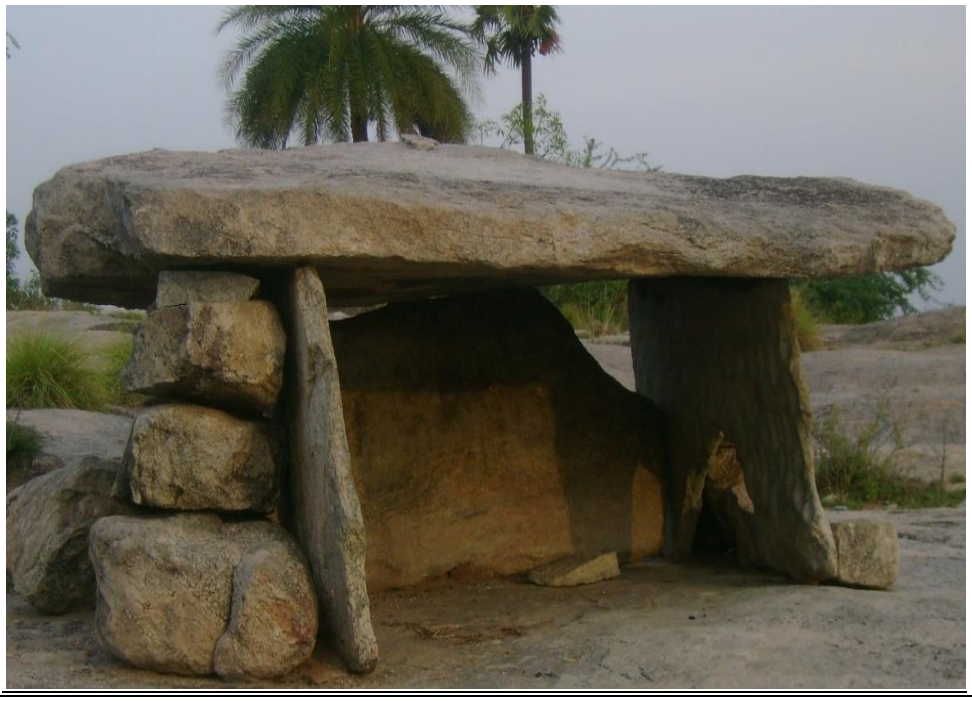
INDIAN ARCHAEOLOGY 2008-09

-AREVIEW







INDIAN ARCHAEOLOGY 2008-09 - A REVIEW

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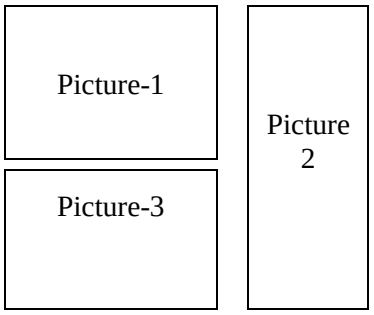
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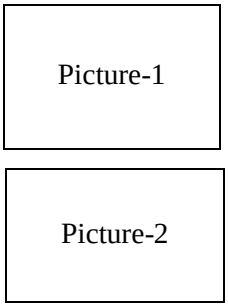


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Front



Back



Front Cover: 1: Circular platforms composed of white compacted earth and ash, Indor Khera, 2: Terracotta ring-well, Bangarh. 3. Sarcophagus of Iron Age, Punceri.

Back Cover: 1 & 2: Aurangabad Cave 4, Aurangabad, before and after conservation.

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PREFACE

I take the privilege to present the issue of *Indian Archaeology 2008-09 – A Review*, before the scholars and general readers. The issue of the Review is to record the achievements of archaeological activities in the length and breadth of the country.

This volume includes information on archaeological research undertaken during the year 2008-09 throughout the country including explorations, excavations, epigraphy, numismatics, outstanding discoveries, palaeobotany, museums, structural/chemical conservation as well as landscaping work by the Archaeological Survey of India and other organizations. I thank all the contributors and heads of archaeological organizations in States, Universities, Museums and Research Institutes including our own colleagues in the Survey for their cooperation in bringing out this publication in its present shape. In editing this vast material, some errors might have crept in for which I must tender my apologies. However, in respect of information furnished by the respective contributors, the responsibility lies with them only.

I am grateful to Dr. D.N. Dimri, Director (Publications) and his team in the Publication Section especially Ms. Anchal Sharma, Stenographer for immaculate typing, formatting and designing the volume and making it press-ready in the record time.

Last but not the least, I would be failing in my duty, if I do not mention my gratitude to Shri C. Dorje, Former Joint Director General, Archaeological Survey of India for going through the final manuscript and suggesting necessary corrections.

Date: …../…../2015
New Delhi

(Rakesh Tewari)
Director General
Archaeological Survey of India

INDIAN ARCHAEOLOGY 2008-09 - A REVIEW

I. EXPLORATIONS AND EXCAVATIONS

ANDHRA PRADESH

1. Exploration and Excavation in the Nalgonda and Guntur District: The Excavation Branch-I, Nagpur of the Archaeological Survey of India, under the direction of Nandini Bhattacharya Sahu, assisted by S.B.Suple, Prabash Sahu, Samir Diwan, Uday Anand Shastry, S.K. Gulrandhe, H.J. Barapatre, D.K. Kasbi, R.G. Nagulwar, A.E Keshwar, B.V. Bhoyar, S.M. Khairkar, Shahid Akhtar, D.A. Kamble, M.R. Kambe, R.G. Patil, Balbahadur Ghale, Mehtab Alam, Kartik Mudliar, Krishna Desai, Kiran Pyarelal Bhagat, Anand Tayde, Jarrar Hussain and Vijay Kanojiya conducted excavations at the Megalithic sites of Vadinapalli (locally known as Vajenapalli), Nemalipuri and Vellaturu, in the Mellacheruvu mandal of the Nalgonda district; photo documentation of the site of Shobhanadrigudem in the same mandal and explorations in the Guntur district, as salvage work in the areas which were to go under submergence of the Pulichintala Irrigation Project on the River Krishna.

In all, there are 886 megalithic burial sites in the twin-sites of Vadinapalli (VNP) and Nemalipuri (NMP) of which three hundered sixty at VNP and five hundred and twenty-six at NMP. These megaliths located amongst thick shrubs, were extensively surveyed and recorded. The megalithic burial monuments mainly comprise of cist-chambered tombs, with or without capstones, with or without cairn-filling or boulder circle surrounding them, simple cairn circles, subterranean cists covered with massive capstones, with port-holes, transeptal cists, cist within cist, and stone circles with broken orthostats used in place of stones. Due to the paucity of time, effort was made to excavate at least one example from each type, if not more. The results unearthed, varied considerably between different types. In VNP, of the megalithic monuments numbered between 1 and 360, Megalith nos. 4, 5A, 6, 20 and 293 were taken up for excavation and in NMP, of the megaliths numbered between 1 and 526, Megalith no. 6 was taken up for excavation.

Megalith no. 6, at the site of NMP is a free-standing cist burial without any surrounding

1. The Archaeological Survey of India is referred in the following pages as the Survey.

boulder circle. The four orthostats arranged in the typical *svastika* pattern enclose a chamber, which has the dimensions of 1·88m on the longer east-west axis and 1·40m on the shorter north-south axis. The internal height of the chamber is 0·70m on the western side and 0. 80m on the eastern side, from the surface to the basal stone slab, which has the dimension of 2·0m x l·40m. The eastern orthostat has a port-hole above the ground level, having a diameter of 0·45m, without any passage from the outer periphery. The port-hole in this case is pear/*ghata*-shaped, with the narrower end opened to the sky. The filling inside the chamber comprises earth of the surrounding type as well as black cotton soil. At the base of the chamber is a slab over which are placed pots, medium and small-sized, some of them tripods. The pottery comprises red wares and black-and-red wares. The red wares are plain and mostly ill-fired but the black-and-red ware has a distinct polish on them. The pottery, in general, has a profusion of graffiti on them. The pottery shapes comprise small vases, some of them tripods, small *matkas*, bowls with wide mouth, with or without carination.

Megalith no. 4 at the site of VNP is a cist-burial comprising four orthostats arranged in the *svastika* pattern with a port-hole on the eastern orthostat encircled by a boulder with cairn packing. This burial monument has a cist within the main cist, which is placed centrally along with skeletal remains on its either sides. All the three internments within the main cist chamber are oriented in the west-east direction. In the first stage of excavation, after opening the main cist, the centrally placed main cist within it was enclosed by boulders. The four orthostats arranged in the typical exposed. This chamber, measuring 0·84m east-west and 0·60m north-south, has an arrangement of a wide-mouthed shallow bowl (or dish?) placed over a few boulders together with a couple of long and short bones. In the second stage of excavation, the space to the left of the central cist-chamber, abutting the southern orthostatic was exposed. This is used for articulated secondary burial of an adult, laid with the head towards the west, set in a somewhat crouching position, facing north. Efforts to articulate the skeleton have not been correctly made as erroneous bones have been used in different positions. The skeletal remains are directly placed over the basal stone slab, which forms the floor of the entire cist. Above the skeletal remains is an arrangement of six cobbles surrounding a wide-mouthed, shallow bowl of black-and-red ware. In the third or final stage of excavation, the narrow strip to the right of the central cist, abutting the northern orthostatic, was exposed. A skull, crushed badly, perhaps due to the overlying earth pressure, was found placed to the west abutting the western orthostatic. This too is placed directly on the basal stone slab. The outer, bigger cist tomb measures 1·55m east-west and 1·35m north-south. The height of the eastern orthostatic is 1·46m from the top to the bottom and that of the western one is 1·45m. The port-hole on the eastern orthostatic has a diameter of 45cm. The complete burial monument is encircled by a boulder which measures 6·25m along the longer east-west axis. The pottery comprises black-and-red ware and red ware.

Megalith no. 6 at the site of VNP is a burial of the subterranean type, covered with a 28cm thick massive capstone, measuring 2·10m east-west and 1·95m north-south. The burial monument is enclosed within a roughly circular boulder enclosure measuring 6·05m on the west-east longer axis and 5·05m on the north-south shorter axis. On removing the capstone, a subterranean chamber made by the *svastika*-type arrangement of four free-standing orthostats standing on a basal slab was exposed. As in the case of most burial monuments at the site, this one also has a por-thole on the eastern orthostatic, this one being a subterranean one. The chamber measures 1·60m east-west and 0·90m north-south. The height from the base to the top of the chamber on the interior is 1·25m on the western side and 1·35m on the eastern side. The port-hole on the eastern orthostatic, which measures 30cm in diameter, is partially covered by a stone slab, placed horizontally with filling covering the port-hole. Upon clearing the mud filling from within the cist burial, an arrangement of pottery comprising large bulbous vases, dishes, squatted bowls, *handi*, straight-sided bowls and *lota* was found arranged in tiers. Atop this arrangement were a few horizontally placed long bones. The pottery repertoire comprises red ware, black-and-red ware and black ware. Almost all the vessels bear graffiti. This megalith is the only burial amongst the excavated lot which yielded iron implements. To begin with, the megalith builders placed a celt, a chisel and a razor on the basal slab. A small black bowl and a *lota* were placed atop the implements. Then the pots were arranged tier-wise inside the chamber. By the side of the iron implements was arranged a lump of black cotton soil. Megalith no. 20 is a burial comprising four orthostats arranged in the *svastika* pattern with a port-hole in the eastern orthostatic having a diameter of 40cm. The port-hole was subsequently filled up by rubble and earth filling. The burial monument is encircled within a boulder circle with cairn-filling. The boulder circle has a diameter of along the east-west axis and 6·70m along the north-south. The chamber of the cist tomb measures 1·57m on the east-west axis and 1·18m on the north-south. The chamber has a depth of 1·00m on the west and 1·14m on the east. The chamber filling comprises earth mixed with potsherds from the habitation. An iron nail was also found from the filling. The sherds have the usual shapes like vases, *handis*, bowls, dishes, etc., as recovered from the neighboring megaliths. The repertoire is made up of black-and-red ware as well as black ware. As prevalent at the site, on the basal stone slab is placed arrangements of skull, long bones, pebbles and pottery. On the portion abutting the southern orthostatic is an elaborate arrangement comprising cobbles and small vases, globular and shallow, over which are placed few long bones. On the north-west corner is an arrangement of pottery comprising dishes and vase fragments together with long bones. The pottery recovered from these arrangements comprises *lota*, small globular bowls and small dishes in black-and-red ware and red ware.

Megalith no. 5A, like many other such burials at the site of VNP, measures about 1·00-2·00m. On excavating one, it was

found that this is a child burial. The burial monument comprises four upright orthostats, again arranged in the *svastika* pattern, encircled by a pebble circle with a diameter of 1·90m on the east-west axis and 2·35m on the north-south. The cist chamber measures 45cm east-west and 23cm north-south. The interior of the 20cm deep chamber is filled up with earth. The basal slab has an arrangement of a crushed baby's skull along with bone pieces, potsherds and earth, all combined together. No pottery remains apart from the ones crushed along with the skull could be found.

Megalith no. 293 at the site of VNP is a burial comprising a circle made of slanting vertical slabs in place of boulders or stones. The excavation revealed that the megalithic folk might have followed the practice of constructing burials much in advance of receiving the skeletal remains. Since this burial appears to be totally unused, it did not reveal any grave goods or skeletal remains. It, however, bore evidence of certain activities which might have been performed during the construction of the burial. Two charred post-holes were discovered, which might have been used to erect shades while work was on.

The site at Vellaturu houses a total of 44 megalithic monuments. The geography and the geological position of the site provided the megalithic architects with more rock slabs to be used as orthostats, rather than boulders, for constructing boundaries of the tombs. In all, the site yielded twelve oblong cists; ten *svastika* patterned cists enclosed within a circle, mostly made of pieces of stone slabs, usually with capstones; ten *svastika*-patterned cists with or without capstones and essentially without any enclosure and twelve *svastika*-patterned semi-subterranean cists enclosed within covered slab circles, the central cists also bearing capstones. Of these, few had passage ways.

Although four megaliths were taken up for excavation, due to time constraint, only two could be excavated in detail**.** Of these, Megalith no. 21 is an open oblong cist within a stone circle, which yielded a crushed pot placed on the basal slab, without any skeletal remains. Megalith yielded a lid made of red ware, placed on the basal slab. Megalith nos. 20 and 34 are of a different type which has been reported for the first time from this site.

Megalith no. 20 is a covered *svastika* cist burial, encircled by a vertical slab circle, covered by capstones. A paved passageway from the south connects to the southern orthostat. As it appears, this megalith is a twin-burial, encircled by a vertical slab circle with a diameter of 7m. The burial chamber is constructed by placing four free-standing orthostats in the *svastika* pattern, making a squarish central chamber measuring 1·11m north-south and1·60m east-west with a depth of 2·25m. Outside the stone circle of vertical slabs are strewn pebbles in the form of a rough circular paving, which has a diameter of 10·3m. The southern orthostatic has a port-hole, having a diameter of 40cm, placed 1·15m below the covering capstone. A stone-paved passage, as in any other megalithic burials, could have been made with many beliefs, but the entire range of activities using the port-hole must have been a one-time affair, after which it was covered by the huge

capstone measuring 2·4m x 2m x 2m. After the construction of the *swastika* cist and the passageway, the vertical stone slab circle must have been erected, that was then covered by huge capstones at the last stage of construction. Just abutting the slab circle, on the exterior is found a red ware pot, placed inside the passageway. The burial is divided into two halves by a partition slab and the two halves have separate basal slabs, thus making it a double burial. The funerary remains include crushed pots of red ware, black ware and black-and-red ware, long bones, crushed skull remains of an infant and skulls of adults.

Megalith no. 34 is of a similar type, though devoid of a passage. The vertical slab circle, in which the slabs are covered, has an ovoid appearance and measures 5·55m east-west and 6·00m north-south. It encloses a s*vastika* cist measuring 2·35m east-west and 2·35m north-south. This too has a port-hole on the southern orthostatic. This is a transeptal cist and the funerary remains comprise skulls and long bones, all thrown in a very haphazard manner into the cist. The type of megalithic burial monuments described above has not yet been reported from any other site in the country. To demarcate it from the vertical slab circle variety, it has been termed as a "covered" vertical slab circle.

2. EXPLORATIONS IN KUPPAM REGION, DISTRICT CHITTOOR: In the course of village-to-village survey, P.C. Venkatasubbaiah, of the Department of History, Archaeology and Culture, Dravidian University, Kuppam, conducted archaeological explorations in the Kuppam region of district Chittoor. He found megalithic burial sites, hero-stone shrines and medieval temples at the following village revenue jurisdictions:

Village/Sites	*Nature of Remains*
Agaram (12° 47' 30"; 78° 17' 15")	A dolmen and a menhir; medieval temple of late Vijayanagara period; eleven hero-stones belonging to Vaidumbha period (eighth-fourteenth century CE)
Atinattam (12° 50'; 78° 16')	Twenty-nine megalithic burials spread over three clusters representing cairns, cist circles, stone circles and a menhir
Ayyavarigollapalli (12° 48'; 78° 15' 50")	A dolmen
Banditippanapalli (12° 5l'; 78° 21' 20")	A dolmen
Baiyanur (12° 44' 25"; 78°24')	Forty-four burials spread over two clusters: Cluster 1 lies on the terrace of the granite hillock and Cluster 2 at the foothills of dolmenoid cists, stone circles and pit burials
Bisanattam(12° 51' 15"; 78° 16')	Megalithic burials in two clusters: Twenty-one burials of types such as cairns, cairn circles and stone circles in Cluster 1 and eleven burials of

	types cairns, cist circles and stone circles in Cluster 2
Chindarapalem (12° 50' 30"; 78° 17' 30")	Thirty-eight megalithic burials of Complex 1 spread over five clusters of types cairns, stone circles and cairn circles, a menhir and twenty-seven burials of Complex 2 in two clusters of similar types
Dasamanipalli (12° 50' 50"; 78°17' 30")	Twenty-one megalithic burials spread over two clusters of cairns and stone circles with capstone at the centre
Gasikapalli (12° 51' 05"; 78° 19')	Megalithic burials spread at two localities: Locality 1 consists of thirty-five burial cists, cist circles and stone circles; Locality 2 consists of eight cists of square and rectangular plan, buried deep
Gudlayanipalli (12° 44'; 78° 18')	Eleven burials of cist circles and cists
Kalannur (12° 40' 30"; 78° 21')	Sixty burials of dolmens and dolmenoid cists
Kottur (13° 00' 45"; 78° 28' 30")	A dolmenoid cist and a dolmen
Mayattur (13° 04'; 78° 30')	Forty burials cairns, stone circles with central capstone and cist circles
K.Nakkanapalli (13° 02' 15"; 78° 27' 45")	Sixty burials spread over two clusters: Cluster 1 lies at the foot of the granite hillock and another cluster on the granite terrace consisting of stone circles with central capstone, dolmens and cist circles
Onnappanayanakottur(12° 42' 25"; 78°13')	Three stone circles
Peddaparthikunta (12° 45'; 78° 15')	Cist circles in the forest zone, 2·5km west of the village
Reddiyanipalli (12° 52' 25"; 78° 19' 20")	Cists, a dolmen, cairns and cist circles
Sajjalapalii (12° 43'; 78° 25' 30")	Seventy burials of dolmeniod cists, dolmens and stone circles
Solisettipalli (12° 51' 30"; 78° 19' 45")	A dolmen
Tippanapalli(12° 50' 55"; 78° 18' 25")	Twenty-one burials of cairns, cist circles and stone circles
Venkatapuram(12° 46' 30" ; 78° 16' 30")	A stone circle and a dolmen
Veppur(12° 41' N; 78° 24' 40")	Twelve burials of stone circles and cairns with central slab

Hero-stones/shrines have been found at Avulanattam, Badasettipalli, Beggilipalli, Birudanapalli, Boggulapalli, Chamaguttapalli, Govindapalli, Guttapalli, JavanapalIi, Karamatla, Kottalu, Kothindlu, Maldepalli, Ontipalli, Paluru, Pogurupalli, Rallabuduguru, Reddiyanipalli and Vasanadu. The most common figures represented in these shrines are a hero with a sword in his right hand, a bow and an arrow in his left hand in action; a dagger at his waist and two *sati* figures to his right; a hero with a sword in his right hand, a bow and an arrow in his left hand in action: a dagger at his waist and a *sati* figure to his right; a hero on a horse with a sword raised in his right hand and *sati* to his right with a high-necked vessel; a hero fighting a tiger with a sword in his right hand; and a hero with bow and arrow in action.

The cultural material found in several megalithic burials at Bisanattam, Gasikapalli, Peddaparthikunta, K. Nakkanapalli and Tippanapalli consists of black-and-red ware, red ware, black ware and chocolate or brown ware, of fine and thick fabric. The storage vessels are invariably of coarse variety with sand admixture and the shapes represented in the collection comprise high-necked urns with wide mouth and legs, wide-mouthed pots, cups, miniature bowls, lids, storage vases, etc., fragmentary calcified bones and pieces of iron objects? Graffiti marks are noticed on the red and the black-and-red wares. One or two burials have been subjected to treasure hunt.

Late medieval temples dedicated to Venugopalaswamy are found on a granite outcrop at K. Krishnapuram enclosed by 1m thick boundary wall. It is rectangular in plan with *garbhagriha*, *antarala*, *mukhamandapa* with four pillars (sculptures depicted on four sides), a porch and *dhwajastambha* in front. The entrance of the temple is flanked by sculptures of two elephants on either side and it has a brick-built tower. The sculptures noticed on the pillars of the *mukhamandapa* consist of Narasimha, Anjaneya, Krishna, *sankha*, *charka*, moon, Ganesa, etc. Similar temples, perhaps built in different period of time, are found at Motlapalli, Chinnasvama, Palaru, Bandasettipalli, Malavarikotturu and Onnappanayanakottur. Loose sculptures are found on the boundary of a field at Maddirallu village.

3. EXPLORATION IN LOWER TUNGABHADRA REGION, DISTRICT KURNOOL: P.C. Venkatasubbaiah, of the Department of History, Archaeology and Culture, Dravidian University, Kuppam, undertook exploration in the Kodumur and Kurnool taluks of District Kurnool and located several protohistoric and early historic sites in the lower Tungabhadra region.

Village/Sites	*Nature of Remains*
Ayyavari Gokulapadu (15^0 47' 05"; 77^0 56' 05")	Megalithic?
Bastipadu (15^0 47'20"; 77° 58' 20")	Neolithic, Megalithic, early historic
Budidapadu (l5° 44' 10"; 77^o 54' 20")	Neolithic/ early historic

Doddipadu(l 5° 44' 40"; 77°")	Neolithic
Dupadu (15° 43'; 78° 05')	Neolithic? early historic
Gorantla(15° 38' 15"; 77° 49' 30")	
Gudipadu-South(l5° 45'; 77°51')	Early historic
Gudipadu-East (15° 46'; 77^0 52')	Neolithic
Gudur-West(15° 46' 30"; 77° 48' 15")	Neolithic
Gudur-Northeast (l5° 46' 30"; 77° 48' 15")	Neolithic
Kurnool (l5°50'; 78° 02')	Megalithic
Kuruva Nagalapuram(15° 45' 35" ; 77° 55' 10")	Neolithic
Laddagiri (15° 37' 10"; 77° 53' 40")	Neolithic
Mudamalagurti (l5° 39' 30"; 77° 47' 15")	Early historic
Nayakallu (15° 39' 55"; 77° 56')	Early historic, medieval
Nidzuru (15°52'; 77° 59')	Neolithic
Kurnool (15^0 50'; 78°02')	Megalithic
Neravada (15° 47' 30"; 77° 58' 05")	Neolithic
Pandipadu (15° 45' 05"; 78° 00')	Neolithic, early historic
Penchikalapadu (15° 45' 05"; 77° 53' 45")	Neolithic
Ponnekallu (15° 47' 10"; 77° 46' 45")	Neolithic
Remaduru (15° 40'; 77° 54' 50")	Neolithic
Remata-South (15° 49' 30"; 77° 51' 15")	Neolithic
Remata-Northeast (l5° 50' 15"; 77° 51' 45")	Neolithic
Ulchala (15° 50'; 77° 55')	Early historic

The protohistoric sites, especially the habitations located on the major river banks have been subjected to destruction. They have been completely erased or dug out for soil procurement for domestic as well as agricultural purposes and sometimes brought under cultivation. Hence, at several places, the Neolithic habitation deposits are sparsely represented. At such places, sites are located on the basis of enquiry, thorough investigation and material evidence. Random sampling and surface collection

comprise Neolithic pottery of red ware, grey ware, buff ware, black ware, polished stone axes, animal bones, stone objects like hammer stones, querns, Megalithic black-and-red ware, black ware and red ware; early historic period red ware, brown ware, black-and-red ware, black ware, along with bricks (50cm x 25cm x 12cm), shell bangle pieces, stone objects and artefacts etc. Habitations with thick deposits are well-preserved, especially the early historic mounds, as they form part of the present village settlements, when compared to Megalithic and Neolithic habitations. At Nayakallu, a medieval temple (*garbhagriha*) dedicated to Siva, containing an inscription on a squarish slab, in Telugu characters, probably belonging to a period between the twelfth-thirteenth centuries CE was found. At Edururu village, on the right bank of River Tungabhadra along with ancient habitation deposits, a sculpture of Veerabhadra Siva probably belonging to the Vijayanagara period was found.

ARUNACHAL PRADESH

4. SCIENTIFIC CLEARANCE IN THEMBANG DZONG, DISTRICT WEST KAMENG: The State Archaeology Department, Government of Arunachal Pradesh, took up conservation and renovation work at Thembang Dzong i.e., the fort (*Dzong*) at the village of Thembang, situated 55km north-east of the district headquarter Bomdila, District West Kameng. It is situated at an altitude of 2172m above sea level and lies between 27° 20.4’ 52" and, 92^0 23.11' 2". The total area of the Dzong is 13,104sq m.

Before the settlement of the present village, the Thembang Dzong is believed to have been full of dense vegetation of bamboo and other plants and trees. According to the prevailing traditional account, the Dzong was built in the eighteenth century CE by the Khochilu, the Shardokpa, the Attajepu and the Dirkhipa of the Monpa clan, following traditional Monpa technique. The Dzong has two gates-the western gate, which was the main entrance gate and the eastern gate which was most probably the exit gate. The western gate measures 6m x 5m x 5·70m while the eastern gate measures 6·68m in length and 4m in height. Both the gates were used for the movement of people, but only the western gate was used for the movement of horses and other domestic cattle. This is because the entrance of the eastern gate was very steep. Earlier, people of the Khonia, the Zirgaan, the Khuhitam and the Rahun areas undertook renovation of the Dzong whenever required. In return, the people of Thembang gave cows, yaks and goats, etc.

First, the area was cleaned of debris and original materials like corner stone and mud-mortar were collected. It revealed evidence of traditional Monpa technique of construction and the use of local materials. Thereafter, conservation and renovation work was started from the plinth level upwards, using materials available nearby. A trial-excavation was conducted with the help of local people near the entrance of the eastern gate of the Dzong. The excavation was to be carried out in Trenches YF4 and TF5 but so far only quadrant II of Trench YF4 and quadrant III of Trench YF5 have been excavated. The depth was 1m BSL.

During the excavation, potsherds and grinding stone (*godum* in the local language) were unearthed at a depth of 87cm. Some prehistoric tools were also discovered from agricultural field of Cherong and Gontung villages of Dirang circle.

ASSAM

5. EXCAVATION AT AMBARI, DISTRICT KAMRUP: The Guwahati Circle of the Survey in collaboration with the Directorate of Archaeology, Assam, under the directorship of S.K. Manjul and H.N. Dutta, assisted by Arvin Manjul, Ranjana Sarma, Sanjay Panda, Salam Shyam Singh, Tapash Dutta, Jitumani Das, Rekha Das, Nipu Ranjan Dutta and Parsuram Lai Karan, conducted excavations at the archaeological site of Ambari (26° 11' 8"; 91° 45' 21"), situated in the heart of Guwahati city near Dighali Pukhri in the District. The site had been accidentally discovered in course of digging the foundation for the building of the Reserve Bank of India in 1969. From 1970 to 2003, the site was excavated by different excavators who divided the occupation of Ambari into two distinct cultural periods from seventh to twelth century CE and thirteenth to seventeenth century CE respectively. The site was re-selected for archaeological spade-work with a view to re-examine the cultural sequence of the site.

Keeping this objective in mind, the site was divided into squares of 6m x 6m and eleven trenches viz., AMB- OA, IA, 1A', IB', IIC', IIIB', IV-B', IIIC' and VA', VI-B & VI-B' were systematically excavated. Out of these, OA, IA', IB', IIC' were newly excavated trenches while the rest had been partly excavated earlier.

During the course of excavation, eight layers were encountered (pls. 1-2). Layer (1) is semi-compact, greyish mixed with light brown in colour. It contains brickbats, potsherds and some iron objects**.** Layer (2) is compact and brown in colour. It contains large number of brickbats in the upper part, charcoal patches and potsherds**.** Layer (3) is semi-compact in nature and reddish-brown in colour mixed with blackish and ashy patches. It contains mostly brickbats and potsherds. Layer (4) is semi-compact and ashy black in colour. It contains lots of brickbats and potsherds. Layer (5) is semi-compact, slightly sticky and reddish in colour. This layer shows dominant presence of brickbats of larger size compared to the upper layers and less number of potsherds. Layer (6) is a light brown mixed with ashy grey layer of semi-compact to loose in nature. It consists of small brickbats all around and potsherds having burnt mark. Layer (7) is dark ashy-grey layer of loose nature consisting of potsherds. Layer (8) is a loose, slightly sandy, light brown mixed with ashy-grey layer. It contains brickbats and few potsherds.

The natural soil was touched after the 5th layer in Trench AMB-OA and after two layers below the already exposed brick structure in Trench AMB-VA. This season's excavation is important in view of the fact that no cultural findings of the Sunga-Kushana period (second-first century BCE to third century CE) were ever excavated from the site before. The most important discovery of this season's excavation is a

Plate 1-2



1



2

Excavated trench showing different layers in the section and pottery on the floor, Ambari.

huge brick staircase, probably of a tank (pl. 3) which was encountered in Trenches AMB- IIIB', IIIC' & IVB'. Eight brick steps of the staircase, in north-south orientation, have so far been unearthed. However, the exact dimensions of the steps as well as the tank could not be determined because of the limited area and superimposed brick structures (pls. 4-5) of later periods. The dripping nature of the layers towards south, which is evident from the section facing west, suggests that the steps may continue towards the eastern side. The bricks of the seventh and eighth steps were found extending to the east, which supports the possibility of extension of the tank towards the eastern side. The eighth step is partially exposed due to high percolation of sub-soil water and a superimposed structure at the top. The exposed brick steps measure lm in breadth and 12m in height. Most bricks of the steps, belonging to the early period are hand-made and there is little variation in shape and size. The brick sizes found in construction of the steps are 47cm x 33cm x 69cm, 45cm x 31·5cm x 69cm and 40cm x 24cm x 69 cm. These brick-sizes are almost or nearly similar to the brick-sizes at other sites like Bangarh in West Bengal, Kausambi and Hulas in Uttar Pradesh and Sanghol in Punjab, all belonging to the Sunga-Kushana phase and are also not well-fired, as a result of which cracks can be seen in almost all of them. Other brick-sizes encountered are 39-40cm x 24-27cm x 5-7cm; 27-29cm x 24cm x 5·5-6·5cm; 26cm x 26cm x 6cm; 21cm x 21cm x 4cm and 19cm x 15cm x 5cm.

Besides, in Trench AMB-VA two floors and two hearths were encountered. Floor-I was noticed about 40cm below the last brick course of the earlier exposed structure, above which five unfinished stone blocks were found scattered in the east, south, south-west and north-west parts. Floor-II was noticed about 40cm below the first floor. In this floor, two hearths were found in the eastern and western sides (pl. 6). The eastern hearth measures 111cm in length and the exposed width is 45cm. It contains charcoal, sand, brickbats and pottery consisting of mainly lamps of different sizes and shapes and offering bowls, etc. The hearth in the western side measures 113cm in length and the exposed width is 97cm. It also contains charcoal, brickbats, pottery and very few stone flakes. Two postholes are also found near the exposed eastern hearth. The natural soil was encountered below this.

In Trench AMB-LA', a finely-laid brick pathway with brick-on-edge bonding in north- south orientation has been partially exposed (pl. 7). The exposed length of the pathway is 5m and the maximum width is 90cm. In the same trench, a small fire altar of a late period, measuring 50cm x 45cm was also exposed.

In the absence of datable objects like coins, inscriptions, etc. and pottery sequence, particularly from Northeast India or Assam, the periodization at Ambari, at this point, can only be suggested on the basis of structural and sculptural evidence, encountered from different strata during the course of excavation and their correlation with other excavated sites of India. The chronology of the site is as follows:

Plate 3



Excavated water tank? Ambari.

Plate 4-5



4



5

Excavated brick structures, Ambari.

Plate 6



Excavated trench showing two hearths, Ambari.

Plate 7



Partially exposed brick-on-edge pathway, Ambari.

Pd I - Sunga-Kushana (*c.* 2nd century BCE to 3rd century CE)
Pd II - Phase-I – (*c.* 7th century to 10th century CE)
Phase-II Early medieval (*c.* 11th century to 14th century CE)
Pd III – Medieval (*c.* 15th century to 17th century CE)
Pd IV – Modern (*c.* 18th century to 19th century CE)

The massive brick steps running in north-south orientation, found in Trenches AMB-IIIB', IIIC' & IVB' can be dated to a period between second-first century BCE to third century CE, contemporaneous to the Sunga-Kushana period. A terracotta figurine with typical Sunga-Kushana features (pl. 8), found from the excavation confirms the Sunga-Kushana date of the brick steps. The overlapping/superimposed foundation stones and brick structures over the steps, evident in the same trenches, can be assigned to three phases (i) 7th century CE to 10th century CE (ii) 11th to 14th century CE and (iii) 15th to 17th century CE.

The floors and the hearths associated with the stone activities, which are evident in Trenches AMB-VA' and VIB' can be divided in to two periods: (i) 7th - 12th century CE (ii) 13th - 14th century CE. The evidence of brick walls and pathways can be assigned to a period between fifteenth century CE and seventeenth century CE. The latest structural evidence, noticed in the form of remains of brick fire alter, which are found in Trench AMB-1B', can be assigned to the eighteenth-nineteenth century CE.

The ceramic industry of the site is dominated by kaolin ware, red ware, buff ware and few grey wares, which are available in medium and coarse fabrics and occasionally applied with slip (pls. 9-10). The pottery is wheel-turned, though a significant percentage of hand-made pottery has also been found. Some of the pottery is made by wheel and beater. The clay is well-levitated and contains small particles. The texture of the pottery varies from fine to coarse and the fabric varies from medium to thick. The entire assemblage is well-fired except few but they are devoid of any metallic sound. The shapes include bowls, vase, jars, carinated *handi*, dish, *lota*, lamp, lamp-on-stand, inkpot and few smoking pipes. A large number of decorative potsherds are also found from the excavation. Various patterns like loops, diamonds, leaves, rosettes etc (pls. 11-12) are stamped or impressed upon them. Most of these decorative designs appear on the pottery from the Kushan levels. Other types of incised decorations include ribbed, basket, quadruple, crosses and criss-cross designs, done with the help of beater. Besides, Arretine ware and Rouletted ware (first-second century CE), Chinese Celadon ware (tenth-twelth century CE) and green glazed ware (sixteenth-seventeenth century CE) have also been found.

Among the notable antiquities of this season's excavation, mention may be made of one miniature terracotta Siva-*linga* (pl. 13), terracotta sealing impressed on a burnt-clay lump (pl. 14), and iron objects including chisels, terracotta beads and a coin of the British period.

6. EXPLORATION IN DISTRICT MORIGAON: Under the village-to-village survey scheme, Sanjay Kumar Manjul, assisted by Arvin

Plate 8



Terracotta plaque with Sunga- Kushana features, Ambari.

Plate 9-10



9



10

Wheel turned pottery applied with occasional slip, Ambari.

Plate 11-12



11



12

Stamped/impressed pottery with rosettes, Ambari.

Plate 13



Miniature terracotta Siva-*linga, Ambari.*

Manjul, Sanjay Panda and T.K. Srivastava of the Guwahati Circle of the Survey, explored eight villages and reported the following sites of archaeological importance:

Village/Site	*Location*	*Nature of Remains*
Chandrapur	26°14' 21·4" ; 91°57' 22·5"	Architectural fragments of temple of Ahom period *circa* seventeenth - eighteenth century CE
Xilghar	26°14' 13·3" ; 91°59' 41·1"	Rock-cut Ganesa image *circa* eleventh-thirteenth century CE (pl. 15)
Badhaghat	26°15' 15.3" ;	Stone sculpture of Uma- Mahesvara, shifted from its
	92°00' 32·8"	original place; rock-cut four-armed Ganesa image holding *parasu*, rosary, *ankush* and *modak* (pl. 16); seven swords and a wooden post, probably a sacrificial spot; and a terracotta elephant
Kola Pukhri	26°15' 40" ; 92°00' 39"	An ancient tank constructed by the Mayong king's royal officer, Kola Singh. Red ware and dull red ware pottery found nearby.
Burha Mayong	26° 15' 42·2" ; 92°00' 32"	Rock-cut four-armed Ganesa image holding *parasu*, rosary, *ankush* and a bowl of *modak* (pl. 17)
Burha Mayong	26°15' 42·2" ; 92°00' 32·2"	Rock-cut *yonipitha*
Burha Mayong	26°15' 28·4" ; 92°00' 36·3"	Rock-cut four-armed Ganesa image holding *parasu*, rosary, *ankush* and bowl of *modak* (pl. 18)
Mayong village (Personal collection)	26°15' 34·7" ; 92°02' 16·3"	Neolithic tools, terracotta plaques, potsherds of different periods, dabber, metal and wooden objects (pls. 19-21)
Hatimuria	26°16' 29·5" ; 92°02' 28·1"	Ganesa Temple and rock-cut four-armed Ganesa image. Red ware and dull red ware of late medieval period
Kasosila	26°16' 39·4" ; 92°02' 43·3"	Two stone sculptures of Uma-Mahesvara, remains of stone pillars and decorative brickbats.

BIHAR

7. EXPLORATION IN DISTRICT MADHUBANI: In the course of exploration under the guidance of Vivek Kumar Singh and the leadership of Uma Shankar Pandit, the team comprising Atul Kumar Verma, Satyadeo Roy, Sanjeev Ranjan and Chandra Mohan Lal of the Directorate of Archaeology, Government of Bihar discovered the following antiquarian remains:

Site/Village	*Block*	*Distance*	*Nature of Remains*
Bhith Bhagwanpur	Madhepur	8km from block HQ	Surya, Siva-Parvati in black stone (basalt?) and one door-jamb depicting life cycle of a man in sandstone
Rahua Sangram	Madhepur	On Madhepur Bheja Road	A temple constructed over an ancient mound; remains of medieval temple with bricks; one small sandstone Ganesa sculpture
Sahni	Lakhnaur	5km from block HQ	Medieval Siva Temple
Pandaul	Pandaul	1km south from block HQ	Medieval Ram-Janaki Temple; marble sculptures of Surya, Durga, Ganesa and Siva
Pachahi	Lakhnaur	5km east of block HQ	Early medieval Chamunda Temple constructed over ancient mound; red ware and terracotta beads of the early medieval period
Dwalakh	Madhepur	14km away from block HQ	Medieval temple, named Hareshwar Nath Mandir, situated in an island of the River Koshi. Painting on inner side of the dome; black stone Siva-*linga* and Nandi Medieval Lakshmi-Narayana Temple containing black stone (basalt?) sculpture of Vishnu as presiding deity
Mansarpur Dih	Madhepur	10km from block HQ	Medieval mound
Bheja	Madhepur	9km from block HQ	Renovated medieval Siva Temple
Kaitheniya	Lakhnaur	South of Jhanjharpur railway station	Medieval temple
Harina	Andhratharhi	5km from block HQ	Modern temple containing a medieval, four-armed Kali sculpture
Kandarpi Ghat	Andhratharhi	6km from block HQ	Medieval mound yielding remains of brick structure eroded by the River Kamla

Gandharaien	Andhratharhi	3km away from sub-divisional HQ	Medieval Siva Temple
Andhratharhi	Andhratharhi		Medieval Temple constructed over an old mound yielding early medieval door-jamb; black stone (basalt?) Surya and Vishnu sculptures
Rajegram	Pandaul	6km from block HQ	Medieval Siva Temple
Bhaur	Pandaul	10km from block HQ	Medieval temple established in 1556 Saka Samvat (i.e., CE 1634)
Dighiya Pokhar	Pandaul	10km north-west of block HQ	Early medieval mound; red ware potsherds
Bhagwatipur	Pandaul	13km from District HQ	Medieval black stone Surya and Agni sculptures, Siva Temple, situated 1km away from Bhagwatipur and a mound, early medieval brick structures (at Kutiptir locality of the village)
Pastan	Andhratharhi	5km from block HQ	Mound formed over remains of stupa (?), revealing brick structures
Rajnagar	Rajnagar	13km north-east of Madhubani District HQ	Renovated medieval Kali Temple; several nineteenth century temples constructed within premises of the Raj Palace built by the Darbhanga Raj
Koilakh	Rajnagar	13km east of District HQ	Late medieval temples of Bhagawati, Mahadeva, Lakshmi-Narayana
Navadah	Pandaul	5km of block HQ	Late medieval temple built on an old temple site

8. EXCAVATION AT GHORAKATORA, DISTRICT NALANDA: In continuation of the previous year's work and to impart field training to the students of the Institute of Archaeology, excavation was carried out at the southeastern part of the mound Ghorakatora (25°01'37"; 85°31'31") by Excavation Branch-III, Patna, of the Survey under the direction of N.G. Nikoshey, assisted by Sujeet Nayan, J.K. Tiwari, Ashish Kumar, Neetesh Saxena, S.P. Gupta, O. P. Pandey, Dhananjay Kumar and Raman

Kumar. The main objectives of this year's excavation were to trace the extension of earlier exposed structures and to know the complete habitational pattern, especially of the Pala period.

This year, the excavation work has been resumed in twenty-one trenches. On the basis of ceramic industries, antiquities and other elements of material culture recovered from the excavation, the following chronology is suggested:

1. Period I: Chalcolithic culture (*c.* 1500 to 800 BCE)
2. Period II: NBPW period (*c.* 800 to 200 BCE)
3. Period III: Sunga-Kushana period (*c.* 200 to 300 CE)
4. Period IV: Gupta and post-Gupta period (*c.* 300 to 800 CE)
5. Period V: Pala period (*c.* 800 to 1200 CE)

No structural remains of Period I have been found at the site during the excavation. Only some traces of mud floor with blackish patches have been noticed in the square A1" at GKR-2, at the eastern most part of the mound at a distance of 2·50m. The people of this period lived in huts made of mud and reed.

Period II is represented by the ring well, found in Trenches N11, Qdt.IV at a depth of 6·80cm below the surface level. It has two numbers of rings with a height of 0·31cm. Its diameter is 0·75cm and the height of each ring is 0·14cm. It is sealed by layer 7 and continues in layer 8 i.e., natural soil. Numbers of potsherds of red ware have been found within the ring well. Few *"labani"*-shaped vases (elongated vases locally known as *labani*) of red ware have also been recovered from the same place.

A ring-well of Period III has also been traced in the same trench, Trench N11, Qdt.IV at a depth of 3·90cm below the surface level. It has a diameter of 70cm, which is less than that of the other ring-well found in the same trench, which is of the NBP period. It has twenty-four numbers of rings with a height of 2·95cm. Its diameter is about 60cm and the height of each ring is 12cm. It is sealed by layer 4 and continues in the layer 8 i.e., natural soil.

Structural remains of Period IV have been exposed in Trenches J11, Qdt.I and IV at a depth of 1·90m below the surface level. These are two massive walls intersecting each other at right angles, the first measuring 2·80m x 1·13m x 0·84m, running from west to east and the second measuring 4·45m x 1·13m x 1·11m, running from the south-west corner to north. This wall was constructed in the Gupta period and was also used in the post-Gupta period. Less quantity of mud and sand has been used as mortar in the lower seventeen courses of the brick structure in phase I and mud has been used as a binding material in rest of the upper structure.

Structural remains of Period V have been found at the uppermost surface of the mound and divided into three sub-phases. Structural activities of phase I have been traced in Trenches J16, Qdt.I and IV and H14, Qdt.III and IV.

Activities of phase I have been identified with traces of brick walls, exposed in Trenches J16, Qdt.I and IV. A burnt-brick wall (7·80m x 0·60m x 0·42m) starting

Plate 14-15



Terracotta lump depicting sealing, Ambari.



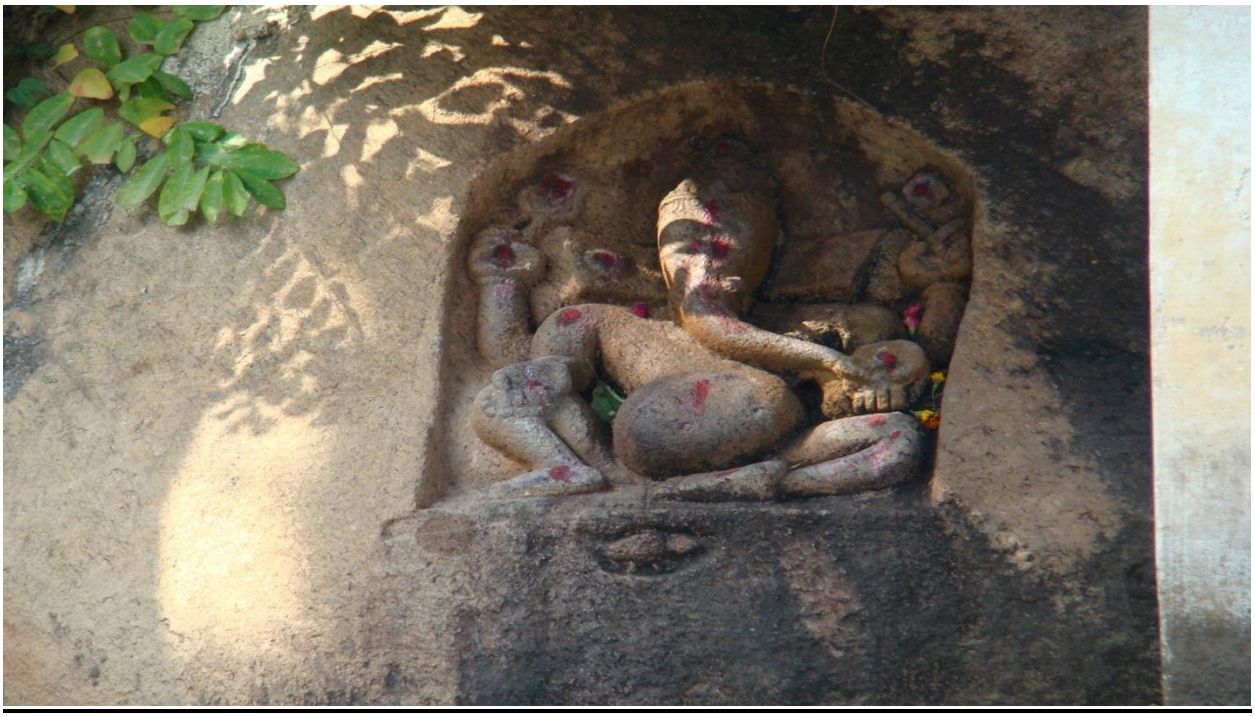
Rock-cut Ganesa, Morigaon.

Plate 16



Rock-cut four-armed Ganesa, Morigaon.

Plate 17-18



Rock-cut four-armed Ganesa, Morigaon.



Rock-cut four-armed Ganesa, Morigaon.

Plate 19-21



Neolithic tools, Morigaon.



Terracotta plaques, Morigaon.



Wooden objects, Morigaon.

at a depth 1·00m below the surface level, constituting of five courses of bricks, running north to south has been found in square J16, Qdt.I and IV. It is sealed by layer 3 and is contemporary to layer 2. The same wall has also been noticed in Trench J15 just below the wall of phase III.

Another burnt-brick wall (4·5m x 0·72m x 0·45m) at a depth of 0·40m from the surface level has been exposed in Trenches H14, Qtd.X III and IV. It may be the outer wall at the residential complex of phase I. It has six courses of bricks, running from east to west. Another adjoining wall, intersecting the outer wall at right angle, has also been traced and exposed. It measures 2·0m x 0·72m x 0·71m, constituting of ten courses of bricks, going north to south. These walls also continue in the second phase of the same period. An alignment of rubble stone has been traced at a depth of 0·50m from the surface level in Trench J14.

In the third phase of Period V, two residential complexes with a 4·5m wide passage in between, exposed during the excavation, deserve special mention.

Remains of three parallel walls running east to west have been exposed in Trenches J13, J14, K14. Most of the walls have been robbed by the locals.

Seven aligned storage-jars in between two western walls have also been exposed in Trenches J14 and K14. They may have been used for storage of grains. Some vases have also been noticed in Trench J14.

Remains of successive rammed floors made of lime-*surkhi* jelly have been noticed. Few other brick activities have also been exposed in the northern portion of the complex and the same structures continued in the successive phase.

At the western residential complex, structural remains forming square-shaped rooms have been traced in Trenches J16 and K16. The frequency of potsherds and antiquities was more than that found in the other complex.

A burnt-brick wall (4·00m x 0·45m x 0·44m) and an alignment of bricks with a length of 4·75m, which may have been used for partition of room, have been exposed in Trench J15. Some structural activities have been exposed in Trench K15.

Some other brick activities have also been traced in Trenches C16, Qdt.I, E16, Qdt.I, G16, Qdt.I and II, H14, Qdt.III and IV and H16. Remains of a wall in the form of ghost wall have also been noticed in Trenches H16, J16, K16, K15, J14, K14 and K13.

Evidence of successive floors has also been noticed during the excavations in Trenches J16 and K16. The same structures continued to be in use in the successive phase.

Evidence of a covered drainage system of phase III of Period V has been found and exposed in Trench J15 and some part of the drain has also been traced in the square K15 x IV. It measures 5·55m x 1·05m x 0·28m running west to east. Another structure contemporary to the drain, in the form of brick wall, has been exposed in the same trench going south to north. It measures 3·25m x 0·42m x 0·28m and contains five courses of bricks.

Evidence of successive floors made of lime-*surkhi* jelly belonging to the same period has

been exposed in Trenches J14, K14, K13, K16 and H16.

Some structural remains exposed in Trench J9 and an alignment of bricks and stone indicate that possibly this may be the workshop of an artisan.

Some other structural activities of this phase have been traced and exposed in Trenches H15 and H16 in the form of brick walls.

Only few traces of structures of this phase have been exposed because most of the walls were found robbed and floor activities had washed out due to the effect of the weather. Mud mortar has been used as a binding material in all structures. The bricks measure 35 cm x 25 cm x 5cm; 36 cm x 26 cm x 5 cm; 30 cm x 25 cm x 5 cm; 29 cm x 24 cm x 5 cm; 30 cm x 25 cm x 7 cm; 29 cm x 24 cm x 6cm and 12 cm x 12 cm x 6 cm. Some broken moulded bricks with floral design have also been recovered from the upper layers in Trenches K14, Qdt.IV and J14, Qdt.II.

Excavations at Ghorakatora have produced a good repertoire of pottery from all the five successive periods found at the site. The ceramic industry of Period I (Chalcolithic period) is classified into black-and-red ware, black ware, black-slipped ware and red ware. Typical black-and-red ware from the earliest level of this period contains a rich amount of rice husk and can be compared with the pottery found from the excavations at Chirand and Sonpur. The fabric of this ware ranges from coarse to fine variety. The types include dish-on-stand, vases, bowls, dish, basin, lipped basin, storage-jar, *handi* with carination on the shoulder, long-necked jar, suspended jars and perforated basins.

Period II, which is marked by the advent of NBPW, is rich with a wide range of ceramics like black-and-red ware, Northern Black Polished Ware, black ware, black-slipped ware, grey ware and red ware and there is continuation of some of the early shapes i.e., vases, bowls, dish, lid-cum-bowls, etc. Deep bowl, basin and dish are some of the most common types in black-and-red ware which belongs to the pre-Northern Black Polished Ware phase. A fairly good number of painted potsherds have been found in red ware and grey ware. The design consists of loops and intersecting loops, vertical strokes in different angles and matted design. The paintings are mostly done in cream pigment on the outer surface of the pot. Dish and bowls are generally painted on the inner surface. The painted sherds of grey ware and red ware may be compared with those found from Sonpur, Kausambi and Vaishali.

The pottery of Period III and IV is not very different in shape. The ceramic industry of these periods is classified into red ware and grey ware. Red ware is found in slipped and dull varieties. The fabric ranges from course to fine. The types include vase, bowls, basin, *handi*, *tawa* with lug handle, storage-jar, spouted vessels, etc.

Red ware is the predominant industry of Period V. Most of the sherds are well-fired and almost devoid of any surface treatment. Very few of them are treated with red slip. The fabric ranges from course to medium. The types include vases with narrow mouth, vases with wide mouth, carinated *handis*, bowls, lamps, lids, basins and storage-jars. A few glazed ware sherds have also been recovered from the upper level.

The excavation has yielded a total number of six hundred and fifty-six antiquities including three hundred and ninety-seven terracotta objects, one hundred and sixty-eight stone objects, forty-six glass objects, twenty-one iron objects, fifteen copper and bronze objects, three shell objects, three bone objects, two objects of paste and a single specimen of steatite.

Terracotta objects include human and animal figurines, beads, pendants, bangles, stamps, stoppers, hopscotches, wheels, crucible, skin rubbers, spools, toy-plough and sealings. One sealing bears the inscription '*matrah'* in 11th century CE proto-Nagari characters.

Beads of semiprecious stones, bowls, querns, pestles, celts, sling balls, bead-polisher, plaque, tool sharpener, ring and small sculptures of Vishnu, Parvati, Ganesa, Lakshmi, Mahishamardini, Durga, Jambhala and Varahi are the other stone objects. Fragments of knife, nails, rings, chisel, hook, fodder cutter, *fawarah* and plough-shares made of iron have also been found.

Among the copper objects, pendant, antimony rods, bowls, coil, coin, bangle, ring and lid are noteworthy. Bronze images of Avalokitesvara and Garuda have also been found during the excavation. Beads, bangles, rings, amulet and small pot made of glass have been recovered from the site. Steatite bead, paste beads, shell beads, bone arrowhead and decorated ring as well as fragment of shell bangle are among the other miscellaneous objects.

9. EXPLORATION IN DISTRICT NALANDA: Jalaj Kumar Tiwari and Neetesh Saxena of Excavation Branch-III, Patna of the Survey conducted explorations for antiquarian remains in the blocks Ven, Rajgir, Nursarai Parwalpur and Ekangarsharai of District Nalanda and discovered the following sites:

Site/Locality	*Natures of remains*
Khata (25° 4'10" ; 85° 24' 35")	Early historical mound, NBPW, sculpture of Pala period
Chandaura (25°3'58" ; 85° 23' 25")	Early historical mound, NBPW, sculpture of Pala period
Barhauna (25° 8' 25"; 85° 21' 15")	Early historical mound, NBPW, sculpture of Pala period
Miar (25° 3'30" ; 85° 22' 42")	Early historical mound, Late NBPW, sculpture of Pala period
Badi-ant (25° 11' 45"; 85° 24' 28")	Early historical mound, sculpture of Pala period
Ajaypur (Lat. 25° 13' 55" N; Long. 85° 25' 5" E)	Early historical mound, NBPW, sculpture of Pala period
Sakrorha (25° 10' 55" ; 85° 25' 31")	Early historical mound, sculpture of Pala period

CHHATTISGARH

10. SCIENTIFIC INVESTIGATION AT MAHADEV TEMPLE-COMPLEX, TUMAN, DISTRICT KORBA: The Raipur Circle of the Survey carried out scientific investigation at the centrally protected monument/site of Tuman (22° 34' 29"; 82° 25' 21"), known for its Mahadev temple, located in Katghora tehsil, District Korba, on the Katghora- Pendra Road, on the bank of the River Ahiran. The site is surrounded by steep hills on all its four sides. The objective of the investigation was to trace out the habitation site as well as the temple remains, based on epigraphic and literary references to the site. Epigraphic evidence indicates that around CE 900, Tuman was built as the first capital of the Kalachuris of South Kosala kingdom. Although the Somavamsis wrested political power from the Kalachuris around CE 950, the latter regained power over Tuman by defeating the Somavamsi ruler around 1000 CE. The Ratanpur inscription of Jajalladev I, dated to Kalachuri Samvat 866, states that in honour of the first capital, Kalachuri king Ratandev I had constructed many temples at Tuman.

As many as seven mounds were located within the Mahadev Temple-complex, of which, Mound 1 to Mound 6 were investigated. Remnants of as many as twenty temples of different dimensions with different phases of structural activities were identified. The temples are constructed out of very inferior quality sandstone using dry stone masonry. Iron dowels had been used for locking the architectural components. The work has revealed as many as ninety-three sculptures of Vaishnava, Saiva and Sakta pantheon, apart from a large number of architectural fragments. Among the sculptures of divinities, those of Brahma, Vishnu, Siva, Durga, Ganesa and Hanuman are noteworthy. Secular figures include turban-headed bearded male figure, man sitting with legs crossed, amorous couples, *vyala* figures, etc. Other important finds include *amalaka*, iron dowels and nails, etc.

GOA

11. EXCAVATION AT ST. AUGUSTINE CHURCH-COMPLEX, DISTRICT OLD GOA: In continuation of the previous year's work, the scientific clearance of the complex was continued by N. Taher and his team comprising Abhijit Ambekar, Vishnu and Manuel Perra, with an aim to scientifically clear the debris from the southern part of the convent. Work commenced from a hall located at the southern end of the eastern corridor of the second cloister. The hall is parallel to a passage connecting the first and the second cloister, which was exposed in 2005-06. The hall was filled with debris up to 2 to 3·2m. One-third of the ceiling is the only intact evidence available at its south eastern corner. After removing the debris, i.e., loose earth and fallen stones, a hall of 10·1m x 7·5m was exposed. In this hall, two passages were identified. The passage to the northern side opens to the corridor of the second cloister and the other, connected to window for exchanging articles between one room and another. Series of sockets found on the wall in alignment suggest that they could have supported paintings. A similar arrangement was also identified on adjacent walls of the room.

On the floor, remains of a collapsed ceiling was exposed, in alignment, suggesting that the collapse took place at one go. Laterite stone flooring made over earlier lime flooring suggests that the height of the flooring was raised in the later phase.

In the centre of the hall, a stone alignment was observed on the floor which runs north-south. This must have been a drain, probably originating from the second cloister, traversing through the hall and leading to the exterior.

The other area identified for scientific clearance was the adjacent hall in north-south orientation, parallel to the corridor ofthe second cloister. After removing 2m debris of laterite blocks and loose earth from here, another large area (hall) was identified here, another large area (hall) was identified with large concentration of debris in the western half. The northern wall of this hall had collapsed on the southern wing of the corridor of the second cloister, which had been excavated and consolidated earlier. The earlier *in situ* conservation of collapsed structures had to be partly removed to expose this wall. Few porcelain sherds, one cannon ball made of iron and few nails were collected from the heap (dump). There are two windows on either side of the hall. There is one door in the centre of the hall that opens into the corridor and the other door opens into the backyard of the convent. These two openings are not in symmetry. The stable debris fallen within the hall was consolidated at different levels and in different layers.

Scientific clearance was further initiated in the south and west of the second hall. In the extreme south, structures were exposed. Some rooms with stone flooring were uncovered. A flight of steps leading to the upper storey had collapsed. At one corner, three arched doorways leading to the exterior of the complex were exposed and simultaneous preventive conservation was undertaken for the steps and the walls.

At the southwestern corner of the second cloister, a passage connecting the superior refectory was exposed. Adjacent to this was uncovered a tank for holy waterand a broken arch, which could have been an altar. The southwestern corner of the corridor of the second cloister and remains of its ceiling were also exposed.

At the extreme southern end of the convent, an underground passage, possibly used to drain rain water was exposed. Its outer opening is yet to be traced. A huge amount of porcelain sherds were collected from a large dump within the confines of an enclosed unidentified structure.

At the southwestern corner, a large structure was partly exposed which bore evidence of a staircase. It was identified as the remains of the over-bridge connecting the convent of St. Augustine with the college of Populo, on the other side of the street. This structure, which needs further clearance, was vividly sketched by Lopes Mendes in 1885. All the exposed structures were taken up for simultaneous conservation and *in situ* conservation, so as to retard deterioration.

GUJARAT

12. SCIENTIFIC CLEARANCE OF ANCIENT SITE, DISTRICT KACHCHH: The Excavation

Branch-V, Vadodara of the Survey, under the direction of Shivananda V, assisted by R. N. Kumaran, N. B. Soni, J. B. Makwana, Rajesh Shambharkar, M. N. Raval and H. R. Tadvi, carried out the work of clearance of debris near the southern and eastern reservoirs, to further expose the southern Citadel wall that was partly exposed in the earlier excavations.

First, the work of removing the debris in between the southern reservoir and the south of the citadel wall, including the rain-gulley area was undertaken and completed.

Second, the work of removing the debris accumulated in front of the eastern gate of the Citadel and the eastern reservoir was undertaken and completed. Third, the work of exposing the southern Citadel wall was taken up in the trench 48m x 4m and 48m x 14m. The citadel wall was exposed further by 20m. During the course, antiquities like shell, terracotta, steatite and semiprecious stone beads; stone objects; shell and terracotta bangle pieces; shell debitage; chert blades; blade-lets of chalcedony; some unidentified copper objects; a square steatite seal devoid of script and depicting a bull; and a soapstone (?) seal with two letters and devoid of figurine were recovered. Finally, both the southern and eastern reservoirs were de-silted and new sloping sections were provided in the place of damaged and eroded sections in order to minimize further damage to the structures.

13. EXCAVATION AT KANMER, DISTRICT KACHCHH: In continuation of last season's work, further excavation was undertaken at Kanmer (23°23'; 70°52'), situated close to the Little Rann of Kachchh in Rapar taluka of district Kachchh. The excavation was carried out under the general direction of J.S. Kharakwal and the responsibility was equally shared by Y.S. Rawat and Toshiki Osada. They were assisted by Hansmukh Seth, Rajesh Meena, Suresh Meena, Asif Hussain, K.P. Singh, Narayan Paliwal, Rohit Menaria, Soyeb Qureshi, Pankaj Goyal, Lal Chand Patel, Krishna Pal Singh, Sanjeev Kataria and Hitesh Bunkar. Shahida Ansari, Anil Pokharia, Takao Uno, Hirofumi Teramura, Toru Kishida, H. Chiba also participated in various scientific studies during the excavation.

Excavation work continued in the fourth season with the objectives: to understand the nature and history of the fortification wall; to understand the possible function of the site; to enquire if there is a lower town or any settlement outside the main mound; and to train young students of archaeology in field techniques.

Earlier the cultural sequence was reported as Pd I: Early Harappan, Pd II: Mature Harappan and Pd III: Late Harappan. These cultural periods correspond to KMR I, KMR II and KMR III respectively. This new terminology is preferred because the total Harappan deposit represents different stages of the culture. KMR IV represents the early historic deposit whereas KMR V the medieval one.

Considering the previous season's result it was decided to lay down more trenches in the south-central and northeastern parts of the mound to address the objectives mentioned above. In addition, to understand the constructional phases of the fort wall and the deposit accumulated along its exterior, a

small area of the eastern face of the fort wall was also exposed. The vertical excavation near the western arm of the fort allowed one to identify the pre-fortification deposit whereas the horizontal excavation in the central part and northeastern area added largely to out understanding about planning of the settlement and nature of the defence wall. The remains of the earliest inhabitants at Kanmer were found on the floors right on the bed-rock. This deposit yielded ceramic assemblage which appears to be dominated by localized pottery types such as bichrome, cream-slipped, red and chocolate-slipped, un-slipped types and coarse red ware. Harappan material in small quantity was also recovered from this level. It has been identified as cultural period KMR I. No structural remains have so far been exposed from this level, mainly because a small area could be exposed.

Presence of a strong fortification around a small site like Kanmer is one of the most impressive and significant discoveries at the site. Interestingly, the fortification of Kanmer is not oriented along the cardinal directions as has been noticed at most of the Harappan sites. It is rather oriented in north north west-south south east direction. Excavation of the wall face, in both these areas, revealed that the main wall is provided with a reveting wall all along its outer face. Two corners, the northeastern and the southeastern, are exposed internally whereas the northeastern and northwestern corners are exposed externally. In a cutting (Trenches Y 15, 16 and 17) near the northeastern corner, it was realized that the core of the wall is actually made of mud-bricks (mostly brown sandy clay) and it is veneered on either side by large semi-dressed stone blocks procured from the nearby hillocks. Some of the blocks placed in the lower part of the wall measured about 2m in length and 50cm in breadth and 40cm in thickness. The additions on the northern and eastern arms along with the later additions were exposed up to a length of about 35m and 36m respectively. As many as ten courses of the eastern outer arm and six courses of addition were exposed up to a length of 36m in order to understand whether the construction pattern matches with that of others. The exposed surviving height was measured 3·20m and its construction pattern was found identical to rest of the walls.

The average width of the northern and the eastern walls was measured about 18m at a depth of about 2·20m from the highest point on the mound. As the wall has a tapering face, it is likely that the width at the base would measure more than 20m. Compared to its northern and eastern width measures only 15m at a depth of 3·70m from the highest point. The length of the eastern, western, northern and southern arms was measured 116m, 109·50m, 107m and 113·50m respectively. The inner length of the northern, southern, eastern and western arm was measured 72·50m, 79·50m, 78·50m and 74·50m respectively.

Test Trench N3, located close to the northwestern corner of the fortification, was laid on the northern arm to confirm the history of addition to the outer arm. It was found that as many as fifteen courses of the outer arm have survived at several places with a total height of 4m. There was a gap

of about one meter between the outer arm and addition, which yielded filling material. Both the outer arm and addition were found resting on a 30cm thick, dark grayish soil deposit on the bed rock. Thus this test trench indicated that the addition may have been erected shortly after the construction of the fort.

To understand the history of the fort wall, a few trenches were selected close to the western arm in order to expose the entire inner face. These trenches were undertaken in the depression visible in the contour map to understand the total history of the wall. Two residential structures belonging to the historical phase were exposed just below 15cm from the surface (at a depth of 3·60m from the reference point). This historical deposit was underlined by a 25cm thick, dark grayish layer representing a break between the historic and the Harappan deposit. The historic people prepared an outlet or chute by cutting down layer 3 between the aforesaid rooms, roughly in east-west orientation and it passed through the then extant top of the western arm of the fort. It appears that the historical settlers used this location as an entrance to their settlement. They pushed off the massive stones from the then surviving top of the fort and rearranged them to form a staircase.

A Harappan structure made of semi-dressed stone was partially exposed in this area. It was erected on the dumping of ash leveled as layer 5. A rectangular steatite seal with perforated knob on the reverse and with engraved cross-like sign on the obverse was a significant discovery from these levels. This seal appears to be quite interesting as it has a coating of faience.

A huge dumping of ash was found deposited against the inner face of the western arm. Based on its colour, composition and nature of deposit, various episodes were identified. This direction of slope suggests that this ashy material was being thrown from the top of the fort wall. The thickness of this episode gradually decreases as one goes away from the face of the wall. Besides, the surface tends to become gentler. At the base of this layer was found a thin lense of burnt earth, which looks almost horizontal but actually has a gentler slope close to the face of the wall. Episode 5c, deposited against the fifteenth and sixteenth courses of the wall, is more or less horizontal and is composed of thin lenses of burnt earth and ash. The combined thickness of these three episodes was measured about 3m. Layers 12 and 13 were found deposited against the earliest courses of the wall. A few floor levels and patches of white clay (powdered shale) were identified in these early levels. The cultural material, particularly pottery, of layers 5, 6, 7 and 8 is comparable to that from layer 8 of the central area or KMR II B whereas layers 9, 10, 11, 12 and 13 yielded material that is grouped under KMR II A.

Underlying the fort wall, layers 14 and 15, resting on the virgin soil (i.e., layer 16) belong to the pre-fortification phase. This deposit yielded fragments of bichrome, coarse red ware pottery and a few sherds of unclipped red ware identical to the ones found from layer 12 of AA 28 and Z 28 in the central part, identified as KMR I.

In this area, the inner face of the wall was found surviving up to a height of 5·70m with twenty-nine stone courses. The entire

exposed inner face of the western arm appears to have tilted considerably towards the west. Except for the four lower courses, the remaining upper part looked repaired. It appears that some serious damage was caused to the fort wall perhaps soon after its construction. Was it an earthquake (?), which brought about this damage? The aforesaid additions to the exterior of wall on all three sides appear to be a protective measure taken up after the calamity.

In the northeastern corner were found several parallel additions or revetments, oriented north north east-south south west. Two of them were found curved on their western ends. One of them, located close to the inner corner of the fort was exposed up to a depth of 2·40m (fourteen courses) but could not reach its base because it was erected right in the core of the fort wall. These may represent local repairing of the fort wall. Some what similar parallel stone alignments were also noticed in the northwestern corner of the fort wall. Perhaps, these indicate sub-structural phases of the fort construction and may belong to KMR IIB.

After exposing these parallel walls, it seems that there was no inner bastion at the northeastern corner, at least after the end of the urban phase, KMR IIB. Could there be a watch tower kind of structure, squarish in plan, the corners of which were rounded? Whether these parallel walls were the result of successive veneer added to the northern arm of the fort at its eastern end or were simple constructions is yet to be ascertained. Some such indications were exposed in the northwestern corner too.

The fort wall was perhaps sealed on top with a thick layer of white clay as its evidence has survived in the northeastern and southeastern corners. In the southeastern corner, a 65cm thick deposit consisting of successive layers of a variety of clays (e.g., brown, grayish, yellowish and white and pinkish) was exposed in Trenches II 29, HH 29 and 30. The average thickness of each layer was found to be about 4cm. It is interesting to note that repetition of such layers and their being sealed every time by white or pink powdered shale suggests phases of regular repairing or maintenance of the fort wall. The eastern end of the northern arm of the fort appears to have survived with a maximum height of about 9·70m with thirty courses.

Excavation at the site revealed five major phases of Harappan structural activities. Of them, three major phases were identified in the central area and two others in the southeastern area. The latter ones were partially exposed in the previous season. Each of these major structural phases had sub-phases suggesting constant addition or alteration by various generations. None of them could be entirely exposed. Most of these structures were largely disturbed or destroyed by the activities of subsequent occupants of the site.

In the first cultural period i.e., KMR I, no structure could be discovered since the excavation was restricted to a very small area. However, as many as four successive floor levels were identified in Trenches AA 28, Z 28, and Z 30 in the central part. The earliest among them was prepared right on the bed-rock.

In layer 9, a rectangular structure (St. 30) with a platform was exposed in Trench Z 30. Two more rooms each to the west (St. 15) and east (30 e and c) of this structure were discovered. All these rooms are of different dimensions. Perhaps, there was an open space in the central part around which these rooms or houses were constructed. A few more walls (St. 29a and 29h), located at a distance of 2m to the west of St. 15, join structure 29g at right angle. Perhaps, it was a separate complex contemporary to St. 30. All these structures belong to Pd IIA built in the central part of the settlement. Several rooms of this complex were exposed partially. One of the walls (St. 29), oriented north north eastern-south south western, was exposed up to a length of 14m. It was found overlying the structures belonging to KMR IIA. One of the walls (29c) joining this wall (St. 29) was also exposed up to a length of 14m, oriented north north east-south south west. There was a gap of 50cm in this wall, which may have been an entrance to the structure. To the north of structure 29 were discovered several walls belonging to different rooms and forming sub-phases. In one of the rooms (St. 28 b and c), located to the north of structure 29, was found a platform in the northwestern corner.

In the southeastern area of the mound as many as four different structural complexes were discovered. Out of these, three belonged to the Harappan phase and two to the historical deposit. Among the Harappans ones, two rooms (St. 21 and St. 17) were found adjacent to each other with a common southern wall. The northern arms of these structures were missing. The second Harappan structural complex (marked as St. 16, a, b, c, d, e, f, g) perhaps, had four rooms with a common southern wall, which was parallel to the southern arm of the fort. Unfortunately, most of these structures were destroyed by the later activities at the site by Iron Age groups. The third Harappan structural phase was identified as St. 13. Only one wall of this structure was traceable near the southeastern corner of the fort. It joins the southern arm of the fort.

Besides Harappan, a few historical and two medieval structures were also found in the excavation. Two parallel walls (in the central part) and two rooms (in the southeastern area) of the historical phase were exposed.

A large variety of minor objects such as seal impressions, seals, beads of terracotta, paste, semiprecious stones, gold, shell, terracotta cakes, dice, gamesmen, amulets, bead polishers, drill bits (164), etched beads rough-outs and weights have been discovered. Besides these, a few beads of faience, blades and drill bits of Rohri chert have also been found. Beads outnumber all other finds as around eighteen thousand beads have been discovered. The most striking discovery of the site appears to be two identical terracotta seal impressions, which appear to be sort of identity cards or passports, perhaps used by Harappans for long-distance trade. On the obverse is depicted a unicorn, besides a few Harappan letters. The reverse shows a signature. Apart from these, a button-shaped steatite seal depicting a donkey, a broken unicorn seal and another one with a geometric design matching a cross are some of the significant discoveries made at the site.

Hundreds of lithic objects such as flakes, cores, lunates, notches, long parallel-sided blades have been discovered from Kanmer. The raw material of lunates, flakes and cores are mostly agate and local chert, perhaps brought from Mardhak Bet, an island located in the Little Rann, about 20km to the north-east of Kanmer. However, notches and ribbon blades are made of Rohri chert. Interestingly, no raw material or any core of Rohri chert was found at the site. What is interesting is that we have been able to locate as many as nine drill bits of Rohri from the site. It seems that besides Earnestite, only Rohri chert was used for preparing drill bits at Kanmer.

The ceramic assemblage is mainly represented by red ware, right from the beginning, which is treated with a variety of slip e.g., red, chocolate, buff, cream, black, bichrome and reserve. Except for black slip, finer (grey) variety of reserve slip and Ahar type black-and red ware, all other types were introduced at the site right from the beginning. Both fine and coarse varieties remained in use throughout the period of habitation. Of course, the coarse variety accounts for a small percentage of the assemblage in the early levels and it gradually increases in the subsequent phases with matte surface. The fine variety of red ware (in case of bowls, dishes and medium-sized jar/pots) is very often treated either with red slip or with chocolate slip or sometimes with both. In the lower levels (KMR I and KMR IIA), the slip is uniformly applied on the external surface whereas later on very often the outer surface appears to have been moistened with slip. Sometimes the slip is not applied to the entire outer surface. Rather, wide panels are prepared all around the body leaving the major area unslipped. Though pottery was fired at high temperature, it seems that uniform firing was not maintained in all the types. Towards the end, most of the pottery types appear ochreous. It has not been ascertained if this character is the result of poor firing technique.

