-b; during conservation of Brhamanical Rock-Cut Temple

36. SAVITE TEMPLE, BHOJPUR, DISTRICT RAISEN

An interpretation centre was set up so as to enable the visitors to understand the history art, architecture, techniques applied for the construction of the temple. The work of providing stone pitching near interpretation centre, tiles on wooden steps of the main temple and laying of pipes near rock engraving were also taken up.

37. STUPAS AND OTHER REMAINS, SATDHARA, DISTRICT RAISEN

Dry stone masonry work to the southern side of the Stupa no. 7 was taken up and is in progress.

38. BUDDHIST STUPA AND MONASTERY, BARHAT, DISTRICT REWA

The work of providing RR stone boundary wall along with chain link wire fencing over it was provided for security and safety of the monument.

39. RAHATGARH FORT, SAGAR, DISTRICT SAGAR

The work of resetting of the stairs of *baoli* and the work of RR masonry was taken up after completing the vegetation clearance.

40. VIRAT TEMPLE AND REMAINS, SOHAGPUR, DISTRICT SHAHDOL

The work of taking out loose stone and debris from the platform of the temple and filling it with RR stone masonry is in progress.

41. SURWAYA GADHI, SURWAYA, DISTRICT SHIVPURI

The work of providing stone slab on lime concrete base was completed

42. GADARMAL TEMPLE, BADOH PATHARI, DISTRICT VIDISHA

The work of resetting of flooring and rising of dwarf wall is in progress.

43. HELIODORUS PILLAR LOCALLY KNOWN AS KHAMB BABA, BESNAGAR, DISTRICT VIDISHA

Repair of pathway around the boundary wall of the monument was taken up and work is in progress.

44. CAVES 1 TO 20, UDAYGIRI, DISTRICT VIDISHA

The steps at Cave nos. 19 and 20 were repaired and stone pitching at Cave no.19 is in progress.

45. UDAYESHWAR OR NEELKANTHESHWAR MAHADEVA TEMPLE, UDAYPUR, DISTRICT VIDISHA

Replacing the bulged and broken pieces of stone flooring and re-fixing them in their original place over the base of lime concrete was taken up and work is in progress.

46. ARCHAEOLOGICAL MUSEUM SANCHI, DISTRICT RAISEN

The toilet blocks at the museum premises were repaired by providing the plaster at the walls, cement concrete flooring, brick masonry work, fixing of ventilation grills, supply of water and providing of sewage pipe line.

BHUBANESWAR CIRCLE

ODISHA

47. KEDARESVAR TEMPLE, CHOUDWAR, DISTRICT CUTTACK

The conservation work of the sub-shrine has been completed by way of watertightening, pointing, grouting and resetting of khondalite stone with traditional lime mortar.

48. ANCIENT SITE, BANESWARNASI, DISTRICT CUTTACK

In continuation of previous year's work the restoration and repair of the damaged *pidha* portion of *jagamohana* of Padmesvara Mahadeva temple is in progress.

49. EXCAVATED BUDDHIST SITE, LALITAGIRI, DISTRICT CUTTACK

In continuation of previous year's work the conservation of the monastery and *chaitya* complex has been completed by way of watertightening, pointing, grouting with traditional lime mortar.

50. EXCAVATED BUDDHIST SITE, UDAYAGIRI-2, DISTRICT JAJPUR

The conservation work of the shrine complex in front of the monastery of the Udayagiri-2 was taken up by way of watertightening, pointing, grouting with traditional lime mortar.

51. LINGARAJ TEMPLE, BHUBANESWAR, DISTRICT KHORDHA

The erection of tubular scaffolding on the southern side of main temple was taken up for undertaking physical examination and repairing of the *kalasa* of the temple. Renovation of the original ancient drainage system of the temple complex in north-west corner is in progress. The repair of stone columns/walls by pinning the same material i.e. sand stones of *natamandapa* is in progress. The pointing work of the main temple is also in progress.

52. SAHASRALINGA TANK, BHUBANESWAR, DISTRICT KHORDHA

In continuation of previous years work the restoration of the embankment wall of the dilapidated tank has been completed.

53. PAPANASINI TANK, BHUBANESWAR, DISTRICT KHORDHA

The restoration work of the embankment of the dilapidated tank is in progress.

54. CHAUSATHI YOGINI TEMPLE, HIRAPUR, DISTRICT KHORDHA

The work of replacement of laterite pavement of the monument with sandstone, construction of sandstone pedestal for Gopinatha sculpture, laterite stone pavement around Gopinatha sculpture including earth work excavation, sand filling, bed concrete, flush pointing has been completed (Pl. 109).

55. ANCIENT SITE, HARIPURGARH, DISTRICT MAYURBHANJ

In continuation of previous year's work, the structural repair to the excavated brick structures by way of dismantling, resetting and recess pointing of the brick joints, replacing the decayed bricks with available bricks with traditional lime *surkhi* mortar as per the original is in progress.

Plate 109

a

b

Hirapur: a; before and b; after conservation of platform of Chasathi Yogini temple.

56. SRI JAGANNATHA TEMPLE, PURI, DISTRICT PURI

Replacement of old damaged architectural members of *bandhana* and upper *jangha* of *kanikapaga* in the north-west corner is in progress by way of providing with new khondalite stone blocks and re-fixing with epoxy resin and stone key. Unauthorized structures abutting the *simhadwara* and *Meghanadaprachira* in the north side of the eastern entrance *gumuta* have been removed. After the demolition of Pratihari Niyoga the de-plastering of the lime plaster and brick/concrete encased walls from the northern side wall of the *gumuta* was taken up. Structural repair in the *bandhana* of the *bada* of eastern *gumuta* is in progress by way of resetting and recess pointing of the joints, replacing the decayed stones with new ones with traditional lime mortar as per the original. Laying of the floor on the basement of the Nabagraha shrine after dismantling the damaged stones with dressed khondalite blocks attended. Construction of khondalite stone pillars abutting the old Jaya-Vijaya pillars of *simhadwara* with interlocking in between the alternate layers and making grooves in old pillars for fixing the stone key has been completed.

Replacement of missing and damaged architectural members in *pabhaga* and upper *jangha* of north side *bada* of *simhadwara gumuta* is in progress. Laying of khondalite dressed stone blocks in the inner passage of *simhadwara gumuta* is in progress.

The removal of the dead plaster from the *jagamohana* of the main temple on north-east corner is in progress. The work of de-plastering of northern entrance to the temple complex is also in progress. Besides, lying of khondalite stone flooring to the western side of the main temple by way of replacing the damaged stones with new one is in progress. Injecting PMC mortar to the north - west side *bada* of *jagamohana* for consolidation of the inner core of the masonry after making holes of 16mm *dia.* up to a length of 400mm was done. Repairing of the *chakra* of *jagamohana* with steel riveting/bolting and welding at the damaged parts of the *astadhatu chakra* was done. Lightening arrester system was provided to *nilachakra* of the *jagamohana* in the north side for safety of the temple.

Repairing of flooring in the Western side *dhukudi-dwar* and *rosaghar* of the complex was taken up by way of replacing of the undulated *khondalite* stone blocks.

Repair to the *garbhagriha* of the main temple was taken up during the Rathayatra. The following conservation measures were attended:

I. Chemical cleaning and washing of the *garbhagriha*, 1st floor, Steel trusses, *ratna singhasana*, silver door, silver plate, brass doors, brass plates was done.

II. Colouring and painting to the walls, ceilings, MS *jali*, beams and wooden rafters and the *kanakamundi* (wooden canopy) over the *ratnasinghasana* and MS wooden doors of *jagamohana*, *natamandapa*, *bhogamandapa* and entrance *gumutas* with matching colour was done.

III. Drilling holes of 22 of 18mm dia. to the ceiling stones at the slit line for air more effective circulation/ventilation up to

1m depth was done after removing the top lime concrete layer and exposing the slit lines.

IV. Providing and fixing SS rack/box at the side wall of *dhukudi-dwara* of the *jagamohana* after replacing the wooden members was done.

V. Replacing the sunken and damaged stone slabs from the *natamandapa* floor with dully dressed and finished with combine mortar and filling the joints with PMC mortar.

VI. Fixing of new ceiling support to the *jagamohana* with good quality plywood pieces was also done.

VII. Petty patch repairs to the damaged plasters surface of side walls of *jagamohana* and *natamandapa* with combine mortar/PMC mortar at the decorative parts was attended. The colouring over the finished surface and joint sealing to the uneven floors of *bhogamandapa* with PMC mortar matching with the original colour and texture was also taken up.

The de-plastering of the dead and decayed lime plaster in the south side *bada* near *dakhinighara* has been taken up after erecting tubular scaffolding and supporting to the projected *pidha* stones and other dislodged members. The wall has been completed up to the *bandhana* layer. The visible cracks lines have been identified for marking with tell tale. The *kalasa* of the *jagamohana* has been supported with strong and rigid platform and a loose plaster has been taken out in the lower dome part and top glass for thorough repairs. The work is under way. The replacement of damaged stones in the *bandhana* and upper *jangha* of the *bada* in the north-west side is also in progress.

The repairs to the undulated and sunken floor in the western side of the complex taken up with removal of the damaged stones. The dressing of the new khondalite stone blocks is in progress for laying in front of Sabitri and Khirochora Gopinatha temples.

The damaged and sunken stone floor with steps has been taken of at the north entrance gate. A portion of floor near Sitala temple and its approach was repaired with new and old khondalite stone block with combine mortar. The recess pointing to the fine joints has been completed.

The construction of new masonry wall has been erected outside the *Meghanada prachira* of the eastern side with fine dressed sand stone blocks. The damaged stagings around the *nilachakra* of the main temple has been dismantled for erection with new MS tubular pipes for repair of the *kalasa*.

57. SUN TEMPLE, KONARK, DISTRICT PURI

The erection of tubular scaffolding for attending documentation, laser scanning as well as structural and chemical cleaning are in progress. The work of providing the drainage system from pump set to outer drain has been completed.

CHANDIGARH CIRCLE

HARYANA

58. DARGAH OF HAZRAT SHEIKH JALALUDIN, HARSH-KA-TILA, KURUKSHETRA

The work of repair to the bulged underground cells after taking out of uneven portion was done. Restoration of tile brick flooring after dismantling uneven portion with lime concreting was also carried out.

59. KARAN-KA-KILA, THANESAR, DISTRICT KURUKSHETRA

Grill fencing around the ancient mound was done.

60. HARSH-KA-TILLA THANESAR, DISTRICT KURUKSHETRA

Collapsed boundary wall of south side of ancient mound was restored.

61. PATHAR MASJID, THANESAR, DISTRICT KURUKSHETRA

The work of providing of red sandstone flooring was taken up and work is in progress.

62. NABHA HOUSE, THANESAR, DISTRICT KURUKSHETRA

The work of providing wooden roof with rafter, planks including laying lime concrete and tile brick flooring after dismantling slabs on the roof, modern structure on the back of Nabha house was taken up and completed.

63. CHURCH TOWER, DISTRICT KARNAL

The work of providing apron around graves, boundary wall and pathway with tile brick on edge flooring with lime concreting was done.

64. KABULI MOSQUE, DISTRICT PANIPAT

Underpinning of western portion of the mosque with traditional mortar was taken up and work is in progress.

65. ADI BADRI COMPLEX, DISTRICT YAMUNANAGAR

Dwarf wall in tile brick with grill fencing in south west portion of the site was repaired. Collapsed wall of the north portion was restored.

66. ANCIENT MOUND, COMPLEX SHEETLA MATA MANDIR, AGROHA, DISTRICT HISSAR

Re-construction of collapsed wall with grill fencing at the site was taken up and work is in progress.

67. ANCIENT SITE RAKHIGARHI, DISTRICT HISSAR

Boundary wall with grill fencing was provided around Mound no. 1 to avoid further encroachment at the site.

68. FEROZ SHAH PALACE, DISTRICT HISSAR

Repair to the inner cells of Tehkhana was taken up offer removing of debris.

69. BARSI GATE, HANSI, DISTRICT HISSAR

Restoration of circular front, walls, roof and floor area was taken up by way of plastering and pointing.

70. LAT KI MASJID, DISTRICT HISSAR

Restoration of red sandstone *jali*, plastering of inner gumbad area was taken up and work is in progress**.**

71. ANCIENT MOUND, DISTRICT NAURANGABAD

Dwarf wall in the remaining portion of mound was provided.

72. SURAJ KUND, LAKARPUR, DISTRICT FARIDABAD

The works of grill fencing, pitching and painting was completed. Dislodged stone of lower steps were conserved. Repair of the tank, remaining portion of Gaughat besides leveling of earth bed were completed.

73. JAL MAHAL, DISTRICT NARNAUL

MS grill on existing dwarf wall in north east side were provided. Fencing of remaining portion of parking in the entrance gate was done. Scientific clearance of inlet of water tank and dwarf wall on south west side was taken up and is in progress.

74. GROUP OF TOMBS, JHAJJAR, DISTRICT JHAJJAR

Pathway and gate were provided around the protected area to facilitate the visitors.

75. KOS MINAR 22, AURANGABAD, HODAL, DISTRCT PALWAL

Repair to the Kos Minar 22 was done.

76. BUDIYA-KA-NALLA, DISTRICT FARIDABAD

Repairs to dilapidated structure was done by way of using traditional mortar matching with the original.

77. SHAHJAHAN-KI-BAOLI, MEHAM DISTRICT ROHTAK

Repair to the ancient wall of the monument was taken up and work is under progress.

78. GAUSE ALI SHAH, DISTRICT FARUKHNAGAR

The work of repair to the sunken wall of *baoli*, plastering and laying of tile bricks on roof was taken up and is in progress.

79. MACHIGHAR AND HAMMAM BUILDING, COMPANY BAGH, DISTRICT AMRITSAR

The work of providing of tile brick on edge apron, flooring and providing red sandstone *jallis*, watertightening of rooms were done.

80. SHAMSHER KHAN TOMB, DISTRICT BATALA

Grill fencing with dwarf wall, pointing to enclose wall was done. Parking area was also developed.

81. TAKHT-E-AKBARI, DISTRICT KALANAUR

The work of taking out of dislodged masonry and providing of tile brick masonry and MS grill fencing, lime plaster and lime concreting of flooring, etc. was completed

82. GATEWAYS OF SARAI, AMANAT KHAN, DISTRICT TARAN TAARAN

Repair to the east and west of the south side cells of western gate were taken up. In addition, removal of earth, underpinning, pointing, stitching besides flooring and restoration of roof was also attended.

83. GATEWAY OF OLD SARAI, DISTRICT FATEHABAD

Lakhauri brick/tile masonry, stitching of cracks, pointing lime concreting and flooring was attended.

84. RAM BAGH GATE DEODI, DISTRICT AMRITSAR

The work of providing of lime concrete, plaster, tile brick masonry of boundary wall, tile brick on edge for flooring and roof, cement plaster, lime mortar to highly designed decorated carved and moulded windows and painting was done.

85. DAKHNI SARAI, NAKODAR, DISTRICT JALANDHAR

The western wall of Sarai was conserved and apron was provided. Decayed plaster, *lakhauri*/tile brick masonry on both side of the gate and western tower with roof were removed and repair to the same was taken up and work is in progress.

86. NOOR MAHAL SARAI, NOORMAHAL

The work of repair of the monument by way of underpinning of west side wall and plaster of the gate was taken up and is in progress.

87. ANCIENT SITE THEH GHATI NAGAR

Providing and fixing of dwarf wall with grill fencing in north east at Theh ghati is in progress.

88. BHATINDA FORT, DISTRICT BHATINDA

Repairs to the Fort wall was carried out by way of providing *lakhauri*/tile brick masonry in arches, cornices, providing and laying of lime concrete and brick terracing, pointing in east side. Providing and laying lime concrete, flat brick terracing, tile brick masonry in *chajjas* cornices, pointing in south side of inner fortification wall was also attended. Providing and fixing tile brick on edge in pathway from Gurudwara to main gate was also completed.

89. EASTERN GATE, STAIRS AND COLLAPSED FORT WALL BEHIND EXISTING GURUDWARA, BHATINDA FORT, BHATINDA, DISTRICT BHATINDA

The work of providing of mud brick masonry core in wall, providing of *lakhauri*/tile brick masonry in arches, vaults of stairs and gate were attended. Lime concrete in floor, brick terracing, plastering, pointing was also done.

90. QILA ANDROON, BAGICHI GHAR, DISTRICT PATIALA

The work includes providing and fixing of sapwood settings of different sizes and deodar wooden planking on the roofs, door frames were attended. Providing and laying of lime concreting in roofs, rooms, pointing of joints in tradition mortar were attended. The above works were attended under deposit work.

91. PAINTED HALL AND OTHER CELLS BEHIND BURJ BABA ALA, DISTRICT PATIALA

The work includes providing *lakhauri* country tile brick masonry, 1st class

sapwood, deodar wood, teak wood, in roof, door, window frames and panel was completed. Wood painting, water proofing sheets over wooden paint, tile brick terracing over wooden plank, lime concrete, pointing, plastering works were also attended.

CHENNAI CIRCLE

TAMIL NADU

92. RAMPART WALLS, FORT ST. GEORGE, DISTRICT CHENNAI

The work of conserving the fallen/missing portion of the fortification walls has been completed (Pl. 110).

104. MURUGANATHA TEMPLE, TIRUMURUGANPUNDI, DISTRICT COIMBATORE

The work of conserving the damaged brick flooring of the temple has been completed. The work of conserving and plastering the brick masonry of the *abisheka* water drainage wall of the temple has been completed. The work of laying of stone flooring and pointing the stone joints on Bhairava, Suriya and Bhavaniswarar sub shrines has been completed. Providing of iron grill gate on Bhairava, Surya and that Sinamoorthy sub shrines has also been completed.

103. CHENNARAYA PERUMAL TEMPLE WITH ADJACENT LANDS, ADIYAMANKOTTAI, DISTRICT DHARMAPURI

The work of conserving the stone masonry wall on the western and northern sides of the protected area (partly) has been completed. The work of providing the stone flooring of in front of the temple has been completed.

93. SHORE TEMPLE, MAMALLAPURAM, DISTRICT KANCHIPURAM

The damaged fencing was removed and provided with a new one on the southwest and northwest of the monument. The work of pointing the stone masonry walls as well as stone flooring (damaged portion) of the protected area has been completed.

94. GROUP OF MONUMENT AT HILLOCK, MAMALLAPURAM, DISTRICT KANCHIPURAM

The work of repairing the badly damaged pathways connecting different monuments on the hillock are taken up and work is in progress.

95. MUNKUDIMI ESWARAN TEMPLE, P.V. KALATHUR, DISTRICT KANCHIPURAM

The badly damaged and the dislocated door of the temple was removed and provided with new teak wood door with the necessary fitting on the south east side of the temple.

98. MEGALITHIC CAIRNS AND CISTS, KARANITHANGALI, DISTRICT KANCHIPURAM

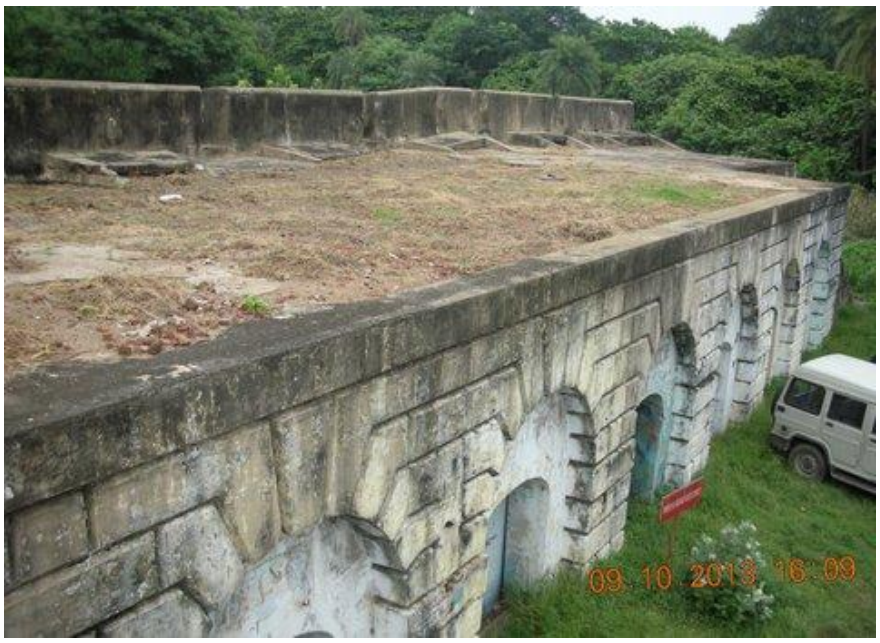
The work of providing fencing on the western side of the protected area has been completed.

100. MEGALITHIC CIST WITH BOUNDING STONE CIRCLES, VADAMANGALAM, DISTRICT KANCHIPURAM

The work of providing fencing to the protected area has been completed.

102. IRAVATANESVARA TEMPLE, KANCHIPURAM, DISTRICT KANCHIPURAM

Plate 110



a

b

Fort St. George: a; before and b; after conservation of rampart walls.

The work of providing fencing around the monument has been completed. The work of providing the new stone flooring near the gap between compound wall and exiting flooring around the temple has been completed. The work of strengthening the inner and outer side of the compound wall has been completed. The work of plastering and pointing to the sand stone masonry steps of the dwarf wall has been completed.

105. TEMPLES OF SRI NARASIMHASWAMI AND RANGANATHANSWAMI, NAMAKKAL, DISTRICT NAMAKKAL

The work of mending, design and strengthening the broken/missing parts of the stuccos of the Ramar *pathamandapa* has been completed.

97. RANJANGUDI FORT, RANJANGUDI, DISTRICT PERAMBALUR

The work of conserving the steps leading to the cannon point on the top from the 1st entrance has been completed. The work of repair of the fort walls on the sides of the pathway has been completed. In addition of pointing the stone joints of the fort walls on the outer side of the north wall was also completed.

111. MENNANDAR PILLAYAR TEMPLE, MELANILAIPATTI, DISTRICT PUDUKKOTTAI

The work of conserving the dwarf wall on the east, south and western sides of the main temple was completed. The work of providing the stone flooring on *garbagrika*, *arthamandapa* and in front of the temple has also been completed.

112. WHOLE OF THE SIVA TEMPLE AND THE INSCRIBED STONE IN THE FRONT MANDAPAM, DISTRICT PUDUKKOTTAI

Dwarf wall on the east, south and western sides of the temple tank has been conserved.

96. SIVAGANGA LITTLE FORT ENCLOSING THE GREAT TEMPLE, THANJAVUR, DISTRICT THANJAVUR

The work of conserving cracked and dilapidated brick work of the fortification wall on the west and north sides has been completed.

101. ROCK CUT CAVES, NARASAMANGALAM, DISTRICT TIRUVANNAMALAI

The work of providing fencing on the eastern side of the protected area has been completed.

99. CHANDRAMALLESWARAR TEMPLE, NATTERY, DISTRICT TIRUVANNAMALAI

The work of providing fencing on the south and west side of the protected area has been completed.

106. JALAKANTESWARA TEMPLE, FORT VELLORE, DISTRICT VELLORE

The outer *prakara* of the temple on the east and south corner, south and east sides of the Bathalamandapa and west and south sides of the *alangaramandapa* has been provided with stone flooring to avoid the stagnation of water.

107. FORT VELLORE, VELLORE, DISTRICT VELLORE

The work of removing undulated fallen, lower moat wall stone members on the

western side of the monument has been completed (Pl. 111).

108. THE MASJID AND TWO PONDS IN THE WEST OF THE CITADEL, ARCOT, DISTRICT VELLORE

The work of providing grill fencing on the eastern, southern and west side of the monument has been completed.

109. THE MASJID AND TWO PONDS IN THE WEST OF THE CITADEL, ARCOT, DISTRICT VELLORE

The work of providing grill fencing on the eastern, southern and west side of the monument has been completed.

113. RAJAGIRI FORT, FORT GINGEE, DISTRICT VILLUPURAM

The sunken stone step on the eastern side of the Chettikulam tank has been conserved. The work of providing stone flooring to the Sapthamatrika shrine was attended (Pl. 112).

114. KRISHNAGIRI FORT, FORT GINGEE, GINGEE, DISTRICT VILLUPURAM

The work of fencing the protected area of the fort on the north side has been completed.

115. PATTABIRAMA TEMPLE, NARASINGARAYANPETTAI, DISTRICT VILLUPURAM

Fencing of the protected area on the northern and southern side of the temple has been completed.

116. SRI PATALESWARA TEMPLE, BRAHMMADESAM, DISTRICT VILLUPURAM

Strengthening of the sub shrines of the temple has been completed.

117. TALAGIRISWARA TEMPLE, PANAMALAI, DISTRICT VILLUPURAM

The work of conserving the *gopuram*/stucco of the temple has been completed.

118. SRI APATHASAHAYESVARA TEMPLE, SENDAMANGALAM, DISTRICT VILLUPURAM

The work of the stone flooring on the northern and southern side of the cloister *mandapa* has been completed.