The faunal analysis is being carried out by P.P. Joglekar and Pankaj Goyal from Deccan College, Pune. They have identified several animal taxa, which include mammals, birds, fish, reptiles and molluscan species. Among the domestic animals, cattle, buffalo, sheep, goat and pig have been identified. More than a dozen wild animals have been identified in the collection, including the *nilgai*, antelopes, deer, carnivores and rodents.

Palaeobotanical remains are being studied by Anil K. Pokharia (Birbal Sahni Institute of Palaeobotany, Lucknow). He has identified a large variety of cereals and pulses such as barley (*Hordeum vulgare*), bread-wheat (*Triticum aestivum*), dwarf-wheat (*Triticum sphaerococcum*), rice (*Oryza sativa*), field-pea (*Pisum arvense*), grass-pea (*Lathyrus sativus*), and green-gram (*Vigna radiata*), besides cotton (*Gossypium arboreum/herbaceum*), some weeds and wild taxa. Besides, he could retrieve a number of charred grains of jowar-millet (*Sorghum bicolor*), pearl-millet (*Pennisetum typhoides*), sesame (*Sesamum indicum*) and horse-gram (*Macrotyloma uniflorum*).

The excavation indicates that the earliest settlement (KMR I) was raised on a thin soil

cover overlying the bed-rock, which may also be stated as pre-fortification deposit. It was identified on the basis of the presence of Anarta types coarse red ware, bichrome and polychrome types, cream slip pottery, red ware (sometimes decorated with a panel of grooved decoration on the shoulder or body) together with some Harappan types. Except for coarse red and Harappan pottery, all other types gradually disappear in the subsequent cultural deposit. The urban phase deposit has been given the label Period KMR II, which is further sub-divided in two parts: Period KMR IIA and Period KMR IIB, on the basis of appearance of new ceramic types, nature of deposit and change in planning of the settlement at the site. It seems that during this period, a planned settlement was built at Kanmer, which was secured with a massive and strong fortification. An addition was made all along the outer arm of the fort wall during Period KMR II perhaps, to check some serious damage to the wall. It was identified as the second major structural phase of the fort wall. Towards the end of Period KMR II, the height of the fort was further raised but its width was reduced. It was identified as the third or last constructional phase of the fort wall. The layout plan documented during our archaeological diggings and the results of digital recording indicate that the shape of the fortified settlement was like a parallelogram. The total thickness of the wall was measured about 18m in the middle level of its height.

The remains of the post-urban phase, identified as KMR III, were found overlying the remains of KMR II. The pottery assemblage of KMR III generally appears ochreous. It is likely that the Late Harappans also used the existing rampart initially but did not continue to maintain it since they did not require it. Finally, they raised their houses right on top of the rampart. Thus there was no cultural discontinuity throughout the deposit of Harappan vintage.

After the decline of the Harappans, the site remained unoccupied for about sixteen hundred years. This long period of time was represented by a thick layer of dark grey sandy soil, often loose in composition and devoid of any structural remains. It was identified as layer 6 in the central part, layer 2 in the northern area and layer 3 in the western part. The historic structures, belonging to KMR IV, were raised on this break. The discovery of a large number of sherds of West Asian Torpedo jar and Roman amphorae indicate that Kanmer, directly or indirectly, was also included in the Indo-Roman trade network. The site seems to be again deserted for a few hundred years after the historic period. During this long spell of abandonment, there was again a deposition of fine silt mixed with clay at the site, which indicates that aeolian soil was getting deposited in the large depression surrounded by the ruins of the fort and subsequently getting reworked by rain.

Outside the rampart area, no other settlement like a lower town could be located. Of course, there is a very thin deposit of the Late Harappan period to the east of the main mound and the laser survey has indicated an outer defence wall-like feature to the east of the main mound. From the deposits of the Mature and Late Harappan phases, considerable quantity of

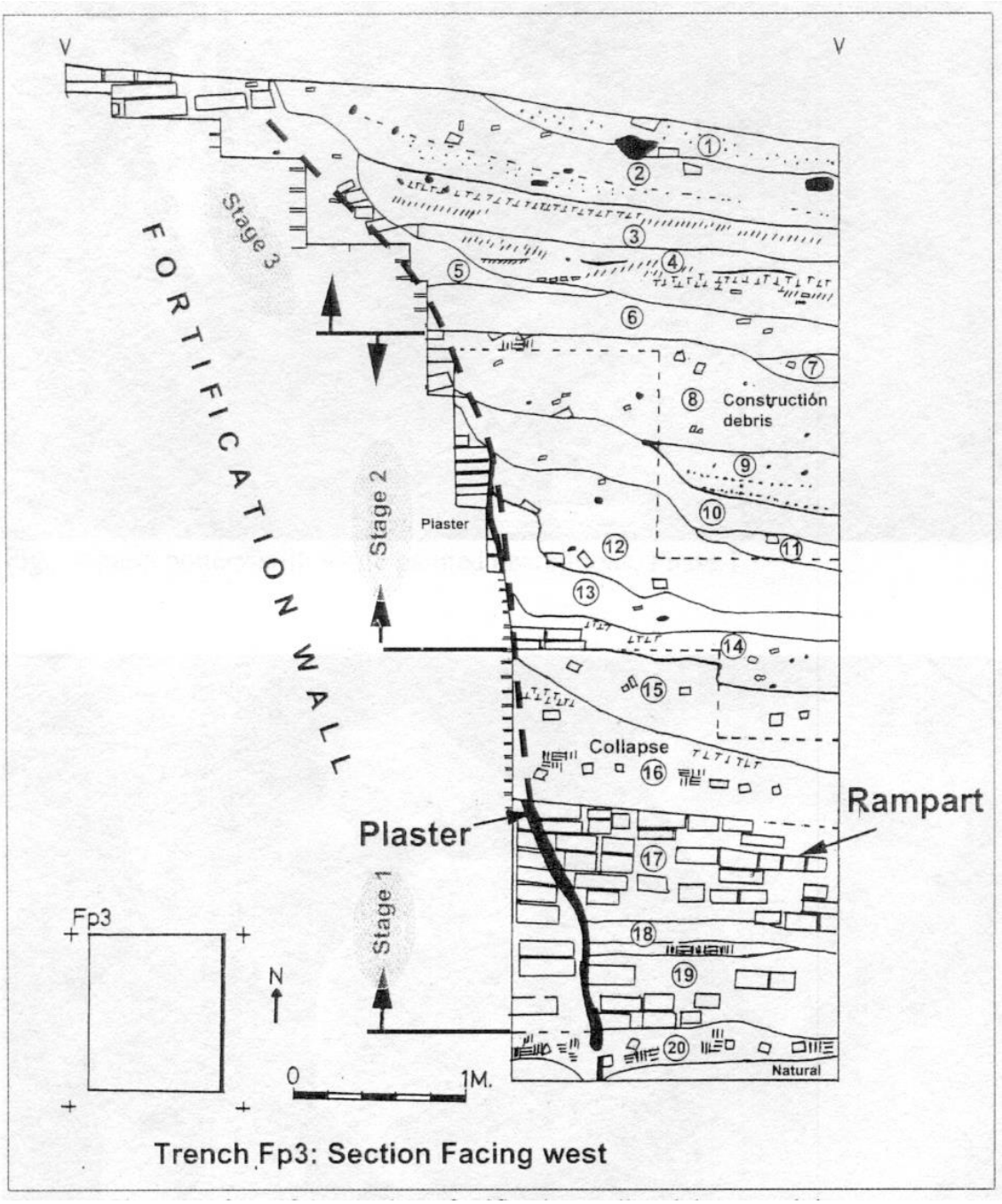
nodules of agate has been recovered. These were perhaps brought from Mardhak Bet. It is likely that this raw material was used for making a variety of beads, blades and weights. The faunal and floral remains clearly indicate that other than bead craft, agriculture and cattle breeding were among the important occupations at the site right from third millennium.

14. EXCAVATION AT SHIKARPUR, DISTRICT KACHCHH: In continuation of the previous year's work, the Department of Archaeology and Ancient History, M.S. University of Baroda conducted excavations at Shikarpur during the second field season with the main objective of unearthing the beginning of the fortification wall and its main configuration. It was also planned to expose the layout of Classical Harappan structures belonging to Phase I through selective soundings within the fortified area.

The layout of trenches for the new excavation in the southern side of the site was planned to extend last year's work further and to trace construction features of the southern fortification wall that was partially exposed in the last season. The excavations on both the inner and outer side of the fortification revealed a multi-coloured brick wall, about 6·30m high, running east-west in the south. Deep sounding just outside the wall in Trench Ep3 revealed that the construction of the wall had started from the very beginning of Harappan occupation at the site, as the basal part of the wall was found resting on natural sediments (fig. 1). The extant top of this tapering wall is about 9m thick, while at the base the thickness could easily be more than 12m. Although a cross-section of the wall was not cut, it was obvious from the habitation strata on both sides of the wall that it was built at least in three stages in order to increase the overall height. In the beginning, the lower part of the wall was covered with a thick whitish clay plaster on the exterior and probably on the interior too. It also had a small rampart-like support at the base which certainly was built later but in the first stage itself. The rampart was built of dark coloured mud-bricks that were popularly used in the early stages of wall construction. It appears that the inner and outer faces of the wall were periodically repaired; on some occasions even expanded, making the wall progressively thicker at each stage. This is evident from the difference in the types of bricks in the central core and the inner and outer faces of the wall. The core of the wall, about 4·50m to 5m, is built of different shades of dark grey and light cream-coloured mud-bricks. Both outer and inner margins of the wall, at the same time, are built of yellowish-brown bricks whose consistency and composition vary considerably from the brick used in the core.

The excavation was later extended across the site to the north to trace the fortification in the north. Just as the southern wall, the northern wall too was built of multi--coloured mud-bricks, varying in composition and consistency. The thickness of the wall was expanded periodically in this part too. This was evident from the presence of a thick white plaster running within the wall parallel to its edge. This prominent line is about 2m inside from the extant external/outer edge of the wall. The overall

Fig. 1



The outer face of the southern fortification wall and the strata lying against it. It shows three successive stages of wall construction, Shikarpur.

thickness of the wall in the north, where much of the top has been eroded, is a little above 10m. The fortification wall in the south and the north are 99·55m apart. The distance between the east and the west walls has also been estimated to be close to 95m. Therefore, the overall fortified area may measure close to one hectare.

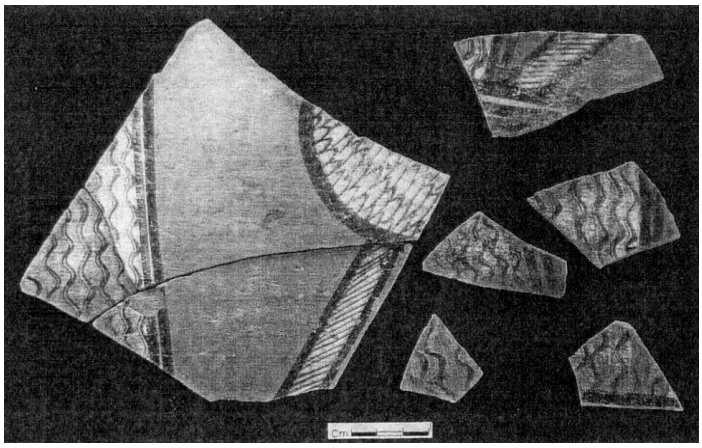
The site has a large basin-like morphology with the buried fortification wall prominently rising up and forming a sort of boundary all around. The relatively flat, low-lying area at the centre is about 3·50m below the datum. Excavations in a large 10m x 10m area at this point revealed that this part of the settlement was used as an open space surrounded by structures, probably right from the beginning of Harappan occupation at the site and it remained so throughout. The open space was periodically silted and filled with water-borne sediments deposited from all sides due to monsoonal erosion. The space, however, was used temporarily for various activities related to both craft and domestic production, whenever it was suitable to do so. Bordering the open space in the north and in the south were structures of different phases, built of both mud-bricks and rubble stones. The eastern and the western margins are demarcated by gently rising slopes. The actual margins of this open space can be estimated once the excavations are expanded in all directions in the next season.

Deep soundings in one of the trenches in the central open space, Trench Em l3 in the north and Trench Fp3 in the south ascertained the stratigraphic sequence proposed in the last excavation. In Trench Em 13 was found evidence of the first habitation, directly over the natural sediments. It appears that the first habitation came up here after leveling the top of the sand-dune by reworking the sand and yellowish gravel and preparing a living floor. The floor has an open hearth and a large pot, partially buried, adjacent to the hearth. The rather flat base of this pot was found buried into the natural sediments.

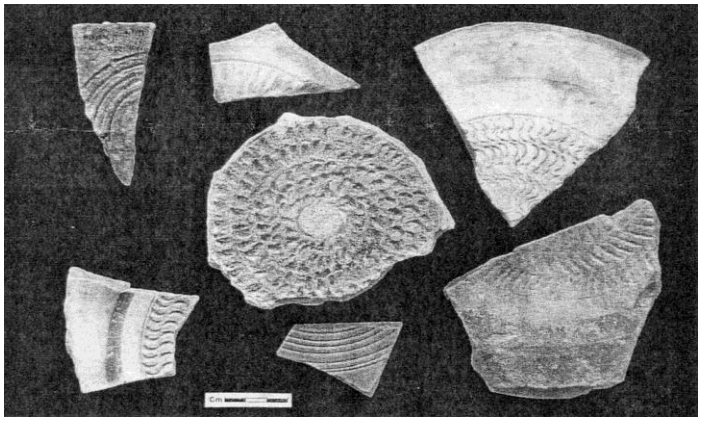
This floor and the mud-brick structure as well as the brick-paved floor that follow immediately above it, constituting a deposit about 40cm thick, incorporates much more Anarta pottery than the subsequent layers (pl. 22). Even then, the predominant ceramic type in this early level is the Classical Harappan pottery, which includes all the characteristic vessels and painted decorations (pl. 23). Several sherds of the Harappan black-slipped jars, perforated jars, basins, S-shaped jars and dish-on-stand and reserved-slip ware are part of this assemblage. Remains of at least two series of mud-brick structures were found in the subsequent strata in Trenches Em 13 and El 16. These structures not only follow the general plan and layout of the preceding structures but are also found associated with hearths and buried storage-pots. Besides, the two inscribed terracotta sealings recovered this season (discussed below) are associated with the above structures (pl. 24).

Structures belonging to Phase II showing the presence of Sorath Harappan are found in the last three layers (layers 3, 2 and 1), as well as in the pits associated with these layers. The remains of rubble-stone structures found in the upper layers in this trench were all constructed in the terminal

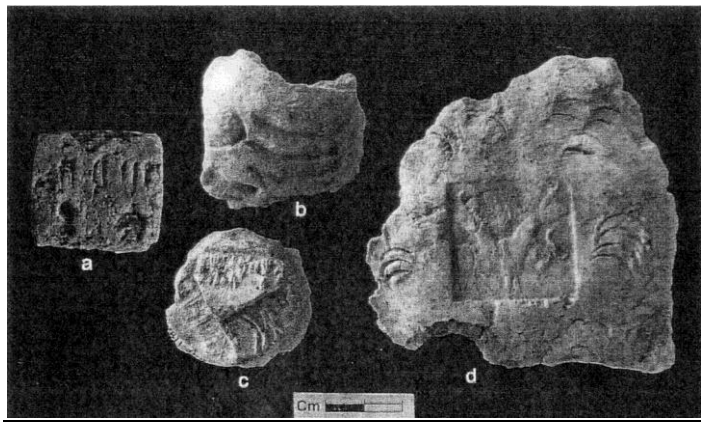
Plate 22-24



Anarta pottery with white painted decorations, Phase I, Shikarpur.



Classical Harappan pottery incised patterns, Phase I and II, Shikarpur.



Terracotta inscribed square tablet and terracotta sealings with inscribed seal impressions, Shikarpur.

stages of Classical Harappan occupation in Phase I, as they are not associated with the Sorath Harappan relics. These structures were in use during Phase II too. A 2m long platform-like structure, found in the third layer of the Trench El 16, belongs to this phase. The platform, prepared by paving flat stone slabs, appears to be part of a large stone structure of Phase II.

Trench En l5, about 5m south of the central open space, also has mud-brick structures of Phase I followed by rubble-stone structures belonging to the last stages of Phase I and the beginning of Phase II, which was partially destroyed by later pits. This structure was in use during the second phase of the habitation too with very little repair and reworking. The later deposits incorporated the Sorath Harappan ceramics along with the Classical Harappan. A 16cm long thick copper stake/chisel with a square cross section and gently bevelled and blunt point, as well as a small and very shallow pan-like copper vessel were recovered from this structure. Besides, on the southern side of this structure there is another rubble wall running very close and parallel to it, which suggests that it could be part of a drainage channel adhering to the structure.

The most interesting antiquities unearthed are two terracotta sealings with impressions of inscribed Harappan seals. One of the sealings bears impression of a unicorn-like animal with three heads, one turned back, as if it looking backwards; the second, held up and looking ahead and the third, slightly bent down as if looking down. While the lowered third head is that of a bull having two horns, the other two are in the usual unicorn style with a single horn. Several sets of impressions of thumb nail-like crescent marks are found all around the stamped impression. Although the purpose and significance of these sorts of crescent marks are not known, they are not uncommon on terracotta sealings and are reported from several Harappan sites. The back of this sealing has an impression of the object it sealed, in the form of a shallow depression bearing textile (?) mark.

The second sealing is relatively small and actually bears impressions from three consecutive stamping of three different inscribed Harappan seals. The stamping is done in such a manner that the inscribed upper part in all the three seals is clear and legible while the lower part of the seal bearing the animal motif is obliterated due to overlapping impressions. At the back it bears a very deep impression of the thread and the knot.

Another interesting object unearthed is a terracotta tablet with engraved Harappan inscription from the Trench Fk 13. The engraving is done exactly in the same manner as that of the usual steatite intaglio seals using a sharp tool. The tablet measures 30mm x 30mm x 7mm and bears a two line inscription in four or five characters and some unidentifiable motif or a Harappan character at the bottom left. The back of this tablet/seal is flat and does not have the usual projected pierced boss. This belongs to the beginning of Phase II occupation at the site.

Other important antiquities include several long chert blades made from the Rohri chert originating from Sindh; ornamental beads of semiprecious stones, steatite and terracotta; bangles of shell and terracotta; copper

chisels, knives, arrowheads, bangles and rings (pl. 25) and terracotta toy cart frames and animal figurines. A human torso in terracotta is noteworthy for its simple round modelling (pl. 26). Made of moderately refined clay, it is reasonably well baked and has a bright red slip that has partially peeled off from the surface at many places. The two arms, the head and the part below the navel have broken off.

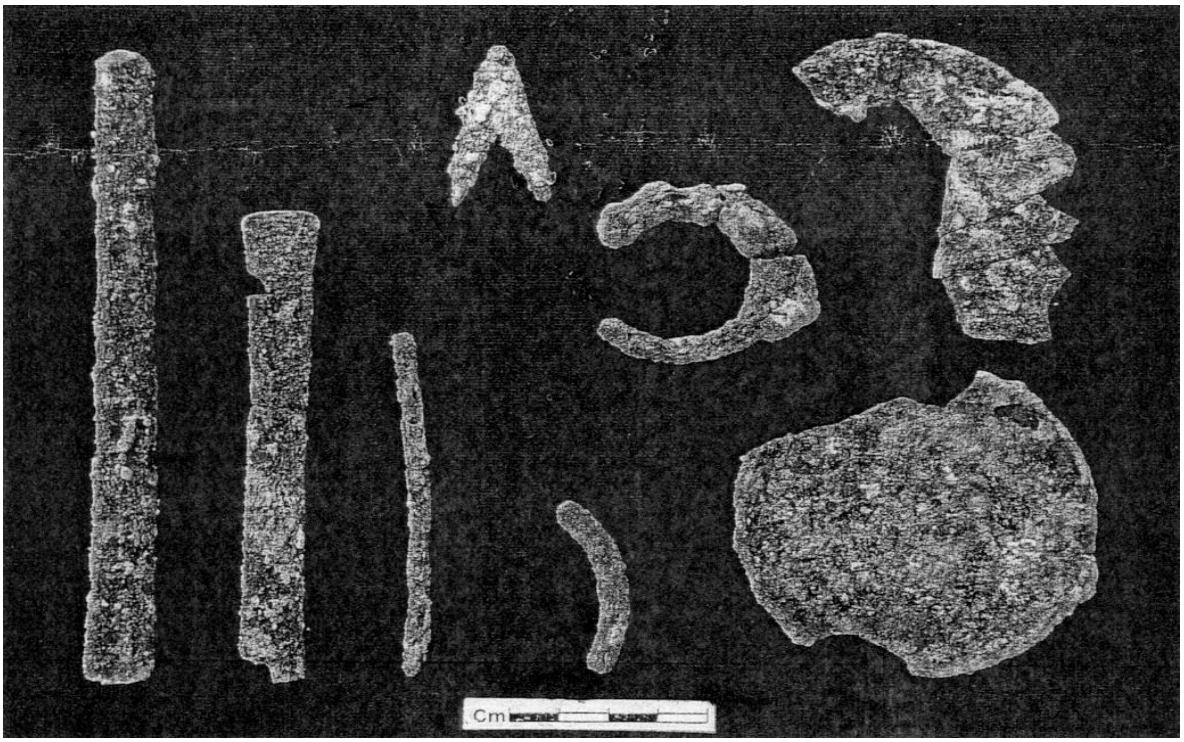
Besides, the excavation in this season has benefitted from the GPR survey and photogrammetric recording carried out as a training programme by a team of Japanese archaeologists led by Takao Uno and Hirofumi Teramura of the Indus Project, the Research Institute of Humanity and Nature (RIHN), Kyoto, Japan.

15. EXCAVATION AT VADNAGAR, DISTRICT MEHSANA: In continuation of the previous year's work, the Department of Archaeology, Gujarat State, under the direction of Y.S. Rawat, assisted by M.V. Joshi, Dilip Kushwaha, Shishir Jain, Bhimraj Barhat, Ritesh Makwana, V. Vinod, R.B. Patel, P.B. Otia and Mukesh Thakore, conducted further excavations at Vadnagar in District Mehsana. Excavations were resumed at three previous locations within the fortification area-Ghaskol Darwaja, Durga Mata Mandir and Khari Kui (near Primary School-3). In addition, a new area, Ghaskol-2 located immediately outside the fortification was taken up for excavation, where the wall takes a westward turn. This location was chosen to understand the compulsions of the ancient planners to provide a large offset at this point by abruptly turning the east-west running wall first towards north and then after a short run again towards west.

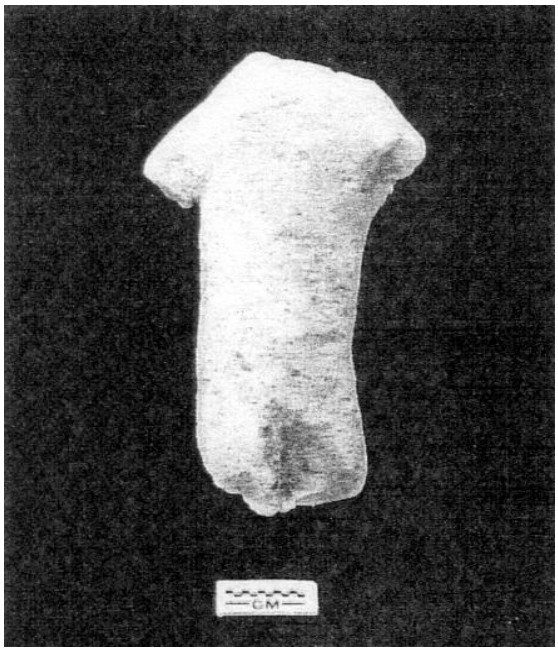
Ghaskol area yielded remains of a Buddhist monastery in the previous season. In order to expose the complete plan of the monastery, excavation was extended further south. Besides, minor excavations were carried out at places to understand the relationship between various structures and successive structural phases. During the season, complete plan of the monastery was brought to light. In plan it is roughly 14·04m square but is provided with two additional chambers from the western side near its north-east corner. On the north, a narrow verandah is provided which is attached to an entrance platform furnished with two flights of steps- one on the east and other on the west. Near the north-east corner of the monastery, two small votive stupas have been uncovered. In plan, one of them is square while the other is circular. The stratigraphical context shows that these votive stupas were built at a later stage, around the fifth century CE.

A large number of valuable antiquities have been recovered from the site in addition to large quantity of potsherds of different varieties. A few potsherds of a large vessel known as Torpedo jar have been found at this site, which was in use in Mesopotamia or the Persian Gulf region during the third-fourth century CE. Outside the fortification wall, to the north-west of the Ghaskol Gate, two massive brick walls oriented parallel to each other at a distance of about 5m have been excavated. These walls have been erected roughly parallel to the fort wall and seem to be revetments provided for it during two different phases. Further excavation

Plate 25-26



Copper implements, Phase I and II, Vadnagar.



Male torso (broken), terracotta, Vadnagar.

may throw more light on the precise use of these walls.

Excavation at Durga Mata Mandir area has brought to light complete sequence of the town from fourth century BCE to date. A large corner of a residential block was exposed in the previous season which revealed that town-planning remained unchanged through successive periods, from about first century CE to twelth century CE, i.e., a period of about twelve hundred years. This type of archaeological continuity is very rare and there are very few such towns in India.

The last season's trenches were extended further eastwards in Qdt.2&3 of Trench A-1. Besides, two new Qdt.2&3 of Trench A-2 were opened up. In all, four quadrants were operated to know the relationship between the settlement and the fort wall. The maximum depth of 14·10m was reached in Trench A-l/I which is located about 15m north of the fortification. Although the cultural remains were found continuing further down, the excavation could not go deeper due to high ground water table. In all, thirty-five strata have been identified and these deposits are so far divisible tentatively into seven cultural periods (including the recent one) on the basis of ceramics, antiquities, artefacts and structures. The earliest 1·90m thick deposit, marked as layers 27 to 33, represents the pre-Kshatrapa period in this trench. An east-west oriented wall consisting of four courses represents the earliest structural phase in this trench. This wall too belongs to the upper level of this deposit. The size of bricks used in this wall measured 41 x 27 x 8cm in length, breadth and thickness respectively. The lower, 8·50m deposit of this trench is comparable to the excavated deposit of Ghaskol area. The upper, 5.50m deposit represents the cultural accumulation of three periods, beginning with Muslim rule in Gujarat i.e., around the beginning of the fourteenth century AD and continuing through the Maratha and colonial periods. The east-west wall showing seven successive phases has been exposed to a length of 9·35m in Trench A-l and is still continuing further east. The extant combined height of these successive structures measured 9·60m. In all, one hundred and twenty-nine courses of kiln-baked bricks have been identified. Of these, the lower seventy-six courses, showing five distinct phases of successive constructions, belong to the Kshatrapa periods, whereas the remaining fifty-three upper courses represent two distinct phases of successive constructions made during the Maitraka and Rajput periods.

Among the antiquities, mention may be made of a gold ring seal with a Brahmi legend which reads *shri bali sha? ra sya*, a few copper coins of king Sarva Bhattaraka and the Maitrakas, terracotta human and animal figurines, a variety of beads made of semiprecious stone and terracotta, shell bangles and terracotta sealings with Brahmi characters.

Excavation at the site near Primary School-3, known as Khari Kui area, also corroborates the findings from Durga Mata Temple area. A continuous succession of brick structures has also been noticed here. The exposed structures have also provided

some clues about the gradual expansion of the town.

The maximum depth reached in Qdt. XA.l/III is 17·85m. Ten major phases of structural activities have been noticed so far, beginning around the fourth century BCE and ending with the Maratha period. The available evidence suggests that in this part of the town, a street was passing in north-south direction, possibly connecting the Darbargadh (royal enclosure) in the north with the main street running along the fortification in the south. The exact breadth of the street could not be known as structures belonging to the post tenth century CE period and is encroached upon. On the topmost level, floors of houses belonging to the late nineteenth century CE have been exposed. The floors are made of lime concrete. In this cutting, the lowest, 5·70m thick cultural deposit which underlies the one hundred and thirty course brick structure, represents the pre-Kshatrapa period. This deposit is devoid of any intact structure but debris consisting of brickbats has been noticed in the middle level of this deposit. However, a few post-holes associated with compact whitish-coloured clay floors noticed in the layers 31 and 32 suggest that during the initial stage of the settlement, majority of structures may have been made of wood. The ceramic industry at the site is represented by a variety of wares, in different shapes and forms. The pottery in the initial stage comprises a few forms like bowls, vases and jars in red, orange-red and black-and-red wares. Bowl is the predominant form. A large number of antiquities including copper and silver coins, beads, bangles, figurines, dice, terracotta sealing and metal objects have been recovered from this cutting. Mention may be made of one terracotta sealing which bears a Brahmi legend on one side and an impression of a Roman coin on other side. It provides evidence of early historical trade links with the Roman Empire.

16. EXPLORATION ON THE JUNAGADH COAST: Field exploration was undertaken along the Junagadh coast in Gujarat by Arati Deshpande Mukherjee along with Sushama Deo of Deccan College, Pune. Investigation was mainly undertaken between Diu and Somnath. The basic objectives were to visit some of the already reported sites, look for new sites, study the geomorphology of the present day coast and take into account the molluscan diversity in the area. Places visited were Veraval, Prabas Patan, Kodinar, Kanjetar, Mul dwarka and Diu. The coast in general is smooth, occasionally indented and along it marshy depressions have developed due to drainage blockage by sand dunes and bars. The shore is characterized by narrow beaches with melliolite rocks. At Diu the coast comprises sandy beaches and melliolite deposits which are carved out like caves due to sea erosion. Important fishing villages in the district of Junagadh are Kotda, Dhamlej, Sutrapada, Veraval, Chorwad, Mangrol and Porbunder which are engaged in fishing of Pumptrets, Hilsa, etc. The communities involved are the Kharvas, Machiavas and Moilas. Shells were collected from Veraval, Somnath, Mul Dwarka and Diu coast. These mostly comprised small gastropod shells such as *Turbo, Trocus,* sp. The molluscan diversity is much less as compared to the Dwarka coast.

At Prabhas patan, the ancient site which was earlier excavated was visited. It is located close to the Sita Mata Mandir overlooking the Hiran River. Currently it is covered with thick vegetation but few exposures of the brick wall are visible. Exploration in and around the town of Prabhas Patan revealed many ancient structures, temples, brick walls, etc. The entire modern town is located on the ancient settlement. Traces of the habitational deposits are visible in some of the freshly dug ditches along the road side.

An archaeological deposit was found on the beach close to the modern Sreenath temple. Overlooking the beach, the deposit has thickness of one meter and extends over an approximate length of 1/2km. Consisting of coarse sand, it contains pottery sherds and animal bones. This deposit has got exposed due to the cutting by a small nullah which flows through it and joins the sea. Around the nullah, in section, both pottery and bones were visible. The latter occur as a layer in the section which extends nearly half the length of deposit. The bones appear to be mostly those of cattle and a few fish bones were also visible. A few pottery and bone samples were collected by section scrapping which are currently being analyzed. Due to its location on the immediate coast, this deposit is important and its excavation could yield significant data for carrying out Palaeoenvironmental and Palaeo subsistence research. The examination of animal bones *in situ* would help to explain the factors responsible for their deposition and their significance. The appreciable amount of pottery present in the deposit could provide information about the cultural history of the site. Since the deposit is being exposed to new destruction due to the flowing of the nullah through it and hordes of tourist who use the beach could lead to its permanent destruction over the time. Hence salvage excavations in the near future would be useful.

The site of Mul Dwarka which was earlier reported by S.R. Rao in the sixities was visited which lies to the south of Prabhas Patan on the coast. There is a small temple made from milliolite with sculptures located on a sand dune. Around the temple pottery sherds were found. Close by, a few hero stones are visible strewn in the beach sand. The site is fairly isolated and not much of present day human habitation is visible except for the large Ambuja factory nearby and a small fishing settlement of the Kharvas.

HARYANA

17. HARAPPAN SITE OF FARMANA, DISTRICT ROHTAK: In continuation of previous year's work, the Deccan College, Post-graduate and Research Institute, Pune, Research Institute for Humanity and Nature, Kyoto and the Department of History, M.D. University, Rohtak carried out excavation at Farmana. Excavation revealed two-fold cultural sequence namely, Period I- Early-Harappan Hakra Tradition (c.3500-2600 BCE) and Period II- Mature Harappan (c. 2500-2000 BCE). The excavation carried out with the aims and objectives to know further extension of the structural complexes of the Mature Harappan phase excavated in the previous season in order to facilitate reconstruction of socio-economic

Organization, to reconstruct the cultural development and settlement patterns of the two Harappan phases and to understand the composition of population, demography, various burial customs, diet and pathology of the Harappan population.

To fulfill the first aim, a series of trenches (50) of 5m x 5m were laid on the western and southern sides of the Harappan structure complexes excavated last year. In order to understand the second objective, it was decided to take a number of trenches at different locations in the centre of the site in which efforts were made to excavate remains of the Early Harappan phase and at least four trenches were dug up to the natural level. This has helped in understanding the extension of the Early Harappan phase at the site. In order to study the Harappan population, it was decided to excavate the Harappan Cemetery, located 900m to the north-west of the habitational site, on a much larger scale.

The Early Harappan (Period I) at the site is represented by pit-dwellings and ceramic wares such as mud appliquéd incised, chocolate slipped, etc. Between the Early and Mature Harappan, a number of structural levels have been identified. There appears to be a gradual transformation from pit-dwelling to rectangular structures at the site. The structures excavated in the transition phase are rectangular made of mud-bricks and are small and independent. Inside they are found both circular or rectangular fire-places and circular storage pits. They appear to have been well planned and are mostly domestic structures.

The large horizontal area excavated at Farmana has unearthed part of the well planned Mature Harappan (Period-II) settlement. In all, twelve different complexes of the Mature Harappan period have been excavated and they present separate socio-economic units. On the basis of pottery and other artifacts, the Mature Harappan phase has been sub-divided into IIA, IIB and IIC. The last sub-phase has been completely removed when the site was badly damaged in the process of ploughing. This year's excavation was aimed at excavating structures of Period IIA and IIB. Five structural complexes were excavated in Period- IIA. All the structural complexes of this period are made of mud-bricks and they are oriented parallel to the main street, which runs in north-west–south-east direction. All of them have multiple rooms and on the basis of contents these rooms could be inferred to have been used for a variety of different purposes such as dwelling, storage, cooking and craft manufacture. The fire-place found in the kitchen is usually rectangular in shape. They are either made of simple clay or mud-bricks. Near the fire-place is found either one or two pots. This phase has yielded one rectangular steatite seal engraved with a unicorn and Harappan letters.

In Period II of the Mature Harappan phase, the extensions of incomplete structure complex partially excavated in the last season was further exposed. The Structure Complex 3, 26 rooms of which were excavated last year, extends further towards the west and 6 more rooms of this were excavated. The 33-room complex housed 8 different households which have been

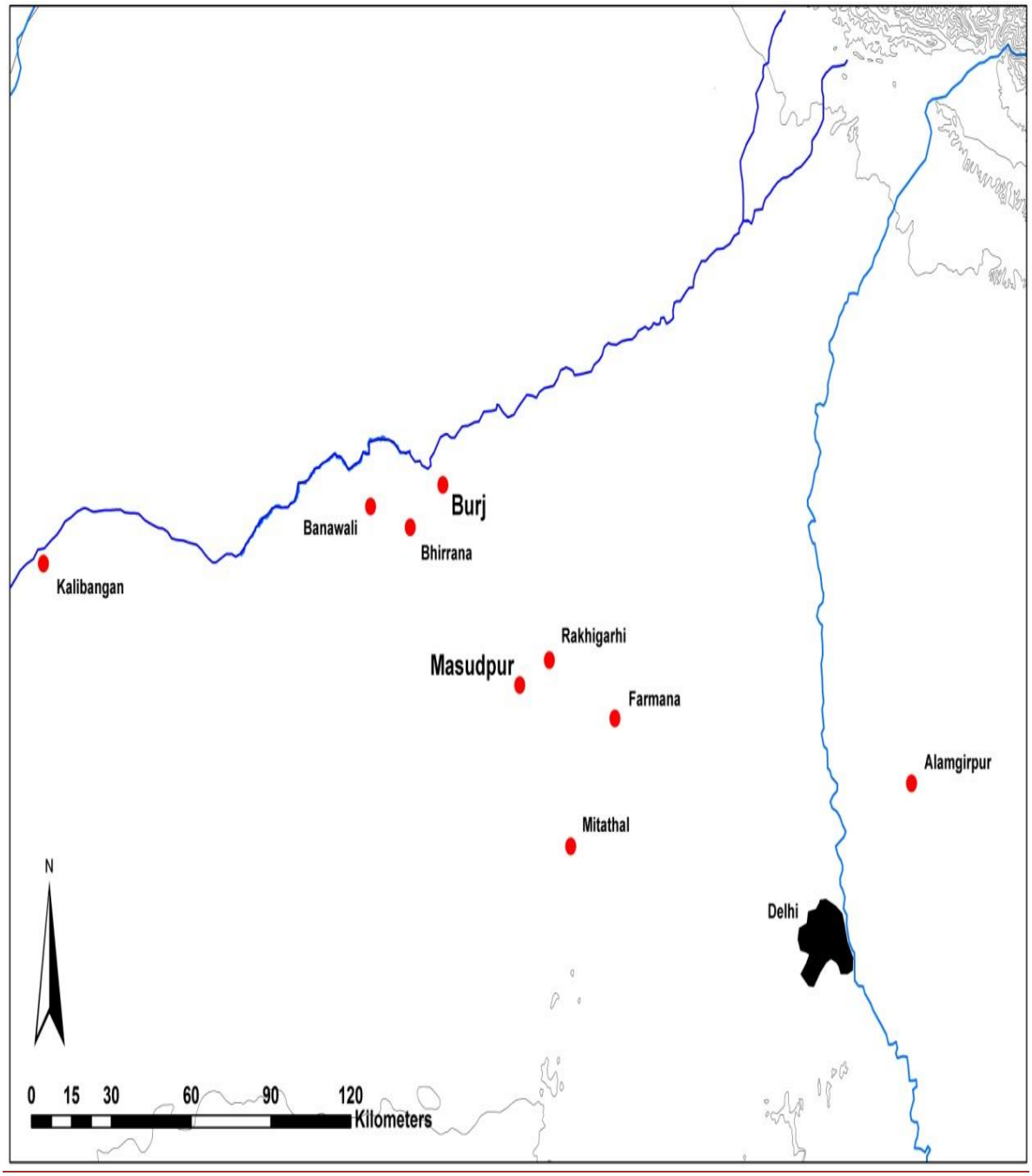
identified on the basis of kitchens. Some of the partially excavated rooms of the structure complex 4 last year were fully excavated this year. Besides, the new complexes excavated this year include structure complex 5 (5 rooms of which have been excavated) and Complex 6 (6 rooms). These complexes have been arranged in a linear pattern oriented in north-west-south-east direction similar to those of the Period-IIA. They alsocomprise rectangular storage pits, rectangular fire-places with one or two pots near them and bathing platforms made of wedge-shaped burnt bricks. The bathing platforms were connected to the main drain, part of which was excavated between the structure complexes 3 and 6. These complexes are situated along the street and lanes running in north-south and east-west direction. One of the most significant discoveries is the large partly broken steatite seal engraved with a Zebu Bull. What is interesting about this is that the same letters found on the face are engraved on a double loop on the reverse.

The different ceramic wares consist of mud appliqué, incised, grooved, grey wares etc. Besides, the typical Mature Harappans sturdy Red Wares are found in large quantity. This is one of the finest wares, made from very fine clay and perfectly fired. The outer surface is treated with either slip or wash of red or variants of red colour. Typical Harappan shapes like dish-on-stand, goblets, S-shaped jars, perforated jars, beakers are in small quantity in the collection. They are decorated with simple linear or curvilinear geometric patterns in black colour. Motifs like *pipal* leaf, intersecting circles, fish and fish-scale patterns, complex geometric patterns, etc. are rare.

The material remains found at Farmana include a large number of well made triangular and circular terracotta cakes, *mustikas*, copper exes, bangles, terracotta bull figurines and bullock cart frames, spindle whorls, bangles, etched carnelian and bone beeds, paste, shell and faience beads and bangles. It should be mentioned here that this is the only Harappan site which has produced the evidence of etched bone beads. The analysis and classification of structures, artefacts and ecofacts are in progress.

The Harappan cemetery was discovered 900m to the north-west of the main habitational site. In all, 70 burials have been excavated so far in a roughly 50m by 30m area. Three different levels could be observed- Level- 1 to the Period IIA, Level-2 to the Period IIB phase and Level- 3 belonging to the Period IIC. The burials of the Period IIC have been partially damaged by the plough share. The lower two level burials are in good state. The usual orientation of the burials is in north-east-south-west direction, but there are a few examples in north-south and north-east-south-west direction. There are three burial customs noticed at Farmana-primary secondary and symbolic. They all have perfectly rectangular pits and some of them even have coffins made of the clay lining. Almost all the burials contain grave goods consisting of a number of pots such as beakers, goblets, dishes, dish-on-stand, S-shaped jars, lids and small globular pots, the number of which varies from burials,

Fig. 2



Location of Masudpur village in relation to other major Harappan sites, with the course of the ephemeral Ghaggar River shown in dark blue.

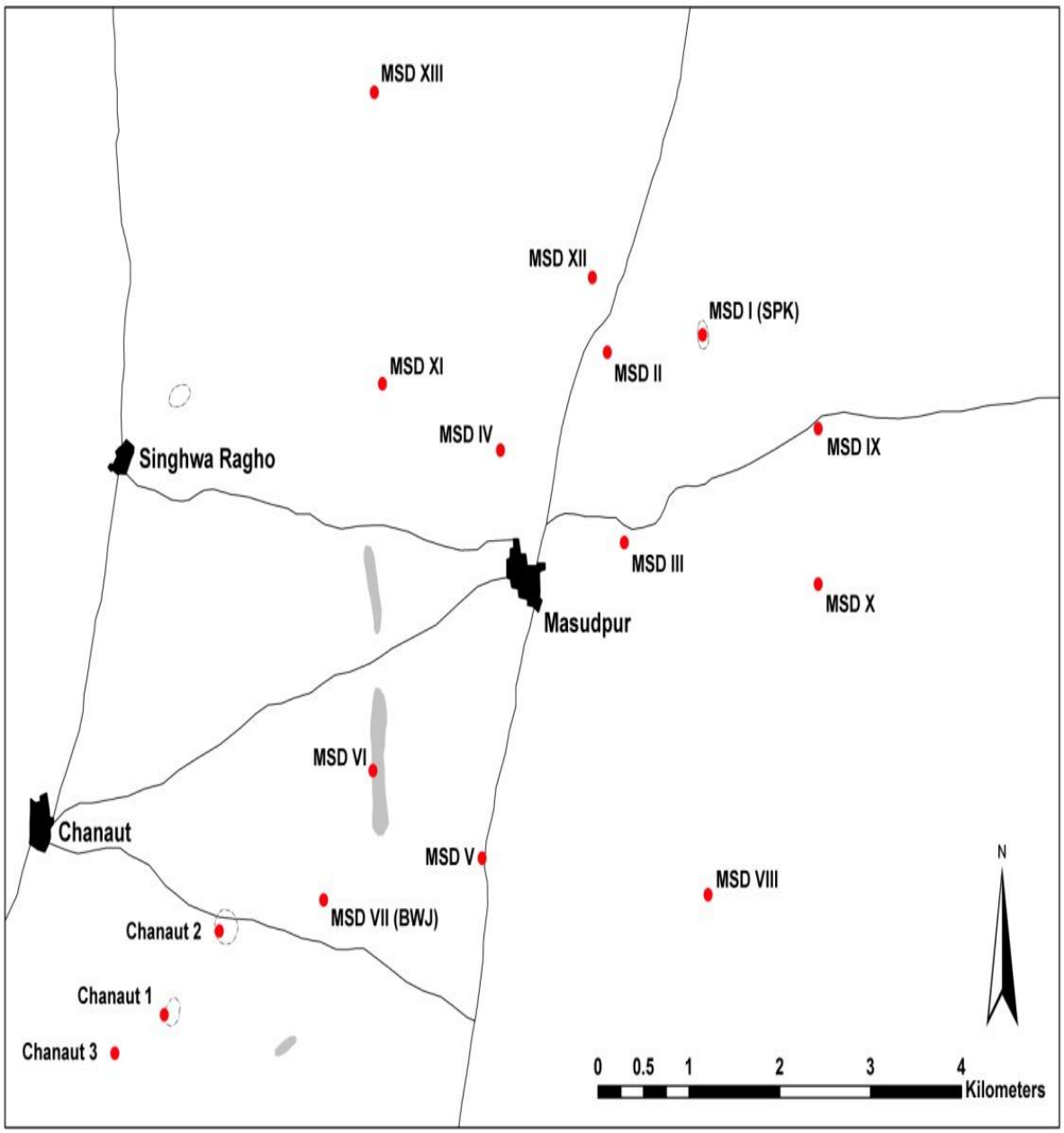
depending upon socio-economic condition of families. It is proposed to undertake DNA and Element Analysis of the human skeletal remains from Farmana, which may light on various problems raised.

18. EXPLORATION AND EXCAVATION AROUND MASUDPUR, DISTRICT HISSAR: Under the direction of R.N. Singh and C.A. Petrie with assistance from A.K. Singh, S. Neogi, D. Parikh, N. Parmer, V. Pawar, carried out a preliminary survey and excavations at two Harappan sites in the vicinity of Masudpur village (fig. 2) under the *Land, Water and Settlement Project*. The archaeological component of the project is primarily focused on establishing the relationship between archaeological sites and their geographical and landscape context in two primary zones: the area northeast and east of New Delhi in western UP and the central Haryana plains, between Hisar and Karnal.

The principal aims of the archaeological component of the *Land, Water and Settlement Project* are: (i) to revisit previously identified archaeological sites that have occupation dated to the Mature Harappan, Late Harappan and/or Painted Grey Ware phases, which are in close proximity to perennial and ephemeral river channels, and ideally contemporaneous sites that have been excavated; (ii) to conduct excavation at a number of these sites with the specific aim of recovering evidence for palaeo-environment, subsistence behavior and absolute chronology; (iii) to assess the immediate and broader off-site landscape and environmental contexts of these sites through landscape survey, detailed geomorphological investigations and to correlate these results with the on-site evidence. The survey around the village of Masudpur and the excavations that have been carried out at Masudpur I (Sampolia Khera) and Masudpur VII (Bhimwada Jodha) have been designed to satisfy all three of these aims. A total of thirteen proto-historic and historic mounds were visited, and excavations were carried out at two sites: Masudpur I (Sampolia Khera – first visited by project team members in April 2008) and Masudpur VII (Bhimwada Jodha). All of the sites in the vicinity of Masudpur lie between 12 and 16kms of the urban site of Rakhigarhi (76º 06·715', 29º 17·365'), and are all thus situated in its hinterland. It is highly likely that they lay within Rakhigarhi's socio-economic and political catchment during the Mature Harappan period, when it was occupied to its greatest extent. A preliminary reconnaissance was carried out of the region around the modern village of Masudpur. Previous surveys had recorded the existence of four mounds close to the village, which are typically listed as Masudpur I, II, III and IV and given one geographic location, although this has varied (76º 00', 29º 14' Joshi et al. 1984; or 75º 58' 12", 29º 12' 47" Possehl 1999; Kumar 2009). An attempt was made to identify these four mound sites in order to establish their individual geographical locations, but during the reconnaissance, a total of 13 mounds were identified, and many of these appear to have been occupied.

It was thus impossible to be precise about which mounds corresponded to those that had been previously identified as Masudpur

Fig. 3



Location of mound sites in the vicinity of Masudpur

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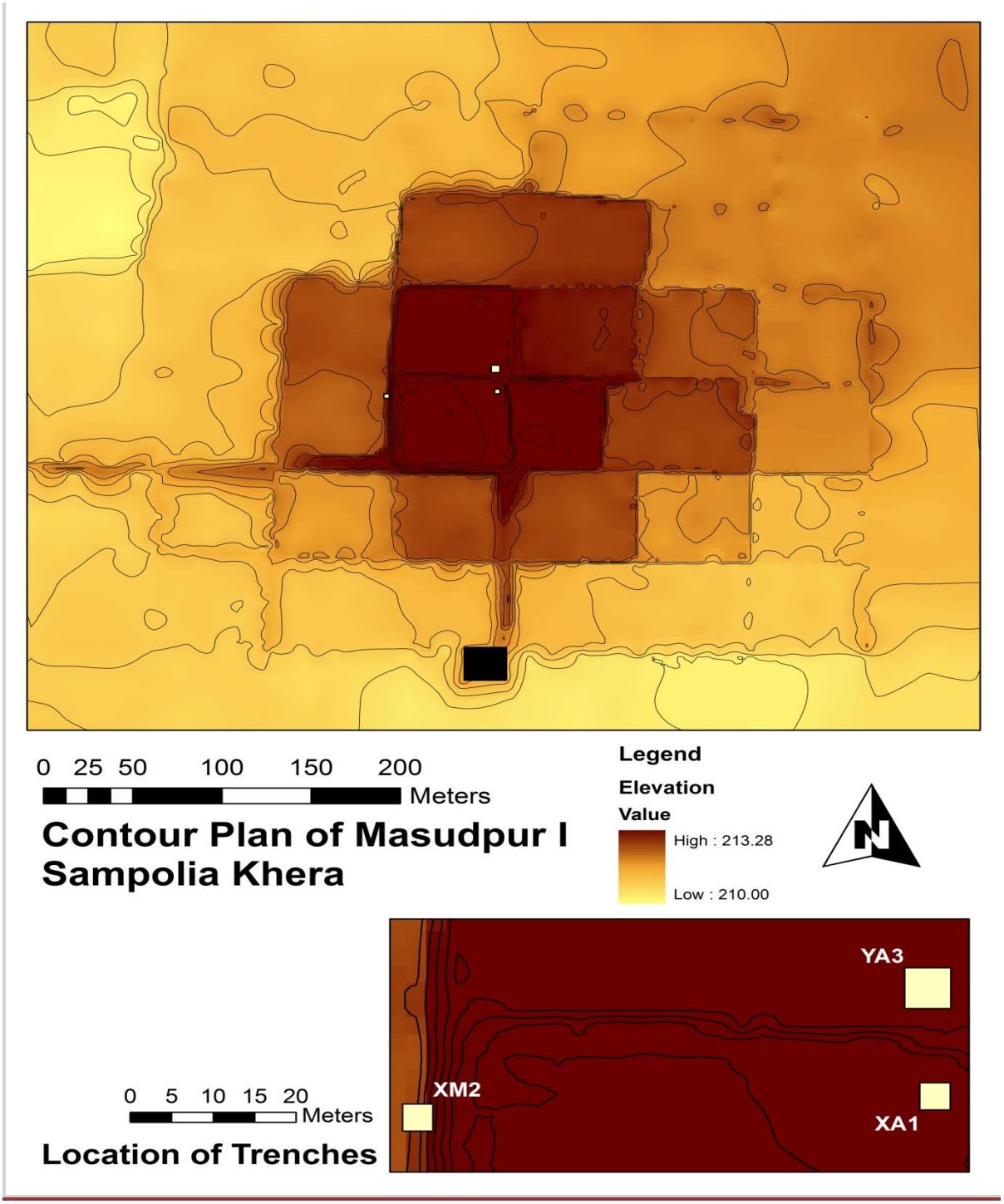
Geographical location of sites in the vicinity of Masudpur

MSD No.	Site name	Size (ha.)	Elevation (m asl)	Geo-referenced location				Periods of occupation				
				Easting		Northing						
				Deg.	Mins.	Deg.	Mins.	EH	MH	LH	PGW	His
I	Sampolia Khera	6	213	75	59.611	29	14.636		X	X		
II	Sunarwala Khera	1	214	75	59.037	29	14.576					
III	Nighaha	3	208	75	59.144	29	13.832	X				
IV	Abhayram	1	208	75	58.307	29	14.203					X
V	Mamanwala	3	208	75	58.179	29	12.603	X				
VI	Tibba Khera	1	212	75	57.441	29	12.951	X				
VII	Bhimwada Jodha	1	208	75	57.090	29	12.445	X	X	?		
VIII	Malapawala Khera	2-3	208	75	59.705	29	12.144	X				
IX	Tharu Khera	1	211	76	00.468	29	14.270					X
X	Sala Dheri	1	208	76	00.468	29	13.663	X	X	X		
XI	Dolanwala	2.5	214	75	57.509	29	14.467	X				
XII	Unknown	1	210	75	58.935	29	14.872	X	X			
XIII	Unknown	1	211	75	57.460	29	15.610	X	X			

I, II, III and IV, so it was decided to re-number the mounds as MSD I-XIII. The one geographical location that was previously given for the Masudpur sites corresponds most closely with the location of a mound known as Mamanwala, which has been given the number Masudpur V table (fig. 3).

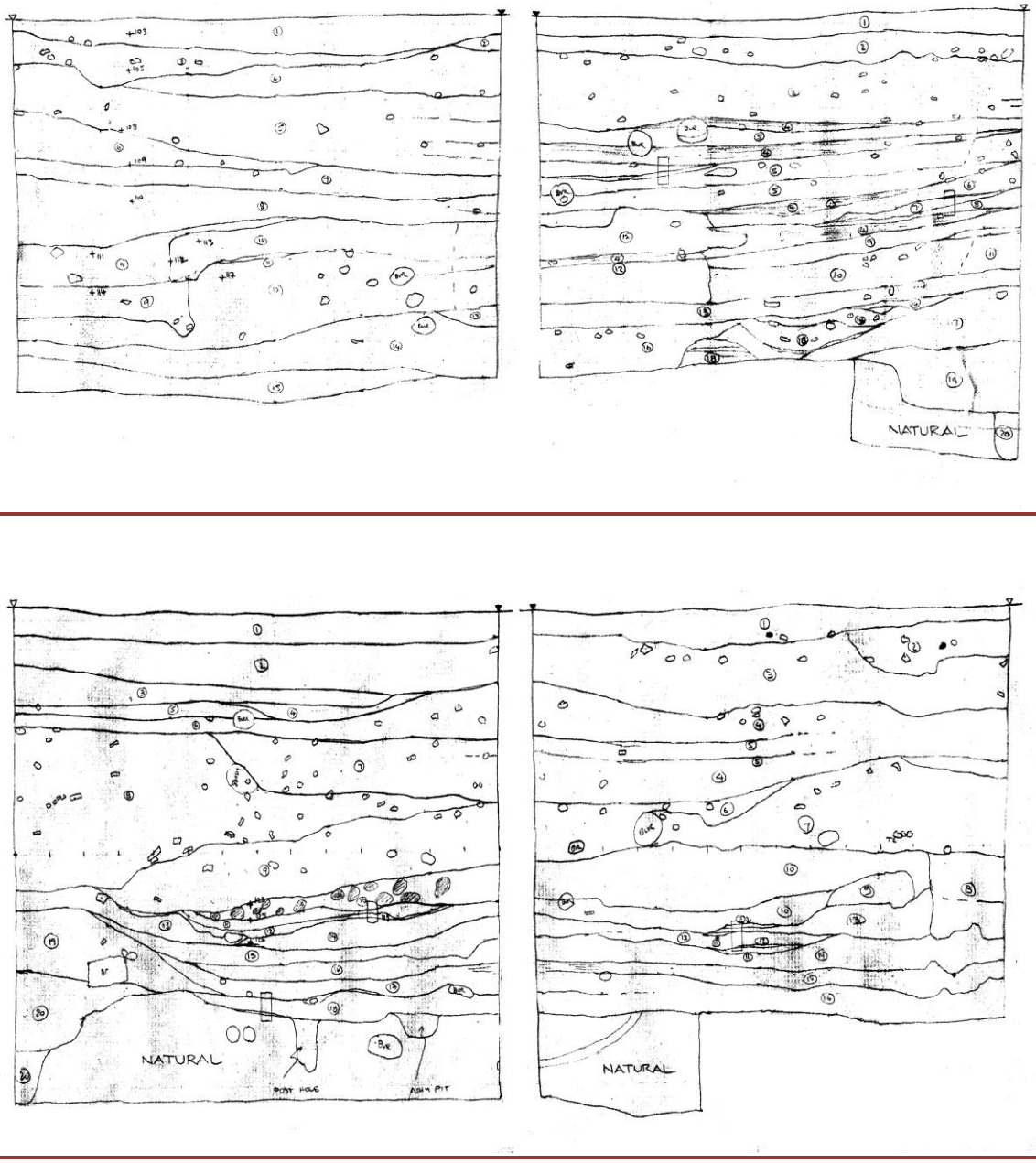
19. EXCAVATIONS AT MASUDPUR I (SAMPOLIA KHERA), DISTRICT HISSAR: The Masudpur I mound, which is known locally as Sampolia Khera, was visited during the survey conducted by members of the *Land, Water and Settlement Project* in March/April 2008, and at that time it was selected for further investigation as the material recovered from the surface indicated that the site was occupied during the Mature and Late Harappan phases (pl. 27). A detailed topographic survey of the site was carried out using a Leica TCR805 total station, which was also used to lay out trenches in three areas, labeled XA1, YA3 and XM2 (fig.4). The three-dimensional data generated from the topographic survey was processed using ArcGIS version 9 and ArcMAP version 9·2, and a plan of the site with 20cm contours was generated. The topographic survey showed that some areas of the mound rise to a height of 3m above the plain, and suggesting that it was a large village during the proto-historic period. There are clear signs that the mound has been heavily disturbed for the purposes of agriculture and it is unlikely that any surface of the original mound is currently preserved. In fact, the entire mound has been leveled to produce fields and as a result, large areas of that now appear to be the mound is the product of a range of cut and fill operations. It is likely that the area over which cultural artefacts are now scattered is larger than the original mound

Plate 27



Contour plan of Masudpur I (Sampolia Khera).

Fig. 4



E+S and W+N section from Trench MSD I/XA1.

Excavations in Masudpur I (Trench XA1) commenced on April 16th and continued until May 1st, 2009. The trench was deliberately placed at the highest part of the mound (213·00m ASL). It was hoped that a complete sequence of the occupation preserved on the mound would be exposed.

Naturally compacted sand was reached at a depth of 1·65m below the modern ground surface in this area of the mound, at an absolute height of 211·25m ASL. This is approximately 1·25m above the level of the ground surface that surrounds the site.

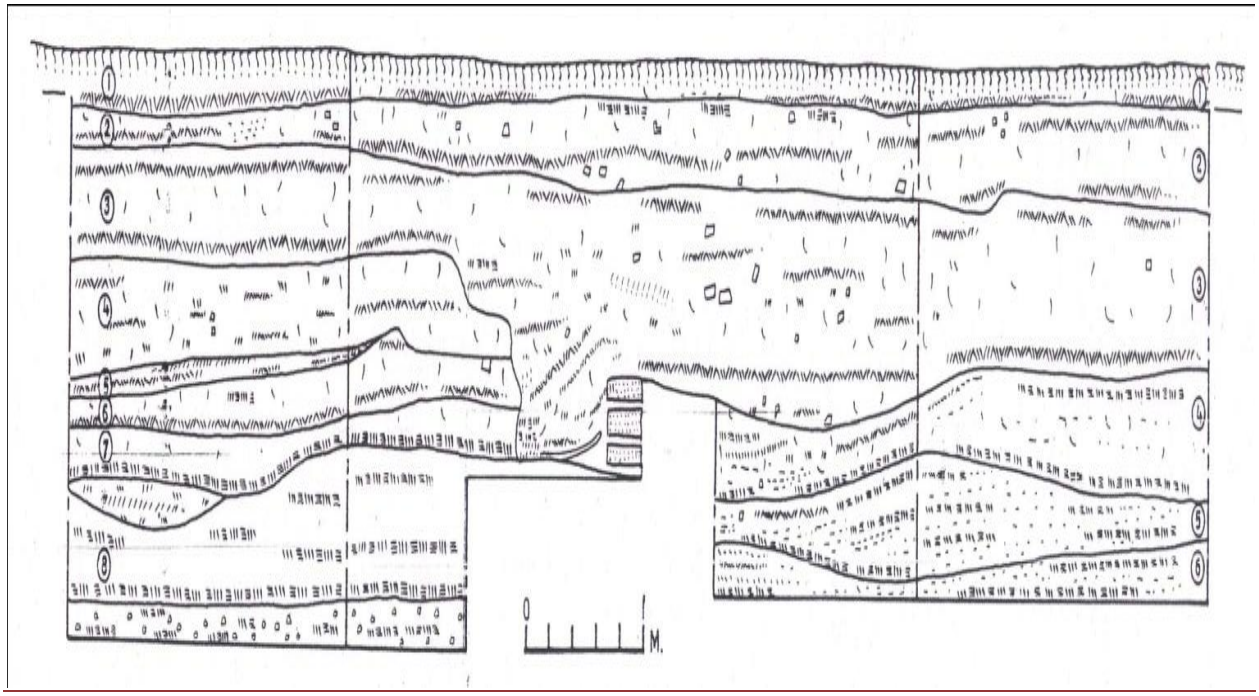
A total of 38 separate stratified deposits were delineated in Trench MSD I/XA1, and these comprise 9 individual stratified phases of occupation. The lower phases of the trench appear to be characterized by locally made Early-Mature Harappan ceramics. These are overlain by a deposit containing a mix of Mature and Early Harappan material, which is in turn overlain by phases characterized by Late Harappan ceramics.

The Trench YA3 was deliberately placed in the field adjacent to MSD I/XA1, and the absolute height of its upper surface (212·54m ASL) was 0·46m lower than that of that trench. It was hoped that a comparable sequence of the occupation would be exposed to that seen in XA1. Naturally compacted sand was reached at a depth of 1·60m below the modern ground surface in this area of the mound, at an absolute height of 210·95m ASL. This is approximately 0·95m above the level of the ground surface that surrounds the site. A total of 9 separate stratified deposits were delineated in Trench MSD I/YA3, and these comprise 4 individual stratified phases of occupation. The lower phases of the trench appear to be characterized by locally made Mature Harappan ceramics. These are overlain by a deposit containing a mix of Mature and Late Harappan materials.

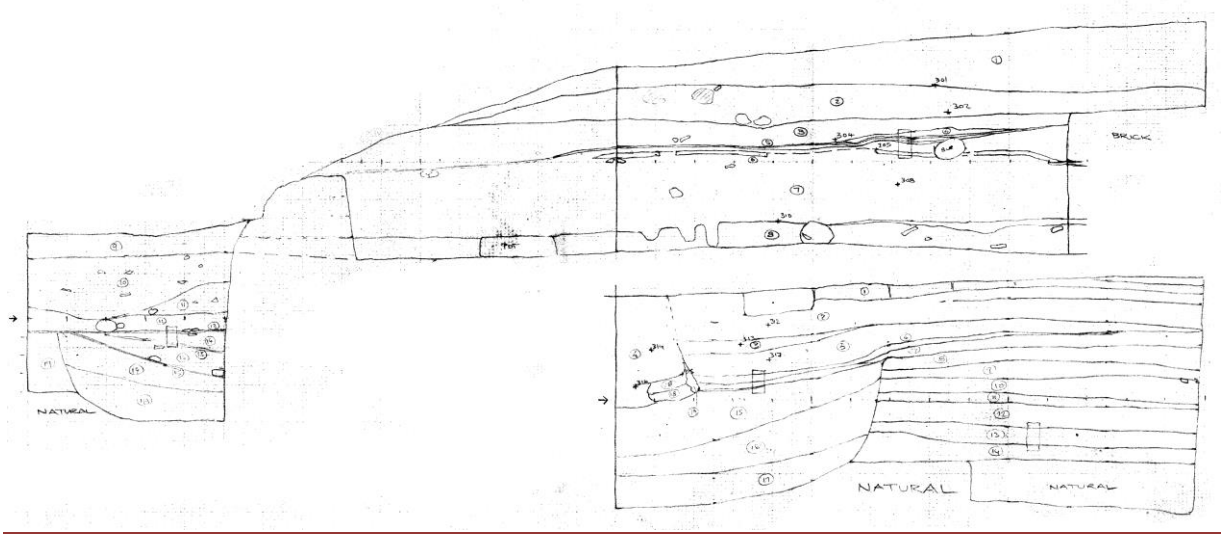
The trench XM2 was deliberately placed in an area on the western side of the mound that had been exposed by field leveling, and where section cleaning had shown the remains of a mud brick structure. The absolute height of the surface at the highest point in the trench was 212·75m ASL. Naturally compacted sand was reached at a depth of 1m below the modern ground surface at the western side of the trench, at an absolute height of 210·75m ASL. This is approximately 0·75m above the level of the ground surface that surrounds the site. A total of 24 separate stratified deposits were delineated in Trench MSD I/XM2 (fig. 6), and these comprise 10 individual stratified phases of occupation. The lower phases of the trench appear to be characterized by locally made Mature Harappan ceramics. These are overlain by phases characterized by Mature and Late Harappan ceramics.

It is notable that the absolute height of the natural sand at the base of each trench is variable, ranging between 0·75m and 1·25m above the average height of the ground surface around the mound. This suggests that the site was established on an irregular surface that was not entirely flat. It also indicates that the site was either established on naturally raised ground, or that the area around the mound has now been deliberately lowered in recent years.

Fig. 5-6



E+S+W sections from Trench MSD I/YA3.



N+E section from Trench MSD I/XM2.

20. EXCAVATIONS AT MASUDPUR VII (BHIMWADA JODHA), DISTRICT HISSAR: The Masudpur VII mound, which is known locally as Bhimwada Jodha, was visited during the survey of the Masudpur area conducted by members of the *Land, Water and Settlement Project*. It was selected for preliminary probing as the material recovered from the surface indicated that the site was occupied during the Early, Mature and Late Harappan phases (fig. 7).

A detailed topographic survey of the site was carried out using a Leica TCR805 total station, which was also used to lay out a sounding trenches at the top of the mound, labeled YA2 (fig. 8). The three-dimensional data generated from the topographic survey was processed using ArcGIS version 9 and ArcMAP version 9·2, and a plan of the site with 20cm contours was generated. The topographic survey showed that some areas of the mound rise to a height of 2·3m above the plain, and in total it covers an area of approximately one hectare, suggesting that it was a small village during the proto-historic period. Unlike Masudpur I, Bhimwada Jodha is relatively well preserved, however all four sides of the mound have been squared by plowing.

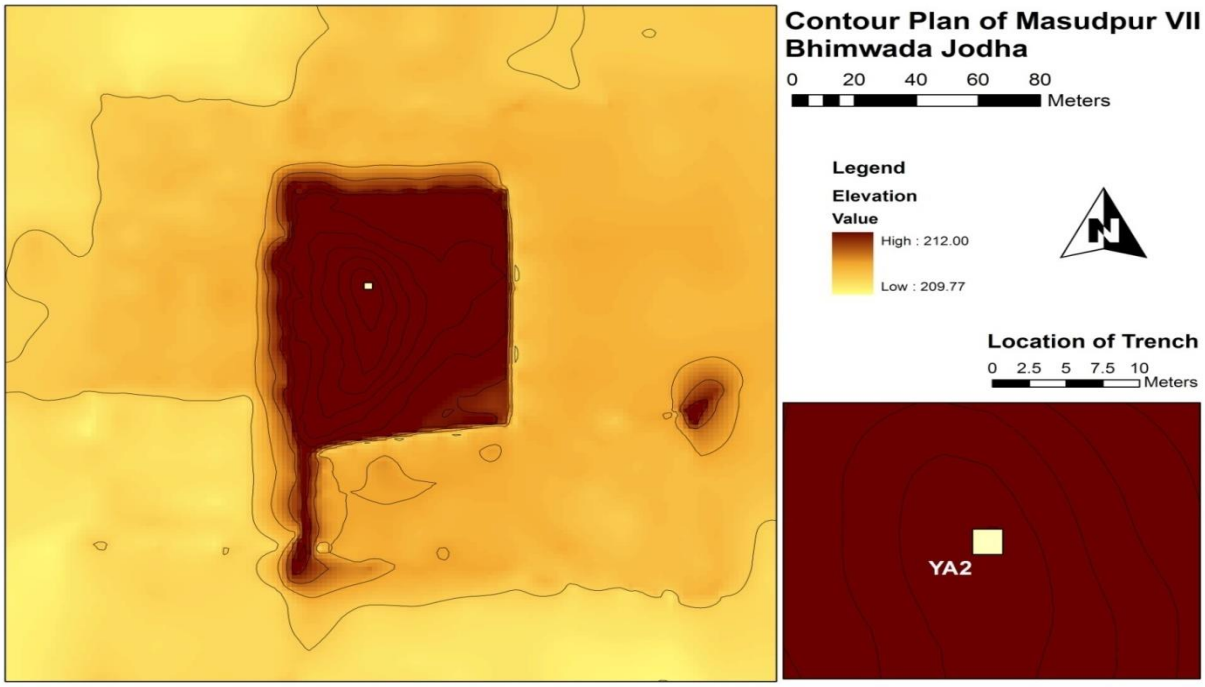
A limited amount of time was available at the end of the season, so a decision was made to excavate a small sondage into Masudpur VII (Bhimwada Jodha), as the material from the surface of the site suggested that it was occupied in the Early, Mature and Late Harappan phases. The preliminary sounding excavated at Masudpur VII as Trench YA2 was excavated. It was deliberately sited at the highest point of the mound (212·00m ASL) and it was hoped that a complete sequence of the occupation preserved on the mound would be exposed. Naturally compacted sand was reached at a depth of 2·90m below the modern ground surface, at an absolute height of 209·10m ASL. This is approximately 0·75m below the level of the ground surface that surrounds the site.

A total of 31 separate stratified deposits were delineated in Trench MSD VII/YA2, and these comprise 13 individual stratified phases of occupation. The lower phases of the trench appear to be characterized by locally made Early Harappan ceramics. These are overlain by deposits containing Mature Harappan material, which is in turn overlain by phases characterized by Mature and Late Harappan ceramics.

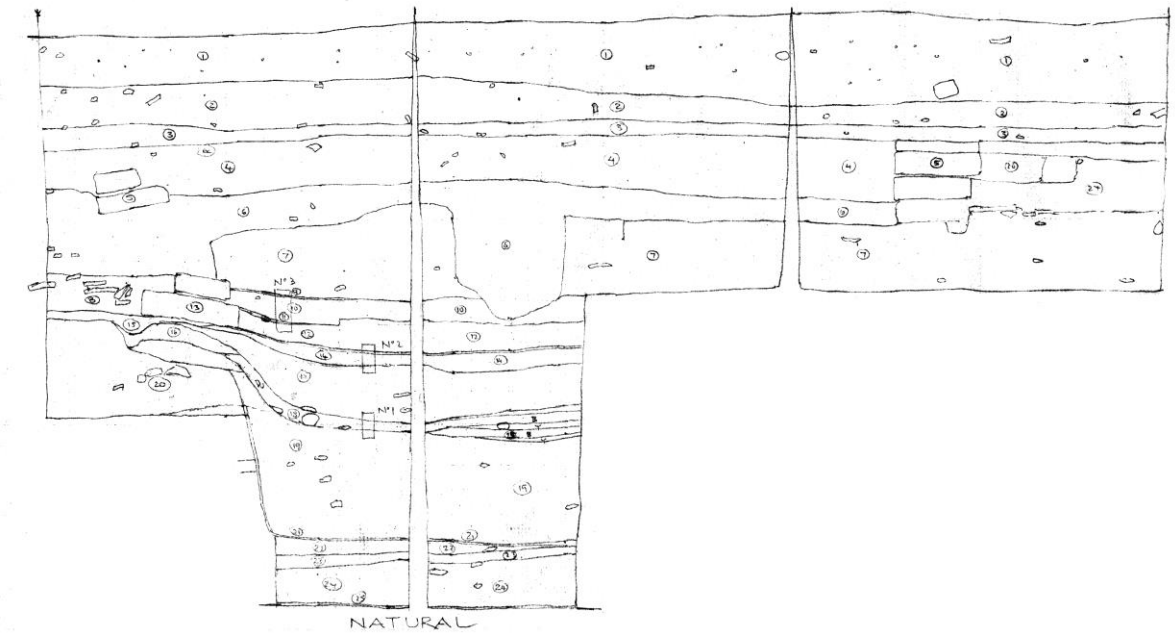
It is notable that the absolute height of the natural sand at the base of Trench MSD VII/YA2 is 0·75m below the average height of the ground surface around the mound. This suggests that since the site was established, the ground surface around the site has risen. It is worth noting that Masudpur VII is located relatively close to a sand dune, so it is possible that the accumulation of dune sand in the last 4000 years has contributed to the rise of the ground level.

A wide range of cultural material was recovered from the surface of the sites in the Masudpur regions and from the excavations at Masudpur I and VII. The most common material recovered was fragments of fired ceramic vessels of various periods, but there were also large numbers of ceramic and

Fig. 7-8



Contour plan of Masudpur VII (Bhimwada Jodha).



Section from Trench MSD VIII/YA2.

faience bangles, fragments of several different types of ceramic figurines and toy carts, and beads of various types, including examples made from semiprecious stones and one gold bead. The pottery recovered from the excavations at Masudpur I and VII ranged in date from the Early/Sothi-Siswal period to the Late Harappan period. A number of different ware types were represented, and these will be introduced individually by period.

The Early Harappan/Sothi-Siswal type pottery was marked by the appearance of a number of distinct fabric types that have previously been described at sites such as Kalibangan. These include chocolate slipped ware, and examples of Kalibangan fabrics A, B and D. Several sherds had examples of post firing graffiti, including several examples of a motif showing what appears to be crossed flags (pl. 28).

The Mature Harappan pottery was characterized by the appearance of a range of what are best described as local Harappan fabrics and decorative styles, together with numerous red-slipped ware and black-on-red-slipped ware forms and fragments (pls. 29-30) include dish-on-stand and numerous examples of perforated vessels were also recovered. Furthermore, several jar forms that are akin to the BARA vessel types seen at Alamgirpur were also recovered.

In addition to the Mature Harappan fabrics, there were also quantities of what appear to be Late Harappan forms and fabrics recovered. Typical forms include dish on stand in the late form.

A total of 172 antiquities were recovered from Masudpur I and VII, and these included a wide range of types. One of the most commonly recovered artefact types were fragments of segmented bangles, which appeared in both double and triple banded variants. No complete examples were found. In addition, a number of figurine fragments were recovered, and almost all of these were bovine figurines, many of which could clearly be identified as representations of the zebu. Several fragments of toy cart frames were also recovered (pl. 31).

One very distinctive anthropomorphic figurine was recovered from MSD VII (pl. 32). This object has excellent parallels to 4th millennium BC figurines from the site of Sheri Khan Tarakai in the Bannu District of the NWFP, Pakistan (Khan *et. al*. 1991).

A wide variety of ornamental artefacts were recovered, including a range of faience beads in various forms, several different types of steatite beads including a number of large disc beads, and a number of beads made from semi-precious stones, including banded agate, carnelian and lapis lazuli. Interestingly, a gold bead was also recovered from Masudpur VII. In addition to the beads, a large number of incised faience bangles of various sizes and forms were also recovered (pl. 33).

The survey and excavations carried out in the Masudpur area have produced a number of significant results relating to the location and distribution of prehistoric settlements, the preservation of those settlements, the chronology of occupation of those settlements and the geographical landscapes within which those settlements lie.

Plate 28-29



Early Harappan/Sothi-Siswal pottery, Masudpur.



Mature Harappan pottery, Masudpur.

Plate 30-32



Late Harappan pottery, Masudpur.



Terracotta bangles, figurines and toy cart fragments, Masudpur.



Anthropomorphic figurine, Masudpur.

Plate 33



Faience, steatite and semiprecious stone beads, and faience bangle fragments, Masudpur.

The survey around Masudpur has highlighted several of the problems that were noted after the survey undertaken by the project in 2008. The existing survey databases of proto-historic sites in Haryana list a total of 4 sites in the Masudpur area, and all of these are listed with one geographical location. The survey undertaken identified 13 separate sites, and the location of only one of these corresponds to the location listed in the existing survey databases. This confirms the observation that any attempts to assess the geographical context of the prehistoric archaeological sites in Haryana using the existing data set of prehistoric site locations are likely to be fundamentally flawed. It seems likely that such analyses can only be carried out if all known Harappan period sites in the region are resurveyed to establish their precise location, size and the periods in which they were occupied (Singh *et. al.* 2008). The evidence from Masudpur also highlights the fact that there are almost certainly a higher number of archaeological sites in Haryana than is currently recorded, and it is likely that small village sites are under-represented. If the Masudpur example is anything to go by, there could be as many as three times the number of sites. This has profound implications for our understanding of settlement dynamics in the region.

The excavations that were carried out at Masudpur I and VII focused on recovering well stratified cultural material, carbonized organic remains for new radiocarbon assay, samples for phytolith and soil micro-morphological analysis, and samples for flotation to collect macro-botanical remains. A multi strand analysis of this material is currently underway, and this will allow for a far more refined interpretation of site date range, use and function than is currently available. Detailed geo-morphological investigations of construction materials, floor composition and preparation, and occupation sequences are currently underway. In order to date the land-surfaces upon which these archaeological sites were established, samples for OSL dating were taken from the natural sand at the base of each trench.

By looking at the relationship between the geographical and landscape context and the archaeological evidence for human occupation, existing hypotheses about the impact of the environment on the Harappan civilization can be re-examined, particularly as they relate to water systems. It will be by determining the precise relationship between settlement, water resources and the landscape, that it will be possible for the first time to establish how the human populations of NW India interacted with the land.

JAMMU AND KASHMIR

21. SALVAGE ARCHAEOLOGICAL OPERATION AT TIBBA NAME SHAH, DISTRICT JAMMU: In continuation of the previous year's work, the Srinagar Circle of the Survey carried out a small-scale excavation under the salvage archaeological operation at the site of Tibba Name Shah (32°44'; 74°44') in the Marh block, Jammu tehsil, under the direction of R. Krishnaiah, assisted by AK. Khanna, M.K. Joshi, Prakash Kumar, Balbir Singh Jamwal, Gulzar Singh and R.K. Koul. The aim of the excavation was to establish the

nature and sequence of cultural deposits and correlate them with other sites of Jammu.

In all, eight quadrants of two squares each were excavated. Each square measured 10m x 10m. A preliminary study of the site revealed a five-fold cultural sequence:

Period I: Painted Grey Ware (PGW)
Period II: Pre-Kushana (grey ware)
Period III: Kushana
Period IV: Gupta
Period V: Post-Gupta

This kind of a cultural sequence has been found for the first time in the Jammu region. The most significant finding is Painted Grey Ware (PGW), from the northernmost state of the Indian sub-continent (pl. 34). At the site, habitation continued from the PGW period to the post-Gupta period. No structural remains were noticed in any period.

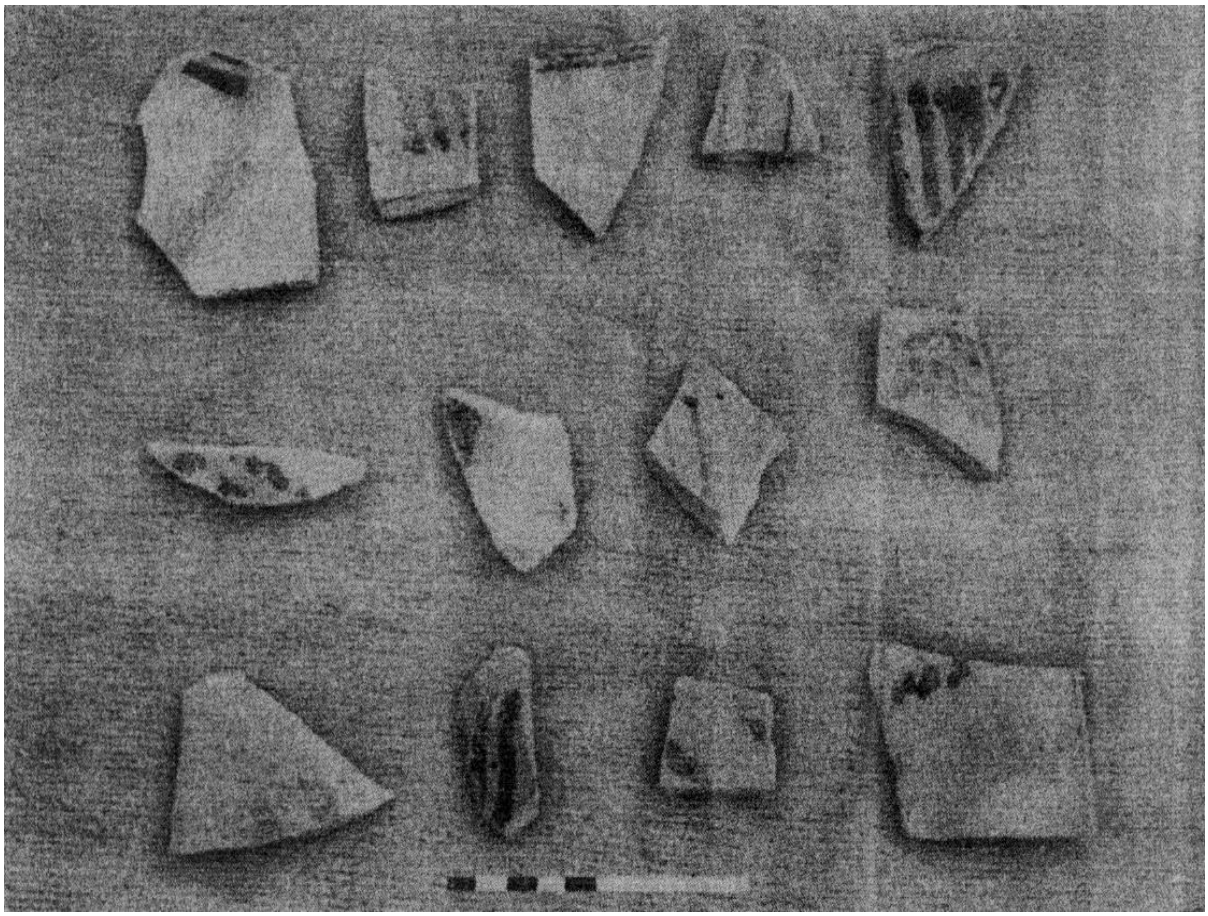
Subsequently, two quadrants, namely Qdt.I of Sq XCI and Qdt.3 of Sq AI were taken up for excavation to find out the stratigraphic sequence at the site. Fourteen layers were noticed in Qdt.3 of Sq AI. A separate horizon was found here, over the natural soil, at a depth of 7m from the present level of the road. The habitational layers (13&14) of Qdt.3 of Sq AI and layer (4) of Qdt.1 of Sq XCI represented the PGW culture belonging to Period I. Some sherds of PGW-wheel-made, well-fired and distinguished by black painting on grey ware-were found in the excavation. Plenty of associated grey ware and few black ware potsherds were unearthed in these layers with shapes such as bowls and dishes, fine to medium in fabric. No antiquities were noticed in this period.

Period II, represented by the habitational layers (10, 11&12) of Qdt.3 of Sq AI and layer (3) of Qdt.1 of Sq XCI, belongs to the pre-Kushana period. The excavation yielded sherds of grey ware with shapes being mainly dishes, bowls, miniature pots etc. Among the antiquities found, terracotta bangle pieces, beads, gamesmen and wheel are noteworthy.

Period III, represented by the habitational layers (7, 8 & 9) of Qdt.3 of Sq AI and layer (2) of Qdt.1 of Sq XCI, belongs to the Kushana period. The excavation yielded sherds of red ware with shapes being mainly stamped vases, dishes, bowls, basins, spouts basins with lips, lids, storage-jars, miniature pots, etc. These are distinguished by stamped designs and geometrical patterns with black painting on the surface. Important antiquities include a piece of shell bangle, hopscotch, sling ball, bangle pieces, terracotta cake and beads, etc. In layer (7), there was evidence of habitational floor/ working surface, covered with brickbats and stone pebbles.

Period IV, supposed to be the habitational layers (4, 5& 6) of Qdt.3 of Sq AI, belongs to the Gupta period. Plenty of potsherds were noticed in this layer. Most of them are red ware. Some are red-slipped ware and red ware with black painting. The shapes are mainly dishes, bowls, basins, spouts, basins with lips, lids, storage-jars, miniature pots, etc. The pottery is distinguished by appliqué designs on the surface of vases and geometrical patterns painted in black on other shapes. Among of the important the important antiquities found are beads of semiprecious stone, terracotta sling balls and

Plate 34



Painted Grey Ware (PGW) sherds from Tibba Name Shah, Jammu.

beads, bangle pieces, hopscotches and animal figurines etc. A habitational floor/ working surface with circular hearth were noticed in layer (5). The hearth yielded charred wheat.

Period V, represented by the habitational layers (1, 2 & 3) of Qdt.3 of Sq AI, belongs to the post-Gupta period. A large number of red ware and some red ware potsherds with black painting on them were noticed. The shapes are similar to Period IV red ware pottery. Some of the important antiquities are terracotta beads, bangle fragments, animal and bird figurines and a bone pendant, etc.

In XC1, a deposit of red wash with thickness of 2 ½m was encountered which could not be studied probably due to the raise of sub-soil water in the trench. Sherds were also noticed in this deposit of red soil. This is an unusual phenomenon and to know the nature of the deposit of red wash/ soil of suchthickness, probably above the natural soil, one needs to investigate further.

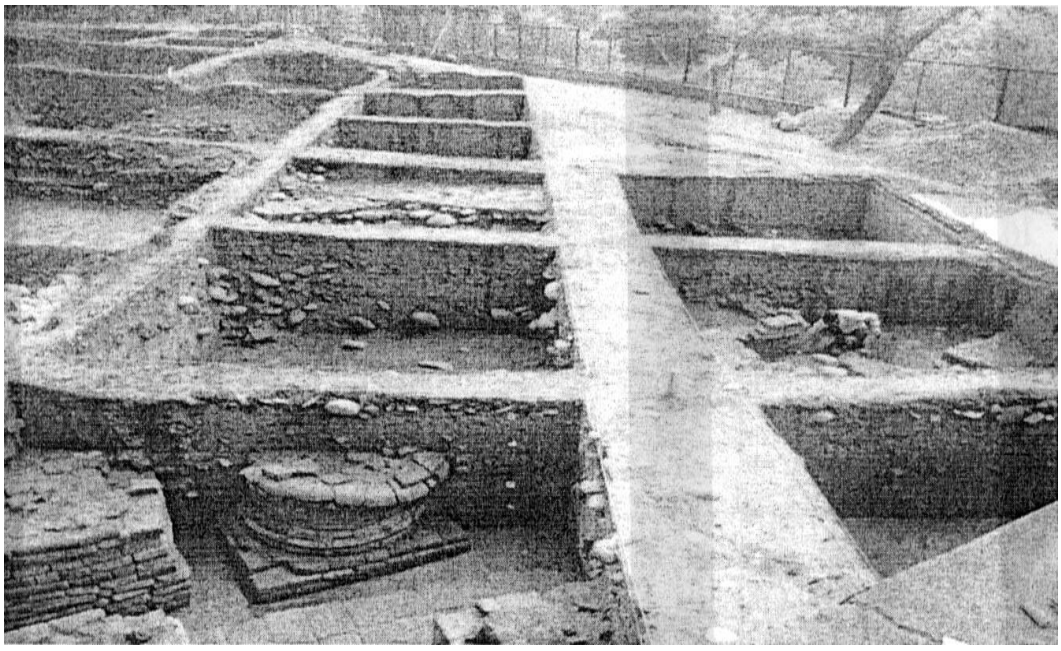
22. SCIENTIFIC CLEARANCE WORK AT AMBARAN, DISTRICT JAMMU: Srinagar Circle of the Survey, under the direction of R. Krisnaiah, assisted by A.K. Khanna, M.K. Joshi, Prakash Kumar, B.S. Jamwal, Gulzar Singh, R.K. Koul and Raghubir Singh, carried out scientific clearance and conservation work at the ancient Buddhist site of Ambaran, near Akhnoor, on the right bank of the River Chenab, about 28km north-west of Jammu. During the course of conservation, when some structural remains were unearthed, systematic scientific clearance was begun to assess their character. Scientific clearance was undertaken in thirteen quadrants of seven squares, of 10m x 10m each, in a limited area within the fencing. As was noted in the excavation reports of the site between 1999 and 2001, no structural remains were encountered in Period I (pl. 35). Four votive stupas (pl. 36) were unearthed in Qdt.3 ofTrench XA3 in the same level, sealed by layer (2) of Period II. Out of the four votive stupas, three are square in shape and measure 1·40 x l·l0m; 1·79 x 1·80m; 1·70 x 1·70m respectively. They are built using twelve, twelve and nine courses of burnt-bricks respectively, of size 37cm x 23cm x 7cm. One of the votive stupas has an almost square base, 1·50m x 1·40m, built using three courses of burnt-bricks measuring 37cm x 23cm x7cm. The upper portions of all the votive stupas are missing. Potsherds exhumed from the site are mainly red ware of medium to fine fabric, devoid of paintings. The shapes are spout, sprinklers, lamp, bowl, basin and storage-jar. Beads of semiprecious stone and one ring of copper are noteworthy findings.

JHARKHAND

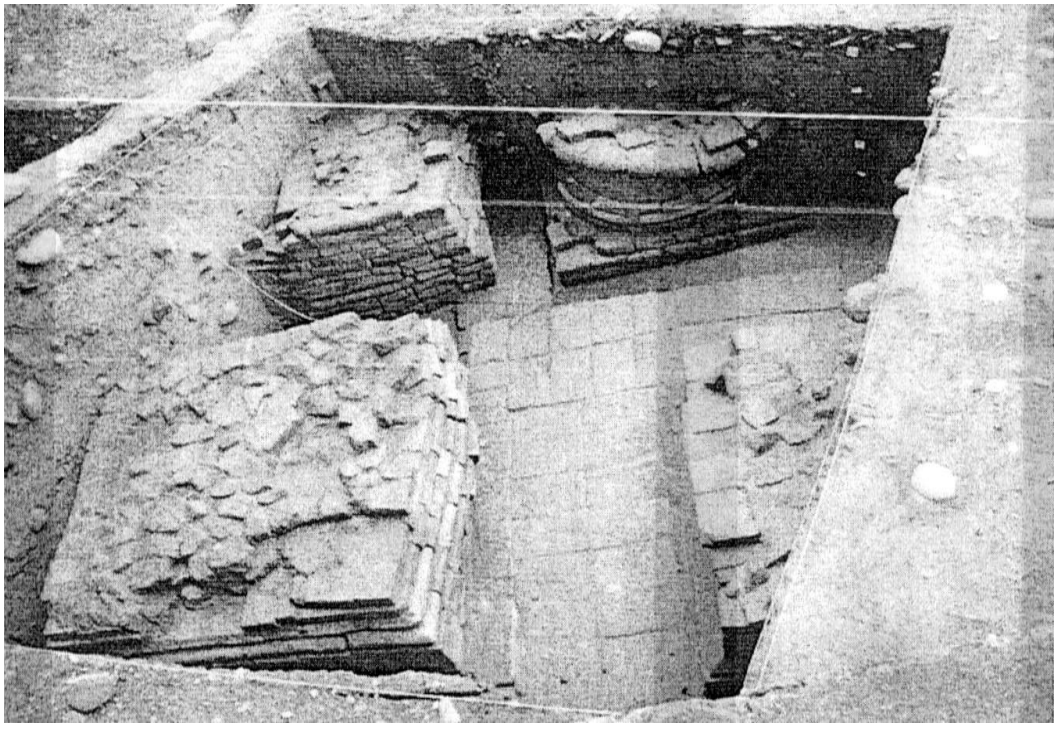
23. EXPLORATION IN DISTRICT SARAIKELA KHARSAWAN: The Ranchi Circle of the Survey, under the direction of C.L.N. Shastri, assisted by M.K. Sarkar, N.K. Sinha, R. Raj and C. Kumar, conducted an exploration in and around the subscribe area of the proposed Icha Dam, as a part of the Subarnarekha Multipurpose Project.

In the course of exploration, the Sri Raghunathji Mahaprabhu Temple was inspected. Stylistically, the main shrine has a curvilinear *sikhara*, whereas the *sikharas* of

Plate 35-36



View of the exposed site, Ambaran.



Excavated votive stupas, Ambaran.

the four adjoining rooms follow the dual *pidha* style. The sanctum of the temple is 3·15m x 4·70m, approached by a rectangular 3·10m x 4·70m porch, constructed using burnt-bricks with traditional adhesive lime and *surkhi*. The interior of the sanctum has geometric/non-geometric and floral paintings, created by applying polychrome resin. According to the tradition of the local *raja's* family, the temple dates back to 1887 CE.

24. Exploration at Ghatsila, District East Singhbhum: In continuation of the previous year's work, the Prehistory Branch of the Survey, under the direction of D. Bhengra, assisted by Gajanan Katade, R.K. Dwivedi, P.L. Janbandhu and P.S. Pashine, re-explored Ghatsila, on the bank of River Subarnarekha, near Tatanagar. The exploration yielded Lower Palaeolithic handaxes and cleavers made of quartzite. Most of the tools which were collected from the river-bed are rolled and weathered.

25. Scientific Clearance Work, Benisagar, District West Singhbhum: The Ranchi Circle of the Survey carried out scientific clearance at the protected site of Benisagar under the supervision of C.L.N. Shastri, assisted by R.K. Sinha, N.K. Sinha, Abdul Arif, R. Dehuri, R.K. Raj, M. Brahmchari and M. Ekka. In the course of clearance, an area of 40m x 30m area in Devisthana was exposed. The remains of eight dilapidated platforms measuring 1·75m x 1·90m, 1·20m x 1·90m, 0·72m x 0·70m, 0·70m x 0·70m, 0·80m x 0·85m, of small shrines, which are very close to each other, were exposed in the northern part of the exposed area. The remains of another *panchayatana* temple-complex, dedicated to Siva, were exposed. An 80cm long Siva-*linga* was lying in the debris over the sanctum. The sanctum is built out of stone, *tri-ratha* in plan and measures 3·80m x 3·80m. The four subsidiary shrines, located on four corners of the main shrine are equal in size, measuring 1·50m x 1·70m. The Siva-*linga* and three sub-shrines are intact. A part from these, a roughly squarish brick-built structure was exposed in between the two *panchayatana* temple-complexes. The outer surface of the structure's wall has a small shrine with a small Siva-*linga*. Interestingly, a number of post-holes were exposed along with wall and brick flooring. A good number of sculptures were also noticed, of which, those of Sakambari or Lajja-gauri, seated lion, terracotta animals and standing Siva holding trident are important.

KERALA

26. Exploration in District Kozhikode: The discoveries were made in the course of a field study undertaken by N.K. Ramesh, a student in the Department of Anthropology, Kannur University Centre at Palaya Campus, under the guidance of the faculty members of the Department of Anthropology, Kannur University with the help of P. Rajendran from the Department of History, Kerala University. A large number of urn-burials were discovered at Kokri. The evidence includes big jars, black-and-red ware pottery and capstone. The bigger jars are hand-made and sun-baked while others are wheel-made and kiln-baked. Several urn-burials have been found in and around this area earlier. The presence of a

large number of urn-burials clearly shows that the region was inhabited by the Megalithic people. There is a cultural continuity among the primitive tribes in the interior forest of the region. A proto-handaxe was discovered from Kattikkandam near Puzhamula. It was found from the high terrace of the River Vanimel, which is in the highland region. A pointed hand axe made of quartz pebble, it is 16·5cm in length, 6·6cm in breadth and 4·4cm in thickness. Its ventral side is fully flaked leaving a prominent ridge running end to end, half of its dorsal surface retains the cortex while the remaining part is flaked. Clear flake scars indicate the use of the stone hammer technique. One of its longer margins has a zig-zag edge, which proves alternative flaking. It is a typical Lower Palaeolithic tool discovered for the first time from district Kozhikode. Similar implements were discovered long back by P. Rajendran from Thenkara in District Palaghat. They clearly show the Acheulian elements of the Lower Palaeolithic in Kerala. Most of the other Palaeolithic evidence from Kerala belongs to the chopper-chopping flake industry of Lower and Middle Palaeolithic culture.

Three stone adzes were discovered from Kommiyode and one from the gravel bed of the River Vanimel at Pandikkadavu. The Stone Age people utilized locally available granite, quartz and river- worn pebbles as raw materials for making tools. The adzes made of quartz are well polished and more or less symmetrical in shape. This kind of preparation of quartz requires high expertise in quartz fabrication. Tools made of granite have a polished convex dorsal surface while the ventral side is concave with flake-scars and not polished. They have more or less a straight to convex working edge at the distal end. The length, breadth and thickness of the adzes are respectively 10·1-5·8-2·4cm; 8·6-4·3-1·7cm; 9·1-4·6-2·2cm; 12·8-5·6-2·4cm. Such a concentration of Neolithic implements from the region illustrates that the region was inhabited by the Neolithic people during the late phase of the Holocene. Similar evidence has been reported from several sites in Kerala, stretching from the coast to the Ghats.

27. EXCAVATION AT KADANAD, DISTRICT KOTTAYAM: The Thrissur Circle of Survey, under the direction M. Nambirajan, assisted by K. Lourdu Swamy, C. Kumaran, Leksmi and L.R. Rakes, undertook excavation at the megalithic sites of Kadanad in Meenachil taluk, with a view to understand the material culture, distribution, settlement pattern and chronology of the megalithic culture of central Kerala in particular and Kerala in general. The cist burials are located in three different localities viz., Mattathilpara (KND-I), Inchukavu (KND-II) and Kurumannu (KND-III) in the revenue limits of the Kadanad village. These megalithic sites are located about 56km north-east of the district headquarters Kottayam.

The megalithic sites KND-I and KND-II were found in disturbed and partially exposed conditions. KND-I consists of two cist burials and KND-III consists of four cist burials arranged side by side in north-south orientation. KND-II yielded a single transeptal dolmenoid cist having traces of cairn packing on the west. All the cist burials are oriented in east-west direction.

The associated burial goods and ceramics were found in KND-III.

KND-I, locally called Mattathilpara, is located about 8km north of KND-II and KND-III, approachable through the PWD road from Neelur to Karimkunnam junction. The megaliths at Mattathilpara consist of two cist burials arranged side by side in east-west direction. Cist-I is partially disturbed and its port-hole on the west is visible. The horizontal method of excavation was followed by layinga 5m x 5m trench at the site. Cist-I, located to the north of this group, measures 203cm in length, 111cm in width and 154cm in height. Cist-II, to the south, measures 176cm in length, 152cm in width and 155cm in height. The eastern orthostats of Cist-I and orthostats of Cist-II are partially broken and have fallen inwards. The maximum depth of the trench was 170cm. Port-hole orthostat on the west of both the cists are approached by a passage chamber measuring 1cm x 1cm x 75cm. Cist-II has a stone-paved floor at depth of 135cm from the ground level. Except some fragments of red ware and black ware, no other burial goods were collected from the burials.

KND-II is located 8 km south-east of the KND-I and can be approached from Neelur. The site has been subjected to cross-section method of excavation, to expose a transeptal dolmenoid cist with cairn packing. The orthostats on the northern, southern and eastern sides are almost intact except the western one, which is broken. The transeptal cist has two port-holes on the west. The average dimension of the cist is 290cm x 195cm. The northern orthostat measures 300cm x 28cm x 190cm; the southern one is 275cm x 23cm x 200cm and the eastern one is 300cm x 26cm x 200cm. No antiquities were collected except fragments of pottery, mainly red ware, black ware and small sherds of black-and-red ware.

KND-III yielded a group of four cist burials found side by side, situated 2 km south-west of KND-II. At least one orthostat each in all the cists is in a partially disturbed condition. The site has a natural slope from east to west. All the cists are arranged in east-west direction having the port-hole orthostat in the west. To reveal the full extent and nature of the burials, two 10m x 10m trenches were laid out according to the grid pattern. Among the four cists, Cist-II (256cm x 182cm x 172cm) and Cist-III (230cm x 170cm x 180cm) are the largest ones. All the burials contain burial goods such as antiquities and black-and-red ware sherds along with iron objects. Skeleton remains were not included. Orthostats of Cist-I and Cist-II are arranged in a clockwise direction but that of III and IV are in an anti-clock wise direction. The port-hole orthostats of all the cists are located in between the northern and southern orthostats.

All the cists are rich in pottery, although majority of them are highly fragile. Cist-I, Cist-II and Cist-IV have single urns. Cist-II consists of two urns of red ware. Other ceramics in the burials include bowls of black-and-red ware, vases of red ware, miniature pots, ring stands, etc. Among twenty-five pottery pieces found from Cist – IV, ten are ring stands. Cist-III, Cist-II and Cist-I contain twelve, eighteen and six

pottery pieces respectively. All the pottery is highly fragile, coarse in fabric and ill-fired. The excavation has yielded varieties of beads in chert, quartzite and carnelian. Only one etched carnelian bead has been found from the urn in Cist-I. The etching is done in white colour. It is a long, barrel-shaped bead with zig-zag lines enclosed within a singular marginal line on either side. Other beads include barrel-shaped, cylindrical and long pendant type. Iron implements from KND-III are unique and are in a well-preserved form.They include dagger, spearhead, sword, long rod, long rod with curved edges, hoe, axes, etc. An iron rod from Cist-I, with hilted handle on one end and curved long projections on the other, is a unique artefact found from the Kadanad megaliths. The hilted iron implement was kept in a vertical position as the hilt of the rod rested over the rim of a black-and-red ware while the other end was facing the floor.

28. EXPLORATION IN CHYTRAV AHINI, DISTRICT KASARGOD: Shri N.K. Ramesh, an Anthropology student in the Department of Anthropology, Kannur University under the direction of Dr. P. Rajendran, UGC Research Scientist and Archaeologist in the Department of History, Kerala University, discovered a few Palaeolithic implements at Cheerkkaya and Anakkayan on the Chythravahini river basin, in the highland region of Kasargod district. These are from the terrace of the river. They have the characteristics of pointed choppers of the Lower Paleolithic and are made of the heavy split pebbles of granite. In addition, there is a borer-cum-scraper made of a large flake ventral surface of which has single flake scar while several flakes scars are seen on the dorsal side. The notch near the borer end and the dorsal ridge are conspicuous. A side scraper on a flake has also been discovered. Unifacial secondary flaking from the dorsal surface along the two margins is clear and the tool is slightly rolled. These palaeolithic implements are discovered for the first time from Kasargod district.

29. EXCAVATION AND EXPLORATION AT PATTANAM, DISTRICT ERANAKULAM: Pattanam (10° 09·434'; 76° 12·587') is a hamlet under Vadakkekkara revenue village in Paravur taluk of Ernakulam District. The site is located in the delta of the river Periyar, about 25km north of Ernakulam/Kochi. About one km south of the site, flows the Paravur Todu, a tributary of the river Periyar. The Arabian Sea is about 4km west of the site. About one km from the western boundary of the site is the Tattapally River or Munambam kayal, a backwater body that runs parallel to the Arabian Sea. Pattanam is densely populated and land is mostly owned by families. The site has been considerably disturbed by various activities like digging for wells, ponds, house construction and agricultural activities. Another noteworthy feature of the site is the network of canals linking the area with the Paravur Todu and the Tattappally River and many residents remember that these canals were used by boats until mid-20th century.

The excavations were carried out under the direction of P.J. Cherian, Director, Kerala Council for Historical Reseach in collaboration with various research institutes and universities of India and foreign

countries. The investigations sought to explicate the site and its historical and cultural contexts from a holistic perspective.

The objectives of excavation included to understand the cultural and chronological sequence of the site; study the spatio-temporal organization of the settlement, re-construct the palaeo-environment, understand the layout of the port-town; study its industrial output and technological legacy, unravel the cross cultural movements; map the maritime heritage of the west coast, evaluate the role of Pattanam in the Indian ocean trade, study the state and polity of the region, locate Muziris the ancient trade emporium on the west coast, and establish site museums and interpretation centers at Pattanam.

The excavation adopted 'locus methodology' which distinguishes each layer/feature/pit/structure/activity (termed as locus) on the basis of colour (measured by Munsell colour chart), texture and composition. Each locus was excavated as one unit. The top and bottom levels of each locus in relation to the trench datum point along with its other dimensions were measured. The top plan of each locus was drawn to scale. As excavation preceded, the Harris matrix, depicting the relationships between the different loci was prepared.

The core area of the Pattanam site covers about 0·5sq.km (45 hectares). The northeastern part of the site was selected for digging. This choice was partially due to the unwillingness of local people to provide land for excavation. Five trenches (PT 08 VII, VIII, IX, X, XI) covering an area of *ca*. 160sq.m were excavated in the northeastern part of the site almost adjacent to the trenches of 2007. In addition, in the northeastern part of the site at the Padamadathil house plot-three trenches (PT09-XII, XIII and XIV) measuring 5m x 3m was also dug. Towards the western side of the site, a fourth trench PT 09 XV measuring 4m x 2m was dug in the Pattanam Government LP School ground. A total area of *ca*. 60sq.m was excavated in 2009.

Pattanam is a multi-cultural site that seems to have been occupied from the early centuries of the first millennium BCE. Based on the stratigraphic, artefactual, Accelerator Mass Spectrometry (AMS), radio carbon dating and other chronometric analyses, the *ca* 4m thick cultural deposit can be divided into four cultural periods:

Period I: The Iron Age-Early Historic Transition (10th *c*. BCE to 3rd *c*. BCE). The earliest cultural period can be termed as Iron Age-Early Historic Transition and is represented by the deposit above the Aeolian sandy layers. This period represents the terminal Iron Age and the beginning of the Early Historic, prior to the Roman/West Asian contacts. It is marked by typical Iron Age/megalithic ceramics, iron objects and fragmentary human bones.

Period II: The Early Historic (2nd *c*. BCE to 4th *c*. CE). The Early Historic occupation is marked by a plethora of imported Pottery. Roman Amphora, Terra Sigillata, WestAsian pottery and Turquoise Glazed Pottery (TGP) are the most important identified categories. Burnt bricks, triple-grooved tiles and huge quantities of local pottery including Indian Rouletted Ware suggest that Pattanam trading community

had been engaging with emergent regional trade networks. The brick structures and post-holes are comparable to the Early Historic architectural features found at Arikamedu, Korkai, Azhakamkulam, Poompuhar (Kaveripattinam), Kodumanal and Porunthal excavation sites. Other interesting finds include semiprecious stone beads, cameo blanks, gold ornaments, Roman glass ware, glass beads and early Chera copper coins (pls. 37-46).

Period III: Medieval (5th *c.* CE to 15th *c.* CE) the Early Medieval period is represented mainly by the blue glazed early Islamic pottery and enormous quantity of glass beads. Some of the architectural features of the Early Historic period seem to have been re-used in the later periods. In this broad Medieval Phase (5th *c.* CE to 15th *c.* CE), the site could have been less occupied or deserted or re-occupied. This period seems to be not an active phase of the site and gaps in between can be understood through further studies.

Period IV: Modern [16th *c.* CE to the present] The very scanty Late Medieval occupation at the site probably indicates desertion. There is lack of evidence for the 11th to 16th century period. The blue-on-white Chinese ceramics and oral history suggest that the site witnessed re-occupation possibly after the arrival of Portuguese traders. The land settlement records indicate that communities with landed property left the site in the 19th century.

Among other findings of excavation are the water-logged area near the wharf fetched botanical remains including a rope made of an unidentified plant fibre, teak, pepper, cardamom, paddy, coconut shell and frankincense. A layer of clay at *ca* 3 m depth in the water logged area seems to have prevented oxidation and ensured the preservation of botanical remains from decay. A variety of non-local (foreign) ceramics, a large number of semi precious stone and glass beads (over 3000), copper coins -most of them in a corroded condition, iron, copper, gold and tin artefacts, cameo blanks, spindle whorls, terracotta lamps, etc. were also found. In addition, structural remains and huge quantities of re-used bricks and broken roof tiles have also been reported. The maximum size of intact bricks measured 40cm x 20cm x 7cm. Local pottery sherds numbering over 4 lakh imply the density of habitation at the site.

The Kerala Council for Historical Research under the direction of P.J. Cherian has also conducted exploration in and around Kodungallur during the period under review. The objective was to identify Early Historic satellite sites and to collect archaeological, anthropological and topographical information. Relevant bits of information could be gathered from Mathilakam (north of Kodungallur), regarding its archaeological potential through surface findings and features. Edavilangu, Kodungallur. However, this could not be followed up. The Naval Hydrographic Team of Southern Naval Command of the Indian Navy organized underwater explorations in the rivers, backwaters and off-shore. The objective was to identify archeological remains like ancient shipwrecks and debris of structures. Rear Admiral HS Bhaktvatsala, VSM of Southern Naval Command flagged off the Survey and

Plate 37



Brick structure and toilet feature, Pattanam.

Plate 38



Brick architecture, Pattanam.

Plate 39-40



Pattanam wharf, Eranakulam district, Pattanam.



Brick architecture, Pattanam.

Plate 41-42



Rope made out of plant fibre, Pattanam.



Northern section of the trench PT 08, VIII, Pattanam.

Plates 43-44

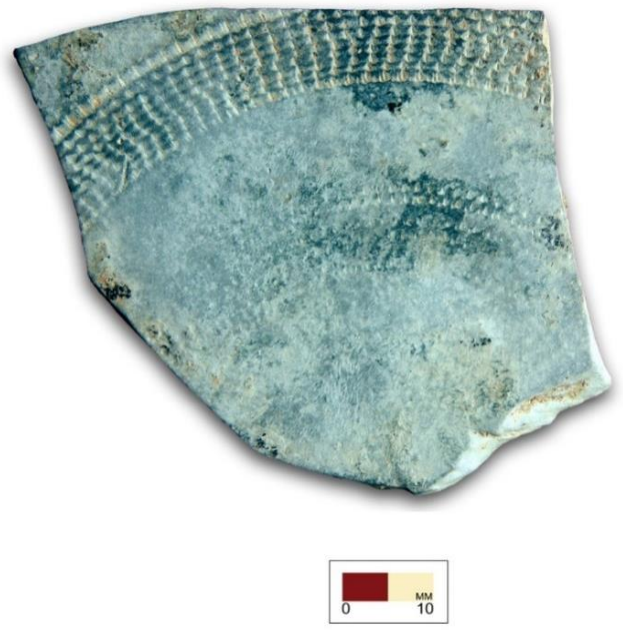


Stone beads, Pattanam.



Cameo blanks, Pattanam.

Plate 45-46



Indian rouletted ware sherd, Pattanam.



Early Chera coins, Pattanam.

Diving Operations at Kottapuram, Kodungallur. The survey was carried out using Digital Side Scan Sonar interfaced with Differential GPS and Echo Sounder. A Digital Side Scan Sonar makes use of the sound energy to locate the seabed/riverbed undulations, which get represented on the digital trace as submerged objects, etc. The Side Scan Sonar images were analyzed to locate the potential spots for underwater diving and photography. The findings were inconclusive, but important to understand the sedimentation pattern evolved over the centuries due to accretion.

Field surveys were organized in the area around 10km of Pattanam site during weekends to identify Early Historic satellite sites and to collect archaeological, anthropological and topographical information. A boat survey of about 20km distance in the vicinity of Pattanam was conducted to identify the paleo-channels that connect Pattanam mound with Paravur Thodu and Cheraikayal or Pallipuram channel.

MADHYA PRADESH

30. EXPOSITION OF LAL BAGH, MANDU, DISTRICT DHAR: During the period under review, debris clearance work was carried out which exposed the evidences of ancient/medieval water works in this area. The area possess a symmetrical arrangement of terraces (platforms) interspersed by water channels besides tanks and cascades facing each other. The exposition of the water channels not only showed a system of channels on four directions but also fountains along all four directions besides the central one. The evidence found here appears that the water was supplied from the Sagar Tank located on the west through a system of terracotta pipes connected with tank.

31. EXCAVATION AT MEHTAKHERI, DISTRICT WEST NIMAR: The site of Mehtakheri (22 13' 44"; 76 01' 37") was excavated under the direction of Sheila Mishra of Deccan College, Pune to collect samples for luminescence dating securely associated with the microlith horizons. Previously, a date from ostrich egg shell of 41 kyr had been obtained for this site. Therefore, it was expected to get an old date for this site. The trench was taken in the area of thickest remaining sediment cover in the gulley to the west of Mehtakheri village. A step trench was taken. The stratigraphy is as follows:

Unit 1 (0-270cm) A series of units of sandy silt. 9 layers were distinguished on the basis of finding upwards. No artefacts have been found (270-307cm) thin layers of sand and clay. The sand has an erosional contact with the underlying series without any artefact.

Unit 2 (301-460cm) Calretized sandy silt. Layers were distinguished on the basis of calcrete in between the layers. Artefacts occurred continuously from 300cm upto 460cm with largest frequency of artefacts at 320 cm, 350cm and 410cm. An ostrich eggshell piece was found at a depth of 360 cm which might be the level from which the previously dated ostrich eggshell reported.

Unit 3 (460-550cm): More sandy and less concretized than above layers.

The sediments exposed in the step trench can be divided into three main units, each with a number of layers. Layers 1-9 are all sandy silt. The boundaries between the layers are marked by calcrete and each one appears to fine upwards, so that the coarse base of the upper layer and fine top of the lower layer can be seen. In a few cases, a distinct silt layer can be seen in-between two sandy silt layers, as in the boundary between layer 2 and 3. They resemble flood deposits known as "slack water deposits". Calcrete nodules occur but the sediments are loose, and have 10 YR hues on the munsell colour chart. Layers 10-17 at 270-301cm depth, form the second unit. This unit shows more variation in texture, with bioturbated fine sands, showing horizontal laminations interlayering with silt and clay layers. Layer 17 is a discontinuous sand unit which has an erosional contact with layer 18, the top layer in unit 2. This series of layers shows a different fluvial facies to that overlying it. Rather than uniform flood deposits, a near channel series of sands with clay dropes are seen. This unit has similar colour and calcretization to the unit 1 above. Layers 18-25 show very distinct difference in colour and compactness to the above layers. Sedimentary structures are obscured by pedogensis and calcretization. Layers have been distinguished on the basis of calcrete nodules between the layers, filled cracks and some more sandy layers. The microlithic artefacts are found throughout this unit, although the frequency varies through the section as discussed above. At 460cm the colour and texture of the sediments change to become less compact and more sandy. The colour is less red. Artefacts become in frequent. Associated luminescence dates imply an age gap of around 20 kyr between unit 2 and unit 3. The stone tool industry is microlithic in nature. Cores occur in low frequency compared to debitage and blades. All the cores are microblade cores. Only 2 backed blades were found.

MAHARASHTRA

32. EXCAVATION AT KHOLAPUR, DISTRICT ARAVALI: In continuation of the previous year's works, the excavation of Early Historic site of Kholapur (20º 57'; 77º 31') located on the right bank of river Purna about 30km west of Amravati, a district place in Vidarbha region of Maharashtra was taken up as a part of UGC sponsored project under the direction of B.C. Deotare assisted by Satish Naik, Gurudas Shete, Sachin Joshi Srikant Pradhan, Reshama Sawant, Astha Dibyopama and Kanchana Bhaisare of the Department of Archaeology, Deccan College, Post-graduate and Research Insitute, Pune. Because of large extent of the site, locality I, V and VI were selected for three trenches to reconfirm the stratigraphic sequence revealed in last year's excavation. The ancient habitation is spread over an area of more than hundred acress including present village surrounded by partly intact mound. In locality I on mound II, two spots were selected for resistivity surveying in order to reveal underground ancient feature. The surveying was done by putting grid of 2m covering 20m x 20m area. Wherever there was a buried structure, the resistance of that spot was high, the results were plotted on the graph paper and huge resistance area is marked and accordingly the trenches were taken. The

materials recovered in the excavation were the house quantity of pottery, brick bats, broken roof tiles, etc. Because of the concentrated fired material, there was high resistance. The field near to mound II was ploughed and leveled for agricultural purpose. Another trench measuring 4m x 4m was taken on mound 1 of locality VI. It has 2·5m habitation deposit resting over the virgin black cotton soil at the base. The red ware, red slipped ware, chocolate or brown ware, black-and-red ware and micaceus ware are the characteristic pottery of this trench. The chocolate ware in some cases turned into black. Micaceous ware is characterized by fabric containing small mica grains. The sherds decorated with moulded deisgns on red slipped ware and graffiti marks on black-and-red were also come across. Delux pottery like thin black ware and red polished ware is also found which is identical to Bhon suggestive of Gangatic plain and Gujarat coastal contact. Tiles are found in profuse quantity throughout the depth of this trench. The broken brick pieces are also recovered along with tiles. The terracotta antiquities such as beads (areca nut, round, round and flat collar shaped), *triratna* pendants, drop pendants, a human figurine amulate, mounded ear studs with intricate design, wheels, discs, rod and animal figurine have been recovered from this trench.

Another trench measuring 2m x 2m at the highest point of mound of Locality V was laid down with a view to have fair idea of stratigraphic sequence. The total thickness of habitational deposit is around 2m. Tiles and bricks are totally absent throughout the deposit. The other antiquities in lower levels are terracotta discs, gamesman, drop pendants, weight and canelian beads, iron and copper fragments. The Locality-I and Locality VI can be placed to *c.* 3rd century BCE to *c.* 1st century BCE (Pre-Satavahana phase) on the basis of identical material culture from Bhon, the site around 90km west of Kholapur in downstream of the Purna river. The bricks and tiles, black ware imported from Gangetic valley, un-inscribed die-struck coins and mounded terracotta antiquity are identical characteristic feature of this period. These characteristic features of Pre-Satavahana period are totally missing in a trench of 2m deposit of Locality V and thereby confirming this lower deposit most probably belongs on the Mauryan and Iron Age. The initial observation based on the recovery of antiquities and stratigraphic sequence from both the trenches suggests that the site was occupied from *c.* 6th – 5th century BCE and continued up to 1st century BCE. The extent wise this seems to be one of the largest Early Historic settlement in the central India in general and Vidarbha in particular.

33. EXCAVATION AT JUNNAR, DISTRICT PUNE: In continuation of previous year's work the excavation at Agar (Junnar) was taken under the direction of Vasant Shinde and Shreekant Jadhav assisted by Shrikant Ganveer of Deccan College, Post-graduate and Research Institute, Pune. The main goal was to establish a cultural sequence at the site of Junnar and to find out if there is any pre-Satavahana phase, at the same time to reach the virgin soil. One Trench F15 was undertaken and excavated upto a depth of 6·63m. Structures (house) of burnt bricks were exposed and thoroughly documented.

Remains of a fallen house were recovered at a depth of 1·24m. Random rubble masonry ramped in black cotton soil recovered in three different levels appears to be the foundation of houses. The pottery recovered in Trench F-15 in this season is the same which was recorded in the previous seasons. The antiquities like shell bangle pieces and debitage, areca nut beads etc. are the same found in the previous seasons. The most noteworthy antiquities of this season are – the small perforated shells (10mm) about 20 in number and a lead coin of Nahapana recovered in the 12th layer.

A total 20 Mollusoan shells were recovered from Trench F15 at a depth of 2·25m. The shells are very small in size i.e., 10mm. All are marine shells, except for one which is a land snail *(Zootecus insularis)*. The marine shells comprise one bivalve species *(cardium sp)* and two gas tropod which are yet to be identified. Some of the cardium shells show perforation below the umbo region. It is yet uncertain whether the perforation is natural or artificial and needs to be investigated.

The large burnt bricks set in yellowish mud-mortar were exposed. The fallen debris on the wall and inside the structure indicates presence of a superstructure made of mud brick and terracotta tiles. This could be assigned to Satavahana period as the typical brick size and the roof tiles which are flat with two holes would indicate. Considering the size of the structure which extends towards south, east and west, it appears to be part of the wall that was excavated in the adjoining trenches i.e. D14 & E14 in the previous seasons. Large size of the structure with a solid foundation made of alternate layers of black clay and stone boulders suggests its public nature. This appears to be a large building made for community use.

34. EXCAVATION AT MORGAON, DISTRICT PUNE: In continuation of previous year's works, Sheila Mishra and Sushama Deo of Deccan College excavated a small trench at Moregaon to understand the occurrence of the tephra. Trench was taken in the furtherest down stream exposure of the tephra, on the bank of the Karha river (18 16'27'; 74 19'56"). 2m of black fissured clay and 3m of gravel overlies the excavated trench which was taken on a small erosional bench. No artefacts were found in the excavation. A few re-worked Acheulian artifacts have been found in the upper gravel. A laterite pebble was collected from the lower gravel.

The excavation made a number of clarifications in the stratigraphy. The tephra occurs within the black fissured clay. The gravel below the tephra which occurs within the pinkish silt and the gravel overlying the tephra which occurs within the black fissured clay show different post-depositional weathering. The lower gravel is well cemented, the basalt pebbles have a grey patina. The gravel facies varies from coarse sand with a few pebbles to rubbly horizons while the upper gravel is sandy pebbly gravel. The pebbles in the upper gravel have a black colour, and do not appear very weathered. Some bivalve shells could be collected from this gravel. No convincing microliths could be found in this gravel, but a few re-worked Acheulian artefacts were found. One single direction core on basalt was collected from exposure

of this gravel. The gravel containing Acheulian artefacts differs from both the gravels occurring with the tephra. It has a well developed reddish weathering ring and is differentially cemented. The gravel underlying the tephra appears older or contemporary to the Acheulian while the gravel overlying the tephra appears younger than the tephra.

35. EXCAVATIONS AT CHAUL, DISTRICT RAIGAD: A team comprising Abhijit Dandekar, Sachin Joshi and Shivendra Kadgaonkar of Deccan College, Pune under took excavation at the archaeological site of Chaul, in continuation of the ongoing research on the west coast of Maharashtra to understand long distance trade between India and Europe in the Early Historic and Medieval periods. A small trench on top of a hillock opposite the Hingalaj Mata temple hill was taken up for excavation. The locality was designated as 'CHL-H'. It was important to see nature of this structure on the hill top as the road on which it is situated was a main trade route starting from the port of Chaul going to hinterland. Previous explorations carried out on the hill have yielded pottery and roof tile, indicating some structural activity at the top. A small trench of 3m x 3m was taken which was eventually extended on the southern side by 1m. Although the deposit was very thin, i.e., 15cm, it has revealed the evidence of a structure. A big spread of roof tiles of the medieval period was cleared. A few antiquities such as fragments of glass bangle and nails were recovered. Ceramic assemblage comprised monochrome glazed ware, Chinese Blue-on-White Porcelain and coarse red ware of the medieval period. A partial skeleton which was sandwiched between the roof tiles was also recovered. A few teeth and fragments of long bones were the only retrievable parts of the skeleton. In addition, Ground Penetrating Radar Survey (GPRS) was also conducted at the site which has revealed possibility of a large structure.

36. EXPLORATIONS IN KONKAN, WEST COAST REGION, DISTRICT SINDHUDURGA: Exploration was carried out by Deccan College in the Kanakvali, Kudal, Savantwadi and Malvan talukas and brought to light the following sites of archaeological importance.

Dev Adityanath Temple: This temple is situated in village Ajagaon of Savantwadi taluka. A Surya image was found in the temple. The height of this image is 0·80m. Surya is standing on the chariot of seven horses. Two lotus flowers are noticed in each hand. Two female attendents are shown standing near the feet of this image. The image belongs to 16th century CE.

Dutch Factory in Vengurla: Explorations were carried out at the 16th century Dutch factory in Vengurla village. Dutch architectural remains are found at the site. Remarkable feature of this monument is squarish bastions on the fortification wall. A three-storeyed building in dilapidated condition is standing inside the fortification wall.

Kaleshwar Temple: This temple is situated in village Nerur of Kudal taluka. One copper plate is already reported from this village. During the explorations image of Siva, Bhairava, Brahma, a few Jain images, hero stones, sati stones, and an image of

Gajalakshmi were found in the temple. All these sculptures belong to 16th century CE.

Laksminarayana Temple: This temple is situated in the village Valawal of Kudal taluka. The 1·70m height Lakshminarayana image is under worship. The image holds *Sankha, Chakra, Gada* and *Padma* in four hands. Lakshmi and Garuda are shown standing on the right and left sides of the image, respectively.

Dev Adinarayan Temple: This temple is situated in Parule village of Kudal taluka. There is an image of Surya. The height of this image is 0·90m. It has two hands holding two lotuses. Two female attendants are shown standing near the feet. Surya is riding on the seven horse chariot. Two more broken images of Surya and one that of Vishnu are found inside the temple complex.

Jaina Images: Eleven Jaina image were discovered in Pendure village of Malvan taluka belong to 16th century CE. A medieval fort, Vetalwdi, was explored during the field work.

MANIPUR

37. EXPLORATION IN AND AROUND, MANIPUR: The Underwater Archaeology Wing conducted exploration in and around the Loktak Lake. Once the Loktake Lake convered almost entire valley, but its area is shrinking at a steady rate. Dried-up and peripheral areas have been inhabited since antiquity. Traces of early habitations are found now and then in the rim areas which are now being utilized for agricultural puposes. Due to vegetation in the lake, diving is little difficult and would require cutting of weeds and cleaning of the area before any under water work could be undertaken. But the remains preserved on the bottom of the lake would be able to throw fresh light on the past societies that lived in and around the lake. The area of Loktake Lake holds great potential for archaeological studies and to study prehistoric socieites of North east India.

MEGHALAYA

38. EXCAVATION AT BARAPANI, DISTRICT KHASI HILLS: The Prehistory Branch of the Survey undertook trial-excavation at Barapani (25° 40'; 91° 54'), Umiam river valley, under the direction of D. Bhengra, assisted by Anil Kumar, K.M. Girhe, R.K. Dwivedi, P.L. Janbandhu and P.S. Pashine. A trial-trench measuring 3m x 2m was taken up for excavation in north-south orientation on the left bank of the River Umiam. Loose brownish riverine deposit was excavated up to a depth of 3m. Yellowish silty deposit of the river bed appeared at the bottom. During excavation, Lower Palaeolithic tools, comprising rolled and weathered handaxe, scraper, cleaver, etc., were found in association with boulders of medium to small size.

MIZORAM

39. EXPLORATION IN SAIRANG LUL VALLEY, DISTRICT LUSHAI HILLS: The Prehistory Branch of the Survey conducted explorations in Sairang Lul Valley, tributary of the River Tlawng or Dhaleshwari and its adjoining area under the direction of D. Bhengra, assisted by Gajanan Katade, K. M. Girhe, R.K. Dwivedi, P.L. Janbandhu and P.S. Pashine. This was the first time that the Prehistory Branch conducted explorations in

the state. The explorations yielded three Neolithic tools: two axes made of fossil stone and one probably a harvester from Sesawng I & II and Thingsuthian, respectively.

40. EXPLORATION IN WESTERN AND EASTERN MIZORAM: Laldotluanga, Research Investigator in the Archaeology, Art and Culture Department of the Government of Mizoram documented the archaeological wealth of Mizoram. It is obvious that earlier inhabitants of the area used some form of pictorial representations for depicting their social life, usages, practices and the things that they valued and by the Mizos as '*Chhura Farep*'. These figures/pictures carved on rocks are found at the old site of Tlaikuang near Khawbung, Lungpho and Mualpheng villages. At the southern extremity of Champhai valley in eastern Mizoram, twenty five human figures interlocking their arms are carved in relief on the memorial stone of Mangkhaia. The style of carving in relief is not practiced in the later days and it is, therefore, believed that some other tribes might have occupied Mizoram in the earlier times. The living culture of the Mizos ever since they settled down in the expanse of the land between the Rivers Run and Tiau (Noin Myanmar) is characterized by erection of memorial stones and carvings on rocks depicting their social practices, occupations and other aspects of their living conditions.

At the site of Lungvando, 4km north of the nearest village of E. Lungdar is found a cylindrical, dressed stone pillar which is 6 m high and stands on a platform which is 30cm high. In 1824, the Burmese king invaded the British territory of Assam resulting in the break out of the Anglo-Burmese War. It is believed that boundary pillars at Lungvando were erected between British India and the Burmese kingdom. Similar stone pillars are also found at the Mualkhang area of Khawhai village, near the Primary School, New Chalrang, near Lungtan village and at a saddle of land between Sialhawk and Khawhai villages. Pictures of gongs, swords, human and *mithun's* heads are found engraved on a rock at Lungkeiphawtial, 1km east of Farkawn village in District Champhai. In Mizo society, it is a tradition that one who performs *Thangchhuah* (a feast of honour) is respected and held in high esteem by the people. *Thangchhuah* can be performed in two ways: either by killing a certain number of domesticated animals for giving a public feast or by killing a certain number of wild animals including eagle in a hunting excursion. It is said that while the villagers are eagerly waiting for a *Thangchhuah*, a man postpones his feast due to the death of his son. In such a situation, he leaves the village and spends his time in the jungle and carves pictures of gongs, sword, human heads and *mithun's* heads on rocks. These rocks later came to be known as Lungkeiphawtial. Pictures of three *mithun's* heads, put up one above the other on a sacrificial post are also found at Lungkeiphawtial. Clusters of pillars, which could demarcate a community graveyard in hundred and fifty stones are erected here which bear the figures of humans interlocking their arms; a man holding a spear with his right hand, wearing head-plume (*chhawn*); a gayal, fish and deer; a man with a smoking pipe between his teeth; and a woman's smoking pipe. These human

and animal pictures may depict the way of life of the people who inhabited the region at that time.

A brick-built structure found at Zamuang in western Mizoram shows two important things: one, it is fairly long and second, it contains one brick pillar about1·5m high, 30cm broad without any plastering thereon. Burnt-bricks of four different sizes have been used in the walls which have been plastered masterfully with lime most probably being used as binding substance. These ruins could have been linked with the Raja of Tippera or his contemporaries.

Sikpui Lung is a solid rock-2·70m long, 1·35m broad and 2·5m thick, lying flat on the ground at the old site of Zote village, about half km east of the present Zote village. In olden days, the Hmar clan of the Mizo tribe used to celebrate or observe "Sikpui Kut" when a village enjoyed good health and bumper harvest consecutively for three years without any loss of life in the village. On such festivals, the drummer would sit on the stone plate beating the drum and the community danced for days and nights. A memorial stone erected at Zote village under the Chief Zahulha Sailo mentions - *"He lung hi hmanlai Hmar ho 'Sikpuina' a ni. Tin, keini kum 28.2.1918 ah hian kan awm tan ta"*.

41. EXPLORATION AT MIZORAM: The Art & Culture Department, Government of Mizoram has conducted Survey of archaeological remains in the eastern part of the state. Survey revealed, human figures piercing through the necks with sharp objects curved in relief on rocks. These are commonly known by the Mizo as 'Chhura Farep'. These figures pictures carved on rock are found at the old site of Tlaikuangnear Khawbung, Lungpho and Mualpheng villages. At the southrern extremely of Champhai valley in eastern Mizoram twenty-five human pictures/figures interlocking their arms are curved in relief.

ODISHA

42. EXPLORATION AT BILEISUNI CAVE, DISTRICT DHENKANAL: In the course of exploration at Bileisuni Cave, S. K. Mitra, assisted by J.K. Patnaik, S. K. Kar and D. N. Bhoi, of the Bhubaneswar Circle of the Survey, discovered a cave site of the Mesolithic period, on the northern side of a hill, approachable from the right side of the motorable road from Kuturia village to Kamarda in the Anantapur Reserved forest in Kankadahad tahsil. It was observed that the cave was occasionally occupied by the local people. The surface exploration yielded various types of microliths made of chert, quartz, milky quartz, etc. To corroborate the surface implements, a trial excavation was carried out inside the cave up to a depth of 30cm only, which yielded both geometric and non-geometric tools without any pottery. The tool types include blade, crescent, trapeze, point, lunate, thumb nail scraper, side scraper, etc.

43. EXCAVATIONS AT SISUPALGARH, DISTRICT KHURDA: In continuation of previous year's work, the Deccan College, Pune under the direction of R.K. Mohanty and Monica L. Smitt of the Costen Institute of Archaeology at the University of California, Los Angeles (USA) with the cooperation from Archaoelogical Survey of India carried out excavation at Sisupalgarh.

The earlier excavation carried out at the site had revealed continuous occupation within the fortifications. The antiquity of the settlement at this site can go back to middle part of the 1st millennium BCE considering the cultural materials found from the early levels. However, several datable samples have been submitted for absolute dating. Excavation was carried out at two places, the first one was to expose the northwestern gateway with the purpose to understand the architecture, function and antiquity of the gateway. Another area of investigation was on the outside of the northern fortification and moat. The northwestern gateway of the northern fortification had a different contour in comparison to other gateways. The outer opening of the gateway ended where the moat begins. The excavations at this place exposed the architecture of the gateway which is quite similar to that known from excavation in 1948. Except that, it is larger and has enclosed open space between the end of inner gate and the outer post of the gate. It revealed several stages of construction and reinforcement. It further revealed that the provision of gateway was made from the beginning of the layout of the city. The earlier structure was not elaborate as the later impressive structure on the upper levels exposed at many places as well as the one which was earliest excavated.

The other excavation area for this season was located beyond the moat on the northern site of the rampart of the city. This area was excavated by the Archaeological Survey of India in 1952. His excavation was of limited nature and the findings belonged to megalithic structure. However, later investigations have revealed that this area had relics similar to the ones used as *vedika* in Sanchi and Barhut. Similar railings have also been found at several places in Odisha. A trench measuring 10m x 5m was laid out at the eastern side of the mound. The excavation revealed similar kind of cultural material as has been witnessed inside the fortified city of Sisupalgarh. The antiquity of the settlement here is probably as early as the settlement within the fortified area of Sisupalgarh. The excavation also revealed two unique structures made of thin lateritic blocks placed vertically in a circular fashion probably enclosing some structure. Inside the structure there were several layers of varieties of clay fillings without any significant cultural material. The structures looked like a domical mound enclosed by the lateritic blocks at the base. Below these structures, the habitation of the earlier period was exposed which could be tentatively dated to early phase of 1st millennium BCE.

RAJASTHAN

44. EXPLORATION IN DISTRICT SIROHI: Praveen Singh and Shiv Kumar Bhagat of the Jaipur Circle of the Survey, under the guidance of T.J. Alone, carried out exploration in District Sirohi and discovered the following cultural remains:

Locality	*Nature of Remains*
Abu Road (24° 29'; 72° 47')	Rishikeshji-ka-Mandir (Inscription of V.S. 1623) Sarveshvar Raghunath Mandir

	Vashistha Muni Temple (Inscriptions of V.S. 1514, 1506)
Ajari (24° 45'; 73° 02')	Mahaveer Swamiji-ka-Mandir (Inscription of V.S.1202) Shri Gopal Temple
Vasantgarh (24° 44'; 72° 2')	Surya Temple
Rohida (24° 37'; 72° 57')	Rajrajeshwara Temple Ramachandarji's Temple
Vasa (24° 37'; 72° 54')	Surya Mandir Jamdagini Rishi Temple
Mungathala (24° 29'; 72° 43')	Mahaveer Swamiji Jain Mandir (Inscriptions of V.S.1309 and 1389) Old Siva Temple Shri Madhusudhan Temple (Inscription of V.S.1245)
Dattani (24° 32'; 72° 30')	Siddeswara Mandir Jain Mandir (Inscription of V.S.1298)
Jeeraval (24° 40'; 72° 29')	Parshvanath Mandir
Oriya (24° 38'; 72° 46')	Jain Temple (eighteenth century CE) Kankeshwar Mahadev Temple
Achalgarh (24° 37'; 24° 46')	Shri Adinath Jain Temple (Inscriptions of V.S. 2037, 1751, 1566) Achaleshwar Mahadev Temple (thirteenth-fourteenth century CE) Ancient tank (eighteenth century CE)
Mirpur (24° 47'; 72° 46')	Shri Parshvanath Temple (Inscription of V.S. 1552) Shri Shantinath Temple
Undara (24° 50'; 73° 00')	Vishnu Temple (Nagari Inscription of V.S. 1529)

45. EXCAVATION AT NAGAR FORT, DISTRICT TONK: The Jaipur Circle of the Survey carried out excavation at Nagar Fort under the guidance of T.J. Alone, assisted by Manoj Dwivedi, Praveen Singh, Shiv Kumar Bhagat, Satish Gupta, S.K. Aypariya, K.L. Saini and M.S. Khot. The trenches were laid at three different localities to know the extent of the site and its cultural sequence. Location 1 is 10m x10m. Location 2, a rain gulley, where three trenches were laid and step-excavation was taken up, is the only place where the level of the natural soil was reached. Location 3 is a small mound thought to be a stupa, where a brick structure, rectangular in plan, with two projections on its south side, was found. This seems to be a religious structure, to be confirmed by further excavation.

46. ROCK-PAINTINGS AND SCULPTURES, DISTRICT SIROHI: S.K. Sharma, accompanied by Kanwar Singh and R.P.Mathur, of the Jaipur Circle of the Survey, discovered rock paintings at Mandar, with a panel of six horsemen in two rows with swords and shields in their hands. A standing man with a long pointed object held by both hands is shown behind the

upper row of four horsemen. The painting is very simple and executed with white pigment. Ten stone sculptures were found fixed over a cemented platform under a rock cliff. These include Ganesa, Mahisasuramardini, *saptmatrikas* and *charana-padukas*. All these stone figures are date able to twelth-thirteenth century CE. A four-armed standing image of Ganesa holds a *parasu* and a rosary in the right hands; a bowl of *modaka* and an indistinct object are held in the left hands. The tusk is straight. The image is shown wearing the usual ornaments and a *mukuta* on the head. A four-armed image of goddess Mahisasurmardini is seated in squat posture and holds a trident and a sword in her right lower and upper hands respectively. She holds an indistinct object in the upper left hand. She is piercing the chest of Mahisasura by a spear held in her lower left hand. The *saptamatrika* panel consists of seven standing divine mothers, all separated from each other. All the figures are mutilated and are unidentifiable except Varahi and Chamunda. All the figures, except Chamunda, hold a child on their left lap. Five figures are four-armed and two have two hands each. The *vahanas* of the divine mothers and most of their attributes are unidentifiable. Stylistically, all the figures bear resemblance to each other in their material, mode of execution and postures. The *charana-padukas* are a pair of footprints, in same material and style as the *saptamatrikas* described above. The feet are carved on a pedestal and there are square pillars on its right. A beautiful image of *Seshasayi* Vishnu at Vasantgarh, in reclining position, is placed in a small shrine in front of a step well. It may be dateable to eighth-ninth century. An eight-armed standing image of Mahishasuramardini at Mungathala, carved on black stone, is placed under a small canopy adjoining the old Siva Temple. The image is under worship and it may be ascribed to 9th century CE.

47. EXCAVATION AT NATHARA-KI-PAL, DISTRICT UDAIPUR: The Department of Archaeology of the Institute of Rajasthan Studies, Janardan Rai Nagar Rajasthan Vidyapeeth University, Udaipur, conducted excavation, during the second season, at Nathara-Ki-Pal, under the direction of Lalit Pandey of the University and Vasant Shinde of the Deccan College Post-graduate Research Institute, Pune. They were assisted by Jagdish Meena, Kulshekhar Vyas, Chain Singh and Hemendra Choudhary. The M.Phil, Ph.D., M.A., Post-graduate Diploma and undergraduate students of the University also participated in compulsory field-training.

Nathara (73° 47'; 24° 16') is located about 70km south-east of Udaipur and 7km north-east of Chavand, the famous capital of Maharana Pratap. Geographically, the village Nathara is located on the foot hills of the Aravalli. The total area of the village is 5,527 hectares. Spatially, it is not only the largest *pal* (tribal village) but also the largest village in Magra (hilly tract). The ancient site is located in close proximity of the River Gargal, which originates from Mandas-Dhawara *ghata*. The total area of Nathara is 1km (NS) x ½km (EW). Heaps of iron slags on the surface of the mound indicate that it was a major centre of iron metallurgy. The site is located in close vicinity of a source of

iron ore on a hill at a distance of 1½km to the north-west. Locally, the hill is called *Beda-ghata*. According to the report of the Department of Mines and Geology of the Government of Rajasthan, Nathara has a good amount of iron deposit and the iron content in ore ranges from 48% to 62%. The objectives of the excavation were to ascertain the expansion of iron working in south-east Rajasthan from the early historic to the medieval period; to develop a chronology of south-east Rajasthan from early historic period since this aspect has not been worked upon; to trace a chronological development of the furnace to understand. To fulfill the above objectives, four trenches were laid down. All these trenches were divided into four quadrants i.e., SW, SE, NW, and NE and separate lot numbers were given to each quadrant. In Trench TT_1, only the NE quadrant was excavated.

During the course of excavation, it was observed that the inhabitants had constructed a rampart to safeguard the settlement either from floods or invasions. The rampart consists of an outer as well as an inner wall. Probably, the outer walls survive only in the north and south corners in the form of bastions. The northern bastion of the outer wall survives to a length of 6·20m, only in north-south direction with a total width of 90cm. Its total surviving height is 1·60m only. Seventeen courses were clearly visible on the surviving wall. The southern bastion is found in a dilapidated condition. Its surviving height is 10·5m with a width of 1·10m. The total length of the outer wall of the rampart, from the north to the south bastion, is 25·10m. The inner wall of the rampart is constructed at a gap of 2m from the outer wall. The gap between the outer and the inner walls is filled with mud, pebbles and iron slags and it is perfectly rammed. The inner wall of the rampart also runs from north to the south. It could be exposed only in NE quadrant of TT_1 and NW quadrants of TT_3, TT_4 and TT_5. Its surviving length in TT_1 is 1·83m and 5m in the others. Its total surviving height is 1m, width is 70cm and it has eleven courses. In TT_5, the inner wall of the rampart consists of a E-W wall of 5m length with a height of 1m. Its total width is 60cm. A total of eight courses are seen in the length of the wall. The inner wall of the rampart continues from layer (1) to layer (2). Few living structures, rectangular in shape, were exposed. Probably, windows and entrance gates had also been constructed by the inhabitants. In SE and SW quadrants of TT_1, an entrance is also observed, which is about 1m in length in layer (1). In addition to this, a floor was also noticed in SE, SW and NW quadrants of TT_3 in layer (3). It is made of large stone slabs. The average size of the slabs is 70cm x 65cm x 9cm. In NE quadrant of TT_3, a platform of 1·40cm x 90cm x 45cm was also exposed in layer (3).

The pottery from the site can be categorized into two phases: (i) post-Kushana and (ii) early medieval. Red ware, in fine and course fabric, is the major pottery type, which is found from layers (1) to (12). Course red ware is in abundance. Storage-jars constitute the major type of red ware. The fine variety of red ware includes spouts, medium-sized jars and *handis*. All these are well-fired and some of the body sherds contain floral designs. Most of the red ware sherds are plain and micaeous. There are a few sherds

on which traces of slip can be seen. Grey ware is found in a very low percentage, in coarse and fine ware, from layers (1) to (7). The fine grey ware is well-fired and burnished. The upper parts of the sherds have varied designs in wavy lines, parallel lines and comb-like designs.

Coins constitute the major category of antiquities. They are Indo-Sassanian coins, all circular in shape. The diameter varies from 14mm to 17mm, with an average thickness of 2mm. The average weight is about 3·75g. A preliminary examination shows that coins contain about 60% silver. The other remaining metals are copper and zinc. Other antiquities include shell bangles, perforated bone bead, terracotta stud, iron nail and copper ring.

TAMIL NADU

48. EXCAVATION AT SIRUTHAVUR, DISTRICT KANCHIPURAM: The excavation at the megalithic site of Siruthavur, Chengalpattu taluk was carried out by the Chennai Circle of the Survey, in collaboration with the Department of Geology, Anna University, Chennai, under the direction of Sathyabhama Badhreenath, assisted by K.P. Mohandas and Sarangadaran of the Survey and Hema Achyuthan and Smirithi Haricharan of the Anna University with the main objectives, to evaluate chronologically the iron age of coastal Tamil Nadu; to understand and evaluate the spatial and temporal distribution of megalithic burials; to assess the man-land relationship in the proto-historical period in relation to north-east monsoon and climate change and to understand and analyze the material excavated and collected from the site.

A total number of eight burials were excavated, of which three were disturbed and five were intact. The burial types include urn burials, pit with sarcophagus, and sarcophagus without stone assemblage, dolemenoid cist with dressed stone bounded by stone circle, dolmenoid cist with unhewn stone without stone circle and dolemenoid cist with unhewn stone bounded by stone circle. The grave goods collected from these burials include pottery, gold ring, beads and iron implements. The pottery consists of black-and-red ware, red ware and black ware. The important shapes include pot, bowls, dishes, ring stands, tripod jar and plate, etc. Antiquities include etched carnelian beads in various shapes such as tablet and barrel along with few terracotta barrel-shaped beads. The iron objects include wedges, sickles, knives, spear, axe, etc. The site can be estimated to belong to a period between second century BCE to second century CE.

49. EXCAVATIONS AT MELCHITTAMUR, DISTRICT VILLUPURAM: Melchittamur (12° 16'; 79°35'), the headquarters of the Digambar Jain sect in Tamil Nadu, lies 17km west of Tindivanam and 12Km east of Gingee. Six trenches, MCR-1, MCR-2 and MCR-3, MCR-4, MCR-5 and MCR-6 measuring 6mx5m 3mx3m and 6mx5m were laid within a radius of 300m around the local Parsvanatha temple. Excavations revealed a habitational deposit to an average thickness of about one meter, divisible into two cultural periods (Period I and Period II), commencing from the early centuries of the Christian era down to medieval times (*c.* 1st century CE to 9th century CE). Encouraged by the findings the Department of Ancient

History and Archaeology, University of Madras, resumed the excavation at Melchittamur for the fourth season (2009), by laying two trenches measuring CR-7 (6mx5m) and MCR-8 (3mx3m), under the direction of P.D. Balaji, Head in-charge of the Department, assisted by A. Ekambaranathan, J. Soundarajan, and M. Seran. This season's excavatiosn revealed a habitational deposit divisible into two cultural periods namely Period I and Period II, commencing from the early centuries of the Christian era down to medieval times (*c.* 4th century CE to 13th century CE)

Period I was represented by black ware, black and red ware and red slipped ware. These potteries are not of fine varieties as are commonly found in other important historical sites. Besides, remains of animal bones were also collected in this level. A lot of iron slags were collected in the excavation. On the basis of potteries and associated materials this period is tentatively dated to 4th century CE to 6th century CE.

Period II was marked by the inferior variety of red slipped ware, coarse red ware, and conical jar roof tile pieces. Antiquities like hopscotches, and glass bangles, a coral bead, terracotta votive lamp and terracotta figurines were found. Apart from this, numerous remains of iron objectswere also noticed. On the basis of the potteries and associated material, this period is tentatively dated to 6th century CE to 13th century CE.

50. EXCAVATIONS AT THE PREHISTORIC SITE OF PILLAYARPATTI, DISTRICT THANJAVUR: Archaeological excavations were conducted at Pillayarpatti, under the direction of V. Selvakumar, Department of Epigraphy and Archaeology, Tamil University, Thanjavur with the view to understand the context of the lithic artifacts found on the surface in Thanjavur region. Two trenches (PPT 09-I and PPT 09-II) were excavated within the Tamil University campus to the west of the Women's hostel. The objectives of the excavations were to understand the cultural sequence and chronology of the prehistoric cultures of this region and also to comprehend the palaeo-landscapes and palaeo-environmental conditions of the prehistoric cultures. A small stream drains this area and flows towards the head of the Kaveri delta in the northern side exposing many artifacts in the laterite bed. Trench PPT 09 I was laid on an un-eroded surface and it measured 5m x 5m. The trench was divided into 25 square meter grids and the top locus was red loam and its colour was 5YR 5/8. The trench had red loam deposit for about 75cm. A few microlithic artifacts were found in this red loam deposit. But a few black and red ware sherds were also found. This suggests that microliths were continued to be used in the Iron Age. At a depth of 75cm on the laterite gravel, canal like formation was found. The surface of the lateritic gravel sloped down towards north-east into what appeared like a large pit. It appears that it was intentionally dug to harvest rain water. Hence, the trench was extended by three square metres in the north-east corner. It was found that the pit-like formation extended further beyond the trench. A large quantity of microlithic quartz artefacts were found at this level.

The Trench PPT 09 I was excavated 12m west of trench PPT 09 II. Surface around this trench was about 70cm below the

surface of Trench PPT 09 I. This trench does not have the red loam deposit, except a few areas, on top. The laterite gravel covered most of the area on the surface itself, unlike the trench PPT 09 I. The hard lateritic gravel had microlithic quartz artefacts. The other loci yielded a few quartz microliths. Locus 9, 80-95cm from the datum a few artifacts were found and they represent the Late Palaeolithic cultures. The excavation below the depth of 95cm did not reveal any artifacts. The excavation revealed evidence for the following culture periods: -

Period I. Late Palaeolithic
Period II. Mesolithic
Period III. Iron Age

The chronology has not yet been fixed in the absence of concrete evidence. But based on the comparative archaeological materials, the Late Palaeolithic could be placed in the Later Pleistocene period. The Mesolithic could be placed in the Early Holocene period, while the Iron Age could be dated between 1000 BCE and 300 BCE based on the few C-14 dates from the excavations at the Iron Age site of Vallam. The mciroliths are predominantly made of quartz, which is available locally. But the tools such as scrapers, hand axes (broken specimens) were made of cherty quartzite. The microliths mostly consisted of flake tools. A few triangles and scrapers were also found in this collection.