119. SRI AZHAGIYA NARASIMHA PERUMAL TEMPLE, ENNAYIRAM, DISTRICT VILLUPURAM

Providing of stone flooring of the cloister *mandapa* has been completed.

110. FORT AND TEMPLE, TIRUMAYAM, DISTRICT TIRUMAYAM

Conservation of the open well has been completed. The work of conserving the *mandapa* of Karuper temple has been completed (Pl. 113). The work of providing the stone platform on the eastern side of the Vishnu temple has been completed. Fencing on the north and northwest corner of the fort has been provided. The tank wall on the north corner of the fort was also conserved.

DEHRADUN CIRCLE

UTTRAKHAND

120. GROUP OF TEMPLE, JAGESHWAR, DISTRICT ALMORA

The compound wall of the temple was

Plate 111

a

b

Vellore: a; before and b; after conservation of lower moat wall.

Plate 112

a

b

Rajagiri: a; before and b; after conservation of the Sapthmatrika shrines, Fort Gingee.

Plate 113

a

b

Tirumayam: a; before and b; after conservation of the mandapa of Karuper temple.

provided with barbed wire iron angles except road side boundary wall which was provided with cast iron angles.

The stone paved flooring of the compound was repaired by way of providing new stone flooring wherever required. The damaged wooden canopy of one of the temple in the complex has been repaired.

A new wooden ramp has been provided for convenient access of differently able persons.

121. FORT WITH WALLS AND RUINS OF DWELLING HOUSES AT CHANDPUR, DISTRICT CHAMOLI

Pathway leading to the hill fort is relayed and provided with galvanized iron pipe railing at outer side. Cultural notice board and stone benches were also provided at the site.

122. EXCAVATED SITES AND REMAINS AT PUROLA, DISTRICT UTTARAKASHI

Protected area was provided with a dwarf, boundary wall with chain-link fencing for the purpose of safety and security of excavated remains.

123. SUN TEMPLE AT KATARMAL, DISTRICT ALMORA

The work of reconstruction of collapse southern retaining wall of the temple complex has been taken up and work is in progress.

124. BADRINATH GROUP OF TEMPLE AT DWARAHAT, DISTRICT ALMORA

The subsidiary shrine located on the north-east corner of the complex which developed voids on its *shikhara* were repaired. The roof and the door of the sculpture shades were repaired. The stone flooring wherever damaged was also repaired.

125. GUJARDEO TEMPLE AT DWARAHAT, DISTRICT ALMORA

Floor of the temple platform has been provided with stone slabs while stone apron was provided around the temple with proper gradient.

126. RUDRANATH TEMPLE, GOPESHWAR, DISTRICT CHAMOLI

Repairs to the old wooden canopy of main temple, repairs to stone flooring and underpinning of wall and grill to the windows of Rawal palace has been done.

127. PANDUKESHWAR TEMPLE, PANDUKESHWAR, DISTRICT CHAMOLI

Repairs to masonry wall, flagstone flooring, MS grill and copper sheet to roof of Bhogshala have been done. New stone benches have been provided. A bilingual CNB has also been installed in SS plate.

128. ASHOKAN ROCK INSCRIPTION, KALSI, DISTRICT DEHRADUN

Drinking water facility to the visitors at site has been provided.

129. DANDESHWAR TEMPLE, DANDESHWAR, DISTRICT ALMORA

Retaining wall has been provided on missing portions of boundary wall along with MS grill.

130. ROCK INSCRIPTION IN SURVEY PLOT NO. 89, MANDAI, DISTRICT CHAMOLI

This is one of the most important rock inscriptions in district Chamoli GI sheets shed over the inscription was provided to stop further weathering of the inscription.

131. ARCHAEOLOGICAL MUSEUM, JAGESHWAR ALMORA

Surrounding of the Jageshwar museum building get face lifted by way of repairs to the walls, floor, compound wall, drainage, etc.

DHARWAD CIRCLE

KARNATAKA

132. CHIKKI GUDI TEMPLE, AIHOLE, DISTRICT BAGALKOT

Resetting of the temple, stone apron, pathways and lowering the ground to the original level of temple was taken up. Dismantling of sub-shrine, sunken plinth level structure, roof slabs, beams, capitals, pillars, walls and inner portion of the temple flooring was taken up. Earthwork excavation for foundation of the sub-shrines, main shrines, plinth level sub structure and excavation for base flooring was done. Laying to the foundation of sub-shrine and plinth level was taken up. Restoration of dismantled stones and removing of undulated/broken sand stone flooring was attended. Fixing sand stone beams, slabs and laying sand stone flooring all around sub-shrine was attended (Pl. 114).

133. GALAGANATH GROUP OF TEMPLES, AIHOLE, DISTRICT BAGALKOT

Earthwork excavation for foundation of the sub-shrine and plinth level was carried out. Removing of undulated and broken sandstone flooring all around the temple complex was attended. Dislodged and out of plumb portion of the sub-shrine and plinth was dismantled.

Laying rubble soling to the foundation of the sub-shrine and plinth level structure and bed concrete to the foundation of sub-shrine and flooring was done. Restoration of the dismantled sub-shrine and plinth and fixing of new stone members wherever missing was taken up. Sandstone flooring all around sub shrine was layed. Fixing of curbing stone to the flooring sides and coping stone to the compound wall were also provided (Pl. 115).

134. FORT WALL, AIHOLE, DISTRICT BAGALKOT

Dismantling of the disturbed /out of plumb portion of the fortification wall and laying of PCC for the foundation was done. Restoration of the wall on the southern side of the Huchhappayya temple was taken up and work is in progress (Pl. 116).

135. CHAKRA GUDI, AIHOLE, DISTRICT BAGALKOT

The work of lowering of the ground to the original level without causing any damage to hidden structure was taken up. Dislodged and out of plumb portion of the flight of steps and wall of the ancient well was taken out and restoration of the same was done as per original (Pl. 117).

136. AGASTYATEERTHA TANK, BADAMI, DISTRICT BAGALKOT

Plate 114

a

b

Aihole: a; before and b; after conservation of Chikki Gudi temple.

Plate 115

a

b

Aihole: a; before and b; after conservation of Galaganath group of temples.

Plate 116

a

b

Aihole: a; before and b; after conservation of fort wall.

Plate 117

a

b

Aihole: a; before and b; after conservation of Chakra Gudi.

The work of the dismantling the out of plumb portion of the fortification wall on western side and restoration the same using lime mortar was taken up (Pl. 118).

137. GROUP OF MONUMENTS AT CHOLACHAGUDDA, BADAMI, DISTRICT BAGALKOT

Providing roof slab and reconstruction of the abutment wall around the temple was done (Pl. 119).

138. VIRUPAKSHA TEMPLE, PATTADAKAL, DISTRICT BAGALKOT

The work of removing of dead loose cement pointing from the roof and relaying with using lime mortar and providing hood stone was attended. Out of plumb portion of the *prakara* wall was repaired as per original (Pl. 120).

139. MALLIKARJUNA TEMPLE, PATTADAKAL, DISTRICT BAGALKOT

The dead loose cement pointing from the roof of the temple was removed and re-done using lime mortar and providing hood stone wherever missing and fixing sand stone windows and steps. Leveling and lowering of the undulated area for easy flow of rainwater and providing teakwood doors was also attended.

140. HAZAR KOTRI, BIDAR FORT, DISTRICT BIDAR

Removing loose and peeled off lime mortar plaster from wall and ceiling and providing fresh lime mortar plaster was attended. Earthwork excavation for leveling and lowering the ground level and providing lime mortar concrete bed flooring was also done.

141. BAROOD KOTA, BIDAR FORT, DISTRICT BIDAR

The out of plumb portion of fort wall was taken out and repaired by way of providing earthwork excavation for leveling and lowering of ground level and lime mortar concrete bed flooring. Dead lime mortar concrete from roof top was taken out and re-laid as per original. MS grill for arch openings were also fixed.

142. BIJAPUR FORT, BIJAPUR, DISTRICT BIJAPUR

Collapsed and missing portion of the fortification wall was taken up for repair and work is in progress (Pl. 121).

143. ASAR MAHAL, BIJAPUR, DISTRICT BIJAPUR

Oil Band Distemper to interior wall surface, touch wood and enamel paints to wooden members was provided.

144. JUMMA MASJID, BIJAPUR, DISTRICT BIJAPUR

Oil Band Distemper to interior wall surface and ceiling of the dome was provided.

145. HASAN GULJAR TOMB WITH MARBLE TOMB NEAR RAM LINGA TANK, BIJAPUR, DISTRICT BIJAPUR

Collapsed debris and dead lime mortar concrete from roof top of tomb was removed and watertightened. De-plastering of the dead lime mortar from wall and ceiling was also done and fresh lime mortar plaster was provided (Pl. 122).

Plate 118

a

b

Badami: a; before and b; after conservation of Agastyateertha tank

Plate 119

a

b

Badami: a; before and b; after conservation of *group of monuments at Cholachagudda.*

Plate 120

a

b

Pattadakal: a; before and b; after conservation of Virupaksha temple.

Plate 121

a

b

Bijapur: a; before and b; after conservation of Bijapur fort.

Plate 122

a

b

Bijapur: a; before and b; after conservation of Ram linga tank.

146. IBRAHIM ROUZA, BIJAPUR, DISTRICT BIJAPUR

Construction of the dwarf compound wall around the protect area was done. Fencing of the newly acquired land for providing drainage behind the monument by earthwork excavation, laying bed concrete and construction of UCR stone masonry for the foundation was attended (Pl. 123).

147. JOD GUMBAZ, BIJAPUR, DISTRICT BIJAPUR

The work of taking out of dead lime mortar concrete from roof top and watertightening was taken up. De-plastering the dead lime mortar from wall, ceiling, and providing a fresh lime mortar plaster was also carried out. Laying bed concrete flooring, applying OBD to wall surface and enamel paints to doors and windows was attended (Pl. 124).

148. SANGEET AND NARI MAHAL, BIJAPUR, DISTRICT BIJAPUR

Landscaping work around the monuments was carried out.

149. BASAVANNADEVA TEMPLE, TAMBUR DISTRICT DHARWAD

Schist stone apron and pathway around the temple was provided (Pl. 125).

150. AMRUTESHWARA TEMPLE, ANNIGERI DISTRICT DHARWAD

Restoration of out of plumb portion of the wall and watertightening the leak roof was attended.

151. MAHADEVA TEMPLE, ITTAGI, DISTRICT GADAG

Reconstruction of out of plumb portion of the entrance of the *mandapa* by way of dressing the stone blocks for preparing moulding, carving, etc. was taken up (Pl. 126).

152. DODDABASAPPA TEMPLE, DAMBAL, DISTRICT GADAG

The work of dismantling the entrance of the Nandi *mandapa* and reconstruction of the same as per the original was taken up.

153. FORTIFICATION WALL, GULBARGA, DISTRICT GULBARGA

Restoration of missing portion of merlons using trap stone block in lime mortar and core filling between gaps of the veneering wall was attended.

154. GREAT MOSQUE, GULBARGA, DISTRICT GULBARGA

The dead plaster from ceiling and inner dome of mosque was taken up and re-plastered matching to the original.

155. HAFT GUMBAZ (TOMB OF FIROZSHAH), GULBARGA, DISTRICT GULBARGA

The work of providing lime plaster to dome was attended.

156. EXCAVATED SITE KANAGANAHALLI, SANNATI, DISTRICT GULBARGA

The work of providing pile foundation in CC masonry and plinth filling was done. Repairs of the votive stupas using lime mortar was also carried out.

157. JATTAPPANAIKAN CHANDRANATHESWARA BASTI, BHATKAL, DISTRICT UTTARA KANNADA

Plate 123

a

b

Bijapur: a; before and b; after conservation of Ibrahim Rouza.

Plate 124

a

c *d*

Bijapur: a; before and b; after conservation of Jod gumbaz.

Plate 125

a

b

Tambur: a; before and b; after conservation of Basavannadeva temple.

Plate 126

a

b

Ittagi: a-b; during conservation of Mahadeva temple.

Dressed schist stone pathway was provided within the complex (Pl. 127).

158. JOSHI SHANKARANARAYANA DEVASTHANA, MUD-BHATKAL, DISTRICT UTTARA KANNADA

Damaged *mandapa* was conserved by replacing broken roof slab, beams, coping stone, pillar base, capital and pillar with new ones. The dislodged flooring of *mandapa* portion was re-laid over concrete base. Plinth protection all around the devasthana by dressed schist stone was provided. The fallen, damaged compound wall was removed and foundation was laid for re-construction of compound wall in laterite stone masonry (Pl. 128).

159. KETAPAI NARAYANA DEVASTHANA, MUD-BHATKAL, DISTRICT UTTARA KANNADA

Damaged wooden door has been replaced with new ones as a security measure.

160. GROUP OF MONUMENTS AT GERSOPPA, DISTRICT UTTARA KANNADA

Damaged wooden door was replaced with new ones as a security measure.

161. VIRUPAKSHA TEMPLE, BILGI, DISTRICT UTTARA KANNADA

Damaged roof slabs, coping stones and *chajjas* of *mandapa* and door of the sanctum were replaced with new ones. Damaged laterite steps were removed and replaced with new schist stone steps. The open area of the entrance has been laid with schist stone flooring. A garden was developed and temple has been illuminated (Pl. 129).

162. MIRJAN FORT, KUMTA, DISTRICT UTTARA KANNADA

Rank vegetation from the fort and moat areas has been removed. Restoration of bulged out, missing and fallen portions of the fort wall was taken up (Pls. 130-131).

GOA CIRCLE

GOA

163. BASILICA OF BOM JESUS CHURCH, OLD GOA, DISTRICT GOA

The undulated laterite stone pavement in front of the church has been re-laid by using old and new stones. As a security measure, the surveillance cameras have been provided at Se' Cathedral and Basilica of Bom Jesus church. The out of plumb retaining wall towards southern side of the church has been re-constructed. The quadrangle portion has been white washed after scraping and cleaning moss and lichen (Pl. 132).

164. MAHADEV TEMPLE, TAMBDISURLA, DISTRICT GOA

The roof of the temple has been watertightened (Pl. 133).

165. RACHOL SEMINARY, RAIA, DISTRICT GOA

The damaged roof of the main church along with wooden ceiling inside the church has been dismantled and re-laid the same by replacing decayed wooden beams, rafters and fixing of pre-coated sheets below the Mangalore tiles. The work is in progress (Pl. 134).

Plate 127

a

b

Bhatkal: a; before and b; after conservation of Jattappanaikan Chandranatheswara temple.

Plate 128

a

b

Mud Bhatkal: a; before and b; during conservation of Joshi shankarnarayana devasthana.

Plate 129

a

b

Bilgi: a; before and b; after conservation of Virupaksha temple.

Plate 130

a

b

Mirjan: a; before and b; after restoration of fort wall.

Plate 131

a

b

Mirjan: a; before and b; after restoration of fort wall.

Plate 132

a

b

c

d

Old Goa: a; before and b; after conservation of Basilica of Bom Jesus,

Plate 133

a

b

Tambdisurla: a; before and b; after conservation of roof of Mahadev temple.

Plate 134

a

b

Rachol Seminary: a; before and b; during conservation of r oof of the main church.

166. ST. CAJETAN CHURCH, OLD GOA, DISTRICT GOA

The decayed and damaged windows of the central dome were replaced with the new ones (Pl. 135).

167. SE' CATHEDRAL CHURCH, OLD GOA, DISTRICT GOA

The side altars inside the church have been re-set and restored by strengthening them and replacing decayed wooden pegs with new ones. The loose and peeled off portion inside and outsides of the church has been plastered in lime mortar duly preparing the designs and moldings as per the original (Pl. 136).

168. UPPER FORT AGUADA, DISTRICT GOA

The decayed, damaged and missing doors and windows of the light house have been repaired and replaced with the new ones. The underground water tank in front of the light house has been applied with preservative coat. (Pl. 137).

GUWAHATI CIRCLE

ASSAM

169. DHANDI TEMPLE, DISTRICT SONITPUR

Height of existing compound wall of the temple was raised and MS grill was fixed over it for the purposed of strengthened the security.

170. CACHARI RUINS, KHASPUR, DISTRICT CACHAR

Construction of low height compound wall with standard brick including fixing of MS grill, etc. was completed.

171. GROUP OF FOUR MAIDAM, CHARAIDEO, DISTRICT CHARAIDEO

Construction of retaining wall to the left side of the excavated maidam, etc. was done.

172. RANGAMATI MOSQUE, PANBARI, DISTRICT DHUBRI

Dismantling of old damaged floor and relaying of lime concrete floor was done.

173. REMAINS OF A FORT, DISTRICT DIMAPUR

The work of pointing the ancient structure, painting to the existing MS grill, etc. was completed.

174. BHUBANESWARI TEMPLE, DISTRICT GOMATI

Extension of retaining wall including fitting & fixing of MS grill, etc. was done (Pl. 138).

175. SRI SURYAPAHAR RUINS, DISTRICT GOALPARA

Construction of pathway, chain link, etc. was done.

176. U-MAWTHAW-DUR-BRIEW, NARTIANG, DISTRICT JAINTIA HILLS

RR stone masonary retaining wall to arrest the erosion of soil was done (Pl. 139).

177. VISHNUJANARDAN, GUWAHATI, DISTRICT KAMRUP

Extension of RCC stairs, RR stone retaining wall, fixing of pipe railing, etc. was done.

Plate 135

a

b

Old Goa: a; before and b; during conservation of windows of the central dome of St. Cajetan church.

Plate 136

a

b

Old Goa: a; before and b; during conservation of outer/frontal portion Se Cathedral church.

Plate 137

a

b

Candolim: a; before and b; after preservation coat of underground water tank upper fort Aguada.

Plate 138

a

b

Rajnagar: a; during and b; after extension of retaining wall with MS grill Bhubaneswari temple.

Plate 139

a

b

Nartiang: a; before and b; after construction of retaining wall of U-Mawthaw-dur-briew.

Mending of stone pillars of the temple was done and pathway was providing.

179. KAMESWAR TEMPLE, DISTRICT KAMRUP

Construction of breast wall, pathway, etc. was done.

180. ANCIENT REMAINS AT BHISMAKNAGAR, DISTRICT LOHIT

Construction of compound wall around the protected site, fixing of MS grill, gate, etc. was done.

181. ANCIENT REMAINS AT BAKSHANAGAR, DISTRICT SHIPAHIJALA

Lime concrete brick apron around the newly exposed structure was provided (Pl. 140).

182. GAURISAGAR TANK, DISTRICT SIVASAGAR

RR masonary work including fixing of MS grill railing around the ancient tank was attended.

183. SIVADOL AT JAYSAGAR, DISTRICT SIVASAGAR

Lime *surkhi* plastering, strengthening of the ancient boundary wall was carried out (Pl. 141).

184. VISHNUDOL AT GAURISAGAR, DISTRICT SIVASAGAR

Lime *surkhi* plaster to the monument, lime concrete flooring and roofing, etc. was attended (Pl. 142).

185. SIVADOL AT GAURISAGAR, DISTRICT SIVASAGAR

Lime *surkhi* plastering, restoration and strengthening the ancient boundary wall, etc. was done.

186. SIVADOL AT SIVASAGAR, DISTRICT SIVASAGAR

The work of watertightening of the roof of the temple with lime *surkhi* mortar, lime surkhi plastering, etc. was attended.

187. VISHNUDOL AT SIVASAGAR, DISTRICT SIVASAGAR

Repair to the monument was taken up by way of providing lime *surkhi* plaster after removal of decayed damaged one.

188. DEVIDOL AT SIVASAGAR, DISTRICT SIVASAGAR

The *mukhamandapa* was repair and by way of providing lime *surkhi* plastering after removal of decayed damaged one.

189. VISHNUDOL AT JAYSAGAR, DISTRICT SIVASAGAR

Filter drain was provided to check seepage of water to the *garbhagriha*. Lime concrete roofing, construction of new gate, etc. was done.

190. MASONRY REMAINS OF BAMUNI HILL, DISTRICT SONITPUR

Construction of retaining wall and compound wall was done (Pl. 143).

191. SINGRI HILL RUINS, DISTRICT SONITPUR

Dwarf wall was raised further for the purpose of safety and security of monument.

Plate 140

a

b

Bakshanagar: a; before and b; after making lime concrete brick apron.

Plate 141

a

b

Jaysagar: a; before and after strengthening of the ancient boundary wall.

Plate 142

a

b

Gaurisagar: a; before and b; after conservation of flooring and roofing of Vishnudol.

Plate 143

a

b

Masonary: a; before and b; after construction of retaining wall of Bamuni hill.

192. SUKRESWAR, RUINS OF TEMPLE, BISWANATHGHAT, DISTRICT SONITPUR

Raising the height of dwarf wall and fixing of MS grill, etc. was done (Pl. 144).

193. THAKURANI TILLA AT PILLAK, DISTRICT S. TRIPURA

Construction of relaying approach pathway, painting to the existing grill and GCI sheet over the roof was done.

194. ROCK-CUT-SCULPTURES AT UNAKOTI, DISTRICT UNAKOTI

Approach pathway (steps) with RR stone masonary around the monument were provided (Pl. 145).

JAIPUR CIRCLE

RAJASTHAN

195. MAHAL BADSHAHI (PUSKER), DISTRICT AJMER

The conservation of both *baradaris* of Mahal Badshahi was taken up for repair by way of using matching stone blocks. Lime plaster was provided at places, wherever it required. The damaged stone of the staircase were also replaced with new one. Damaged/missing protruding out canopies and *chajja* stones were also conserved as per original (Pl. 146.

196. ANCIENT SITE, BHANGARH, DISTRICT ALWAR

The buried/missing outer fort wall between bastions no. 20, 21 were taken up for conservation. The buried wall was exposed carefully and conserved as per original. Watertightening was done on the top to stop seepage. The vegetation growth over the wall and neighbouring area was also cleaned (Pl. 147). The buried structures adjoining to the eastern wall of a *stabal* complex was also taken up for clearance. The structures were carefully exposed and conserved. The work is in progress (Pl. 148).

197. SIVA TEMPLE AND RUINS (ARTHUNA) DISTRICT BANSWARA

Conservation work of the Kumbhaleswar temple, Garhi complex and Khanda Dera complex were taken up for repair. The accumulated earth over the platform was removed carefully and missing/ displaced stones were reset as per original. The minor sub shrine located in the close vicinity was repaired. Apron was conserved on the front side for easy movement of the tourists.

Scientific clearance work was undertaken on the eastern half of the complex to expose the buried platform of the Jain temple. The missing/ displaced stones of the enclosure wall were reset to their proper position. Dwarf wall with iron grill was provided to safeguard the whole complex (Pl. 149).

198. ANCIENT RUINS AND STRUCTURAL REMAINS, KRISHNAVILAS, DISTRICT BARAN

Aapron was provided from all side to the monuments to stop seepage of water in the foundation. Undulated/dislodged stones of the floor were taken out and reset as per original. The work is in progress.

For the safety and security of the monument, a high dwarf wall with grill fencing has been provided from all side with a gate at the centre.

Plate 144

a

b

Biswanath: a; before and b; after raising the height of dwarf wall and fixing MS of the Rock known as Sakreswar.

Plate 145

a

b

Unakoti: a; before and b; after construction of sculptures and rock-cut reliefs of the pathway.

Plate 146

a

b

Puskar: a; before and b; after conservation of second pavilion of the Badshahi mahal.

Plate 187

a

b

Bhangarh: a; before and b; during conservation of buried outer most fortification wall of ancient site.

Plate 148

a

b

Bhangarh: a; before and b; after conservation of buried structures to the northern side of inner most fortification, ancient site.

Plate 139

a

b

Arthuna: a; before and b; during conservation of Siva temple and ruins.

199. MOAT, SURROUNDING THE FORT WALL OF BHARATPUR, DISTRICT BHARATPUR

The fortification wall between bastions no. 25 to 29 were taken up for repair. The huge cavities were filled with traditional material and a proper pointing was done to stop the further vegetation growth.

200. NAND BHAWAN, DEEG, DISTRICT BHARATPUR

The missing *chajja* stones on the north-east corner of the Nand Bhawan were provided. The lotus flower frieze was also provided on the projecting end, matching to the original. Windows and doors were also taken for repair. The work is in progress.

The overhead tank for running the fountain was also taken up for repair. The whole inner roof and the walls were re-plastered in lime mortar as per original. The undulated floor was also leveled and lime concrete was provided to stop the vegetation growth. The work is in progress (Pl. 150).

201. LAL MAHAL RUPVAS, DISTRICT BHARATPUR

The restoration of missing *chajja* stone of the camp office building located next to the *tehsil* office was taken up. *Chajja* stone were replaced wherever require matching with the original.

The worn out/broken stones of the floor were also replaced with the new one and the joints were properly pointed to stop the vegetation growth.

202. FORT OF CHITTAUR AS A WHOLE, DISTRICT CHITTAURGARH

The missing and badly damaged steps of the Sukhadia tank were restored with the help of combination material whereas the bulged, out of plumb support wall and the base stones were dismantled and reset as per the original (Pl. 151).