UTTAR PRADESH

51. EXCAVATION AT PURWA UDAI, DISTRICT AURAIVYA: The archaeological excavation at Purwa Udai have been carried out by a team of the UP State Archaeology Depatrtment, led by Rakesh Kumar Srivastava assisted by K.K. Singh, Subhash Chandra Yadav, R.G. Mishra and B.K. Srivastava under the general direction of Rakesh Tewari. Main objective of the excavation was to ascertain archaeological context of the copper hoard accidentally recovered from this site during the year 2007 by a villager. For excavation, three locations were selected in south-east, south-west and northern portion of the ancient site. Two trenches A-1 and B-1 were laid down on the find spot of the hoard at location-1. This area is towards the south-east direction of the village. Quadrant-III of trench A-1 has been excavated down to the virgin soil. A number of red ware sherds were found during the course of excavation. Second location lies towards the south-west portion of the site. A small trench excavated down to the depth of natural surface has yielded red ware. The result of third excavated trench is more or less identical. The deposit is disturbed. Therefore, the Copper Hoard found here seems to have been buried in an open area. Apart from the above, it is important to mention here that the small sherds of N.B.P., black slipped, painted grey and black-and-red wares have been found scattered on the surface of the site.

52. EXPLORATION IN DISTRICT JHANSI: Regional Archaeological Unit, Jhansi of U.P. State Archaeology Department undertook village to village exploration of Development Block Moth of the district. Suresh Kumar Dubey, Assistant Archaeological Officer, Jhansi explored 29 villages and their hamlets pertaining to the above mentined Development Block under the direction of Rakesh Tewari, Director,

U.P. State Archaeological Department. The exploration revealed mounds, temples, stone sculptures, *garhi, baolis* (stepped wells) and other archaeological remains from the following villages:

District	Village	Cultural Assemblage
Jhansi	Amraokha	Late medieval *baoli, panchmukhi* Siva-*linga* and image of Nandi.
	Amkhera	Medieval mound with RW and un-identified stone image.
	Bagoniakhera	Medieval mound with RW, fragmentary pieces of stone sculptures and image of Hanuman.
	Bhujond	Siva-*linga* with *argha*, dilapidated image of Surya, Hanuman and Nandi.
	Budhavli	Fragmentary pieces of stone Siva-*linga* with *argha* and stone temple of medieval period. Late medieval *Sati-patt* and watching tower.
	Chhapar	Remains of stone temple and dilapidated stone image of Vishnu (medieval period), late medieval brick temple and stone image of Anjani-mata.
	Erora	Medieval mound with RW and stone image of Hanuman.
	Imilia	Stone image of Vishnu and Hanuman of medieval period.
	Jaora	Medieval mound with RW, remains of stone temple and a stone *kolhu.*
	Jaraha Khurd	Remains of stone temple comprising Natraja Siva on a *lalatabimba.*
	Kharona	Medieval mound, remains of stone temple and image of Mahismardini Durga, an un-identified god, Hanuman, Nandi and Mughal coins.
	Lavan	Remains of medieval stone temple, late medieval stone image of Hanuman, veer-*patta* and *sati-patta.*
	Pasaiya	A dilapidated stone image of eight armed deity of medieval period and late medieval *sati-patta* and *kolhu.*
	Reva	Stone image of Hanuman and un-identified deity of medieval period.
	Sena	Late medieval brick temples (*Samvat* 1740), well and *veer-patta.*
	Silari	Late medieval stone images of *Hanuman* and *Anjani*-mata and a *sati-patta*.

53. EXCAVATION AT JAJMAU, DISTRICT KANPUR: In continuation of the previous year's work, the Uttar Pradesh State Archaeology Department resumed excavations at Jajmau. The excavation team, under the general direction of Rakesh

Tewari, comprised Ram Vinay, Rajeev Kumar Trivedi, GK Rastogi, N.S. Nyagi, B.K. Srivastava, R.G. Mishra, Mukesh Kumar and Panch Bahadur, etc. The ancient site of Jajmau is situated on the right bank of river Ganga. It is extended over an area measuring about 170m (north-south) an about over 500m (east-west). National Highway 25 divides the mound into two parts. Since, the widening project of National Highway 25 is in progress under the National Highway Authority of India (NHAI), therefore, there was a need to remove the certain area of mound as per requirement under the salvage operation. Keeping this in view, the entire operation area was divided for excavations into two parts **Location-I** and **Location-II.** The excavations at **Location-I,** situated just on the right bank of river Ganga, have yielded a five-fold cultural sequence from Pre-NBPW to medieval period. The excavation at this location is completed.

The excavations at **Location-II** have been carried out down to the levels comprising medieval deposit. A number of house-walls, floors, drain and part of a narrow street made of brickbats and broken bricks of earlier periods have been exposed. The ceramic industry includes wheel turned red ware of medium to coarse fabric. Main shapes in pottery comprise water vessel, knife edged bowl, conical knobbed lid, dish with flared rim, storage jar, carinated handi and basin. Noteworthy, antiquities include a terracotta sealing bearing the symbol of three *stupas* in a row followed by an inscription *ya dhamma hetu prabhava*, terracotta human and animal figurines, sling balls, decorated discs, skin rubbers, dabbers, gamesmen, mulars, stone beads, iron arrow-heads and bone-arrow-heads, etc.

54. EXCAVATION AT AHICHCHHATRA, DISTRICT BAREILLY: In continuation of previous year's excavation, the Agra Circle of the Survey resumed excavations at Ahichchhatra under the direction of D.N. Dimri, assisted by Bhuvan Vikrama, with the objectives to establish a fresh the cultural sequence of the early period; to collect charcoal samples for C^{14} dating and to collect palaeo-botanical samples in order to understand the plant-economy of ancient Ahichchhatra.

With these objectives in mind, trenches were laid out in the eastern sector of the fortified city. Initially, two trenches were laid out on the highest point of the eastern most mounds. Later on, another trench was laid out on the slopes of a mound of considerable height, lying along the *kachcha* road from Anandpur cutting across the city and leading to Nasratgunj, with a view to get the PGW and earlier cultural assemblages. The eastern trenches have so far been excavated up to a depth of 3·4m. The cultural assemblage so far revealed in this area is divided into two periods. The upper, 2·5m deposit is assignable to the Mitra Panchala period, contemporary to the Sunga-Kushana period while the lower 90 cm deposit belongs to the Mauryan period. However, natural soil is yet to be reached in this area.

Generally, typical expressions of post-Mauryan cultural periods contemporary to the Sunga-Kushana period in other areas, such as pottery and other significant objects are not represented at Ahichchhatra. Here, all the coins encountered in the excavation

represent the Mitra kings of Panchala lineage, highlighting the local and individual personality of the city. It appears that the city maintained its identity independent of the suzerainty of Kushana rule. It was only the sword of Samudragupta that subdued Achyuta, the last of the Mitra kings of Panchala. Therefore, paying respect to the independent personality of the site, the period contemporaneous to the Sunga-Kushana period has been termed as Mitra-Panchala period (200 BCE-200 CE) in respect of the Panchala region.

The uppermost layer of the eastern mound has yielded coins of Achyu (ta), the king mentioned in the Prayag *prashasti* of Samundragupta. In the successive lower layers Bhanumitra, Agnimitra etc. respectively. The pottery is more like the Kushana type but the typical Kushana ware (RPW) and shape (sprinklers) are conspicuous by their absence. Among important finds of the period are tubular amulets, antimony rods, inscribed object of copper; beads of semiprecious stones including carnelian, quartz, amethyst, garnet, chert, etc., spools/ear-studs of lead and a few punch-marked coins of silver and copper-silver mix. So far only four structural phases have been encountered from the Mitra-Panchala level. These structures are in the shape of rooms and walls made of burnt-bricks of various sizes i.e., 37 x 47 x 8m, 37 x 47 x 6·5m. The top level of the Mitra-Panchala period revealed a collapsed brickwall. This period has also revealed street deposits of successive phases. Successive mud floors have also been encountered from the early phase of the Mitra-Panchala period. Due to the limited area of excavation, the exact nature of the structure could not be ascertained.

In the other trench on the slope, from the top surface below the eroded material, PGW sherds were found in association with red ware plain as well as mica-dusted and basket or cord-impressed ware. Plenty of bones of large animals were found which are yet to be studied and are likely to add some new facets to cultural study. The total deposit so far excavated, yielding PGW, is about 1·20m. The area of excavation is so small that this information needs to be re-confirmed at one or two more spots, which are already under way. However, some floor levels of the PGW culture have been encountered from this area. Considerable quantity and a large variety of charred grains were collected for study from the PGW deposit by the Birbal Sahni Institute of Palaeobotany, Lucknow. In addition, baulks were removed from the area excavated in the previous year and detailed plan of some of the structures were exposed. In ACT-V, a large storage jar of the Mitra-Panchala period, which was partially exposed last year, was fully exposed this year.

55. EXCAVATION AT INDOR KHERA, DISTRICT BULANDSHAHR: Jaya Menon of Aligarh Muslim University and Supriya Varma of Jawaharlal Nehru University resumed excavation at the site of Indor Khera (pl. 47). They were assisted by 25 students from the University of Hyderabad, Aligarh Muslim University and Jawaharlal Nehru University. The site of Indor Khera (28°14'57"; 78°12'48") is located in Tehsil Debai on the Chhoiya Nadi, also called Nim Nadi. Indor Khera lays between the rivers

Kali Nadi and Ganga. The village of Indor is located 0·5km off the Aligarh-Anupshahar Road and is about 10km from the River Ganga. Out of the trenches excavated in the northwestern area of the mound in 2006-07 (first season), B1a, B1b, B1c, B1d and C1a were reopened. New trenches, C1b, C1c, C1d, ZB1a, ZB1b, ZB1c and ZB1d were newly opened for excavation in the second season (fig. 9). Of these trenches, B1a, B1b, B1c, B1d, C1a, C1b, C1c and C1d are part of Operation 3, while ZB1a to ZB1d trenches were laid on the adjacent, higher part of the mound. The grid and baulk method of excavation and recording had been followed in the first season.

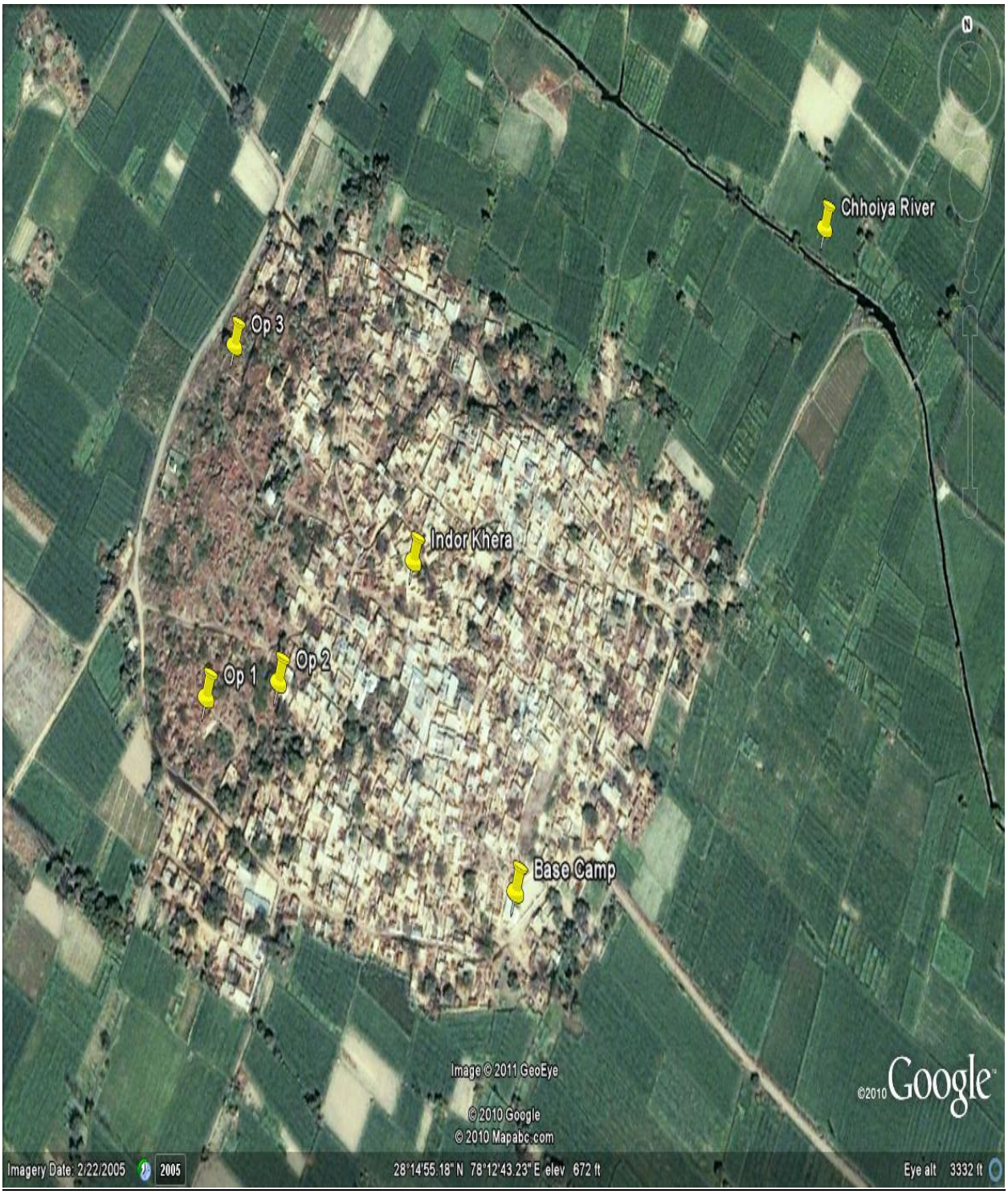
In the second season, the excavations focused on the deposits with material ranging from roughly 1200/1100 BCE to possibly 1200/1300 CE. The chronology in this part of the site of Indor Khera was built on material such as pottery (Black slipped Ware, Painted Grey ware, Northern Black Polished ware, Kushana red wares including stamped pottery and late historic red wares), seals and sealings, coins, terracotta human and animal figurines, stone human figurines and other small finds such as etched beads and glass beads.

Three structural periods have been identified. In Period I, there were no brick structures. Baked brick structures were encountered in Period II and what is striking is that in this phase, whole bricks were used in construction. In contrast, structures in Period III were constructed out of brickbats.

In period I, several mud floors were exposed as well as two furnaces in trench B1c. In this part of the mound, excavations were carried out till the natural soil, which was reached at 14 m in trench B1c. The earliest occupations here (Painted Grey Ware and Black slipped Ware) correspond with what was exposed in the trial cutting A3 in the first season in the southwestern part of the mound. In Period II, a mud-brick platform in trenches B1a and B1d was exposed. There was also evidence of part of a baked brick house with two rooms and a brick paved area in B1b. With these were associated the firing facilities comprising of reddish deposits and rammed brickbats found in trenches B1a and B1d. These firing facilities continued to be used in the next sub-phase in which was found a mud-brick house in trenches B1a and B1b. Belonging to a slightly later phase was a large (six to eight roomed) house that covered trenches B1c, B1d, C1a, C1b, C1c and C1d and appeared to continue eastwards (pl. 48). Walls 1, 2 and 3 in trenches B1c and C1a from the earlier excavation were now found to be part of this house of which several sub-phases have been identified. The eastward extension is yet to be fully exposed and excavations in this area will be carried out in the next season. Further north in B1b and ZB1a were exposed walls of another house which was contemporary to the above mentioned house. It is in association with these houses that the circular platforms of white ashy deposits were found (in trenches C1b, Zb1a and ZB1d), suggesting that these were houses of potters.

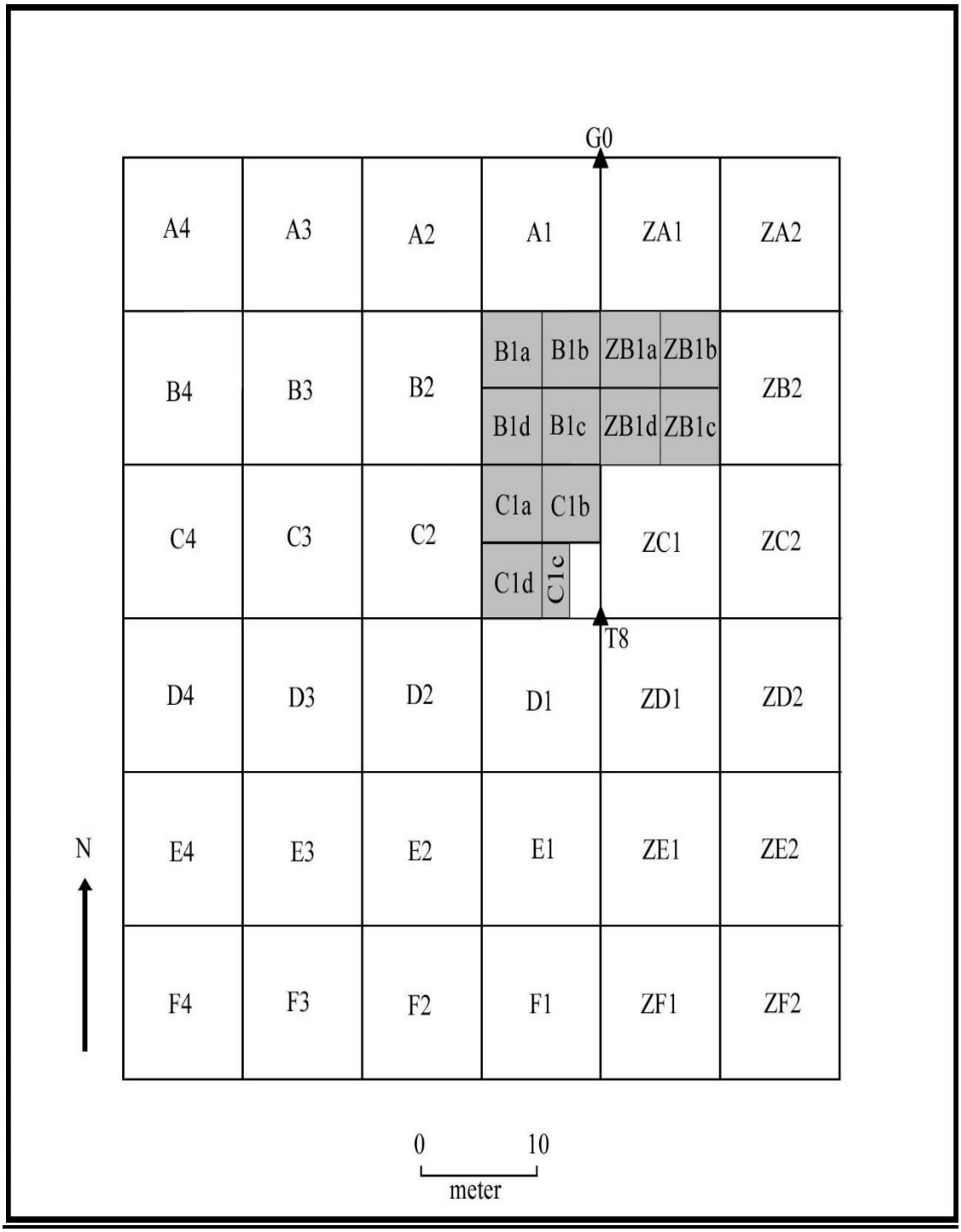
In Period III, several walls made of brickbats were found though no plan could be identified. These included two east-west walls in ZB1d, a north-south wall in ZB1a, a brick paved area in B1c, a hearth in C1b, as

Plate 47



Excavation at the site of Indor Khera.

Fig. 9



Layout of the trenches for excavation, Indor Khera.

well as random alignments in C1band ZB1a. After this phase, there is evidence of collapse and possible abandonment represented by over 2m of fill deposits in at least this part of the settlement (pl. 49).

On the basis of artefacts and pottery, tentatively dated the different structural phases as the following:

Period I: 1200/1100 BCE - 200 BCE
Period II: 200 BCE - 500/600 CE?
Period III: 500/600 CE? - 1200/1300 CE?

At this stage, there is no clear evidence regarding the dates for the end of Period II as well as when the occupation in this part of the mound came to an end. From the surface has been found a six-*jital* (*shashgani*) coin which has been dated to the 13th and 14th centuries CE. Only with further excavation can these issues of dates and possible abandonment be further addressed. Artefacts attributed to Period I include animal figurines, discs, whorls and worked sherds of terracotta, a clay disc, a wire and coin of copper, a point of bone, and a piece of slate. From Period II were found seals, sealings, human and animal/bird figurines, whorls, anvils, pottery stamps, discs, miniature vessels, marbles, beads, reels, toy-carts, toy-lids, moulds, pendants, wheels, bangles, rings, tops, point, balls, cakes, skin rubbers, tile piece, button, pellets, rolls, lumps, worked sherds and numerous unidentified objects of terracotta; beads, whorl, discs, wheels, ball, marbles, animal figurines, miniature vessels, tops, tablet, reels, pellets, lumps, and several unidentified objects of clay; bangles, beads (including micro), pendant and ring of glass; antimony rods, earrings, bangles, hook, needles, coins, rods, vessel, rings, ornaments and reel of copper; knives, rods, drill, rings, spear-heads, nails, punches, trowel, clamps, hooks, arrow-heads and circlets of iron; pellet, roll and strip of lead; points, bangles, pendant, pin, beads, ornaments and tools of bone; bangles and beads of shell; beads (including etched), drill, ball, socket-stones, lids, pestles, slabs, vessels, disc, tablets, human figurine, pendant, pebbles and unidentified stone objects; and beads of a vitreous material. From Period III, whorls, discs, balls, beads, human and animal figurines, wheels, marbles, roll, plaques, toys, reels, anvils, lumps, pellet, mould, shuttle, miniature vessel, worked sherds, and un-identified objects of terracotta; wheel, anvil, marble and lumps of clay; strip and ring of copper; rod, handle, chain, clamps, hooks, nail, spear-head, pot, knife and unidentified objects of iron; bangles, beads and ring of glass; shell bangles; beads, pestles, grinding stones, sculpture, balls, socket-stone and several unidentified objects of stone; as well as a moulded brick. It had been reported in 2006-07 that there was evidence that crafts such as pottery and terracotta production, glass and bone working were undertaken in this area. However, in the excavations of 2008-09, it was found that the major crafts practiced in this area were pottery and terracotta production. The evidence for bone working showed that primarily tools such as points probably used for incising decorations on pottery and terracotta objects were being made here. There was little evidence for glass production.

The most significant aspect of the excavations this season has been that most

Plate 48-49



Large house unearthed after excavation, Indor Khera.



Brick paved area and hearth, Indor Khera.

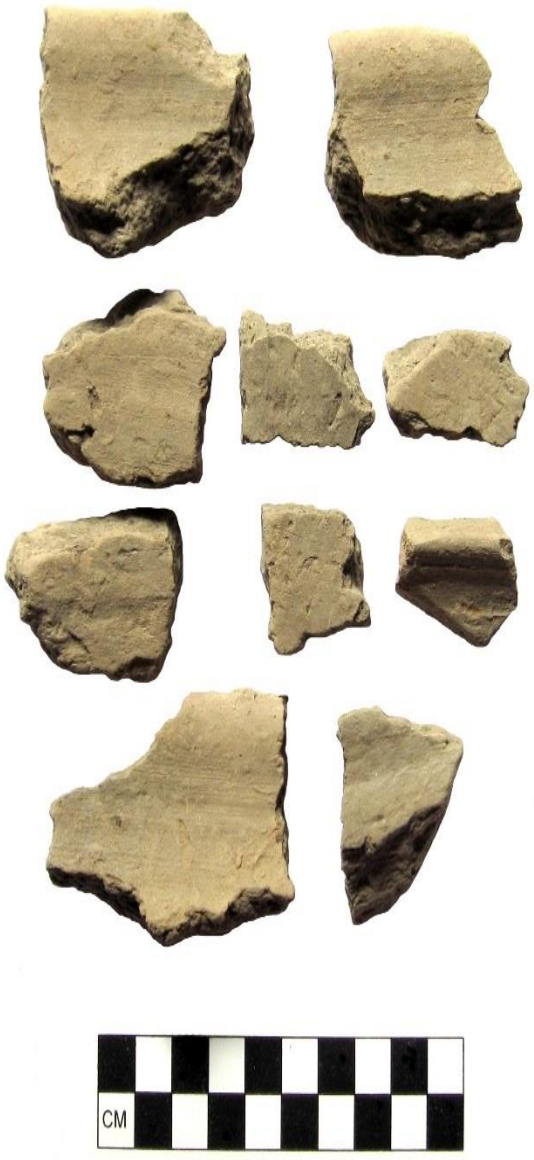
of the indicators for ceramic and terracotta production as well as their spatial co-occurrence have been found. These include permanent facilities like firing areas; tools such as anvils/dabbers, socket stones, pottery stamps, bone engravers and pebbles as polishers; residues in the form of lumps, rolls or coils and pellets of clay and terracotta; semi-finished products in the form of terracotta lumps, unbaked objects and pottery (pl. 50) wasters or over-vitrified material; rejects or misshapen objects; and materials kept for recycling which may include the very large number of pottery bases found in the vicinity of the excavated houses that may have been kept for modifying into tools for spinning and weaving. The raw materials for ceramic and terracotta production in the form of clay lumps were also found. Important evidence has also been recovered in the form of two sealings that have a direct connection with potters, one written as "*kumharo*" and the other as possibly "*kumbhajagatha*".

It is thus evident that most of the indicators for the production of ceramics and terracotta production have been found in the form of lumps, many of which are the fine, compact yellowish-grey silty clay considered ideal for ceramic production. Several lumps of terracotta have been also found suggesting the accidental firing of clay lumps kept for working. As an example, the data on clay and terracotta lumps from a single house is quite revealing. A larger number of clay and terracotta lumps were found outside the house to the north but this data relates to the number found within the house. A total number of 28 clay lumps weighing between 1·0 and 133g and 73 terracotta lumps weighing between 1·0g and 95·0g were found within this house. Rolls and coils of clay and terracotta as well as terracotta pellets have been found which were used perhaps to make appliquéd additions to artefacts such as figurines. Many of these show pinched ends indicating the manner in which they were to be used. Several small lumps show shallow depressions in the centre with finger impressions suggesting they were to be pinched into miniature containers or vessels. However, some of the lumps could also represent discarded bits of clay.

As far as the tools of production are concerned, some are straight-forward and obvious while others are hypothesized to be potters' tools. The most obvious are the terracotta stamps used for decorating the surfaces of vessels, resulting in what are generally termed as "stamped pottery". It is clear that the terracotta stamps were used on ceramics as the same designs on the stamps are also found on pottery at Indor Khera. In fact from one house, not only was a stamp found but also sherds of pottery with exactly the same design.

Another obvious potter's tool is the terracotta anvil, of which numerous specimens have been found. Anvils indicate the clear knowledge of the paddle-and-anvil method, with the convex working edge held horizontally against the inner wall of the vessel and the paddle beaten on the exterior wall of the vessel. Several sherds from the excavations at Indor Khera reveal the rounded gentle depressions on the interior that are characteristic of the use of the anvil.

Plate 50



Terracotta lumps, unbaked objects and pottery, Indor Khera.

It is also possible that these objects may have been used in a vertical motion with the working edge against the base of the vessel which would classify them as "dabbers".

The interestingly great variation in the size of these objects at Indor Khera can be used to suggest that possibly some large ones may actually be "dabbers" (pl. 51).

Another tool that was possibly made of wood in the past which has not survived is the wheel. However, what have been recovered are several flattened (and sometimes worked) stones with small round depressions on one or both sides. These depressions show considerable polish resulting from friction. These have been identified as "socket stones", (pls. 52-53) as the pivot would rest and move in the depression which is the socket.

The socket stones and the anvils thus provide evidence of primary and secondary formation techniques for ceramics. A number of other formation techniques provide evidence of primary and secondary formation techniques for ceramics. A number of other formation techniques are indicated by the variety of terracotta artefacts recovered in the excavations. For example, many of the terracotta figurines of animals found in this area were made by the technique of hand modeling. Some human figurines too were hand modeled whereas the finds of terracotta plaques suggest the knowledge of the technique of moulding.

Firing facilities were also found, of two types. In the lower levels was found a brickbat packed platform with over-vitrified brickbats and ash. In the upper levels were found the distinctive circular platforms composed of white compacted earth and ash ranging from 1-2m in diameter (pl. 54). These were marked by 4-5cm of white ashy deposits, perhaps representing the remains of firing activities. Eleven such facilities were fully or partially recovered during excavations. The lack of remains of kiln linings and the fact that the majority of the pottery in the early centuries of the Christian era was incompletely oxidized suggests that these were the remains of open firing. That these ash deposits have survived for so many centuries indicates that such firing areas were probably permanent.

Numerous unfinished artefacts have been recovered, largely in the unfired form. Almost every class of terracotta artefact from Indor Khera has some specimens left unfired. Certain craft tools such as a pottery stamp from Period II and an anvil from Period III have been found unfired, suggesting that potters made their own tools out of clay. Similarly, evidence for the production of bone points within these houses, some of which may have been used for incising lines or designs on pottery, possibly corroborates that several of the tools that they requiredwere made by the potters themselves. Many of the smooth pebbles found in the excavations may have been used as tools to polish or burnish the surfaces of certain vessels.

One of the important aspects about production is the context within which it took place. As far as pottery and terracotta production areas are concerned, middens or trash deposits are usually located close to use and production areas. In this context, it can be noted that due to the fragility of pottery at various stages of production, finds

Plate 51



Terracotta dabber, Indor Khera.

Plate 52-53



Socket stone, Indor Khera.



53

Partly damaged brick floor, Indor Khera.

Plate 54



Circular platforms composed of white compacted earth and ash, Indor Khera.

of semi-finished pottery are likely indicators of production areas. Ceramic and terracotta production at Indor Khera was taking place within houses of which four have been mapped within the excavated area. These have been identified as houses based on the evidence of household-related objects such as stone grinders and pestles, tools of iron (such as axe heads) and copper (such as fish hooks) and ornaments of varied materials. Several of the terracotta artefacts found in these houses fall into the category of toys, such as marbles, wheels and toy-carts which may have been made and used here. Found within and outside these houses are other miniature objects, including vessels that may have been made by children. It is also important to point out that probably there was little strict demarcation of areas into living and working spaces except for where the firing facilities were located.

Moreover, while production was taking place at the household level, yet it was not within a rural setting. Further, ceramic and terracotta production was on a fairly large scale as evident from quantitative tabulation of craft indicators, and the range of artefacts that were produced and used. The number of firing facilities also may indicate the scale of production. One or other of these indicators are often reported in excavation reports but usually without any context. Through the excavations this season important evidence for ceramic and terracotta production was uncovered within what have been interpreted as houses. Thus, for the moment, the hypothesis is that at Indor Khera 'household workshops' for ceramic and terracotta production existed during the period 200 BCE to 500 CE.

56. EXPLORATION IN DISTRICT CHITRAKUT: A number of archaeological sites and remains were brought to light during the course of exploration in Mau sub-division by R.N. Pal of the Uttar Pradesh State Archaeology Department, under the direction of Rakesh Tewari. The important Stone Age sites include Rishian, Variari Kala and hillocks of Nala Bheel, which have yielded tools made of quartzite, chalcedony and sandstone. The tool types comprise cleavers, scrapers, core, flakes, blades and blade-lets.

Early historic remains from Daraur Dam are represented by NBPW, red ware and iron slag. Ceramic remains of Kotia culture and brickbats have been found at Rishian Dam. Teken dih, Mankuanr dih, Ithahar (Tikra), Tilaudi, Bhardevar, Laurian Dai, Puraka Tekuri, Garhwa and Sesa are the important sites of the early medieval period. The main ceramic found at these sites is red ware. Iron slag and stone *kolhus* were also found.

A number of painted rock shelters were observed at Panchmukhi, Variarikalan, Nanela and Rishian. Locally, these are known as *Sugara ki pathari, Ghuradai ki pathari, Binduli ki pathari and Dadaia- ki-pathari,* respectively. The main themes of the paintings include human figures, hunting scenes, animals and geometrical designs, etc.

Stone *kolhus* were found at Bhitari, Barha kotara, Tilauli and Mankuwar dih, etc. Almost all the *kolhus* were identical in shape and manufacture. The *kolhus* found from Tilauli and Barha Kotara bear Nagari inscriptions. A trident mark was seen on the surface of a stone *kolhu* from Tilauli. A

number of temple retains datable to the early medieval period were documented from the villages Paranubba Shakhi Dai, Laurian Dai, Anandi Mata, Batasha Dai, Mata, Chaturvedi Devi, Kalka Devi, Rataura and Rishian cave.

UTTARAKHAND

57. EXPLORATION IN DISTRICTS ALMORA AND UDHAM SINGH NAGAR: Chandra Singh Chauhan, under the direction of Ashish Kumar, of the Regional Archaeological Unit, Almora, conducted sporadic archaeological explorations in districts Almora and Udham Singh Nagar of Kumaun, as a result of which a number of ancient temples, sculptures, inscribed copper plates and sites were brought to light. A copper plate bearing an inscription in the Devanagari script was found in the possession of a local from *mohalla* Gopal Dhara in Almora city. This copper-plate, dated *Saka* 1544 (1622 CE) belongs to king Dilip Chand, who ruled in Kumaun during the seventeenth century. Two water springs, locally known as *naula* of the late medieval period, were found in *mohallas* of Tilakpur and Badreshwar. An ancient temple built by King Udyot Chand during the seventeenth century was discovered in Dhurka village of tehsil Bhanoli. A number of stone images of Parvati, Ganesa and Vishnu, dated ninth to eleventh century CE, are kept in the sanctum of the temple. An ancient temple belonging to the twelth century CE is situated in the village Takulti of tehsil Dwarahat. It is a *panchayatana* temple with four subsidiary corner shrines (*devkulikas*) and the main deity's shrine built in the centre of the complex. Two contemporary stone images of Uma-Mahesa and Vishnu in his Vaman incarnation are kept in the sanctum and are under worship. This *panchayatana* shrine is well-built and is in a good state of preservation.

In a village known as Madh in tehsil Someshwar, an inscribed image of Uma-Mahesa (36cm x 27cm) along with a sculpture of the Sun god (44cm x 24cm) and Ganesa in stone, datable between the ninth to the fourteenth century CE, were found kept in the sanctum of a temple called Bhatineswar Mahadeva Temple. A copper plate of *Saka* year 1695 (1773 CE) with Devnagari inscription was also found in the temple. According to the inscription, the plate was issued by the king Deep Chand, a ruler of Kumaun. In the vicinity of Someshwar, there is a modern temple named Akula Devi in village Dotiyal, where many ancient stone sculptures are found. Among them, an image of Parvati dated ninth century CE and 12th century CE are important discoveries.

In Taleshwar village of tehsil Bhikiasain, remains of an ancient brick wall, about 1m in length and 58cm in width, belonging to the Kushana period was brought to light. It is situated in the courtyard of a modern Siva Temple. The kiln-baked bricks used in the wall are of the size 36cm x 22cm x 7cm. Archaeologically, Taleshwar village is famous for having two copper plates of the sixth century CE. In this context, the Kushana period structure is an important discovery. A huge monolithic sculpture of Ganesa, carved out of rock, is found near the Taleswar village. It measures about 9m in height, 7m in width and 2·45m in thickness.

Huge rock-cut monolithic sculptures were erected to protect the village. An early medieval temple in *pidha* style was brought to light on the bank of the river Vinod near Kaihar village. A stone image of Lakshmi-Narayana, belonging to *circa* tenth century CE is under worship in the sanctum of the temple.

An ancient mound was discovered near Vidora Majhola village in tehsil Sitarganj of District Udham Singh Nagar. A number of brickbats and red ware potsherds are strewn over the surface of the site. Few polished sherds indicate that the site dates from the early historical to the medieval periods.

WEST BENGAL

58. EXCAVATION AT BANGARH, DISTRICT DAKSHIN DINAJPUR: The Kolkata Circle of the Survey, under the direction of T.J. Baidya, assisted by S. Maiti, P.K. Naik, Nityanand, T. Dutta, K. Srimani, P.N. Biswas, S. Sarkar, S. Roy and D.K. Dey, undertook excavation at Bangarh mound (25° 25'; 88° 34' 33"), Mouza Rajibpur with the main objective of the excavation to ascertain the complete cultural sequence of the site in relation to the settlement pattern and to substantiate K.G. Goswami's hypothesis about the presence of a pre-Mauryan level.

The site of Bangarh consists of the citadel area (central mound), rampart wall and a moat beyond it on all four sides (pls. 55-56) and settlement on the eastern and northern sides. The area beyond the moat has been inhabited for long, thus posing a barrier to archaeological work. Trenches were laid out on the highest mound near the southern rampart wall so that co-relation between the two could be established easily.

The excavation was carried out to a maximum depth of 10·75m from the central peg A1 and about fourteen successive layers were exposed. Tentatively, the deposits at the site indicate a seven-fold cultural sequence/periods viz.,

Period I : Pre-Mauryan
Period II : Mauryan
Period III : Sunga-Kushana
Period IV : Gupta
Period V : Post-Gupta
Period VI : Pala
Period VII : Sultanate/Madieval Period

Different structural phases were encountered during the course of excavation along with antiquities.

Period I is coeval with the pre-Mauryan period. The most interesting finds of the period are black-slipped wares and beads, etc. Evidence of reed impression on burnt mud lumps were encountered in A3 Qdt.IV during the course of excavation. Stratigraphically, it could be dated to the pre-Mauryan period. It suggests that wattle-and-daub houses were in vogue in this period. A chalcedony bead and a miniature terracotta boat-shaped object were noticed in this level. Further excavation could not be undertaken due to rise of sub-soil water in the trench. The deposit indicates some sort of late Chalcolithic assemblage, traced else where in other sites of West Bengal. The important wares of this period are black-slipped ware and fragments of black-and-red ware.

Plates 55-56





General view of ancient site, Bangarh.

Period II is represented by the Mauryan period and the most interesting find of the period is a beautiful terracotta ring-well (pl. 57) discovered while excavating in A3, Qdt.IV. The top of the ring-well is found at a depth of 7m from the surface. Thirteen rings of the well were encountered. The height of the ring well is 1·06m; its width is 0·53m and its thickness is 3·5cm with an average height of 8cm. The rings are wheel-made and of fine fabric. The bottom most three rings are applied with black slip. A brick wall belonging to the Mauryan period, which seems to be the only structural remnant of the period, as noticed in A3, Qdt.IV. It is oriented in south-east and north-west direction. The length and width of the brick wall respectively measure 0·95m and 0·24m. The exposed height of the wall is 5cm. The measurements of the bricks are 39cm x 22cm x 5cm and 36cm x 24cm x 5cm. A big-sized brick of 50cm x 38cm x 6cm has been recovered from this level. The antiquities of this period include punch-marked copper coins, terracotta gamesman, terracotta stopper, etc.

Period III is marked as Sunga-Kushana period. A brick structure belonging to this period was encountered in A3 Qdt.I. The wall is running from south-west to north-east. The extant length of the structure is 4·65m and its width is 0·23m. Eleven courses of the brick wall have been exposed so far. The measurements of the bricks are 35 x 24 x 4cm, 37 x 24 x 4cm, 35 x 24 x 4cm and 24 x 24 x 9cm. A large number of terracotta tiles, both intact and broken, were recovered from this level. The Sunga-Kushana period yielded a number of important and outstanding objects which include uninscribed cast copper coins, copper bangles and copper antimony rods, a circular terracotta lump bearing six seal impressions (pl. 58), terracotta plaques depicting *yakshi* (pl. 59), animal figurines and terracotta stopper (pl. 60), etc. The most important antiquity of this period is a broken terracotta ring bearing some typical symbols. Red ware, grey ware and fragments of black-and-red-ware pottery were noticed in this period. The important shapes are dishes of deep and shallow variety, bowls, vases, miniature pots, etc.

Period IV is supposed to be the Gupta period. It is represented by the discovery of broken bricks and brick walls. The most important finding is a terracotta ring-well (pl. 61) found in A2, Qdt.IV. Its top is traced at a depth of 4·54m i.e., (8·76m from Al). The exposed height of the ring well is 2·87m, its diameter is 0·60m and the average width is 0·65m. The height of the ring varies from 15cm to 16cm and the thickness of the ring is 3·5cm. The ring-well is sealed by layer (5) and cuts through (6) (7) and (8). The bottom rings of the well could not be excavated due to paucity of time. A drain made of burnt-bricks was encountered in A2, Qdt.I. The length of the drain is 4·20m from east to east. Its width is 0·50m on the western side and the minimum width is 0·15m on its eastern side. Only three courses of the drain wall have been exposed. Another burnt-brick wall running in east-west direction has been encountered in A2, Qdt.1. The length of the wall is 4·08m and its width varies from 0·58m to 0·60m. The measurements of bricks used in the structure are 22 x 20 x 3cm, 20 x 13 x 5cm, 15x 13 x 3cm, 14 x 10 x 5cm and

Plate 57



Terracotta ring-well, Bangarh.

Plates 58-60



Terracotta lump bearing seal impressions, Bangarh.



Terracotta yakshi, Bangarh.



Terracotta stopper, Bangarh..

Plate 61



Terracotta ring-well, Bangarh.

18 x 11 x 4cm, etc. An interesting discovery made in B3, Qdt.III is a burnt-clay floor (pl. 62). Its length from east to west is 2·73m and its width is 2·20m from north to south. Burnt-bricks were laid in a flat position over which the clay floor was made and later burnt. In the southeastern corner of the floor, a burnt-brick hearth was encountered. The dimension of the rectangular hearth is 41cm x 29cm; the diameter of its mouth in the centre is 0·18m and its depth is 8cm. Within the hearth, a lot of charcoal pieces were noticed. The important antiquities comprise terracotta beads, semi precious stone beads, terracotta animal figurines, terracotta stoppers, copper objects, etc. The most important object of this period is a terracotta mould (pl. 63) that depicts a human figure standing on a lotus in a peculiar pose and trampling two giant-like creatures. Mention may also be made of terracotta seal bearing Shell script.

The Gupta period is represented mainly by red wares and grey wares. The ceramics are made mostly of well-levigated clay. Red slip has been applied on the exterior surface of most of the wares. The important shapes are spouted vases, lamps, *handis*, pan with handle, miniature pots, bowls and deep dishes.

Period V belongs to the post-Gupta period. The foundation of a residential-complex was encountered in Al, Qdt.IV and A2, Qdt.I. The residential-complex has been partially exposed. The complex is 6·32m from north to south and its width is 4.06m from east to west. The width of the wall varies from 1·18m to 1·27m. Only two courses of the wall have been exposed. The complex is in south-west and north-east orientation. The wall is made out of few full-sized bricks and mostly broken bricks and brickbats. The workmanship involved in the construction is very inferior in nature, wherein bricks were placed haphazardly. The measurement of few bricks are 25 x 13 x 5cm, 20 x 15 x 3cm, 20 x 11 x 4cm, 20 x 12 x 9cm, 20 x 12 x 3cm, 20 x12 x 9cm, 17 x 14 x 4cm and 20 x 9 x 5cm. The room- complex consists of one room along with a verandah in its northern side. The verandah and the room are partitioned by a brick wall 0·80m in width. The interior of the room is 2·19m from north to south. The interior width of the verandah is 0·80m (north to south). The verandah is enclosed by a brick wall in its northern side, the width of which is measured 0·50m and the exposed length is 1·44 (east to west). The width of the verandah, including the exposed wall is1·22m from north to south. The western side of the room has an open courtyard which is 1·97m from east to west. To the east of the courtyard, another brick wall was noticed running in north-south direction. The length of the wall is 3·10m (north to south) and its width is 0.78m. The measurement of the bricks are 15 x 12 x 5cm, 16 x 17 x 5cm, 14x 10 x 4cm, 14 x 12 x 4cm, etc. One L-shaped brick wall is also encountered in the northern side of the quadrant. The length of its longer courtyard, another brick wall was noticed running in north-south direction. The length of the wall is 3·10m (north to south) and its width is 0.78m. The measurement of the bricks are 15 x 12 x 5cm, 16 x 17 x 5cm, 14 x 10 x 4cm, 14 x 12 x 4cm, etc. One L-shaped brick wall is also encountered in the northern side of the quadrant. The length of

Plates 62-63



A burnt-clay floor, Bangarh.



Terracotta mould, Bangarh.

its longer arm is 1·78m (east to west) and the smaller arm is 0·59m (north to south), whose width is 0·44m. Different occupational floor levels were noticed in the section.

The antiquities include minor terracotta objects like hopscotch, stoppers, etc. The most interesting finding of the period is a composite terracotta figure representing Lajja-gauri on one side, and a tortoise, *garuda* and a bird on other side.

The ceramics of this period are mostly of inferior variety and made of coarse fabric. The shapes are vases, bowls, basins, *handis* and storage-jars, etc.

Period VI is Pala period and two brick-built bastions of the rampart wall are the main finds of the period. The typical stone sculpture of the period along with terracotta female figurines and other minor antiquities have been found. Excavation was conducted on the southern rampart wall. Consequently, a circular brick-built bastion was noticed. The diameter of the bastion is 8·10m. An 'L'-shaped brick-built wall was noticed inside the bastion. The brick-built bastion was made over the remains of earlier architectural remains. On the exterior, a number of offset projections were noticed along with a rectangular chute. Forty-five brick courses of the bastion were exposed and the extant height is 2·66m. Mud mortar mixed with gravel and fine potsherds has been used as binding material in the construction. The measurement of bricks are 18 x 12 x 20cm, 18 x 12 x 4cm, 16 x 15 x 3cm, 12 x 8 x 4cm, 16 x 10 x 2cm, 14 x 10 x 4cm, 20 x 18 x 3cm, 18 x 18 x 9cm, 28 x 11 x 3cm and 22 x 14 x3cm, etc. Bastion 2 is located on the western side of Bastion 1 on the southern mud rampart wall. The exposed height of Bastion 2 is 2·18m and the diameter is 7·13m (from exterior to exterior). Fifty-five brick courses of Bastion 2 have been exposed. The interior of the bastion shows that it is constructed in two phases for which an offset projection is noticed. About six offset projections were encountered on its exterior side. The bastion is half-circular, abutting just on the outer edge of the southern fortification wall. A rectangular void was noticed in the foundation level which has been filled in by putting earth and clay. Different sizes of burnt-bricks have been used in the construction of the bastion. The measurements of a few exposed bricks are 29 x 16 x 4cm; 27 x 19 x 5cm; 23 x 15 x 6cm; 16 x 12 x 5cm and 19 x 15 x 4cm, etc. The construction shows bricks of the earlier period have been utilized. The antiquities of the Pala period which were found during the excavation are typical stone sculptures, a miniature stucco boat, human and animal figurines, terracotta stopper, a bone hair pin, semiprecious stone beads, etc. A large number of sherds of red ware and gray ware were encountered in this period. Jars and vases dominate the ceramic industry of the Pala period. The wares are mostly of medium to course fabric although few fine fabric sherds have been encountered.

Period VII i.e., the Sultanate/Medieval period is represented by glazed sherds and structural remains of re-used bricks and a guard wall of Bastion l. The guard wall is made on the embankment of the moat, possibly to protect the foundation of the brick-built bastion which was reused in this period. It is constructed at a distance of 5·25m from the bastion on its southern side.

The eastern side guard wall is located at a distance of 5·25m from the bastion. The extant height of the eastern and southern side guard walls are 0·90m and 0·60m respectively. The antiquities in this period are very rare and only few terracotta stoppers and beads were covered. The shapes of the ceramics are decorated bowls and dishes of glazed wares as well as common red wares.

59. EXCAVATION AT DHEKA, DISTRICT MURSHIDABAD: The Directorate of Archaeology & Museums, Government of West Bengal, conducted an archaeological excavation at the mound of Doilopar (also called Dohalia Par and Deulesvar) in the village Dheka, under the direction of Amal Roy, assisted by Binoy Moni, Shiharan Nandy, Somenath Ghosh, Monojit Bhowmick, Subhas Kr. Basu, P.K. Acharya, D.P. Ghosh and Santanu Paul. The main objective of the excavation was to know the nature of the buried structures along with the chronological sequence at the site.

The site (23° 55' 08"; 87°59' 21") is situated within the village Dheka under the Gram Panchayat Sabalpur, Mouza Bichkandi (JL no. 125), sub-division Kandi. It is well-connected with Kandi town, 15km away, by a good motorable road and is at the extreme west near the Idgah. It is under the private possession of a local. The site is associated with strong religious beliefs of both the Hindu and Muslim communities

The grid-pattern layout method, as specified for horizontal excavation, was applied for digging the mound, by making each trench into a Qdt. of 6·00m x 6·00m. Six trenches were considered for the excavation. All the four trenches quadrants C3, C4, D3, and D4 yielded structural remains, constructed with burnt-bricks of different sizes and mud-mortar. Due to occurrence of frequent brick structures, a limited space was available for deep digging in trench D4. This helped to ascertain the cultural sequence on the basis of successive deposits and relative structural remains. Trial-digs were also conducted in Trenches XB1 and XB2 in the southwestern part of the mound, though no significant structural components were found except a huge quantity of brick-debris with potsherds.

After a careful study of the exposed structural components in relation to the stratigraphical context, antiquities and pottery, it was ascertained that structural activities occurred at the site for a long time, through three phases of structural activities. It was observed that the early structural activity during the first phase was marked by structures of smaller dimensions, use of bigger bricks and platforms, which were exposed in Trenches C4 and D4 at a depth of 3·00m and 2·40m respectively. The former measured 1·06m x 70cm whereas the latter measured 2·74m x 1·78m respectively.

The second phase of structural activity is marked by the use of comparatively smaller bricks and significant use of moulded bricks. The exterior surface shows the use of plaster (lime and sand) with various designs and stucco. The structural components of this phase were exposed in Trenches C3 and D3. The structure belonging to this phase is a wall with multiple offsets. One wall-component was found at a depth of 1·50m and another part was traced at a depth of 1·20m. The average thickness of the wall is

2·00m. The use of moulded bricks at the base of the exterior of the wall provides elegance to the structure by giving it better dimensions. The bricks used are well-burnt; the clay-mortar is fine and sticky. The veneering bricks are bigger in size and the bricks used in the core of the structure are irregular and of different sizes. The superstructure has been vandalized by brick-hunting and the mound is also used as a playground. The remaining parts of this structure and other antiquarian remains did not provide any definite clue to ascertain the nature of the structure.

The late structural activities during phase 3 were traced in the form of a wall, exposed at a depth of 25cm in Trenches C3, D3 and D4, in which smaller bricks and brickbats had been used. Running north-south and measuring 11·26m in length and 2·32m in width, the structure bears evidence of poor construction quality with the use of collected bricks. The wall runs parallel to the structure of the second phase with a similar offset. It appears that after the damage of the earlier structure, the last phase of construction was undertaken on a cushion laid with collected debris comprising brickbats, fragmentary pieces of terracotta plaques, plaster, stucco, pottery and other materials, as recorded during the course of digging through layer 2 in Trench C4 and D4. The ground plan of the excavated structures will provide a complete picture of the structural phases with relative positions.

Various sizes of bricks were used for the construction of the structures under different phases of activities. The following sizes have been recorded from the excavated structural components of all the phases: 40x27x7cm, 37x27x7cm, 34x29x7cm, 33x28x7cm, 26x29x6cm, 37.5x28x7cm, 41x27x6cm, 32x25x6cm, 28x25x6cm, 28x13x5cm, 28x16x7cm, 22x19x6cm, 11x10x4cm, 12x8x3cm, 15x13x6cm and 20x25x5·5cm. After studying the sizes, it has been found that the length of the bricks mainly varies between 30cm and 41cm whereas the thickness mainly varies between 5cm and 8cm.

Trench D4 was selected for deep digging up to a depth of 3·70m to ascertain the chronology of the site on the basis of the deposits and undertake a detailed study of the material remains within the stratigraphical context. Layer 1 is characterized by semi-compact earth, light brown in colour, mixed with brickbats and potsherds. The maximum and minimum thickness of the deposit is 68cm and 34cm respectively. Several antiquities were recovered from this layer including terracotta balls (two), terracotta lamps (two), unidentified terracotta object (one), iron slag (one) and unidentified iron object (one). Layer 2 mainly comprises semi-compact earth (though loose soil is present sporadically), brownish in colour, huge quantities of debris comprising brickbats, lime-plaster, stucco-remains and huge potsherds (red ware is predominant). The maximum and minimum thickness of the deposit is 110cm and 78cm, respectively. A fair numbers of antiquities were collected from this layer, which include terracotta balls (seven), terracotta lamps (four), terracotta beads (two), terracotta hopscotches (seven), terracotta mould (one), fragmentary terracotta plaques (three), iron

nails (three), iron slags (five), unidentified iron object (three) and stucco-plasters with design (sixty-two). Layer 3 comprises semi-compact grey earth mixed with brickbats and potsherds (less in number). This deposit yielded a fair number of antiquities. Minimum thickness of this layer is 28cm whereas the maximum thickness is 62cm. Antiquities recovered from this layer include terracotta hopscotches (eight), terracotta balls (nine), terracotta lamps (two), terracotta beads (two), fragmentary terracotta plaques (three), unidentified terracotta object (one), fragmentary glass bangle or ring (one), stone bead (one), stone pestle (one), iron utensil(one), iron ore (one), iron slag (fifteen), iron nail (three), iron ring (one), iron tool (one) and unidentified iron objects (two). Layer 4 has a maximum thickness of 54cm and the minimum thickness is 14cm. It comprises semi-compact grey soil mixed with a huge quantity of brickbats and profusion of potsherds. Some portions of this layer are constituted by dump materials. A good number of antiquities were collected from this deposit. These are terracotta seals (three), terracotta hopscotches (three), terracotta lamps (two), terracotta balls (three), iron slag (eight), iron ore (four) and copper objects (two). Layer 5 has a maximum thickness of 44cm and minimum thickness of 36cm respectively. It is characterized by loose clay mixed with sand and calcareous nodules (*ghutins*), used for making a surface uniform to serve as a floor. A profusion of potsherds and brickbats were recovered from the upper parts of this layer. A hearth was traced while digging through this layer. The presence of iron slag indicated that the hearth was associated with iron-smelting. Considerable numbers of antiquities were recovered from this layer. They are terracotta seal and seal- like objects (thirteen), terracotta ball (one), terracotta hopscotches (two), terracotta weight/hop scotch (one) and fragmentary terracotta plaque (one), iron nails (three), iron slags (seven). Layer 6 has an average thickness of 28cm. The deposit is characterized by semi-compact earth mixed with limited number of brick bats and potsherds. It is associated with rammed floor or cushion of brick-nodules. It did not yield any antiquities. Layer 7 was identified as natural soil. The soil is compact in nature, blackish incolour and mixed with sandy particles. The digging was continued up to 40cm to confirm the nature of deposit and its composition. Due to accumulation of sub-soil water, further digging could not be undertaken. No occupational deposit was traced in this layer.

Among the antiquities, the terracotta seals are noteworthy. All the seals are inscribed with scripts though most of them are fragmentary and illegible. Two such seals with legible scripts provide a date for the site. Palaeographically, the seals may be assigned to *circa* fifth/sixth century CE, on the basis of the so-called Gupta features with verticals showing no indication towards formation of a slope or twist towards the right, as is characteristics of a later period. The head-marks on the top are also not as developed as in the later period scripts such as *Siddhamatrika or Kutila*. The legends are *vijayachandrasya* and *vainya* as deciphered by Suresh Chandra Bhattacharya. As the seals were collected from the contemporary

layers of the depositions of the structure belonging to phase I, it may be assumed that structural activity at the site started from the fifth/sixth century CE and continued up to seventh century CE, i.e., prior to the Palas. The nature of the structures, brick-sizes and pottery do not provide any evidence of the cultural traits of the Pala period. Three fragments of stucco figures were found during the excavation, of which, one depicts a partial face with one eye and a mutilated nose. The decorative designs on stucco-plasters are varied in nature with predominance of floral and geometrical motifs. The fragmentary terracotta plaques depicting human figures are interesting. It may be assumed that they were also used for the decoration of the outer walls since they have been found within the collapsed debris. A large number of potsherds were collected during the excavation. After studying the assemblage, it was found that red wares are predominant while the grey and black wares are less in number. The qualities of the sherds do not indicate an impressive and developed ceramic industry at the site, though a few pieces of orange-red ware, micaceous red ware, chocolate wares and black wares of thin fabric have been collected from the site. Painted sherds are not available. Incised designs on both the exterior and interior are available in limited cases. Most of the sherds are of thick variety and wheel-made, while those of thin fabric, made out of well-levigated clay are limited. Among the types, mention may be made of vase, jar, cooking vessel with carinated body and handle, fry-pan, spouted-vase, bowl, bowl-cum-lid, knobbed-lid, lamp-stand, basin, trough, etc. Among other shapes, terracotta lamps with flat base and rudimentary burning notch as well as bowls with corrugated surface and rimless, thick vertical edge are common. Through a comparative analysis of similar Pala-period antiquities, it has been ascertained that the site belongs to the pre-Pala period. This corroborates the palaeographic evidence of the seals. All the antiquities and structural components, so far exposed through the initial diggings, indicate that Dheka was under occupation during the sixth/seventh century CE.

60. EXCAVATION AT DIHAR, DISTRICT BANKURA: In continuation of the earlier excavation, the Department of Archaeology, University of Calcutta, resumed excavation at three unprotected mounds of Dihar (23°7'10"-23° 08' 10"; 87°21'-87° 22'), Police Station Bishnupur, District Bankura, under the supervision of R. K. Chattopadhyay, assisted by A. Datta, D. Basu, B. Basak, T. Gantait, S. Paul, S. Mukherjee, D. Sen, S. Mondal and S. Prasad. Other members of the team included Sharmistha Chatterjee, Dipsikha Acharya, Doyel Banerjee, Tumpa Paul and Rammathot Khongreiwo along with the M.A/M.Sc final year students of the Department of Archaeology.

Located on the northern bank of the River Dwarakeswar and on the left bank of the Kana *nadi*, the dried bed of the Dwarakeswar, Dihar is about 6km north of Bishnupur town. Archaeologically, a landmark of this site is the complex of two early medieval/medieval temples, viz., Sanreswara/Shadeswara and Saileswara, situated on the elevated bank of the Kana

nadi in the northern corner of the village of Dihar.

Previous excavations revealed evidence associated with the emergence of a rural settlement since the early village farming phase. The settlement was first occupied by the copper-using people who acquired the knowledge of iron smelting in a subsequent period. In all probability, settlement activity at the site continued up to the early historic phase, bearing evidence of diagnostic types of artefacts comprising a large number of cast copper coins, ceramics, terracotta objects and other types of metallic and non-metallic objects. Apart from the departmental teaching programme related to archaeological field-training including excavation methods for the final year Post-graduate students, the objectives of the present work were: to know the comprehensive stratigraphy of the site as comparable as well as complementary reference to the earlier excavation reports; to elucidate the actual location of the core and the peripheral zones by excavating undisturbed areas both along the river bed and inside the modern settlement-complex of the village; to establish the role of metal, particularly copper and iron, in the reconstruction of the socio-economic aspect of the region; and to obtain absolute date of the black-and-red ware phase at Dihar following radiometric dating methods.

Keeping in mind that this was a small scale excavation, altogether six trenches were laid out: four at the Ma Bhavani Tala mound (DHR1); one at the Hirapur Mound (DHR2) and another one at the Manasatala Mound (DHR3) in the southwestern, northeastern and southeastern corners of the village/ site respectively. In order to unfold the buried habitational remains, the trenches were laid by following the usual horizontal method. Each trench, measuring 6m x 6m with 50cm baulk on each side of the square area, was further divided into two halves, thus reducing the actual digging area to 5m x 2·5m. Besides, trial-digging work in form of test pit (3m x 3m) was carried out at the high mound of Kalbhairav-Tala along the dried-up bed of Kana *nadi*.

The mound of DHR1, locally known as Ma Bhavani-Tala, is situated in the southwestern corner of the village, along the left bank of river Dwarakeswar flowing towards the north. Covering an area of approximately 300sq.m, the mound is regarded as one of the important places of the *gram devata* i.e., Ma Bhavani. The mound may have got its name from this village deity who has been worshipped here for a long period of time. However, instead of enjoying the status of a holy area, most parts of the mound remain much damaged due to the interference of different agencies, both natural and human. So far as the geo-physical condition of the mound is concerned, it is flattish in nature inclining mostly towards the flood plain. It can also be described as an inclined ground, sloping towards the cultivated land from the peripheral area of the modern habitation. Four trenches viz., XA1, XA2, XA3 and ZA1, were laid out on this mound. Deep digging was restricted only to Trench ZA1, which has yielded seven layers of implementiferous deposit, of about 1·20m in depth. Unfortunately, virgin soil was not encountered in this trench. The uppermost layers, i.e., layer 1, 2 and 3 showed

deposition of diagnostic type of artefacts, such as BRW, iron slag, debris of metal working, etc. This hinted at the possibility that they might have been re-deposited or dumped from the nearby area. Conversely, the occupational debris recorded in the layer 5 and 7 showed a kind of homogeneity in the form of artefacts, viz., potsherds, bones, iron slag, lumps of burnt earth, charcoal and minor antiquities. Dark grey soil along with decomposed habitational leftover suggests activity related to metal working inside the living area. Unfortunately, no working floors have been detected. The occurrence of mud plaster in fragile condition and reed-impressed burnt earth together added to the nature of structural remains. Although the work conducted in the rest of the trenches (XA1 and XA2) on the mound was certainly limited, nevertheless, the excavated archaeological remains helped to fix a time-bracket of the early medieval/ late medieval period. The excavation laid bare the evidence of early medieval /medieval habitational miscellany in the form of a large concentration of ceramics, probably indicating the existence of a potter's workshop. At places (XA3), the deposits on various layers are best identified as a rubbish dump, a workshop and a series of backyards. The occurrence of structures at stray locales, containing lateritic blocks provides some information on the large structural-complex at the western corner.

The Hirapur mound (DHR2) is situated at the eastern corner of the village, along the main village road. It is closely bordered by modern habitation at its western and northern parts whereas a fertile flood plain outlines its southern end. The eastern part of the mound is marked by dense vegetation and merges with the floodplain showing incline from west towards east/south-east. In spite of its contiguous situation with the flood plain, the nature of soil and morphology of the mound clearly exhibit an archaic character. The central part of the mound was selected to mark the cardinal point '0', from one trench was taken in its southeastern quadrant. The preliminary intention was to unfold the cultural sequence of the mound but due to its potential, enough provision has kept for horizontal excavation in future. A trial-dig was carried out in the eastern half of the trench, which yielded loose earth and continuous occupational debris in the upper layers, including the humus and below it. Up to a depth of 80-84 cm, the trench did not yield any artefact which could signify a specific period of occupation. Instead, it yielded rather mixed-up assemblages containing potsherds, bone fragments, charcoal, terracotta objects and hopscotch, belonging to early medieval, medieval and/or pre-modem periods. In the same assemblage, a substantial amount of BRW was also recorded, indicating an overlapping sequence of the cultural matrix. Thereafter, the trench yielded extensive remains associated with the BRW-using cultural phase. Digging revealed that with a certain amount of variation, the phase continued up to the depth of 2·37m, below which, the virgin soil was detected. The concentration of cut bones and worked bones, occurrence of slag and metal objects, antlers, besides other artefacts related to the household suggests that the users of BRW certainly played an important role in the mobilization of the agrarian set-up. Below

the depth of 2m, more sophisticated specimens of BRW were found in association with cow dung, strewn over a floor which further contained embedded potsherds, cut bones and few pieces on worked bones. A major concentration of charcoal, burnt earth and the evidence of firing were also detected in a few disturbed clusters.

Certain elements confirmed that the BRW cultural tradition predominately manifested strong agro-pastoral activities at the site. This tradition continued for a long period owing to the utilitarian values of the ceramics in the day-to-day life of agro-pastoral communities. A close scrutiny of the recovered antiquities clearly reflects their skill in manufacturing some diagnostic artefacts like tumbler in BRW, worked bones comprising arrow head, point, awl etc. These not only satisfied few specific purposes but also clearly defined the mode of their survival strategy.

The planning of residential-complexes was certainly conditioned by the demands of the new farming economy that had changed the very basis of community life. At Hirapur mound, the exposed area suggests that domestication of animals and protection thereof in a cattle-pen *(gosala/gowal)* became one of the prime concerns of the community. There are layers of cow-dung on a floor level, possibly formed with its regular application (locally available and traditionally continued) and plastered by mud on both the sides. Burnt fragments of earth and charcoal have been obtained practically from each habitational area. Unlike the living space ofthe Manasatala mound, the contents overlying the floors excavated at this mound helped to specify the utilization of occupation area for different purposes i.e., residential area, courtyard, working place, cattle- pens etc. In each residential-complex, the floors were almost bereft of tools and food processing equipments; the only exception being the eastern corner of the trench, in which all the residential areas yielded bone tool-making and food processing objects.None of the residential spaces at Dihar have yielded evidence of stone pavings though river pebbles/gravels are noticeable at places. Materials recovered from the complex comprise pottery, game objects like hopscotch, discs, sling balls, polished pebble stones, rubble stones and other minor antiquities. The pottery unearthed from the floor was invariably associated with storage of water/liquid and kitchen vessels. The dimension of cattle-pens encountered at the site is unknown. It could have been surrounded on four sides by a housing-complex. The number of hooves preserved in two corners clearly indicates that a large number of cattle were kept in the pens.

The Manasatala mound (DHR-3) possibly acquired its present name from the modern temple of Manasatala which stands nearby. Topographically, it is relatively oval in shape, situated along the left bank of the river Dwarakeswar flowing towards the north.The location of the mound is a little away from the cultivated land from which it gently rises and outlines the southern and eastern corners of the village. It is disturbed by the encroachment of modem habitational areas at its northern and western parts, though some of them are now abandoned

and it is bisected by a village road along its eastern corner. However, there should be no hesitation in calling it an undisturbed locality that still possesses substantial evidence of ancient habitational remains. The same strategy for laying out trenches was followed as that adopted on the mound of Hirapur and selected Trench A1 in the southeastern quadrant. Occupational debris, consisting of moderate concentration of potsherds embedded with a cluster of assemblage containing pieces of slag, tiny fragments of bones, bead and charcoal and other fragments associated with metal works, was first encountered at a depth of 15-16cm, after removing the layer of humus. At the depth of 18-19cm, another cluster of assemblage of BRW and other associated sherds, slag, raw materials, hopscotch, pigments and other objects associated with metal works was encountered. A similar situation occurred throughout the trench up to the depth of 27cm, below which a major concentration of BRW and other associated potsherds and early medieval ceramic types along with the evidence of activities associated with metalwork (*kamarsala*), such as circular patches of burnt earth, possibly a part of an oven/hearth and charcoal pieces were exposed. At about the same level (i.e., 27cm) in the southeastern quadrant, the trench yielded a small metal object (with a flat and sharp cutting edge of the size of the smallest fingernail and with a round butt or butt-end) along with iron slag and other materials possibly associated with metalwork. Clusters of artefacts continued to offer similar, if not the same, features at various depths of 4cm, 48cm, 54cm and 61cm, which were encountered at the upper levels. The appearance of Rouletted ware along with two sherds of black-slipped ware from the depth of 67cm is certainly an important evidence for the reconstruction of various issues of the early historic period. The core is compact grey and the surface is polished and smooth and black in colour. It may be noted here that two of the three sherds of the early historic ware were alsofound associated with this Rouletted sherd. Thus, the occurrence of red ware, BRW along with early historic pottery is helpful in dating the deposits of the exposed assemblage to the early centuries of the Christian era if not later. However, as we descended deeper, the amount/concentration of slag and other specimens related to metal work remained the same. So, we assessed the potential of the site and took a decision to discontinue digging after reaching the depth of 109cm. The digging at Kalbhairav-Tala mound has resulted in the discovery of highly disturbed occupational area containing artefacts of different categories. The presence of BRW sherds in sufficient numbers, copper object (arrowhead), bone tools and other diagnostic types of artefacts of the BRW phase suggests its nature as a habitational area of early village farming communities. The dig, which was confined to a small segment of the mound and continued up to a depth of 164cm unfolded the basic identity of the location i.e., its close association with the BRW phase.

Structural remains found from Dihar have been conditioned primarily by the variegated geological- hydrographic factors, of highly disturbed contexts and in very poor states of preservation. A review of the available database will amply testify to the existence

of the following categories of structural remains: (a) mud/rammed floors, (b) reed-impressed clay chunks, (c) occasional occurrence of hearths / ovens and furnaces, (d) larger strips of floor areas possibly indicating lanes / passages / open spaces, (e) pit-silos, (f) refuse pits, (g) structural / storage-pits, (h) post-holes, (i) industrial / manufacturing-complexes or workshops (potters' and metal workers') and (j) reed-impressed clay, indicating extensive use of wattle-and-daub structures.

Among pottery, BRW has remained the most endemic type at Dihar. Besides this diagnostic category, three major pottery types BSW, red ware and grey ware, have prevailed at the site. Among the many prominent types in BRW found at Dihar, the various sub-types of bowls like channel-spouted vessels (particularly bowls), carinated *handi*/bowl with splayed-out, flaring rim, convex-sided bowls with a sagger base, bowl with internally beveled rim, platters, jar and tumbler etc. have remained steady. Cord-impressed and rusticated wares were found in good numbers. Evidently, the two types of Rusticated Ware, basin and *handi* were generally used as cooking vessels, as borne out by soot marks on them. The application of cord-wrapped paddle on the wet surface of the pot seems to be quite visible. On inspection however, it appears that the striated impression without twists and knots are probably the result of the application of tortoise shell of different age groups as dabber. A large number of tortoise shells were obtained during the excavation. It may be noted that a steady occurrence of a red-slipped ware in association with BRW and a Rouletted ware at Manasatala mound among stratigraphic assemblages associated with early historic deposits is a feature of the BRW phase at Dihar. The Rouletted ware was represented by a single sherd recovered from a depth of 67cm. The core is compact grey and the surface is polished and smooth and black in colour. It may be noted here that two of the three sherds of early historic ware were also found associated with this Rouletted ware sherd.

The bone industry, as shown by artefacts prepared from worked bones and antlers in Dihar is quite rich. Artefacts made of bones increased markedly in number and variety in the BRW phase. The classification of worked bone assemblages could mainly follow a functional theme. In general, the tools can be linked to hunting, sewing and weaving activities. Ornamented specimens are the second most common category. Artefacts associated with skin working, fishing and hair-dressing round out the inventory. Tools tied to hunting consist of various bone points and barbed points. Although the barbed point is generally associated with fishing, its presence in nearby forested and woodland areas implies that it was more likely used for hunting of animal. Specimens that appear to have been used for sewing and weaving include slender pierced points, awls and borers. A few tools suggest identification as sickle, typically prepared from cut bones of limbs and are sometimes decorated with a parallel line. The emergence of an elaborately-worked bone industry in the BRW phase at Dihar could be explained as resulting from a secure economic position. The richness of the worked-bone industry also suggests that

BRW-using cultural groups at Dihar would have had greater amount of time to devote to such labour-intensive task as bone tool manufacturing. In addition, the effectiveness of these tools would have attracted the villagers to bone as a new material for large-scale production. In this context, the presence of antlers and highly decorative bone specimens should be seen as ideal status objects. Following are a few points regarding the richness of worked bone: Most of the specimens are ornaments rather than utilitarian pieces. A number of utilitarian pieces are also elaborately decorated. Ornamental objects such as pendants are typically fashioned from bones, shell and tooth. Pendants prepared from canine teeth have also been recorded from Hirapur. Art objects recovered from the BRW phase were most likely linked in some manner to ritual and ceremonial activities. The emergence and efflorescence of art probably paralleled the heightened ritual and ceremonial activities developed by the early village farming community.

The presence of metal and the varying contexts of its occurrence at Dihar have remained one of the most intriguing issues in the study of the BRW phase of this region. Metal working assemblages were traced on a wide-scale in all the mounds excavated during this field season. Both finished and unfinished/damaged specimens made of copper and iron have been recorded all over the mounds of Manasa-Tala and Hirapur. An arrowhead found at Kalbhairav Tala certainly exhibits good craftsmanship.

Polished stone tools and milling tools like saddle-querns, besides ground/polished quartzite stones are found in association with BRW at Hirapur and Kalbhairav Tala. The Hirapur specimen is a celt prepared on river pebble containing original cortex. The polishing has been done with great care at its working border. However, the remaining part of the tool has been left undressed.

Terracotta objects have been found in profusion from all the excavated trenches. A general review of artefacts provides extensive evidence in the form of terracotta balls, net-sinkers, hopscotches, spindle-whorls, beads, miscellaneous game objects, terracotta discs, figurines, etc.

The following comprehensive chronology of the various periods at the different mounds of Dihar has been worked out on the basis of the cultural outfit of each mound (as stated above), their stratigraphic positions, objects with definite chronological status and a comparative study of the assemblages of one mound with those of another.

II. EPIGRAPHY

SANSKRITIC AND DRAVIDIC INSCRIPTIONS[1]

ANDHRA PRADESH

1. EASTERN CHALUKYA INSCRIPTION, DONEPUDI, DISTRICT GUNTUR: This inscription, engraved on a stone slab, is found in front of the Adinarayana temple in the above mentioned village. It is in Telugu language and script and dated in Saka year 903 (981 CE). The inscription belongs to the reign of the later Eastern Chalukya king Vishnuvardhana. It records the gift of some land in Donepudi for erecting *Garudagambham* and making food offerings to the deity Kesavaperumal at Donepudi by the king. The inscription also states the gift of fifty sheep for burning perpetual lamp in the temple.

2. KAKATIYA COPPER-PLATE INSCRIPTION, BUCHCHI REDDIPALLI, DISTRICT NELLORE: This copper-plate inscription is preserved in the house of Gopalareddy at the above-mentioned village. It is in Nagari characters and Sanskrit language. It belongs to the Kakatiya king Prataparudradeva and is dated in Saka year 1223 (1301 CE). The inscription records the gift of land in Rojavolu-*mahagrama*, situated on the bank of the river Megha, to the donee (name lost), son of Bhavanarayana, grandson of Somabhata belonging to Srivatsa-*gotra* and *Yajurveda*, by the king, after taking bath in the river Pinakini, in the presence of the god Samgamesvara.

3. EASTERN GANGA COPPER-PLATE INSCRIPTION, SANIVADA, DISTRICT SRIKAKULAM: This copper-plate inscription is preserved in the Tahsildar office at the above-mentioned village. It is in Sanskrit language and Nagari characters of the eleventh-twelfth century CE. It belongs to the Eastern Ganga king Anantachodagangavarman (999-1070 CE). The charter records the gift of the village Sirivara to a brahmana Vallinakya by Padmamaharaja, a feudatory of the king, for the merit of the king's parents.

BIHAR

4. MINOR ASOKAN ROCK-EDICT NO. 1, RATANPURWA, DISTRICT BHABUA: This is one of the unique discoveries of the year. The version of this Rock Edict is very akin to that of the Sasaram Minor Rock Edict 1. In the inscription, Asoka says that he had been an *upasaka* (lay worshipper) for more than two-and-a-half years and that in the

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[1] Information from : T.S. Ravishankar, Jayaprakash, S. Swaminathan, K. Karuppaiah, S. Rajavelu, K. Muniratnam, K. Panneer Selvam of the Epigraphy Branch, Mysore and zonal offices at Chennai and Lucknow of the Survey.

beginning, he could not make significant progress. Only after his association with the *sangha*, he zealously propagated *dhamma*. Further, the emperor says that he made the people of Jambudvipa so virtuous that even gods came on earth and mingled with them. He informs that this proclamation was made by him when he was on tour for two hundred and fifty-six days. In the end, he exhorts that the inscription should be engraved on rocks and on pillars wherever available.

RAJASTHAN

5. NAGARI INSCRIPTION, TODARAYASINCH, DISTRICT TONK: Engraved on a sculptured *sati*-stone fixed in the platform of a *chhatri* built in the premises of the Nrisimha temple and dated [Vikrama] 1594 (1537 CE), this inscription in Nagari characters and local dialect, records that this is *purohita* Gopala's memorial and mentions the performance of *sati* by Gorabadi and Malade, two wives of *purohita* Gopala, son of *purohita* Kisunadasa.

6. STONE INSCRIPTION, TODARAYASINCH, DISTRICT TONK: Engraved on a stone-slab built into a niche of the eastern wall of the Jagannatha *bavadi* and dated [Vikrama] 1654 (1597 CE) and Saka year 1519, this inscription in Nagari characters and corrupt Sanskrit language, records the construction of the step-well (*vapi*) by Jagannatha and its installation by Krishnadasa, son of Vrahmadasa. The record was written by Paramanamadasa, son of Jesobhavadasa.

TAMIL NADU

7. PANDYA INSCRIPTION, TENPUDAIYUR, DISTRICT CUDDALORE: This inscription, in Tamil language and characters, is found engraved on the west wall, of the central shrine of Pasupatisvara temple. It is dated in the third regnal year of the Pandya ruler, Parakrama Pandya (1338 CE). It records the confirmation of seven *ma* of land at Koliyurparru, made during the seventeenth regnal year of Sundara Pandya, by the assemblies of *sabha* and *nadu* with tax exemption for conducting offerings and worship to the god Parpatisvaram-udaiya nayanar at Tenpudavur in Koliyur-parru in Irungolapadi, a sub-division of Virudaraja bhayankara-valanadu.

8. CHOLA INSCRIPTION, SIRUKUNRAM, DISTRICT KANCHIPURAM: This inscription, in Tamil language and characters, is found engraved on the south wall *kumudha* of Purridamkondesvara temple. It is dated in the nineteenth regnal year of the Chola ruler Rajaraja III (1235 CE) and its records the gift of a she-buffalo by Umaialvan *alias* Tiruchchirrambala Velan, a citizen of Kulattur for burning a twilight lamp to the god Tiruvagattisvaramudaiyanayanar of Sunkunram. The temple servants received the gift.

9. CHOLA INSCRIPTION, UTTARAMERUR, DISTRICT KANCHIPURAM: This inscription, in Tamil language and characters, is found engraved on the south base of the *mahamandapa* of the Kailasanatha temple. It belongs to the Chola ruler, Aditya I (871-907 CE). It records an agreement made by the members of the garden committee with Devandai devanai Diran of the Northern bazaar, who made a gift of a lamp-stand to the god of the temple of Mugappa Brahmisvaram. After his death, this

committee received from his son, Adittan, nine *kalanju* of gold and undertook the responsibility of measuring out an *ulakku* of oil daily for burning the lamp.

10. PANDYA INSCRIPTION, PUTTIRANKOTTAI, DISTRICT KANCHIPURAM: This inscription, in Tamil characters and language, is engraved on the north wall of the central shrine of the Isvara temple in the village of Puttirankottai. It is dated in the twelfth regnal year of the king Maravarman Tribhuvanachakravarttigal Sundara Pandya (Maravarman Sundara Pandya I – 1228 CE). It records that an individual named Siraman made a gift of quarter *veli* each of dry and wet land, after purchase from the *kaikkolar*, in order to provide food offerings and to conduct worship and rituals to the goddess Durggaparamesvari, who was consecrated at the niche of the temple. The land was declared as tax-free and the matter of Puttanurkottai gave an undertaking to the trustees of the temple that they would maintain this charity.

11. CHOLA INSCRIPTION, VARAKADAI, DISTRICT NAGAPATTINAM: This incomplete inscription, in Tamil language and characters of the twelth century CE, is found engraved on the north wall (*kumudha*) of the Amman shrine of the Varundisvaran temple. It is dated in the twelfth regnal year of Kulottunga Chola III (1190 CE). It records an undertaking given by the *tanattar* of Tiruvunagisvaramudaiyar temple of Periyankudi, a hamlet of Sri Rajasikhamanich-chaturvedimangalam, an *agaram* (brahmanical quarters), to a mendicant Tiruchchirrambalanambbi, who made a gift of 2500 *kasu* in order to supply flowers, for providing anointment and also for conducting other offerings and worship to the god Tiruchcharrutnai-udaiyar consecrated by him to the temple. The *tanattar* agreed to carry out the charity.

12. TAMIL INSCRIPTION, KUNNANDARKOYIL, DISTRICT PUDUKOTTAI: This inscription, in Tamil characters of the tenth century CE, is found engraved on a pillar in the *ardha-mandapa* of the rock-cut Siva temple of the village mentioned above. It records that Sri Kodai Mayindan endowed rice to the god of Tirukkunrakkudi-devar for feeding one hundred and ten brahmanas on the occasion of Tiruvadurai festival, for the merit of Mayindan Vira Kadan.

13. CHOLA INSCRIPTION, TILLAISTHANAM, DISTIRCT THANJAVUR: This inscription, in Tamil language and characters of the tenth century CE, is found engraved on the door-jamb to the north of the central shrine, which faces west of the Ghritapurisvara temple of the above-mentioned village. It is dated in the tenth regnal year of Parakesarivarman, who may be identified with Uttamachola (981 CE). It records that Madhurantakan Gandaradittan gifted ten buffaloes for ninety sheep to burn a perpetual lamp to the god Mahadeva of Tiruneyttanam in Poygai-nadu. The shepherds who received the sheep agreed to supply an *ulakku* of oil daily for the purpose.

14.CHOLA INSCRIPTION TIRUCHCHENDURAI, DISTRICT TIRUCHIRAPALLI: This inscription, engraved in Tamil language and characters of the tenth century, is dated in the twenty-third regnal year of Parakesarivarman (Parantaka Chola I-930 CE). It is engraved on the base *(jagai)* of the south-central

shrine of the Chandrasekhara temple. It records that Madhurantaka Irukkuveldn *alias* Aditta Bhuti made a grant of land at Venbhutankudi in Uraiyur-kurram, to the stone temple of Paramesvara at Tiruchchendurai, for providing food offerings to the god on the occasion of the first feeding (*anna-prayam*) of his son Bhuti Parantakan, as his gift (*dakshina*). The apportionment of the yield of the paddy from this land for providing various food offerings to the god is also enumerated.

15. TWO TAMIL INSCRIPTIONS, KOTTUR, DISTRICT TIRUVARUR: The first inscription is found engraved on a pillar of the *mukha-mandapa* of Sundaresvarasvamin Temple. It is in Tamil language and characters of the eleventh-twelth century CE. It records the construction of the entrance-hall (*tiruvasal-mandapam*) by Puvannur-udaiyar elum Bhogamukhiyar.

The other inscription, also in Tamil language and in thirteenth century characters, is found engraved on the north wall of the *mukha-mandapa* of the same temple. It records the gift of silver ornaments by Varagappar of Malur to the temple of Tiruvidaikka-udaiyar.

16. PALLAVA INSCRIPTION, BALEKUPPAM, DISTRICT VELLORE: This hero-stone inscription, erected in the above-mentioned village, is in Tamil language and script. It is dated in the twentieth regnal year of the Pallava king Dantivarman (816 CE). It records the installation of a stone (*kalnadu*) for a certain Mennan, son of Arikondi, who was killed (*parra*) at Manaidaivaimur, when Mahabalivanaraya was ruling. It is also stated that the son-in-law of the deceased was given a share of land for his maintenance.

17. RASHTRAKUTA INSCRIPTION, POYGAINALLUR, DISTRICT VELLORE: This inscription, engraved in Tamil language and characters of the tenth century, is dated in the twenty-ninth regnal year of the Rashtrakuta ruler, Kannaradeva (Krishna III-968 CE). It is damaged at the end. It records an undertaking given by the *sabha* of Poygainallur in Damar-kottam to provide food offerings to the gods in the Vishnu and Siva temples of the village, from the yield of the land grant of five hundred *kuli* of two adjacent plots, made by Madhava Bhutikramavittan, a (resident) of Ayirkatturnallur. The *sabha* agreed to pay a penalty of one-eighth *pon* daily, if there was any default by the members of the committee, in the supply of food-offerings.

18. HERO-STONE INSCRIPTION, MALLAPURAM, DISTRICT VILLUPURAM: This fragmentary hero-stone inscription is in Tamil language and Vatteluttu characters of the seventh century and it mentions the death of Kandanadirai, son of Eranran, grandson of Karankumarakkan and a servant of Ponnatikannar, while fighting with a certain Somiyar.

19. HERO-STONE INSCRIPTION, VANJIKULI, DISTRICT VILLUPURAM: This Tamil inscription, in Vatteluttu characters of the seventh century CE, is engraved on a hero-stone. It records that during the twenty-fourth regnal year of the king Kovisaiya Narasimha perumar (Narasimhavarma Pallava I), a chieftain of Vanjikuli Kalimpei, died in a skirmish, at Arrur.

UTTAR PRADESH

20. CHANDELLA COPPER-PLATE CHARTER, AMROHA, DISTRICT AMROHA: The copper-plate charter, at present, is in the hands of an antique dealer at Amroha. Though the charter is fragmentary, the details regarding the grant and historical portions are not lost. It is written in Sanskrit language and early Nagari characters and dated in Vikrama 1079 (1011 CE). The charter belongs to the reign of the Chendella ruler Maharajadhiraja Vidyadharadeva. The object of the grant is to make a gift of land, exempting it from all encumbrances and taxes, to twenty brahmana donees, on the lunar eclipse day, for the merit of the king.

ARABIC AND PERSIAN INSCRIPTIONS[2]

DELHI

1. TUGHLUQ INSCRIPTIONS, DELHI: During the debris clearance work of a step-well within the Tughluqabad Fort, New Delhi, nearly nine inscribed slabs were discovered by D.V. Sharma, of the Delhi Circle of the Survey, which in due course were copied. These nine fragmentary pieces were probably part of the Persian epigraphs which might have adorned the arch of the entrance of the step-well. These epigraphically slabs of red sandstone mention lofty titles of Sultan Ghiyas-ud-Din Tughluq (1320- 25 CE). It seems that these epigraphs refer to the construction of this step-well to meet the needs of potable water within the fort of Tughluqabad. Unfortunately, the date portion, which would have thrown light on the year of its construction, is still elusive. These are nine pieces with epigraphically bands of different sizes which indicate that there must have been more than three epigraphs. The style of calligraphy of these Persian records is bold Naskh, which conforms to the pattern of the Tughluq period (pl. 64).

HARYANA

2. INSCRIPTION OF MASUD SHAH, HANSI, DISTRICT HISSAR: One loose inscriptional slab, in three fragments, was copied from the Central Antiquity Collection, Purana Qila, Delhi which was reportedly brought from Hansi. This fragmentary record bears the name of Sultan Masud Shah with part of his title. The motif on its border indicates that this piece must have been from the inscriptional band of the *mihrab* at some mosque in Hansi. The epigraph is important because of the unavailability of the records of Mamluk Sultans. Sultan Masud Shah (1241-46 CE) was successor to Muiz-ud-Din Kaiqubad, the heir to the Delhi throne after Razia Sultana. Unfortunately, other details of the epigraph, which otherwise would have been of immense historical importance, are lost.

Information from: G.S. Khwaja, assisted by M.A. Zeya of the Epigraphy Branch, Nagpur of the Survey, who copied and examined ninety-eight Arabic and Persian inscriptions during the year under review, out of which few important ones are being highlighted here.

The style of writing is monumental Naskh of Sultanate period.

KARNATKA

3. INSCRIPTIONS OF NAWWABS OF SAVANUR, DISTRICT HAVERI: Many important epigraphs belonging to the regional dynasty of Nawwabs of Savanur were copied from Savanur. Some of them are quite important for the local history. One such Persian record is an epitaph of Nawwab Abut-Tabriz Khan entitled Diler Jung Bahadur, from his grave in the compound of Asar Sharif. It registers the demise of the Nawwab in AH 1210 (1842 CE) on the tenth day of Muharram, the first month of Hijri calendar. The style of writing of this epigraph is Nasta'liq. Another epitaph from the same place is from the grave of Nawwab Ali Jah Abdul Khair Khan. This record in metrical Persian registers the death of the Nawwab by poisoning, on twelth Rabi-ul-Awwal in AH 1243 (1827 CE). The well-composed text of this epitaph is executed in beautiful *Nasta'liq* style, of which the last hemistich contains the chronogrammatic phrase to reveal the date of the event (pl. 65).

UTTAR PRADESH

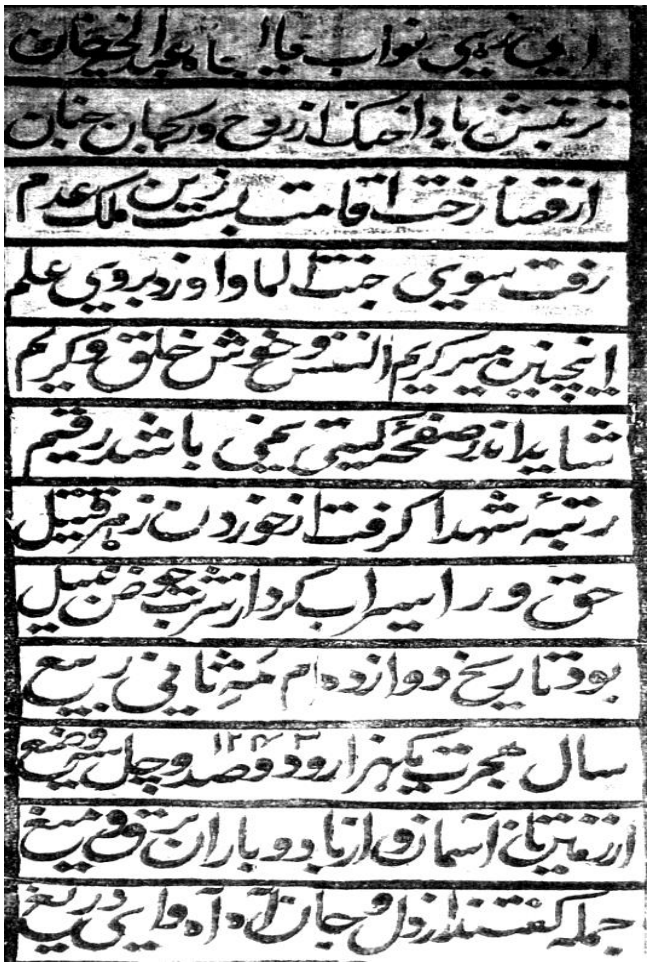
4. MISCELLANEOUS INSCRIPTIONS FROM SAFIPUR, DISTRICT UNNAO: Few Persian epigraphs have been copied from the premises of Dargah of Hadrat Khadim-i-Safi in Safipur. The first one records the demise of Hadrat Makhdum Shah Muhammad Khadim-i-Safi in the year AH 1287 (1870 CE). The text of this record, written in Persian verse and prose, as well as Urdu, hold the saint in high esteem because of his relations to the Nizami and Chishti Sufi orders. The texts also registers the date of birth of the saint as AH 1229, Rajab 12 (1814 CE, June 30). The Persian as well as Urdu texts are executed in *Nasta'liq* style.

Another record from the same Dargah registers the demise of saint Khadim-i-Safi, in four Persian hemistiches but interestingly, each hemistich is a chronogram for the date i.e., AH 1287 (1870 CE). It contains an Urdu prose portion mentioning the name of the composer as Aziz. The scribe is Haji Shaikh Qasim Ali Lukhnawi (i.e., of Lucknow). The third epigraph of this series has a reference to the construction of a dome over the grave of Saint Khadim-i- Safi. It states that one of the disciples of the saint Khaslat Husain, son of Hashmat Husain Chaudhary, built the dome in AH 1288 (1871 CE). This record in Persian verse and prose is composed by Aziz. One more epigraph in Persian verse from the southern gate of the same Dargah mentions, evidently, the completion of the construction of the gate by Habibullah Shah alias Sayyid Muhammad Yasin Khalili in AH 1290 (1873-74 CE). The text is also composed by Aziz, the poet who has composed earlier epigraphs. A bilingual record in Persian and Urdu from the main gate of the Dargah of Khadim-i-Safi registers the construction of the gate in AH 1298 (1880-81 CE). The text contains two chronograms referring to its date, in Hijri era. A loose slab kept in the Imambara at Safipur registers the death of one Shaikh Ahmad alias Nannhe Miyan in AH 1300 (1883 CE). The Urdu text written in *Nasta'liq* characters mentions the deceased as holding the post of *jamadar* (supervisor).

Plate 64-65



Persian inscription of Ghiyas-ud-Din Tughluq, Tughluqabad Fort,



Epitaph of Nawwab Abdul Khair Khan, Savanur.

III. NUMISMATICS AND TREASURE TROVE

UTTAR PRADESH

1. Coins, Sannpura, District Agra: Agra Circle of the Survey examined sixty-four coins at Khera Rathore Police Station, which were recovered from Sannpura village in Bah tehsil. Out of these, seven silver coins are dated to 1835 CE and are imitations of late Mughal period coins of Shah Alam-II while the rest are of British period.

IV. OTHER IMPORTANT DISCOVRIES

ANDHRA PRADESH

1. STUPA AT KOTTURU, DISTRICT VISAKHAPATNAM: During scientific clearance of the stupa located on the western side of the site, disturbed remains of a brick stupa was exposed. The exposed circular stupa was marked by eight spokes around its central circle, followed by 16 spoked circle containing 2 to 15 brick courses. This is further encircled by the drum wall, followed by the *pradakshinapatha.* A stone relic-casket was found on the southeastern spoke of the inner circle. The present stone relic-casket comprises a stone lid and lower receptacle all in Khondalite and a small crystal casket within it. The other associated finds include, cut sheet flower in gold (?) and silver, small golden objects (Beads and spirals?), some indeterminate copper fragments, semiprecious stones and pearls.

KARNATAKA

2. SCULPTURES, RAIBAG, DISTRICT BELGAUM: The Dharwad Circle of the Survey reported the discovery of twenty-three Jaina Tirthankara images and *prabhavalis* during excavation undertaken for the construction of a house in Raibag. The retrieved images and *prabhavalis* were found from the foundation deposits, which were highly disturbed and devoid of any cultural material. The images are made of copper alloy and are assignable to the late medieval period, i.e., sixteenth-seventeenth century.

TAMIL NADU

D. Dayalan assisted by A. Anil Kumar, S. Ashok Kumar, A. Palanivel, Samuel Joshua and P. Venkatesan of Temple Survey (Southern Region) of the Survey discovered and located number of archaeological remains in Tamil Nadu during field Survey. The details of which are as under:

3. BAS-RELIEF OF A SAINT, TIRUCHIRAPPALLI, DISTRICT TIRUCHIRAPPALLI: The bas–relief sculpture has been carved on the north-west face of an out crop on the top located at Ucchipillaiyar Koil. The figure is carved in an uneven rectangular niche slightly deep at the bottom. The dropping line has been cut on the top of the niche. The figure is shown seated straight in the *vajraparyankasana* attitude on a pedestal. Four devotees two at the upper level and two at the bottom level are also shown. Another boulder at the low level of this bas-relief, showing image of Buddha with an inscription of 12/13th century and also a pair of *pada* (foot print). The bas-relief is datable to 8th -9th century (pl. 66).

Plate 66



Bas-relief showing image of Buddha with an inscription of 12/13th century, Tiruchirappalli.

4. UNFINISHED ROCK-CUT FAÇADE, TIRUCHIRAPPALLI, DISTRICT TIRUCHIRAPPALLI: The low lying outcrops on the western and northern sides of the Tayumanuvar sannati have yielded a clinching evidence of rock-cut activity during the Pallava/Pandya period. These are the remarkable specimen to show the technique involved in preparing the façade of the cave, removal of unwanted rock mass, etc. Different shape of wedge marks, grooves and chiseling marks indicate the typo-technology of preparing the rock cut cave temple (pl. 67).

Similar to the one noticed on western and northern sides of the temple, another out crop immediately on the back side of the Tayumanuvar sannati also yielded 'L' shaped cutting to make façade on both sides of the boulder (pl. 68). Interestingly on the top, engraving of the plan of temples with sanctum and front *mandapa* has been noticed (pl. 69).

5. MEGALITHIC STONE CIRCLES AND LOOSE SCULPTURES, ERAIYAMANGALAM, DISTRICT DINDUGAL: A large number of megalithic stone circles with or without cairn packing were noticed in the field near the village. The stone circles are made of granite boulders and are of different dimensions (pl. 70). Some of the stone circles are more than 12m dia. The area has also yielded Black-and-Red Ware pottery and other artefacts of Iron Age period. Loose sculpture of Jyestha datable to 9^{th} -10^{th} century (pl. 71) and a sculptured hero stone with inscription were also found in this village (pl. 72).

6. URN BURIAL SITE, SANDAIYUR, DISTRICT DINDIGUL: Many urn-burials of Iron Age period with or without capstone over them were noticed in the close vicinity of the village. The pieces of different shapes of Black-and-Red Ware, Black Ware and red ware pottery and lids of different variety are also found wherever the urn-burials are disturbed (pl. 73).

7. UNFINISHED ROCK-CUT CAVE, KANNADAMPATTI, DISTRICT DINDUGAL: At the top of the hillock near the Kannadampatti village was noticed a temple of 13^{th} – 14^{th} century. By the side of the temple, attempt had been made to scoop out rock cut cave temple. The façade for the proposed rock-cut temple had been prepared and the work had been stopped at that stage.

8. INSCRIPTIONS AND LOOSE SCULPTURES, TIRUVELLARAI, DISTRICT TIRUCHIRAPPALLI: The Merchant guild inscription datable to the 10^{th} - 11^{th} century CE, with several symbols engraved on it, has been noticed to the south-west of the Pundarikaksa temple. The sack or the hanging bags known as *Pasumpai* is shown prominently on the top of all the symbols. The *Pasumpai* was considered more sacred by the merchant communities. The other symbols found in the slab are sword, bill-hook, coiled whip, elephant goad, bow and arrow (?) and lance. The symbols seem to be of ritual significance of the people who erected the stone. The inscription engraved on a granite slab has 21 lines in Tamil, with a few Sanskrit words. The inscription refers to an *ambalam* (temple or mandapa) of Cettiyar of Tiruvallarai. The *ambalam* was known as *ainnurruvan* (pl. 74). On the surface rock, in which the unfinished rock-cut cave temple has been excavated, were found label

Plate 67



Rock cut cave temple, Tiruchirappalli.

Plate 68



'L' shaped cutting to make façade on both sides of the boulder, Tiruchirappalli.

Plate 69-70



Engraving showing plan of temples with sanctum and front mandapa, Tiruchirappalli.



Stone circles made of granite boulders, Eraiyamangalam.

Plate 71



Sculpture of Jyestha datable to 9th -10th century, Eraiyamangalam.

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Plate 72



Sculptured hero stone with inscription, Eraiyamangalam.

Plate 73



Black ware and red ware pottery with urn-burials, Sandaiyur.

Plate 74



Inscription referred to an ambalam (temple or mandapa), Tiruvellarai..

inscriptions of 7th - 8th century (pls. 75-76), Chola inscriptions and a huge inscription of 13th -14th century. Large number of loose sculptures such as Jyestha (pl. 77), Saptamarikas, Siva, Vishnu, Ganesa, etc. are also noticed in and around Tiruvellarai.

9. CHOLA AND LATER INSCRIPTIONS, UTTIRAMERUR, DISTRICT KANCHIPURAM: Inscription of Aditya Chola (871-907) has been noticed on the *adhishtana* of Kailasanatha temple, Uttiramerur. The inscription refers to some donation to the *Brahmesvarattu peruntali Mahadevar*. The inscription also refers to touch-stone named *enpuram nirai* to test the purity of the gold. The Krishnadevaraya inscription engraved on the back side of the temple refers to a gift to a *matha* known as Isana Sivacharya math. Interestingly, the *adhishtana* on the southern side is engraved with a measurement scale known as "*virupparayan*" datable to 13th - 14th century (pl. 78). The scale measures 6·72m with few inter-measures within it. The *balipitha* in front of the main temple has the bas-relief of the trio Saiva *nayanmars* namely Appar, Gnanasambandar and Sundarar. The Gnanasambandar is shown as a child, within a *prabha mandala*, the Appar is shown with spade (*mazhu*).

10. IRON AGE BURIALS, CHENGALUR-VADAKKIPPATTI, DISTRICT TIRUCHIRAPPALLI: The Iron Age burials spread in nearly 20 acres of area were noticed. The burials are mainly stone circles made of huge blocks of laterite. The traces of mud and cairn packing within the circles are found in many cases. These stone circles are either entombing urn burials capped by granite slabs or cist burials. The black and red ware, red ware and black ware potteries kept in the urns were found scattered all around the area. The traces of iron furnace of Iron Age are also encountered in this area. Interestingly, the site has also yielded microlithic tools, made of quartz, and chalcedony. Large numbers of nodules as well as chips of these raw materials are found all around the area (pls. 79-83).

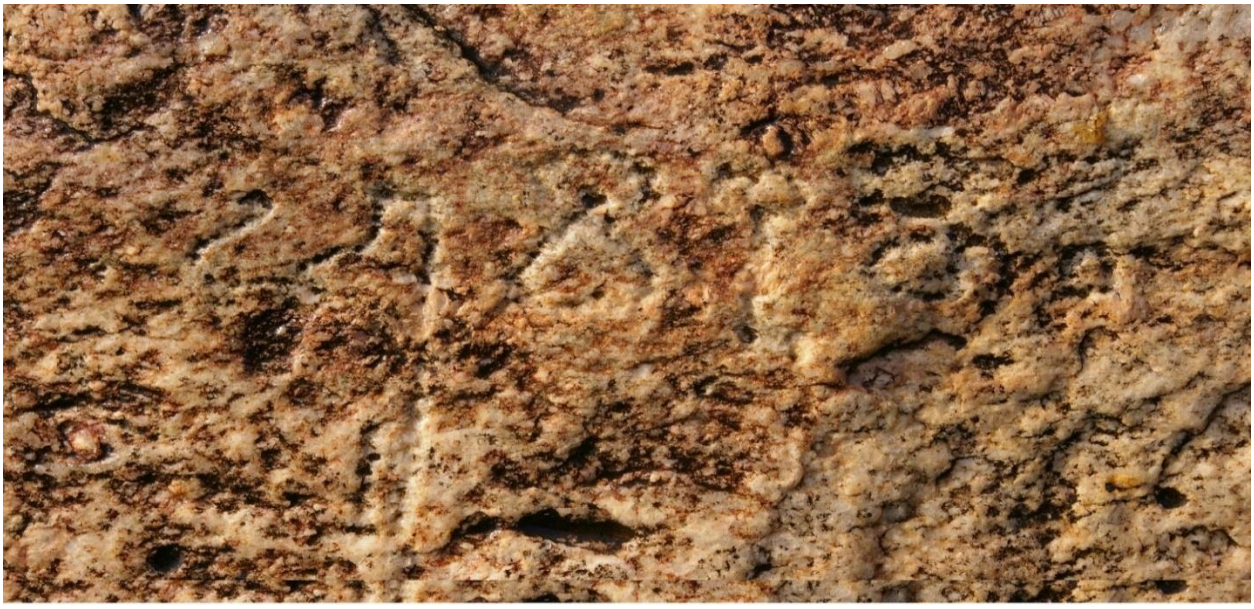
11. MEGALITHIC BURIALS, TEMPLE AND HERO-STONE, KOLLIMALAI, DISTRICT NAMAKKAL: The exploration in Kollimalai region revealed Neolithic celts, megalithic cist burials (pl. 84) with port hole and a Jaina temple (pl. 85) with a seated Jaina Tirthankara of 10th-11th century (pl. 86), etc. At Vasalur village on the top of the Kolli hills, a small temple of 7th-8th century dedicated to Siva has been noticed. Inscribed hero-stone of 9th-10th century is erected by the side of the road leading to Karaiyankattuppatti, located 3-4kms from Vasalur (pl. 87).

12. BRICK TEMPLE, VEPPATTUR, DISTRICT THANJAVUR: Brick temple of Chola period dedicated to Vishnu was noticed. The existing portion revealed that it is a *tri-tala* pyramidal *vimana* (pl. 88). It is *sama chaturasra* up to the *prastara* (architrave) of the third *tala*, but the *griva* and *sikhara* over it seem to be *astasra*. The *vimana* is constructed by using corbelling technique as it was the common feature found during the Chola period. The walls of the first or lower *tala* of the vimana have five bays or *bhadras* with four intervening *salilantara* recesses. The *madya tala* has three bays with two intervening *salilantara* recesses.

Plate 75-76



75



76

Unfinished rock-cut cave temple with number of label inscriptions of 7th -8th century, Tiruvellarai.

Plate 77



Sculpture of Jyestha, Tiruvellarai.

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Plate 78



Engraved measurement scale known as "virupparayan" (13th -14th century), Uittiramerur.

Plate 79-80



79



80

Megalithic burials of cairn circle, Chengalur-Vadakkippatti.

Plate 81-82



81



82

Megalithic burials with microlithic tools, made of quartz, and chalcedony, Chengalur-Vadakkippatti.

Plate 83-84



Megalithic site with black ware potteries and urns, Chengalur-Vadakkippatti.



Megalithic cist burial with port hole, Kollimalai.

Plate 85-86



Remains of jaina temple (10th-11th century), Kollimalai..



Jaina tirthankara (10th-11th century), Kollimalai.

Plate 87



Inscribed hero stone of 9th-10th century, Kollimalai.

Plate 88



A tri-tala pyramidal vimana,Veppattur.

The top or *upari tala* is devoid of *hara* over the *prastara*. The size of the brick used forconstruction is 30 x 16 x 7cm and 26 x 17 x 3·5cm. It is comparable with the size of the bricks found in the well known Chola edifices at Gangai Konda Cholapuram and Darasuram. Interestingly, the whole *garbha-griha* was originally painted during the Chola period and the remains of the painting are still visible at few places. As the paintings are damaged badly it is difficult to identify the theme of the painting at present. However, it is surmised that the paintings depict mainly the religious themes and some paintings seem to be of gods and goddess. The paintings are executed over lime plaster in different colours (pls. 89-90). There is also a sculpture of Jyeshtha found in the paddy field. The sculpture is assignable to Pallava period (pl. 91).

13. MEGALITHIC DOLMEN, AYAL, DISTRICT VELLORE: Megalithic dolmen with three orthostats on the sides except on the east has been noticed on the low lying hillock overlooking Lake at Ayal. The capstone is huge and extends beyond the orthostats. The orthostat on the north has a 'U' shape port-hole. Interestingly, there are large numbers of cup marks on the orthostats. The surrounding area has yielded potsherds of black and red ware, red ware, black ware, and also iron slag of Iron Age period (pl. 92).

14. MEGALITHIC STONE CIRCLE, SOORAI, DISTRICT VELLORE: Huge megalithic stone circle made of granite boulders has been noticed very close to an outcrop by the side of the road leading to the village. Originally, the stone circle is filled with cairn and the cairns are scattered all around the area. The site has also yielded black and red ware, black ware, and red ware pottery of Iron age period (pl. 93).

15. PALLAVA INSCRIPTIONS AND MEGALITHIC BURIAL, PUNCERI, MAMALLAPURAM, DISTRICT KANCHIPURAM: Punceri, a small village to the west of Mamallapuram has yielded a large number of potteries datable to Iron Age, early historic period and early mediaeval period. Stone circles, urn burials and sarcophagus of Iron Age are found in the close vicinity of Puncer (pls. 94-95). These indicate that this area was inhabited at least from Iron Age period. A few metres away towards the western side of the Buckingham canal are a small knoll. Running throughout on the western side of this has been noticed a set of 3 to 4 deep cut grooves probably to accommodate the foundation of a huge structure of Pallava or Pre-Pallava period. Interestingly Punceri has the credit of providing epigraphical information about the names of the sculptors who probably created the magnificent stone creations at Mamallapuram. Two label inscriptions of Pallava *grantha* character are found now on the boulders found very close to the backwater, of which, one is read as *"Svasti sri Narendrah: Narendrah."* (Pl. 96) Interestingly, the engraving of the letters up to *"Svasti sri Narendrah"* is more perfect, elegant and ornamental whereas the word *"Narendrah"* following that is not so elegant. Notwithstanding it is also written in Pallava *grantha* character, it is reasonable to presume that the latter word *"Narendrah"* might have been engraved not along with the prior one but perhaps later than that. However, it is difficult to say how late it is.

Plate 89-90



89



90

Paintings executed over lime plaster in temple, Veppattur.

Plate 91



Sculpture of Jyeshtha, Veppatturr.

Plate 92-93



Potsherds of black and red ware, Iron Age, Ayal.



Black and red ware pottery of Iron Age, Soorai.

Plate 94-95



94



95

Sarcophagus of Iron Age and stone circle, *Punceri*.

Another label inscription of Pallava *grantha* character found on another boulder is weathered/worn out badly and all letter are not traceable. The visible letters can be read as *"Srivar"* (pl. 97).

WEST BENGAL

16. MOUNDS AND TEMPLE, BONOFULJHOR, DISTRICT BARDDHAMAN: In the course of inspection and exploration, Sunipa M. Ketkar and Karabi Saha, located a dilapidated mediaeval temple amidst a number of mounds at the site.

17. REMAINS OF FORTIFICATION WALL, ARCHITECTURAL REMAINS AND TEMPLES, KHAROBARI, DISTRICT BARDDHAMAN: In the course of inspection and exploration, P.K. Naik found the remains of the fortification wall and other architectural remains dating to the tenth-eleventh century CE. Other architectural remains at Garhchandi have also been duly surveyed.

Plate 96-97



Inscription on boulders, svasti sri narendrah, Punceri.



Inscription on boulders, 'srivari', Punceri.

V. PALAEOBOTANICAL AND POLLEN ANALYTICAL INVESTIGATIONS[1]

The present report incorporates the work done on the subject at the Birbal Sahni Institute of Palaeobotany, Lucknow.

GUJARAT

1. KANMER (23°23'; 70°52'), DISTRICT KACHCHH: Further investigations added considerably to our understanding of the exploitation of botanical resources by ancient settlers between 1800-1500 BCE. In addition to the crops already reported, the remains of *Lathyrus sativum* (grass pea) and *Linum usitatissimum* (linseed) were the new finds. Remains of weeds and other wild taxa were also encountered, reflecting the ecological conditions and ground vegetation. Two agricultural approaches have been reported at the site. One approach involves crops sown in winter and the second approach is based on plants sown in summer.

UTTAR PRADESH

2. HETAPATTI (25°49'39"; 81°91'68"), DISTRICT ALLAHABAD: A rich assemblage of cereals, pulses and fibre-crop is evocative of an advanced state of agricultural practice. The study is in progress.

3. NAIMISHARANYA (27°21'; 80°30'), DISTRICT SITAPUR: Morphological investigation of samples of seed and fruit remains, from the cultural horizons of the Sunga and Kushana periods (approximately 200 BCE to 300 CE), was carried out to build up the plant economy practiced by the ancient settlers at the site and the ecological conditions in this region in the past. The site exhibits ancient plant economy comprising field-crop finds belonging to cereals- barley, rice; minor crops like *sawan* and Italia millet; pulses- lentil, field pea, green-gram, black-gram; seeds of cucurbit/vegetable crop; along with seeds of cotton (*Gossypium* sp.) and silk-cotton (*Salmalia malabarica*) tree taxa. Seeds of custard apple, fruit remains of neem (*Azadirachta indica*) and jujube fruit- stones have also been encountered. The record of neemseed/fruit remains, medicinally valuable tree taxon from the Sunga-Kushana levels (200 BCE-300 CE) is significant in the archaeological lexicon of the Ganga plain. Weeds and wild taxa have also been encountered in

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1. Contributed by Chanchala Srivastava and Anil K. Pokharia of the Birbal Sahni Institute of Palaeobotany, Lucknow.

association with field-crop remains, belonging to wild grasses viz., Blue stem grass (*Andropogon* sp.), Crow-foot grass (*Dactyloctenium aegyptium*), Goose grass (*Eleusine indica*), Panicum grass (*Panicum*sp.), Blue or Meadow grass (*Poa* sp.); Lalsabuni (*Trianthema portulacastrum*) and hairy indigo (*Indigofera hirsute*). In ancient agriculture at the site, *Dactyloctenium aegyptium* and *Trianthema portulacastrum* may have been the weeds in summer group crops like rice whereas *Indigofera hirsuta* represents the weed component in winter crops like wheat and barley.

VI. MUSEUMS

1. Taj Museum, Taj Mahal, Agra: Sixteen museum objects which are in a fragile condition have been chemically treated through the Science Branch laboratory at Dehradun. The marble pillars decorated with inlay work in the Main Hall have been covered with acrylic sheets to prevent visitors from touching the surface. Acrylic pedestals have been used in the showcases for display of objects and captions.

2. Archaeological Museum, Aihole: Stone pathways have been provided to the remaining half of the open air gallery. Sandstone veneered pedestals in the galleries and the exterior wall surface of the museum building have been painted. Solar street lights have been provided in gaps among the existing solar lighting system and new solar home lights have been provided in the open air museum galleries.

3. Archaeological Museum, Badami: Colour wash has been provided to the museum building, galleries and stone veneered pedestals. Solar street lights have been provided in the gaps within the existing solar lighting system.

4. Archaeological Museum, Bijapur: The damaged and worn-out cloth cover provided to the manuscripts has been replaced after dusting and cleaning. More solar lights have been provided in the corners and around the museum building.

5. Fort Museum, Fort St. George, Chennai: An exclusive gallery, has been inaugurated which exhibits the prints of various monuments and historical places of India prepared by Thomas and William Daniells and others. Besides, two more galleries viz., Fort St. George and Numismatics have been organized.

The Interpretation Centre "Clive's Corner" at Clive's House in the Fort St. George, exhibiting copies of rare letters, documents and photographs related to the life of Robert Clive has been inaugurated.

6. Sculpture Shed, Dabhoi: The work of construction of a sculpture shed including plaster on the wall and ceiling, fixing of door and windows and laying of Kota stone inside the sculpture shed have been completed.

7. Period Museum, Deeg Bhawan, Deeg: Both the Gopal Bhawan and the Krishan Bhawan portions of the Period Museum have been provided with close circuit T.V. (CCTV) cameras and Metal detectors as a security measure. Proper signages, captions, visual maps and charts have been provided

for the convenience of the visitors. Documentation work of objects is being done in a new format.

8. ARCHAEOLOGICAL MUSEUM, DHOLAVIRA: The work of providing false ceiling inside the museum complex has been completed.

9. ARCHAEOLOGICAL MUSEUM, OLD GOA: The mill stones retrieved from the defunct, now destroyed gun powder factory site at Panelim have been displayed thematically in the open, near the museum. A diorama has been prepared to display the stamps of the first day covers of the monuments and sites of Goa, issued by the Government of India. The arms showcase has been reorganized and upgraded along with information on arms and artillery during India's medieval period with special reference to the Portuguese in India. Transparent acrylic sheets have been provided to the wooden antiquities, as protection from the physical touch of the visitors to the museum. A model of Portuguese ship has been repaired and a Navigation Gallery has been reorganized with the help of traditional boat builders for both school children and visitors wanting to know about navigational science in the Age of Discoveries in the late 15th century. This gallery has been further provided with wooden flooring and additional illumination.

10. KARNATAKA LOKA, KANNADA UNIVERSITY, HAMPI: In the course of village-to-village survey in Districts Bellary, Koppal and Davanageri, the Department of Museum, Archaeological and Folklore Museum has collected more than five hundred archaeological and folk objects which have been displayed in the museum galleries and around the museum building. The collected antiquities including sculptures during village-to-village survey by the Department have been displayed in five galleries of the museum.

11. SALAR JUNG MUSEUM, HYDERABAD: During the year, the museum organized special photo-exhibition on "Bharat Ratna Dr. B.R. Ambedkar" on the occasion of the birth anniversary celebration on April 13, 2008 special exhibition on "Iran at a Glance" jointly with National Library & Archives of Iran, on the occasion of World Heritage Day (April 17, 2008); on "Muhamadyat - the Calligraphic Art of Mr. Fareedul Ali", jointly with Darul Arab", Hyderabad (April 27, 2008); photo exhibition detailing "Science and Technology of India by D.A.V.P. on the occasion of World Environment Day (May15, 2008); special exhibition on "Free Masonry and Salar Jung as a Free Mason" during the hundred and nineteenth birth anniversary celebrations of Salar Jung III (June 14, 2008); special festival exhibition on the occasion of the birth anniversary celebrations of Mouled-E-Kaaba (July 30, 2008); photo exhibition on "1857 Freedom Movement" jointly with D.A.V.P. (August 14, 2008); special festival on Sri Krishna on the occasion of Janamashtami (August 23, 2008); temporary exhibition on "Illuminated Codices of Quran" (September 15, 2008); on "Calligraphic Art of "Quranic Verses" by Hafiza Mubeena Begum (September 25, 2008); photo exhibition on "Salar Jung Museum at Dewan Deodi", on the occasion of World Tourism Day (September 27, 2008); on "1908 Musi River Floods", a

photo-exhibition on the areas of old Hyderabad city (September 28, 2008); special festival exhibition on "Durga Mata" on the occasion of Durgashtami (October 7, 2008); temporary exhibition on "Painting: The Love of Beauty and the Queen of the Arts: European Paintings from the Reserve Collection of Salar Jung Museum" (November 15, 2008); special exhibition on "Indian Miniatures and Modern paintings" on the occasion of Museum Formation Day (December 16, 2008); special photo-exhibition on "Monuments of Hyderabad: Qutub Shahi and Asaf Jahi Periods" on the occasion of Museum Week (January 8-14, 2009), inaugurated on January 7; special photo-exhibition on "Manuscripts and Shrines: Martyrs of Karbala" inaugurated on January 19 by Nawab Ahteram Ali Khan, Hon'ble member, Salar Jung Museum Board; special photo-exhibition on "Our National Leaders" jointly with D.A.V.P. (January 24, 2009), on the eve of Republic Day celebrations; inter-state exhibition on "Archaeological Monuments of Indian Sufis" in collaboration with Maulana Azad Arabic Persian Research Institute, Tonk, Rajasthan (February 18-22, 2009); exhibition in which thirty-two oil paintings by fine arts and freelance artists were displayed, in collaboration with Karnataka Urdu Academy, Bangalore (February 22 to 26, 2009) and special festival exhibition "Seerat-e-Tayiba Muqamat-e-Muqaddasah" on the eve of Milad un Nabi (PBUH) (March 24, 2009) besides arranging monthly lectures in collaboration with the Historical Society of Hyderabad on every second Saturday of the month. In addition to these, special lectures were arranged during the time of Salar Jung's birthday function and during visits of museum experts which includes 'Rise and fall of Nizam; History through the perception of art', 'Sufi saints of Deccan;' 'Life history of Tathagatha;' 'Cultural informatics -a new dimension;' 'Planet earth and health: building a safer environment'; 'The religion of Prophet Zarathushtra'; 'Documentation on Chola murals'; 'Brihadisvara Temple, Tanjore' 'Freedom Struggle in Hyderabad, Karnataka'; 'Was 17th September 1948 truly Hyderabad Librarians' Day?' 'Problems related to conservation'; East and west: Art, image and cultural identity; 'Dr. B.R. Ambedkar: the architect of Indian Constitution'; 'Appointment of Salar Jung III as Prime Minister'; 'Ragamala Miniatures; The Seven Tombs'; 'Basaveswara and Basava Kalyam (Basava Kalyam through the ages)'; Contribution of Bhagat Namdevji of Narsi, Deccan; Sharjah Museum; Agra fort and Shahjahan; Dance as depicted in Kakatiyan sculpture and literature. A three-day national workshop on "Curative Conservation of Paintings" was organized (August 18-20, 2008). The Salar Jung Museum in collaboration with Maulana Azad Arabic Persian Research Institute (APRI) Tonk, Rajasthan organized a seminar on February 18, 2009. A two-day national seminar on "The Contribution of Indian Scholars to Seerah Literature" was organized during March 16 and 17, 2009 at the museum. Among other events organized by the museum, mention may be made of the Summer Arts Camps being organized for school children in two batches since 2000. Subjects chosen for this camp were *Yoga* and *Pranayama*, Drawing and Painting,

Moulding & Casting, Embroidery & Fabric Painting. Besides, a few lectures were also arranged on topics like "Indian culture", "Traditions" and "Ancient Monuments".

To strengthen the security of the museum, CCTVs have been installed in all the galleries and open places. A fire alarm system has also been introduced. During this year, two new galleries viz., Far Eastern Porcelain Gallery and Statuary Gallery were opened in the Far Eastern section. During the Museum Week (January 8-14, 2009), *rangoli* competition was conducted for the ladies on the occasion of Pongal. Museum also organized an oil painting competition in collaboration with Karnataka Urdu Academy, Bangalore, between February 10 and 13, 2009.

The Non-Conventional Energy Development Corporation of A.P. Limited, Hyderabad (NEDC) awarded the first prize for the year 2007-08 to the Salar Jung Museum in appreciation of its achievements in energy conservation in the government / autonomous body buildings category. In the same month, the museum also received a Gold Medal from the Governor of Andhra Pradesh for "Highest Donations collected for Red Cross". *Hindi Saptah Samaroha* (Hindi Week) was held in the Salar Jung Museum from September 15 to 20, 2008. International Women's Day was celebrated in the museum on March 8, 2009. On this occasion, "Kala Shrusti" was organized in which around forty women artists from two cities participated by bringing their paintings.On the occasion of *Ugadi* (Telugu New Year), the museum organised a "*Sahiti Goshti*" on Telugu *Prasashtyam*.

12. ARCHAEOLOGICAL MUSEUM, KALIBANGAN: Door frames and metal work detectors including hand metal detector were provided as security measures. Eco- friendly generator set has been installed and fibre sheet covers have been provided over the open courtyards. Proper signages have been provided in the museum to facilitate the movement of visitors.

13. SITE MUSEUM, KAYAVAROHAN: The museum housing the sculptures from Goraj and Kayavarohan villages was open to the public.

14. KOCH BIHAR PALACE MUSEUM, KOCH BIHAR: During the year under review, besides other regular works, the work of upgradation of existing electrical fixtures including hanging of befitting chandeliers in the Durbar Hall and in Gallery 4 and 5 respectively have been done. The work of upgradation of CCTV surveillance system has also been done successfully.

15. ARCHAEOLOGICAL MUSEUM, KONARK: In order to attract more the visitors to the museum, all the galleries have been provided with split air conditioners. Further, in order to thwart the low electricity voltage fluctuations and improve the constant flow of electricity, 1 x 100 KVA 1110·4 KV sub-station by Grid Corporation, Government of Odisha including construction, installation and conversion of LT base, etc. The obsolete and damaged metal detector for the inside entrance gate of the museum has been replaced with a new one as a part of effective security of the museum. As a measure of security to combat any fire hazard, the existing gate cylinders has been suitably refilled and a few new ones have

been procured for the galleries, store and office room of museum. The museum building, including the galleries, store and office have been provided with anti-termite treatment. To make the outside area attractive, twenty-five numbers of masonry pedestals have been provided for installing the sculptural and architectural fragments. Widening of existing damaged new apron of the reserve collection building outside and fixing of terracotta-like tiles similar to the apron of the main museum building have been provided. Minor repairing and weather coat painting of the inner side of museum galleries, corridor and verandah have been done. Vitrified tiles have been laid on the floor of the publication sales counter, office and store room of the museum building.

16. ARCHAEOLOGICAL MUSEUM, LOTHAL: The work of providing PVC ceiling inside the galleries and relaying of new tiles after removing the damaged stone flooring inside the museum have been completed.

17. HAZARDUARI PALACE MUSEUM, MURSHIDABAD: The existing earthing system has been replaced with a new one as per I.S. specification of the Indian Electricity Rules. Security lights have been installed around the palace M.S. grills and collapsible gates have been provided to the windows and doors of the reserve collection. Old damaged silk curtains have been changed and new pelmets have been provided. A new spacious cloak room has been opened with racks and locks. Twenty numbers of old furniture in the reserve collection have been repaired and polished for their better preservation. As a part of modernization work, the existing EPABX system has been upgraded and extended. The newly-built ticket counter and publication sales counter have been furnished with new showcases, almirahs, book stands and chairs etc. Seventeen numbers of new cushioned benches and four numbers of sofas have been provided for the visitors in different galleries and the lobby. Cleaning and replacement of old wiring of all the chandeliers in the museum galleries have been completed. For improving the aesthetic appeal of the museum galleries, the antique furniture and wooden barricades have been properly polished.

18. INTERPRETATION CENTRE, EXCAVATED REMAINS POOMPUHAR: The Interpretation centre "Excavated Remains of Kaveripattinam" was opened adjacent to the remains at Melaiyur (Pallavaneswaram), Poompuhar, District Nagapattinam on March 25, 2009 with replicas of excavated structures and antiquities and excavation photographs of Kaveripattinam.

19. ARCHAEOLOGICAL MUSEUM, RATNAGIRI: Apart from day to day maintenance, safety and security as well as upkeep of the four galleries of the museum, ten precious sculptures and architectural members have been selected from the reserve collection for display in the rear verandah of the museum. For safety and security of these exhibits, proper grill work on the rear of the verandah has been done. The museum building is being given a facelift by painting the exterior. The painting of the interior of the museum along with pump house, generator room including frames of skylights and windows has also been completed. For providing portable drinking water to the visitors, a water purifier has been installed in the museum

premises. Existing fire extinguishers are being refilled. All the antiquities have been accessioned and parts of these have been properly documented except being photographed.

20. ARCHAEOLOGICAL MUSEUM, TAMLUK, PURBA MEDINIPUR: Apart from day to day maintenance and upkeep of the museum, proper security arrangement has been done by engaging security guards. Three bathrooms of the museum have been repaired by changing damaged fittings, pipes, etc. Lights in the showcases and galleries have been replaced. The background cloth of the showcases has been changed to improve their appearance. Documentation of museum objects has been started.

21. INTERPRETATION CENTRE, FORT GATEWAY, TIRUCHIRAPPALLI: The Interpretation Centre at Fort gateway, Tiruchirappalli, displaying loose sculptures retrieved from District Pudukkottai and also giving information on the early Chola period art and architectural styles and history was opened to the public on January 26, 2008.

22. VICTORIA MEMORIAL, KOLKATA: During the year under review, thirteen thousand stamps and four hundred oil paintings have been physically verified and one hundred and eighty-nine artefacts have been digitized. Four oil paintings and two antique frames have been restored. Five oil paintings including one oil painting from another institution are under restoration. Preventive conservation treatment has been given to seven oil paintings. A team of restorers visited Burdwan University Museum and prepared a condition report of fifteen oil paintings. The conservation status of one hundred and thirty-six paintings has been recorded. Sixteen oil paintings have been restored/conserved for display and public viewing in the renovated gallery of the Tripura State Museum. The work on remaining sixteen paintings is in progress. Twenty-two photographs (black and white) and one colour photograph from the Raj Bhavan, Kolkata have been given conservation treatment. The assessment and recording of the status of conservation of twelve marble busts in the Raj Bhavan have been done. Sixty-three colour aquatints, water colours, pen and ink drawings, etching, photographs and prints on paper have been conserved. Preventive conservation has been done on seventeen manuscripts and eight watercolours of Samuel Davis.

The VMH and INTACH, Kolkata jointly organized a two-day seminar cum workshop (May 4 and 5, 2008) on "Heritage Education for Visitors with Special Needs" at the VMH. The resource persons included Sujata Sen, Priti Patel, Baisakhi Mitra, Jeeja Ghosh, Debasis Biswas, Ashok Choudhury, Subhasish Chatterjee, Samir Kr. Samanta, Shyamal Mondal and officials from The Asiatic Society, VMH, State Archaeology Department, ISI Museum, Museum of National Heritage, Bhadrakhali, Rabindra Bharati Museum, Jiyagunge Museum, Murshidabad, Acharya Jogesh Chandra Purakriti Bhavan, Rabindra Bhavan Museum, Barrackpore Gandhi Museum and Sunderban Biosphere Museum. The VMH and Uluberia College, Howrah jointly organized a two-day seminar titled *"Bangalee Jatisatta O Samaj: Darsane,*

Itihase O Sahitye" (March 20-21, 2009) at Uluberia college, Howrah. A sit-and-draw competition and a quiz contest were organized involving economically and socially deprived as well as physically challenged school children at the Bishnupur Fair 2008, Bankura. The programme involved thousand children (both girls and boys). Both renowned and young poets from Kolkata and other parts of Bengal/India participated in the various Poets' Meets organized by the VMH. A two-day poetry reading session "Kavita Utsav: 2008" involving five hundred poets from different parts of West Bengal was organized at Burdwan. A two-day poetry reading session "Bangla Kavita Utsav: 2008" involving five hundred and sixty-three poets from different parts of West Bengal was held at Kolkata. A daylong poetry reading session "Hindi Kavita Utsav, 2008" involving two hundred and fifty poets from all over India was organized at Burdwan.

The exhibitions organized during the year under review include "Select Views of Daniell's Oriental Scenery" based on reproductions, mounted at the Ganga Festival 2008 at Ahiritola,Kolkata (August 20-22, 2008). A temporary exhibition based on the reproductions of Jamini Roy's art works from the collection of the VMH was held at Bishnupur, Bankura (December 23-27, 2008). Two *Son-et-Lumiere* (Sound and Light) public shows in Bengali and English "Pride and Glory: The story of Calcutta" were held from April to June.

The digitization work of six thousand artefacts of the Victoria Memorial has been completed by the National Institute of Design (NID) and the digitization work of another two thousand artifacts is in progress.

23. ARCHAEOLOGICAL MUSEUM, CHANDERI: Chanderi and Vaishnav galleries of the museum have been organized and 25 new pedestals have been installed to display sculptures. In open air site, sculptures were displayed on running pedestals. Apart from this the works of shifting of sculptures, debris clearance from parking and development of garden were also taken up.

24. ARCHAEOLOGICAL MUSEUM, GWALIOR: Construction of a wall panel and refurbishing of wooden pedestals in gallery No.1 have been done to display selected sculptures in a thematic order. Newly acquired antiquities from Bateshwar (District Morena) were documented. The work of digital documentation of museum objects was also taken up.

25. ARCHAEOLOGICAL MUSEUM, SANCHI: The inscribed Sunga period pillar from Panguraria, a Buddhist site, has been shifted to the museum. False ceiling has been provided in Gallery 2 & 3 of the museum. Besides, CCTV cameras were installed inside the museum and the work of upgradation of toilet was also taken up during this period. Keeping in view of the safety and security of the museum, the wire fencing on the eastern side has been removed and a compound wall with iron grill was provided.

VII. ARCHITECTURAL SURVEY

NORTHERN REGION

The Temple Survey Project, Northern Region of the Survey under the direction of S.V. Venkateshaiah, assisted by G.S. Gaur, Rajani Mishra, S.K. Bajpai, S.K. Shrivastava and K. R. Malviya carried out Kachchhapaghata Temples in and around Kadwaha, District Ashok Nagar with the aim to ascertain the extent of the Kachchhapaghata dynasty through the existence of Kachchhapaghata temple remains in and around Kadwaha. In the course of exploration, village Thoban and nearby areas were extensively explored. Thoban, a small village located on either side of the Chanderi-Ashok Nagar road is about 22km west of Chanderi, which is about 40km from Lalitpur on the Central Railways. Several temples are scattered not only within the present village but also in the far-flung and adjoining areas of the village. The area immediately west of the modern village is called Gargaj and the one across the river Leelat (ancient Lilavati) is called Kuti area. To the south of the village is yet another group called Sitamarhi. Considering the expanse of the site, the proper village area contains four temples and these have been named as T1, T2, T3 and T4 while Gargaja, the adjoining area to the north-west of the village, contains fifteen temples, numbered GT1 to GT15.

Temple-1 is east-facing and dedicated to Siva. It consists of a small *garbhagriha* and a pillared *mandapa*, located on the west edge of a modern pond. The temple stands on a simple and low *jagati*. Most parts of the temple have been destroyed but the *mandapa* based on pillars is intact. A Siva-*linga* is planted in the sanctum. Siva has been shown on the *lalatabimba*. River goddesses are carved on the lower part of the door-jamb. The low pillars of the temple are decorated with pot-and-foliage motifs which is a very common feature of the Kachchhapaghata temples. On the basis of stylistic consideration, the temple is datable to tenth century CE.

Temple-2 also known as Holi-ki-Madiya is located almost in the middle of the Thoban village, immediately by the side of the Chanderi-Ashok Nagar road. The east-facing temple consists of *garbhagriha*, *antarala* and a small *mandapa*. The *vedibandha* is composed of *khura*, *kumbha* and *kalasa* mouldings. The *jangha* portion of the temple is decorated with Brahmanical sculptures in deep niches. These niches are shadowed by the *chhajja*, topped by the *chaitya* ornamentation and flanked by

human figures. The *vitana* (ceiling) of the *mandapa* is supported by pillars which are decorated with pot-and-foliage motifs. The door-jamb has *panchasakha* and the *lalatabimba* is shown with Vishnu in the centre and Brahma and Siva in the terminal points. The temple may be datable to eleventh-twelth century CE (fig. 10).

As one proceeds from T2, there is another miniature temple (Temple -3) which is east-facing. The temple comprises a sanctum with projected roof, which may have been used as a *mandapa*. It is locally known as Bajra-ki-Madiya. This temple is also datable to eleventh-twelth century CE.

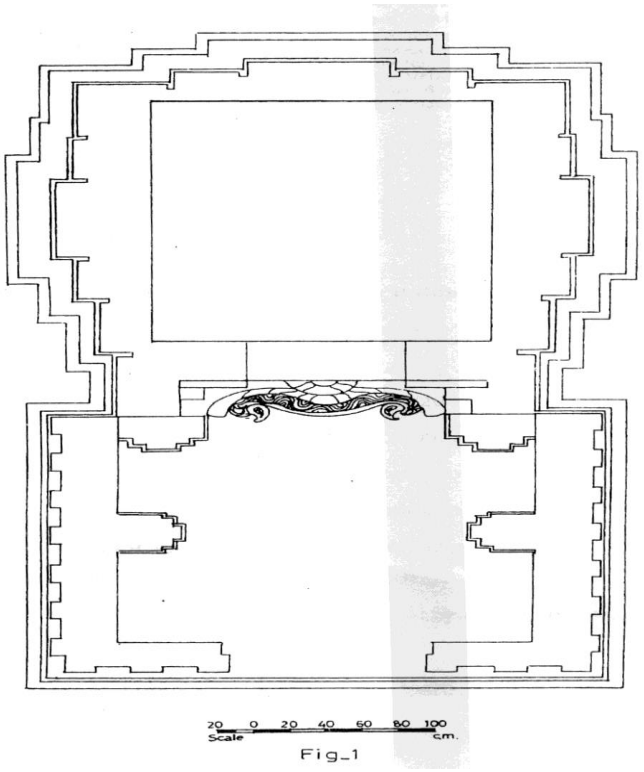
Temple 4 is located on the right side of the Chanderi-Ashok Nagar road in the peripheral area of the village. At present, only the *mandapa* portion of the temple is surviving. But, on close observation of the traces on the ground plan, one can identify the sanctum and *antarala* of the temple. The temple is dedicated to Siva. Another noteworthy feature of this temple is its profusely carved *vitana* of the *garbhagriha* which is decorated with fully-blooming lotuses. The temple is assignable to eleventh-twelth century CE.

Kuti area is situated across the river Leelat. The Kuti-complex is not only well-preserved but also promises a great potential as an attractive tourist resort. The Kuti group comprises a verandah-like monastery, flanked by temples on either side. Baradari, consisting of two small temples in east-west orientation, is situated on the extreme north and close to the rock face. It is flat-roofed and supported by six pillars in two rows. There are six small cells. They are basically simple structures with flat roofs and comparatively smaller entrances. These cells may have been used for the purpose of deep meditation and rest. There are seven temples out of which five temples were dedicated to Vishnu and two belong to Siva.

Temple 1 and 2 are associated with the cult of Vishnu as they carry the image of Vishnu on the *lalatabimba*. The other common feature of this kind of temple is their single cell shrine. This was common practice during the time of the Kachchhapaghata rulers. These temples have low plinths. The other feature is that Siva and Brahma have been shown on either sides of the main deity on the *lalatabimba*. The door-jambs of these temples are profusely decorated. It is only in the Temple-3 that a large-sized Vishnu image is enshrined whereas the remaining temples are devoid of any image. It seems that images may have been lost or stolen with the passage of time. These temples are assignable to eleventh-twelth century CE.

KT3 - KT4: That these two temples are dedicated to Siva is evident from the central deity on the *lalatabimba*. These temples are simple and carry less decoration on the outer walls. The outer walls are decorated with the images of Ganesa and other figures. On the *lalatabimba*, Brahma and Vishnu are depicted on either sides of Siva. These temples are assignable to *c.* eleventh-twelth century CE. To the north-west of the complex are ruined temples.

Fig. 10



Holi Ke Madiya, Thoban, District Ashok Nagar

SOUTHERN REGION

The Temple Survey Project, Southern Region of the Survey under the direction of D. Dayalan, assisted by A. Anil Kumar, S. Ashok Kumar, A. Palanivel, Samuel Joshua and P. Venkatesan carried out survey and documenation of cave temples of the Pandyas and other minor dynasties in Tamilnadu. The details of which are as under:

S.No	*Name of the Temple*	*Place Name*	*Taluk*	*District*
1.	Rock-cut cave temple (Ladan Kovil)	Anaimalai	Melur	Madurai
2.	Narasimha Cave Temple (rock-cut)	Anaimalai	Melur	Madurai
3.	Idaichi *Mandapam* Cave Temple	Arittappatti	Melur	Madurai
4.	Maiaikozhundeeswarar Temple	Ayankudi	Tirumayam	Pudukkottai
5.	Rock-cut Siva Cave Temple	Kosa Kottaiyur	Tirumayam	Pudukkottai

6.	Rock-cut (Tirumalai- Udaiya Mahadeva) Cave Temple-western	Kunnakudi	Tiruppattur	Sivaganga
7.	Rock-cut cave temple Masilsvaram - middle cave	Kunnakudi	Tiruppattur	Sivaganga
8.	Rock-cut (Malaikkolundisvaram) Eastern Cave Temple	Kunnakudi	Tiruppattur	Sivaganga
9.	Parvatagirisvara Cave Temple	Kunnandar Kovil	Kulattur	Pudukkottai
10.	Unfinished rock-cut Cave temple	Kunnandar Kovil	Kuiattur	Pudukkottai
11.	Unfinished rock-cut Cave temple	Kuthapundiyav-aiasu	Ottamchatram	Dindugai
12.	Rock-cut(lower) Vishnu Cave Temple	Malaiyadipatti	Manapparai	Tiruchirappalli
13.	Rock-cut (upper) Siva or Vagisvara Cave Temple	Malaiyadipatti	Manapparai	Tiruchirappalli
14.	Malaiyakkovil (southern)	Malaiyakkovil	Tirumayam	Pudukkottai
15.	Srivaramudayar Cave Temple or Eastern Siva Cave Temple	Malaiyakkovil	Tirumayam	Pudukkottai
16.	Rock-cut cave temple	Mangulam	Madurai North	Madurai
17.	Paliyilisvaram Cave Temple	Narthamalai	Kulattur	Pudukkottai
18.	Vaishnava Cave temple	Narthamalai	Kulattur	Pudukkottai
19.	Two small, unfinished rock-cut cave temples	Narthamalai	Kulattur	Pudukkottai
20.	Pushpavanesvara Cave Temple	Puvalaikkudi	Tirumayam	Pudukkottai
21.	Arivar Koil or Jaina cave temple	Sittanavasal	llluppur	Pudukkottai
22.	Rock-cut Siva Cave Temple	Tevarmalai	Tirumayam	Pudukkottai
23.	Lower rock-cut cave temple	Tiruchirappalli	Tiruchirappalli	Tiruchirappalli
24.	Gokarnesvara Cave Temple	Tirukokarnam	Pudukottai	Pudukkottai
25.	Rock-cut Sivadharmisvara (Kakolanatha) Cave Temple	Tirukoiakudi	Tiruppattur	Sivaganga
26.	Rock-cut cave temple	Tirumalai	Sivaganga	Sivaganga
27.	Lower Siva Cave Temple, Satyavagisvara	Tirumayam	Tirumayam	Pudukkottai
28.	The upper rock-cut cave	Tirumayam	Tirumayam	Pudukkottai

	temple			
29.	Vishnu Cave Temple	Tirumayam	Tirumayam	Pudukkottai
30.	Siva Cave Temple	Tirupainjili	Manacchanallur	Tiruchirappalli
31.	Siva Cave Temple	Tiruvellarai	Manacchanallur	Tiruchirappalli
32.	Unfinished Cave temple	Tiruvellarai	Manacchanallur	Tiruchirappalli

VIII. PRESERVATION OF MONUMENTS

MONUMENTS OF NATIONAL IMPORTANCE

AGRA CIRCLE

UTTAR PRADESH

1. AGRA FORT, AGRA, DISTRICT AGRA: Watertightening of the roof of the pavilion has been attended. Old and decayed plaster has been removed and replastered as per original. Besides, four missing pinnacles in the northern side of the pavilion have also been provided. The approach from Moti Masjid and to Meena Bazar was renovated by way of removing the extra earth filled during British period and the original level has been exposed and repaired. The south gate of the second Meena Bazar-complex had partially collapsed and was in a dilapidated condition. Propping was provided during the British period to retain the structure. The toilet blocks over the gate were also constructed in the past. The modern toilet blocks have been removed. All bulged-out stone architectural members of the gate have been taken out and repairs to the same have been started. The missing stone architectural members have been replaced with new ones. The work is still in progress.

In continuation of the previous year's work, the removal of old cement plaster from walls, ceiling and cells of the third Meena Bazar-complex have been taken up and surface of the wall has been exposed. It has been noticed that several portion of old walls were repaired by using modern bricks. These modern bricks have been removed and replaced with *lakhauri* bricks. Besides, exposed wall has been repaired by way of underpinning, pointing and watertightening by traditional mortar. The restoration of the *chhajja* of the Moti Masjid has been completed. The restoration work of inlay pieces has been taken up and work is under progress. The Delhi Gate area of the fort has been taken up for conservation during the period under review. The top surface of the outer rampart has been exposed and lime concrete flooring has been provided. The moat wall has also been repaired by restoring the collapsed portion in the eastern side of the gate. The work of providing missing veneering stones of the wall with new ones has been taken up. Besides, south-west corner of the rampart of the Delhi Gate has been attended by way of removal of debris and exposition of the buried and choked drainage. The work is in progress.

2. AKBAR'S TOMB, SIKANDARA, DISTRICT AGRA: In continuation of the previous year's work, the old and decayed plaster of the first

floor of the eastern gate of the tomb-complex has been removed and re-plastered matching to the original. The missing stone *jali* on the eastern side of the gate has been provided. Besides, missing inlay pieces on the east face of the gate have also been restored. Repairs to the main entrance gate of the tomb-complex have been taken up. Missing inlay pieces have been substituted. The conservation of the northeastern facade of the gate has been attended to and the work is in progress. Partially collapsed two *chhatris* of the northeastern corner on the third floor of the tomb of the main mausoleum have been restored by way of refixing the available architectural members like brackets, *jalis* of red sandstone, etc. at their original places.

The work is taken up to provide a ramp for physically challenged persons. To begin with, a brick masonry ramp at the eastern side of the main entrance gate has been provided and the work of providing wooden ramps inside the monument-complex is in progress.

3. DIWANJI-BEGUM MOSQUE, TAJGANJ, AGRA, DISTRICT AGRA: The unauthorized encroachments have been removed and repairs of the mosque have been taken up. The cells have been conserved by fixing of red sandstone in the façade, dasa, dab, veneer, *chaukhat* and flooring wherever missing and broken. The *wuzu* tank and flooring around it have also been conserved as per original after dismantling and taking out modern structures and cement concrete flooring. The fencing and approach have also been provided around the mosque.

4. FIROZ KHAN'S TOMB, AGRA, DISTRICT AGRA: In continuation of the previous year's work, the monument has been conserved by providing carved plaster work in place of dead plaster in the ceiling of the dome and the arches. Besides, plain lime mortar on the outer and inner sides of the boundary wall matching with the original has been laid.

5. GAUSHALA, RAM BAGH, AGRA, DISTRICT AGRA: Originally known as Katra or *Sarai*, the series of the cells locally known as Gaushala have been taken up for repair. Most of the cells were in a dilapidated condition and some of them were on the verge of collapse. So far, a total of fourteen cells have been repaired. The missing walls of the cells have been restored with *lakhauri* bricks by traditional masonry and mortar. The roofs have been repaired and restored. The original floor of the cells has been exposed and repaired. The works of repairing the remaining cells are in progress.

6. JAMA MASJID, AGRA, DISTRICT AGRA: In continuation of the previous year's work, repairs to the prayer hall of the *masjid* have been taken up. Decayed plaster of the ceiling and wall of the dome has been removed and replastered matching to the original. The damaged and fragile stone slabs of the interior of the mosque have been replaced. Repair to the courtyard in front of the mosque has also been taken up. The damaged stone slabs have been replaced with new ones matching to the original. The old defunct drainage system has been revived by way of removing silt and repairing the side walls.

7. ITIMAD-UD-DAULAH'S TOMB, AGRA, DISTRICT AGRA: During the period under review, the work of providing inlay pieces in place of the missing and fallen ones in the upper story of the tomb has been taken up which is in progress. The northeastern corner *burj* of the complex has been conserved by providing red sandstone *jali*.

8. JASWANT SINGH KI CHHATRI, RAJWARA, AGRA, DISTRICT AGRA: In continuation of the previous year's work, the exposed water channels and cascades have been repaired. Apron has been provided all around the inner side of the boundary wall. The missing veneering stones and the *dasa* of the exposed structures have also been provided. The work is still in progress.

9. MOSQUE ADJOINING THE TOMB OF JAFAR KHAN, AGRA, DISTRICT AGRA: The garbage/debris deposited on the ground floor of the portion from where encroachment was removed has been cleared and conservation work has been taken up by way of providing of stone slabs, brick masonry arches and lime concrete flooring in the interior. The work is still in progress.

10. GROUP OF MONUMENTS, TAJ MAHAL, AGRA, DISTRICT AGRA: In continuation of the previous year's work, the remaining work of replacing the carved veneer panels and inlaid panels in the Mehman Khana have been completed. Missing inlay pieces of the wall panels, columns and outer façade of the parapets have been restored as per the original. The *dasa* with embossed carving and flooring of the Mehman Khana have also been conserved by taking out damaged red sandstone slabs and resetting other ones in original pattern. In the mosque, veneer panels with carved floral pattern and inlaid panels have been conserved. Missing inlay pieces on the wall panels have also been restored as per the original. The *dasa* with embossed carvings and flooring of the mosque have also been replaced by taking out decayed red sandstone slabs as per original pattern. The *chhajja* stones also have been replaced by taking out broken and missing stones from the south-west *burj* of the mosque. Existing pinnacles have also been re-set by using stainless steel rods. The existing defunct drainage system of main mausoleum on the Chameli floor has been made functional by opening and cleaning it, thus enabling the drainage of storm water from the white marble floor to the north façade (river side) and Mehman Khana. The open joints of the roof terrace of the mausoleum including *chhatris* and the main dome have been sealed and watertightened. Decayed red sandstone veneering of the platform around the main dome have also been replaced with new ones. Besides, pointing with special lime mortar has been done on the white marble façade after completion of mud pack cleaning by the Science Branch. The underground cells on which the main mausoleum stands have also been repaired. The old, decayed and bulged plaster from the ceiling of the cells from the eastern corner to the west, up to 30m, has been taken out and replastered as per original. Besides, dead mortar from the walls of the cells has been removed and replaced again as per original.

In continuation of the previous year's work, the damaged flooring has been replaced. The

pathways from the main gate to the main mausoleum leading to the north-east and north-south corners of the lawn level have been conserved with hexagon and square patterns in red sandstone set in lime mortar. The work is in progress. The south-east and south-west *dalans* of the forecourt have been conserved by raking out of the ugly cement plaster and replacing it with lime plaster in the cells as per original in the ceilings of domes and corners of arches. Red sandstone flooring in the *dalans* has been replaced with new. After proper documentation the stone slabs are replaced with new stones slabs. Aprons have also been provided in front of the south-east and south-west *dalans* as per the pattern adopted inside the Taj-complex. Old, decayed and worn-out red sandstone veneer and *dasa* with floral design on front edge have been replaced with new ones as per original. In continuation of the previous year's work, repair of the rear (west) side of the Fatehpuri Mosque has been attended. The red sandstone, veneering and dab have been provided over tile brick wall all around the mosque after removal of debris. Red sandstone flooring has also been provided all around the mosque. Boundary and pathways in Saheli Burj area have been provided, after removal of debris and taking out old and bulged brick masonry. The cells have also been repaired and booking counter has been shifted from the west gate to Saheli Burj. The decayed and worn out red sandstone *dasa*, base, pillar and cap of pillar, niches, veneer stone and *chaukhat* members have been replaced as per the original after taking out the decayed.

In the Khane-e-Alam, repairs to the damaged and bulged-out portion of the existing wall have been taken up by way of underpinning and watertightening. The main building has also been taken up for repair. The damaged and dilapidated steps leading to the ground floor have been repaired. The square tank exposed in front of Mehman Khana has also been conserved. The graves inside the Khane-e-Alam complex have been repaired. Wooden ramps, for physically challenged visiting from the forecourt to the Chameli floor (up to Mehman Khana and mosque level) have been provided as per international standard. The stairs leading from the Chameli floor to the marble platform of main mausoleum have been covered with wooden tram without disturbing the old marble stairs to avoid any incident.

11. TWO GATEWAYS AND MOSQUE, JAJAU KI SARAI, DISTRICT AGRA: The double-storeyed north gate of the *sarai*, which was completely in a dilapdridated condition, has been attended for conservation. The verandah on the ground floor and cells on the first floor have been conserved. The roof which was full of vegetation has been repaired after cleaning of vegetation, removal of dead concrete mortar and relaid with traditional material. Missing and decayed red sandstone veneering, *dab*, quid, *gola*, *galta*, carved panel and *dasa* stones have been replaced.