In continuation of previous year's work the conservation of the damaged portion of the fortification wall between Mrigwan to northern side has been taken up. The missing/fallen wall was reset in lime mortar as per original. The pointing was done with lime mortar after removing the vegetation.

203. MAHANAL TEMPLE AND MATH MENAL, DISTRICT CHITTAURGARH

The *prakara* wall on the back of the premises which was collapsed due to heavy rain was taken for repair by way of using available stone numbers. The work is in progress.

204. BAORI, ABANERI, DISTRICT DAUSA

The conservation of the damaged/ missing battlements/*kanguras* of *baori* was taken up. Missing *kanguras* were conserved with brick masonry in lime mortar on all side of the enclosure wall and provided with lime plaster matching with original.

The missing roof of the veranda near main entrance gate was taken up for conservation. The roof top was provided with lime concrete. Existing cement plaster of the walls on the left side in the main complex was removed and coated with lime plaster to match it with the original.

Plate 150

a

b

Deeg: a; before and b; during conservation of broken chajja, Nand Bhawan.

Plate 151

a

b

Chittaur: a; before and b; after conservation of dilapidated/missing ghats of Sukhadia tank, Fort of Chittaur.

205. JAISALMER FORT, DISTRICT JAISALMER

In continuation of previous year's work the damaged, decayed, tilted and dislodged dry masonry pitching wall near police *chowki* was taken up for conservation. New stone blocks were placed in the wall with lime mortar. Joints were properly pointed to stop seepage of water and vegetation growth. The pitching wall was reconstructed up to its original height. Missing/dilapidated apron was also repaired and wherever required new stones were provided.

The damaged, dilapidated and settled pitching wall near the electric transformer was also taken up for conservation. Each stone of the wall was properly documented, marked and thereafter dismantled. A new foundation was provided to the wall. Available stones were used during the reconstruction but new stone blocks also provided. The work is in progress (Pl. 152).

206. RANTHAMBHOR FORT, DISTRICT SAWAI MADHOPUR

Battis Khamba *chatri* was taken for repair. The missing/broken *chajja* of the minor subsidiary *chatris* were replaced with new ones matching to the original. Worn out/ damaged *pandasa* stones of the main dome were replaced with the new stone. The damaged shaft and pillar base of the dome stones were replaced with the new one matching to the original.

Repair to the *mandapa* of the Jain temple was taken up for repair. The work is in progress.

LUCKNOW CIRCLE

UTTAR PRADESH

207. ANCIENT BRICK TEMPLE, KURARI, DISTRICT FATEHPUR

Boundary wall with iron grill has been provided in the eastern and northern portion of the monument for safety and security purpose.

208. EMPEROR AURANGZEB'S PAVILION, BAGH BADSHAHI, KHAJUA, DISTRICT FATEHPUR

Southern and western damaged wall were restored by the use of *lakhauri* bricks and lime plaster matching with the original.

209. CLOSED BRITISH CEMETERY, KAITHA, DISTRICT HAMIRPUR

The boundary wall of the cemetery was repaired. The damaged portion of the wall was restored as per original. Roof of the hall in cemetery has also been repaired as per original.

210. LORD JAGANNATH TEMPLE, BEHTA, DISTRICT KANPUR

Interior portion of the *garbhagriha* of the temple was conserved. The *dwarmandapa* and *mukhamandapa* was also repaired by using of *lakhauri* bricks and lime plaster.

211. KATCHEHRY CEMETERY, KANPUR, DISTRICT KANPUR

In continuation of previous year's work, damaged graves in the western portion of the cemetery were restored with available bricks in lime plaster matching with original.

Plate 152

a

b

Jaisalmer: a; during and b; after conservation of piching wall near transformer of Jaisalmer fort.

212. ANCIENT BRICK TEMPLE, KANCHALIPUR, DISTRICT KANPUR

In continuation of previous year's work, boundary wall was constructed towards the north and west of the monument and a pathway from the gate of the boundary wall to the temple was also provided.

213. MONUMENT IN THE MEMORY OF COL. T.S. POWEL, KUNWARPUR, DISTRICT KANPUR

Damaged portion of the monument including the pillar were restored matching with the original. Dwarf wall with grill was provided to ensure the safety and security of the monument. Boundary wall has been repaired by the use of *lakhauri* bricks and lime plaster.

214. AMJAD ALI SHAH'S MAUSOLEUM, LUCKNOW, DISTRICT LUCKNOW

Restoration of the inner gateway of the mausoleum was taken up by way of underpinning with *lakhauri* brick masonry matching with the original. Carved mouldings have been restored as per original by way stucco lime plastering.

215. BIBIAPUR KOTHI, LUCKNOW, DISTRICT LUCKNOW

The roof of the first floor has been conserved by way of using wooden beam, tiled brick, lime-concrete. Cracks in wall were repaired by the way of pointing and underpinning.

216. IMAMBARA ASAF-UD-DAULAH (BARA IMAMBARA), LUCKNOW, DISTRICT LUCKNOW

In continuation of previous year's work, repair of the ceiling and walls of the *shah nasheen* hall of the Bara Imambara by way of removing of dead plaster and restoring with richly moulded lime plaster as per original was completed. Lime punning of the ceiling was also done.

217. TOMB OF MUHAMMAD ALI SHAH (CHOTA IMAMBARA), LUCKNOW, DISTRICT LUCKNOW

Conservation of the Shahi *hammam* in Chota Imambara complex has been taken up by way of restoring of lime plaster in the small rooms. Damaged and missing floral designs in the centre of ceiling and on the border of the walls were reproduced.

Exterior of the *qibla* wall of the shahi mosque was strengthened by way of underpinning. Stucco work in lime mortar was also reproduced as per available design.

218. DILKUSHA KOTHI, LUCKNOW, DISTRICT LUCKNOW

Lime plaster work was taken up in the exterior lower portion at the eastern, northern and southern walls of the main building. Pathways at the south and eastern portion of the main building were repaired with the *lakhauri* bricks as per original.

219. GENERAL WALI KOTHI, LUCKNOW, DISTRICT LUCKNOW

In continuation of previous year's work, stone flooring of the monument was restored. Lime concrete work of the roof was taken up. Wooden doors were repaired matching with the original.

220. GHAZI UD-DIN HAIDER TOMB, LUCKNOW, DISTRICT LUCKNOW

The southern gateway of the tomb was repaired with simple moulded lime plaster as per original. Apron and the pathway were also repaired.

221. KAISERBAGH GATE, LUCKNOW, DISTRICT LUCKNOW

In continuation of previous year's work, interior of the eastern gate of Kaiserbagh gates was repaired by way of restoring of decorative motifs and designs matching with the original. *Lakhauri* brick and lime plaster was utilized for veneering.

222. RESIDENCY, LUCKNOW, DISTRICT LUCKNOW

Main residency tower was conserved by way of pointing using lime mortar. The cornice of the tower was reproduced by the use of *lakhauri* bricks and lime mortar as per original.

223. RUMI DARWAZA, LUCKNOW, DISTRICT LUCKNOW

Repair work of the inner portion above the first floor of Rumi Darwaza was taken up. Dead and damaged plaster was removed and coated with fresh plaster. Decorative cornice mouldings were re-produced as per original by the use of lime mortar. Miniature domes were repaired by *lakhauri* bricks and lime mortar. Pinnacles were reproduced in terracotta and colored matching with original. Watertightening work of the roof terrace by providing proper slope and drainage was also done.

224. VICTORIA MEMORIAL, LUCKNOW, DISTRICT LUCKNOW

Damaged and decayed sand stone flooring and steps were repaired and the stone railing was restored matching with the original. Damaged floral motives and pinnacles were also restored.

225. SMALL MOUND LOCALLY KNOWN AS BHAINSA SUR WITH A RUINED TEMPLE ON THE SUMMIT AND OLD STATUE INSIDE IT, CHUKA, DISTRICT MAHOBA

Boundary wall was provided at the south-western portion of the temple for the safety and security.

226. CHANDEL TEMPLE, RAWATPUR, DISTRICT MAHOBA

The scattered architectural member nearby the temple were removed and the work of resetting of the temple with available stones were taken up. Before, putting up the stone slabs for platform, the surface was strengthened. Drainage system around the temple has also been repaired.

MUMBAI CIRCLE

MAHARASHTRA

227. ELEPHANTA CAVES, ELEPHANTA, DISTRICT RAIGAD

The old existing drainage on the top of the caves which was damaged at many places was repaired by way of removing of damages portions and reconstructing the same, wherever missing and PCC coping was provided over the walls (Pl. 153).

228. OLD PORTUGUESE FORT REMAINS, BASSEIN, DISTRICT PALGHAR

The debris of collapsed portion of the fort accumulated in and around the structure was cleaned and buried portion was exposed. Watertightening to the top of

exposed walls including leveling of the uneven walls up to its original height with UCR masonry in lime mortar was done. The gaps and cracks developed in the walls were filled with stone bolder and fixed in lime mortar, pointing was done to prevent further growth of vegetation (Pls. 154-155).

The debris around Nossa Senhora was cleared and buried structure was exposed. Watertightening the top of exposed walls including restoring of the missing and damaged portion of the structures with UCR masonry in lime mortar was attended. The pointing was also done to prevent the further growth of vegetation. Ancient drainage system was revived with providing necessary masonry and watertightened the same as per original in lime mortar. (Pl. 156).

228. JOGESHWARI CAVES, JOGESHWARI, DISTRICT MUMBAI SUB URBAN

The top surface of the cave was watertightened with lime mortar including filing up the natural pockets with brick *jali* and lime mortar and given the rock appearance to the top surface as per existing pattern. The height of existing parapet wall was raised over the cave with UCR masonry in cement mortar for security of visitors and to avoid any unauthorized activities.

229. KORLAI FORT, KORLAI, DISTRICT RAIGAD

Unwanted tree and roots were removed from the fortification wall and repaired was done with CR stone masonry with lime mortar, matching as per the original. Strengthening the core portion with UCR masonry in lime mortar and placing the pin header stone at a regular interval was also done (Pl. 157).

230. LOHAGAD FORT, LOHAGAD, DISTRICT PUNE

The enclosure wall of the *Dargah* which was missing and damaged at many places was taken for repair. The height of the wall was raised by providing UCR masonry in lime mortar. The damaged Shahabad stone flooring was removed and replaced with the dressed stone slab fixed in lime mortar over the lime concrete bed (Pl. 158).

231. MANDAPESHWAR CAVES, MANDAPESHWAR, TALUKA-BORIVALI, DISTRICT MUMBAI SUB URBAN

Vegetation was removed, debris were cleared with taking care to avoid the damages to the hidden structures. The exposed structures were repair by way of the pointing in lime mortar, watertightened to prevent the further growth of the vegetation (Pl. 159).

232. SHELARWADI CAVES, SHELARWADI, TALUKA-HAVELI, DISTRICT PUNE

The courtyard of the cave was extended by providing retaining wall at the valley side with UCR to make it more convenient to the visitors (Pl. 160).

233. SHIVNERI FORT, JUNNAR, TALUKA-JUNNAR, DISTRICT PUNE

The fortification wall, battlement and bastions have been taken for repair by way of using traditional material. The dislodged and damaged portion of wall was removed carefully and repaired matching to the original.

Plate 153

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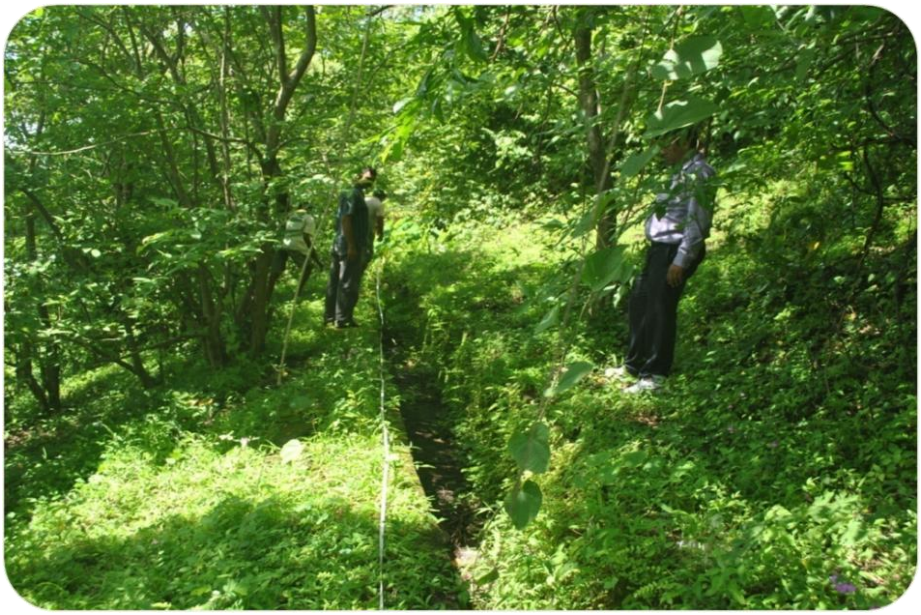


a

b

Gharapuri: a; before and b; after conservation of drainage of Elephanta caves.

Plate 154

a

b

Bassein: a; before and b; after conservation of Mesericordia complex, old Portuguese fort and remains.

Plate 155

a

b

Bassein: a; before and b; after conservation of Mesericordia complex, old Portuguese fort and remains.

Plate 146

a

b

Bassein: a; before and b; after conservation of Nossa Senhora Sauda complex old Portuguese fort

Plate 157

a

b

Korlai: a; before and b; during conservation of fortification of Korlai fort.

Plate 158

a

b

Lohagad: a-b; during conservation of the enclosure wall of the Dargah Lohagad fort.

Plate 159

a

b

Taluka-Borivali: a; before and b; after restoration of structure over the caves of Mandapeshwar caves.

Plate 160

a

b

Shelarwadi: a; before and b; after conservation of retaining wall of caves.

The existing damaged pathway from Mahadarwaja to Peer gate was repaired by using dressed stone slab fixed over the base of lime concrete (Pl. 161).

234. SINDHUDURG FORT, MALVAN, TALUKA-MALVAN, DISTRICT SINDHUDURG

The restoration work of the fort wall and bastions were carried out at selected portion of the fortification wall on the seaside by using basaltic stone blocks for veneering by using hydraulic lime mortar (brick powder, river sand with pebbles, hydraulic lime, Mangalore tile earthen pot pieces, herbal plants seeds and fibers) (Pl. 162).

235. SOLAPUR FORT, SOLAPUR TALUKA-SOLAPUR, DISTRICT SOLAPUR

To keep monument in presentable condition the vegetation was cleared and the stem and roots of the trees were removed.

The collapsed portion of fortification wall was reconstructed with CR stone blocks for veneering in lime mortar. The core portion of the wall was filled with UCR masonry in lime mortar.

Northwest corner of the mosque which was fallen down due to settlement of the foundation was reconstructed with CR stone masonry in lime mortar. Foundation was strengthened with bed concrete in lime mortar and stone boulders (Pl. 163).

236. VIJAYDURG FORT, VIJAYDURG, TALUKA-DEVGAD, DISTRICT SINDHUDURG

The collapsed portion of the fortification wall near Dariya *burj* was removed. The foundation was consolidated by using laterite stone blocks with specially prepared mortar.

RAIPUR CIRCLE

CHHATTISGARH

237. LAXMAN TEMPLE, SIRPUR DISTRICT MAHASAMUND

Conservation of brick structure adjacent to residence of priest has been taken. Chain link fencing over dwarf wall to the outer periphery was provided and refurbishment of Sculpture shed-1 inside the complex was carried out.

238. EXCAVATED STRUCTURES, SIRPUR, DISTRICT MAHASAMUD

Conservation work to the back side of vihar with laying flooring inside the cells and Padmapaniv vihar was attended (Pl. 164). Newly excavated structure near Raikera tank was provided with boundary wall with chain link fencing. Mending of the architectural fragments and stitching the lintel slab of Tiwardev complex was taken up. Repair of the fortification wall in vihar complex was also attended. Apron all around the monastery (SRP-16) with approach was provided (Pl. 165).

Palace Complex was repaired by way of veneering, under pinning, core filling and watertightening. Flooring to the cells matching to original was also provided (Pl. 166). Repairs to the newly excavated monastery near school was attended by way of veneering, underpinning, core filling and watertightening.

Plate 161

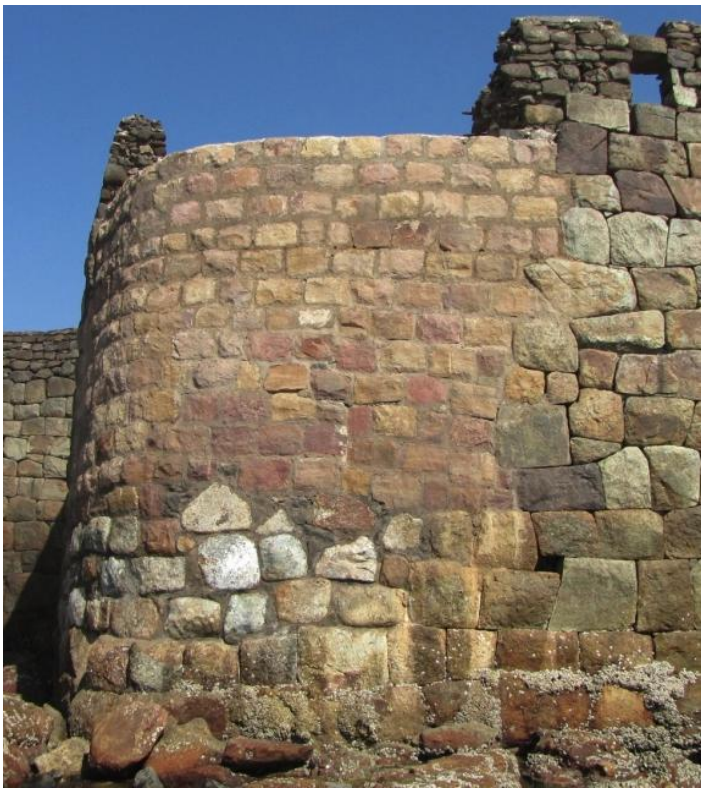
a

b

Shivneri: a; before and b; during adjacent to the Hathi gate Shivneri fort.

Plate 162

a



b

Sindhudurg – a; before and b; after conservation of bastion no. 14 of Sindhdurg fort.

Plate 163

a

b

Solapur: a; before and b; after conservation of mosque, Solapur fort.

Plate 164

a

b

Sirpur: a; before and b; after conservation of Padmapani vihar.

Plate 165

a

b

Sirpur: a; before and b; after conservation of monastery (SRP-16).

Plate 166

a

b

Sirpur: a; before and b; after conservation of palace complex.

Dwarf compound wall with MS grill was provided around the structure (SRP-16, 31 and 32). Conservation of excavated Buddha vihara near Raikera tank was attended by way of veneering, underpinning, core filling and watertightening (Pl. 167).

Structural conservation to a damaged wall of monastery (SRP-25) was carried out. Compound wall with MS grill fixing was provided around excavated market area. Compound wall with MS grill was raised around the excavated shrine (SRP-29). Conservation of exposed Chandi temple was attended. Buried portion of Shiva temple-1 was taken up for scientific clearance and the work is in progress. Conservation of Rama temple with laterite stone was attended (Pl. 168). The work of repair of the floor at Surang tila was carried out.

Construction of dwarf compound wall with MS grill around the structure (SRP-27) was carried out. Stitching and strengthening the fragile architectural fragment of Baleshwar Mahadev temple were carried out (Pl. 169).

239. JAGANNATH TEMPLE INSIDE RAJIV LOCHANA TEMPLE COMPLEX, RAJIM, DISTRICT GARIABAND

Dwarf compound wall with MS grill around the monument was constructed. The undulated land was made presentable by way of cutting and filling the area.

240. SHIVA TEMPLE, DEOBALODA, DISTRICT DURG

Development work around the existing pond, laying underground MS pipe for de-watering the stagnation water from *antarala* was attended.

241. BHAND DEUL TEMPLE, ARANG DISTRICT RAIPUR

Conservation to the raised plinth of temple was done (Pl. 170).

242. SITA BAREE, RAJIM, DISTRICT GARIABAND

Iron grill was provided to the remaining portion of boundary wall of the site.

243. SIVA TEMPLE, ADBHAR DISTRICT JANJGIR CHAMPA

The work of the repair to the super structure of the temple and gateway was attended (Pl. 171).

244. RATANPUR FORT, RATANPUR, DISTRICT BILASPUR

Pitching work all around the tank, near gate no.3 was attended. Approach pathway from palace no.3 to gateway no.3 was also attended.

245. VISHNU TEMPLE, JANJGIR, DISTRICT JANJGIR CHAMPA

Construction of boundary wall to the back side of the temple and providing apron around the temple was done.

246. PALI INSCRIPTION, SEMERSAL DISTRICT BILASPUR

Approach pathway and other basic amenities were provided as a part of visitor amenities at the site.

247. PATALESHWAR MAHADEV TEMPLE, MALHAR, DISTRICT BILASPUR

Plate 167

a

b

Sirpur: a; before and b; after conservation of newly excavated monastery.

Plate 168

a

b

Sirpur: a; before and b; after conservation of newly excavated structure, Rama temple.

Plate 169

a

b

Sirpur: a; before and b; after conservation of Baleshwar Mahadev temple.

Plate 170

a

b

Arang: a; before and b; after conservation of plinth of Bhand deul temple.

Plate 171

a

b

Adbhar: a; before and b; after conservation of Siva temple.

Stitching and strengthening of the fragile architectural fragments were carried out.

248. SHEORINARAYAN TEMPLE, SHEORINARAYAN, DISTRICT JANJGIR CHAMPA

Repairs to the exterior walls of temple by way of under pinning was done (Pl. 172).

249. MALHAR FORT, MALHAR, DISTRICT BILASPUR

Construction of dwarf wall with M.S. grill fencing all around the fort was taken up and work is in progress. In addition conservation work to the exposed excavated structure by way of veneering, underpinning and watertightening was carried out (Pl. 173).

250. MAHADEV TEMPLE, TUMAN DISTRICT BILASPUR

Repair to the shrines and laying approach all around the temple complex was attended (Pl. 174).

251. CHAITURGARH FORT, LAPHA, DISTRICT KORBA

Conservation work to the wing wall of main gate of the fort by way of veneering, core filling and watertightening was done (Pl. 175).

252. MAHADEV TEMPLE, BASTAR DISTRICT BASTAR

Boundary wall with grill fixing on the sloped area of the temple was provided to prevent erosion.

253. CHANDRADITYA TEMPLE, BARSOOR, DISTRICT SOUTH BASTAR DANTEWADA

The work of stone pitching was done (Pl. 176).

254. DANTESHWARI DEVI TEMPLE, DANTEWADA, DISTRICT SOUTH BASTAR DANTEWADA

The work of watertightening to the roof of *mandapa* through lime-*surkhi* concrete in traditionally method was attended. Approach pathway all around of temple, drinking water tactility and extra toilet was provided. Damaged wooden members of Chhotima temple were repaired. Back portion of temple was attended by filling the ditch with providing drain to prevent stagnation of water.

255. KAMA MEMORIAL, DHILMIL, DISTRICT SOUTH BASTAR DANTEWADA

Apron around the memorial and pathway within the complex was provided.

256. MAMA BHANJA TEMPLE, BARSOOR, DISTRICT SOUTH BASTAR DANTEWADA

The work of grouting and pointing was done in the temple to prevent seepage.

VADODARA CIRCLE

DAMAN AND DIU (U.T.)

257. FORT WALLS, NANI DAMAN, DAMAN

Conservation of eastern moat wall was carried out by way of removing the out of plumb/ dislodged masonry wall and resetting the same with using new stones, wherever required. Consolidating of the parapet wall and plastering of the fortification wall is in progress. Underpinning of the northern outer fort wall by way of applying 20mm thick lime plaster was done. Damaged barbed wire

Plate 172

a

b

Sheorinarayan: a; before and b; after conservation of Sheorinarayan temple.

Plate 173

a

b

Malhar: a; before and b; after conservation of excavated remains, Malhar fort.

Plate 174

a

b

Tuman: a; before and b; after conservation of sub-shrine, Mahadev temple.

Plate 175

a

b

Lapha: a; before and b; after conservation of wing wall, Chaiturgarh fort.

Plate 176

a

b

Barsoor: a; before and b; after conservation of Pond, Chandraditya temple

fencing was replaced with MS grill fencing near northern side of inner area of the fort wall.

GUJARAT

258. BHADRA TOWER, DISTRICT AHMEDABAD

The work of removal of fallen debris, scientific clearance of exposed buried structure, providing grill fencing on the road side, demarcating the boundary of the monument was completed.

259. BIBIJI MASJID, DISTRICT AHMEDABAD

Removal of undulated sunken stone/brick flooring, laying stone flooring inside the mosque using *dhrangadhra* flooring stones over line concrete base were completed.