12. SANKARA FORT, DISTRICT ALIGARH: The mound has been provided with boundary wall in stone masonry to avoid further encroachment.

13. GROUP OF MONUMENTS, FATEHPUR SIKRI, DISTRICT AGRA: Gateways of city wall have been taken up for repairing. The

decayed and broken red sandstone *dasas* with *panpatti* design have been replaced with new ones at Ajmeri Gate, Tehra Darwaza, Gwalior Gate, Delhi Gate and Chandra Pole Gate. Besides, decayed lime concrete floor on both sides the verandahs of the gates and rooms has been removed and provided with new lime concrete. Repairs to the collapsed portion of the city wall adjoining the gates have also been attended to. The collapsed city wall has been restored with C.R. and R.R. masonry and recessed pointing on C.R. masonry with composite lime mortar. Another major work of repair to the city wall between Delhi Gate and Lal Darwaza has also been taken up. The plinth of the wall has been exposed and repair to the same is in progress.

Todarmal Baradari has been taken up for repair. The majority of the architectural members were missing, some were broken and a few of them were dislodged. To save the structure from collapse, stone masonry pillars were provided long back. In the first phase, repair to the ground floor has been taken up. The dislodged architectural members have been taken out carefully and the usable members have been reset again in their original positions. New pillar members have been provided in place of missing and damaged portion as per the original. The damaged flooring in the verandah has been attended. The decayed plaster on the wall of the ground floor has been conserved. Most of the brick masonry pillars have now been removed. The work is still in progress.

14. AJITMAL GATEWAY, DISTRICT AURAIYA: The gateway was in a dilapidated condition. The walls had collapsed and were missing at several places. There was huge vegetation growth over the structure as a result a series of cracks had developed on the ceilings and the walls. The vegetation growth has been removed. The open joints have been sealed, the collapsed portion of the wall has been restored as per original and entire structure has been watertightened.

15. TEMPLE 1, AHICHCHHATRA, RAMNAGAR, DISTRICT BAREILLY: In continuation of the previous year's work, the bulged-out terraces of the northern side of the temple have been repaired. Similarly, the eastern side of the temple has also been taken up for conservation and two terraces from the ground level have been conserved by using bricks available at the site. The work is in progress.

16. JAMA MASJID, ETAWAH, DISTRICT ETAWAH: The old and damaged propping provided at the mosque has been removed and the broken beam has been replaced with new one. The decayed pillar has also been replaced with new one matching to the original. The exterior of the mosque has been re-plastered with traditional mortar after removal of cement plaster.

17. DARGAH, RAPRI, DISTRICT FIROZABAD: The groups of monuments at Rapri, have been taken up for repair. The old boundary wall which had collapsed and was missing at several places has been restored matching to the original wall. Decayed, dead and pulverized plaster of the dome has been removed and replastered. The *mazar* on the western side of the complex has also been conserved by underpinning, pointing and providing *kangoora*. The collapsed arch of the gate has also been conserved. Besides,

the work of providing of red sandstone *kangoora*, *chhajja* and missing pinnacle and decayed members have been attended too. Proper approach has also been provided within the complex.

18. ADINGA MOUND, MATHURA, DISTRICT MATHURA: The mound has been provided with boundary in R.R. stone masonry.

19. AKBARI SARAI AND GATEWAY, KOSI, DISTRICT MATHURA: The entire area of Akbari Sarai and the gateways are under occupation since long and there is hardly any space to work except at a few locations wherever walls and gateways are visible. The visible portion of the walls and gates were repaired.

20. ROMAN CATHOLIC CHURCH, SARDHANA, DISTRICT MEERUT: The existing height of the boundary wall has been raised with brick masonry and lime mortar for security purposes. The damaged floor of the inner side of the *minar* of the church has been conserved by lime mortar with aggregate. The original damaged design, mouldings and plaster work on the outer side of the *minars* have also been attended to.

21. TOMB OF NAWAB BANGAS KHAN, DISTRICT FARRUKHABAD: Since the structure was completely in dilapridated condition. The modern brick masonry support was provided to avoid further collapse of the roof. Six collapsed arches have been repaired during the period under review. The underpinning works of the masonry pillars and arches have been taken up. The damaged floor of the tomb has also been relaid in lime concrete. The dead and pulverized plaster of the dome has been removed for replastering. The work is in progress.

22. GROUP OF MONUMENTS, MUJHERA, DISTRICT MUZAFFAR NAGAR: The tomb of Sayeed Umar-nur-Khan and the tomb of Chhaju Khan have been taken up for repairing. The buried platforms within the compound wall of the tomb of Sayeed Umar-nur-Khan have been exposed and repaired by way of underpinning, pointing and watertightening. The decayed and damaged portions of the tomb of Chhaju Khan have also been taken up for repairing with available stone blocks at the site.

23. MOSQUE AND TOMB OF ABDUL RAZAK, JHINJHANA, DISTRICT MUZAFFAR NAGAR: The mosque has been conserved by way of taking out of the dead and pulverized plaster and re-plastered as per original and the top roof watertightened. The modern cement plaster from the brick-on-edge floor in front of the mosque has been removed and the exposed surface has been conserved by pointing in lime mortar. The red sandstone *chhajja* and *jali* of the tomb of Abdul Razzak have also been conserved by pointing and watertightening. The main entrance gate has been provided with the Mughal patterned door.

24. OLD BRITISH CEMETERY, SAHARANPUR, DISTRICT SAHARANPUR: The decomposed wooden planks of the gate have been replaced with new ones and new tiles have been provided in place of the missing or broken ones. The entire area which was full of debris and vegetation growth have been removed and the exposed graves have been conserved as per the original.

AURANGABAD CIRCLE

MAHARASHTRA

25. AJANTA CAVES, AJANTA, DISTRICT AURANGABAD: The Geological Survey of India (GSI) recommended the construction of a contour drain (LD4) at a level higher to that of the existing drain and at the base of the hill above the Ajanta scarps to stop further water seepage inside the caves. To trap rainwater at a higher level and divert it away from the main scarp of the drain has been made suggested by the GSI and the design has been provided by Central Water and Power Research Station (CWPRS), Pune. The excavation for laying the base layer for the drain has been started and the work of the construction of the base layer is in progress. The existing concealed M.S. trough drain in the ceiling of rear aisle of Cave 1 was found choked due to continuous accumulation of debris and the silt depositor has been reopened, the accumulated debris has been removed and it has been replaced with a new stainless steel trough to effectively divert the seepage water from the ceiling (pls. 98-99). The various caves at Ajanta have been provided with a network of pathways and the pathway from Cave 16 leading to the toilet block near the forest area was repaired after concreting the base (pls. 100-101). The Ajanta caves have been facing a regular menace of bats which occupy the darker interiors and deface the ceilings and walls by urinating. Bat-proof mesh doors and windows have been provided with wooden frames including suitable paint for mesh as per the existing texture and the ancient look. The cultural notice boards engraved on granite stone slabs have been provided for Caves 1, 2, 4, 6, 9, 10, 16, 17, 19, 20, 21, 25, 24 and 26. The direction boards have also been provided in the same pattern at locations.

26. AURANGABAD CAVES, AURANGABAD, DISTRICT AURANGABAD: A portion of Cave 4 had deteriorated and fallen down due to the pulverization and formation of instabilities in the basaltic rock mass. A portion of the left half of the ceiling and top of pillars had also fallen down. The broken top portion of the pillars and a portion of the ceiling have been restored. The exterior surface has been finished as per rock texture (pls. 102-103). An alternate pathway had been constructed during 2007-08 to have access to the western group of caves as the existing pathway had been considerably damaged and the visitors were threatened by the collapse and falling down of rock mass. The alternate pathway had been provided with parapet walls on either side of the steps. These parapet walls have been provided with stone coping (pls. 104-105).

An alternate pathway to the eastern group of caves (Caves 10 and 11) had been provided by carrying out necessary excavation and constructing a retaining wall in stone masonry and stone steps. A Hume pipe culvert has also been provided below the pathway for safe passageway of water from the stream located to the right of Cave 10 (pls. 106-107). Basalt stone flooring has been laid in front of Caves 2 to 5 by fixing two line-dressed stone slabs over a layer of cement concrete.

A surface water drain has been constructed over the top of the western group of caves to restrict water seepage into them. Recess

Plate 98-99



98



99

Cave 1, before and after conservation, Ajanta.

Plate 100-101



100



101

Pathway, before and after conservation, Ajanta.

Plate 102-103



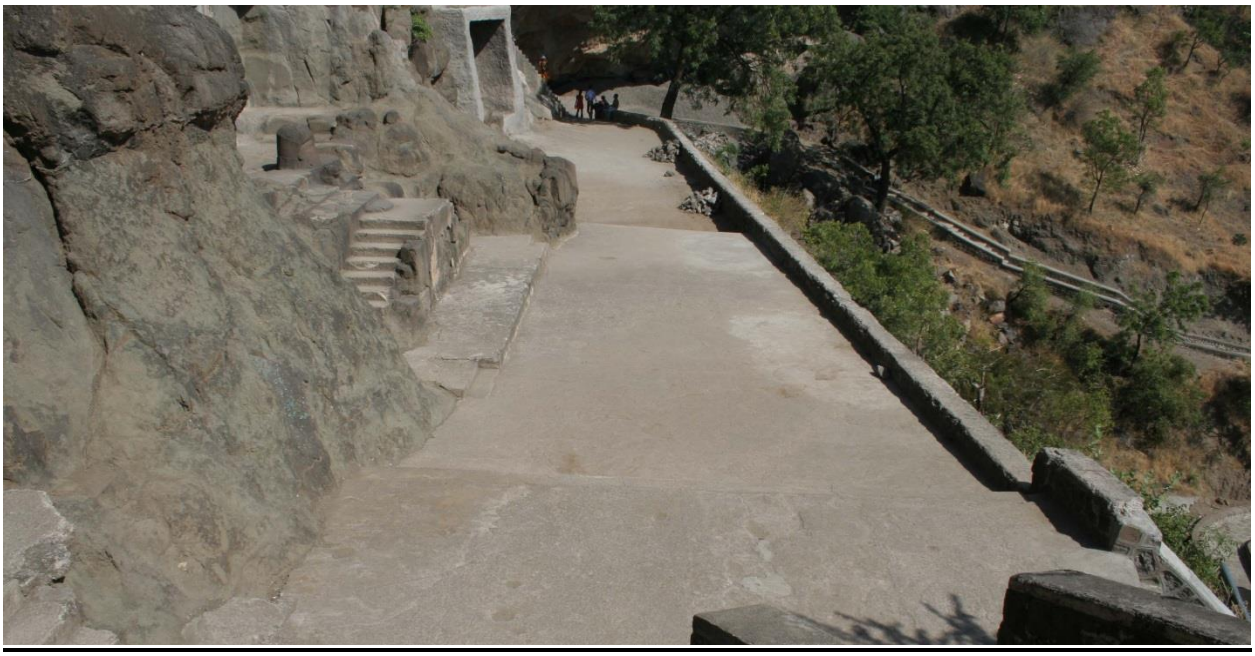
102



103

Cave 4, before and after conservation, Aurangabad.

Plate 104-105



104



105

Cave 1 to 5. before and after conservation, Aurangabad.

Plate 106-107



106



107

Cave 10, before and after conservation, Aurangabad.

pointing including raking out joints has also been carried out (pls. 108-109). The existing surface water drain above the eastern group of caves has been repaired by carrying out works like removal of debris, raising the height of the parapet wall above Caves 7 and 8 to divert water from the stream, repairing the existing parapet walls and realigning some portion of the drains by properly deepening them.

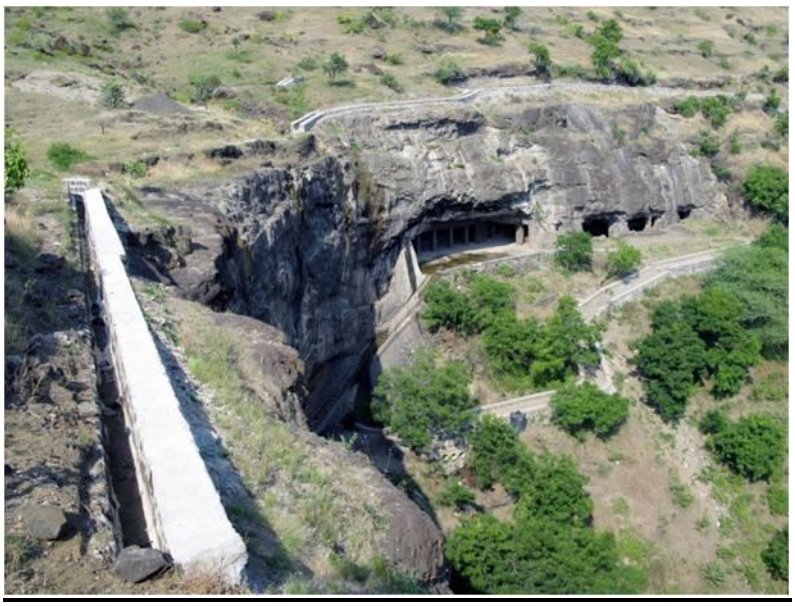
27. BIBI-KA-MAQBARA, AURANGABAD, DISTRICT AURANGABAD: The lime plaster of the enclosure wall and underground cells of the mausoleum were found decayed and pulverized. The old and decayed plaster from the western face of the enclosure wall and four underground cells has been carefully raked out and the exposed surface has been replastered with fresh lime mortar and finally provided with finishing layers similar to the ancient lime plaster. The old and decayed plaster on the exterior surface of the southeast minaret has also been carefully raked out and the exposed surface has been provided with a new coat of lime plaster including repairs to the decorative lotus medallions located below the balconies (pls. 110-111). The roof of the masjid on the raised platform of the mausoleum was watertightened after removing the old, decayed lime concrete and damaged bricks. The roof has been re-laid with fresh lime concrete over a layer of moulded bricks of special sizes. The wide cracks over the roof of the masjid have been stitched using brickbats in lime mortar (pls. 112-113).

28. DAULATABAD FORT, DAULATABAD, DISTRICT AURANGABAD: The roof of the palace complex had completely fallen down and only remnants of two pavilions on the southeast and southwest had been preserved along with wooden pillars and brackets The restoration of Rang Mahal has been decided to be taken up based on the approval obtained from the Panel of Experts (PoE) under the project, 'Ajanta Ellora Conservation and Tourism Development Project', carried out under a soft loan from Japan Bank of International Cooperation (JBIC). A complete documentation of the palace-complex has been carried out by preparing plan, elevation and sections before carrying out the conservation works. The palace had been originally provided with a series of wooden pillars and bracket arrangements surmounted by wooden beams and ceiling. The necessary teak wood for the restoration work has been procured from the Forest Department and the wooden brackets of various sizes and designs, as per the existing patterns, have been prepared. The pillars, capitals, beams and rafters have been erected in the southeastern and southwestern rooms and wooden ceilings have been laid over them. The restoration work in the remaining rooms of the Rang Mahal is in progress. The undulated and badly damaged stone steps and missing parapet walls on either side from the Ganesa Temple to the Baradari have been completely removed and re-constructed over a cement concrete bed. The missing merlons over the parapet wall of the Baradari building have been restored in brick masonry as per existing pattern (pls. 114-115). A portion of the fortification wall in the eastern gate-complex of the fort had fallen down. The fallen veneering wall has been re-constructed by using available old

Plate 108-109



108



109

Cave 7 and 8, before and after repair to the drain, Aurangabad.

Plate 110



Minaret at south-east corner of Bibi-ka-Maqbara, before conservation, Aurangabad.

Plate 111



Minaret at south-east corner of Bibi-ka-Maqbara, before conservation, Aurangabad.

Plate 112-113



112



113

Roof of masjid, Bibi-ka-Maqbara, before and after conservation, Aurangabad.

Plate 114-115



114



115

Baradari at Daulatabad fort, before and after conservation, Daulatabad.

stones and new stones, wherever necessary. The top portion of the wall has been watertightened by providing brickbat concrete.

29. ELLORA CAVES, ELLORA, DISTRICT AURANGABAD: Caves 1-34 at Ellora are located on the western face of the hill in a more or less linear pattern extending nearly 1.5km in length. The work of connecting these caves by a stone pathway has been taken up and the work is in progress. The objective of providing this pathway has been to connect the caves so that the visitors starting from Cave 1 can go up to Cave 34 without having to take any circuitous route. The pathway connecting Caves 1-34 necessitates construction of a pedestrian footbridge to the right of Cave 16 as it passes over a small stream. The abutment and piers have been erected and the M.S. super structure has been fabricated and installed over the piers and abutment. In order to store water for its use in the gardens, the construction of two weirs across the River Elaganga, near Cave 29, has been taken up and the construction work of the latter is in progress.

The cultural notice boards and signages for all the caves have been provided apart from providing direction boards in stone slabs. The G.I. chain link fencing on the angle iron post has been provided for covering the protected area on top of the caves and to stop local people from trespassing into the archaeological area.

30. FARAHBAGH PALACE, DISTRICT AHMEDNAGAR: The old and decayed plaster has been carefully removed. The wall surface and ceiling have been replastered with lime as per the original composition.

31. ANCIENT SITE AND REMAINS, DAIMABAD, DISTRICT AHMEDNAGAR: A retaining wall in stone masonry on the southern side of the mound has been constructed to stop the erosion caused by the river Pavara. The wall has also been provided with chain-link fencing on the top.

32. DAMRI MASJID, AHMEDNAGAR, DISTRICT AHMEDNAGAR: The construction work of a stone masonry wall on three sides of the mosque has been carried out in order to protect the archaeological area and the work has been completed in all respects.

33. SIVA TEMPLE, PARNER, AHMEDNAGAR, DISTRICT AHMEDNAGAR: The work of erection of G.I. chain-link fencing over a dwarf masonry wall has been completed around the protected area of the temple to stop unauthorized entry into the archaeological area.

34. MAHADEO TEMPLE, DEOTHAN, DISTRICT NASIK: G.I. chain-link fencing on angle iron post over a dwarf masonry wall has been provided enclosing the protected area of the temple to stop unauthorized entry into the archaeological area.

35. GONDESWAR MAHADEV TEMPLE, SINNAR, DISTRICT NASIK: G.I. chain-link fencing on angle iron post over a dwarf masonry wall has been provided enclosing the protected area of the temple to stop unauthorized entry into the archaeological area.

36. CAVES, ANKAI, DISTRICT NASIK: Stone flooring has been carried out in front

of Cave 1 to 11 over a layer of cement concrete bed to drain out the rain-water.

37. HINDU TEMPLE, AMBEGAON, DISTRICT NASIK: The work of erection of G.I. chain-link fencing over a dwarf masonry wall has been completed around the protected area.

38. TEMPLE OF DEVIAND SAMBHA, DIGHI, DISTRICT JALGAON: A retaining wall on the south-east corner of the archaeological area has been constructed. A chain link fencing over a dwarf wall (north and west sides of the temple) has been constructed. To stop further water seepage into the plinth portion of the temple, an apron has been provided around the temple by using trap stone slabs, in two line dressing after proper consolidation.

39. GAIMUKHA AND FIFTEEN TEMPLES, LONAR, DISTRICT BULDHANA: The flight of steps from the Brahma *Kunda* of the Gaimukha Temple to the lower rim of the crater had been badly damaged and found in a dilapidated condition. The restoration work of the flight of steps has been taken up by providing a firm base of cement concrete and topped with stone slabs. A parapet wall has also been provided along the stream side.

40. PAPAHARESWAR TEMPLE, LONAR, DISTRICT BULDHANA: The area around the temple has been taken up for scientific clearance to reveal the original levels of the temple and to clear off the debris caused by the collapse of the retaining wall of the stepped tank, located to the north-west of the temple. The work is in progress.

41. ANANDESHWAR TEMPLE, LASUR, DISTRICT AMARAVATI: A retaining wall has been constructed along the south, north and northeastern sides.

42. CITY WALL OF NAWAB ISMAIL KHAN, ACHALPUR, DISTRICT AMARAVATI: G.I. chain-link fencing on angle iron post over the dwarf masonry wall was provided along the fortification wall and enclosing the protected area.

43. LAL KHAN TOMB AND TANK, AMNER, DISTRICT AMARAVATI: The old tank located in front of the Tomb, filled up with debris has been removed through scientific clearance and the original features of the tank exposed. The rough and uneven stone flooring inside the tomb was carefully removed. The newly added enamel colour covering the original surface inside the tomb wall has been cautiously taken off and the original lime plastered surface exposed.

44. PATUR CAVES, PATUR, DISTRICT AKOLA: G.I. chain-link fencing on angle iron post has been provided over a dwarf masonry wall covering the protected area to stop trespassing into the archaeological area.

45. ASADGARH FORT, AKOLA, DISTRICT AKOLA : The fallen debris on the southern side of the fort wall was removed and the useful materials have been sorted out and stacked for use in further conservation works.

46. BALLARSHA FORT, BALLARSHA, DISTRICT CHANDRAPUR: The missing inner veneering of the fort wall on the eastern side facing west has been taken up for re-construction. At the base, suitable foundation has been provided by using new

sandstone. The wall consisting of three line dressing has been fixed in hydrated lime mortar for core filling. The veneering stones have been set as per the original and finished similar to dry masonry. The top surface of the wall watertightened.

47. BHANDAK FORT, BHADRAVATI, DISTRICT CHANDRAPUR: The heap of fallen stones and debris of the fort wall has been removed and useful material has been stacked for the restoration of the veneering wall. The core of the fort wall on the western side has been filled up with U.C.R. stone masonry in hydrated lime mortar. The coping portion of the wall has been watertightened by laying brick-jelly concrete.

48. GROUP OF TEMPLES, MARKANDA, DISTRICT GADCHIROLI: An emission lightning conductor has been installed in the main temple. This conductor is capable of giving maximum protection over an area of 109m in air.

BANGALORE CIRCLE

KARNATAKA

49. BHEEMESWARA TEMPLE, NILAGUNDA, DISTRICT BELLARY: Disturbed stone masonry in the *hara* portion has been removed and restored as per the original. Plinth protection course was provided around the temple.

50. MALLIKARJUNA TEMPLE, KURUVATTI, DISTRICT BELLARY: Deteriorated lime plaster of the *gopura* has been carefully removed and re-plastered with lime mortar. The roof of *Mallikarjuna* and *Nandi* temple were restored with lime and *surkhi*.

51. UPPER FORT AND CITADEL OF TIPPU SULTAN PERIOD AND NAGALACHERUVU, BELLARY, DISTRICT BELLARY: The disturbed and fallen portion of the fort wall was dismantled and reconstructed using the original blocks. The core is filled with rubble and mortar. The parapet was restored in lime plaster.

52. FORTRESS AND TEMPLES ON THE HILL, CHITRADURGA, DISTRICT CHITRADURGA: The fallen and disturbed portion of the fort wall was dismantled and reconstructed with available stone members as per the original besides water tightening the top surface (pls. 116-117).

53. SITA HONDA ON JATTINGA RAMESHWARA HILL, JATTINGA RAMESHWARA, DISTRICT CHITRADURGA: Fallen portion of the fort wall and bastion were re-constructed with available stones. Silt accumulated in the *Sita Honda* (tank) has been cleared (pls.118-119).

54.RAMESWARA TEMPLE, NARASAMANGALA, DISTRICT CHAMARAJANAGAR: Damaged stucco figures of the *vimana-gopura* have been restored with lime plaster. Disturbed and uneven stone flooring was re-laid over a sand cushion. A flight of steps have been provided to the eastern entrance of temple and to the *Sapta-matrika* shrine. The ancient enclosure wall on the northern side of the temple was exposed.

55. KALLESWARA TEMPLE, BAGALI, DISTRICT DAVANGERE: The revetment wall close to the tank bund was completely dismantled and re-constructed with the available stones after proper documentation. Four fallen *mandapa*s, exposed during the

Plate 116-117



116



117

Fort wall, before and after conservation,Chitradurga.

Plate 118-119



118



119

Sita Honda on Jattinga Rameshwara hill, before and after conservation, Jattinga.

debris clearance in the temple complex, were restored. Undulated stone flooring around the temple was re-laid on sand cushion (pls. 120-121).

56. HILL FORT AND RUINED PALACE, UCHCHANGIDURGA, DISTRICT DAVANAGERE: Damaged ancient flight of steps of the fort have been restored by providing dressed stones. Fallen portions of the fortification have been restored (pls. 122-123).

57. FORT, CHENNAGIRI, DISTRICT DAVANAGERE: The fallen and disturbed portion of the fort wall was restored as per the original using the available stone and suitably water tightened (pls. 124-125).

58. FORT AND DUNGEONS, MANZARABAD, DISTRICT HASSAN: The parapet and fort wall were plastered in lime mortar and weather proof course in lime concrete was provided to the first entrance of the fort.

59. AMRITESWARA TEMPLE, AMRITAPURA. DISTRICT HASSAN: The leaky roof of the temple has been water tightened by removing the damaged lime mortar and by providing a fresh course of *surkhi* with lime mortar mixed with water proofing compound.

60. BIRTH PLACE BY HAIDER ALI, BUDIKOTE, DISTRICT KOLAR: The undulated and broken steps near the *mandapa* were restored with available stone members and using fresh stones, wherever necessary.

61. SOUMYAKESHAVA TEMPLE, NAGAMANGALA, DISTRICT MANDYA: The damaged *mahadvaragopura* has been restored with lime mortar to arrest the rainwater entering into the *gopura* and growth of vegetation over it (pls. 126-127).

62. LAKSHMINARAYANA TEMPLE, SINDHGHATTA, DISTRICT MANDYA: The out of plumb and disturbed entrance *maha-dvara* of the temple was dismantled after proper documentation and reconstructed as per the original using available stone blocks after providing suitable foundation.

63. SIDLU MALLIKARJUNA TEMPLE, BETTADAPURA, DISTRICT MYSORE: The bulged out *Jodi-nandi-mandapa* was dismantled after proper documentation and was restored. Undulated stone flooring of the *mandapa* has been re-laid on sand bed. Nandi and stucco figures over the *mandapa* have been restored with lime mortar, besides providing weather proof course.

64. FORT, KAVALEDURGA, DISTRICT SHIMOGA: The remains of the Palace inside the fort were exposed and the walls unearthed were consolidated and traditionally plastered. The fallen fortification near the palace site was restored. The damaged and undulated ancient stone pathways are re-laid and balustrades were properly restored. The fallen and out-of-plumb gateways of the *prakara* wall of Sri Kashi Visvēswara temple inside the fort have been resorted (pls. 128-129).

65.TRIPURANTESWARA TEMPLE, BALLIGAVI, DISTRICT SHIMOGA: The damaged, undulated and missed flooring of the entrance *mandapa* was re-laid with available stone slabs (pls. 130-131).

Plate 120-121



120



121

Kalleswara Temple, before and after conservation, Bagali

Plate 122-123



122



123

Fort and ruined palace, before and after conservation, Uchchangidurga.

Plate 124-125



124



125

Fort wall, before and after conservation, Chennagiri.

Plate 126-127



126



127

Soumyakeshava Temple, before and after conservation, Nagamangala.

Plate 128-129



128



129

Fort, before and after conservation, Kavaledurga.

Plate 130-131



130



131

Tripuranteshwara Temple, during and after conservation, Balligavi.

66. TRIMURTINĀRAYANA TEMPLE, BANDALIKE, DISTRICT SHIMOGA: The missing flooring of *garbhagriha* was re-laid and plinth protection course was provided around the *sahasra-linga*.

67. SHIVAPPA NAYAKA'S FORT, NAGARA, DISTRICT SHIMOGA: Fallen portion of the fortification has been reconstructed with available stones and using new blocks wherever necessary (pls. 132-133).

68. TEMPLES AND INSCRIPTIONS, UDRI, DISTRICT SHIMOGA: Plinth protection course has been laid around the Iswhara temple for stabilizing the foundation. Crimped wire mesh fencing was fixed over a dwarf wall for protecting the archaeological premises.

69. FORT, MADHUGIRI, DISTRICT TUMKUR: Fort wall and the entrance gateway have been plastered with lime mortar. The leaky roof is provided with weatherproof course. Stucco figures and parapet of the second entrance were restored.

BHOPAL CIRCLE

MADHYA PRADESH

70. KARAN TEMPLE, AMARKANTAKA, DISTRICT ANUPPUR: The platform and out of plumb portion of the temple was taken up for consolidation. The work of providing steps to the platform is going on. Stone apron around the temple is being provided to avoid water stagnation and weakening of the foundation.

71. SIVA TEMPLE, AMARKANTAKA, DISTRICT ANUPPUR: Conservation works, like pointing of temple walls, repair and replacing of architectural members of the temple platform were taken up. Apart from this efforts are also being made for the up gradation of the monument by appropriate landscaping.

72. CHANDERI FORT, CHANDERI, DISTRICT ASHOKNAGAR: Structural repairs such as erection of beams, columns, providing flag stone flooring and lime concrete over the roof of first floor was completed and that of second and third of Navakhanda Mahal has been taken up. Khilji Mosque has also been consolidated and conserved.

73. QILA KOTHI, CHANDERI, DISTRICT ASHOKNAGAR: After scraping and raking the earlier applied cement plaster, traditional lime mortar is being provided to the wall surfaces of Qila Kothi.

74. BADAL MAHAL, CHANDERI, DISTRICT ASHOKNAGAR: Pointing work was carried out in lime concrete on the exterior of the fortification wall. Providing of flagstone flooring around Badal Gate is in progress. Besides, CR stone work at the *baodi* was carried out and settled debris was cleared to enhance the aesthetic look of the monument.

75. LANJI FORT, LANJI, DISTRICT BALAGHAT: A sculpture shed along with a compound wall around it was constructed.

76. ATER FORT, ATER, DISTRICT BHIND: Conservation by way of recess pointing, underpinning, R.R masonry and brick masonry works were carried out at the fort to strengthen various structures. After removal of pulverized old plaster from the wall surfaces, it was re-plastered with traditional lime mortar 8 mm thick lime concrete was provided over the roof of various structures located to the left of Raja

Plate 132-133



132



133

Shivappa Nayaka's Fort, before and after conservation, Shimoga.

Baithak and on the pathway. In addition, settled debris has been removed from various locations of the fort.

77. IDGAH AT ASIRGARH, DISTRICT BURHANPUR: A dwarf wall with MS grill was provided during the period under review.

78. OLD FORT BURHANPUR, DISTRICT BURHANPUR: Underpinning and pointing of random rubble and brick masonry structures with lime concrete was carried out. In addition, plastering of walls in the palace complex with lime mortar was also carried out.

79. RAJA KI CHHATRI, BURHANPUR, DISTRICT BURHANPUR: During the period under review, the work of strengthening and replacing of missing veneering stones from the dome of the *chhatri* and parapet wall has been carried out. Besides, lime concrete base has been provided below the newly fixed veneering stone. An iron gate was provided to the entrance for its safety and security.

80. WESTERN GROUP OF TEMPLES, KHAJURAHO, DISTRICT CHHATARPUR: The decayed and pulverized lime floor on the southern side of Kandariya Mahadeva temple platform was removed and sand stone flooring has been provided in its place. Restoration and consolidation work was also taken up at Chousath Yogini temple and Jagadambi temple. Barbed wire fencing was provided around the Bijamandal mound.

81. JAL MAHAL, MANDU, DISTRICT DHAR: In continuation of earlier work, flag stone flooring was completed and R.R masonry wall on northern side was restored with lime mortar. Stone arches all around the monument were restored and recess pointing was done wherever required. The work of providing missing veneering stones to pillars was also taken up.

82. DAI KA MAHAL, MANDU, DISTRICT DHAR: The works of restoring R.R. masonry wall and to strengthen the structure, filling up of cracks were taken up. Sandstone flooring was provided around the platform of main dome and in the room located at the western side of the Mahal. *Chhajja* stones were also provided at the missing portion of the main dome. The work of restoring stair cases was also taken up.

83. HOSHANG SHAH'S TOMB, MANDU, DISTRICT DHAR: Debris from the *baodi* located at the back side of the tomb has been removed and taken up for restoration. Broken *chhajja* stones were repaired and stone flooring was provided at the main entrance of the tomb. Besides, the works of providing pathway and conservation of the main dome are in progress.

84. MALIK MUGHITH'S MOSQUE, MANDU, DISTRICT DHAR: In continuation of last year's work, providing of brick masonry to the east and north side of the monument was completed. The dome and the parapet wall were plastered with 40mm thick layer of lime plaster. *Dasa* stones were provided over the bracket. R.R masonry work was carried out on the north and south side of the monument as per original. *Chhajja* at the front side of the mosque was restored. The works of erecting stone pillars and brackets, edging of original plaster and pointing at various places is under progress.

85. MAN SINGH PALACE, GWALIOR FORT, DISTRICT GWALIOR: Missing and broken architectural members such as stone *jalis*, slabs, beams, pillars, etc. were provided after necessary chiseling and mouldings. The roof of the monument was watertightened by providing lime concrete. Besides, stone slab flooring is being provided. Lime plastering to various structures was carried out with traditional lime mortar.

86. VISHNU VARAHA TEMPLE, PANAGARH, DISTRICT JABALPUR: The sunken area of the temple was raised up to existing ground level by filling with earth and sand. Lime flooring was provided so as to avoid water stagnation within the compound of the monument. In addition, MS angle iron gate at the entrance of the temple was also provided for its safety and security while the work of construction of boundary wall is in progress.

87. CHAUSATH YOGINI TEMPLE, BHERAGHAT, DISTRICT JABALPUR: Barbed wire fencing of the monument has been replaced with a dwarf compound wall for the safety and security.

88. CHOUBARA DERA 1 AND 2, UN, DISTRICT KHARGONE: Missing architectural members were restored at various places by fixing chiseled and dressed stones. Fallen and damaged stones of the ceiling as well as damaged stone slabs of the *garbhagriha* were removed and reset with stone members to provide strength to the structure. Besides, restoration of *sikhara* of Temple 1 is in progress.

89. BAJI RAO PESHWA KI CHHATRI SARAI, RAVERKHEDI, DISTRICT KHARGONE: To achieve the structural stability of the monument, watertightening of various structures, plastering of walls, providing of lime flooring, etc. were carried out during the period under review. In addition, a dwarf wall was also being provided around the monument for its safety and security.

90. GROUP OF TEMPLES, BATESHWAR, DISTRICT MORENA: During the period under review, the temple known as Dhonamath and temples located in Complex II were taken up for conservation and restoration. After removing the debris from Dhonamath, the walls, pillars, roof and beams were lowered down and after providing a sound foundation, the structure is being re-erected. At various places, missing stone beams and roof slabs were provided. R.R stone work and repairing of staircase are in progress. Front side of the platform of Dhonamath is being restored by providing and fixing of ashlar stones. In Complex II, a collapsed temple was taken up for restoration. After documentation, the bulged and out of plumb portion of the temple was taken out with the help of chainpulley and before its re-erection, a lime concrete base was provided to strengthen the structures. The temple platform was provided with ashlar stones masonry. Broken members are being mended together with stainless steel clamps while missing architectural members are being replaced with the new ones which are being prepared by chiseling and dressing at the site itself.

91. SIVA TEMPLE, BHOJPUR, DISTRICT RAISEN: In continuation of the previous year's work, the temple was restored by providing dressed stones, bracket members and veneering stones at various places. For

restoration of the blind balcony located on the eastern side of the temple, mending of broken beams, brackets and columns with the help of stainless steel rods with epoxy is being carried out. The exposed core portion of the temple has been provided with new matching architectural members. New architectural members of about 2 tons weight has been provided at the missing places on the top left side of the entrance. In addition, stitching of stone members is in progress.

92. Buddhist Stupa, Murelkhurd, District Raisen: The walls of the monastery were conserved and the work of restoring and resetting of stupas were taken up.

93. Ancient Site, Eran, District Sagar: A dwarf wall around the protected limit of the site was partly constructed.

94. Siva Temple, Chandreh, District Sidihi: The out of plumb portion of the temple was restored and the work of resetting the temple platform and providing apron around the monument are in progress.

95. Mouj Mata Temple, Terahi, District Shivpuri: Approach pathway was provided from main entrance to the temple. Besides, surrounding area of the temple was provided stone pavement, after removing the old flag stones. A dwarf compound wall mounted with MS grill was provided around the monument and restoration work of temple platform was taken up during this period.

96. Siva Temple, Mahua, District Shivpuri: To retain the original temple platform, R.R. stone masonry has been provided with lime mortar around the temple. To support the settled temple foundation ashlar stone masonry was provided.

97. Siva Temple, Mahua, District Shivpuri: Pointing of the temple platform was carried out and a staircase with ashlar masonry was provided to the temple. For safety and security of the monument, a boundary wall was constructed around it.

98. Hindola Toran, Gyaraspur, District Vidisha: The work of constructing a boundary wall along with MS grill on all three sides of the complex was taken up during the period under review.

99. Gadarmal Temple, Badoh Pathari, District Vidisha: A boundary wall with MS grill was constructed around the monument.

100. Neelkantheswar Temple, Udaipur, District Vidisha: The work of repairing flooring of the temple was taken up during this period.

101. Udaigiri Caves, Udaigiri, District Vidisha: The work of constructing an interpretation centre is being carried out at the site.

Bhubaneswar Circle

ODISHA

102. Bhringesvara Mahadeva Temple, Bajrakot, District Angul: The approach pathway/apron work of the temple has been completed by way of laying flag sandstones. Structural repair to the temple has been taken up by way of pointing and sealing the

joints with the help of traditional lime mortar.

103. PASCHIMASOMANATHA, BHUBANESVAR AND KAPILESVAR TEMPLES, DISTRICT BOUDH: Conservation work of the monument has been taken up by way of laying the approach pathway and sandstone apron around the minor shrines within the complex.

104. NILAMADHAVA AND SIDDHESVARA TEMPLES, GANDHARADI, DISTRICT BOUDH: In continuation of the previous year's work, structural repair to the common platform of the temple has been taken up by way of pointing and sealing the joints and replacing the decayed stones with new dressed stone blocks and the work is in progress. The pointing work on the temple has been taken up by way of sealing the joint with traditional compact lime mortar. Construction of dwarf wall along with providing M.S. grill is in progress.

105. BARABATI FORT, CUTTACK, DISTRICT CUTTACK: In continuation of the previous year's work, restoration work of the moat wall (inner portion) has been taken up by way of replacing missing stone blocks with new stone blocks. The lighting arrangement on the pathway around the palatial-complex has been completed.

106. EXACAVTED BUDDHIST SITE, LALITAGIRI, DISTRICT CUTTACK: The restoration work of excavated remains (*chaitya*-complex) has been taken up by way of sealing the joints with traditional lime mortar and replacing the decayed brick with new and old available ones. The restoration of the damaged brick work of the monastery is in progress. Raking out the damaged concrete from the roof of the existing sculpture shed is in progress as a watertightening measure.

107. CHANDRASEKHAR JEW TEMPLE, KAPILAS, DISTRICT DHENKANAL: In continuation of the previous year's work on the retaining wall and restoration of damaged, missing sandstone steps leading to the temple is in progress. Construction of guard wall over hill-top with R.R. stone masonry is in progress. The damaged main entrance door and floor stones inside the sanctum have been replaced.

108. KANAKESVARA MAHADEVA TEMPLE, KUALO, DISTRICT DHENKANAL: In continuation of the previous year's work, the restoration of the sunken floor of the main temple and other sub-shrines has been taken up by way of relaying the dressed khondalite stone blocks on a coarse sand cushion and the work is in progress.

109. ANNAKOTESVARA MAHADEVA TEMPLE, LATADEIPUR, DISTRICT DHENKANAL: Laying of khondalite stone apron around the temple has been completed and deep-roots of trees have been removed from the *sikhara* of the temple with due consolidation/resetting the stones as per original.

110. ANANTASAYI VISHNU, SARANG, DISTRICT DHENKANAL: A part of the random rubble stone masonry wall has been provided on the river side of the rock-cut reclining sculpture of Vishnu to protect it from the thrust of flood waters of the river Brahmani.

111. KAPILESVARAMAHADEVA TEMPLE, HATUARI, DISTRICT DHENKANAL:

Construction of random rubble stone masonry retaining wall around the temple, to protect from flood waters, is in progress.

112. ASOKAN ROCK EDICT, JAUGADA, DISTRICT GANJAM: Watertightening the roof of the inscription shed has been completed. Development work at the main entrance of the inscription shed has been completed by way of laying sandstone blocks.

113. MINOR SHRINES, TRILOCHANESVARA TEMPLE COMPLEX, DISTRICT JAJPUR: Restoration work of the minor shrines near the main entrance has been taken up. The vegetation was removed first; all architectural members were documented and taken out very carefully. After completion of dismantling, the resetting of architectural members was attended to and all the stone blocks were refixed at their original locations/positions.

114. EXCAVATED BUDDHIST SITE, RATNAGIRI, DISTRICT JAJPUR: Laying of khondalite stone apron around the Mahakala Temple with other development items is in progress.

115. EXCAVATED BUDDHIST SITE, UDAYAGIRI-2, DISTRICT JAJPUR: Resetting the out-of-plumb excavated brick structures in the shrine-complex has been taken up by way of replacing the decayed brick with new and old available ones with traditional lime mortar as per original. Construction of a shed for keeping architectural fragments is in progress.

116. JAGANNATHA TEMPLE, JAJPUR, DISTRICT JAJPUR: The restoration work of the out-of-plumb *snana mandapa* within the temple-complex has been taken up by way of sealing the joints and replacing the decayed stone members with new ones with traditional lime mortar as per original. Dressing of procured stones for laying stone approach pathway to the *snana mandapa* is in progress.

117. VARAHANATHA TEMPLE, JAJPUR, DISTRICT JAJPUR: The damaged sub-shrine adjacent to the main temple has been taken up for conservation by way of dismantling the structure as per the archaeological norms and resetting the architectural members as per original.

118. KHANDAGIRI AND UDAYAGIRI CAVES, BHUBANESWAR, DISTRICT KHURD: In continuation of the previous year's work, the construction of dwarf wall with matching sandstones in the ticket counter area of Udayagiri has been completed. Visitors' amenities like construction of a pump house and a shed for water cooler has been completed. Watertightening work on the roofs of Cave 1 and 2 has been taken up by way of pointing and sealing the joints with traditional lime mortar. The structural conservation work of the apsidal *chaityagriha* has been taken up by way of pointing and sealing the joints with traditional combined lime mortar and the work has been completed. Recess pointing on the ancient ramp leading to the Hathigumpha is in progress.

119. LINGARAJA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The Anantesvara Temple, adjacent to the main temple, has been taken up for conservation by way of consolidating and restoring the plinth portion with the help of collected architectural laterite blocks as per original.

The conservation work of a miniature shrine behind the Ganesa Temple (right side of the main entrance) and north of the Lingaraja Temple has been completed by way of pointing and sealing the joint with traditional lime mortar. The work is in progress.

120. RAMESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: In continuation of the earlier work, restoration of retaining wall to the west side of the tank has been completed. Construction of *rosaghara* has also been completed.

121. MARKANDESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The restoration work of the compound wall has been taken up; missing portions have been recreated as per original. The damaged and sunken floor of the temple was also repaired and the surrounding area has been made presentable.

122. BAKRESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The structural repair of the temple has been taken up by way of pointing and sealing the joints with traditional mortar. Boundary wall on the front side has been completed.

123. MARKANDESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The watertightening work of the temple has been completed by way of pointing and sealing the joints with the help of traditional combined lime mortar to prevent seepage of water.

124. RAJARANI TEMPLE, BHUBANESWAR, DISTRICT KHURDA: Sandstone flooring work on the east side of the temple has been completed along with pointing with traditional lime mortar.

125. CHAUSATH YOGINI TEMPLE, HIRAPUR, DISTRICT KHURDA: New Cultural and protection notice board for the site have been provided.

126. JAMBESVARA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: Repair to the *nata-mandapa* was taken up by way of replacing the decayed and missing architectural members with new ones with traditional combined lime mortar. The work has been completed. Pointing work on the south side of main temple and the *antarala* has been completed.

127. ANANTAVASUDEVA TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The conservation work of the damaged courtyard was taken up by raking out the decayed stone blocks and relaying it with new and available good ones with combined traditional lime mortar. Pointing work on the *prakara* wall with traditional lime mortar is in progress.

128. ANCIENT SITE, SISUPALGARH, BHUBANESWAR, DISTRICT KHURDA: In continuation of the earlier work, structural repair on the western entrance gateway has been taken up by way of pointing, sealing thejoints and replacing the decayed stone members with traditional lime mortar and completed.

129. ANCIENT SITE, HARIPURGARH, DISTRICT MAYURBHANJ: Providing brick apron around the Rasikraya Temple and watertightening its roof has been completed with the help of traditional combined lime mortar. Restoration and consolidation of the

excavated structures within the complex are in progress with the help of special size brick tiles and traditional mortar.

130. SRI JAGANNATHA TEMPLE, PURI, DISTRICT PURI: In continuation of the previous year's work providing khondalite stone flooring in north-west corner of the temple is in progress. The repair work on the *kurmibedha* by way of sealing the stone joints, replacing of missing / damaged stone members with due grouting with traditional combined lime mortar has been completed. The structural conservation works of the Uttarayani, Ramachandra, Ganesa, Bata Jagannatha, Navagraha and Nrisimha Temples, located at Baisi Pahacha, have been completed by way of plastering, pointing and sealing the joints with traditional combined lime mortar. Restoration work of the Kshetrapala shrine is in progress after necessary documentation. Repair to the *garbhagriha* was taken up during the Ratha *yatra* from July 4 to 14, 2008, when the presiding deities were shifted to the Srigundicha Temple. As per the recommendation of the Technical Expert Committee and the Temple Administration, the conservation measures such as:strengthening the abacus of the *Garudasthambha* inside the *jagamohana* by providing bronze band; pointing on the floor and interior wall of the *bhoga-mandapa* with combined lime mortar; replacement of damaged stones of the sunken floor inside the *simhadwara*; replacement of five Naraj-rings on the *Ratnasimhasana*; repair and replacement of the wooden beams with M.S. *jali* on the ceiling above the *kanakamundi* of the *garbhagriha*; replacement of supported rusted M.S. scaffolding pipes on the first floor and the mezzanine floor along with painting the pipes using anti-corrosive paint; fixing of tell-tale glass on the visible cracks on the stone in the first floor of the *garbhagriha* and exterior wall of the south-west corner of the *jagamohana*; cleaning the outlet of the *garbhagriha*; underpinning stone work on the north wall of the mezzanine floor of the *garbhagriha*; mezzanine floor ceiling iron beams to be supported from the bottom through wooden rafter and M.S. scaffolding pipe have been attended.

131. SUN TEMPLE, KONARK, DISTRICT PURI: The structural conservation work in the kitchen area has been completed by way of replacing the decayed laterite/khondalite stone blocks with new ones, pointing and sealing the wide joints as watertightening measures. Repair to the sunken platform within the complex is in progress. Stone edging work around the *nata-mandapa* and the *jagamohana* has been completed. Khondalite stone pavement work has been completed on the west side and the work is in progress on the south side of the temple. Consolidating the *pidhas* on the south/west corner side of the *jagamohana* is in progress. Brass railing has been fixed in the south and the north sides of the *jagamohana*.

CHANDIGARH CIRCLE

HARYANA

132. KOS MINAR, SIKRI, DISTRICT FARIDABAD: The platform and the octagonal surface of the Kos Minar have been restored by underpinning and plastering. Patchwork has been done on the outer surface.

133. MASONRY TANK, SURAJKUND, DISTRICT FARIDABAD: Stone casing has been provided on the steps. The apron of the platform is being restored by pointing. R. R. stone work is in progress. Steps of the *kund* are being restored by pointing and random rubble stone masonry.

134. SHEESH MAHAL, FAROOQ NAGAR, DISTRICT GURGAON: The pointing work is in progress. Some of the floors have been provided and brick-on-edge around the gateway is in progress.

135. PRITHVIRAJ CHAUHAN'S FORT, HANSI, DISTRICT HISSAR: The southern fortification wall of the ruined *qila* is being conserved by matching brick masonry in lime-*surkhi* mortar. The removal of fallen debris and earthwork excavation of the foundation of the fortification wall (south-west side) are in progress. Construction of grill fencing over a dwarf wall in brick masonry after removing temporary encroachment is in progress.

136. FEROZSHAH'S PALACE AND *TEHKHANA*, HISSAR, DISTRICT HISSAR: The conservation work of the eastern fortification wall of the fort has been taken up by underpinning of stone masonry and apron has been provided around it. The floor is being restored by laying of lime concrete mortar. The work is in progress.

137. ANCIENT BRICK TEMPLES INCLUDING PRACHIN SIVALAYA, KALAYAT, DISTRICT KAITHAL: The southern wall of the *ghat* is being restored after removing fallen, collapsed masonry wall by strengthening the foundation. Providing apron around the monument is in progress.

138. NABHA HOUSE, KURUKSHETRA, DISTRICT KURUKSHETRA: Loose and bulged-out *lakhauri* brick masonry and the modern brick wall have been removed from the southern side for restoration of the same as per original with lime-*surkhi* mortar.

139. ANCENT SITE KNOWN AS HARSH-KA-TILA AND ARCHAEOLOGICAL REMAINS, THANESAR, DISTRICT KURUKSHETRA: Restoration of tile brick masonry of the boundary wall has been carried out for protection of the structure. Restoration of the excavated trenches has been completed.

140. JAL MAHAL AND ADJACENT LAND NARNAUL, DISTRICT MAHENDRAGARH: The pillars of the Mughal bridge leading to the Jal Mahal are being strengthened by way of providing R.R. masonry in lime-*surkhi* mortar after stabilizing its foundation. The work of providing pathway in R.R. masonry, inside the monument, is now in progress.

141. KOS MINARS 16 AND 17, GADHPURI, DISTRICT PALWAL: A dwarf wall has been provided around *Kos Minar*.

142. KOS MINAR, KHUSROPUR, DISTRICT PALWAL: Restorations of the damaged platform and the octagonal surface were done by underpinning and pointing.

143. KOS MINAR, AURANGABAD, DISTRICT PALWAL: The platform has been restored by underpinning. Plastering has been done on the surface.

144. IBRAHIM LODI'S TOMB, PANIPAT, DISTRICT PANIPAT: Damaged portion of the platform has been restored as per original after removing the old and decayed plaster.

145. KABULI BAGH MOSQUE, PANIPAT, DISTRICT PANIPAT: Restoration of the tile brick masonry of the inner face of the boundary wall has been completed.

146. KOS MINAR, TARAF AFGHAN, PANIPAT, DISTRICT PANIPAT: Damaged portion of the *Kos Minar* has been removed and replastered as per original.

147. OBELISK COMMEMORATING THE THIRD BATTLE OF PANIPAT (KALA AAMB), PANIPAT, DISTRICT PANIPAT: Repairing of the exhibition hall, peripheral grill painting, photographs and frames, etc. are now in progress.

148. SHAHJAHAN-KI-BAOLI, MEHAM, DISTRICT ROHTAK: The southern and northern sides of the *baoli* have been restored by laying lime-*surkhi* after leveling and dressing.

149. ANICIENT SITE KNOWN AS KHOKHARAKOT, ROHTAK, DISTRICT ROHTAK: About four hundred and fifty R.C.C. pillar (demarcation) posts have been provided in the vacant pocket of the site in order to check further encroachment.

150. TOMB OF KHWAZA KHIZR, SONIPAT, DISTRICT SONIPAT: Loose and bulged-out masonry of the front wall has been taken out and the same has been restored as per original.

PUNJAB

151. RAM BAGH GATE (*DEORHI*), COMPANY BAGH-COMPLEX, AMRITSAR, DISTRICT AMRITSAR: Dressed red stone flooring has been provided in the *deorhi*. Brick/tile flooring has been provided on the roof. Restoration work of watch towers, *chhatris* and *jalis* of the Baradari are now in progress. Grills around the Baradari have been painted, its lawns have been dressed and leveled and a pathway has been provided with tile flooring.

Decayed and loose masonry along with the modern plaster and brick masonry have been taken out from the watch towers and restored with brick tile masonry and plastered in lime-*surkhi* mortar as per original. Besides plinth protection, removal of debris, fixing of wooden doors have almost been completed. Painting of the grills, leveling and dressing of the lawns of the *Baradari* have been completed. Tile flooring has been provided on the pathway.

152. OLD SARAI (AKBAR OR JAHANGIR), OLD DELHI-LAHORE ROAD, AMANAT KHAN, DISTRICT AMRITSAR: Debris has been removed from the cells of the western gateway. Cells and walls of the western gate have been restored. Grill doors have been provided on the western gate. The staircase and walls of the mosque have been strengthened by pointing and the gateway has been plastered after removing loose plaster.

153. BHATINDA FORT, BHATINDA, DISTRICT BHATINDA: The work of underpinning and restoration of brick masonry of the ancient structure, i.e., the fortification wall, pointing, tile brick-on-edge and brick terracing have been completed. The work of cutting, uprooting of trees and vegetation clearance from the inner fortification wall has been taken up and is in progress. The work of vegetation clearance at the main

entrance gate has been taken up and is in progress.

154. OLD SARAI (AKBAR OR JAHANGIR), OLD DELHI-LAHORE ROAD, FATEHABAD, DISTRICT TARAN TARAN: The eastern gateway of the *sarai* has been restored by edging, pointing, etc.

155. ANARKALI BARADARI, BATALA, DISTRICT GURDASPUR: The work of restoration of missing *lakhauri* brick masonry of the ancient structure i.e., steps and *ghats* of the Anarkali Tank, their pointing, concreting and tile brick-on-edge have been completed.

156. NUR MAHAL SARAI, DISTRICT JALANDHAR: The work of restoration of damaged, disintegrated and missing *lakhauri* brick masonry in the first floor of the Rang Mahal has been completed. The work of pointing, concreting, tile brick flooring and tile brick edge flooring has been completed. The work of brick masonry of south side cell, apron wall, tile brick masonry, tile brick-on-edge and tile brick masonry, tile brick-on-edge and tile brick terracing have been completed.

157. TOMBS OF MOHAMMAD MOMIN AND HAJI JAMAL, NAKODAR, DISTRICT JALANDHAR: The work of underpinning and restoration of *lakhauri* brick masonry, lime concreting, restoration of plinth with specially made octagonal/square tiles in Mohammad Momin Tomb as well as pointing on pathways and plastering work in the Haji Jamal Tomb have been completed.

158. DAKHNI SARAI, DAKHNI, DISTRICT JALANDHA: The work of *lakhauri* brick masonry, tile brick masonry, tile brick-on-edge and tile brick terracing have been completed. The work of taking out old and sunken broken terrace from the northern cells has been taken up and is in progress. The work of taking out decayed brick masonry from the outer fortification wall has been taken up and is in progress.

159. ANCIENT SITE, SUNET, DISTRICT LUDHIANA: The work of earthwork excavation for the foundation of the boundary wall for grill fencing of the area has been taken up and is in progress.

160. MAIN ENTRANCE GATE, PATIALA, DISTRICT PATIALA: The work of restoration of missing brick masonry on the second floor of the main entrance gate (*chhatri's* inner side), fixing of wooden scantlings, concreting of the brick paving, restoration of decorative plaster have been taken up under civil deposit work and are in progress.

161. NALAGARH KOTHI, ROPAR, DISTRICT ROPAR: Water storage tank and P.V.C. pipelines have been provided at the top of the kothi. Provision for retaining wall of tile brick masonry in trenches have been made along with the extension of the platform and laying of lime cement concrete, pointing and providing of apron.

162. ANCIENT BUDDHIST STUPA SITE, SANGHOL, DISTRICT FATEHGARH SAHIB: The work of earthwork excavation for the foundation of the boundary wall for grill fencing of the area has been taken up and is in progress.

CHENNAI CIRCLE

TAMIL NADU

163. CLIVE'S BUILDING, FORT ST. GEORGE, DISTRICT CHENNAI: Conserving the terrace of the first floor (eastern side) by removing the dead weathering course and conserving the damaged skylight windows of Clive's Building have been done. The work of re-construction of the fallen portion of the fortification wall on the north-east corner has been completed. The work of providing fencing on the northeastern side of the fort has been completed. The work of giving a facelift by painting the exterior of the museum and landscaping in front of the museum has been completed. The bell tower of the church has been given an exterior coat of paint and the old clock on the tower has been repaired. The work of removing old damaged plaster from the side walls and plastering the big ware house has been completed.

164. ROCK-CUT SIVA TEMPLE, KUNNANDARKOIL, DISTRICT PUDUKKOTTAI: The work of mending the weathered portion of the brick *tirumadil* on the southern side and the stucco figures of the *vimana* has been completed.

165. SIKKANATHASVAMI TEMPLE, KUDUMIANMALAI, DISTRICT PUDUKKOTTAI: The terrace of the thousand-pillared *mandapa* in the northern and southern sides has been watertightened. The undulated stone flooring of the *mandapa* in the southern side has been reset as per the original.

166. ROCK-CUT SIVA TEMPLE, NARTAMALAI, DISTRICT PUDUKKOTTAI: The roof of the southern and eastern sides of the cloister mandapa has been watertightened and the original base of the *prakara* wall on the southern side has been exposed.

167. UTHAMADANESVARA TEMPLE KEELATHANAYIAM, DISTRICT PUDUKKOTTAI: The roofs of the *garbhagriha* and the Murugan shrine have been watertightened. The work of conserving the Amman shrine has been completed and the work of conserving the *prakara* wall on the eastern, northern and southern sides has been completed.

168. SIVA TEMPLE, AMMANKURICHI, PUDUKKOTTAI: The roof of the *maha-mandapa* has been watertightened. The revetment wall of the tank on the northern side has been strengthened and pointing the old stone flooring in front of the main shrine and in the *mukha-mandapa* has been completed.

169. STONE AND BRICK FORT, TIRUMAYAM, DISTRICT PUDUKKOTTAI: The work of reconstruction of the fallen fortification wall on the southern side gateway near the *mandapa* has been completed. The brick merlons have been strengthened.

170. ROCK-CUT CAVES, NARASAMANGALAM, DISTRICT TIRVANNAMALAI: The work of providing fencing to the protected area on the eastern side has been completed. The pathway and stone steps leading to the caves have been conserved. The cracks on the top of the caves have been filled with suitable mortar.

171. MEGALITHIC CISTS AND CAIRNS, SANUR, DISTRICT KANCHIPURAM: The eastern side of the protected area has been fenced.

172. VENKATESAPERUMAL TEMPLE, THIRUMUKKUDAL, DISTRICT KANCHIPURAM: The roofs of the front *mandapa* and *madapalli* have been watertightened. The work of providing apron around the main shrine and the sub-shrine flooring has been done. The work of strengthening the *prakara* wall has been completed.

173. BRIHADISVARA TEMPLE, THANJAVUR, DISTRICT THANJAVUR: The work of resetting the out-of-plumb structural members of the northern cloister after strengthening the foundation and mending of the *adhishthana* mouldings of the *maha-mandapa* has been completed.

174. SCHWARTZ CHURCH, THANJAVUR, DISTRICT THANJAVUR: After the strengthening of abutment of the arch and watertightening the terrace, the work of replastering the damaged outer surface of the vaulted roof of the church has been completed.

175. APATHSAHAYESWARA TEMPLE, SENDAMANGALAM, DISTRICT VILLUPURAM: The work of conserving the cloister *mandapa adhishthana* moulding on the southern and western sides of the corridor and the *prakara* wall has been completed.

176. FORT GINGEE, GINGEE, DISTRICT VILLUPURAM: The work of conserving the fort wall on the eastern side of the Rajagiri Fort has been completed. The work of fencing the protected area on the southern and eastern sides of the Siva Temple inside Fort and providing low level fencing in between the third and the fourth entrances of the eastern gate have been completed.

177. SADAD-ULLAH-KHAN MOSQUE SIRUKADAMBUR, DISTRICT VILLUPURAM: The stone steps leading to the hill top on the northern side have been strengthened. The wall surface of the inner side of the prayer hall of the mosque has been replastered after removing the damaged plaster.

178. SADAD-ULLAH-KHAN MOSQUE, FORT GINGEE, GINGEE, DISTRICT VILLUPURAM: The work of fencing the protected area has been completed.

179. RUINED DUTCH FORT AND CEMETERY, SADRAS, DISTRICT KANCHIPURAM: Fencing the southern side of the fort has been completed. The work of conserving the brick fortification wall by underpinning and watertightening on the southern side of the fort has been completed.

180. SHORE TEMPLE, MAMALLAPURAM, DISTRICT KANCHIPURAM: The work of relaying the stone pavement by removing damaged stone on the pathway leading to the Shore Temple has been completed. The monument has been provided with flood lights.

181. FIVE RATHAS, MAMALLAPURAM, DISTRICT KANCHIPURAM: Fencing on the western and northwestern sides has been provided to the protected area. Flood lights have been provided in the monument.

182. MEGALITHIC CISTS AND CAIRNS, TIRUPORUR, DISTRICT KANCHIPURAM: The work of fencing the protected area is in progress.

183. ROCK, SCULPTURES AND CAVES, VILAPPAKKAM, DISTRICT VELLORE: The work of providing fencing to the protected area has been completed.

184. FORT, VELLORE, DISTRICT VELLORE: The conservation of the lower moat wall on the northern side has been completed. In the State Museum building located inside the fort, the decayed plaster of the walls has been removed and replastered and the roof has been watertightened.

185. NITISWARASWAMY TEMPLE, SRIMUSHNAM, DISTRICT CUDDALORE: The work conserving the brick floor and the vaulted roof has been completed.

186. BRAHMAPURISVARA TEMPLE, BRAHMADESAM, DISTRICT VILLUPURAM: The work of conserving the *mukha-mandapa* of the main shrine has been completed. The laying of stone flooring around the main shrine has been completed.

187. PATALESVARA TEMPLE, BRAHMADESAM, DISTRICT VILLUPURAM: The work of conserving the *patasala-mandapa* after strengthening the foundation has been completed. The original base of the *prakara* wall, *mahadwara* and the Amman shrine has been exposed.

188. HILL FORT, NAMAKKAL, DISTRICT NAMAKKAL: The dead plaster over the fortification has been removed and replastered after pointing the stone joints.

189. NARASIMHASWAMI TEMPLE, NAMAKKAL, DISTRICT NAMAKKAL: The work of conserving the *mandapa* of the Amman shrine has been completed. The work of pointing the joints of the *vahana-mandapa* and the *prakara* wall on the southern side of the main shrine has been completed.

190. FORT AND TEMPLE ON THE HILL, SANKARI, CHINNAKAVANDANUR, DISTRICT SALEM: Watertightening the top portion of the bastion on the southern side of the main shrine has been completed. The work of conservation of the fort wall and the temple tank revetment wall has been completed. The original base portion of the Veerabhadra shrine has been exposed. The undulated stone flooring has been conserved as per original.

191. SRI SUGRISWARA TEMPLE, SIRCARPERIYAPALAYAM, DISTRICT SALEM: The stone revetment wall around the temple tank has been strengthened. The work of laying stone flooring around the Nandi-*mandapa* and providing of proper drainage for the *abhisheka* water have been completed. The work of providing fencing to the protected area in the northern and eastern sides has been completed.

DEHRADUN CIRCLE

UTTRAKHAND

192. GROUP OF TEMPLES, BAJINATH, DISTRICT BAGESHWAR: Dismantling and re-setting of the out of plumb, damaged and weathered veneering stones of three shrines near the main shrine of the complex have been restored as per original, after strengthening the foundation. All rusted iron dowels were also replaced by copper. The work of re-setting of out of plumb *mandapa* near main shrine is completed as

per original after strengthening the foundation.

193. SUN TEMPLE KATARMAL, DISTRICT ALMORA: Four miniature shrines have been dismantled and re-erected as per the original with combination of traditional mortor. Old damaged stones and iron dowels were replaced with new stones and copper.

194. JAGESHWAR TEMPLE PHULAI GUNTH, DISTRICT ALMORA: Three miniature shrines near *Pushti Devi* temple were dismantled after proper documentation and as per original with combination traditional mortar. Old damaged stones and iron dowels were replaced with new stones and copper dowels respectively.

195. DANDESHWAR TEMPLE (KOTULI AND CHANDHOK GUNTH), JAGESHWAR, DISTRICT ALMORA: Dwarf wall of ashlar stone masonry with cast iron ornamented panels and stone pillars in between grill panels in fine chiseled dressed stone block to the front side of the compound is completed. Cast iron gate of double leaf ornamental design along with pillars has been provided.

196. BADRINATH GROUP OF TEMPLE, DWARAHAT, DISTRICT ALMORA: Renovation of store has been done and converted into Sculpture Shed with properly displayed sculptures.

197. BRITISH CEMETERY, ROORKEE, DISTRICT HARIDWAR: The detached head stones, cross and cenotaphs of different materials of the graves especially those on left side of the inner compound have been restored with combination of materials as per original, after providing apron around each grave. The pointing work of the boundary wall with white pigment matching as per the British design has been completed. Chain-fencing has been provided on either side of the inner pathway leading from the entrance to the other end. Work of construction of the fallen walls of cemetery compartments is completed. Extension of compartment dwarf wall with MS railing is also completed.

198. KALINGA MONUMENT, DISTRICT DEHRADUN: Dwarf wall with M.S. Railing has been provided to the eastern and western sides of the compound as well as to the terrace garden of the lower compound. A low height retaining wall has been provided towards back-side just behind the memorial to give further support to the upper retaining wall.

199. RUDRANATH TEMPLE (GOPESHWAR), DISTRICT CHAMOLI: Open joints of the *sikhara* have been stitched in combination of materials matching with the original. The pointing and watertightening with composite mortar have been taken wherever necessary. The reparing of *mandapa* walls and roof is in progress.

200. SIVA TEMPLE, LAKHAMANDAL, DISTRICT DEHRADUN: The construction of retaining wall towards hill side is in progress. The rusted gates of the compound have been replaced by cast iron gate of double leaf in ornamented designs. A (Fiber Reinforcement Plastic) toilet block was also provided outside the temple complex for the tourists and pilgrims.

201. THE INSCRIBED ROCK EDICT OF ASOKA (KALSI), DISTRICT DEHRADUN: The C.R. stone masonry dwarf wall with railing

towards Amla road side has been completed up to the end of protected limit of the site. The badly damaged boundary wall of slope towards village side has been provided with new dwarf wall with M.S. railing as per existing design. Fallen portion of the retaining wall of the inner compound towards hill side has been restored with the combination of matching materials. The work of second retaining wall in approach lane has been completed.

202. Old Temple Sacred at Sitavani, Ramnagar, District Nainital: The repairs to the verandah of subsidiary shrine of Sitavani temple is in progress. Paving of stone work in forecourt of the temple is in progress. The work of paving in front of water spring and construction of retaining wall has been completed.

203. Temple Sacred to Mahasu, Hanol, District Dehradun: The rotten wooden beams and rafters of *kothar* have been replaced by new one as per the original. The dilapidated basement of *kothar* has been fully dismantled, re-set and strengthened. The work of retaining wall on road side of staff quarter is in progress.

204. Excavated Site, Govishana, Kashipur, District Udham Singh Nagar: Dwarf wall with M.S. railing has been provided towards Drona Sagar (water tank) and some part of north-eastern side M.S. round bar grill has been also provided just behind the Tatambari Baba Temple complex besides two staircases on either side of the wall for the convenience of visitors. The brick paved pathway has been provided by the side of Tatambari temple complex.

Dharwad Circle

KARNATAKA

205. Durga Temple, Aihole, District Bagalkot : The out-of-plumb and sunken area of the fortification wall has been carefully dismantled after proper documentation. Re-construction with available materials and providing new dressed stone members wherever damaged and missing with a suitable binding material to the core filing including consolidation of the same has also been done.

206. Tarabasappa Temple, Aihole, District Bagalkot: A compound wall has been constructed on the southern and western sides with sandstone slabs cladding to prevent encroachment as well as to develop the environs. The foundation of the temple has been strengthened and fixing the dressing stone so as to match as per the original.

207. Jyotirlinga Temple, Aihole District Bagalkot: The ancient tank has been desalted and the useful materials have been stacked for re-use. The out-of-plumb/disturbed stone members have been removed after proper documentation. Re-constructing with available stone members and providing dressed stones wherever missing including filing the core with the suitable materials have been done.

208. Basavannaor Arali Basappa Temple, Aihole, District Bagalkot: The dislodged and out-of-plumb portions of the structures i.e., roof slabs, lintel, capitals and pillars door-jamb have been removed after proper documentation. Re-setting the

same by using old stone members and replacing by new dressed stone wherever required including strengthening the foundation with suitable materials have been done.

209. VENIYAR GUDI, AIHOLE, DISTRICT BAGALKOT: The undulated area has been excavated and the unwanted stuff has been deposed. Leveling for developing the environs have been taken up. Necessary grills have been provided on the compound wall to prevent the misuse of the area.

210. MALAGITTI SIVALAYA, BADAMI, DISTRICT BAGALKOT: The breached fortification wall has been re-constructed with the available material including providing dressed new stone wherever missing and providing core filling to the fortification.

211. TARKASH MAHAL, BIDAR, DISTRICT BIDAR: The dead plaster has been raked out from the interior surface of the wall and fresh lime plaster has been provided. Relaying the stone flooring and providing new stones wherever necessary or missing so as to match as per the original have been done. M.S. grill with mesh has been provided to the monument as a safety measure.

212. GAGAN MAHAL, BIDAR, DISTRICT BIDAR: The dead plaster has been raked out from the interior surface of the wall and fresh lime plaster has been provided to the wall as per the original (pls. 134-135).

213. TAKHAT MAHAL, BIDAR, DISTRICT BIDAR: Providing and laying P.C.C. bed to the compound wall has been completed (pls. 136-137).

214. AINUL MULK TOMB, AINAPUR, DISTRICT BIJAPUR: A compound wall with U.C.R. trap stone has been provided to prevent encroachment or trespassing by the locals (pls. 138-139).

215. JAHAN BEGAM'S TOMB, AINAPUR, DISTRIC BIJAPUR: The disturbed compound wall has been dismantled, the material has been stacked and the unwanted stuff has been disposed. The compound wall has been reconstructed with suitable binding materials by using old and new trap stone including fixing the grill over it (pls. 140-141).

216. GOL-GUMBAZ, BIJAPUR, DISTRICT BIJAPUR : M.S. grill has been fixed over the compound wall as a safety measure. M.S. grill has been provided to the *dalan* for closing the open arch in order to prevent vandalism.

217. IBRAHIM RAUZA, BIJAPUR, DISTRICT BIJAPUR: The disturbed or damaged compound wall has been dismantled and the useful material has been stacked for re-use. The damaged M.S. grill has been mended and fixed over the compound wall as a safety measure.

218. JOD GUMBAZ, BIJAPUR, DISTRICT BIJAPUR: The damaged or decayed wooden windows have been removed and the same have been refixed with new and old wooden members including providing mesh, colouring, etc. The cattle trap has been fixed after providing suitable wall on either side to prevent the entry of animals.

219. MAHADEVA TEMPLE, ITTAGI, DISTRICT KOPPAL: The bulged tank wall has been dismantled and re-constructed and

Plate 134-135



134



135

Gagan Mahal, before and after conservation, Bidar.

Plate 136-137



136



137

Takhat Mahal, before and after repairs, Bidar.

Plate 138-139



138



139

Ain-ul-Mulk Tomb, before and after conservation, Ainapur.

Plate 140-141



140



141

Jehan Begam's Tomb, before and after conservation, Ainapur.

dressed stone blocks have been provided for the missing steps as per the original.

Providing and re-constructing with new dressed stone blocks in place of damaged capitals, broken pillars and beams for the portion of the *mandapa* including strengthening the *sikhara* with dressed stone blocks of the sub-shrines have been done.

220. ANCIENT WELL, ITTAGI, DISTRICT KOPPAL: Dressed granite stone blocks have been provided to the missing portion of the ancient well (pls. 142-143).

221. GROUP OF MONUMENTS, LAKKUNDI, DISTRICT GADAG: The disturbed and damaged compound wall built in random rubble has been removed and the useful material has been stacked. The compound wall has been re-constructed with available material by using fresh binding material and providing cladding with dressed stone slabs on the exterior and interior so as to match with the monument, including fixing M.S. iron grills over the compound wall as a safety measure.

222. DODDA-BASAPPA TEMPLE, DAMBAL, DISTRICT GADAG: Dressed schist stone blocks have been provided and fixed with suitable moulding and carving as per the original, to the missing portion of the Nandi-*mandapa*. New stone flooring has been provided wherever missing.

223. BASAVANNA TEMPLE, TAMBUR, DISTRICT DHARWAD: The disturbed and damaged compound wall built in random rubble has been removed and the useful material has been stacked. It has been re-constructed with available material by using fresh binding material and providing cladding with dressed stone slabs on the exterior and the interior so as to match with the monument including fixing M.S. iron grills as a safety measure.

224. BANASHANKARI-DEVI TEMPLE, AMARGOL, DISTRICT DHARWAD: The random rubble wall built around the exterior surface of the temple has been dismantled and dressed stone has been provided with simple moldings and offsets as per the original including filling the core with suitable material.

225. EXCAVATED SITE, KANGANAHALLI, DISTRICT GULBARGA: The vegetation all around the stupa site has been carefully removed and the area has been leveled for draining out rain-water from the stupa. The Asokan inscription has been erected after mending the same.

226. GALGESHWARA TEMPLE, GALAGANATHA, DISTRICT HAVERI: The dislodged portion of the sub-shrine has been dismantled carefully after documentation. The same has been re-constructed by using old stone blocks and providing new dressed schist stone blocks, wherever missing after strengthening the foundation with suitable material.

227. SOMESWARA TEMPLE, HARLAHALLI, DISTRICT HAVERI: The disturbed sub-shrine has been dismantled carefully after documentation. The dismantled portion of the sub-shrine has been re-constructed by using old stone masonry with fresh binding material including providing suitable foundation, etc. (pls. 144-145).

228. KALMESHWARA TEMPLE, BALAMBEEDU DISTRICT HAVERI: Dressed granite stone

Plate 142-143



142



143

Ancient well, before and after repairs, Ittagi.

Plate 144-145



144



145

Someswar Temple, before and after conservation, Harlahalli.

slabs have been laid all around the monument.

229. TARKESWARA TEMPLE, HANGAL, DISTRICT HAVERI: The damaged portion of the *mandapa* roof has been carefully removed after documentation and the same has been re-set as per the original. New dressed schist stone blocks have been provided to the outer veneering of the main *mandapa*, wherever necessary.

230. SIDDESHWARA TEMPLE, HAVERI, DISTRICT HAVERI: The fallen portion of the compound wall has been removed and the same has been stacked. It has been re-constructed by using old material with new binding material including providing cladding schist-stone slabs over it.

231. MUKTESHWAR TEMPLE, CHAUDADANAPUR, DISTRICT HAVERI: The damaged compound wall has been removed and the useful material has been stacked. The undulated area on the eastern side of the monument has been leveled and the unwanted stuff has been disposed.

232. MADHUKESHWAR TEMPLE, BANAVASI, DISTRICT UTTARA-KANNADA: The compound wall has been re-constructed with laterite blocks and M.S. iron grill has been provided over it as a safety measure.

233. FORT AT MIRJAN, DISTRICT UTTARA-KANNADA: The terrestrial platform has been dismantled and restored by using dressed laterite blocks, wherever missing. The fallen areas of the inner and outer fortification wall have been dressed with laterite blocks and suitable binding material. The debris has been removed by excavation and the plan of the entrance has been exposed.

234. ANCIENT SITE, GUDNAPUR, DISTRICT UTTARA-KANNADA: The compound wall has been constructed in laterite blocks with suitable binding material to prevent encroachment into the protected area.

GUWAHATI CIRCLE

ASSAM

235. ANCIENT TOMB, JOGIGOPHA, DISTRICT BONGAIGAON: Scientific clearance of the site has been carried out and P.C.C. work over the surface of the approach pathway is in progress.

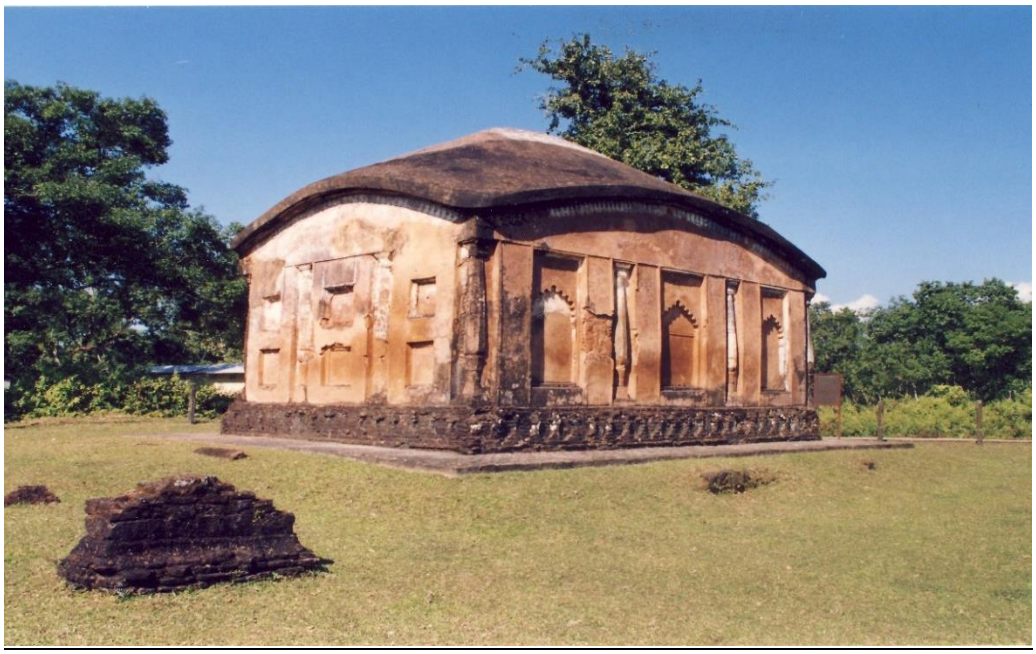
236. IDGAH, RANGAMATI HILL, DISTRICT DHUBRI: Lime concrete work of the courtyard is in progress.

237. CACHARI RUINS, KHASPUR, DISTRICT CACHAR: Watertightening of the temple of Ranachandi (locally known as Vishnu Temple) after removing the dead plaster and reproduction of ornamental work as per original (pls. 146-147), watertightening and plastering of one of the small temples, construction of approach pathway and re-construction of ancient wall with special size bricks, have been completed.

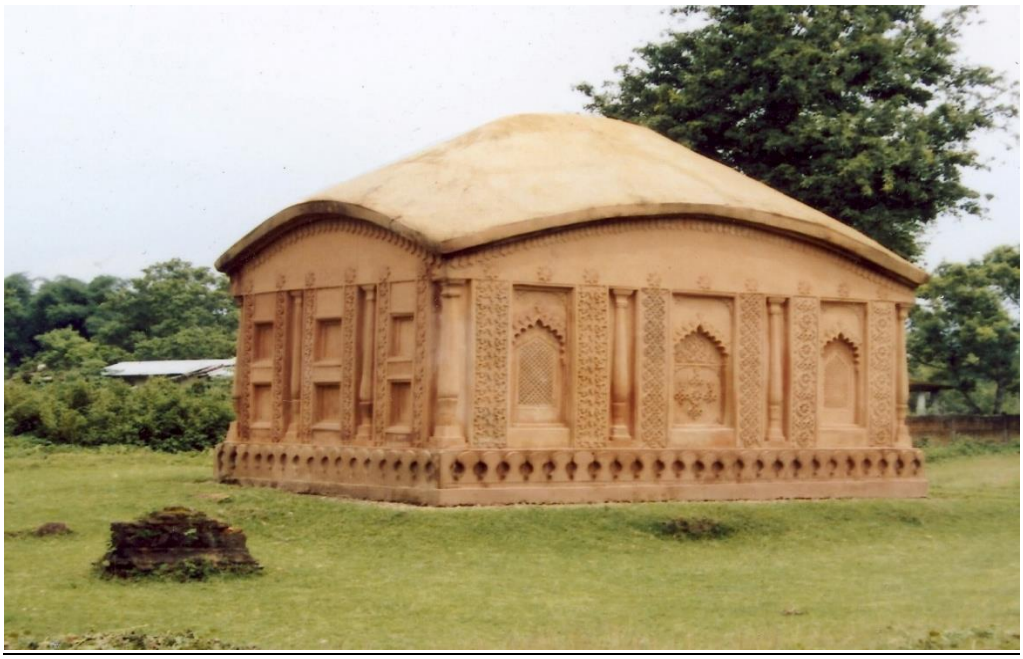
238. DEVIDOL, GAURISAGAR, DISTRICT SIVSAGAR: Raising the height of the ancient boundary wall as well as construction of a toilet block for the visitors are in progress.

239. SIVADOL, GAURISAGAR, DISTRICT SIVSAGAR: Lime-*surkhi* plastering of both inside and outside walls of the *mukha-mandapa* after removing the old, decayed plaster has been completed. Re-flooring with brick-jelly concrete of the same is in progress.

Plate 146-147



146



147

Vishnu Temple, Chachri ruins, before and after conservation, Khaspur.

240. GROUP OF FOUR *MAIDAMS*, CHARAIDEO, DISTRICT SIVSAGAR: Construction of dwarf wall on one side of the excavated *maidam* has been completed and construction on the other side is in progress. Repairing of the toilet block and construction of approach pathway to it has been completed.

241. GURHGAON RAJA'S PALACE (AHOM RAJA'S PALACE), GURHGAON, DISTRICT SIVSAGAR: Flooring of the monument with brick-jelly after raking out the damaged floor, lime-*surkhi* plastering, re-laying of damaged brick-on-edge apron around the monument and pointing of the brick pathway have been completed. Conservation of the staircase was also attended. Construction of a toilet block for the visitors has been completed and water connectivity. Work is in progress.

242. KARENGGHAR OF THE AHOM KINGS, TALATALGHAR, DISTRICT SIVSAGAR: Vegetation clearance of the site has been carried out. Removal of damaged concrete floor has been completed and re-flooring of the same is in progress (pls. 148-149). Lime-*surkhi* plastering of the rear wall of the right wing of the monument has been completed. Construction of remaining portion of the drain all around the monument, to drain out rainwater, has been completed. Construction of verandah in the newly-constructed toilet block for the visitors has been completed.

243. RANGGHAR RUINS, JOYSAGAR, DISTRICT SIVSAGAR: Re-laying of brick-jelly flooring on the ground and first floors and new brick-on-edge apron after raking out the damaged concrete floor and removing the old apron have been completed. Construction of toilet block for the visitors has been completed and water connectivity work is in progress.

244. VISHNUDOL, JOYSAGAR, DISTRICT SIVSAGAR: Pointing of approach pathway and apron after raking out the old one all around the monument has been completed. Re-flooring with brick-jelly concrete of the *garbhagriha* is in progress.

245. SIVADOL, SIVSAGAR, DISTRICT SIVSAGAR: Pointing and sealing of the joints of the stone masonry of the main temple, pointing of the brick-on-edge apron around the monument and painting of the roof truss of the *mandapa* of the main temple have been completed. Repairing of the ancient boundary wall is in progress.

246. DEVIDOL, SIVSAGAR, DISTRICT SIVSAGAR: Laying of brick-on-edge apron and construction of drainage system around the monument have been completed.

247. GHANASHYAM'S HOUSE, JAYASAGAR, DISTRICT SIVSAGAR: Construction of approach pathway has been completed and pointing of the brick-on-edge apron after raking out the damaged pointing has been completed.

248. HAYAGRIVA MADHAVA TEMPLE, HAJO, DISTRICT KAMRUP: Plastering of the brick coping wall of the main entrance after removing the old plaster with lime-*surkhi* and dismantling of the ancient stone steps of the western side entrance of the temple and resetting of the same with parapet wall on both sides have been completed. Plastering of the parapet wall has been completed.

Plate 148-149



148



149

Karengghar of the Ahom kings, before and after conservation, Talatalghar.

249. KEDAR TEMPLE, HAJO, DISTRICT KAMRUP: Dismantling of the old, decayed plaster of the ancient compound wall has been completed and replastering of the same has also been completed. Re-plastering of the outer and inner surfaces of the façade has been completed.

250. GANESA TEMPLE, HAJO, DISTRICT KAMRUP: Re-setting of the damaged connecting pathway between the main temple and the *Bhog-ghar* has been completed.

251. SRI SURYAPAHAR RUINS, DISTRICT GOALPARA: R.R. stone masonry and P.C.C. work over the platform in front of the *Dashabhuja* has been completed. Construction of visitors' lobby in the Archaeological Museum has been completed. Construction of low brick wall and fixing of G.I. chain-link fencing over it have been completed.

252. MONUMENT OVER THE GRAVE OF MR. B.J. STOW, DISTRICT GOALPARA: Clearance of vegetation growth over the monument has been completed and Protection notice board has been fixed.

253. RUINS, SINGRI HILLS, DISTRICT SONITPUR: Vegetation and scientific clearance all around the monument have been done and the outer line of the temple-complex has been exposed (pls. 150-151). Construction of brick compound wall with standard bricks in cement mortar is in progress.

254. DHANDI TEMPLE, DISTRICT SONITPUR: Construction of approach pathway and apron around the monument is in progress (pls. 152-153).

255. SAKRESWAR ROCK, DISTRICT SONITPUR: Construction of compound wall with standard bricks in cement mortar is in progress.

256. BARDOLE TEMPLE, BISWANATH, DISTRICT SONITPUR: Lime-*surkhi* plastering both inside and outside the main temple is in progress (pls. 154-155).

257. MASONRY REMAINS, BAMUNI HILLS, DISTRICT SONITPUR: Brick pedestals have been constructed and the architectural members have been displayed on them.

258. MONOLITHS, KASOMARIPATHAR, DISTRICT GOLAGHAT: Vegetation clearance of the monument was attended to and construction of approach pathway has been completed.

ARUNACHAL PRADESH

259. REMAINS IN BHISMAKNAGAR, DISTRICT WEST KAMENG: Restoration of ancient brick structure with special size bricks in lime-*surkhi* mortar and lime concrete flooring has been completed (pls. 156-157).

MANIPUR

260. VISHNU TEMPLE, BISHNUPUR, DISTRICT BISHNUPUR: Lime-*surkhi* plastering of the main temple, compound wall including M.S. railing over it and repair of the approach pathway have been completed.

261. BEITHAB OF SHRI GOVINDAJI TEMPLE, KANGLA, DISTRICT IMPHAL WEST: The two identical double-storyed structures on either sides of the three rows of columns (without roof) comprises the whole structure Beithab. The columns were replastered after

Plate 150-151



150



151

Ruins, Singri hills, before and after removal of vegetation, Singri.

Plate 152-153



152



153

Dhandi Temple, before and after conservation, Dhandi.

Plate 154



Bardol Temple, before conservation, Biswanath.

Plate 155



Bardole Temple, after conservation, Biswanath.

Plate 156-157



156



157

Ancient brick structure, before and after conservation, Bhismaknagar.

replacing dead bricks and spongy mortars. Providing roof of the double-storyed structures is in progress. The renovation work of the Beithab is done under the supervision of experts from INDIA-ICOMOS, New Delhi.

262. Citadel Wall, Kangla Fort, District Imphal West: Restoration of the Citadel Wall at Kangla, which is being carried out by INDIA-ICOMOS, New Delhi, is in progress.

263. Samadhi of Maharaj Gambhir Singh, Langthabal, District Imphal West: Development and beautification of the Samadhi of the Maharaj and its surrounding area by providing protective fencing, entrance gate, gardening and landscaping is in progress.

264. Temple of Leimapokpa Keirungba at M.S.R.T.C. Compound, District Imphal West: The work of removing the vegetation growth on the body of the Temple was completed. The moss and lichen from the roof of the monument was also removed to protect the monument from damage caused by the moss, lichen & vegetation.

265. Temple of Thangal General at Wangkhei, District Imphal West: The work of providing apron and decorative fencing around the temple for proper maintenance of the monument was completed.

266. Temple of Madan Mohanji at Nahabam Bamon Leikai, District Imphal West: The work of removing thick vegetational growth from the body of the temple was completed.

267. Memorial of Wangkhei Meiraba, Machin-Munaou Ching, District Thoubal, Kakching: Retaining wall is provided on the side of the memorial of Wangkhei Meiraba and development of the area is in progress.

MEGHALAYA

268. Stone Memorial of U-Maw-Thodur-Brew, Nartiang, District Jaintia Hills: Re-setting of menhirs in proper manner and clearance of vegetational growth inside the monument have been carried out. Construction of stone masonry wall in the front side for checking erosion of soil and safe guarding of menhirs as well as erection of hand railing is in progress.

269. David Scott's Monument, Cherrapunji, District East Khasi Hill: Vegetation clearance of the monument was conducted and the grills around it were painted.

TRIPURA

270. Ancient Mound Called Thakurani Tilla, Jolaibari, District South Tripura: Vegetation clearance inside the monument has been carried out and construction of sculpture shed and toilet block for the visitors have been completed.

271. Ancient Mound called Shyam Sundar Tila, Jolaibari, District South Tripura: Re-setting of the exposed brick structure with special size bricks and watertightening of the same have been completed.

272. Bhubaneswari Temple, Rajnagar, District South Tripura: Construction of

retaining wall to stop soil erosion, has been completed.

273. ANCIENT REMAINS AT BAKSHANAGAR, DISTRICT WEST TRIPURA: Watertightening of the upper surface of the exposed brick structure with special size bricks and combination mortar has been completed. Construction of compound wall, approach pathway and earth filling of low-land area and leveling of the same have also been completed. Dwarf wall with M.S. grill has also been completed.

274. SCULPTURES AND ROCK-CUT RELIEFS, UNAKOTI, DISTRICT NORTH TRIPURA: Erection of R.C.C. hand railing for visitors' easy approach, repair of brick steps and construction of R.R. stone retaining wall are in progress.

HYDERABAD CIRCLE

ANDHRA PRADESH

275. THOUSAND PILLAR TEMPLE, HANUMAKONDA, WARANGAL DISTRICT: As part of the ongoing major conservation of Kalyanamandapa, the granular pile foundation work was executed to strengthen the foundation and to enhance the bearing capacity. Accordingly, granular piles were provided for the foundation upto a depth of maximum 7m. Varied sizes of metal and sand was provided in granular pile and further rammed with 1 ton weight layer wise. On site experimentation was conducted following plate load test on the laid granular pile to calculating load bearing capacity of the pile.

276. CONSERVATION TO CAMEL STABLEAT GOLKONDA FORT: The dilapidated roof of camel stables got cleared of jungle growth the damaged lime concrete parts over the roof were removed and re-laid with lime pebble concrete as per the original. The complete roof was water tightened with the lime mortar. A railing wall was constructed all over the roof for the safety of the visiting public.

The missing portions of the damaged merlons of Mecca Darwaza were re-constructed using the lime mortar in 1:2 ratio and water tightening was done on rampart in lime mortar.

The excavated site (scientifically cleared) on the right side of the Ranimahal complex near steps to Darbar hall) in which the square cistern surrounded by a screen wall on three sides and an octagonal water cistern at the centre , water channels etc were brought to light were conserved as per original . The debri around the excavated area was cleared and different structures around the site were conserved up to the existing levels.

The walls have been strengthened by grouting and pointing with lime mortar and watertightened with lime concrete using 6 mm HBG Metal.

277. WARANGAL FORT, DISTRICT WARANGAL: The jungle growth on the northern stone fortification walls was removed and subsequently, the conservation and repair works were carried. The missing and damaged merlons got repaired and restored in 1:2 ratio and watertightened. The rampart was also conserved and watertightened.

278. VAIDYANATHASWAMI TEMPLE, PUSHPAGIRI, DISTRICT KADAPA: The roof of Vaidhyanatha main temple and above the closed cloister *mandapa,* which was damaged and resulted in leakage, was conserved and watertightened.

279. BHIMA LINGESWARA SWAMY TEMPLE, DISTRICT KADAPA: The missing roof portion of the *mukhamandapa* on the right side of the steps was restored and conserved. The front side of the temple was provided with stone flooring.

280. TRIKUTESWARA SWAMY TEMPLE, DISTRICT KADAPA: The vertical crack on the rear side of the temple was conserved by removing, consolidating and re-setting the same. The dilapidated *vimanas* of Sri Trikuteswara Swamy temple were restored to original along with stucco work, strengthened and conserved.

281. SRI SIVAKESAVA SWAMY TEMPLE, PUSHPAGIRI, DISTRICT KADAPA: The damaged *sikhara* portion and roof of the *Devi* shrine got conserved. The damaged *vimana* of the *Rudrapadam* located in the. temple premises was appropriately conserved. The accretion walls around the *mukhamandapa* of the temple were got removed and provided with a suitable grill, covering the open space between the pillars of the *mukhamandapa* from the security point of view and the damaged floor around the temple area was replaced by laying out stone flooring.

282. SRI RANGA NAYAKULA SWAMY TEMPLE, GANDIKOTA FORT, DISTRICT KADAPA: The broken stone beam of *mukhmandapa* of Sri *Ranganayakula* swamy temple was conserved after removal and joining the broken part by placing I section girdle and epoxy resin. The damaged roof of *kalyanamandapa* and also the main temple was conserved and water tightened. The damaged steps at outer veneering wall were restored, conserved and strengthened.

283. SOUMYANATHASWAMY TEMPLE, NANDALURU, DISTRICT KADAPA: The dilapidated *mandapa* near the well was restored, strengthened and conserved and the damaged flooring was replaced with stone flooring.

284. PARASURAMASWAMY TEMPLE, ATTIRALA, DISTRICT KADAPA: The damaged wagon- vaulted shaped *vimana* of *Parasuramaswamy* temple got conserved and the damaged *vimana* portion restored and water tightened.

285. BUDDHIST ROCK CUT CAVES ON HILL TOP, GUNTUPALLI, DISTRICT WEST GODAVARI: The work of laying the khandolite stone flooring around the *stupa* was completed.

286. EXPOSED STRUCTURES, ALLURU, DISTRICT KRISHNA: The exposed drumwall, spokes, pathway around the *stupa* and exposed remains of all votive stupas were strengthened and conserved by using the original brick bats and lime mortar in 1:2 ratio.

287. BUDDHIST STUPA AT GUDIVADA, DISTRICT KRISHNA: The accumulated debri over the brick stupa and around was removed and the stupa features exposed.

288. ANCIENT BUDDHIST REMAINS AT PEDAVEGI, DISTRICT WEST GODAVARI: The debris around the site was removed to make the site more conspicuous.

289. CHANDRAGIRI FORT, CHANDRAGIRI, DISTRICT CHITTOOR: The decayed and damaged exterior veneering wall of the temple along with missing parts was restored. The *prakara* wall was also restored.

290. CHENNAKESASWAMY TEMPLE, SOMPALEM, DISTRICT CHITTOOR: The roof was conserved by using brick jelly lime concrete.

291. PARASURAMESWARA TEMPLE, GUDIMALLAM, DISTRICT CHITTOOR: The roof of Sree Parasurameshwara *Swamy* Temple, Gudimallam was taken up with brick jelly lime concrete.

JAIPUR CIRCLE

\

RAJASTHAN

292. ANCIENT SITE AT BHANGARH, DISTRICT ALWAR: Purohitji-ki-Haveli, was taken up for conservation and its walls, floor, steps in addition to its roof. Few minor structures in front have also been repaired and the work is in progress. Exposing of buried structures and their simultaneous conservation work has also been taken up.

293. CHAURASI KHAMBA TEMPLE, KAMAN, DISTRICT BHARATPUR: The out-of-plumb wall of the temple has been made to plumb. The main entrance gate has been repaired and the missing *chhajja* stones have been provided as per original.

294. SIVA TEMPLE AND CHAUSATH YOGINI TEMPLE, ARTHUNA, DISTRICT BANSWARA: The platform of the *Someshwar Mahadev* Temple has been taken up for repair and made as per original. Some minor repairs to the *sikhara* have also been attended and work is under in progress. The conservation of Chausath Yogini Temple has been taken up for repair and its floor and gate has been attended.

295. DEEG PALACES, DEEG, DISTRICT BHARATPUR: Stone flooring has been provided in front of the main gate of the palace-complex. The restoration of Nand Bhavan has been carried out by providing *chhajja* stones wherever missing. The work is under progress.

296. CHITTAURGARH FORT, CHITTAURGARH, DISTRICT CHITTAURGARH: The Fatta Haveli has been conserved, and the main entrance gate has been repaired by providing ramp and pathway. Grill fencing has been provided to the haveli-complex. A small portion of the Sukhadiya tank has also been conserved.

297. KUMBHALGARH FORT, KUMBHALGARH, DISTRICT RAJSAMAND: Conservation of the *mandapa* of the Sun Temple has been taken up and the work is almost complete. The huge dam/ water reservoir has been taken for repair and about half of the structure has already been conserved and remaining work is under progress.

298. KALA PAHAD TEMPLE, TODARAI SINGH, DISTRICT TONK: The plinth of the temple has been conserved as per the original and it has been further strengthened by providing apron. The small *gadhi* over which the temple is constructed, is also being repaired and the work is in progress.

299. BADSHAHI MAHAL, PUSHKAR, DISTRICT AJMER: One of the pavilions of

Badshahi Mahal has been conserved. The floor of the platform has been taken up for repair and the work is under progress.

KOLKATA CIRCLE

SIKKIM

300. CORONATION THRONE, NORBUGANG, DISTRICT WEST SIKKIM: Pointing to stone joints, repairs to coping of boundary walls and widening pathway inside the complex have been done.

301. DUBDI MONASTERY, KHEOCHAD PHALRI, DISTRICT WEST SIKKIM: Renewing fencing around the monument has been completed.

302. RABDENTSE SITE OF ANCIENT CAPITAL OF SIKKIM, FOREST AREA OF PEMAYANGTSE MONASTERY, DISTRICT WEST SIKKIM: Structural strengthening to back side wall by underpinning stone work and pointing to stone joints, etc. have been done.

WEST BENGAL

303. 108 SIVA TEMPLE, KALNA, DISTRICT BARDDHAMAN: Damaged roofs and floors have been repaired as per original. Re-plastering of walls and restoration of cast iron *kalasas* atop the roofs of the temples have been completed.

304. SANTINIKETAN, BOLPUR, DISTRICT BIRBHUM: "Santiniketan Griha", the first building which came up in Santiniketan and the building which was christened by Maharshi Debendranath Tagore, Rabindranath's father, was in a dilapidated state due to lack of appropriate repair and maintenance for decades together. This building has been thoroughly repaired with due care to conserve and preserve its original building fabric as far as possible and keeping the original architectural style intact. Damaged roofs were re-laid and cracked floors were repaired along with replastering of walls. Damaged doors and windows were also repaired and missing railings restored. The damaged mural paintings on inner wall surfaces have been scientifically preserved."Glass Temple" or "*Upasana Griha*" or "*Mandir*", a place of prayer in the "*Asrama*" area has been repaired by replacing damaged glass panels by new ones of similar quality. Settled marble floor has been re-laid. Huge iron gates, which became unserviceable, have been repaired and made functional. The roof was repaired by removing clay tiles and re-laying them after repairs to damaged supporting frame. *"Taladhwaja"* a mud house in the *"Asrama"* area was in a state of collapse. To prevent total collapse; it was propped up and covered by tarpaulin sheet by the University Engineering Department of Visva-Bharati University. This building has been repaired and preserved with all its original architectural features by undoing inappropriate modern repairs, sealing and stitching cracks, resurfacing mud walls, re-laying thatched roof, providing plinth protection and finally, restoring the missing canopy atop the thatched roof which originally served the purpose of preventing ingress of rain-water into the mud walls.

305. BANGARH, RAJIBPUR, DISTRICT DAKSHIN DINAJPUR: Restoration of collapsed brick walls, watertightening work to other walls of the temple-complex have

been carried out. Appropriate surface drainage for rain-water have also been done.

306. KOCH BIHAR PALACE, KOCH BIHAR, DISTRICT KOCH BIHAR: Peripheral area development by renewing electric light arrangements, re-laying pathways, etc. have been completed.

307. BETH-EL-SYNAGOGUE, KOLKATA, DISTRICT KOLKATA: Roof of the monument has been re-laid. Walls have been restored. Watertight apron around outer walls has been provided.

308. MAGHEN DAVID-SYNAGOGUE, KOLKATA, DISTRICT KOLKATA: Roof of the monument has been re-laid along with the restoration of wall. For watertightening, apron around outer wall of the monument has been provided. Restoration of walls has been done.

309. VICTORIA MEMORIAL HALL, KOLKATA, DISTRICT KOLKATA: Old damaged plaster from walls and ceilings have been carefully removed. Pointing of open marble joints to prevent rain-water into the structure has been carried out along with the repairs to stone linings of interior wall surfaces.

310. LOTTON MOSQUE, GAUR, DISTRICT MALDAH: Restoration of missing ornamental brick work has been carried out along with the repairs of damaged roof.

311. IMAMBARA, MURSHIDABAD, DISTRICT MURSHIDABAD: Re-laying of damaged floor, restoration of missing wooden weather boards, resurfacing of roofs, re-plastering of the walls for restoration of surface etc. have been done.

312. TOMB AND MOSQUE OF MURSHID QULI KHAN, SABJIKATRA, DISTRICT MURSHIDABAD: Underpinning brick work and pointing to brick joints of the walls of the monument have been carried out as per original.

313. CLIVE HOUSE, DUMDUM, DISTRICT NORTH TWENTY FOUR PARGANAS: Repair to brick masonry walls and re-laying roof to the monument have been undertaken.

314. HASTING'S HOUSE, BARASAT, DISTRICT NORTH TWENTY FOUR PARGANAS: Repair to brick masonry walls and relaying roof to the monument have been undertaken.

315. HASTING'S HOUSE, BARASAT, DISTRICT NORTH TWENTY FOUR PARGANAS: Underpinning brick work to walls has been taken up along with re-laying of lime concrete roof and replacement of damaged wooden members supporting the roof by new ones.

316. 26 SIVA TEMPLES, KHARDAH, DISTRICT NORTH TWENTY FOUR PARGANAS: Damaged roofs and floors of the temples have been repaired. Wall surfaces of the temples have been replastered.

LUCKNOW CIRCLE

UTTAR PRADESH

317. GARHWA FORT, DISTRICT ALLHABAD: The northeastern bastion and fortification wall of *Garhwa* fort has been restored. The out of plumb bastion made in CR masonry and ashlars masonry of the fort has been opened and re-constructed matching with the original. The cracks in the bastion and fortification wall have been filled up with

lime-mortar. The interior and exterior walls and *kanguras* of the bastion were plastered with 40-50mm thick lime-*surkhi* mortar. The damaged and dislodged western wall of the tank was restored by resetting with lime-mortar, broken and missing stones were replaced with new ones matching with the original (pls. 158-159).

318. KHUSHRU BAGH, DISTRICT ALLAHABAD: The monuments of Khushru Bagh have been restored. The damaged *chhajjas, chhatri* of the Tomb of Khushru and southern side of main gate have been restored by replacing with new ones as per original. The damaged ornamental designs executed on the interior walls of the Tomb of Khushru's sister, Tomb of Bibi Tambolan and Tomb of Khushru's Mother have also been restored and reproduced as per original. The old damaged flooring stones on the front of Tomb of Khushru's sister have been replaced with matching ones and re-laid in lime-concrete.

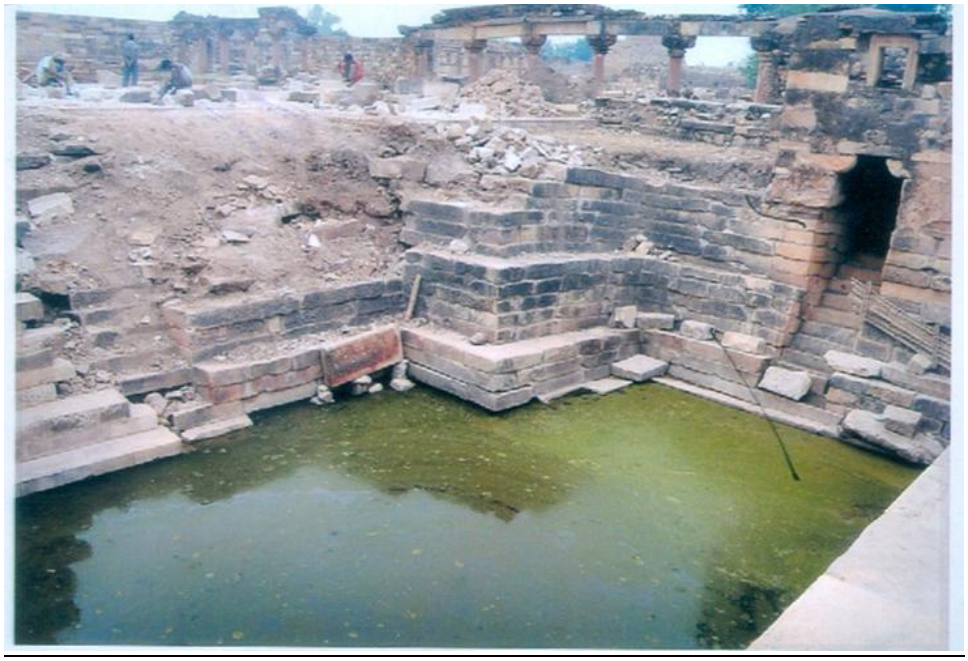
319. EXCAVATED SITE, KAUSAMBI, DISTRICT ALLAHABAD: The loose and dislodged bricks of the Tank-B were restored by re-setting and pointing with lime-mortar. The excavated Tank-B was restored by laying out lime-concrete in the foundation of new drain.

320. CEMETERIES AT KYDGANG, DISTRICT ALLAHABAD: The graves were restored by re-setting of loose stones provided with core in lime-mortar, pointing and re-plastering. An apron has also been provided around the graves.

321. KALINJAR FORT, DISTRICT BANDA: The watertightening in the Koti Tirth tank has been undertaken by filling and grouting of cracks in lime mortar. The northern embankment wall of the tank which was out of plumb and damaged has been dismantled and restored by re-setting of old stones mixed with new hammer dressed stones in lime-mortar while CR stones mixed with lime-concrete were filled in the core. A new lime-concrete foundation has been provided in the damaged portion of the wall. The damaged interior plaster and flooring of the rear *verandah* of Raja Aman Singh Palace has been removed and restored by re-plastering and laying of sandstone *chauka* in verandah. The stucco designs carved on the interior walls have been reproduced in lime-mortar as per original. The damaged stones of *hawankund* in the *mandapa* of Nilakantha temple have been replaced with matching ones. The damaged fortification wall and its *kanguras* near the Nilakantha temple were restored in CR masonry with lime mortar and plastered as per original.

322. TOMB OF SHUJA-UD-DAULA, GULAB BARI, DISTICT FAIZABAD: The roof of first and second floor of the tomb has been repaired. The damaged roof of second floor was opened and repaired with re-laying of lime-concrete and plastered with lime-*surkhi* as per original (pls. 160-161). The old and damaged stones of apron on the ground floor have been changed with matching ones. The damaged roof of the main gate was repaired by replacing the damaged wooden rafters with new ones and re-laid the lime concrete over them (pls. 162-163). Decorated dead plaster of the northern portion of the main gate has been raked out and re-plastered with lime-*surkhi* mortar. The connecting pathway from the gateway to the main tomb was restored with re-laying of flag stone

Plates 158-159



158



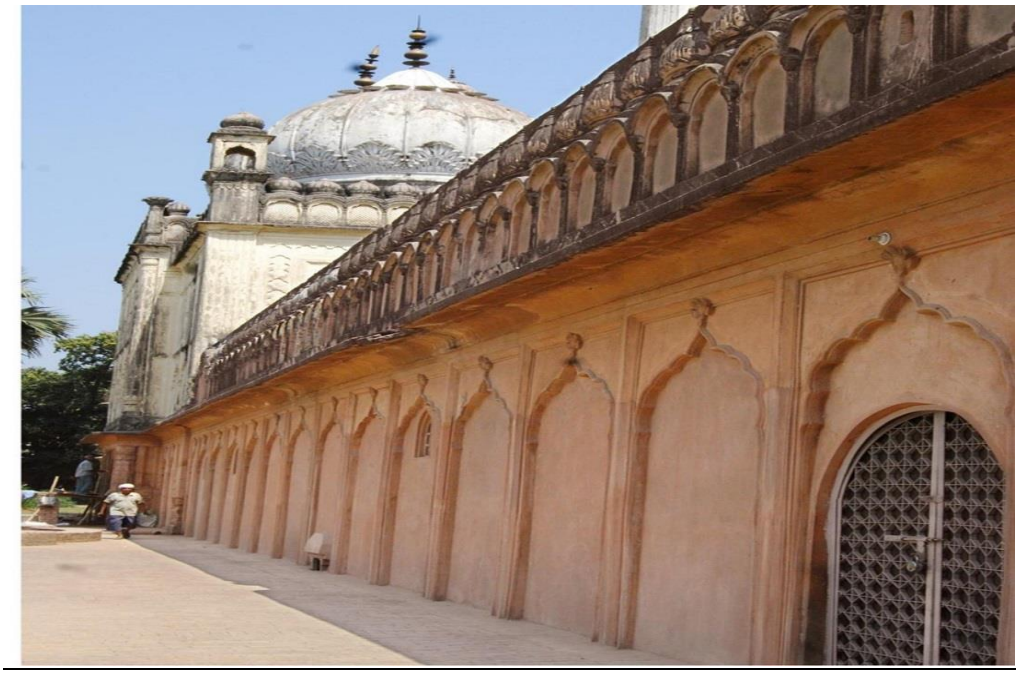
159

Garhwa Fort, before and after conservation, Allahabad.

Plate 160-161



160



161

Tomb of Shuja-ud-Daula, before and after conservation, Gulabbari.

Plate 162-163



162



163

Tomb of Shuja-ud-Daula, before and after repair of the roof, Gulabbari.

flooring after removal of damaged flooring (pls. 164-165).

323. TOMB OF NAWAB DILER KHAN, SHAHABAD, DISTRICT HARDOI: Old mosque located in the premises of the tomb has been restored by underpinning. The damaged floor made of *lakhauri* bricks has also been restored as per original in lime-*surkhi* mortar. The front wall of the platform of Diler Khan's tomb has been restored by dismantling the masonry stones and re-fixing with lime-*surkhi* mortar and iron dowels as per original. The damaged masonry stones have been replaced with similar ones.

324. SIVAJI MAHAL, BITHOOR, DISTRICT KANPUR: The old and ruined palace which is under the protection of State Government of Uttar Pradesh was repaired by underpinning with *lakhauri* bricks in lime-mortar, re-laying of lime-concrete over the roof and re-plastering on the damaged portion of walls, under the deposit work. Under the environmental development, a new garden has been laid out and it is adorned with suitable plants on the rear portion of the palace.

325. SHRI KRISHNA TIKRU-KI-BARADARI, BITHOOR, DISTRICT KANPUR: The damaged portion of Krishna Tikru-ki-Baradari which is under the protection of State Government of Uttar Pradesh has been restored by re-laying of lime-concrete on the roof, filling of cracks, replacement of broken *chhajjas*, replastering on affected portions and stucco work, under the deposit work.

326. SIVA TEMPLE, BITHOOR, DISTRICT KANPUR: The Siva Temple at Bithoor which is under the protection of State Government of Uttar Pradesh has been restored under the deposit work. The damaged stone *jalis*, parapets and doors have been restored and replaced with new ones as per original. New lime-concrete flooring was laid out after removal of old and damaged floor. The old, dead and pulverized plaster were raked out and replastered with lime-*surkhi* mortar as per original.

327. EXCAVATED SITE KAUSHAMBI, DISTRICT KAUSHAMBI: The buried excavated structures were exposed by removal of debris and vegetational growth and restored with pointing and watertightening. Floor was strengthened by providing lime concrete.

328. BILMORI TEMPLE, CHANDPUR, DISTRICT LALITPUR: The foundation of the temple has been strengthened by providing lime-concrete at the base and dislodged ashlar masonry stone have been re-set. The old damaged flooring stones have been removed and new flagstones were re-laid over lime-concrete base.

329. DASAVATARA TEMPLE, DEOGARH, DISTRICT LALITPUR: The damaged and dismantled stones of the plinth of the temple have been restored by re-setting the ashlars masonry wall over the lime-concrete foundation. The vegetation around the temple has also been removed.

330. JHAMMAR-KI-MADHIYA, CHANDPUR, DISTRICT LALITPUR: The badly affected north and western corner portion of the plinth of the temple was restored by re-setting of loose and dislodged ashlar masonry stones with lime mortar. The foundation of the plinth was also strengthened by re-laying of lime-concrete

Plate 164-165



164



165

Tomb of Shuja-ud-Daula, before and after relaying the pathway, Gulabbari.

and an apron of flag stones has also been provided over the lime-concrete base around the temple.

331. SIVA TEMPLE KNOWN AS LESSER SURANG, DHUDHAI, DISTRICT LALITPUR: The temple was repaired by removal of vegetation over and around the temple, providing lime-concrete foundation to plinth for re-setting of side mouldings of the temple. The core of the plinth has been filled with RR stones in lime mortar and veneered with heavy dressed stones in lime-mortar.The joints of mouldings were also filled with recess pointing.

332. SUN TEMPLE AT BUDHANI, DISTRICT LALITPUR: The temple was repaired by way of removal of debris from the premises, re-setting of dislodged stones of plinth after dismantling. Before re-setting of ashlar masonry stones, the core of the foundation was filled with RR stones mixed with lime-mortar and joints were filled with recess pointing.

333. TEMPLE AT SONARI, DISTRICT LALITPUR: The temple was repaired by re-setting of old dislodged stones of the *sikhara*, underpinning and recess pointing, wherever required. A new pathway has also been constructed with flag stones after earthwork and leveling.

334. TEMPLE KNOWN AS BHANDARIA, CHANDPUR, DISTRICT LALITPUR: The temple has been repaired by strengthening of foundation by providing lime-concrete at the base and resetting of dislodged ashlar masonry stones of *pitha* moulding of the sanctum. The damaged flooring has been repaired by re-laying of new flag stones over lime-concrete base.

335. VARAH TEMPLE, CHANDPUR, DISTRICT LALITPUR: The temple was repaired by removing of debris, earth work, removal of the dislodged stones dumped on the south of the temple, watertightening with lime-concrete, providing flag-stone flooring over the lime concrete base. The open joints of stone masonry wall have been restored by the recess pointing.

336. BIBIAPUR HOUSE, DISTRICT LUCKNOW: The ruined building was restored with the old serviceable materials like wood and bricks. The damaged roof of the front and rear verandah of the main building has been restored with replacement of rotten wooden rafters and a fresh lime-concrete was re-laid on the roof. The dead and pulverized plaster on the front, rear portion and eastern portion of building has been removed and re-plastered with lime-*surkhi* as per original.

337. DILKUSHA KOTHI, DISTIRICT LUCKNOW: The eastern façade of the Dilkusha Kothi has been restored by watertightening and providing lime-*surkhi* plaster as per the original (pls. 166-167). The bases of the portico pillars which were made in *lakhauri*-bricks have also been restored by recess pointing and water tightening from the top. The interior portion of north-eastern corner has been restored and new *lakhauri*-brick flooring was provided after the earthwork and lime-concrete layer. The damaged portion of inner walls of the north-east building has been attended by way of raking out old and dead plaster and restoring by edging, underpinning, pointing of old, plaster (pls. 168-169). A fresh lime-plastering has

Plate 166-167



166



167

Dilkusha Kothi, before and after conservation, Lucknow.

Plate 168-169



168



169

Dilkusha Kothi, before and after conservation, Lucknow.

also been done, wherever required, matching with the original.

338. GENERAL WALI KOTHI, DISTRICT LUCKNOW: The building was in ruined condition when it was taken over from the district administration in the year 2008. The restoration work has been started by removal of new additions which were made in form of partitions, closing the original doors and windows with modern bricks. The dead and pulverized lime plaster has been removed from the main entrance on the south, northern and central portion of the building and restored by re-plastering with lime-*surkhi* matching with the original (pls. 170-171). The old damaged doors had also been repaired and replaced with similar ones, wherever required.

339. IMAMBARA ASAF-UD-DAULA, DISTRICT LUCKNOW: The *Pipal* tree grown over the octagonal walls of the Shahi baoli, in the complex have been removed and the wide cracks and holes have been filled with *lakhauri* brick masonry and underpinning was done with rich lime-mortar in deep holes and cracks in the baoli, where ever required.

340. MAIN HALL OF AMJAD ALI SHAH MAUSOLEUM, DISTRICT LUCKNOW: The old decayed plaster and stuccos of the ceiling of the main hall of mausoleum have been raked out, re-plastered and reproduced. Stucco designs were reproduced matching with the original. The holes and cracks were filled up and underpinning work carried out with lime mortar. The western side building has been restored by providing arches in structural works of *lakhauri* bricks in lime mortar matching with the original. The old and damaged stone flooring of platform and staircase has been restored by using old and new stone slabs.

341. RESIDENCY COMPLEX, DISTRICT LUCKNOW: The pillars on the main VIP gate have been restored and provided with MS grilled gate. Ancient wall from kitchen wing to old well located in front of *mazar* has been dismantled and restored as per original. An apron has also been provided on both sides of the wall. The parapet walls of the Model Room building were restored by way of re-plastering in lime-*surkhi* mortar and watertightening from the top as per original.

342. ROOMI DARWAZA, LUCKNOW, DISTRICT LUCKNOW: The old and decayed plasters of ceiling of middle gateway of Roomi Darwaza have been taken out and re-plastered with lime-mortar matching to the original. The wide cracks and holes developed in the entire building were filled up with rich lime-mortar.

343. TOMB OF MUHAMMAD ALI SHAH (CHHOTA IMAMBARA), HUSAINABAD, DISTRICT LUCKNOW: The main entrance of the Chhota Imambara was repaired by removing of old decayed layers of lime wash, plaster and stucco which was giving a shabby look. The wide cracks and holes were filled up with *lakhauri* bricks in lime-mortar, wherever required. Stucco work has also been reproduced on the façade of the entrance matching to the original.

344. BRAHAMANICAL TEMPLE, SUKURA, DISTRICT MAHOBA: The out of plumb and dislodged walls of the temple were re-set

Plates 170-171



170



171

General wali Kothi, before and after conservation, Lucknow.

after dismantling and some missing decorated architectural members have also been reproduced and fixed at their original place matching to the original.

345. RAHELIYA TEMPLE, DISTRICT MAHOBA: The scattered old architectural members of the temple have been collected for re-setting. The out of plumb inner wall of *mandapa* was re-set as per original. The missing stones of super structures have been reproduced in granite and fixed in their *insitu* position of *mandapa* with the help of copper dowels matching the original.

346. THE LAKE OF KIRAT SAGAR, DISTRICT MAHOBA: The missing, broken and out of plumb portion of the embankment wall of the lake has been restored by the resetting of stone slabs and by using some new ones as per the original.

347. ANCIENT SITE, GANWARIA, DISTRICT SIDDHARTHA NAGAR: The northern portion of the large palace complex has been restored by water tightening with lime mortar. The votive stupa at Ganwaria has also been repaired with lime mortar and bricks. The monastery located on the northern side of smaller structure has been repaired by re-setting of loose bricks, water tightening from the top with lime mortar.

348. SITE, STUPA AND MONASTERY, PIPRAHWA, DISTRICT SIDDHARTHA NAGAR: The eastern outer wall of the eastern monastery has been repaired by pointing and resetting of loose bricks with lime-mortar. The damaged flooring of the cells has been removed and lime-concrete flooring was re-laid. The northern monastery has also been repaired by way of watertightening and pointing. The construction of boundary wall on the northeastern corner and southern portion has been completed and MS railing has also been fixed over the boundary wall.

349. THE SITE OF SAHET-MAHET, DISTRICT SRAVASTI & GONDA: The excavated Stupa-H complex and monastery at Sahet, have been restored with pointing of lime mortar and new lime concrete flooring has also been laid out in the cells of monastery. The debris and vegetational growth have been removed from the Jaina temple, Mahet. The dislodged bricks have been restored with lime mortar and lime concrete flooring was laid out in the cells. Kachchi Kuti, Mahet, has been restored by removal of excess earth from the stone slabs and by using some new ones as per the original. Pakki Kuti, Mahet has been restored by pointing of bricks in lime mortar, watertightening from the top and re-laying of lime-concrete flooring in the cells. The landscaping around the temple has also done for beautification of the temple (pls. 172-173).

MINI CIRCLE, GOA

GOA

350. CHURCH OF ST. FRANCIS OF ASSISI, OLD GOA, NORTH GOA: The work of removing the damaged components of wooden windows has been taken up and repaired. Those missing have been replaced by new wooden components. The vertical cracks over the front façade of the church have been grouted and the external walls have been colour washed. The dead plaster has been removed and re-plastered with lime mortar and whitewashed. The damaged wooden rafters of the Mangalore tiled roof have been removed and re-laid including

Plate 172-173



172



173

Pakki Kuti, Mahet, before and after conservation, Sravasti.

G.I. sheet. Wood preservative has been applied. The original ground level at the rear of the Church has been exposed to arrest the seepage of ground water into the walls. R.C.C. curtain wall, laterite stone apron and laterite stone channel have been provided to drain out the water.

351. Se' Cathedral, Old Goa, North Goa: The altar of Our Lady of Hope has been repaired by replacing the decayed wooden components and fixing marine plywood at the rear, sprayed with wood preservative paint. The dead plaster has been removed and replastered with lime mortar and the whole monument has been whitewashed. The laterite stone compound wall on the north side corner, which had collapsed due to heavy rains, has been re-constructed.

352. ASI Museum Building, Old Goa, North Goa: The deteriorated plaster has been removed and re-plastered with lime mortar and white washed. Damaged wooden rafters of roof have been replaced, including laying of G.I. sheet. Wood preservative paint has been applied where applicable.

353. Chapel of St. Catherine, Old Goa, North Goa: Plastering the compound wall with lime mortar has been done and the same has been colour washed. The wicket gate has been fixed.

354. Safa Masjid, Ponda, North Goa: The *Wuzukhana* has been provided with a shed and covered with Mangalore tiles to match the heritage structure. A temporary *chhajja* has also been provided to the entrance of the Masjid to prevent the spray of rain water.

355. Basilica of Bom Jesus, Old Goa, North Goa: The work of filling the cavities on the surface of the wall with composite mortar i.e., laterite nodules + lime mortar and brick-*surkhi* (Laterite Pack) and matching the original with flush pointing have been attended too. Chequered tiles of red colour have also been provided. Repairing of wooden structure in front of chapel of St. Anthony, plastering the damaged wall surface, painting the ceiling wall surface and providing laterite pathway on north side was also attended.

356. Church of Our Lady of Rosary, Old Goa, North Goa: The work of removing the dead plaster and re-plastering, whitewashing, painting the windows and grill have been attended too.

357. St. Augustine Church and Church of Our Lady of Grace, Old Goa, North Goa: The work of removal of debris from a rectangular tank has been attended too. A pathway with edge stones of laterite has been provided and Cuddapah stone floor pathway has also been provided around the rear of the ruins of the Church of Our Lady of Grace, for easy movement of visitors while viewing the excavated site and for providing access.

Mumbai Circle

MAHARASHTRA

358. Kolaba Fort, Alibag, District, Raigad: The work of reconstruction of the eastern side fallen fortification wall with available cyclopean stone in cement mortar up to 2m. height as well as removal of debris and core filling the breached of fort wall was

taken up. The work of the restoration of the bastion was also taken up with available and new cyclopean stone in lime cement mortar, and core filling the breached of bastion with using UCR stones. The construction of toilet block was completed.

359. KORLAI FORT, DISTRICT RAIGAD: Approach pathway was provided with dressed stones on eastern and western side of the fort. The damaged out of plumb walls and roof of the church have been taken for repair and work is in progress. The steps on the western side of entrance have also been replaced. Repairs to the church by way of plastering in lime mortar as well as restoration of the main door was taken up and work is in progress.

360. ELEPHANTA CAVES, DISTRICT RAIGAD: Construction of the retaining wall with stone pitching from Cave no. 1 to Round structure and Cave no. 5 to toilet blocks has been completed.

361. KONDIVITE CAVES, DISTRICT MUMBAI: Replacing the existing barbed wire fencing with CR stone pillar over the wall, providing landscaping in front of Caves, removal of debris from the drainage and extension of courtyard has been completed.

362. SHANIWAR WADA, DISTRICT PUNE: Repair of the Mastani bastion on the eastern side was taken up by way of using brick, masonry with lime mortar after filling the core with the brick jelly concrete. The work is in progress.

363. PATALESHWARA CAVES, DISTRICT PUNE: Teak wood framed panels in between the pillars of the caves have been provided to prevent the unauthorized entry inside the monument. In addition, compound wall with M.S. grills fencing to the open area has also been provided.

364. LENYADRI CAVES, JUNNAR, DISTRICT PUNE: Providing of stone pathways in front of the booking counter over the stone jelly concrete has been taken up and work is in progress.

365. LOHGAD FORT, DISTRICT PUNE: The undulated approach stone steps inside Ganesa gate was dismantled and re-done with the UCR stone over the base concrete and pointed with the combination mortar. The work is in progress.

366. SHELARWADI CAVES, DISTRICT PUNE: Disturbed approach stone steps were dismantled and re-set in their original position over the base concrete. The retaining parapet wall in stone masonry has been taken up. The work is in progress.

367. AGAKHAN PALACE, DISTRICT PUNE: As a security measure, the existing ancient compound wall along the road side has been raised to the height of 0·90m with M.S. grill overt it. Damaged and rusted existing entrance grilled gate replaced with new decorative gate matching with the original structure. The exterior wall surface of three floors and interior wall of ground floor were repaired.

368. KHOKARI GUMBAJ, DISTRICT RAIGAD: The missing portion of the floor on the north-east side has been laid with stone over a firm concrete base. The dead lime concrete of the roof was removed and fresh layer of lime concrete has been provided with water proofing compound.

369. PALA CAVES, DISTRICT RAIGAD: In continuation of previous year's work, construction of parapet wall alongside the pathway has been completed.

370. KUDA CAVES, DISTRICT RAIGAD: Construction of retaining wall in front of the caves has been completed.

372. SIDDESHWAR TEMPLE AT MACHNUR, DISTRICT SHOLAPUR: The outer cells around the main temple have been water tightened by removing dead lime concrete and laying fresh concrete with proper slope to drain out the rain water. The side walls were also watertightened by removing dead plaster and replastering in lime mortar. The fallen portion of southern side wall along the entrance steps has been re-constructed in stone masonry in lime mortar and pointed as per original. The missing wall towards river side has been re-constructed in coursed stone masonry and core filling in rubble masonry in cement mortar.

373. SIDDESHWAR TEMPLE AT SHOLAPUR FORT, DISTRICT SHOLAPUR: The inclined portion on the south, eastern and western portion of the temple has been provided with dry stone pitching after leveling the area. The uncaused rubble masonry parapet wall of 1·00m height has been constructed. The fallen portion of north western corner of fortification wall at a height 7·50m near the temple has been re-constructed in stone masonry matching to the original wall. The missing merlon of outer fortification wall near Balantinichi Vehir has been re-constructed in coursed stone masonry in lime mortar.

374. SIVA TEMPLE, AMBARNATH, DISTRICT THANE: The undulated and undressed stone flooring of north and north eastern portion of cartyard has been removed and re-laid with dressed stone over firm base of cement concrete. The modern step over the ancient remains on north western corner has been dismantled and exposed strcutures have been restored. The damaged base portion of the platform has also been repaired.

375. ARNALA FORT, DISTRICT THANE: The partly undulated parapet wall of the rampart has been raised and leveled with adjoining wall in rubble stone masonry in lime mortar and water lightened with proper slope to drain of the rain water. The loose mortar of the masonry joints of the parapet wall on northern side has been racked out and pointed with lime mortar. The peeled off plaster of inner face of the bastion walls has been removed and re-plastered in lime mortar. The dead plaster of central dome of the main entrance has been removed and re-laid as per original.

376. BUDDHIST STUPA AT NALASOPARA, DISTRICT THANE: The main stupa and votive stupa which was covered with thick vegetation, has been cleared and preparation of the special size brick is in progress for repair to *stupas*.

377. BASSEIN FORT, VASAI, DISTRICT THANE: The partly fallen portion of the rubble masonry enclosure wall all around Church of St. Franciscan has been restored and missing portion has been reconstructed with rubble stone masonry. The pillared hall which was full of thick jungle and fallen debris has been cleared and 0·15 thick lime concrete has been laid. The remains of

damaged base portion of the pillars have been raised to maintain symmetry to a height of 0·60m in rubble stone masonry and water tighten. The roof of the side alters which was collapsed and covered with debris has been cleared and the damaged walls have been restored and missing portions has been raised to maintain level with adjoining wall in rubble stone masonry.

The fallen rear wall of main alter of the church of St. Joseph has been re-constructed in rubble stone masonry in lime mortar. The roof of the main alter has been watertightened by way of raking out dead mortar and re-plastering again. The top uneven portion of the southern and northern side walls of the prayer hall has been attended by removing the penetrated roots, filling the cavities by injecting the cement slurry and grouting. In order to avoid percolation of rain water into the foundation of open prayer hall, the loose earth has been removed, area was leveled and provided with thick brick jelly concrete. The apron has been provided on north and eastern side of the church to stop water logging by laying 0·15m thick lime concrete with proper slope to drain off the rain water.

RAIPUR CIRCLE

CHATTISGARH

377. MAHADEV TEMPLE, BASTAR, DISTRICT BASTAR: For the safety and security of the monument, a dwarf wall mounted with grill has been provided around the protected limit.

378. NARAYANA TEMPLE, NARAYANPAL, DISTRICT BASTAR: Watertightening of the temple was carried out. In addition to it, stone apron has been provided over the platform to arrest water percolation, especially during the rainy season.

379. MEGALITHIC SITE, GAMEWADA, DISTRICT DANTEWADA: Approach road has been provided for easy movement of visitors.

380. DANTESWARI TEMPLE, DANTEWADA, DISTRICT DANTEWADA: Wooden roof of the temple was taken up for restoration. New wooden members have been provided in place of rotten and damaged pieces. As a safety measure, a dwarf wall mounted with grill has been provided around the monument.

381. ANCIENT SCULPTURES, BARSOOR, DISTRICT DANTEWADA: For the safety and security of the monument, a dwarf wall mounted with M.S. grill has been provided around the protected limit.

382. SITA DEVI TEMPLE, DEORBIJA, DISTRICT DURG: A retaining wall mounted with grill has been provided on the northern side of the water body to avoid soil erosion and to provide safety and security to the monument.

383. TIVARDEV VIHAR, SIRPUR, DISTRICT MAHASAMUND: In continuation of earlier works, re-setting, brick veneering, underpinning and watertightening in various structures were carried out.

384. RAMA TEMPLE, SIRPUR, DISTRICT MAHASAMUND: In continuation of earlier works, re-setting, brick veneering, under pinning and watertightening in various structures were carried out.

385. LAXMAN TEMPLE, SIRPUR, DISTRICT MAHASAMUND: Stone pitching has been provided all around a water body which is located in front of the Laxman Temple. In addition to this, the work of providing basic public amenities within the temple premises, such as a new ticket counter, a clock room, toilet blocks, drinking water, approach road etc., are in progress.

386. EXCAVATED STRUCTURE (SRP-13), SIRPUR, DISTRICT MAHASAMUND: Specially prepared bricks with lime mortar have been used for the conservation of the excavated structure. Besides, stone apron around the main structure and approach road from the main road to the monument have been provided.

The excavated brick structure, Siva Temple 4 identified as the priest's house, within the Siva Temple premises, was conserved with newly prepared bricks with lime mortar. Besides, for the safety and security of the monument, a dwarf wall mounted with M. S. grill has been provided around the protected limit. For the safety and security of the excavated structures, grill fencing has been provided over the dwarf wall. Approach path from the main road to the monument has been provided for easy movement of visitors. Besides, drain pipes have been provided to drain out rainwater from the monument premises. The excavated brick structure Siva Temple 3 and 6 has been conserved with specially prepared bricks with lime mortar. Besides, approach road from the main road, stone apron around the structure and providing M.S. grill over dwarf wall to ensure the safety and security of the monument are in progress.

387. BALESHWAR MAHADEV TEMPLE, SIRPUR, DISTRICT MAHASAMUND: Structures on the southern side of the Mahadev Temple were conserved with specially prepared bricks with lime mortar. Besides, a dwarf wall mounted with grill has been provided for the safety and security of the monument.

388. MAHADEV TEMPLE, NARAYANPUR, DISTRICT RAIPUR: In continuation of earlier works, after dismantling the damaged apron, it has been re-set to its original condition, to avoid water stagnation around the monument.

389. BHAND DEOL TEMPLE, ARANG, DISTRICT RAIPUR: In addition to the work of approach path from the main gate to the monument, a M.S. grill gate has been fixed at the main entrance, to provide safety and security.

390. BHAN DEOL TEMPLE, ARANG, DISTRICT RAIPUR: In addition to the work of approach path from the main gate to the monument, a M.S. grill gate has been provided at the main entrance for safety and security.

391. SITA BAREE, RAJIM, DISTRICT RAIPUR: For the safety and security of the monument, a dwarf wall mounted with M.S. grill has been provided around the protected limit.

SRINAGAR CIRCLE

JAMMU AND KASHMIR

392. AKHOON MULLA SHAH MOSQUE, DISTRICT SRINAGAR: The south side wall of the mosque, which was damaged due to earthquake, has been restored in ashlar polished stone masonry with combination mortar and copper dowels. The *chhajja*

portion in ashlar stones has been restored as per original. Dwarf wall in stone from south side, including fixing of chain-link fencing has been completed to protect the area.

393. GROUP OF TEMPLES, NARANAG, DISTRICT GANDERBAL: The retaining walls of the ancient pond, which were damaged due to a cloudburst, have been restored in huge R. R. stone masonry along with combination mortar. The restoration of steps of the pond in ashlar stone masonry with combination mortar as per the original has been attended to. The restoration of some dilapidated miniature shrines has also been carried out.

394. CHAITYA MONASTERY AND STUPA, PARIHASPORA, DISTRICT BARAMULLA: The area in front of the monument has been fenced with dwarf wall in stone masonry and M. S. grill for safety of the monument.

395. PRATAPSWAMIN TEMPLE, TAPPER, DISTRICT BARAMULLA: Maximum area of the monument has been received with chain link fencing over R. R. dwarf wall in combination mortar to safeguard the area from encroachments.

396. MUGHAL ARCADE, VERINAG, DISTRICT ANANTANAG: Damaged arched domes around the ancient spring facing north have been restored with special type of bricks in combination mortar to match with the original. Lime concrete has also been provided over the dome along with lime-*surkhi* plaster to control water seepage.

397. BUMZUVA CAVE, BUMZUVA, DISTRICT ANANTANAG: Ashlar stone pathway along with steps in front of the cave and M.S. grill railing along with staircase have been provided for the convenience of the tourists.

398. ANCIENT STUPA AT MALANGPORA, DISTRICT PULWAMA: The buried stupa, which has been exposed simultaneously restored with ashlar stone masonry in combination mortar as per the original along with the steps.

399. ANCIENT PALACE, RAMNAGAR, DISTRICT UDHAMPUR: The buried structures have been exposed after removing the long accumulated debris. Coursed rubble stone masonry in lime-*surkhi* mortar by underpinning on the west side of Nawa Mahal and Sheesh Mahal, including support wall and steps on south side, has been completed. Damaged lime-*surkhi* and ornamental plaster of front façade of Sheesh Mahal have also been restored as per original. The wood work on *chhajja* and door has been completed.

400. DERA TEMPLE, BABOUR, MANWAL, DISTRICT UDHAMPUR: Weathered and out-of-plumb niche portion of the main temple with its highly ornamental and moulded work has been restored in combination mortar as per the original. Providing of missing, heavy stone slabs on the ceiling of the *mandapa* to match with the original, highly ornamental and moulded work, along with the restoration of the ancient well and steps have been done.

401. AKHNOOR FORT, AKHNOOR, DISTRICT JAMMU: The buried structures facing the river side have been exposed by scientific excavation method. Restoration of the exposed brick structures facing the river along with restoration of pathway in

combination mortar has been completed. Lime-*surkhi* plaster and pointing have also been done on the missing portions as per original.

402. LEH PALACE, DISTRICT LEH: The work on missing/damaged wooden doors and balcony windows in levels third to seventh has been completed. Restoration of mud brick wall facing north on the rear has also been completed. The traditional mud plaster in combination mortar has also been completed. Work on the collapsed roof/ floor adjoining the shrine on its west side has been completed after providing popular poles and twigs in mud concrete as per the traditional method.

403. SHEY PAALCE, SHEY, DISTRICT LEH: Dilapidated rooms of the royal palace have been restored by providing the popular posts, beams, brackets, *tallu*, mud concrete and mud plaster as per the traditional method to match with the original. The tilted and damaged mud brick walls have also been restored with sun-dried mud-bricks in combination mortar. The doors, windows and balconies in levels first to third have been provided after replacing the damaged ones. Traditional mud plaster has also been provided to match with the original.

404. THIKSEY MONASTERY, THIKSEY, DISTRICT LEH: Steps, landing, pathway and retaining wall in coursed rubble stone masonry with combination mortar towards the north-west side have been provided for a *pradakshina* pathway around the monastery.

405. BUDDHIST MONASTERY, LAMAYURU, DISTRICT LEH : Restoration of the mane-wall and chorten in mud mortar including watertightening of the roofs of chorten as per original using the traditional method has been done.

406. BUDDHIST MONASTERY, PHYANG, DISTRICT LEH: The sun dried mud brick masonry has been provided after dismantling of bulged and cracked portion facing west and interlocking walls in levels third and fourth. Providing of doors, windows, fixing of beams, brackets and posts, lying of *tallu* and mud concrete on the roof for watertightening have been completed.

THRISSUR CIRCLE

KERALA

407. TENKAILASANATHA TEMPLE THRISSUR, DISTRICT THRISSUR: The western *gopuram* (three-tiered roof) of the temple has been thoroughly conserved. The carvings have been properly documented and damaged wooden carvings have been reproduced as per the original. The entire wall surface has been plastered with traditional lime mortar. Granite stone apron had been laid all around the *gopuram*. The repair work of the roof of the eastern *chuttambalam* near the *tidapally* of the temple is in progress.

408. SIVA TEMPLE, NATRIMANGALAM, PATTAMBI, DISTRICT PALAKKAD: Repair to the eastern pillared *gopuram* with teak wood roof members and M.P. tile covering has been completed. The roof of the Vishnu shrine has been dismantled and new M.P. tile roof with teak wood members have been provided as per traditional pattern. The *namaskara mandapa* of the main temple has been thoroughly repaired as per original

pattern after thorough documentation. The roof members of the *namaskara mandapa* have been conserved properly and completed with M.P. tile roofing. The area around the temple has been properly leveled to keep it tidy.

409. VISHNU TEMPLE, KADAVALLUR, DISTRICT THRISSUR: The existing damaged concrete of *pradakshinapatha* has been removed and new granite stone for the *pradakshinapatha*, over the brick-jelly concrete base has been provided.

410. SIVA TEMPLE, CHEMMANGTHITTA, DISTRICT THRISSUR: The damaged and out of plumb laterite stone masonry wall of the *gopuram* of the temple has been dismantled after proper documentation. Resetting work of the laterite stone wall with neatly dressed and carved stones of laterite, as per original pattern is in progress.

411. VISHNU TEMPLE, KADAVALLUR, DISTRICT THRISSUR: The existing damaged concrete *pradakshinapatha* has been removed and new granite stone *pradakshinapatha* in the same area has been provided.

412. SIVA TEMPLE, CHEMMANGTHITTA, DISTRICT THRISSUR: The damaged and out of plumb laterite stone masonry wall of the *gopuram* of the temple has been dismantled after proper documentation and dressed and carved stones of laterite has been provided, as per original pattern. The work is in progress.

413. ST. FRANCIS CHURCH, FORT KOCHI, DISTRICT ERNAKULAM: The roof the Church has been taken for repair by way of dismantling M.P. tiles damaged wooden planks and rafters and providing with new teak wooden planks in proper position. After fixing planks, the entire roof of the church was covered with plain fibre sheet and with teak wood reapers and finally covered with M.P tiles. In addition, laterite stone pathway has been repaired. The sunken granite stone apron has been re-laid. The existing toilet has been upgraded.

414. BEKAL FORT, PALLIKKARE, DISTRICT KASARGOD: Approach pathway in laterite stone masonry in combination mortar to the watch tower has been carried out. Restoration work of the damaged, dilapidated rampart wall on the eastern wall, near Bastion No.3 has been carried out. Watertightening work of the fort wall, from eastern side bastion to Bastion No. 3, by dismantling, re-laying with old and new laterite stone masonry in combination mortar, including coping of battlement wall and its recess pointing, have been carried out. Watertightening work of the top layer of the fort wall, from the entrance gate up to the bastion, has been carried out by replacing the worn-out laterite with new one in combination mortar. Underpinning work of the fort wall, from entrance to Bastion has also been taken up by inserting laterite stones in combination mortar, wherever required. Recess pointing on the fort wall, from the entrance up to Bastion No.3 has been done.

415. ST. ANGELO FORT, KANNUR, DISTRICT KANNUR: Approach pathway to the horse stable unit in laterite stone masonry has been laid out. Watertightening work of the top layer of the fort wall, eastern side, by dismantling the worn-out top layer and re-laying with old and new stones and its recess

pointing work have been carried out. Repair work of the front door and refitting of spikes, etc. have been undertaken. Underpinning on the northern side of the moat wall (inner side) and recess pointing etc. have been carried out.

416. ANCIENT SITE, KUDAKKALPARAMBU, CHERAMANGAD, DISTRICT THRISSUR: Cleaning of accumulated debris, maintenance of coconut plants planted at the site and removal of vegetational growth have been done. Lying of laterite stone pathway and provision of visitors' benches have been undertaken. Providing low-level solar energy street lights, lying of UG cable and installation of submersible pump sets have also been attended.

417. ANCIENT SITE, ARIYANNUR, DISTRICT THRISSUR: Maintenance of the site, cleaning of accumulated debris, cutting of overhanging branches of trees, maintenance of pathways have been done.

418. ANCIENT CAVE BURIAL SITE, EYYAL, DISTRICT THRISSUR: Maintenance of the site, cleaning of vegetational growth, maintenance of lawn area and clearing of accumulated debris at the site have been done.

419. ANCIENT CAVE BURIAL SITE, KAKKAD, DISTRICT THRISSUR: Fallen portion of the compound wall has been repaired and chain-link mesh in angle iron frame has been provided. The compound wall has been plastered as per original.

420. ANCIENT CAVE BURIAL SITE, KATTAKAMBAL, DISTRICT THRISSUR: Repair to the fallen portion of the compound wall, laterite stone plastering, providing wicket gate, routine maintenance work and clearing debris have been carried out.

421. ANCIENT CAVE BURIAL SITE, KANDANASSERRY, DISTRICT THRISSUR: Maintenance work of the burial cave by way of removal of vegetation, cutting of overhanging branches of trees and clearing accumulated debris at the site have been undertaken.

422. FORT ST. ANJENGO, ANJENGO, THIRUVANANTHAPURAM: The work of providing apron on west side of the fortification wall has been completed.

TAMIL NADU

423. SRI VALISWARA TEMPLE, THIRUVALISWARAM, DISTRICT TIRUNELVELI: Re-construction of new granite stone masonry veneering wall to the plumb of the north *prakara* wall as per original design has been completed.

424. SRI BHAKTAVATSALA TEMPLE, CHERMADEVI, DISTRICT TIRUNELVELI: The damaged doors in the main temple have been replaced with new teak wood as per the existing ones. Repair to the wall has been completed.

425. SRI VALISWARA TEMPLE, THIRUVALISWARAM DISTRICT TIRUNELVELI: The north *prakara* wall of the temple which was out of plumb was repaired as per original and the core of the wall was filled.

426. VATTAKKOTTAI FORT, VATTAKKOTTA, DISTRICT KANNYAKUMARI: The decayed and dead plaster from the inside fort wall was removed and plastered as per original. Pointing work has been carried out on the

outer fortification wall on the northern side. Veneer wall in the missing portion of the western wall of the fort and the top of the bastion have been provided. The western side of the fort wall and the top of the bastion has been filled with earth, gravel and loose boulders. The walls have been strengthened by filling earth and gravel, besides loose stone boulders, in between the bastion. The dead plaster from the fortification wall has been dismantled and re-plastered. The outer surface of the fortification wall has been pointed.

427. ARCHAEOLOGICAL MUSEUM BUILDING, MATTANCHERRY, KOCHI, DISTRICT ERNAKULAM: In continuation of the previous re-organization works, the dead lime mortar on the walls of the King's Gallery, Dining hall, Mural Gallery and the Durbar Hall has carefully removed and replastered with fresh lime mortar. The old hanging electrical wires and damaged internal electrical boards and switches have been removed carefully and refitted with new electrical fittings and LED lights have been provided for aesthetic appearance of the displayed objects in the galleries. The old enamel paint applied over a period of time on the doors and windows of the above galleries has been completely removed and applied with two coats of Bonacarl wood oil. The thick lime floor of the galleries has been removed to reduce extra laid on the wooden floor. The existing old concrete floor of the gallery and damaged beams and planks of the wooden floor have been carefully removed after documentation and replaced with new beams as per the original size and position. After replacing the old beams with new ones, the surface of the floor was leveled and smoothened and applied with Bonatech Water based polyurethane matte finish for further smoothening. After removing the existing damaged plaster from the wall, application of new lime plaster on the same area is in progress. The Arms Gallery, Religious History Gallery and Social History Gallery have been added this year.

VADODARA CIRCLE

DAMAN AND DIU

428. FORT WALL, MOTI DAMAN DISTRICT DAMAN: The work of re-construction of rubble stone masonry of parapet as per original and providing plaster on the outer face of the fort wall has been completed.

429. FORT WALL, NANI DAMAN, DISTRICT DAMAN: The work of providing fresh plaster on the outer face of the fort wall has been completed.

430. DIU FORT, DIU, DISTRICT DIU: The work of dismantling and redoing weathered bela stone masonry in I.S.S. mortar on the outer face of the St. Nicholas Bastion with fort walls connecting St. Philip and St. Nicholas Bastions with newly-dressed bela stone has been completed. The work of dismantling the decayed broken bela stone masonry and redoing with new bela stone masonry in L.S.S. mortar at the portion between the two culverts on the outer moat wall and the wall near Caballero Bastion has been completed.

GUJARAT

431. MUHAFIZ KHAN'S MOSQUE, DISTICT AHMEDABAD: The cracked lintels on the northern side of the mosque were removed and replaced with newly-dressed Dhrangadhara stones. The damaged stone slab over the lintel was also replaced with new one. The entrance step and flooring of the mosque which have weathered out have been replaced with seventy-five percent new matching stones. The work of replacing of damaged architectural members with matching stone is in progress.

432. SARANGPUR GATE, DISTRICT AHMEDABAD: The re-setting work of the dismantled architectural members using new Dhrangadhara stone and replacement of decayed architectural members as per original have been completed.

433. SHAH ALAM MOSQUE AND TOMB, DISTRICT AHMEDABAD: The northern side minaret affected due to earthquake in the 2001 has been dismantled very carefully with the help of chain pulley after proper documentation. The same has been reconstructed with twenty percent new dressed and carved stones as per original and the work are in progress.

434. GROUP OF MONUMENTS, SARKHEJ, DISTRICT AHMEDABAD: The reconstruction work of the missing retaining wall of the tomb of Mohammad Begda has been started with newly-dressed sandstone with hearting brick masonry and the work is in progress.

435. MANSAR TANK AND SHRINES, VIRAMGAM, DISTRICT AHMEDABAD: The work of providing/re-constructing a flight of steps with outer flooring and retaining wall using similar type of stones duly dressed as per original, is in progress.

436. BAHLOL KHAN GHAZI'S MOSQUE, DHOLKA, DISTRICT AHMEDABAD: The damaged/sunken stone floor has been dismantled and provided with the new stone floor with base concrete. The worn-out, decayed lime concrete has been removed and re-laying of fresh lime concrete on the terrace and the dome has been completed. The work of providing M.S. grill fencing over brick masonry dwarf wall and ashlar stone masonry in lime mortar on the north-west corner of the mosque is also complete.

437. KHAN MASJID, DHOLKA, DISTRICT AHMEDABAD: The work of removing damaged lime concrete floor and re-laying the same as per original is in progress.

438. BRICK DOME (NEAR PANCH MAHUDA KI MASJID), CHAMPANER- PAVAGADH, DISTRICT PANCHMAHAL: The work of providing chain-link fencing on R.R. stone in foundation has been completed.

439. BRICK DOME (NEAR VADA TALAO), CHAMPANER-PAVAGADH, DISTRICT PANCHMAHAL: The work of underpinning the structure on northern and southern side parapet walls in lime mortar has been completed.

440. CITADEL WALL, CHAMPANER-PAVAGADH, DISTRICT PANCHMAHAL: The work of re-construction of fort wall in ashlar stone masonry towards the southeastern side with hearting of R.R. masonry in lime mortar has been completed. The work of providing ashlar stone masonry in lime mortar as per original on the outer face of

citadel walls towards the north-east corner is in progress.

441. KAMANI MASJID, CHAMPANER-PAVAGADH, DISTRICT PANCHMAHAL: The work of re-construction of ashlar stone masonry towards northern and southern side walls, fixing of base stone, re-construction of ashlar stone column and dressing and carving of capital and arches as per original have been completed. The work of providing ashlar stone masonry including R.R. hearting masonry in lime mortar towards the northern side wall is in progress.