260. DADA HARIR'S MOSQUE AND TOMB, ASARVA, DISTRICT AHMEDABAD

The work of removing undulated sunken stone/brick flooring and laying stone flooring inside the mosque, using *dhrangadhra* stones were completed (Pl 177).

261. MALAV TANK, DHOLKA, DISTRICT AHMEDABAD

The work of dismantling of the parapet wall, repair to the stone flooring within Malav tank is in progress.

262. SMALL STONE MOSQUE, PALADI, DISTRICT AHMEDABAD

The work of removing dead/damaged old concrete flooring and laying the line concrete base for providing stone flooring is in progress.

263. THE MANSAR TALAV AND SHRINES, VIRAMGAM, DISTRICT AHMEDABAD

Dislodged carved architectural members of the temple after proper documentation were taken out and re-setting of the same was done as per original (Pl. 178).

264. JAMI MASJID, MANDAL, DISTRICT AHMEDABAD

The work of dismantling of the out of plumb/dislodged ashlar stone masonry wall and repair of the same was taken up with available material using special bricks (*lakhuri* type) in mortar. This work is in progress.

265. ANCIENT SITE, LOTHAL, DISTRICT AHMEDABAD

Providing fencing over brick masonry dwarf wall is in progress.

266. DARBARGADH, SIHORE DISTRICT BHAVNAGAR

Dead/damaged plaster from the entrance wall and ramp were recovered and provided with the steps using *dhrangadhra* stones (Pl. 179).

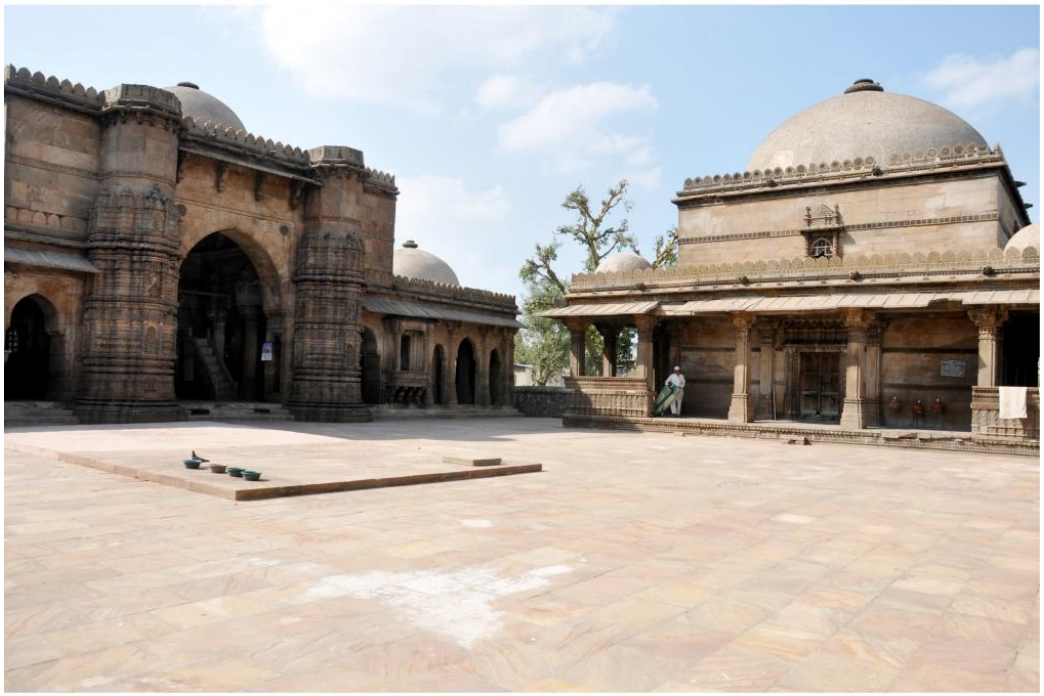
267. STEP WELL WITH INSCRIPTION (RUDABAI STEP WELL), ADALAJ DISTRICT GANDHINAGAR

The work of providing approach pathway in the complex has been completed.

268. DWARKADHISH GROUP OF TEMPLES WITH ITS OUTER COMPOUND, DWARKA, DISTRICT JAMNAGAR

Plate 177

a



b

Asarva: a; before and b; after stone flooring of Dada Harir's mosque and tomb.

Plate 178

a

b

Viramgam: a; before and b; after conservation of Mansar talav and shrines.

Plate 179

a

b

Sihore: a; before and b; after conservation of Darbargadh.

The ashlar stone masonry compound wall near Mokshdwar was conserved by way of replacing damaged/missing stones. Resetting of plumb/dislodged architectural members of the Dattatreya temple were taken up and work is in progress.

269. DURVASA RISHI ASHRAM, PINDARA, DISTRICT JAMNAGAR

The work of debris clearance, removal of damaged masonry wall and earthwork excavation for laying foundation is in progress.

270. MAGDERU TEMPLE, DHRUSANVEL, DISTRICT JAMNAGAR

Constructing of stone masonry compound wall, relaying sunken flooring with new dressed ashlar stone in the place of damaged/missing one was done.

271. RAHEMAT (BIBI) MASJID, MANGROL, DISTRICT JAMNAGAR

The work of removal of damaged stones from the flooring and also from steps was taken up and re-fixing with new stones in the place of damaged/missing one was done.

272. ANCIENT SITE (KOTADA), DHOLAVIRA, DISTRICT KACHCHH

Earthwork excavation for laying concrete base of construction of RR masonry dwarf wall and fixing chain link fencing over the wall was completed.

273. SIVA TEMPLE, KOTAI, DISTRICT KACHCHH

Leveling the ground, spreading good earth consolidating the same is completed. Dressing of stones for laying pathway is in progress.

274. TEMPLE OF GALTESHWAR, SARNAL, DISTRICT KHEDA

The work of construction of brick masonry buttress wall was completed while laying of floor is in progress.

275. VITTHALBHAI HAVELI, VASO, DISTRICT KHEDA

Repair to the brick walls in the ground floor and first floor of Haveli by using special bricks in lime sand *surkhi* mortar was done. Removing of dead/weathers wooden beam, *chajja*, pillar and replacing with new teak wood, after providing proper support to the structural members, removing of dead lime concrete from the second, top floor and relaying with new material were completed.

276. SUN TEMPLE, SURYA KUND WITH ADJOINING OTHER TEMPLE AND LOOSE SCULPTURES, MODHERA, DISTRICT MEHSANA

Stone flooring around Surya Kund was taken up and work is completed.

277. KUND, VIJAPUR, DISTRICT MEHSANA

Brick masonry dwarf wall with chain link was provided (Pl. 180).

278. FORT OF PAVAGADH AND RUINED HINDU AND JAINS TEMPLES ON THE TOP OF THE PAVAGADH HILL, PAVAGADH HILL, DISTRICT PANCHMAHAL

The work of taking out of plumb/bulged out *mandapa* of the temple near Suparasvanath temple was taken up and conserved after strengthening the base.

Plate 180

a

b

Vijapur: a; before and b; after conservation of Kund.

The work of providing chain link fencing with brick masonry dwarf wall is in progress.

279. PATAI RAVALS PALACE, CHAMPANER, PAVAGADH, DISTRICT PANCHMAHAL

Out of plumb/bulged out ashlar/rubble stone masonry wall of palace was dismantled and repaired with available material (Pl. 181).

280. KAMANI MASJID, DISTRICT PANCHMAHAL

The work of taking out of plumb/fallen stone members of the courtyard was taken and restored with available stone member but new stones also unused, wherever required. Flooring was also laid inside the Masjid.

281. RATNESHWARA OLD TEMPLE WITH SCULPTURED SCREEN, RATANPUR, DISTRICT GODHRA

The work of removal of debris and leveling the surrounding area was taken up and completed.

282. CITY GATE, CHAMPANER, DISTRICT PANCHMAHAL

RR masonry wall on the both side of gate was reconstructed. The arch opening has been conserved after replacing the broken slab and the top surface was watertightened with traditional material (Pl. 182).

283. TOMB OF SIKANDAR SHAH, HALOL, DISTRICT PANCHMAHAL

The *chajja* stones and ashlar stone masonry above the *chajja* were conserved with new stone in the place of missing/ broken. Apron around the tomb was provided and approach pathways has been laid (Pl. 183).

284. MINT ABOVE GATE NO. 04, DISTRICT PANCHMAHAL

The work of conservation of the gate after taking out of the broken lintel/roof slab and replacing them with new one as per original was completed.

285. CITADEL WALL (SOUTHERN SIDE) CHAMPANER PAVAGADH, DISTRICT PANCHMAHAL

Out of plumb/ashlar stone masonry of the wall of citadel (southern side) after proper documentation was taken out and restored as per original (Pl. 184).

286. CITY WALLS CHAMPANER PAVAGADH, DISTRICT PANCHMAHAL

Debris of south city wall was removed, and useable stones were stacked for the purpose of re-using the same.

287. RUINS OF RUDRA MAHALAYA TEMPLE, SIDDHPUR, DISTRICT PATAN

Providing corner stone's on both side of pathway leading from main entrance to monument, using *dhrangadhra* stones in LSS mortar was done.

288. RANI-KI-VAV, DISTRICT PATAN

Construction of brick masonry wall extended upto entrance step is in progress.

289. SHAIKH FARID'S TOMB, DISTRICT PATAN

Repair to the tomb has been taken and work is in progress.

Plate 181

a

b

Pavagadh: a; before and b; after conservation of palace of Patai Ravals with tank.

Plate 182

a

b

Champaner: a; before and b; after conservation of city gate.

Plate 183

a

b

Halol: a; before and b; after conservation of tomb of Sikandar Shah.

Plate 184

a

b

Champaner: a; before and b; after conservation of citadel wall.

290. SAVAI MATA TEMPLE, SUNAK, DISTRICT PATAN

Out of plumb/bulged out portion below *sikhara* of the temple was removed carefully after proper documentation and reset again by using new stone blocks, wherever required as per original. (Pl. 185).

291. RANAK DEVI'S TEMPLE, WADHWAN, DISTRICT SURENDRA NAGAR

The worn out/undulated steps of temple were removed carefully and reset as per original. Lime wash was also removed from the walls. Fort wall was conserved using new stones in place of missing/broken one. Approach pathway was laid and minor repairs attended to the *chajja*.

292. ANCIENT MOUND, RANGPUR, DISTRICT SURENDRA NAGAR

The work of removal of unwanted vegetation growth around the site has been taken up and work is in progress.

293. OLD DUTCH AND ARMENIAN TOMBS AND CEMETRIES, DISTRICT SURAT

Fallen/ bulged out brick masonry compound wall was repaired and plastered as per original.

294. SAPTMUKHI VAV, DABHOI, DISTRICT VADODARA

Repair to the retaining wall of the *Vav* by using new stones in the place of missing/ damaged one was taken up and work is in progress (Pl. 186).

295. HIRA GATE WITH ADJACENT CONSTRUCTION, DABHOI, DISTRICT VADODARA

The work of removing undulated/sunken pathway in between gates, flooring of Hira gate, relaying the pathway were completed.

296. NANDODI GATE WITH ADJACENT CONSTRUCTION, DABHOI, DISTRICT VADODARA

Earth work excavation for laying base concrete of stone pavement is in progress.

297. ANCIENT SITE KNOWN AS SANDHIYAPURA, GORAJ, DISTRICT VADODARA

The north side dry stone pitching (slope towards the river) was conserved to prevent soil erosion. The original plinth on the right side of the temple was exposed and approach pathways towards the temple were completed.

Plate 185

a

b

Sunak: a; before and b; after conservation of Savai mata temple.

Plate 186

a

b

Dabhoi: a; before and b; after conservation of Saptmukhi vav.

VIII. ARCHAEOLOGICAL CHEMISTRY

ANDHRA PRADESH

1. SHRI VEERABHADRA SWAMY TEMPLE, LEPAKSHI, DISTRICT ANANTHA PUR

In continuation of previous year's work, the conservation treatment of the mural paintings executed on ceiling of *artha mandapa*, *natya mandapa* in Vishnu shrine were taken up in order to remove dust, dirt, soot, cobwebs and insect nests etc. The affected area of dust, dirt and soot etc. was cleaned using a mixture of 2-Ethoxy ethanol, Toluene (SF) and Tri-ethanolamine in the ratio of 2:2:0.5 after that the surface was cleaned with the mixture of Methanol and Iso-propanol. Further if any remnants left over on the surface were removed with the help of Artist brush and cotton swabs. The work is in progress.

2. ABDUL WAHAB KHAN'S TOMB, KURNOOL DISTRICT KURNOOL

In continuation of previous year's work, the exterior walls and domes of this monument made of lime stone and lime plaster were subjected to cleaning treatment for the removal of microvegetational growth, dust, dirt, rust patches. The microvegetational growth was removed mechanically using a mixture of 2-3% ammonia solution and non-ionic detergent solution in 3:1 ratio. The rust patches were removed by using 4% Oxalic acid solution. The surface was given a wash with dilute ammonia solution for neutralizing the effect of acid present, if any. This was followed by a thorough wash with plain water. All the treated and dried surfaces were given a coat of 2% sodium pentachlorophenate as fungicide in aqueous medium. Finally, the cleaned and dried stone surface was treated with Wacker BS-290 diluted in mineral turpentine oil solvent in 1:16 ratio to impart water repellency to the building stones. The work has been completed.

3. SRI KODANDARAMA SWAMY TEMPLE, VONTIMITTA, DISTRICT KADAPA

The interior walls and ceiling of the temple made up of slate and sandstone were taken up for chemical conservation during the period under review for removal of settled dust, dirt, lime coat, red ochre, iron stains and acrylic paints. Lime and red-ochre were removed using 2-3% aqueous acetic acid solution by chemico-mechanical means. Iron stains were removed using oxalic acid solutions. Remnants of acidic ions were neutralized with liquid ammonia solution. Finally, the surface was washed using non ionic detergent and plenty of water. The work is in progress.

4. SHI CHENNAKESAVA SWAMY TEMPLE, PUSHPAGIRI, DISTRICT KADAPA

The exterior and interior parts of the Sri Lakshimi Devi temple and Hanuman temple made up of lime stone were taken

up for chemical conservation during the period under review for removal of settled dust, dirt, lime coat, red-ochre, iron stains and microvegetational growth. Liquid ammonia mixed with non ionic detergent in the ratio of 3:1 was used for removal of superficial deposits. Lime coat and red-ochre marks were removed using 2-3% aqueous acetic acid solution by chemico-mechanical means. Iron stains were removed using oxalic acid solution. Remnants of acidic ions were neutralized with liquid ammonia solution followed by thorough wash with plenty of plain water. The cleaned surface was finally given fungicidal treatment using 2% sodium pentachlorophenate in aqueous medium. Finally, a silane siloxane based water repellent Wacker BS-290 in MTO in 1:15 ratio was applied on the entire dried surface as preservative coat. The work has been completed.

5. CHARMINAR HYDERABAD DISTRICT HYDERABAD

External façade of connecting walls at north east-south east, south east-south west, south west-north west, north west-north east and minarets were taken up for removal of microvegetational growth and deposits of dust, dirt, soot bird and bat's excreta. During the period under review the cleaning was done by dry brushing with soft nylon brushes. Liquid ammonia mixed with non ionic detergent in the ratio of 3:1 was used for removal of superficial deposits. Dark and deep stains from the surface was removed by sodium carbonate and sodium bicarbonate in 1:1 ratio admixed with fullers earth added with little ammonia and non ionic detergent. After drying the surface was washed thoroughly with plenty of water. The cleaned surface was given fungicidal treatment using 2% sodium pentachlorophenate in aqueous medium as biocide. Finally, a silane siloxane based water repellent Wacker BS-290 in MTO in 1:12 ratio was applied on the entire dried surface as preservative coat. The work has been completed.

6. SRI BHEEMESWARA SWAMY TEMPLE, DRAKSHRAMA, DISTRICT EAST GODAVARI

The South of main temple wall made up of *khondalite* stone/sand stone was taken up for chemical conservation during the period under review for removal of settled dust, dirt, marks of saline effect and microvegetational growth. Liquid ammonia mixed with non ionic detergent in the ratio of 3:1 was used for removal of superficial deposits. Tooth brushes were also used for removal of accretions from the intricate carvings and designs. Soluble salts from the stone surface were removed by repeated paper pulp treatment. The cleaned surface was given fungicidal treatment using 2% sodium pentachlorophenate in aqueous medium. Finally a silane siloxane based water repellent Wacker BS-290 in MTO in 1:14 ratio was applied on the entire dried surface as preservative coat. The work is in progress.

BIHAR

7. TEMPLE NO. 3, NALANDA, DISTRICT NALANDA

The nine stucco sculptures of this temple were taken up for consolidation and preservation work. The restoration work was carried out using Plaster of Paris, lime, brick powder, oxide colour and their

mixture with an ethyl silicate based stone strengthener. The stuccos so repaired were given two coats of water repellent Wacker BS-290 as a preservative to make the stucco surface hydrophobic. The work is in progress.

CHHATTISGARH

8. PATALESWAR TEMPLE, MALHAR, DISTRICT BILASPUR

In continuation of previous year's work, the conservation treatment of the main temple which is made of fine grained sand stone was taken up. Two such deteriorated sculptures are situated in the right and left side of the doorjamb of the main temple. Dissolution of mineral component, stone chipping and vertical cracks were the main problems in sculptures. The replica of deteriorated sculptures had been formed by using fiberglass to regain the same sculpture in future before its consolidation. Removal of superficial accretions of dust, dirt and micro vegetation was carried out with the help of soft nylon brushes followed by using 2% to 3% aqueous ammonia solution with little non ionic detergent. 2% solution of sodium pentachlorophenate in water was applied on treated surface to arrest the further growth of micro vegetation. To provide extra strength to deteriorated and fragile stone surface consolidation and strengthening was given by using an ethyl silicate based stone strengthener Wacker OH-100. Finally a silane siloxane based water repellent Wacker BS-290 in MTO in 1:14 ratio was applied on the entire dried surface as preservative coat. The work has been completed.

9. MAMABHANJA TEMPLE, BARSOOR, DISTRICT DANTEWADA

In, continuation of previous year's work, the exterior surface of the temple which was badly affected and become blackish due to microvegetational growth, deposition of smoke, soot, greasy material, dust, dirt etc. Removal of superficial accretions of dust, dirt and micro vegetation was carried out with the help of soft nylon brushes followed by using 2% aqueous ammonia solution with little non ionic detergent. 2% solution of sodium pentachlorophenate in water was applied on treated surface to arrest the further growth of microvegetation. For providing an extra strength, resistant to effect of erosion, deteriorated part of the stone surface was treated with ethyl silicate based stone strengthener Wacker OH-100. Finally, the cleaned and dried stone surface was preserved with silane siloxane based material, Wacker BS-290 diluted in MTO in ratio of 1:16. The work has been completed.

10. TEMPLE AND FORT GATE AT CHAITURGH, DISTRICT KORBA

The temple made of sand stone was covered with thick layers of dried microvegetational growth and other superficial accretionary deposits. The conservation of stone surfaces consisted of chemico mechanical cleaning with ammonia solution (2%) and neutral detergent solution in water; fungicidal treatment with sodium pentachlorophenate (2%) solution in water. The work is in progress.

11. ANDAL DEO TEMPLE KHAROD, DISTRICT JANJGIR CHAMPA

This small temple is built of brick and stucco. The external part of the temple had become blackish due to deposition of dried micro vegetation growth, dust, dirt etc. Lime coating on the interior portion was also found. Superficial accretions and dust, dirt, etc. were cleaned by using 2% aqueous ammonia solution mixed with non ionic detergent. Lime coatings were removed by chemico-mechanical means using 2% acetic acid followed by its neutralization with dilute ammonia solution. Strengthening of deteriorated brick masonry and hydrophobic treatment is yet to be attended. The work is in progress.

DELHI

12. RED FORT, DELHI

A. KHAS MAHAL

In continuation of previous year's work, the chemical treatment, preservation and restoration work of exploring the hidden paintings (i.e., removal of lime wash layers) and preservation of exposed paintings was continued during the period under review. The older layer of preservative earlier applied on the pigments layer only, was first removed using toluene. After that organic solvent such as, methanol, ethyl alcohol and toluene etc. were used to remove the superficial accretions deposited on the marble areas of the painted surface. The marble surface having inlay work was subjected to chemical cleaning with liq. Ammonia, and non-ionic detergent followed by clay pack method for removing engrained accretions. The work is in progress.

B. RAMPART WALL, RED FORT

The red sand stone wall (under flag mast) facing Chandni Chowk was taken up for the removal of surface dirt, dust, soot, bird's droppings, pollutants, etc. besides remnants of calcareous deposits and other encrustations in order to improve its aesthetic look. A mixture of 3% aqueous solution of ammonia and non ionic detergent was used for general cleaning. Calcareous deposits were removed mechanically using dilute acetic acid on affected area only followed by thorough washing with plenty of water. Two black stone figures of elephants at Hathigate were cleaned and conserved. Finally, the exterior surfaces of the elephant figure were colored suitably as needed.

The huge brass gate at entrance to the Meena Bazar was found to be covered in thick layers of dust, dirt, soot, bird's droppings, etc. and the metal surface had darkened due to atmospheric corrosion effects. The lower part of brass gate was badly disfigured having red spots due to visitors spit. The treatment of the brass gate was carried out with 3-5% alkaline solution of sodium potassium tartrate in distilled water followed by application of dilute solution of lacquer varnish in thinner as a protective coat. The work has been completed.

C. OTHER BUILDINGS OF RED FORT

The brass gate of Moti masjid, the exterior walls of Hamam, the plinth running from Hamam to Rang mahal, central fountain between Rang mahal and Diwan-e-Aam, metal plates at Lahore gate and Delhi gate were taken up for chemical treatment and preservation work. Chemical treatment of

entire area was done with liq. Ammonia and Rankleen neutral solutions to remove dust, dirt and organic pollutants. Treatment of metallic/brass surface was done with alkaline Rochelle's Salt.

Exterior lime plaster surface of Hamam was treated with dilute solution of bleaching powder to arrest microvegetation growth. 2% solution of sodium pentachlorophenate in water was applied on treated surface as biocide. Finally, the cleaned and dried stone surface was preserved with silane siloxane based material, Wacker BS-290 diluted in MTO in ratio of 1:16. The work has been completed.

13. WAZIRABAD MOSQUE, WAZIRABAD, DELHI

The scientific conservation work was carried out on the lime plaster, lime mortar and sand stone surfaces of the monument. The exterior portion of the tomb including perforated stone jalis in the prayer hall of the mosque *kangoora's* on the drum wall of the tomb were taken up for the removal of superficial accretionary deposits *viz*. dust, dirt, soot, smoke and a heavy growth of microvegetation. The treatment of stone surface was carried out using a mixture of 2 to 3% ammonia solution and 2-5% non ionic detergent solution in water. Lime plastered surface was subjected to bleaching powder treatment to eradicate microflora. After cleaning treatment a coat of 2% sodium pentachlorophenate dissolved in distilled water was applied over the entire surface and finally a coat of Wacker BS-290 diluted in mineral turpentine oil (1:11ratio) was applied to the cleaned and dried exterior stone/lime plaster surface to impart water repellency. The work has been completed.

14. ADHAM KHAN TOMB, MEHRAULLI, NEW DELHI

The exterior of the tomb, which includes a hemispherical dome, drum wall, lower eight walls with arches of the octagonal shaped tomb made up of lime plaster/sandstone/quartzite was taken up for chemical treatment and preservation work during the period under review. The entire surface was affected by the deposition of dust, dirt, soot, smoke and other superficial accretions. The exterior portion of the monument was covered with thick growth of microvegetation. The chemical treatment of sand stone, quartzite and lime plaster surface was carried out with a mixture of 5% ammonia solution and 2 to 3% non ionic detergent solution in water. Oxalic acid for removal of iron stains, acetic acid for removal of lime wash coatings were used. The weak surface was consolidated by an ethyl silicate based stone strengthener Wacker OH-100. Lime plastered surface was subjected to bleaching powder treatment to arrest microvegetational growth. After chemical treatment fungicidal treatment with 2% aqueous sodium pentachlorophenate was given. Finally, a coat of Wacker BS-290 diluted in mineral turpentine oil (1:11ratio) was applied on lime plaster, quartzite and sandstone surface. The work has been completed.

GOA

15. SE CATHEDRAL CHURCH, ST. FRANCIS CHURCH, VELHA GOA, DISTRICT PANAJI

In continuation of previous year's work, the badly torn and damaged oil paintings on canvas supported by wooden panels

and polychrome figures were repaired and restored. Surface accretions as well as old picture varnish were removed to improve visibility. For this purpose mixture of suitable organic solvents were used with the help of cotton swabs and sable hair brushes. Loose pigment layers were fixed with the help of wax and resin mixture. Damaged and insect eaten portions were filled with compatible material. After insecticidal treatment retouching and colour reintegration was done wherever necessary. The canvas paintings were given new support from the back side with hot bee's wax and rosin mixture very carefully. Finally, varnish was applied as preservative coating. All the pieces of poly chrome figures were joined together with saw dust, stainless steel nails, etc. colour retouching was also done. The work is in progress.

GUJARAT

16. JAIN TEMPLE, PAVAGADH, DISTRICT GODHRA

In continuation of previous year's work, from the group of four Jain temples, Chinthamani temple and Parswanath temple were taken for chemical treatment and preservation work during the period under review. The sandstone temples had several conservation problems which included a heavy micro biological growth, deposition of dust, dirt, grime, oil bond distempers, thick layers of lime coats etc. on their exterior surface. At several places the stone surface was highly deteriorated due to weathering effects. Micro vegetation growth and other superficial accretions were removed by chemico mechanical method using a mixture of 2-3% Ammonia and 1% non ionic detergent solution in water with the help of soft nylon brushes. Hard and thick lime coats and oil bond distempers from the surface were removed by chemico mechanical means by using 1-2% acetic acid solution in aqueous medium followed by thorough washing with plenty of water. Fragile and pulverized stone surface was consolidated with an ethyl silicate based stone strengthener Wacker OH-100. Fungicidal treatment was given by applying 2% solution of sodium pentachlorophenate in water and finally, Wacker BS-290 in MTO was applied on the exterior stone surface as water repellent treatment. The work has been completed.

17. MACHMURIDO BUILDING, ANJAR

The restoration work of tempera paintings executed on the brick wall with the support of lime plaster was taken up during the period under review under civil deposit work. The painting on the wall of Machmurido Building room are found to be badly affected due to deposition of dust, dirt, cob webs, bats excreta's, mud pockets over the painting, fading of colour, flaking of pigments, cracks and lacunae make disfiguring look to the paintings. The fixing of pigment layer was done using 1-2% poly vinyl acetate solution in toluene. After that organic solvent such as, methanol, ethyl alcohol and toluene etc. were used to remove the superficial accretions on the painted surface. Colour reintegration on necessary area was done, fixing, filleting, was carried out using with compatible materials and with reversible color. Finally the whole treated painted area was preserved with 1% PVA in Toluene. The work has been completed.

18. RANI-KI-VAV, PATAN

This main Vav is renowned for its numerous beautifully carved long standing sculptures made of bulk sandstone. These sculptures decorated the walls of the main well of Vav. The conservation problem includes microvegetational growth, deposition of soot, smoke, dust, dirt, bird's droppings, insect's mud pockets, honey combs etc. Micro vegetation growth and other superficial accretions were removed by chemico-mechanical method using a mixture of 2-3% Ammonia and 1% non ionic detergent solution in water with the help of soft nylon brushes. Hard and thick bat's excreta from the surface were removed by chemico mechanical means by using 2% hydrogen peroxide solution in aqueous medium followed by thorough washing with plenty of water. The work has been completed.

19. BHADRA GATE, AHEMADABAD

The Bhadra gate is one of the eight gates of Bhadra fort, only the exterior portion of the East Side Bhadra gate was taken up for Chemical treatment and preservation work during the period under review. The Gate is build up of sandstone and has a large opening with wooden doors. The exterior surface area of the monument was affected by heavy microvegetational growth, dust, dirt, soot deposition and bird's dropping. The wooden door exposed to sunlight was badly deteriorated. The accretionary deposits were removed using liquid ammonia and non ionic detergent in the ratio of 3:1 with the help of different type of brushes. The fungicidal treatment was given to clean and dried surface of the monument. The week portion of the monument has been strengthened with a stone strengthener. The work is in progress.

20. ASHOKAN ROCK EDICTS AND BUDDHIST CAVES, JUNAGADH

The famous rock edicts and the rock cut Buddhist caves were taken up for chemical treatment and preservation work. The Buddhist caves were fully covered with micro vegetation growth, dust, dirt on the exterior as well as interior portions. In some areas problem of pulverization of stone was also observed due to salt action. Superficial accretions, dust, dirt, etc. were cleaned by using 2% aqueous ammonia solution mixed with non ionic detergent in water and gentle brushing with the help of soft nylon brushes. Followed by thorough washing with plenty of plain water. The weakened stone surface was consolidated with an ethyl silicate based material Wacker OH-100. To arrest further microvegetation growth the dried surface was given fungicidal treatment by using 2% aqueous solution of sodium pentachlorophenate on the exterior areas.

Finally, silane siloxane based water repellent Wacker BS-290 diluted with MTO in 1:16 ratio was applied on dried stone surface as the hydrophobic treatment. The work is in progress.

HIMACHAL PREDESH

21. G-SER KHANG MONASTERY, TABO, DISTRICT LAHAUL AND SPITI

The scientific conservation work of mural paintings on the western, northern and eastern walls was taken up during the period under review, for the removal of accretionary deposits as dust, dirt, soot, smoke, mud streaks etc. from the painted surface using organic solvents *viz*. 2-ethoxy ethanol, n-butyl alcohol, ethanol,

petroleum ether, turpentine oil etc. as individual or in combination depending upon the nature of accretionary deposits. The fixing, filleting, mending, etc. work was carried out to stabilize the loose painted plaster, filling up of the crakes/fixing of bulged area was done with locally available compatible material. Colour reintegration work was also attended to match it with the surroundings. The restored area was preserved with 0.5% solution of PVA in toluene. The work has been completed.

22. LA KHANG MONASTERY, TABO, DISTRICT LAHUL AND SPITI

In continuation to the previous year work, scientific conservation of mural paintings was taken up during the period under review. The mural paintings were cleaned for the removal of dust, dirt, soot, smoke, mud streaks etc. using suitable organic solvents such as 2-ethoxy ethanol, n-butyl alcohol, ethanol, petroleum ether, turpentine oil etc. Filling and filleting work was carried out using locally available suitable compatible materials. Colour reintegration works on the filled / filleted areas were also attended with the surroundings. The restored area was preserved with 0.5% solution of PVA in toluene. The work has been completed.

23. MRIKULA DEVI TEMPLE, UDAIPUR, DISTRICT LAHAUL AND SPITI

The scientific conservation work of doorframe at the entrance of *garbhagriha*; was taken up during the period under review. Fungal infested two panels at the ceiling and insect affected panel at the left side of the entrance was also taken up. The doorframe for the removal of dust, dirt, soot, smoke, grease etc. was carried out using organic solvents such as ethyl alcohol, 2-ethoxy ethanol, acetone, mineral turpentine oil, turpentine oil etc. The cleaned carved wooden surfaces were preserved with wood preservative. The fungus infected panels were treated with boric acid, o-phenyl phenol, zinc chloride, etc. The infested holes in the wooden panels on the left hand side of main entrance were treated with suitable insecticide filled with saw dust powder using suitable adhesive. The treated portions were preserved with dilute varnish. The work has been completed.

24. ROCK-CUT TEMPLE, MASRUR, DISTRICT KANGRA

The exterior surface of the temple, fallen pieces scattered on the ground, loose sculptures etc. of the entire temple was taken up for scientific conservation for the removal of the microvegetation growth, dust, dirt, birds excreta etc. from the stone surface, for consolidation of the fragile stone fragments, filling up of the crakes/ gaps, etc. The consolidation of the fragile, ex-foliated, disfigured stone sculptures was carried out by the application of an ethyl silicate based stone strengthener Waker OH-100. After consolidation the cleaning was carried out using liquor ammonia and non-ionic detergent in the 3:1 ratio using soft brushes. Cleaned surface was thoroughly washed with plain water to remove the remnants of chemicals. The cracks and gaps were filled with thick paste of stone powder of the same colour and consolidant (Wacker OH-100). The cleaned and dried surface was given fungicidal treatment with 2% aqueous solution of sodium pentachlorophenate. Finally, stone surface

was given hydrophobic treatment with Wacker BS-290 in MTO in the ratio 1:14, two coats wet on wet. The work is in progress.

25. RUINED FORT, KANGRA

The scientific conservation work of Laxmi Narayan temple and adjoining Jail area inside the fort complex was taken up for the removal of dust, dirt, bird's excreta, thick growth of microvegetations, hard and ingrained lime mortar (lime + sand) inside the fine carvings of the temple and consolidation of fragile/ex-foliated stone surfaces. The scientific conservation work involves removal of superficial dust etc. with brushes followed by consolidation of fragile/ex-foliated stone surfaces with an ethyl silicate based stone strengthener. The entire stone surface was cleaned using liquor ammonia and non-ionic detergent in the 3:1 ratio. The ingrained lime/lime plastered accretions were removed physico-chemically using dilute aqueous acetic acid solution. After thorough washing and drying, biocide treatment was given to prevent re-growth of microvegetation with 2% aqueous solution of sodium penta chloro phenate. Finally the surface was subjected to hydrophobic treatment with the help of Wacker BS-290 in MTO in the ratio 1:14, two coats, wet on wet basis. The work has been completed.

26. NARBADESHWAR TEMPLE, SUJANPUR TIRA, DISTRICT HAMIRPUR

The mural paintings at *garbhagriha*, circumambulatory path at western entrance and walls of four subsidiary shrines; plastered dome & platform of subsidiary shrines and Nandi *mandapa* made up of stone was taken up for scientific conservation work. The weathered/fragile stone surfaces were first given consolidation treatment with an ethyl silicate based stone strengthener Wacker OH-100 before cleaning the stone /plastered surface with liquor ammonia and non-ionic detergent in the ratio 3:1 taking utmost care for removal of dust, dirt, thick vegetational growth etc. Whereas the cleaning of mural paintings was carried out for removal of dust, dirt, soot, smoke, hand grease, etc. by using organic solvents such as 2-ethoxy ethanol, acetone, iso-amyl acetate, petroleum ether, turpentine oil, etc. as individual or in combination depending upon the nature of accretionary deposits. Filling up of cracks, colour reintegration work in the faded area/filled area and replacing of cement mortar used in the past for patch work at the subsidiary shrines were also carried out. The work is in progress.

27. MANI MAHESH TEMPLE, BHARMOUR, DISTRICT CHAMBA

The exterior as well as interior portion of the temple taken up for scientific conservation work during the period under review**.** The weathered/fragile/ex-foliated stone surfaces were consolidated by an ethyl silicate based stone strengthener Wacker OH-100. The superficial accretions *viz*. dust, dirt, microvegetational growths etc from the temple were removed using liq. ammonia and non-ionic detergent in the ratio 3:1. The ingrained lime plaster from the carvings was removed by physic-chemical technique using dilute solution of acetic acid. After thorough washing, fungicidal treatment was given to the dried surface using 2% aqueous solution of sodium

pentachlorophenate. Finally, surface was given hydrophobic treatment with Wacker BS-290 in MTO in the ratio 1:14, two coats wet-on-wet basis. Thick deposition of soot, smoke and greasy deposits due to burning of oil lamps, incense sticks on the walls and ceiling of *garbhagriha* were removed using organic solvents such as 2-ethoxy ethanol, tri-ethanol amine, iso-amyl acetate, acetone etc. The work has been completed.

28. KATOCH PALACE, SUJANPUR TIRA, DISTRICT HAMIRPUR

The façade and two elephants were subjected for the removal of dust, dirt, microvegetational growth and other accretionary deposits from the plastered surface during the period under review. The accretionary deposits were removed from the plastered surface using liquor ammonia and non-ionic detergent in 3:1 ratio. The cleaned and thoroughly washed and dried surface was given fungicidal treatment with 2% aqueous solution of sodium pentachlorophenate. Finally surface was given hydrophobic treatment with Wacker BS-290 in MTO in 1:14 ratio. The work has been completed.

JAMMU AND KASHMIR

29. ASSEMBLY HALL OF THIKSEY MONASTERY, THIKSEY, DISTRICT LEH

The mural painting was covered by dust, dirt and mud streaks, micro and macro cracks bulging and missing of large chunks of painted plaster was the main conservation problems. Removal of dust and dirt was carried out using chemicals and solvents by with soft brushes. Cracks and missing chunks/portions were filled with suitable materials; reintegration work was done by suitable colours. Finally cleaned and restored surface was preserved with suitable preservative. The work has been completed.

KARNATAKA

30. HOYASALESWARA TEMPLE, HALEBID, DISTRICT HASSAN

a. HALEBID MUSEUM:

The Halebid museum is located in the premises of Hoysaleswara temple complex. It has three galleries. Out of these, two are open galleries and one is the inner gallery of the museum. The exhibited sculptures includes Dwarapalaka, Ganesa, Siva, Vishnu, inscribed pillars, Hoysala emblem and Parswanatha statue etc. are made of schist stone. The schist stone sculptures are exhibited in the open galleries and covered with superficial accretions *viz*., dust, dirt and micro vegetation growth. The dust and dirt from the surface of sculptures located in interior or exterior galleries was removed by using dilute ammonia and non-ionic detergent mixture 3:1, followed by washing with plenty of water. Sculptures located in exterior galleries were given application of sodium pentachlorophenate as fungicide. Finally, Wacker SMK-1311 diluted with water in 1:12 ratio was applied as water repellent in two coats. The work has been completed.

b. HOYASALESWARA TEMPLE

This temple is dedicated to God Siva and made of schist stone. The exterior of the temple was covered with superficial accretions like dust, dirt, microvegetation

growth and splashes of lime/calcareous accretions. The lime/calcareous accretions were removed using dilute acetic acid solution followed by neutralization with dilute ammonia solution. Finally, the area was washed with plenty of water. The dust, dirt and microvegetation were removed by using dilute ammonia and non-ionic detergent mixture (3:1), followed by washing with plenty of water. On exterior surfaces 2% solution of Sodium pentachlorophenate was applied as fungicide. Finally, Wacker SMK-1311 diluted with water in 1:12 ratio was applied as water repellent in two coats. The work has been completed.

31. SUMMER PALACE, DARIA DAULATH BAGH, SRIRANGAPATNA, DISTRICT MANDYA

General cleaning for the removal of loose dust and dirt accumulated on the painted surfaces was carried out with the help of soft brushes on a regular basis. The paintings on wooden ceiling of eastern verandah have floral pattern. On the wooden ceiling canvas was used on joints to continue the patterns of paintings. The canvas had been torned in many places. The main conservation problem was removal of dust, dirt, mud from the planks joints and old preservative coats. The superficial accretions were first removed using gentle dry brushing with soft brushes, old preservatives from the paintings and other accretions like dust, dirt etc. were cleaned using solvents like 2-ethoxy ethanol Diacetone alcohol, Acetone, Butyl Lactate and n-Butyl alcohol and turpentine as restrainer were also used. Torned canvas was removed and fresh canvas was fixed with animal glue, bee wax. Minimum colour reintegration was attended to match with the surroundings. Careful consolidation of fragile pigments was done using 1% poly vinyl acetate in Toluene. The work is in progress.

32. RANGANATHASWAMY TEMPLE, SRIRANGAPATNA, DISTRICT MANDYA

The temple is made of granite stone. The south east corner *mandapa* (kitchen block), outer *garbahgriha* wall, sukhanasi of Lakshmidevi were covered with dust, dirt, soot and oily accretions in entire area. The Compound wall from inner side was covered with lime wash and red ochre stripes, dust, dirt and micro vegetation accretions. The lime wash accretions were removed with dilute acetic acid solution and oxalic acid solution followed by neutralization with dilute ammonia solution. The cleaned area was washed with plenty of water. After that 3% Sodium pentachlorophenate was applied as fungicide. Finally, silicon based water repellent emulsion Wacker SMK-1311 diluted with water in 1:12 ratio was applied as preservative in 2 coats. The thick soot and oily accretions mainly in the ceiling and pillars of closed *mandapa* of south side were removed by clay pack method followed by cleaning with ammonia and neutral detergent solution. The entire cleaned surface was washed with plenty of fresh water. The work is in progress.

33. LORD VIRUPAKSHA TEMPLE, HAMPI, DISTRICT BELLARY

In continuation of previous years work, the adjacent *mandapa* of Rayagopura *(utsava mandapa)* made up of granite genesis, affected with thick lime coats and enamel

paints on ceiling, lintels, pillars, walls all around in south, north, west and *chajja* portions. The lime wash accretions were removed with dilute acetic acid solution followed by neutralization with dilute ammonia and non-ionic detergent solution. The entire cleaned surface was washed with plenty of water. The soot accretions from ceiling were removed by clay pack method and by using ammonia and non-ionic detergent mixture (3:1). The treated area was washed with plenty of water. The work is in progress

34. HARIHARESWARA TEMPLE, HARIHARA, DISTRICT DAVANAGERE

The pillars, walls, ceiling, exterior walls, inscriptions, *deepastambhas* of this temple made up of schist stone. Scientific conservation work was taken up for the removal of dust, dirt, soot, oily accretions, lime wash and micro vegetation from the exterior deteriorated walls around the temple. The work is in progress.

35. TARAKESHWARA TEMPLE HANAGAL, DISTRICT HAVERI

The exterior surface of the temple was covered with dust, dirt, birds excreta, lime coating, soots, oily matters and microvegetation growths. Lime coating was removed by acetic acid solution. The dust, dirt and micro vegetation were removed by using dilute ammonia and non-ionic detergent mixture (3:1) followed by washing with plenty of water. The work has been completed.

36. EXCAVATED STUPA REMAINS AT KANAGHANAHALLI (SANNATHI), DISTRICT GULBARGA

The stupas are made up of limestone and bricks. The stupa was covered with dust, dirt, and bird's excreta along with microvegetational growth. The dust, dirt and micro vegetation were removed by using dilute ammonia and non-ionic detergent mixture (3:1) followed by washing with plenty of water. On exterior surfaces 2% solution of Sodium pentachlorophenate was applied as fungicide. Finally some specific panel's preserved by silane and silaxone based water repellent Wacker BS-290 in MTO in 1:16 ratio. The work has been completed.

37. BANASHANKARI DEVI AND SHANKARLINGA TEMPLE, AMARGOL, DISTRICT DHARWAD

The temple is made up of Sand stone. The exterior surface of the main temple (Banshankari Devi Temple and Shankarlinga Temple) having very fine carving was covered with dust, dirt, bird's excreta along with microvegetational growth. There are also some portions covered by lime coating in the exterior and interior. The scientific conservation and preservation work was taken up to clean the above said accretions on the exterior surface of the monument. The removal of superficial accretions, dust and dirt, engrained accretions including micro vegetational growth was carried out using ammonia and non-ionic detergent mixture (3:1). The treated area was washed with plenty of water. The entire exterior surface was given fungicidal treatment with 2% solution of sodium pentachlorophenate as fungicide. Finally water repellent treatment was given by silane silaxone based water repellent Wacker BS-290 in MTO in 1:14 ratio. The work has been completed.

KERALA

38. SRI VADAKKUNNATHAN TEMPLE, DISTRICT THRISSUR

During the period under review the scientific conservation work was taken up for the removal of soot, dust and dirt accretions accumulated on the wall paintings and consolidation of deteriorated portions of shrine and cloister *mandapa*. For the removal of dust, dirt, organic solvents like 2- ethoxy ethanol, turpentine, diacetone alcohol, butyl lactate and sulphur free toluene were used. The flaked portions were rectified by fresh lime in the traditional combination method with organic ingredients and the conserved portions were integrated. Preservative coat of 1% poly vinyl acetate in sulphur free toluene was applied over the paintings. The work is in progress.

MADHYA PRADESH

39. MATANGESWARA TEMPLE, WESTERN GROUP OF MONUMENTS, KHAJURAHO, DISTRICT CHHATARPUR

In continuation of the previous year's work, chemical conservation work was taken up on the exterior surface. The temple is built up of buff colored sandstone. It is a very huge temple and is living one. Main problem was to remove a thick and compact layer of dried biological growth, dust and dirt from the exterior of the temple. These accretions were removed scientifically with the help of eco friendly and non residual mild chemicals which leave no harmful effects on the stone surface. Soft coir brushes were used with cares so. After cleaning, biocidal treatment was given in order to discourage further growth of micro organisms on the facade. Finally hydrophobic treatment to the cleaned and dried surface was given which imparts water repellency to the surface of monument. The work has been completed.

40. TOMB OF BAHU SAHIBA, MOHAMMED GAUS COMPLEX, GWALIOR, DISTRICT GWALIOR

In continuation of the previous year's work chemical conservation and preservation was taken up during the period under review. About 80% work was completed in the previous year. The domes are plastered and rest of the structure is built up of sand stone partially covered with the lime plaster. The exterior portion of the monument especially domes were covered with thick deposition of dust, dirt and dried microbiological growth. These accretions were removed scientifically with the help of mild chemicals which leave no harmful effects on the stone surface using very gentle brushing with coir brushes. After cleaning, biocidal treatment was given in order to check the further growth of micro organisms. Finally hydrophobic treatment to the cleaned and dried surface was given which imparts water repellency to the surface of monument. Repair work to correct the damage to the plastered surface due human vandalism was also attended suitably. The work has been completed.

41. ROCK CUT BUDDHIST CAVES, BAGH, DISTRICT DHAR

In continuation of previous year work, the conservation and restoration work of the paintings, stucco figures and striped of panels of paintings displayed inside museum were taken up during the period

under review. Annual maintenance/ repair work of Murals in caves and Museum including the fixing, filleting and preservation along with insecticidal treatment was carried. The work is in progress.

42. WESTERN GROUP OF MONUMENTS, DISTRICT KHAJURAHO

(a) In continuation of previous year work, the scientific cleaning and preservation work was taken up for Vishvanth temple enshrining a *Siva-linga*. The scientific treatment and preservation of exterior of the main temple was taken up during the period under review in order to preserve the exterior façade of the temple against the natural vagaries and biological accretion. The scientific treatment was carried out with the help of eco friendly and non residual mild chemicals which leave no harmful effects on the stone surface using coir brushes with most care. After cleaning, biocidal treatment was given in order to check the further growth of micro organisms. Finally hydrophobic treatment to the cleaned and dried surface is given which imparts water repellency to the surface of monument. The work is in progress.

(b) KANDARIYA MAHADEV TEMPLE

The interior of the Kandariya temple is decorated with a lavish wealth of carvings and sculptures. The seepage of rain water from through the joints of the Vimana and other structures is a major issue for the deposition of calcareous deposits thus defacing the interior. Deposition of oily and greasy substances was also seen at many places. Efflorescence cycle of soluble salts under favorable conditions was the major damaging factor. Initially, treatment work was taken up on the interior of the entrance porch and *mandapa* for the removal of the calcareous deposits oily/greasy substance and water marks with the help of appropriate chemicals and solvents in appropriate concentration. This will facilitate breathing of the stone and discourage damage. The work is in progress.

(c) REPAIR, STRENGTHENING AND CONSOLIDATION OF SELECTED SCULPTURES

In the temple many locations of the temples (western group) sculptures and carvings have developed surface cracks/fissures due to loss of materials as a result of mineral disintegration. This problem has been exclusively identified for suitable and effective conservation measure and accordingly suitable conservation measures are being taken up in a phased manner. General cleaning, extraction of salt, repair of cracks and voids, correction of surface erosion were carried out as far as possible, Core consolidation wherever required, biocide application, preservative treatment work was also attendant. The work is in progress.

43. BAJ BAHADUR PALACE, MANDU, DISTRICT DHAR

In continuation of previous year work, the south side courtyard taken up the period under review. Exterior of the monument is built up of black and buff colored lime stones using lime mortar and plaster. The exterior façade courtyard was covered with thick deposits of dust, dirt and dried microbiological growth. Scientific cleaning was done to remove dust, dirt and

dried biological growth from the surface of the monument. Biocidal treatment was given to check the further growth of micro organisms. Finally hydrophobic treatment was given to prevent the monument from the effect of water. The work is in progress.

44. ROOPMATI PAVILLION MANDU, DISTRICT, DHAR

Monument is constructed of basaltic stone blocks masonary in lime mortar. The traces of the lime plaster can be seen on domes and walls. The exterior walls of the monument particularly plaster and mortar was covered with thick deposition of dust, dirt and dried microbiological growth. Scientific cleaning was done to make the surface free from accretions like dust, dirt and micro biological growth. Biocidal treatment was given to the clean and dry surface for the sustained biological action. Finally hydrophobic treatment was given using a silane siloxane based water repellent Wacker BS-290 diluted in MTO to impart water repellency to the stone surface. The work is in progress.

45. DAI-KA-MAHAL, MANDU, DISTRICT DHAR

The building is constructed by lime stone blocks masonry in lime mortar. The monument was badly affected by the growth of micro flora, dust, dirt and looking in shabby appearance due to very thick depositions. Scientific cleaning was done to make the surface free from accretions like dust, dirt and micro biological growth. Biocidal treatment was given to the clean and dry surface to sustained biological action. Finally hydrophobic treatment was given using a silane siloxane based water repellent Wacker BS 290 diluted in MTO to impart water repellency to the stone surface. The work is in progress

46. TAVELI MAHAL, MANDU, DISTRICT DHAR

The stone sculptures displayed in Taveli Mahal are carved out from agglomerate type of stone of very big grains. The quality of stone was not so good and hence it developed fine cracks/fissures; surface mineral grains also lost cohesive binding. However the stone with inscription is very fine and polished. General cleaning for the removal of dust by dry brushing/solvent by means of soft brushes and cotton absorbent, was carried out. An ethyl silicate based Wacker OH-100 enriched with matching colored stone dust were used for crack filling. Core consolidation and strengthening of weak stone will be done using Wacker OH-100. The work is in progress.

47. MOHAMMED GAUS TOMB, GWALIOR

The scientific conservation work was taken up on these monuments during the review. The exterior of Mohammed Gaus tomb is constructed of beautifully carved out perforated screens or *jallies* made up of sand stone. Stone *jallies* and nearby area including pillars, projection, beams and brackets were covered with black/brown deposits of dust, dirt smoky particulate matters, bird's droppings, soiling materials and other stains from the microorganisms. Besides, dried microbiological accretions and greasy matters also soiled the surface at many places. Scientific cleaning was done to make the surface free from accretions.

Biocidal treatment was given to the clean and dry surface to sustain biological action. Finally hydrophobic treatment was given using a silane siloxane based water repellent Wacker BS-290 diluted in MTO to impart water repellency to the stone surface. The work is in progress.

48. CHATURBHUJ TEMPLE, GWALIOR FORT, DISTRICT GWALIOR

The Chaturbhuj temple is situated at the Gwalior fort Major work was related to the repair and restoration of God Chaturbhuj sculpture within the temple. Most of the structure was covered with the deposition of dried microbiological accretions including dust and dirt. Some of the structural surface have been deteriorated and reached nearly to the pulverization state which had been consolidated. The interior portion of the temple was covered with lime depositions. Scientific cleaning is done to make the surface free from, the lime depositions which were removed by using 2% aqueous solution of glacial acetic acid. Biocidal treatment was given to the clean and dry surface to sustain biological action. Consolidation of pulverized portions of the stone surface and sculptures was done by using an ethlyl silicate based stone strengthener Wacker OH-100. Finally hydrophobic treatment was given using a silane siloxane based water repellent Wacker BS-290 diluted in MTO to impart water repellency to the stone surface. The stucco figure was suitably repaired and conserved. The work has been completed.

MAHARASHTRA

49. AJANTA CAVES

The detail of the steps taken in the scientific conservation and preservation of mural painting and sculptures at Ajanta caves may be summarized as follows:

i. General cleaning and removing loose dust and dirt accumulated on the painted surfaces with soft leather brushes, paint and hog hair brushes on a regular basis.

ii. Spraying of 2% pyrethrum extract solution in kerosene or MTO solvent fortnightly in unpainted areas or as needed in the caves in order to control insect activities.

iii. Cleaning and removing the layers of old darkened and yellowed varnishes, PVA soot, dust, dirt and bats excreta and oily accretions from the painted surface in Cave no. 2 with the help of organic solvents like toluene, di-butyl phthalate and acetone with turpentine restraining solvent.

iv. Fixing and filleting on painted plaster in Caves no. 1, 2, 6, 11 and 17 was done using suitable consolidant and then filled by compatible plaster prepared by mixing lime and fine shell powder. Finally filled patches were color matched with the surrounding.

v. Strengthening and reinforcement of painted plaster, wherever, found in danger of becoming detached from the rock wall support in Caves no. 20,21 was carried out with suitable consolidant and then filled by compatible plaster prepared by mixing lime and fine shell powder with water as needed. A fine retouching paste with similar composition was used for filleting the damaged and broken ends of the painted plaster.

vi. The rock cut sculpture in Caves 1, 6, 15, 17, 20, 21, 23, 24, and 27 were washed and cleaned of the surface dust, dirt and other accretionary deposits. After the surface cleaning the salt depart ion was removed by taking great care. The weakened stone of the sculpture was consolidated with Wacker OH-100 (an ethyl silicate based stone strengthener) in order to improve its strength. The work also included filling and mending of large and deep cracks in the sculptures with a mortar mixture of fine stone power and epoxy resin.

vii. Cleaning and removal of accretionary deposits from stone surface in Caves no. 1,2,4,16,17 and 21 was done using suitable organic solvents followed by ammonia non ionic detergent solution with the help of soft nylon brushes.

viii. Monitoring and assessment of climate conditions inside and outside of the caves using thermo hydrograph on a continuous basis and a satellite link automatic weather station.

ix. During the period under review, to collect the suspended dust particulate matter inside the caves, eight number of the Euroair Detox UV photo catalytic Air purifier having a HEPA filtration and ionizing effect was installed in Caves no. 1, 2, 16 and 17. This purification system encompasses these and also disinfects and decomposes toxic contaminates beside killing bacteria, viruses and moulds.

50. ACHALESHWAR TEMPLE, CHANDRAPUR

The scientific conservation work, during the period under review was taken for the removal of dust, dirt, bird's excreta, thick growth of microvegetation and other accretions from the surface of basalt stone sculptures. Removal of dust, dirt and microvegetation growth and other superficial accretions were carried out with the help of 2-3% aqueous solution of ammonia along with 2% non-ionic detergent followed by thorough washing with plenty of water. The smoky and oily accretions of interior surface were removed with the same mixture in addition with few drops of triehenalamine. 2% aqueous solution of sodium pentachlorophenate was applied on cleaned exterior surfaces. The deteriorated stones were consolidated with Wacker OH-100. Application of two coats of Wacker BS-290 diluted with MTO in the ratio of 1:13 (wet-on-wet) were applied on dry and fungicidally treated exterior area. The work is in progress.

51. KUMARESHWAR TEMPLE, LONAR, DISTRICT BULDHANA

The scientific conservation work, during the period under review was taken for the removal of dust, dirt, bird's excreta, thick growth of microvegetation and other accretions from the surface of basalt stone sculptures. Removal of dust, dirt and microvegetation growth and other superficial accretions were carried out with the help of 2-3% aqueous solution of ammonia along with 2% non-ionic detergent followed by thorough washing with plenty of water. The smoky and oily accretions of interior surface were removed with the same mixture in addition with few drops of triehenalamine. 2% aqueous solution of sodium pentachlorophenate was applied on cleaned exterior surfaces. The deteriorated

stones were consolidated with Wacker OH-100. Application of two coats of Wacker BS-290 diluted with MTO in the ratio of 1:13 (wet-on-wet) on dry and fungicidally treated exterior area. The interior area was preserved with single coat of Wacker SMK-1311 in distilled water. The work has been completed.

52. MAHAKALI TEMPLE, CHANDRAPUR

The scientific conservation work, during the period under review was taken for the removal of dust, dirt, bird's excreta, microvegetational growth, and other accretions from the basalt stone surface. The stones are weathered and plaster was missing from some portion. The loose dust and dirt were removed by gentle brushing. Fixing and filleting of loose stucco fragments, consolidation of fragile sculptures and filling up of cracks were carried out. Removal of dust, dirt and micro vegetation growth and other superficial accretions were carried out with the help of 2-3% aqueous solution of ammonia along with 2% non-ionic detergent followed by thorough washing with plenty of water. 2% aqueous solution of sodium pentachlorophenate was applied on cleaned exterior surfaces. The deteriorated stones were consolidated with Wacker OH-100. Application of two coats of Wacker SMK-1311 in distilled water in the ratio of 1:13 (wet-on-wet basis) on dry and fungicidally treated exterior area. The work has been completed.

53. RAMGAYA TEMPLE, LONAR, DISTRICT BULDHANA

The scientific conservation work, during the period under review was taken for the removal of dust, dirt, bird's excreta, thick growth of microvegetation and other accretions from the surface of basalt stone sculptures. Removal of dust, dirt and micro vegetation growth and other superficial accretions were carried out with the help of 2-3% aqueous solution of ammonia along with 2% non-ionic detergent followed by thorough washing with plenty of water. The smoky and oily accretions of interior surface were removed with the same mixture in addition with few drops of triehenalamine. 2% aqueous solution of sodium pentachlorophenate was applied on cleaned exterior surfaces. The deteriorated stones were consolidated with Wacker OH-100. Application of two coats of Wacker BS-290 diluted with MTO in the ratio of 1:13 (wet-on-wet) on dry and fungicidally treated exterior area. The interior area was preserved with single coat of Wacker SMK-1311 in distilled water. The work has been completed.

54. SALABAT KHAN, TOMB, MEHEKARI, AHMED NAGAR

The exterior stone surface of the monument was cleaned and conserved by employing scientific conservation methods. The layers of encrusted dust, dirt, bird's excreta and microvegetational growth were removed mechanically using 2 to 3% aqueous solution of ammonia and 1% non ionic liquid detergent followed by through washing with water. Tenacious white lime an accretion was removed with 5% diluted acetic acid solution. After surface cleaning fungicidal treatment was done with 2% aqueous solution of sodium pentachlorophenate on exterior surface. Silicone based water repellent Wacker BS-290 diluted in MTO in 1:11 ratio was

applied a dried treated exterior area. The work has been completed.

ODISHA

55. SRI JAGANNATH TEMPLE, PURI, DISTRICT PURI

a. The exterior surface of Jagmohana (excluding north vertical wall) was taken up for scientific conservation. The temple on account of its close proximity to sea was suffered extensive damage by erosion. Due to the absorption of rain water, the lime plaster gained more weight and as a result it had lost its strength. Water penetrated into the masonry resulting the rusting of the iron dowels. Due to salt crystallization effect erosion of outer plaster and inner stone surface was taken place. Removal of remnant of lime (after de-plastering) was carried out chemico-mechanically using 2% acetic acid solution followed by thorough washing with mixture of 2% liquid ammonia and non ionic detergent to neutralization effect remove the remnants of the acids. The work is in progress.

b. The scientific conservation of khondalite stone wall of the vimana along with other components like *natamandapa* and *bhogamandapa* were taken up for cleaning, focusing mainly on the removal of microvegetational growth dirt dust, smoke, and salt crystallization from khondalite surfaces. Extraction of soluble salts from the stone pores was carried out by repeated paper pulp treatment using de-ionized water. The accretionary deposits and microvegetational growth were removed by using 2% aqueous solution of liquid ammonia and non ionic detergent with the help of soft nylon brushes. The weak and pulverized stone surface was consolidated by impregnating an ethyl silicate based stone strengthener Wacker OH-100. To check further microvegetation growth, 2% solution of sodium pentachlorophenate in aqueous medium was sprayed on the stone surface as fungicide. The hydrophobic treatment of stone surface was given by applying two coats of Wacker BS-290 (wet-on-wet) diluted with MTO in 1:16 ratio. The work is in progress.

c. The scientific conservation of khondalite stone wall of *garbhagriha*, granite *ratna singhasan*, silver and brass doors were taken up for cleaning, focusing mainly on the removal of accumulated dust, dirt, bird excreta, soot, oil satins and greasy accretions from granite and khondalite surfaces. Silver sheet over doors became tarnished and food particles (*prasad*) accumulated on the lower part, similarly the brass sheet over doors, due to corrosion effect looked dull. Removal of white patches and other accretionary deposits was carried out using 2% liquid ammonia solution mixed with non-ionic detergent followed by thorough washing with water. The granite stone of *ratna singhasana* was treated with aqueous solution of ammonia mixed with non-ionic detergent. The dry surface was polished by wax with cotton absorbent. The silver sheets over the doors were treated with a mild bleaching agent and washed by non-ionic detergent. Finally, the dry surface was polished with silvo. The brass sheets over doors were treated with 1:1 mixture of citric and tartaric acids followed by washing with non-ionic detergent and finally polished with Brasso. The work has been completed.

56. SUN TEMPLE, KONARK

The scientific conservation of khondalite stone wall of exterior of Jagmohana was taken up for removal of microvegetation growth, salt crystallization, deposition of dust, dirt and cementing materials. Extraction of soluble salts from the stone pores was carried out by repeated paper pulp treatment using de-ionised water which was tested with silver nitrate solution. Removal of microvegetation growth was carried out by using 2% aqueous liquid ammonia solution. Dust, dirt and smoke were cleaned using non-ionic detergent with soft nylon brushes. The weak and pulverized stone surface was consolidated by impregnating Wacker OH-100 as stone strengthener. To check further quick microvegetation growth, 2% solution of sodium pentachlorophenate in aqueous medium was sprayed on the stone surface. The hydrophobic treatment of stone surface was done by applying two coats of Wacker BS-290 (wet-on-wet) diluted with MTO in 1:16 ratio. The work has been completed.

57. LINGRAJA TEMPLE, BHUBNESHWAR

a. There are many temples within the compounds out of which the Parvati temple consist of vimana jagamohan, *natamandapa* and *bhogamandapa* were taken up for scientific conservation and preservation work. The temple is made up of sand stone and main conservation problem was superficial deposition of dust, dirt, smoke etc. The scientific conservation of exterior surface of all parts of the temple and interior area of *natamandapa* and *bhogamandapa* was taken out during the period under review. The conservation treatment of stone surfaces consisted of chemico-mechanical cleaning with ammonia solution (2%) and neutral detergent solution in water; consolidating the weakened stone with Wacker OH-100, fungicidal treatment with sodium pentachlorophenate (2% solution in water) and finally applying two coats of Wacker BS-290 diluted in MTO solvent in a ratio 1:15 (wet-on-wet). The work has been completed.

b. The brass sheets over the three wooden doors affected due to the atmospheric corrosion, accumulated dust etc. were taken up for chemical treatment with a mixture of citric and tartaric acids in a ratio of 1:1 in water followed by polishing with brasso. The work has been completed.

58. CHAUSATHI YOGINI TEMPLE, HIRAPUR, DISTRICT KHURDA

It is a circular temple having no roof and enshrined with chlorite stone images of sixty-four Yoginis in separate niches in the interior wall was taken up for cleaning focusing mainly on the removal of accumulated dirt, dust and microvegetation growth from the stone surfaces. All the accretionary deposits were removed chemico-mechanically using the mixture of dilute ammonia solution and a neutral detergent solution in water. To strengthen the weak stone Wacker OH-100 was applied as consolidant in the selected highly pulverized area. Fungicidal treatment was given by applying 2% aqueous sodium pentachlorophenate solution for arresting further microvegetation growth. Finally two coats of Wacker BS-290 (wet-on-wet) diluted with MTO in 1:15 ratio was applied as preservative. The work is in progress.

59. GROUP OF MONASTERIES AT EXCAVATED BUDDHIST SITE, RATNAGIRI, DISTRICT CUTTACK

The Scientific conservation work of monastery no. 2 and 130 numbers of votive stupas are considered this year. The stupas are made up of khondalite stone and monastery no. 2 is made up of brick slabs. The exposed parts of monastery, comprising brick and stone structure were cleaned and conserved. The microvegetation growth was eradicated using a mixture of 2% liquid ammonia solution and non-ionic detergent. The incrusted dirt, dust etc. removed chemico-mechanically using non ionic detergent. Fungicidal treatment was done by spraying 2% aqueous sodium pentachlorophenate solution and finally, two coats of a silicone based Wacker BS-290 (wet-on-wet) diluted with MTO in 1:15 ratio was applied as preservative/water repellent. The work has been completed.

60. ROCK CUT STUPA, LANGUDI, DISTRICT JAJPUR

The Rock cut stupas and sculptures are depicted on the rock surface which were covered with microvegetation growth and other accretionary deposits like dust, dirt etc. The conservation treatment of stone surfaces consisted of chemico mechanical cleaning with 2% aqueous ammonia solution and neutral detergent solution in water by soft brushing. To strengthen the weak stone, Wacker OH-100 was applied as consolidant in the selected highly pulverized areas. Fungicidal application was given by spraying 2% aqueous sodium pentachlorophenate solution for arresting further microvegetation growth. Finally two coats of Wacker BS-290 (wet-on-wet) diluted with MTO in 1:15 ratio was applied as preservative. The work has been completed.

PUNJAB

61. MOHAMMAD MOMIN TOMB, NAKODAR, DISTRICT JALANDAR

In continuation to the last year's work, the scientifc treatment for the removal of superficial dust, dirt, bird's droppings, atmospheric pollutants as well as microvegetational growth was carried out. The superficial accretionary deposits from the plastered surface were removed using mixture of liquor ammonia and non-ionic detergent in the ratio 3:1 followed by thorough washing with plain water. The cleaned and dried surface was subjected to fungicidal treatment using 2% aqueous solution of sodium pentachlorophenate. Finally, surface was preserved with Wacker BS-290 in MTO in the ratio 1:14, two coats wet-on-wet. The arch shaped 32 painted panels which were covered with superficial accretionary deposits cleaned using various organic solvents *viz*., 2-ethoxy ethanol, iso-butyl alcohol, acetone, etc. and finally these painted areas were preserved with about 1% PVA solution in sulphur free toluene. The work has been completed.

62. SEVEN KOS MINARS, TEHSIL NURMAHAL AND NAKODAR, DISTRICT JALANDHAR

The scientific conservation work of seven Kos minars was taken up for the cleaning work during the period under review. Most of the kos minars are located in the field. The superficial dust, dirt, bird's excreta, growth of micro-organisms and other

accretionary deposits from the surfaces were removed using liquor ammonia and non-ionic detergent in the ratio 3:1. The cleaned surface was thoroughly washed with water in order to remove all the traces of the chemicals. The dried surface was given fungicidal treatment with 2% aqueous solution of sodium pentachlorophenate followed by hydrophobic treatment with Wacker BS-290 in MTO in the ratio 1:14, two coats i.e. wet-on-wet basis. The work has been completed.

RAJASTHAN

63. TOMB OF ALLAUDDIN KHAN (SOLA KHAMBA), AJMER

In continuation of previous years work, the marble surface of the walls and pillar were subjected for scientific conservation work. After the general cleaning clay pack treatment was given to the entire surface. A pack of fuller's earth containing 1-2% ammonium carbonate and glycerol was applied over the surface and covered with polythene sheets. After 20-24 hours the surface was washed thoroughly with water. The work has been completed.

64. USHA MANDIR AND JAHANGIRI GATE, BAYANA, DISTRICT BHARATPUR

The masjid in the complex of Usha Mandir and the Jahangiri gate are made of red sand stone both the structure were affected by microbiological growth over the exterior surface while the interior surface of the mosque was having whitish marks left behind due to water seepage. The entire surface of the monument was cleaned by using ammonia solution and non ionic detergent. Some small cracks in the ceiling of the mosque were attended by the filling up with the red sand stone powder mixed with epoxy resin. The cleaned and dried surface was given application of 2% aqueous solution of sodium pentachlorophenate as fungicide. The entire surface was given water repellent treatment by the application of a silane siloxene based material with Wacker BS-290 in MTO in the ratio 1:14, two coats wet-on-wet basis. The work has been completed.

65. MEERA MAHAL OF KUMBHA MAHAL, CHITTAURGARH FORT, DISTRICT CHITTAURGARH

In continuation of previous years work, the stone surface of meera mahal and adjacent portion of kumbha mmahal were taken up of scientific conservation work. The walls were cleaned using the mixture of dilute ammonia solution and non ionic detergent in water for the eradication of micro biological growth, Birds droppings, encrusted dust and dirt etc. The cleaned and dried surface was given a biocidal treatment by spraying 2% aqueous solution of sodium pentachlorophenate. The consolidation treatment was done with Wacker OH-100 (an ethyl silicate based stone strengthener) to improve cohesive strength. Finally, a coat of Wacker BS-290 (a silane siloxane based water repellent material) Suitable diluted in MTO in the ratio 1:14, two coats wet-on-wet basis. The work has been completed.

66. VICTORY TOWER, CHITTORGRAH, DISTRICT CHITTORGRAH

The small chhatries in the complex are plastered with lime mortar were taken up for scientific conservation work. The main

problem was microvegetational growth which was removed using ammonia and non ionic detergent solution by gentle brushing. The clean and dried surface was given biocidal treatment, followed by hydrophobic treatment by application of Wacker BS-290 a silane siloxane mixture as water repellent diluted with MTO. The work has been completed.

67. PADMINI MAHAL, CHITTORAGRAH, DISTRICT CHITTORGRAH

It is a big structure, its walls are plastered and some portions made of stone masonry. The entire surface was badly affected by microvegetational growth. For removal of microvegetational growth ammonia and non ionic detergent mixture was used with the aid of soft nylon brushes. To remove the engrained biological deposits slurry of calcium hypo chlorite solution was used. The cleaned and dried surface was treated with the aqueous solution of sodium pentachlorophenate to impart biocidal action. Finally, a coat of Wacker BS-290 diluted in MTO in the ratio 1:14, two coats. Wet-on-wet basis was applied. The work is in progress.

68. JAGAT SHIROMANI TEMPLE AMBER, DISTRICT AMBER

In continuation of previous years he scientific conservation work of the plinth portion of the temple and the wall paintings inside the temple was taken up. The interior wall paintings which were covered with thick soot and oily depositions and due to seepage of water in the past the portions of the paintings were washed away. The plinth portion was covered with lime wash coats along with the dust, dirt and microvegetational growth was subjected to chemical and mechanical cleaning and consolidation treatment. The thick layer of lime was removed mechanically using dilute acetic acid solution in water. After thorough washing with plain water the entire dried surface was given water repellent treatment. The gapes and cracks in the stone blocks were filled with stone powder and epoxy resin. The wall painting executed interiors of the temple were cleaned using ethanol with the help of cotton swabs. The loose plaster and the pigment layer were fixed using poly vinyl acetate. The mending work and color reintegration was also attended wherever required. Finally, 2% solution of PVA in toluene was applied over the surface of the paintings as protective coating. The work has been completed.

69. KUMBALGARH FORT, KUMBLGRAH, DISTRICT RAJSAMAND

A. PAGADA POLE AND ADJACENT WALLS

It is a final gate to enter the main palace constructed of sandstone. The entire surface of monument affected badly by the accretionary deposits like soot and microvegetational growth was subjected to chemical and mechanical cleaning using mixture of dilute ammonia solution and nonionic detergent in water. The plastered portion was cleaned using slurry of calcium hypo chlorite to remove biological growth. Surface application of 1-2% aqueous solution of sodium pentachlorophenate was given as fungicide. Finally, a coat of Wacker BS-290 diluted in MTO was applied to the entire cleaned and dried surface. The work is in progress.

B. GANESH TEMPLE

This consists of *garbhgriha*, *antaral*, *mandapa* and *mukhamandpa*. The *shikara* of the temple is lime plastered and bears carvings. The construction material used is sandstone and bricks with lime mortar. The sandstone and bricks surface was cleaned by using liquid ammonia solution and nonionic detergent, while the plastered surface was subjected to the treatment with calcium hypochlorite. The cleaned and dried surface was given fungicidal treatment using sodium pentachlorophenate. Finally, the entire surface was imparted water repellency by the application of Wacker BS-290 suitably diluted with MTO. The work is in progress.

C. MARBLE GHATS, NAV CHOWKI, RAJSAMAND

The scientific conservation work was taken up for the removal of graffiti and advertisements painted in enamel paint over the walls of the marble ghats using organic solvents and aqueous solutions of sodium hydroxide. The work has been completed.

TAMIL NADU

70. SHORE TEMPLE, MAHABALIPURAM, DISTRICT KANCHIPURAM

The monument is located on the sea shore, the salt laden winds effect the stone surface which in due course deposits the soluble salt on the stone. As a preventive measure, the process of removing water soluble salts from the infested areas of granite wall was through wet paper pulp poultice technique continued on a regular basis. After the surface cleaning, fungicidal treatment was done with sodium pentachlorophenate (C6Cl5ONa) 2% in water followed by water repellent treatment with Wacker SMK-1311 in water in ratio 1:14. The work is in progress.

71. THIRUMALAI NAYAKA PALACE, SRIVILLIPUTUR, DISTRICT VIRUDHUNAGAR

The inside portion of the palace is adorned with exquisite Nayaka paintings with great workmanship of art. The beautiful paintings were found beneath the very thick multiple layers of lime coat. Similarly paint layers were applied on the wall portions. In order to expose the paintings chemical conservation and preservation work was taken up during the period under review. The hardened and thick lime coat applied over the painted surface was removed by physical-chemical means using suitable tools and by using mixture of organic solvents in appropriate proportion. The work has been completed.

72. SRI BRIHADESWARA TEMPLE, DISTRICT THANJAVUR

In continuation of previous year's work, the scientific conservation of the wall paintings around Shiva and Amman shrines were taken up conservation treatment which included surface cleaning, consolidation, strengthening and application of a protective coat with PVA solution (1%) in toluene. The walls and the ceiling of the entire *pradakshina patha* on the 1st floor around the main Shiva shrine are adorned with finest work of mural painting which comprises both the Chola and Nayaka paintings. The paintings were

executed in tempera technique. The ground layer of the painted surface was found to be lime layer. The paintings around siva shrine and amman shrines were covered with dust dirt, old preservative coating. For removal of these accretions, mixture of organic solvents such as Toluene, Diacetone alcohol, 2-ethoxy ethanol, and few drops of Triethanolamine in different proportions were used (as per the requirement). Fixing, filleting, edging and bulging work was also attended using lime and casein mixture. Finally, 1% PVA solution was applied over the surface as a preservative coating. The work has been completed.

73. PATTABHIRAMA TEMPLE, NARAISINGARAYAN PETTAI AND SIVA TEMPLE, GINGEE FORT COMPLEX, DISTRICT VILLUPURAM

The stucco surfaces of these granite stone temples were covered with thick layer of dust, dirt and other accretionary deposits. The lime coat patches were also present in some portions. Thick oily, sooty accretions, greasy matters were deposited at many parts of the interior portion and also on some pillars and sculptures. The stone surface covered with microvegetational growth. The conservation treatment to the substrate materials of these temples (granite, sandstone and stucco) consisted of mechanical cleaning with a mixture of ammonia solution and non-ionic liquid detergent solution in water (3:1), fungicidal treatment with 2% Sodium pentachlorophenate solution in water and finally protective treatment with Wacker SMK-1311 diluted in water in the ratio of 1:14. Thick oily, soot and greasy matters were removed by using 5% aqueous solution of ammonium carbonate and bi-carbonate mixture followed by treating the surface with ammonia and non-ionic detergent in ratio 3:1. The lime wash removed by using 5% acetic acid solution followed by treating the surface with ammonia and non-ionic detergent in the ratio 3:1. The work has been completed.

74. ROCK CUT SHIVA TEMPLE THIRUMAYAM, DISTRICT PUDUKOTTAI

During the period under review the exterior of Siva Temple, main *vimana*, other sub shrines and other *vandapa*s which were badly affected by microvegetation and interior areas covered by oil, soot and other accretionary deposits were taken up for chemical conservation and preservation work. For the removal of microvegetational growth and other accretionary deposits ammonia and non-ionic detergent mixture was used in the ratio 3:1. When the accretions were removed completely 2% Sodium pentachlorophenate solution was applied as fungicide. Finally when the stucco surface was completely dried preservative coating was applied over the surface by applying Wacker BS-290 in MTO in ratio 1:14. The thick oily, soot and greasy matters were removed from the interior areas by using 5% aqueous solution of ammonium carbonate and bi-carbonate mixture followed by treating the surface with ammonia and non-ionic detergent in the ratio 3:1. The work has been completed.

75. SUYAMBHUNATH SWAMY TEMPLE KILPUTHUR, DISTRICT THIRUVANANNAMALAI

The Temple made of granite stones was subjected to chemical treatment and preservation during the period under review for eradication of thick layer of micro biological growth, dirt, dust and bird's droppings, etc. The superficial accretions and microbiological growth was removed from the substrate by chemico-mechanical method using aqueous ammonia and teepole mixture with the help of soft nylon brushes. The cleaned surface after thorough washing was given fungicidal treatment using sodium pentachlorophenate. Finally when the stone surface was completely dried, water repellent treatment was given using Wacker SMK-1311 in water in 1:14 ratio. The work has been completed.

76. EKAMBARESHWARA TEMPLE, SETHUR, KARAIKAL PUDUCHERRY U.T.

The Temple consist of a *garbhgriha*, *ardhamandapa* and a *mahamandapa*. The *vimana* over the santum made of brick. For the removal of the microvegetational growth, dust, dirt and other accretionary deposits mixture of dilute ammonia solution and non ionic detergent solution in the ratio of 3:1 followed by fungicidal treatment with 2% sodium pentachlorophenate solution in water was given. The cleaned and dried surface was given protective treatment with Wacker SMK-1311 diluted with water in a ratio 1:14. The work has been completed.

77. SHRI BRIHADESWARA TEMPLE, GKC PURAM, DISTRICT ARIYALUR

The exterior surfaces of the Vimana and the sculptures was covered with thick layers of dirt, dust, soot and microbiological growth have been cleaned and conserved during the period under review. For the removal of the moss, lichens, dust, dirt and other accretionary deposits ammonia and non-ionic detergent was used in the ratio 3:1. When the accretions were removed completely 2% Sodium pentachlorophenate solution was applied as fungicide. Finally, when the stucco surface was completely dried preservative coating was applied over the surface by applying Wacker SMK-1311 in water in ratio 1:14. The work is in progress.

78. SUNDARESHWARA TEMPLE AMMANKURUCHI, DISTRICT PUDUKOTTAI

The temple is living one and built of granite. It consist of *garbhgriha* of main shrine (Shiva), *ardhamandapa*, *mukha mandapa*, lion pillared front *mandapa* and *mandapa* before the entrance *gopuram*. Apart from these there are sub shrine like Amman shrine, Chandikeshwarar shrine, Subramanaya shrine, etc. Thick oily, sooty accretions, greasy matter and microvegetational growth were deposited over the surface. For the removal of dust, dirt and other accretionary deposits ammonia and non ionic detergent in the ratio 3:1 was used. When the accretions were removed completely from the exterior areas 2% sodium pentachlorophenate solution was applied as fungicidal coating. Finally when the stone surface was completely dried hydrophobic treatment with Wacker BS-290 in MTO in ratio 1:14 was given. Thick oily, areas were cleaned using 5% aqueous solution of Ammonium carbonate and bi-carbonate mixture followed by treating the surface with ammonia and non-ionic detergent. The work is under process.

79. VAIKUNTA PERUMAL TEMPLE, KANCHIPURAM, DISTRICT KANCHIPURAM

During the period under review the exterior areas such as stucco vimana, Gopuram and compound walls which were covered with thick microvegetational growth and interior areas with thick soot and oily accretion was taken up for scientific conservation work. For the removal of microvegetational growth, dust, dirt and other accretionary deposits ammonia and non ionic detergent in the ratio 3:1 was used. When the accretions were removed completely from the exterior areas, 2% sodium pentachlorophenate solution was applied as fungicidal coating. Finally when the stone surface was completely dried water repellent Wacker SMK-1311 in water in ratio 1:14 was applied as preservative coat. Thick oil, soot and greasy matter were removed using 5% aqueous solution of Ammonium carbonate and bicarbonate mixture followed by washing the surface with ammonia and non ionic detergent in ratio 3:1. The work is under process.

80. SIKKANATHA SWAMY TEMPLE, KUNDUMIYANMALAI, PUDUKOTTAI, DISTRICT TAMIL NADU

The temple is made of granite stone the *vimanas* and *gopuras* are done by stucco. This temple consists of *garbhagriha*, *mahamandapa*, *sabhamanadapa* and *ardhmandapa*. During the period under review the scientific conservation work was taken up for the removal of microvegetational growth, dust, dirt and other accretionary deposits using ammonia and non ionic detergent in the ratio 3:1. When the accretions were removed completely from the exterior areas 2% sodium pentachlorophenate solution was applied as fungicidal coating on dried surface. Finally when the stone surface was completely dried water repellent treatment was Wacker SMK-1311 in water in ratio 1:14 was given as preservative coat. Thick oil, soot and greasy matter were removed using 5% aqueous solution of Ammonium carbonate and bicarbonate mixture followed by cleaned the surface with ammonia and non ionic detergent in ratio 3:1. The work is under progress.

81. ROCK CUT JAIN TEMPLE (ARIVAR KOIL)

The cave temples are decorated with murals made of vegetable colours. During the period under review the painting as well stone surface of rock cut Jain temple, Sittannavasal was taken up. Stone portion of exterior areas were covered with microvegetational growth and the interior area with dust, dirt and greasy matter etc. The interior stone wall which was very fragile in condition consolidated. The work is under progress.

82. SRI VALISVARA TEMPLE, TIRUVALISVARAM, DISTRICT TIRUNELVELI

Provided dwarf wall with fixed chain link fencing towards southern side. Construction of coping over the *prakara* wall using brick masonry with 1:1:5 combination mortar and plastering over the coping base with lime cement mortar with ratio 1:1:5, 20mm thick and thin coat of grinded L.C. Mortar 1:1, including colour matching, curing, etc., completed in north and south side.

83. ROCK CUT CAVE TEMPLE, THIRUNANDIKKARE, DISTRICT KANYAKUMARI

Constructed dwarf wall fencing by fixing L-Angle post with barbed wire on eastern side is completed.

84. FORT, VATTAKOTTAI, DISTRICT KANYAKUMARI

Providing missing portion veneer stone to fort wall with new granite stone and construction of core wall on outer side fort in north side is completed

THRISSUR

85. SIVA TEMPLE, THIRUVANCHIKKULAM DISTRICT THRISSUR

During the period under review the dusting and upkeep of the paintings at Siva Temple was done. The work has been completed.

86. SRI PARASURAMA TEMPLE, THIRUVALLAM, DISTRICT TRIVANDRUM

During the period under review the scientific conservation work was taken up for removal of dust, dirt, and microvegetational growth by using 2-3% solution of ammonia with non ionic detergent. The lime plaster on the stone wall was removed by using 2% acetic acid solution and neutralize by ammonia solution. The chemically cleaned surface was given fungicidal treatment with 2% solution of sodium pentachlorophenate. Finally treated surface was preserved by application of silicone based water emulsion of Wacker SMK 1311 in water in 1:12 ratio. The work is in progress.

87. PAINTINGS OF SEVEN MONUMENTS UNDER THRISSUR CIRCLE

The work involved the dusting and chemical treatment and preservation of paintings on the wooden ceiling at Shree Rama Temple, Triprayar and minor repair in respect of monuments 1. Visnu temple, Kadavallur 2. Siva temple, Chemmanthitta, 3. Siva temple, Pallimannah, 4. Siva temple, Avittathur, 5. Siva temple, Peruvanam, 6. Mattancherry Palace, Mattancherry and 7. Shree Rama temple, Triprayar. Scientific conservation work of Siva temple, Netrimangalam was taken up for removal of dust, dirt, microvegetational growth by using 2-3% solution of ammonia and non ionic detergent. The chemically cleaned surface was given fungicidal treatment by 2% solution of sodium pentachlorophenate. Finally treated surface preserved by application of silicone based water repellent emulsion Wacker SMK-1311 in water in 1:12 ratio. The work is in progress.

88. SCIENTIFIC CLEARANCE OF MEGALITHIC ROCK CUT UNDERGROUND CHAMBER AT KKN PARIYARAM GVHSS, PARIYARAM, DISTRICT KANNUR

Scientific clearance of Megalithic underground laterite rock cut chamber at KKN Pariyaram GVHSS, Pariyaram, Kannur district conducted during World Heritage Week celebration. The site is located on the eastern side entrance of the school and was accidentally found and damaged when school children were planting some trees. Later on it was vandalised by treasure hunters and burial objects were taken out through port hole. In order to salvage the site, the area was

scientifically probed. The loose top soil was removed up to 5cm.

Towards the north western side there was a slightly slanting portion leading to the entrance of the cave. The entrance was closed with a rectangular shaped laterite flat stone measuring 100 x 60 x 10cm. After the removal of the slab two rectangular recessed entrance similar to door jambs found. The entrance of the cave measures 70 x 60cm. The circular plan of the cave has a diameter of 2·00m and actual top opening has a diameter about 40cm. Inside the cave above the floor about 40cm thick deposit found and over that placed some typical pottery belonging to megalithic period which are found in broken condition. The shapes include miniature pots, lid, bowl of black ware and red ware, etc. Some iron implements like spear, broken chisel, etc. were also found from the cave.

89. BEKAL FORT, PALLIKERE, DISTRICT KASARGOD

Restoration, underpinning and water tightening work of stepped well near watch tower on north east side of fort in laterite stone masonry in combination mortar is carried out. The fallen wall of steeped well have been restored in laterite stone masonry in combination mortar. Recess pointing to the wall in tune with colour and texture is carried out. Construction of laterite stone masonry dwarf fencing wall and fixing of MS grill over it on the eastern side of Bekal fort have been carried out. Conservation of South eastern side sea bastion has been strengthened by underpinning, resetting and pointing as per original.

90. ST. FRANCIS CHURCH, KOCHI

Painting to the exterior walls has been done and the doors and polishing of windows in western side completed. Lean to roofs on the southern side of the church has been repaired and re-erected.

91. SIVA TEMPLE, CHEMMANTHITTA, DISTRICT THRISSUR

The damaged beams and ceiling rafters of granary (*pathayapura*) of the temple has been replaced with new teak wood roof members and planks as per existing pattern. Anti-termite treatment to the entire structural portions also attended.

92. SIVA TEMPLE, PERUVANAM, DISTRICT THRISSUR

The Prakara wall of the temple was thoroughly conserved using laterite stone in lime combination mortar in south eastern side as per old existing pattern. The roof of Madathilappan shrine 2nd tier has been conserved by providing teak wood roof members and copper tiles.

93. OS WORK CONSERVATION OF KOOTHAMBALAM OF SRI. KOODALMANICKAM TEMPLE, DISTRICT THRISSUR

The repairs to the roof members of Koothambalam and roof planks are in progress. Apron all around Koothambalam with granite stone is provided.

TRIPURA

94. BHUBANESHWARY TEMPLE, RAJ NAGAR, DISTRICT SOUTH TRIPURA

The brick temple, with lime plastered surface was taken for the chemical

treatment and preservation work. The entire plastered and stone surface was chemically treated using aqueous ammonia solution and non-ionic detergent mixture for eradication of superficial dirt, dust and microvegetational growth, etc. The chemically treated and dried surface was given fungicidal treatment using solution of sodium pentachlorophenate, followed by water repellent treatment to make the structure water resistant. The work has been completed.

95. CHATURDAS TEMPLE, UDIAPUR RADHA KISHOREPUR, DISTRICT SOUTH TIPURA

The chemical conservation work of the entire temple and its subsidiaries was taken up during the period under review. The superficial accretions along with vegetational growth were removed from the surface. The chemically treated and dried plaster and brick surface was given biocidal treatment followed by silane siloxane based water repellent treatment as preservative. The work has been completed.

UTTARAKHAND

96. MRITUNJAYA TEMPLE, DWARHAT, DISTRICT ALMORA

The temple made up of sandstone. The exterior surface of temple was covered with dust, dirt, birds droppings and microvegetational growth and wall and ceiling of interior surface was blacked due to the deposition of oily, splashes of sindoor and tarry matters. A removal of accretionary deposits was carried out with aqueous solution of ammonia and non ionic detergent. The entire chemically treated surface was finally washed with plain water. The treated and dried surface was given biocidal treatment using aqueous solution of sodium pentachlorophenate followed by water repellent treatment application of Wacker BS-290 diluted in MTO. The work has been completed.

97. SHRI KEDARNATH JI TEMPLE, KEDARNATH, DISTRICT RUDRPRAYAG

The temple made up of granite-gneiss stone. The interior wall, sculpture and inscriptions were covered by dust, dirt, and smoke, greasy and oily matters. Removal of accretionary deposits was carried out using aqueous solution of ammonia and non ionic detergent with suitable additives. The entire cleaned and dried surface was finally washed with plain water. The work is in progress.

UTTAR PRADESH

98. DIWAN-E-KHAS, FATEHPUR SIKRI, AGRA

The monument is made up of red sandstone. The exterior sides of the monument become gray black at many places due to deposition of micro vegetational growth, dust, dirt and other tarry matters. Interior portion had lots of water marks and intense dust deposition on walls and jalies. The loose dust and dirt were cleaned by using soft brushes, the microvegetational accretions were eradicated by treating with 2% aqueous ammonia solution containing a little liquid non-ionic detergent from the exterior as well interior surfaces. The plastered surface was treated with calcium hypochlorite. Fragile portion was consolidated by OH-100. The chemically treated surface was applied with a coat of

2-3% sodium pentachlorophenate solution. Finally, the surface so treated was preserved with Wacker BS-290 diluted in MTO. The work has been completed.

99. BURIA-KA-TAL, AGRA

The exterior side of the structure was taken up for chemical conservation work during the period under review for the removal of micro vegetational growth, dust, dirt and other tarry matters. Some portion of tomb and pavilion was very fragile in nature and need proper consolidation and strengthening. The general cleaning with ammonia and non ionic detergent was done. The loose dust and dirt were cleaned with the help of soft nylon brushes. The deep rooted microvegetational growth on lime surface was removed using the paste of calcium hypochlorite followed by cleaning with mild aqueous ammonia solution containing a little liquid non-ionic detergent. Fragile portion was consolidated by an ethyl silicate based stone strengthener OH-100. The chemically treated surface was given a coat of 2-3% sodium pentachlorophenate solution. Finally, the surface so treated was preserved with Wacker BS-290 diluted in MTO. The work has been completed.

100. JUGAL KISHOR TEMPLE, VRINDAVAN

The temple is made up of red sand stone and dedicated to Lord Krishna. The temple comprises a huge Shikhara and entrance porch. There is no Idol in the temple. The exterior surface of the temple had become grey-black at many places due to deposition of dust, dirt and dried microbiological growth. Due to bird's droppings deposition of white patches and marks were also observed. The loose dust and dirt were cleaned by using soft brushes. Microvegetational growth and other accretions were eradicated using 2% aqueous ammonia solution containing a little liquid non-ionic detergent. Fragile portion was consolidated by OH-100. The chemically treated surface was given a coat of 2% sodium pentachlorophenate solution. Finally, the surface so treated was preserved with Wacker BS-290 diluted in MTO. The work has been completed.

101. AKBARS TOMB, SIKANDRA, AGRA

The marble portion of entrance gate has become dull in appearance due to deposition of pigeon excreta, dust, dirt and dried microbiological growth. The stone surface at many places has become fragile. To check the decay of stone surface, application of Wacker OH-100 was given as stone strengthener. The sand stone surface was treated with 2-3 % aqua ammonia solution containing a little liquid non-ionic detergent in order to remove dust dirt and micro-biological growth. The marble surface was treated by applying the paste of fuller's earth containing traces of Ammonium carbonate. The work is in progress.

102. SHEESHMAHAL MAIN MAUSOLEUM, TAJ MAHAL, AGRA

The scientific conservation work was taken up for the marble and lime plaster surface which was affected from dust, dirt superficial accretion, hands touching marks, smoky deposits, and oily/greasy material. The entire surface was treated with mild ammonia solution and non-ionic liquid detergent solution with the help of

soft brushes on the lime plaster. Removal of superficial accretions on marble surface was done by application of Fuller's earth paste of hydrated aluminum magnesium silicate. Finally, the surface was washed with plenty of distilled water. The work is in progress.

103. OLD BRITISH CEMETERY, SAHARANPUR

The chemical conservation work was taken up for the removal of dust, dirt and dried microvegetational growth from the all graves. White patches of pigeon excreta were observed on the exterior and interior surface of graves and especially on the marble statue which is connected with graves. Appearance of marble chhatries were becomes yellowish in colour. The sand stone surface was treated with 2-3% aqueous ammonia solution containing a little liquid non-ionic detergent in order to remove dust, dirt and micro-biological growth on stone surface. The chemically treated sand stone surface was preserved with application of Wacker BS-290 diluted in MTO. Removal of superficial accretions on marble surface were done by clay pack treatment. Finally, the surface was washed with plenty of water. The work has been completed.

104. JAHANGIRI MAHAL, AGRA FORT, AGRA

The exterior surface of Jahangiri Mahal was become dark at many places due to deposition of dust, dirt, smoke and microvegetational growth. It was observed that at few places the sand stone surface become porous and fragile. The loose dust, dirt, etc. were cleaned by using soft nylon brushes, the sticky dust and microvegetational growth were removed from the surface by treating it with aqueous ammonia solution containing non ionic detergent. The entire cleaned surface was given a coat of 2% sodium pentachlorophennate solution as fungicide. The fragile and weak sand stone surface was consolidated with an ethyl silicate based stone strengthener. Finally the surface was preserved with Wacker BS-290 diluted in MTO. The work has been completed.

105. KHAS-MAHAL COMPLEX AND MUSAMMAN BURJ, AGRA FORT, AGRA

The Musamman Burj and Khas-Mahal complex inside the Agra Fort is made up of white marble. The exterior marble surfaces of this palace covered with smoke, dust, dirt, greasy accretions, where as parapet wall made up of lime plaster become black due to depositions of microvegetation. The interior marble surface was also becomes pale-yellow colour due to deposition of dust and dirt. At few places brown patches was also noticed due to rusting of iron dowels. The metallic pinacle and sheet over the chatri of Musamman Burj diminished it's shining due to deposition of dust, dirt and smoke. Due to various accretionery deposits the golden colour of metalic sheet had becomes blackish. The marble surface was treated by applying the paste of Fuller's earth containing traces of additive as needed. Finally the treated marble surface was thoroughly washed with plenty of distilled water to remove the traces of chemical. The metallic portion was treated using chemicals like Rochelle salt, sodium hydroxide and hydrogen peroxide as per requirement. The cleaned metal surface was preserved by applying two coats of

1% solution of PVA diluted in sulphur free toluene. The work has been completed.

106. MADAN MOHAN TEMPLE, VRINDAVAN, MATHURA

The exterior surface of monument made up of red sand stone was become grey-black at many places due to deposition of dust, dirt, microvegetational growth, bats and pigeons droppings inside the temple, resulting formation of dark patches on stone surface. Superficial accretions like dust, dirt etc., were removed with the help of soft nylon/coir brushes. The biological accretions and excreta of pigeon and bats from the surface were removed with 2-3% aqueous ammonia solution adding non-ionic liquid detergent with the help of soft nylon/coir brushes. The Scientifically cleaned sand stone surface was given biocidal treatment by applying 2-3% solution of sodium pentachlorophenate in water. Finally the entire cleaned and dried surface was preserved with the water repellent treatment with silane siloxane based preservative. The work has been completed.

107. FATEHPUR SIKARI, DISTRICT AGRA

a. DIWAN-E-AAM :

The monument is made up of red sandstone. The exterior surface of the Monument was become grey-black at many places due to deposition of dust, dirt, soot, smoke tarry matters, water marks and microvegetational growth. White patches were also observed due to deposition of bird's droppings inside the judgment hall. The superficial accretions of dust, dirt, etc., were removed with the help of soft nylon coir brushes from the surface. The surface was cleaned using 2-3% aqueous ammonia solution and non-ionic liquid detergent with the help of soft nylon / coir brushes. The Scientifically treated sand stone surface was given biocidal treatment by applying 2-3% solution of sodium pentachlorophenate in water. The weak and fragile sand stone surface was treated with an ethyl silicate based stone strengthener. Finally, the surface was preserved with Wacker BS-290 diluted in MTO. The work has been completed.

b. JAMI MASJID:

The interior sandstone surface was covered with dust, dirt, tarry matters, bee hives and pigeons droppings resulting formation of dark patches on stone surface. The superficial accretions of dust, dirt, etc., were removed with the help of soft brushes from the surface. The surface was cleaned with aqueous ammonia solution and non-ionic liquid detergent with the help of soft brushes. The weak and fragile sand stone surface was consolidated with an ethyl silicate based stone strengthener. The work has been completed.

108. SADIQ AND SALABAT KHAN TOMB, SIKANDRA, AGRA

The scientific conservation work was taken up for the restoration of paintings executed on the four beautiful chhatries at the four corners of the platform. The main problem was flaking, bulging, loss of pigments, voids and cracks in the paintings inside the ceiling of four chhatries. Paintings were restored by means of edging, fixing and filleting along with general cleaning with mild organic solvents. Colour reintegration was also attended. Finally the surface was preserved with 1% solution of PVA in sulphur free toluene. The work has been completed.

109. MAKARBAI TEMPLE, MKARBAI, DISTRICT MAHOBA

The exterior and interior portion of the temple was taken up for scientific conservation work during the period under review. The stone surface of the temple covered with dust, dirt, hard accretionary deposits and microvegetational growth. The superficial accretionary deposits were removed using aqueous ammonia solution and nonionic detergent along with various chemicals as per requirement. The weak and fragile stone surface was consolidated with an ethyl silicate based stone strengthener. The chemically treated and dried surface was given fungicidal treatment using aqueous solution of sodium pentachlorophenate followed by water repellent treatment with silane siloxane based preservative. The work has been completed.

110. RANI MAHAL, JHANSI, DISTRICT JHANSI

In continuation of the previous year's work, consolidation and restoration work of wall paintings was taken up during the period under review. The wall paintings were covered with dust, dirt, soot, tarry matters along with minor cracks and graffiti on the painted wall. Filleting and filling work of minor cracks along with edging of the painted plaster was carried out followed by chemical treatment using different organic solvents and their mixtures as required. The colour reintegration as well as preservation work on the chemically treated area was also carried out. The work is in progress.

111. MAIN GATE OF GULAB BARI, FAIZABAD, DISTRICT FAIZABAD

The interior and exterior portion of main gate was taken up for scientific conservation work during the period under review. The plastered surface of the gate was thickly covered with thick microvegetational growth, bird's droppings, dust, dirt and hard accretionary deposits like lime wash. Removal of accretionary deposits was carried out with aqueous solution of ammonia and non ionic detergent. Acetic acid was also used to remove lime wash over the plastered surface. The entire chemically treated surface was finally washed with plain water. The treated and dried surface was given biocidal treatment using aqueous solution of sodium pentachlorophenate. The work is in progress.

WEST BENGAL

112. HANSESWARI AND BASUDEVA TEMPLES, BANSBERIA, DISTRICT HOOGHLY

(a) PAINTINGS OF HANSESWARI TEMPLE

The mural paintings were executed inside the interior *garbhagriha* and *veranda* using tempera technique on rock surfaces. Inside the *garbhagriha*, due to burning of oil lamps and candles, the paintings were affected with thick soot formation. These soots were slowly and very carefully removed using mixture of organic chemicals to expose the original paintings. The exposed paintings were then retouched using natural colours wherever necessary and finally two coats of preservative were applied over the paintings. Paintings in *verandah* were also retouched wherever necessary and

preserved chemically. The work has been completed.

(b) BASUDEVA TEMPLES

In continuation of previous year's work, the remaining chemical treatment and preservation of the temple was completed.

113. BRINDAVAN CHANDRA THAKUR MATH COMPLEX (VIZ. KRISHNA CHANDRA, RAM CHANDRA, CHAITANYADEV AND BRINDAVAN CHANDRA TEMPLES) AT GUPTIPARA, DISTRICT HOOGHLY

(a) CHAITANYADEV AND KRISHNA CHANDRA TEMPLES

In continuation of previous year's work, these temples were preserved chemically using two coats of preservative of Wacker BS-290 in MTO in the ratio 1:15 (wet-on-wet).The work has been completed.

(b) RAMCHANDRA AND BRINDAVAN CHANDRA TEMPLES

The thick growth of microvegetation was removed chemically using ammonia solution mixed with non-ionic detergent with the help of soft brushes. Fungicide was applied over the dried surfaces to arrest the re growth of vegetation. Finally two coats of preservative were applied using Wacker B S-290 in MTO in the ratio 1:
15 (wet-on-wet). The work has been completed.

114. KOCHBIHAR PALACE MUSEUM, DISTRICT KOCHBIHAR

The paintings were executed over the walls of two adjacent rooms of Kochbihar palace, which were damaged due to flaking, loss of painted plasters, loss of colours, etc. Small and big cracks and loose plasters were consolidated using lime water mixed with natural adhesive. These cracks and holes were filled up using mixture of lime, sand and natural adhesive. Colour re-integration was done to match the colours with the surroundings as these are continuous floral designs of similar patterns. The work is in progress.

MONITORING OF AIR POLLUTION

AIR POLLUTION AGRA

AIR QUALITY MONITORING

The Science Branch of the Survey is carrying out air quality monitoring at Taj Mahal, Agra, Bibi-ka-Maqbara, Aurangabad and Charminar, Hyderabad with the objectives to assess the impact of changing environmental conditions on the structure and building materials of ancient monuments and historical buildings. The Air quality monitoring activity consists of ambient air quality monitoring and meteorological conditions.

1. AMBIENT AIR QUALITY MONITORING STATION, TAJ MAHAL, AGRA

Air Pollution Control Laboratory, Agra continuously monitors the following major atmospheric pollutants round the clock at the monitoring station located at Taj Mahal.

Parameter	Sampling Technique	Sampling Time
Sulphur Di Oxide (SO_2) (µg m^3)	Modified West and Greek Method (Sequential Air Sampler)	4 hourly basis
Oxides of Nitrogen (NO_x) (µg m^3)	Jacob and Hochneisser or Sodium Arsenite Method (Sequential Air Sampler)	4 hourly basis
Suspended Particulate Matter (SPM) (µg m^3)	Respirated dust sampler and High volume sampler	8 hourly basis
Sulphation Rate Gm SO_3/m^2/day	Lead Candle Method	Monthly basis
Dust Fall Rate (MT/KM^2/Month)	Dust Fall Jar	Monthly basis

A. The status of Ambient quality observed during April 2013 to March 2014 at Taj Mahal is as follows:

Period	Pollutant								
	SO_2 (µg m^3)			**NO_x (µg m^3)**			**SPM (µg m^3)**		
	Max.	**Min.**	**Avg.**	**Max.**	**Min.**	**Avg.**	**Max.**	**Min.**	**Avg.**
Apr. 13 to Mar. 14	04.74	03.01	03.34	08.61	03.49	05.80	348.86	54.15	191.15

B. The Meteorological parameters like temperature, relative, humidity, wind speed, wind direction, atmospheric pressure, solar radiation are monitored through automatic weather monitoring station (Wind Monitor, WM-271) installed at the site Taj Mahal. Meteorological data is recorded on hourly basis throughout the year and is presented for monthly maximum, minimum and average values in the following table:

Meteorological parameters recorded in the ambience of Taj Mahal for the year 2013-14

Period	Parameter						
	Temperature			**% Relative Humidity**			**Rain Fall mm**
	Max	**Min**	**Avg.**	**Max**	**Min**	**Avg.**	**Avg.**
Apr. 13 to Mar. 14	44.3	8.0	-	98.2	7.3	-	19.62

C. The data showing Sulphation rate and Dust fall rate measured at Taj Mahal have been compiled in the following table:

Sulphation Rate and Dust Fall Rate for the year 2013-14

Period	Sulphation Rate Gm $SO_3/m^2/day$		Dust Fall Rate ($MT/KM^2/Month$)	
	Max	**Min**	**Max**	**Min**
Apr. 13 to Mar. 14	0.0222	0.0083	6.82	2.14

2. AMBIENT AIR QUALITY MONITORING STATION, BIBI-KA-MAQBARA, AURANGABAD.

The ambient air quality monitoring has been carried out at Bibi-ka-Maqbara, Aurangabad to generate data for the following parameters during the period under report.

(i) Suspended Particulate Matter (SPM)
(ii) Sulphur di Oxide (SO_2)
(iii) Oxides of Nitrogen (NO_x)

The meteorological parameters such as Temperature, Relative Humidity, Rainfall, Atmospheric Pressure, Wind Speed, Wind Direction and sunshine have also been monitored using the equipment Satellite Link automatic weather station installed at the site. The data collected have been useful in assessing the impact of pollutants on the preservation and stability of the ancient monument and historical buildings.

THRISSUR CIRCLE

1. M.R. (CT &P) TO PAINTINGS OF SRI VADAKKUMNATHA TEMPLE, DISTRICT THRISSUR

The M. R. Work was framed in the year 2011-12 for removal of soot, dust and dirt accretions accumulated on the wall paintings and consolidation of deteriorated portions of Vadakkumnatha shrine, cloister *mandapa* and Sankaranarayana shrine of the temple.

The work involved the removal of hard soot accretions accumulated on the paintings of Vadakkumnatha shrine and removal of dust and dirt using organic solvents like, 2 ethoxy ethanol, turpentine, diacetone alcohol, butyl lactate and sulphur free toluene. There were many lacunae portions in the murals due to climatic changes, celebrated Thissur Pooram Festival (explosive causing fall certain portions) and other human activities. The flaked portions were rectified by fresh lime in the traditional combination method with organic ingredients and the conserved portions were integrated with water colours. After completion of work in southern portion of the shrine, preservative coat of 1% PVA in sulphur free toluene were given. The 52% of the work is completed and remaining is in progress.

2. M.R. DUSTING AND UPKEEP OF PAINTINGS AT SIVA TEMPLE, THIRUVANCHIKULAM AND 3D LASER SCANNING OF MONUMENTS, DISTRICT THRISSUR

The M.R. work framed in the previous financial year for the dusting and upkeep of the paintings at Siva temple Thiruvanchikulam, Thrissur district and 3D laser scanning of some of the monuments.

In continuation to the dusting work and initial works carried out in the previous financial year, the work for 3D laser scanning, 3D modelling using laser technology, 2 Dorthograph drawing of Siva temple, Chemmanthitta and training for the technical staff for the usage of data has been completed.

3. M. R. (CT&P) SRI PRASURAMA TEMPLE, THIRUVALLAM, DISTRICT TRIVANDRUM.

The M. R. work framed in the current financial year for the chemical treatment and preservation of different shrines of Sri Parasurama Temple, Thiruvallam, District Trivandrum.

The work involved the removal of microvegetation, dust dirt and general cleaning of Ganesa Shrine using 2-3% solution of ammonium hydroxide and non-ionic detergent in water. The lime plaster on the stonewall was mechanically removed and the accretions were removed using 2% acetic acid solution in water and the area was neutralised by ammonium hydroxide solution in water. The chemically treated area was given 2% sodium pentachlorophenate as the fungicide solution and finally preserved by the application of coats of silanes iloxane mixture (Wacker silicons SMK-1311) in water solvent in the ration 1:12. The work is in progress.

4. ANNUAL REGULAR MAINTENANCE OF PAINTINGS OF SEVEN MONUMENTS UNDER THRISSUR CIRCLE

The work involved the dusting and minor repair attending in respect of monuments *viz*. 1. Vishnu temple Kadavallur 2. Siva temple, Chemmanthitta, 3. Siva temple, Pallimanah, 4. Siva temple, Avittathur, 5. Siva temple, Peruvanam, 6. Mattancherry palace, Mattancherry 7. Shree Rama temple, Triprayar and Chemical treatment and preservation of Siva temple, Netrimangalam, Pattambi.

The work involved dusting, anti-termite treatment and preservation for the bracket figures of Visnu temple Kadavallur as well as identification of wood as Artocarpusheterophyllus (Jack wood).

Dusting and attending of minor conservation problems in Siva Temple, Chemmanthitta, Siva temple, Pallimanah, Siva temple, Avittathur, Siva Temple, Peruvanam, Mattancherry palace, Mattancherry, dusting and chemical treatment and preservation of paintings on the wooden ceiling at Sree Rama Temple, Triprayar.

Chemical treatment and preservation of Siva temple, Netrimangalam carried out for the removal of micro vegetation, dust dirt and general cleaning using 2-3% solution of ammonium hydroxide and non-ionic detergent in water, application of 2% sodium pentachlorophenate as the fungicide solution and final preservation by the application of coats of silane siloxane mixture (Wacker silicons SMK-1311) in water solvent in the ration 1:12. The work is completed (Pls. 187-190).

5. ANTIQUITY TREATMENT

The treatment of iron antiquities obtained from Pariyaram, District Kannur, Kerala was treated for the removal of rust in electrochemical method and preserved using microcrystalline wax. Pottery objects

Plate 187

a

b

Kadavallur: a; before and b; after chemical conservation of wooden bracket figurine, Vishnu temple.

Plate 188

a

b

Kadavallur: a; before and b; after chemical conservation of wooden bracket figurine, Vishnu temple.

Plate 189

a

b

Kadavallur: a; before and b; after chemical conservation of wooden bracket figurine, Vishnu temple.

Plate 190

a

b

Pattambi: a; before and b; after chemical conservation of Siva t emple at Netrimangalam.

obtained from the same site was also treated with organic solvents.

PROJECT ABROAD

1. CHEMICAL TREATMENT AND PRESERVATION OF ANANDA TEMPLE, BAGAN, MYANMAR

A. Scientific conservation of wooden doors, Buddha diety and mural paintings were taken up during the period under review. To exposed murals thick lime coat was removed using 3% solution of dilute acetic acid followed by neutralization of acid with 3% solution of ammonium carbonate and sodium carbonate. For cleaning of exposed paintings mixture of organic solvents were used in suitable ratio. Consolidation was carried out by using a solution of lime and lime plaster. Painting were preserved using 1% PVA solution in toluene.

B. The wooden doors were covered with dust, dirt, soot, grease and other accretionary deposits. Superficial deposits were removed with soft nylon brushes followed by cleaning with a mixture of 2-ethoxy ethanol and mineral turpentine oil. Finally the cleaned surface was preserved with 20% aldrine in mineral turpentine oil followed by 2% chloropyriphos in MTO.

C. Out of four Buddha deities, the one situated on east facing gilded with gold foil was taken for its chemical conservation. For the removal of dust, dirt and other superficial deposits the cleaning was carried out using mineral turpentine oil. The work has been completed.

Scientific conservation work taken up on exterior portions of sub shrines east-south. Boundary walls of south-east and east side to removed superficial accretions like dust, dirt, microvegetational growth and thick lime coats. General cleaning was carried out by using 3% solution of ammonia and nonionic detergent in aqueous medium with the help of soft nylon brushes followed by thorough washing with plenty of water to remove remnants of chemicals if any. The thick lime coat from the exterior surface was removed using 3% solution of acetic acid in aqueous medium followed by washing with plenty of plain water and repeated by treatment with 3% solution of ammonia and non ionic detergent solution to neutralize the acid on the surface. To check the growth of micro vegetation dilute solution of calcium hypo chlorite was applied over the surface which was removed after four hours and surface was washed with water. On dried surface 3% solution of sodium pentachlorophenate in water was applied as fungicidal treatment. For weak and fragile surface consolidation was done using Wacker OH-100. Finally, hydrophobic treatment was given using a silane siloxene based water repellent BS-290 diluted in MTO.

The glazed terracotta plaques which were covered with thick coats of lime were taken up for scientific conservation work. The lime coats were removed physic-chemically using 3% solution of acetic acid followed by neutralization with ammonia solution .After thorough washing the dried surface was consolidated using Wacker OH-100.

2. TREATMENT OF EXCAVATED OBJECTS AND MUSEUM EXEBITS.

1. Zonal Laboratory, Aurangabad:

- Antiquities like basalt stone sculpture, iron, copper and terracotta objects from the excavated site Raigad, District, Raigad were chemically treated and preserved with suitable chemicals.

2. Zonal Laboratory, Delhi:

- Chemical treatment and preservation of 41 Nos. paintings received from Indian Agricultural Research Institute, Delhi was carried out.

- Chemical treatment and Preservation of 150 antiquities of various natures like paper object, textile, painting, metal etc of Archaeological Museum (Mumtaz Mahal Museum), Red Fort, Delhi was carried out.

- Restoration and preservation of 109 Nos. books out of 200 Nos. of books received from Central Archaeological Library, Janpath, New Delhi have been carried out.

3. Zonal Laboratory, Mysore

- Chemical treatment and preservation work of broken small copper vessel, copper plates, silver sheets, beads copper box and copper coins were received by the O/o the Superintending Archaeologist, Bangalore Circle, Bangalore were carried out.

4. Zonal Laboratory, Thirssur

- Chemical treatment and preservation work of iron antiquities received from Pariyaram, Kannur, District, Kerala were carried out by suitable chemicals.

5. Science Laboratory, Dehradun

- Restoration and Preservation of 122 Nos. books out of 299 nos. books received from Central Archaeological Library, New Delhi was carried out.

- Chemical treatment and preservation of antiquities of excavated site Singhol is in progress.

- Chemical treatment and preservation of antiquities of Khirsara Excavation Site received from O/o Director, E.E., A.S.I., Vadodara is in progress**.**

TREATMENT OF MONUMENTS AND PAINTINGS

DHARWAD CIRCLE

1. EXCAVATED STUPA REMAINS AT KANAGHANAHALLI (SANNATHI), DISTRICT GULBARGA

Removal of superficial accretions, dust and dirt by dry brushing. Chemical treatment for removal of all types of accretions, superficial and engrained, including microvegetation growth by using liquid ammonia solution mixed with Non - Ionic detergent on the surface of the panels. Sodium pentachlorophenate is applied to arrest algal & fungal accretions are applied on a trial basis. Wacker BS-290 in MTO (1:16 V/V) has been applied to some specific panels on a trial basis.

2. TARAKESHWARA TEMPLE (EXTERIOR), HANGAL, DISTRICT HAVERI

Removal of dust and dirt by using dry brushing. Chemical cleaning by using liquid ammonia and non-ionic detergent. Lime removal is brought into effect by treatment with Acetic Acid so that lime which is Calcium Carbonate ($CaCO_3$) is converted to soluble calcium acetate (Pls. 191-192).

3. BANSHANKARI DEVI AND SHANKARLINGA TEMPLE, AMARGOL, DISTRICT DHARWAD

Removal of superficial accretions, dust and dirt, etc. Chemical treatment for removal of all types of accretions, superficial and engrained, including microvegetation growth. Application of fungicide in entire exterior surface and water repellent in MTO.

CONSERVATION LABORATORY DEHRADUN & AGRA

D. LABORATORY ANALYSIS AND RESEARCH ACTIVITIES

1. SCIENCE LABORATORY, DEHRADUN

- Laboratory studies for chemical and instrumental analysis of stone samples of Hampi group of monuments was carried out.

- Metallographic studies of samples of Nalasopara received from Mumbai Circle were carried out.

- Metallographic studies of Copper ingots received from Michigan, U.S.A. was carried out.

Chemical treatment and preservation of antiquities received from Bangalore Circle, Bangalore was carried out.

- Chemical and instrumental analysis of sample of Keshar Bagh Gate Lucknow was carried out.

- Metallographic studies of Copper ingots received from Lothal, India were carried out.

- Scientific analysis of sample of Masroor received from Chandigarh Zone was carried out for its composition.

2. STONE CONSERVATION LABORATORY, AGRA

The stereo microscopic studies and petrographic studies of stone samples and painted layer of Jami Masjid, Fatehpur Sikri has been carried out by using polarizing microscope (NIKON make- Model E- 600 POL). The transmitted light microscopy used in identifying the constituent materials reveals the inner matrix of the rock. Stereomicroscopic studies were carried out for morphological studies of painted layer and stone samples.

Petrography studies of some marble (Old and New) samples collected from Itmad-ud-Daula was carried out to determine the texture, grain size, distribution patterned, binding medium and mineral composition of rock employed in the construction. The thin sections of stone samples were subjected to microscopic studies to obtain photomicrographs by using polarizing microscope (NIKON make- Model E- 600 POL). The transmitted light microscopy used in indentifying the constituent

Plate 191

a

b

Hangal: Pattambi: a; before and b; after chemical conservation of Tarakeshwara temple.

Plate 192

a

b

Hangal: a; before and b; after chemical conservation of Tarakeshwara temple.

materials reveals the inner matrix of the rock.

Photomicrographs

(A) Photomicrograph showing granular texture of the rock.

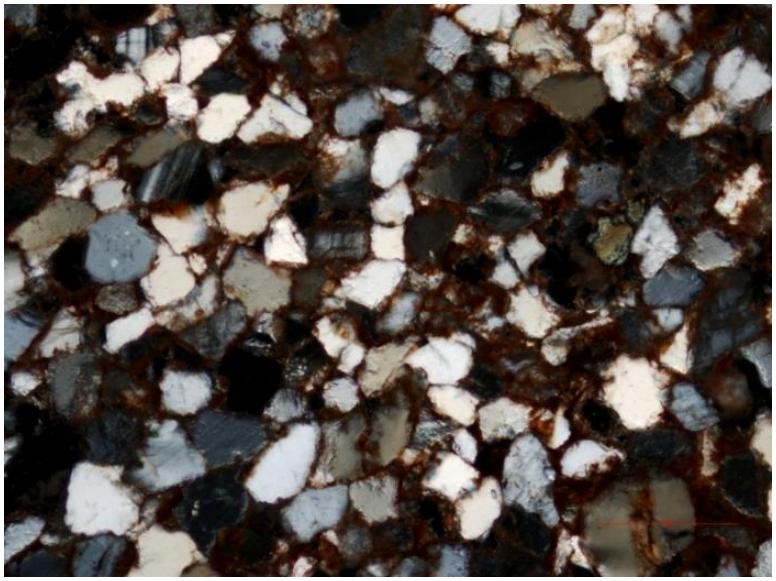
(B) Photo micrograph showing the sub angular quartz grains, plagioclase and microcline feldspar at the top left corner and iron oxide as cementing material encircling the grains.

PHOTOMICROGRAPHS OF PAINTED LAYER

- Photomicrographs of painted material have been obtained with the help of polarizing microscope. The photomicrographs are revealing that the material is hydrated iron oxide with mixing of clay material. Some quartz grains also discernible that may be due to the inclusion of some loose grains of stone matrix into the iron oxide layer (Pl. 193).

Plate 193

a



b

Photomicrograph of stone sample in a; 2x and b; 10x magnification.

IX. ARCHAEOLOGICAL GARDENS

ASSAM

1. DHANDI TEMPLE, RUINS OF SINGRI HILLS, SONITPUR, GHANSHYAM HOUSE, SHIVSAGAR AND MONILITHS OF KASOMARI PATHAR, GOLAGHAT AND AT EXCAVATED SITE BOXANAGR

Bore well were drilled in above sites/monuments to make proper water arrangement for garden activity to enhance the beauty of the monuments and its surroundings.

CHATTISGARH

20. RATANPUR FORT (PH-II), RATANPUR, BILASPUR

For making water arrangement to lying of the garden around the monument provision of two bore wells were done.

GUJARAT

21. RANI-KI-VAV, PATAN

The existing garden was improved to protect monument from wind and water erosion. Additional plantation was carried out to increase the density of plant which includes, Lagerstroemia flos-rignae, Murraya exotica., Ixora singaporensis, Grevillia robusta, Alastonia scholaris Ground covers in form of Selection No. I Grass carpet was also laid in the affected areas (Pl. 194).

JHARKHAND

14. JAMA MOSQUE, ARJIMUKHIMPUR, SAHIBGANJ

The environmental development work was taken-up to beautify the surroundings of the monument. The work includes laying of lawn, dot plantation, shrubbery border and flower beds.

KARNATAKA

6. SHREE RANGANTHASWAMY, SRIRANGAPTANA

A lawn was developed inside the arboretum area to beautify the surrounding of the monument.

7. SHREE KESHAVA TEMPLE, SOMNATHPUR

Relaying of garden was completed. Mango trees were planted. A beautiful lawn border with *clerodendrem* hedge has come up.

Plate 194

Patan: New Plantation at Rani Ki Vav.

8. SHORE TEMPLE, MAHABALIPURAM

Relaying of garden work in front of temple was taken up to enhance the beauty of monument. The work has been completed.

KERALA

9. FORT WALL AND MOAT AT PALAKKAD FORT, PALAKKAD

In order to beautify the area a garden around fort wall and moat was developed by way of landscaping and planting grass and trees.

NAGALAND

2. MONOLITHS OF KACHAN RUINS, DIMAPUR NAGALAND

Water arrangement was made by way of drilling bore well for garden purpose to enhance surrounding of the monument.

ODISHA

19. BRAHMESWAR TEMPLE, BHUBANESWAR

As there was scarcity of the water to develop garden around the temple, bore well was drilled to get sufficient water round the year for proper irrigation of the garden of the temple.

11. SUN TEMPLE, KONARK

The garden development work was taken-up in front of the temple along the pathway after removal of encroachment. In addition, bore well was also drilled in order to make the availability of the sufficient water for irrigation purpose.

12. SHREE JAGANNATH TEMPLE, PURI

The garden development work was taken-up to beautify the area around Meghanada Prachira (compound wall of the sanctum). The area was developed by laying of lawn, dot plantation, shrubbery border and flower beds.

18. MEGHESWAR TEMPLE, BHUBANESWAR

Since original source of the water was dried-up. Therefore, a bore well was drilled to get sufficient water round the year for proper irrigation of the garden.

UTTAR PRADESH

1. TAJ MAHAL, AGRA

The dead original grass of the loan was removed and the area was regressed by way of after trenching and following other operations for making of a weed free lawn (Pl. 195).

2. ADIG-KA-TILLA AT MATHURA

In order to landscape the ancient mound and further to develop the garden activities, water arrangement were made by way of bore well drilling. Accordingly, a new garden was developed by way of planting various trees and shrub plants.

Plate 195

a

b

Agra: a; before and b; after regressing of lawn in the front plots of the Taj mahal garden.

3. KANKALI TILLA. MATHURA

Original garden was extended and water arrangement was made by way of bore well drilling.

4. MEHTAB BAGH, AGRA

In order to provide sufficient water for gardening around the monument, a bore well was drilled.

5. MAHET GARDEN, SHRAVASTI

In view of proposed garden activities to be developed around the site, a bore well was drilled for the purpose for irrigation of area.

WEST BENGAL

13. QADAM RASOOL AND LUKA CHAURI GATE, MALDA

The environmental development work was taken-up to beautify the surroundings of the monument. The work includes lying of lawn, dot plantation, shrubbery border and flower beds.

15. QADAM RASOOL AND LUKA CHAURI GATE, MALDA

In order to develop garden around the monument, water arrangement was made by way of drilling of bore well. Pipe lines were provided in different direction for purpose of irrigation entire are.

X. ANTIQUITIES

Central Antiquity Collection, Purana Qila

Seventeen thousand five hundred seventeen antiquities and potteries have been digitized. Thirteen Antiquities of different periods have been handed over to National Museum for exhibiting in International exhibition entitled (the body of Indian Art) at Brussels, Belgium. The antiquity of Piprahawa and Ganwaria, UP have been shifted to site museum at Piprahawa.

XII. PUBLICATIONS

ODISHA

On the occasion of World Heritage Week celebration, the Excavation Branch-IV, Bhubaneswar has brought out a brochure for free distribution among students and scholars on "**Instilling Cultural Awareness and Endorsing Tourism"** highlighting a glimpse on the increasing tourist trends in the centrally protected ticketed monuments in Odisha during the period from 2008-09 to 2012-13. The brochure was released by the Regional Director (Eastern Region), Kolkata on 24th November, 2013.

Besides, this branch has published a booklet on **"Impregnable Fort Barabati: the tall testimony of medieval Odisha"**, which was released by the Hon'ble Director General, Archaeological Survey of India on 28th February, 2014. The booklet highlights the outcome of the excavations conducted at the Barabati Fort, Cuttack, Odisha between 1989-90 to 2006-07 intermittently for ten field seasons.

Archaeological Survey of India