442. SEVEN ARCHES, CHAMPANER-PAVAGADH, DISTRICT PANCHMAHAL: The work of dismantling of bulged and out of plumb ashlar masonry and providing the seventh arch, which was missing, has been completed as per original. The work of providing new ashlar stone masonry in lime mortar adjoining the arches and providing hume pipe in cement and lime mortar from fort wall to the ground level for outlet of rain water has also been completed. The work of reconstruction of fallen ashlar stone masonry of fort wall, including R.R. Masonry as hearting, is in progress.

443. ATAK GATE, CHAMPANER-PAVAGADH, DISTRICT PANCHMAHAL: Providing chain-link fencing on R. R. masonry dwarf wall has been completed. The work on fallen ashlar stone masonry has been restarted and the work of providing stone pathway is in progress.

444. DWARKADHISH TEMPLE-COMPLEX, DWARKA, DISTRICT JAMNAGAR: The work of laying Bardia stone floor in the open courtyard of the temple-complex and replacement of damaged lintel of the Purushottama Temple within the complex, have been completed.

445. MAHAKSHATRAPA INSCRIPTION, DWARKA, DISTRICT JAMNAGA: The work of providing bela stone flooring with base concrete around the inscription has been completed.

446. RAOLAKHA CHHATRI, BHUJ, DISTRICT KACHCHH: The work of providing and re setting of new architectural members like pillars and capitals as per original is in progress. The work of excavation of earth, laying of P.C.C. in the foundation and construction of R.R. stone masonry wall for chain-link fencing have been completed.

447. EXCAVATED SITE, KOTADA (DHOLAVIRA), DISTRICT KACHCHH: The work of dismantling and re-setting of bulged un-coursed rubble stone masonry wall and structural remains at the ancient site have been completed after numbering and photographic documentation. The work of providing and laying pathway in front of the eastern gate has also been completed. Removal of vegetation growth and desalting of reservoirs have been carried out.

448. SITLAMATA TEMPLE, PILUDARA, DISTRICT PATAN: The re-setting work in ashlar stone masonry of the *sikhara* of the temple has been completed. The work of laying stone apron around the temple, stone flooring in front of the temple and chain-link fencing surrounding the protected area have also been completed.

449. TORANA, PILUDARA, DISTRICT PATAN: The construction work of brick masonry plinth wall with stone veneering of the platform has been completed. The debris has

been removed and the ground has been leveled for gardening.

450. DARBADGADH, SIHOR, DISTRICT BHAVANAGAR: The re-setting work of damaged Mangalore tiled roof and re-construction of fallen/missing R.R. stone masonry on the eastern, western and northern sides of the compound wall have been completed. The work of dismantling and re-laying lime concrete over the main gate and re-laying stone tiles on the second floor roof as well as the southern side room have also been completed.

451. SUN TEMPLE, THANGADH, DISTRICT SABARKANTHA: The work of providing barbed-wire fencing with iron angle around the temple area has been completed. The work of dismantling and re-constructing the compound wall with new stones, wherever necessary, is in progress.

452. NILKANTESHWAR MAHADEV TEMPLE, SUNAK, DISTRICT PATAN: The work of re-laying of apron around the damaged stone flooring of the temple platform and the stone steps has been completed.

453. GROUP OF TEMPLES, KHED - RODA, DISTRICT PATAN: The out of plumb Vishnu Temple and Siva Temple have been dismantled carefully after proper documentation and the work of re-setting of the Vishnu Temple with new stones, wherever necessary, as per original, is in progress.

454. OLD DUTCH AND ARMENIAN TOMBS, DISTRICT SURAT: The work of removing debris and accumulated earth around the cemeteries, construction of brick masonry wall around the tombs and laying apron concrete are in progress.

455. OLD ENGLISH TOMB, DISTRICT SURAT: The work of providing plaster on the compound wall has been completed.

456. QUTUBUDDIN MOHAMMED KHAN'S TOMB HAZIRA, DISTRICT VADODARA: The work of dressing, cutting and setting of stone pathway in the garden area of the tomb is in progress.

457. VADODARA GATE, DABHOI, DISTRICT VADODARA: The work of dismantling the bulged/out of plumb ashlar stone masonry and re-construction of southern side gate has been completed as per original after proper documentation.

458. HIRA GATE, KAYAVAROHAN, DISTRICT VADODARA: The out of plumb ashlar stone wall has been dismantled and architectural members have been sorted and stacked for reuse.

459. ANCIENT SITE, KAYAVAROHAN, DISTRICT VADODARA: The work of re-erection of fencing over compound wall with base concrete and R.C.C. pillar has been completed.

IX. ARCHAEOLOGICAL CHEMISTRY[1]

ANDHRA PRADESH

1. Sri Siddheswara Swamy Temple, Hemavathi, District Anantapur: In continuation of previous year's work, the conservation treatment and preservation work has been taken up for the removal of micro-vegetational growth, dust, dirt, tenacious coats of lime/cement flown marks, red ochre, iron stains, oily stains, greasy matter and soot deposition from interior surfaces of temple which mainly comprises granite and lime plaster.

Micro-vegetational growth was removed using a mixture of 3% liquid ammonia and non-ionic detergent in the ratio of 3:1 followed by gentle brushing with nylon brushes of different sizes and shapes. Tooth brushes and cotton swabs were used for the removal of accretions from the intricate carvings and designs. Lime coats were removed by chemico-mechanical treatment by using 3-5% solution of glacial acetic acid in aqueous medium. Iron stains were removed using 5% oxalic acid solution followed by thorough wash with plenty of plain water. Oil, soot interspersed with dust deposit from the interior surface were removed by using the clay pack method with fullers earth charged with 5% sodium carbonate and bi-carbonate, little ammonia and non-ionic detergent. On drying, the surface was washed with plenty of plain water. Outer *prakara* wall was given a coat of 2% sodium pentachlorophnate as biocide in aqueous medium and a mixture of a silicone based Wacker BS-290 with Mineral Turpentine oil in 1:15 ratio as protective coating. The work was completed.

2. Vaidyanatha Swamy Temple, Pushpagiri, District Cuddapah: The conservational treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt, tenacious coats of lime, red ochre and iron stains, from the exterior and interior surfaces of the temple which mainly comprises shale with the members of slate.

The micro-vegetational growth along with dust and dirt was removed using 3% solution of liquid ammonia mixed with non-ionic detergent in the ratio of 3:1 followed by brushing with nylon brushes. 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.

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1. Information from Director (Science) of the Chemistry Branch of the Survey.

Remnants of acidic ions were neutralized with liquid ammonia solution followed by thorough wash with plenty of plain water. The work was completed.

3. TRIKUTESWARA SWAMY TEMPLE, PUSHPAGIRI, DISTRICT CUDDAPAH: The conservation treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt, tenacious coats of lime, red ochre and iron stains, from the outer *gopuram* and *chhajjas*, of exterior and interior of *mandapa* surface of the temple.

Micro-vegetational growth along with dust and dirt were removed using 2-3% solution of liquid ammonia added with nonionic liquid detergent in the ratio 3:1 followed by gentle brushing with different nylon brushes. Lime accretions and red ochre from the stone sculptures were removed by using aqueous solutions of acetic acid with 2-3% dilution. Iron stains were removed by using 5% oxalic acid solutions in aqueous medium, excess acidic ions were neutralized with dilute ammonia solution followed by thorough wash with plenty of plain water and left the whole surface to dry. All the treated and dried surfaces were given a coat of 2% of sodium pentachlorophanate in aqueous medium as fungicide and a mixture of a silicone based Wacker BS-290 in MTO in 1:15 ratio as a preservative coat. The work was completed.

4. CHARMINAR, HYDERABAD, DISTRICT HYDERABAD: The conservation treatment and preservation work has been taken up for the removal of micro-vegetational growth, soot, dust, dirt, birds and bats' excreta from the minarets and mosque made up of lime plaster. Micro-vegetational growth, dust, dirt and other accretions from the surface was removed by using 3% solution of ammonia and non-ionic detergent in the ratio 3:1 in aqueous medium followed by gentle brushing with soft nylon brushes with the utmost care. 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 teepol. After drying the surface was washed thoroughly with plenty of water. The cleaned area was coated with 2% sodium pentachlorophanate as fungicide. On drying the surface was preserved with silicone based water repellent SMK 1311 in water in 1:15 ratio. The work is in progress (pls.174-175).

5. GOLKONDA FORT, HYDERABAD, DISTRICT HYDERABAD: The removal of micro-vegetational growth, and lime accretions from the back wall of *Silaikhana* and other structures mainly comprise of granite with lime plaster was taken up. The micro-vegetational growth was removed using a mixture of 2-3% ammonia and non-ionic detergent in 3:1 ratio, followed by gentle brushing with nylon brushes of different sizes and shapes and thorough washing with plain water. Lime accretions were removed by chemico-mechanical means using 3% acetic acid solution in aqueous medium. The surface was then given a wash with dilute ammonia solution for neutralizing the remnants of acid present if any followed by a thorough wash with plain water. All the treated and dried surface were given a coat of 2% sodium pentachlorophanate as fungicide in aqueous medium. Finally, the surface was preserved with silicone

Plate 174-175



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Charminar, before and after scientific treatment, Hyderabad.

based water repellent Wacker BS-290 and MTO in 1:15 ratio. The work was completed.

6. SRI UMA MAHESWARA SWAMY TEMPLE, YAGANTI, DISTRICT KURNOOL: In continuation to previous year's work, the conservation treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt oil stains, greasy matter and lime and cement flown marks accretions from the *mandapa* and exterior and interior wall of water tank of the temple which is made of granite and slate. The micro-vegetational growth was removed, using a mixture of liquid ammonia and non-ionic detergent in the ratio of 3:1, followed by brushing with nylon brushes of assorted size for the removal of accretions from the intricate carvings and designs. The coats of lime and cement flown marks were subjected to chemico-mechanical treatment by using 5-10% solution of glacial acetic acid in aq. medium. 5% solution of sodium thiosulphate was used for the removal of cement flown marks. Consolidation of selected and deteriorated stone surface was carried out using ethyl silicate coating. All the treated exterior surfaces were given a coat of 2% sodium pentachlorophenate as fungicide in aq. medium and a mixture of a silicone based water repellent Wacker BS-290 and MTO in 1:15 ratio as a protective coat. The work was completed.

7. BALA BRAHMESWARA SWAMY TEMPLE, ALAMPUR, DISTRICT MAHABOOBNAGAR: The conservation treatment and preservation work was taken up for the removal of micro-vegetational growth, dust, dirt, tenacious coats of lime red ochre, soot and oil stains, from the *Nandi mandapa* and other shrines. Micro-vegetational growth was removed using a mixture of 3% aqueous ammonia solution and non-ionic liquid detergent in the ratio of 3:1 followed by gentle brushing with nylon brushes. For the removal of accretions from the intricate carvings and designs cotton swabs were used. Lime and red ochre stains were removed chemico-mechanically by using 3-5% aqueous solution of glacial acetic acid followed by thorough washing with plain water. Iron stains were removed by using 5% solution of oxalic acid in aqueous medium followed by washing with plenty of water. The treated surface was given a coat of 2% sodium pentachlorophenate as fungicide in aqueous medium and a mixture of silicone based water repellent Wacker BS-290 in MTO in 1:15 ratio as protective coat. The work was completed.

8. BUDDHIST ROCK-CUT STUPAS, SANKARAM, DISTRICT VISHAKAPATNAM: The works of removal of micro-vegetational growth, lime coats from the exteriors of the khondalite stupas and brick structures were taken up by using a mixture of 3% ammonia and non-ionic detergent in a ratio of 3:1 followed by brushing with nylon brushes. For removal of lime coat, chemico-mechanical method was used with utmost care. The treated exterior surface was given a coat of 2% sodium pentachlorophanate as fungicide in aqueous medium and a mixture of Wacker BS-290 and MTO in 1:15 ratio as preservative coat. The work was completed.

9. STUPAS AND OTHER STRUCTURES OF LINGALAKONDA, SANKARAM, DISTRICT VISHAKAPATNAM: The works of removal of

micro-vegetational growth along with dust and dirt and small plants from the stupas and outer wall of caves was taken up. Lime coats and other calcareous deposits were also required to be removed. Micro-vegetational growth along with dust and dirt from the exterior surface was removed by using 3-5% liquid ammonia solution added with non-ionic detergent in aqueous medium followed by gentle brushing with nylon brushes. White patches of lichen growth from the pits and pores of the stones were removed by chemico-mechanical means by using cotton swabs. The growth of plants on the stupas and joints were removed with *hing* by injecting its solution in the stems of plants. Lime coats and other calcareous deposits were removed by chemico-mechanical treatment using 2-3% Acetic acid in aqueous medium. The surface was then given a wash with dilute ammonia solution for neutralizing the remnants of acid present 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, in order to preserve the stone surface mixture of Wacker BS-290 in MTO in 1:15 ratio was applied. The work was completed.

10. Buddhist Stupa, Buddhist remains and other Cave, Guntupalle, District West Godavari: The works of removal of micro-vegetational growth along with dirt, dust, bats exreta, cobwebs and other accretions on the exterior of caves and right side of the cave near entrance gate and lime coats, micro-vegetational growth, oil stains, soot and settled dust etc on the stupas was taken up. These stupas and caves are made of sedimentary stone. Micro-vegetational growth with other accretions were eradicated using a mixture of 3% liquid ammonia and nonionic detergent in the ratio of 3:1 followed by brushing with nylon brushes and washing with water. Calcareous deposit of lime coats were removed by chemico-mechanical means with 3-5% acetic acid. The surface was then given a wash with dilute ammonia solution for neutralizing the remnants of acid present, if any. This was followed by a thorough wash with plain water. For the removal of bats excreta a mixture of liquid ammonia and non-ionic detergent in 3:1 ratio was used, besides application of 5% ammonium carbonate and ammonium bi-carbonate in 1:1 ratio in aqueous medium. The entire surface was washed with plain water to ensure elimination of remnants of chemicals from the stone surface. The treated surface was given a coat of 2% sodium pentachlorophenate as fungicide in aqueous medium and finally preserved using Wacker BS-290 in MTO in 1:15 ratio as water repellent. The work was completed.

11. Kush Mahal, Warangal Fort, District Warangal: The conservation treatment and preservation work was taken up for the removal of micro-vegetational growth from the exterior and lime and other calcareous accretions along with dirt and dust from the outer wall which is made of granite stone. Micro-vegetational growth and other superficial accretions were removed using a mixture of ammonia and non-ionic detergent in 3:1 ratio followed by brushing with nylon brushes. Lime accretions and other calcareous patches were removed using 2-3% aqueous acetic acid

solution. The surface was then subjected to a wash with ammonia water for neutralization of acid remnants followed by thorough wash with plain water. The treated dried exterior surface was given fungicide coating using 2% aqueous sodium pentachlorophenate and finally preserved with a mixture of a silicone based Wacker BS-290 and MTO in 1:15 ratio. The work was completed.

12. THOUSAND PILLARED TEMPLE, HANAMKONDA, DISTRICT WARANGAL: The conservation treatment and preservation work was taken up for the exterior of temple along with part of interiors for the removal of micro-vegetational growth, dust, dirt, lime coat, soot and oily stains and other patches of vermillion. The temple is made of granite and gnesiss. Micro-vegetational growth was removed using 2-3% ammonical solution mixed with non-ionic liquid detergent followed by gentle brushing with soft nylon brushes. Lime coat, vermillion and white patchs of calcarious deposit were removed by chemico-mechanical means by using 2-3% aqueous solution of acetic acid followed by thorough washing with plenty of water. Remnants of acidic ions were neutralized with ammonical water followed by thorough washing with water. Dark and deep patchs of soot and oil stains were removed applying clay pack on the surface using fullers earth mixed with 5% solution of sodium carbonate and bi-carbonate, little ammonia solution and non-ionic detergent. After drying, the surface was thorough washed with plenty of water. Selected weak and fragile surface was consolidated by applying OH-100 a stone strengthener. Big cracks on the roof were filled with an ethyl silicate based stone strengthener OH-100, mixed with stone powder in order to prevent water seepage. The treated exterior surface was given a coat of 2% sodium pentachlorophenate as fungicide in aqueous medium. Finally, a mixture of Wacker BS-290 and MTO in 1:15 ratio was applied to the stone surface as protective coat. The work was completed.

ASSAM

13. CACHARI RUINS AT KASHPUR, DISTRICT CACHAR: The scientific treatment and preservation of brick and lime plastered structures like dwelling house, Baradari, east wall, Singha-Darwaza, Snan mandir, Temple of Ranachandi including two small shrines, etc were under taken first time for eradication of micro-vegetational growth, dirt, dust and bats droppings, etc. using 5% ammonia water and teepol mixture. After cleaning, fungicidal treatment was given using santobrite solution to arrest re-growth followed by application of preservative coating of a silicone based Wacker BS-290 in MTO (1.14) wet-on-wet double coat. The bleaching powder slurry was also applied on the plastered surface in order to remove the micro-vegetational growth. Consolidation of weathered building materials was also carried out at selective areas. The work was completed.

14. MONOLITHS KASOMARI PATHER, DISTRICT GOLAGHAT: The dust, dirt, birds droppings and deposition of micro-vegetational growth were cleaned by using a mixture of dilute ammonia and Teepol solution. The treated and cleaned surface was given biocidal treatment with 5% solution of santobrite followed by

application of a silicone based Wacker BS-290 in MTO as preservative coating. The work was completed.

15. KEDAR AND GANESH TEMPLE, HAZO, DISTRICT KAMROOP: Sandstone Kedar Temple and brick structured lime plastered Ganesa Temple having stone sculpture was undertaken for scientific treatment and preservation work for eradication of thick micro-vegetational growth, dirt, dust, smoke and birds droppings using liquid ammonia and non-ionic detergent mixture. The treated surface was given fungicidal treatment using santobrite solution to arrest re-growth and finally, the surface was given preservative treatment with a silicone based Wacker BS-290 in MTO double coat wet on wet. The work was completed.

16. SHIVDOL GROUP OF SHRINES, DISTRICT SIBSAGAR: The chemical cleaning and repair work of the Shivdol group of shrines includes Shivdol, Devidol and Vishnudol shrine which were taken up for removal of thick micro-vegetational growth, birds droppings, dust, dirt, smoke, etc. using 5% aqueous ammonia and non-ionic detergent mixture. The lime plastered surface of the shrines was cleaned using bleaching powder treatment. The chemically cleaned surface was then treated with fungicidal solution of 5% santobrite followed by preservation with a silicone based Wacker BS-290 in MTO (1:14) double coat wet-on-wet. Weak and fragile stone and lime plastered surface was strengthened with an ethyl silicate based stone strengthener Wacker OH-100 at selective places. The work was completed.

BIHAR

17. MONASTERY COMPLEX NO. 4 AND 5, NALANDA, DISTRICT NALANDA: Brick Monastery 4 and 5 were under taken for eradication of micro-vegetational growth, dust, dirt and birds dropping with dilute ammonia and non-ionic detergent applied gently with very soft Nylon brushes. The area so cleaned was given fungicidal treatment with dilute solution of santobrite in water followed by preservative coating wet-on-wet of a silicone based water repellent Wacker BS-290 in MTO. Work is in progress.

18. STUCCO SCULPTURE OF TEMPLE 3, DISTRICT NALANDA: Consolidation, cleaning and preservation including repairing of the stucco figures of Temple 3, which was dissolved and damaged are made of mud followed by lime plaster was carried out at experimental basis and stucco figure 36, 37 and 38 were restored. The restoration and consolidation of dissolved/damaged figures were carried out using plaster of paris, lime, and seep powder mixed with wacker-OH-100. Finally, the stuccos so repaired were given two coats of a silicone based water repellent Wacker BS-290 in MTO. The fine cracks and crevices were filled up by using saline treatment with Wacker OH-100 and coarse and fine grained powder of similar materials.

19. HASAN SHAH SURI TOMB, DISTRICT SASARAM: Chemical treatment and preservation work to the exterior of the tomb was taken up and completed during the year. The stone tomb with lime plastered central and side domes along with minars and minaret was covered with accretionary

deposits like micro-biological growth, dirt, dust, bats excreta, etc. These accretionary deposits were removed using 3 to 5% aqueous ammonia and non-ionic detergent solution. The bleaching powder slurry treatment was given to the lime plastered surface. The fragile and weak stone surface was given consolidation treatment using an ethyl silicate based stone strengthener Wacker OH-100. The area so cleaned was then given fungicidal treatment with 5% solution of sodium pentachlorophenate followed by application of preservative coating wet on wet of a silicone based Wacker BS-290 in MTO. Work is in progress.

GOA

20. Se' Cathedral Church, Goa: Two paintings in Sacrament of Church were covered by salt strips due to seepage of water which was cleaned with the help of organic solvents and preserved with fresh picture varnish (pls. 176-177).

21. Mahakali Temple, Chadrapur, Goa: The accumulation of thick layer of dust, dirt, birds excreta and other similar accretions on the painted surface was removed by using gentle brushing with the help of D-acetone alcohol, ethyl methyl-ketone, nhexane, cellosolve, dibuthyl phthalate, ethanol, methanol and morpholene. Work is in progress.

22. St. Francis of Assisi Church, Old Goa: The chemical conservation and restoration work of a big canvas painting mounted on wooden support was carried out for the removal of dust, dirt, old varnish, 1000 numbers copper nails. Mending of torn canvas was also attended. Removal of dirt and dust and old varnish was carried out with the help of diacetone alcohol, cellosolve. Removal of nails was done by pushing inside the wooden panel. Fixing of canvas on wooden panel was carried out with Wax and mixture flattened with hot spatula and application of fresh picture varnish as preservative. The work was completed.

GUJARAT

23. Ahmed Shah Mosque, Ahemadabad: This sand stone mosque was covered with dust, dirt and micro-vegetational growth. Lime splashes were also present sparingly over the surface. In some portions pulverization was also observed. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1 % non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro-vegetation. Finally, silicon based Wacker BS-290 in MTO was applied on all treated and dry surfaces as hydrophobic treatment. The work was completed.

24. Rani Sipri's Mosque, Ahemadabad: Thick deposition of soot, dust and dirt was observed on interior surfaces and micro-vegetational growth and other accretionary deposits in exteriors. Thick soot and

Plate 176-177



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Panel painting of Se' Cathedral Church, before and after scientific treament, Goa.

other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Clay pack technique was also employed for the removal of soot in interior surfaces. The consolidation was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated area. Work is in progress.

25. JAMI MASJID, PAVAGADH, DISTRICT GODHRA: During the period under review, the conservation treatment work was taken up on the domes and courtyard of the mosque which were covered with dust, dirt, micro-vegetational growth and lime remnants on courtyard portion. In some portions, pulverization of stone was also observed. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The weak and fragile stones were consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro vegetation. Finally, a silicon based Wacker BS-290 in MTO was applied on treated and dry surfaces as hydrophobic treatment. Work is in progress.

26. SAHAR-KI-MASJID, PAVAGADH, DISTRICT GODHRA: During the period under review, the inner of the citadel wall and exterior of the mosque were taken up for the removal of dust, dirt, micro-vegetational growth. In some portions, pulverization of stones was also observed. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1 % non-ionic detergent in water with the aid of soft nylon brushes. The weak and fragile stones were consolidated using an ethyl silicate based stone strengthener Wacker OH-100. Fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro-vegetation. Finally, after proper drying of the stone surface, silicon based Wacker BS-290 in MTO was applied on all treated dried surfaces of Sahar-ki-masjid and SMK 1311 in aqueous media on citadel wall surfaces as hydrophobic treatment. Work is in progress.

27. DWARKADHISH TEMPLE COMPLEX, DWARKA, DISTRICT JAMNAGAR: During the period under review, wood surface, marble surface, stone surface and silver plated surface of this temple were taken up for scientific conservation work. The monument was covered with micro-vegetational growth and deposition of soot, dust and dirt. Thick lime coats and bats excreta were also present on interior of sub-shrines and *mandapa* area. It was observed that deterioration and pulverization of stone in the beginning stage. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by physicochemical method by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest further deterioration. Bats excreta and other

accretions were removed using suitable chemicals. Finally, a silicone based Wacker BS-290 in MTO was applied on treated surface as hydrophobic treatment. Work is in progress.

28. KALIKA MATA TEMPLE, NAVI-DHREWAD, DWARKA, DISTRICT JAMNAGAR: The chemical conservation work was taken up for the removal of thick lime and acrylic paint coats and soot on exterior as well as interior surfaces of the temple. Deterioration and pulverization of stone was in the beginning stage. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. Acrylic paints were removed using organic solvents. The consolidation treatment work was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part, to arrest further deterioration. Fungicidal treatment was given with 2% solution of sodium pentachlorophenate on exterior surfaces. Finally, a silicone based Wacker BS-290 in MTO were applied on all treated exterior surface as hydrophobic treatment. The work was completed.

29. MALAIMATA TEMPLE PALODAR, DISTRICT MEHSANA: The monument was covered with micro-vegetational growth and deposition of dust and dirt. Lime coats were also observed on interior and exterior of main shrine and the *mandapa*. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed using 1-2% acetic acid solution. Work is in progress.

30. LIMBOJI MATA TEMPLE, DELMAL DISTRICT PATAN: The scientific conservation work was taken up for the removal of micro-vegetational growth and deposition of dust and dirt. Lime coats were also present on the interior and exterior of main shrine and *mandapa*. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment is given with 2% solution of solution of sodium pentachlorophenate to arrest re-growth of micro vegetation. Finally, a silicone based Wacker BS-290 in MTO was applied on all treated and dry surfaces as hydrophobic treatment. The work was completed.

31. NILKANTHESWAR MAHADEVA TEMPLE, RUHAVI, DISTRICT PATAN: The monument was covered with micro-vegetational growth and deposition of dust and dirt. Lime coats were also present on interior and exterior of the main shrine and *mandapa*. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl

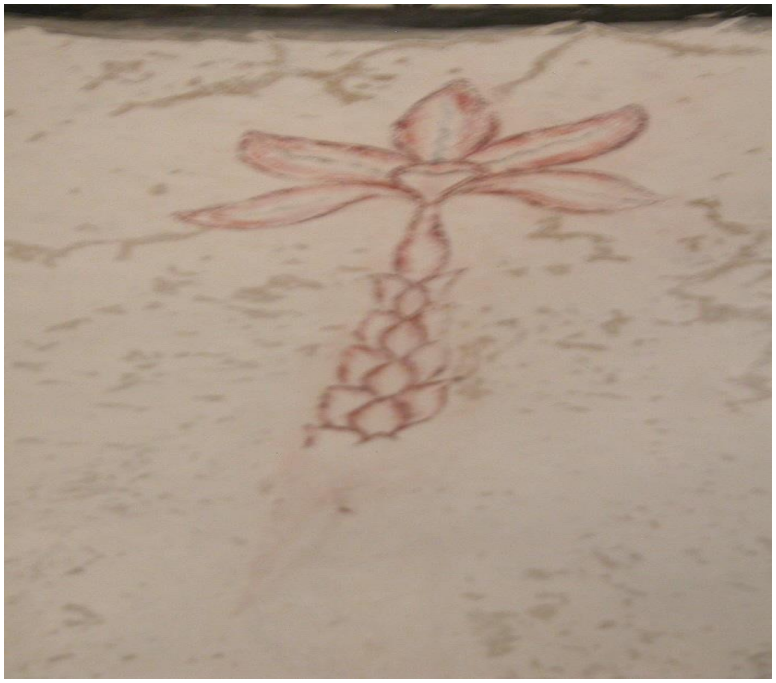
silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro vegetation. Finally a silicone based Wacker BS-290 in MTO were applied on all treated and dry surfaces as hydrophobic treatment. The work was completed.

32. RUINS OF RUDRAMAHALAYA TEMPLE, SIDDHPUR, DISTRICT PATAN: This sandstone monument was covered with micro-vegetational growth and deposition of dust and dirt. Lime coats are also present interior and exterior of main shrine and *mandapa*. Micro-vegetational growth and other superficial accretions were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro vegetation. Finally, a silicone based Wacker BS-290 in MTO was applied over all treated and dry surface as hydrophobic treatment. Work is in progress.

33. DUTCH CEMETERY, SURAT, DISTRICT SURAT: The cemeteries were constructed with brick and stucco plaster having murals on interior portion of the cemetery that includes the Tomb of Hendrik Adrein Vaan Reed. It was observed that the interior paintings are executed on lime plaster now concealed under the multiple layers of lime wash. In the exterior, the paint layer was covered with dust, dirt and soot, etc. resulting in loss of binding medium and fading of pigment layer. The dust and dirt were removed by using organic solvent in various proportions with the help of soft brushes and cotton swab. The multiple lime layers were removed by physico-chemical methods. Re-integration of paintings was carried out wherever necessary, without overlapping the original paint layer. Finally, the treated paintings were preserved by applying 1 - 2 % poly-vinyl acetate solution in toluene. Work is in progress (pls. 178-179).

34. SUN TEMPLE, THAN, DISTRICT SURENDRANAGAR: The scientific conservation work was taken up for the removal of micro-vegetational growth, deposition of dust, dirt and lime coats, etc. on the sandstone surface of the temple interior as well as exterior of main shrine and *mandapa*. Micro-vegetational growth and other superficial accretions on three domes were removed by using 3% ammonia and 1 % non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro-vegetation. Finally, a silicone based Wacker BS-290 in MTO was applied on all treated and dry surfaces as hydrophobic treatment. Work is in progress.

Plate 178-179



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Paintings at Dutch Cemetery, before and after scientific treatment, Surat.

and other superficial accretions on three domes were removed by using 3% ammonia and 1 % non-ionic detergent in water with the aid of soft nylon brushes. Lime coats were removed by using 1-2% acetic acid solution. The consolidation treatment was carried out using an ethyl silicate based stone strengthener Wacker OH-100 in the deteriorated part to arrest pulverization of stone. Then fungicidal treatment was given with 2% solution of sodium pentachlorophenate to arrest re-growth of micro-vegetation. Finally, a silicone based Wacker BS-290 in MTO was applied on all treated and dry surfaces as hydrophobic treatment. Work is in progress.

35. TAMBEKAR WADA. VADODRA, DISTRICT VADODARA: The paint layer was covered with dust, dirt etc. Dissolution of binding medium and fading of pigment layer due to seepage of water and moisture effect was observed in some parts. Flaking of paint layer at some location was also noticed. The dust, dirt and darkened varnish were removed by using organic solvent in suitable proportions with the help of soft brushes and cotton swab. Fragile painted pigments, plaster were consolidated by using synthetic adhesives and flaking of pigment layer was fixed with poly vinyl acetate solution. Finally, the treated paintings were preserved by applying 1-2% poly vinyl acetate solution in toluene. Work is in progress.

HARYANA

36. CANTONMENT CHURCH TOWER, KARNAL, DISTRICT KARNAL: The monument was covered with thick black deposit of dust, dirt, birds excreta, micro-vegetational growth and other hard accretions. Suitable mixture of liquid ammonia and non-ionic detergent were applied with nylon brushes to remove these deposits and accretions. To arrest the further quick growth of micro-vegetational growth over the monument, cleaned surface was given fungicidal treatment with 2-3% aqueous of sodium pentachlorophenate solution. In order to provide water repellent effect and preservation on treated and dried surface, two coats of suitable preservative solution in proper ratio with solvent was used. Work has been completed.

37. JAL MAHAL, NARNAUL, DISTRICT MAHENDRAGARH: The exterior walls of monument and surface of the dome were thickly covered with black coloured deposition of micro-vegetational growth and other multiple accretions, giving a shabby appearance to the monument. These accretions and deposition were removed with suitable mixture of liquid ammonia and surface active agent using soft nylon brushes and clean water. Subsequently, 2-3% aqueous solution of sodium pentachlorophenate was sprayed as fungicide over treated and cleaned surface of the monument. A stone strengthener solution was used to consolidate the deteriorated and weathered portion of the monument. The chemically treated and dried surface was given water repellent treatment with suitable solution of preservative. The work was completed.

HIMACHAL PRADESH

38. PHOO GUMPHA, TABO, DISTRICT LAHAUL AND SPITI: In continuation to

previous year's work, the remaining area of wall painting was taken up for chemical conservation and consolidation work. The painted portion which was taken up during the period under review was badly covered with thick and shining old yellowish preservative layer, dust, dirt, mud streaks, soot and smoke, etc. Besides this, cracks, bulging, flaking, peeling, chipping and damage of painted plaster and application of acrylic colour over the panels were observed at several places. Superficial accretions such as dust, dirt etc. were removed by soft hair paint brushes while, chemical treatment was carried out with the appropriate mixture of different suitable organic solvents to remove water streaks, soot grease and other hard accretions. Filleting, edging and mending work of damaged portions were carried out with suitable and locally available natural materials. Colour re-integration was done at the repaired, consolidated and chemically treated portions by the artist, followed by preservation work with the application of 0·5-1% poly vinyl acetate solution in toluene.

39. BUDDHIST MONASTERY, TABO, DISTRICT LAHAUL AND SPITI: The painted walls of the Ser-Khang were taken up for chemical conservation. The problems of cracks, flaking and chipping were also observed at several places on the murals. Superficial accretion such as dust, dirt, etc were removed by soft hair paint brushes, while soot, grease and other hard accretions were removed with the suitable organic solvents such as alcohol, 2-ethoxy ethanol, turpentine oil, triethanolamine, etc. and their mixture in suitable ratio. The damaged portions were repaired and cracks and crevices were filled and filleted with suitable and locally available materials. Colour reintegration was carried out on consolidated and chemically treated portions followed by preservation with the coating of suitable preservative solution on the murals. Work is in progress.

40. ARDHANARISWAR TEMPLE, MANDI, DISTRICT MANDI: Most of the area of this temple was covered with micro-vegetational growth, soot and other accretions which was taken up for removal of micro-vegetational growth and other accretions with a suitable mixture of liquid ammonia and surface active agent in clean water with soft nylon brushes. After washing the treated surface thoroughly, the fungicidal treatment was given to the stone surface. Preservative solution was applied on the dried surface for giving preservation and water repellent treatment. The work was completed (pls. 180-181).

41. ASAPURI TEMPLE, DISTRICT KANGRA: The main chemical conservation problem was micro-vegetational growth, dust, dirt and other accretions. The stone surface was suffering from acute weathering effect, at several places causing pulverization and exfoliation effect. The superficial accretions were removed by using a suitable mixture of liquid ammonia and surface active agent followed by spray of aqueous solution of sodium pentachlorophenate as a fungicide. In order to give strength to the weak and weathered surface, consolidation work was carried out. Two coat of preservative were applied on the stone surface for providing water repellent. Work is still in progress.

Plate 180-181



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Ardhanarishwar Temple, before and after scientific treatment, Mandi.

42. Fort Kangra, District Kangra: The stone of the fort walls and cells were covered with extensive growth of micro vegetation, dust, dirt and other accretions. Most of the area of walls and cells were under the process of weathering due to extensive humid condition around the fort. Under the process of chemical conservation, first of all, stone surface was subjected to chemical treatment for removal of micro-vegetational growth and other accretions using aqueous ammonia solution and non-ionic wetting agent. Fungicidal treatment was given to the cleaned surface of the monument by the aqueous solution of sodium pentacholorophenate in order to check the further rapid growth of micro-vegetation. The weathered and weak stone surface was consolidated with stone strengthener wherever it was required, and was preserved with two coats of suitable preservative solution in proper ratio, with its solvent. The work was completed.

43. Baijnath Temple, Baijnath, District Kangra: The monument was badly covered with micro-vegetational growth, dust, dirt, bird excreta and other engrained accretions. The temple was subjected to chemical treatment with aqueous solution of different chemicals like liquid ammonia, non-ionic detergent and organic solvents for the removal of micro-vegetational growth along with other accretions. Cleaned surface was sprayed with aqueous solution of Sodium pentacholorophenate as a fungicide. Where stone surface was weak and weathered, a stone strengthener was applied for its consolidation. For preservation of entire area, two coats of preservative solution in proper ratio with solvent were applied over the dried surface. Work is in progress.

KARNATAKA

44. Virupaksha Temple, Hampi, District Bellary: King Krishna Devaraya built the front pillared hall made up of granite called *Rangamandapa.* The ceiling of this *mandapa* which is made up of lime plaster is decorated with beautiful paintings. The main conservation problems was deposition of soot accretions, white patches due to sand blasting, water leakage and bulging of painted plaster. Work is in progress.

45. Mallikarjuna Temple, Kuruvathi, District Bellary: The portion of the main temple is lime plastered. The exterior surface was covered with thick deposit of dust, dirt, micro-vegetational growth and red ochre marks. The plinth area was deteriorated due to weathering. General cleaning for removal of dust, dirt, and micro-vegetational growth was taken up using dilute solution of ammonia and non-ionic detergent. Removal of lime coat, red ochre was carried out using dilute acetic acid solution, followed by neutralization with dilute ammonia solution. The clay pack method using fuller's earth, sodium carbonate and sodium bi-carbonate was taken up to remove sooty and oily depositions over the interior surface of the temple. Deteriorated stone surface was strengthened using an ethyl silicate based stone strengthener Wacker OH-100. 2% aqueous solution of sodium pentachlorophenate was applied as fungicide over the entire cleaned outer surface.

Finally, a silane siloxane mixture Wacker SMK 1311 in water in the ratio of 1:12 was applied over the dried exterior surface as water repellant. The work was completed (pls. 182-183).

46. AKKANA BASATI, SRAVANABELGOLA, DISTRICT HASSAN: In continuation to previous year's work, the chemical conservation work was taken up on the stone surface for the removal of dust, dirt, micro-vegetational growth on the exterior and thin lime coat patches and soot from the interior surface. Dilute ammonia (3-5 %) mixed with nonionic detergent in water was used to remove superficial accretion and micro-vegetational growth. To remove lime coats, dilute acetic acid solution in water was used followed by neutralization treatment using dilute aqueous ammonia. Clay pack method was used for removing soot and oily accretion with fuller's earth, sodium carbonate and sodium bicarbonate. An ethyl silicate based stone strengthener Wacker OH-100 was used to arrest further deterioration of weak and fragile stone surface. 2% aqueous solution of sodium pentachlorophenate was applied as fungicide over the entire cleaned outer surface. Finally, a silane siloxane mixture (Wacker SMK 1311) in water in the ratio of 1:12 was applied over the dried exterior surface as water repellant. Work is in progress.

47. KADAMBESWARA TEMPLE, RATTIHALLI, DISTRICT HAVERI: Scientific conservation work was taken up as an on-going work from last year. This temple is constructed with chloritic schist stone. The exterior surface of the monument was affected with dust, dirt and micro-vegetational growth in many areas and lime coats in some areas. The general cleaning was carried out using dilute (3-5 %) aqueous solution of ammonia and non-ionic detergent. For removal of lime wash, dilute aqueous acetic acid solution was used followed by neutralization treatment using dilute ammonia solution. An ethyl silicate based stone strengthener Wacker OH-100 was applied over the fragile/flaky surface. 2% aqueous solution of sodium pentachlorophenate was applied over the dried cleaned surface as fungicide. Finally, water repellent Wacker SMK 1311 (active agent – silane siloxane) was applied on the exterior surface mixed with water in the ratio 1:12. Work has been completed.

48. SOUMYA KESHAVA TEMPLE, NAGAMANGALA, DISTRICT MANDYA: In continuation to previous year's work, the chemical conservation work was taken up for the removal of dust, dirt, micro-vegetational growth, lime wash coats, oily and sooty accretion in interior side of the ceiling, walls and pillars. Removal of dust, dirt, micro-vegetational growth, was carried out using dilute solution of ammonia and non-ionic detergent. Lime wash coat was removed using dilute glacial acetic acid solution in water, followed by neutralization with dilute ammonia solution. Soot and oily accretion were removed using clay pack method, using fuller's earth, sodium carbonate and sodium bi-carbonate. The weak and fragile stone members were strengthened applying an ethyl silicate based stone strengthener (Wacker OH-100). The total exterior surface was given fungicidal treatment with 2% aqueous solution of sodium pentachlorophenate. Finally, water repellent was applied using Wacker

Plate 182-183



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Mallikarjuna Temple, Kuruvathi Bellary, before and after scientific treatment Karnataka.

Wacker SMK 1311 in potable water in the ratio of 1:12. The work was completed.

49. LAKSHMI NARASIMHA TEMPLE, MAREHALLI, DISTRICT MANDYA: The main conservation problem was deposition of thick lime accretions and red ochre over the surfaces. The details of sculpture were obscured in lime wash. The exterior parts were covered with dust, dirt, thick micro vegetation, lime coats and red ochre. Removal of dust, dirt, micro-vegetational growth, has been carried out using dilute solution of ammonia and non-ionic detergent. Lime wash coat is being removed using dilute glacial acetic acid solution in water, followed by neutralization with dilute ammonia solution. The work is in progress.

MADHYA PRADESH

50. BADAL MAHAL GATE, CHANDERI, DISTRICT ASHOK NAGAR: The scientific conservation work was taken up during the period under review. The stone carvings and *jali* work were very carefully treated for the removal of micro-vegetational accretion and other surface deposits using a mixture of dilute ammonia solution with a non-ionic wetting agent. After proper cleaning and drying, biocide treatment was given to check recurrence of micro-vegetational growth. Finally, a preservative coat was applied using a silicone based Wacker BS-290 in MTO (1:15) ratio. The work was completed.

51. JAMA MASJID, CHANDERI, DISTRICT ASHOK NAGAR: The scientific conservation work that was taken up on the exposed exterior stone surface of this monument included eradication of micro-vegetational growth and other superficial accretions. To facilitate the easy removal of these accretions, mixture of dilute ammonia solution with an effective wetting agent was used. At the entrance gate, the stone carvings were covered with thick coat of lime which was removed mechanically using dilute solution of acetic acid. The cleaned surface was suitably preserved with a silicone based Wacker BS-290 diluted in 1:15 ratio with MTO after biocide treatment. The work was completed.

52. RAJA-KI-CHHATRI, BURHANPUR, DISTRICT BURHANPUR: This structure consisted of nine domes on a high platform is constructed of grey colored sand stones and was carefully treated to remove the harmful micro-vegetational accretions using mixture of dilute ammonia solution (3%) and a non-ionic detergent with mild brushing. The cleaned surface was given biocide treatment and thereafter a preservative coat was applied using a silicone based Wacker BS-290 in MTO (1:15 ratio) to preserve as well as to protect the structure from the vagaries of physical and chemical deteriorating factors. The work was completed.

53. LAXMAN TEMPLE, KHAJURAHO, DISTRICT CHATTARPUR: The removal of micro-vegetational growth and other extraneous matter from the exposed exterior stone surface was taken up by using the mixture of dilute ammonia solution and non-ionic detergent. Hydrophobic treatment was finally given to the cleaned surface to check ingress of water/moisture through the fabric of the stone. Work is in progress.

54. PARSVANATHA TEMPLE, JAIN GROUP OF TEMPLES, KHAJURAHO, DISTRICT CHATTARPUR: This work was taken up during the period under review for the removal of old preservative coating of polymethyl metha acrylate which was given earlier about 5-6 years back turned white and was obstructing the beauty of the stone sculptures as white streaks with blooming effect. Sulphur free toluene has been used with certain other organic solvents using soft muslin cloth for the removal of the white marks. Work is in progress.

55. ASHARFI MAHAL, MANDU, DISTRICT DHAR: The scientific conservation work was taken up on this monument during the period under review on the interior of the corridor and ceiling. The work also included scientific cleaning and preservation of exterior exposed stone surface of the corridor and ruins of victory tower of the monument for the removal of micro-vegetational and other accretionary deposits. The main challenge was to clean exposed lime mortar of the ruins of the victory tower and to give hydrophobic treatment. Work is in progress.

56. JAHAZ MAHAL, MANDU, DISTRICT DHAR: In continuation to previous year's work, scientific conservation work was carried out for the treatment of micro-vegetational growth and other extraneous matter from the stone surface. Mixture of dilute ammonia solution and a non-ionic detergent was used with mild mechanical working using soft nylon brushes. The treatment also included preservation of the cleaned surface with the application of a preservative coat of a silicone based Wacker BS-290 in MTO in the ratio of 1:15 after biocide treatment. The work was completed.

57. JAMI MASJID, MANDAV, DISTRICT DHAR: In continuation to previous year's work, scientific conservation work was carried out on the interior stone surface of a big prayer hall made up of black and white marble in order to remove unwanted accretions from the stone surface. Outer exposed area of the hall and interior as well as exterior of closed wall (cloisters) of the monument was also treated in order to remove extraneous matter and micro-vegetational growth deposited on the stone surface. The scientific treatment involved the use of suitable chemicals like dilute ammonia solution and non-ionic wetting agent in appropriate concentration to facilitate the easy removal of harmful deposits with minimum mechanical working. The clay pack treatment was also used for the cleaning of marble surface. The cleaned marble surface was polished, where ever required. The fungicidal and hydrophobic treatment was given on the exposed cleaned surface of the prayer hall. Work is in progress.

58. HATHI DARWAZA, MAN SINGH PALACE, GWALIOR FORT, GWALIOR, DISTRICT GWALIOR: In continuation to previous year's work, scientific conservation work continued on the exposed stone surface of the monument in order to remove extraneous matter and micro-vegetational growth using mixture of dilute 2% ammonia solution and non-ionic detergent. On certain area lime layer was also removed using dilute acetic acid solution which was found under micro-vegetational growth after cleaning. The

cleaned and dried stone surface was given fungicidal treatment to arrest the further growth of micro-vegetation. Finally, a preservative coat was applied using a silicone based Wacker 290 in MTO (1:15 ratio) to stop ingress of moisture in the stone fabric. The work was completed.

59. ROCK-CUT RELIEF FIGURES OF JAIN TIRTHANKARS, URWAI GATE, GWALIOR FORT, GWALIOR, DISTRICT GWALIOR: These relief figures were in very bad state required to be strengthened and preserved suitably. Prior to consolidation treatment, all the damaging extraneous matter along with micro-vegetational growth was removed very carefully using mixture of dilute ammonia solution and a non-ionic detergent. Later, paper pulp treatment was given to the sculptures as per requirement so as to remove soluble salts, if present in the stone matrix. Thereafter, consolidation treatment was given using an ethyl silicate based stone strengthener Wacker OH wherever it was required. At some places consolidation treatment was given before the cleaning as stone was so fragile that it was not possible to carry out the cleaning. After consolidation treatment, biocide treatment was given followed by hydrophobic treatment using a silicone based Wacker BS-290 in MTO in 1:15 ratio. Work is in progress.

MAHARASHTRA

60. AJANTA CAVES, AJANTA, DISTRICT-AURANGABAD: Besides removal of dust and dirt from paintings and sculptures of different caves using soft brushes, temperature and relative humidity were maintained regularly at caves. Insecticidal treatment was also given regularly on fortnight basis of the unpainted surface using 2% pyrethrum extract in solvent as a preventive measure. Field laboratory at Fardapur is the main analytical laboratory to devise and test the process being used for chemical conservation, preservation & consolidation works at Ajanta caves. During this year, various experimental activities were done in the field laboratory and the result extended to the actual scientific conservation work at Ajanta. In continuation to the previous year's work, the paintings on ceiling of the Cave 1, 2, 9, 10 and 17 were subjected to conservation treatment for the removal of dust, dirt, soot accretions and old preservative coating from Cave 6 and 17 using mixture of suitable organic solvents in different proportions. The loose grains of white pigments etc. on the surface were consolidated and gaps/lacunae were filled with suitable materials. After drying the surface was scientifically cleaned with a mixture of suitable organic solvents followed by preservative treatment using 0·5-1.0% solution of polyvinyl acetate in toluene on the cleaned and dried surface. In order to consolidate the sculptures of Cave 9, 10, 15A, 21 and 22, an ethyl silicate based stone strengthener was percolated inside the cracks, exfoliated and damaged portion by saline method in which the flow of strengthener was regulated as per the requirement. Painted area in Cave 11 and 16 were consolidated using lime plaster and mud plaster. The basalt stone surface at the façade of Cave 4, 10, 15 and 21 were subjected to conservation treatment for the

removal of white depositions of salts, bats excreta, dust, dirt and thick layer of micro-vegetational growth using paper pulp and clay pack methods followed by thorough washing with distilled water to make it salt free. For the removal of micro-vegetational growth aqueous solution of ammonia and non-ionic detergent with few drops of hydrogen peroxide was used. The entire cleaned and dried surface was then given a silicon based water repellent treatment using Wacker BS-290 solution in MTO.

61. AURANGABAD CAVES, DISTRICT AURANGABAD: The stone surface and sculptures of Cave 10 which were carved out in trap basalt rock were undertaken for the removal of thick layer of dust, dirt birds excreta and other accretions on the stone/sculptures of interior and filling of cracks in the sculptures/stone particularly adjacent to quartz veins. Removal of superficial dust, dirt was carried out by gentle brushing. Removal of micro-vegetation growth, cemented dust, dirt birds excreta and other similar accretions were carried out with the help of 2 to 3 % aqueous solution of ammonia + 1% non-ionic detergent and gentle brushing with nylon bushes followed by thorough washing with copious volume of water. The bats' excreta was eradicated with mixture of 5% solution of EDTA, 3% solution of ammonium carbonate, 5% solution of ammonia and drops of triethanolamine. The cracks were filled up with matching rock powder and Wacker OH-100. Application of 2% aqueous solution of sodium pentachlorophenate on cleaned area was given as a fungicide. Application of silicone based Wacker BS-290 diluted in MTO in 1:13 proportions were applied as preservative on the above treated area in dry state. The work was completed.

62. ELLORA CAVES, ELLORA, DISTRICT AURANGABAD: The conservation treatment of stone sculpture and surface of Cave 12 (exterior, façade and interior of ground floor), Cave 33 (lower interior and exterior) and Cave 34 (interior and exterior) was carried out to remove the cemented dust, dirt, bird excreta using 2-3% aqueous solution of ammonia and non-ionic detergent by gentle brushing with nylon brushes followed by thorough washing with cleaned water. Calcareous deposits from rock surface were removed with the help of 1-3% aqueous solution of acetic acid and 1% non-ionic detergent with gentle brushing using nylon brushes followed by thorough washing with clean water. Removal of dust, dirt and soot from mural paintings was carried out using suitable organic solvents like methanol, ethyl methyl ketone, butanol and butylamine mixture in suitable proportions. In order to stabilize the painted surface consolidation, fixing/filleting work of loose painted plasters, cracks, holes, etc. were carried out using appropriate compatible materials and an ethyl silicate based consolidate Wacker OH-100. The cleaned stone surface was given fungicidal treatment using 2% aqueous solution of sodium pentachlorophenate. On the stone/sculpture surface in dry state water repellent treatment was given using Wacker BS-290 diluted in MTO in 1:12 ratio as preservative. The work was completed.

The basalt stone caves of Ganesa Leni having mural paintings on mud and lime

plaster surface were infected with insect activity. To stop this activity, the entrances of caves was properly sealed with the help of plywood and wooden rafters then fumigation with nitrogen and ethylene oxide gas was carried out by exposing the caves to gas for 36 hours and then sealing was removed and the remaining gas was exhausted with exhaust fan. Fumigation of Ganesh Cave 2 with nitrogen and ethylene oxide was carried out to study the effect of gas on m ural paintings and insect activity. Work has been completed.

63. BIBI-KA-MAQBARA, DISTRICT AURANGABAD: The conservation treatment of red sand stone jali, marble slabs and stucco plaster was carried out for the removal of dust, dirt, birds excreta and accretions of suspended particulate matter on the stucco plaster, thick and tough deposits on the marble portion and removal of micro-vegetational growth. Superficial dust, dirt and other accretionary deposits were removed by gentle brushing. Removal of micro-vegetational growth was carried out by applying calcium hypo chlorite paste mixed with sodium pentachlorophenate followed by thorough washing with copious distilled water. This treated stucco plaster was cleaned by applying 1 to 2% aqueous solution of ammonia and 1% non ionic detergent by gentle brushing with nylon brushing followed by thorough washing with distilled water. Consolidation of fragile stuccos and weathered stone *jalis* was carried out with the help of an ethyl silicate based stone strengthener Wacker OH-100. Application of 2% aqueous solution of sodium pentachlorophenate was given over the dried surface as fungicidal treatment followed by preservative treatment by applying three coats of Wacker BS-290 diluted in MTO in 1:10 ratio in dry state.

Marble portion of monument was treated by applying a homogenous paste of fullers earth mixed with 1% non-ionic detergent, a little of sodium pentachlorophenate and traces of triethanol amine in order to soften the hardened sticky accretions. The paste was covered with polythene sheets for 24 hrs for maximum adsorption. Paste was uncovered on being dried and then removed off. The surface so obtained was thoroughly washed with copious distilled water. The process was repeated wherever required for complete eradication of accretions. The work was completed.

64. PITALKHORA CAVES, DISTRICT AURGANGABAD: This Cave is made up of basalt rock having carved sculptures on it. The *dwarpala* near entrance were highly fragile due to weathering of basalt stone as water flows directly on it during rainy season. Old cracks were widened due to seepage of water. Removal of dust, dirt, and old decomposed filling materials were carried out using suitable reagents. Mending work was carried out with rock powder and ethyl silicate. Filling of cracks on top of sculpture was carried out with ethyl silicate and basalt stone powder. The work was completed.

65. DIGHI TEMPLE, DISTRICT DIGHI: Thick coat of lime coat, vermillion coat *(sindoor),* applied on the walls and some sculptures of the temple were removed by 2 – 3% of acetic acid solution. A 10% sodium hydroxide solution was used to remove the

vermillion coat *(Sindoor).* After removing the lime wash, the surface was left to dry for some days. Chemical treatment was carried out using mixture of organic solvents in proper ratio to remove oil and soot accretions. *Mandapa* verandah pillars and beams were covered will blackish micro-vegetation, soot and thick accretions like dust, dirt, lime coats, vermillion coats etc. Chemical cleaning of the thick black and sooty accretions was carried out with the help of mixture of organic solvents and finally to remove the adhered accretions, it was treated with ammonia and non-ionic detergent using nylon brushes and coir scrubbing brushes. When surface was completely dried, a silicone based Wacker BS-290 solution in MTO was applied as a preservative on the cleaned and dried surface, which acts as a water repellent. The scattered pieces collected from different locations inside and outside the temple were subjected to chemical treatment using ammoina and non-ionic detergent for removal of accretionary and other superficial deposits. After completion of this work, mending of broken pieces was carried out using epoxy and stone powder. The treatment was required to give additional support and stability to the sculpture. When surface was completely dried, a silicone based Wacker BS-290 solution in MTO was applied as a preservative on the cleaned and dried surface. Work has been completed.

66. CHANGDEO TEMPLE, DISTRICT CHANGDEO: The sculptures on the outer surface wall were damaged due to exfoliation and weathering, etc. on account of high variation in humidity conditions. Weathered portion and loose portions were consolidated using an ethyl silicate based stone strengthener Wacker OH-100 using saline technique. When surface was completely dried, a silicone based Wacker BS-290 solution in MTO was applied as a preservative on the cleaned and dried surface, which acts as a water repellent.

Chemical cleaning of the thick black dry accretions, water marks, micro-vegetational growth, on the ante- chamber, verandah and verandah walls were carried out with the help of ammonia and non-ionic detergent using nylon brushes and coir scrubbing brushes. Nearly 2-3% of acetic acid solution was used for removing the lime applied on the verandah walls inside the temple and 10% sodium hydroxide solution was applied to remove the vermillion coats applied on pillars and some portion of the walls for bringing back the original architecture. The work was completed.

67. ELEPHANTA CAVES, DISTRICT AURANGABADS: This Cave is made up of basalt rock and the main chemical conservation problem was accumulation of thick layer of micro-vegetational growth, dust, dirt, birds excreta and other superficial accretions on the stone/sculptures of interior as well as exterior surface. Cracks in the sculptures/stone particularly adjacent to quartz veins were also observed. Salt deposition was also observed. The chemical conservation was carried with the help of 2 to 3% aqueous solution of ammonia + 1% non-ionic detergent by gentle brushing with nylon bushes followed by thorough washing with copious volume of water. Paper pulp method was used to remove salts deposition over the surfaces. An ethyl silicate based

stone strengthener Wacker OH-100 was applied on fragile areas to give strength. Tenacious and calcareous deposits were removed with the help of 1 to 3% aqueous solution of acetic acid + 1% non-ionic detergent followed by thorough washing with copious volume of water. The bats' excreta was eradicated with mixture of 5% solution of EDTA, 3% solution of ammonium carbonate, 5% solution of ammonia and few drops of Triethanolamine. Filling up of cracks was carried out with matching rock powder and Wacker OH-100. 2% aqueous solution of sodium pentachlorophenate was applied on cleaned area as was given for fungicidal treatment. Application of silicone based Wacker BS-290 diluted in MTO in 1:13 proportions was applied as preservative on the above treated area in dry state. Work has been completed.

ODISHA

68. BHRINGESWAR MAHADEV TEMPLE, BAJRAKOT, DISTRICT ANGUL: The outer surface of the sanctum is carved with the images of deities and sculptures which were covered with thick micro-vegetational growth along with dust and dirt. Due to high humidity of eastern region, the hydrolysis of minerals present in the stone results in the erosion of the stone. Micro-vegetational growth was treated with 2% liquid ammonia solution while dust and dirt, etc. were removed by soft brushing with aqueous non-ionic detergent. An ethyl silicate based stone strengthener Wacker OH-100 was applied on the stone surface as a consolidant. 2% aqueous sodium pentachlorophenate solution was sprayed over the surface as a fungicide. Two coats (wet-on-wet) of Wacker BS-290 diluted with MTO in 1:16 ratio on the total stone surface was applied as preservative. The work was completed.

69. ANNAKOTESWAR TEMPLE, LATADEIPUR, DISTRICT DHENKANAL: The temple is made of Khandolite stone in ashlar masonry. The temple was thickly covered with living and dried micro-vegetational growth of trees. Due to prolong weathering, erosion of the stone was observed. For eradication of micro-vegetational growth, the effected surface was treated with 2% aqueous ammonia solution. The dust and dirt, etc. were removed by soft brushing with aqueous non-ionic detergent. To give extra strength to weak stones, an ethyl silicate based stone strengthener Wacker OH-100 was used on the stone as a consolidant. 2% aqueous sodium pentachlorophenate solution was sprayed on the surface to resist fungicidal growth. Two coats (wet-on-wet) of a silicone based Wacker BS-290 diluted with MTO in 1:16 ratio on the t-tal stone surface was applied as preservative. The work was completed.

70. ANANTA VASUDEV TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The temple was covered with thick micro-vegetational growth, along with dust, dirt and smoke. High humid condition is responsible for hydrolysis of minerals present in the stone. Erosion of stone is noticed in some places. Treatment of micro-vegetational growth was carried out using 2% aqueous ammonia and removal of dust and dirt by nonionic detergent. Application of an ethyl silicate based stone strengthener Wacker OH-100 was used as surface

consolidant. To arrest fungicidal growth, 2% solution of sodium pentachlorophenate was applied in aqueous media and sprayed over the surface. Finally double coat (wet-on-wet) of Wacker BS-290 (mixture of silane and siloxane), diluted with mineral turpentine oil in 1:16 ratio as preservative, had been applied. The work was completed.

71. BRAHMESWAR TEMPLE, BHUBANESWAR, DISTRICT KHURDA: Due to heavy rainfall the temples were covered with micro-vegetational growth, oil and sooty accretions and in some places loss of cementing material from stone was also observed. Micro-vegetational growth was removed by 2% aqueous ammonia solution and dust, dirt, etc. by non-ionic detergent using soft brushing. To enhance the strength to the weathered stone, an ethyl silicate based stone strengthener Wacker OH – 100 was applied as consolidant. Fungicidal application was given by spraying 2% aqueous sodium pentachlorophenate solution for arresting further micro-vegetational growth. After 15 days wet-on-wet two coats of a silicone based Wacker BS-290 diluted with Mineral MTO in 1:16 ratio was applied as preservative. Work is in progress.

72. RAJARANI TEMPLE, BHUBANESWAR, DISTRICT KHURDA: The temple was fully covered with micro-vegetational growth, dust and dirt, etc. due to favourable conditions of high humidity and heavy rainfall. The surface of the temple was obliterated with bird's droppings. Prolonged dampness has caused erosion of stone due to the hydrolysis of minerals. The dust, dirt, birds' excreta, micro-vegetational etc. were cleaned by using mixture of 2% aqueous ammonia and non-ionic detergent solution with soft brushing. Wacker OH-100 (Ethyl Silicate) was applied as surface consolidant. To check further micro-vegetational growth, 2% solution of sodium pentachlorophenate in aqueous media was sprayed on the surface. Finally double coat (wet-on-wet) of Wacker BS-290 (mixture of silane and siloxane), diluted with mineral turpentine oil in 1:16 ratio was applied as preservative. Work has been completed (pls. 184-185).

73. SUN TEMPLE, KONARK, DISTRICT PURI: The chemical conservation problem was accumulation of dust and dirt, salt deposition, micro-vegetational growth and loss of cementing materials from the stones. Soluble salts were removed from stone surface by repeated paper pulp treatment using de-ionized water, confirmed by testing with silver nitrate solution. Micro-vegetational growth was treated with 2% liquid ammonia and removal of dust and dirt by non-ionic detergent. Application of an ethyl silicate based stone strengthener Wacker OH – 100 was applied as a surface consolidant. 2% solution of sodium pentachlorophenate in aqueous media was sprayed on the surface as fungicide. Finally, double coats (wet-on-wet) of Wacker BS-290 (mixture of silane and siloxane) diluted with mineral turpentine oil in 1:16 ratio was applied as preservative. The work was completed.

PUNJAB

74. DAKHNI SARAI, DAKHNI, DISTRICT JALANDHAR: The monument was badly covered with thick deposition of dust, dirt

Plate 184-185



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Raja Rani Temple, before and after scientific treatment, Bhubaneshwar.

and birds excreta and micro-vegetational growth. These accretions and deposits were removed with soft nylon brushes using a suitable mixture of liquor ammonia and surface active agent. After thorough washing, the cleaned surface was sprayed with the solution of a fungicide with appropriate concentration. Weak and weathered area of the monument was consolidated with stone strengthener as per the requirement. Well dried surface of the monument was preserved with two coat (wet on wet) of a preservative to give the surface water repellency. Work is in progress.

75. QUILA MUBARAK, PATIALA, DISTRICT PATIALA: Wall paintings in Masnad hall and Rang Mahal were facing multiple problems like loss of colour pigments, water seepage, moisture through capillary rise, soot and human vandalism on painted plaster surface. Pulverization, cracks, bulging, flaking, peeling, loss of painted plaster and deposition of dark accretion etc were also observed. Chemical treatment was carried out on wall paintings at the damaged portions. Chemical treatment was carried out on the murals using the different organic solvents and their mixture as per the requirement, viz methanol, ethoxyethanol, triethanolamine, etc. colour re-integration work was carried out, wherever required. This treated surface was preserved with a coat of poly vinyl acetate solution in toluene of suitable concentration. Work is in progress.

RAJASTHAN

76. LAL MASJID, TIJARA, DISTRICT ALWAR: The rectangular structure and domes were blackened due to micro-vegetational growth, dirt, dust, birds and bats dropping, etc. The *jharoka* and arched gates are made of red sand stone where as rectangular structure is made of dark brown black sand stone. Micro-vegetational growth was eradicated by using 2 to 3% liquid ammonia solution in aqueous media added with non-ionic liquid detergent, followed by application of sodium pentachlorophenate as a fungicide on cleaned and dried stone surface. After that, an ethyl silicate based stone strengthener Wacker OH-100 was applied on the surface. Finally, application of water repellent was given using a silicone based Wacker BS-290 in MTO in appropriate proportion. Work is in progress.

77. SIVA TEMPLE 3, ARTHUNA, DISTRICT BANSWARA: In continuation of the previous year's work, the work of the scientific conservation of the temple was undertaken to remove the accretions form the surface of the temple using liquied ammonia and non-ionic detergent in suitable concentrations with the aid of soft nylon brushes followed by the fungicidal treatment by the application of sodium pentachlorophenate 4% solution in water by spraying. Consolidation of the stone blocks was also carried out, where ever necessary, by impregnating building blocks with stone strengthener. Finally, the whole surface of the temple was imparted water repellency by the application of silicone based water repellant. The work was completed.

78. CHITTAURGARH FORT, DISTRICT CHITTAURGARH: The work of chemical treatment and preservation of the entrance gateway [Tripolia Gate] and the exterior

surface of eastern and northern wall of the Kumbha palace was taken up during the period under review. The palace is built of sand stone blocks and lime mortar having blackish deposits of dead micro-vegetational growth along with the dust, dirt birds droppings, etc. On the interior surface of the Tripolia Gate, lime deposits were also present. The blackish deposits were removed chemico-mehanically using ammonia solution and non-ionic detergent in suitable concentrations with the aid of soft nylon brushes. The lime deposits were removed by using diluted acetic acid followed by cleaning with ammonia solution. Cleaned surface was applied with 4% solution of sodium pentachlorophenate in water by spraying. The plaster and the stone blocks were consolidated, wherever necessary, by an ethyl silicate based stone strengthener. Finally, the surface was applied with silicone based water repellent in suitable concentrations so as to impart water repellency over the surface. Work is in progress.

Tulja Bhawani Temple is built of sand stone blocks and lime mortar was taken up for chemical treatment and preservation. The interior surface of the temple had thick deposits of lime wash, which were removed from the surface by using diluted acetic acid solution with the aid of nylon brushes followed by cleaning the surface with ammonia solution and nonionic detergent. The exterior surface of the temple had micro-vegetational growth which was removed by using ammonia solution and nonionic detergent with aid of nylon brushes. The plastered area of domes was consolidated by the gradual impregnation of an ethyl silicate based stone strengthener. The consolidated and dried surface was treated with 4% solution of sodium pentachlorophenate in water by spraying followed by the hydrophobic treatment of the surface by the application of water repellant in suitable concentration all over the surface. The work was completed.

Remains of the plaster over the walls indicate that the whole area of the Ratan Singh palace might have been plastered originally. The conservation problem was due to the presence of black deposits of dead micro-vegetational growth along with the dust, dirt, birds droppings, etc. all over the surface. All these deposits were removed by using ammonia solution and non-ionic detergent with the aid of nylon brushes. The cleaned surface subjected to consolidation work by the impregnation of an ethyl silicate based stone strengthener, followed by the application of sodium pentachlorophenate solution in suitable concentration for as fungicidal treatment. Finally, the surface was given application of water repellant in suitable concentration for imparting water repellency to the surface. Work is in progress.

79. SOMNATH TEMPLE, DEV SOMNATH, DISTRICT DUNGARPUR: This temple is built of huge slabs of micaceous schist gneiss. The stone surface at some places around *janga* portion of main *sikhara* and a *mandapa* including projection and lower portions of pillars in *sabha mandapa* were disintegrating in powdery form, which was restored and strengthened with the help of an ethyl silicate based stone strenghthener Wacker OH-100. The chemical cleaning work was carried out using 2 to 3% of

aqueous liquid ammonia with non-ionic detergent. The work was completed.

80. NAV CHOWKI, DISTRICT RAJSAMAND: All the *ghats* with pavilion, *chattris* and *torans* are made of white marble. The g*hat* no. 4 with inscription, pavilion and *chattri* together with adjacent area was chemically treated during the period under review. Chemical cleaning work was carried out with the help of 2-3% solution of liquid ammonia with addition of non-ionic detergent. Miscellaneous spots at pavilion, *chattris & ghats* were removed using sodium bicarbonate with fuller′s earth. The roof of the *chattri* was plastered with lime and preserved by using a silicone based Wacker BS-290 in MTO as a water repellent after general chemical cleaning with the help of soft brushes and using sodium pentachlorophenate as a fungicide to arrest further growth of micro-vegetation. The work was completed.

81. KUMBHALGARH FORT, DISTRICT RAJSAMAND: Upper part of *sikhara* of Gole Rao Temple 5 is made of bricks covered with lime plaster. Lime plaster over the bricks was damaged and half of the portion fallen down. Lower part of the *sikhara* made of sandstone had become weak and fragile at several places. Flaking was clearly seen on the sandstone surface of *sikhara* as well as *mandapa.* Cracks had developed on lower *sikhara* as well as *mandapa;* lime deposition was present at several places on interior part of the *mandapa*. Domical roofs of temples are made up of lime and sand. Sandstone walls of Temple 4 were also damaging due to natural phenomena of weathering. This Temples 4 & 5 was blackened due to micro-vegetational growth along with dirt and dust. Eradication of microbiological growth was carried by using 2 to 3 % liquid ammonia solution in aqueous media added with nonionic liquid detergent. Removal of lime deposition was carried out using 1-2% solution of acetic acid. Sodium pentachlorophenate was applied as a fungicide over the dried stone surface. An ethyl silicate based stone strengthener Wacker OH-100 was applied on the surface. A silicone based water repellent solution (wacker BS-290 in MTO in 1:14 ration was applied as a preservative on the entire cleaned and dried surface. Work is in progress.

The Bhairav pole, Nimboo pole and Chaugan pole along with the fort wall on way to Badal Mahal. From Rampole to Chauganpole was blackened due to micro-vegetational growth, dirt, dust, dropping of birds and excreta of monkeys etc. Roots of the remains of a few of the earlier existing plants could be seen at a few places of the walls. Eradication of micro-biological growth was carried out by using 2 to 3% liquid ammonia solutions in aqueous media added with non ionic liquid detergent. Removal of plants and trees from fort wall was carried out by using tree killer. Hard lime depositions from the carvings of sand stone were removed by chemico-mechanical method using 1-2% acetic acid solution. Entire treated surface was thoroughly washed with plenty of water to remove any acidic or alkali ions from the surface followed by application of sodium pentachlorophenate as a fungicide on cleaned and dried stone surface. Consolidation of the stone blocks was also

carried out where ever necessary by impregnating building blocks with an ethyl silicate based stone strengthener. Finally, the entire fungicidal treated and dried surface was preserved with water repellent solution Wacker BS-290 in MTO. Work is in progress.

The exterior face of fort walls, bastions and burjies, Vedi temple to Vijay pole were blackened due to micro-vegetational growth, dirt, dust, dropping of birds and excreta of monkeys, etc. Chemical conservation work was carried out to remove micro-biological growth along with dirt and dust and superficial accretions and small trees, etc. The blackish deposits were removed chemico-mehanically using ammonia solution and non-ionic detergent in suitable concentrations with the aid of soft nylon brushes. Removal of plants and trees from fort wall was carried out by using tree killer. The lime deposits were removed by using diluted acetic acid followed by cleaning with ammonia solution. Cleaned surface was applied with suitable solution of sodium pentachlorophenate in water by spraying. The plaster and the stone blocks were consolidated, wherever necessary, by an ethyl silicate based stone strengthener (Wacker OH-100). Finally, the surface was applied with silicone based water repellent (Wacker BS-290 in MTO) in suitable concentrations so as to impart water repellency to the surface. Work is in progress.

82. KALA PAHAR TEMPLE, TODA RAI SINGH, DISTRICT TONK: The work of chemical treatment and preservation was taken up on the temple to clean, consolidate and to make the surface water repellent. Micro-vegetational growth, dust and dirt were removed by using 2-3% ammonia solution added with non-ionic liquid detergent in aqueous medium. Hard lime depositions from the carvings of sand stone were removed by chemico-mechanical method using 1-2% acetic acid solution. Entire treated surface was thoroughly washed with plenty of water to remove any acidic or alkali ions from the surface. The cleaned and dried surface was sprayed with 2% fungicidal solution of sodium pentachlrophenate to arrest further growth of micro vegetation. An ethyl silicate based stone strengthener Wacker OH-100 was applied to strengthen weak and fragile stone surface. Finally, the entire fungicidal treated and dried surface was preserved with water repellent solution a silicone based Wacker BS-290 in MTO. The work was completed.

83. HADA RANI KA KUND, TODA RAI SINGH DISTRICT TONK: The surface, covered with thick layers of dust, dirt, micro-vegetational growth, soots, urine and excreta of bats and growth of plants was removed by using 2-3% solution of ammonia added with neutral liquid detergent. Hard lime coatings were removed by chemico-mechanical means using 1-3% solution of glacial acetic acid with utmost care. The whole treated surface was thoroughly washed with plenty of water in order to remove any traces of acidic/alkali ions from the surface. The weak and fragile stone surface was strengthened with an ethyl silicate based stone strengthener OH-100. 2% solution of sodium pentachlorophenate was used in order to arrest fungicidal growth. The whole fungicidal treated & dried surface was preserved with water

repellent solution Wacker BS-290 in MTO. Work is in progress.

SIKKIM

84. RUINS OF THE PALACE, RABDENTSE, DISTRICT GAZING: The ruins of the Palace Rabdentse made of rubble fortification walls in mud mortar, a throne and three chortens on raised platform at Ga zing were under taken for chemical treatment and preservation, for eradication of trees, micro-vegetational growth, dirt, dust etc. using non-ionic detergent and aqueous ammonia solution. The surface so cleaned and free of all accretionary deposits was given fungicidal treatment with 5% aqueous santobrite solution followed by application of double coat (wet-on-wet) of a silicone based water repellent Wacker BS-290 in MTO as preservative. An ethyl silicate based stone strengthener Wacker OH-100 was also applied on selective areas to strengthen loose and fragile building materials. The work was completed.

TAMIL NADU

85. FIVE RATHAS AND OTHER HILLOCK MONUMENTS, MAHABALIPURAM, DISTRICT KANCHIPURAM: The chemical conservation work was carried out for the removal of dust, dirt, micro-vegetational growth and bats excreta over the exterior granite walls of this monument. 1:3 mixtures of nonionic detergent and ammonia solutions were used for the removal of micro-vegetational growth, bats' excreta, dust and dirt over the stone portions. An ethyl silicate based stone strengthener Wacker OH-100 was used to consolidate the weak stone surface. 2% sodium pentachlorophenate was used as a fungicide and finally on dry surface Wacker SMK 1311 diluted with water in 1:14 ratio was applied as water repellent. The work was completed.

86. SRI NARASIMHA SWAMY TEMPLE AND SRI RANGANATHA SWAMY TEMPLE, NAMAKKAL, DISTRICT NAMAKKAL: Lower portions of these temples are built of granite and some upper portions are made of stucco. The outer area of these temples were covered with micro-vegetational growth, dust, dirt and interior portions mainly covered with oily, sooty accretions and lime wash. Some of the inscribed and sculptured areas were in fragile and powdery condition. 1:3 mixtures of non-ionic detergent and ammonia solutions were used for treating the dust, dirt, oily sooty accretions and micro-vegetational growth. 5% glacial acetic acid was used for the removal of lime wash accretions. Frequently oil applied places were treated with 1:1:100 mixtures of sodium carbonate, sodium bi-carbonate and fuller's earth by clay pack method. The fragile & powdery areas were given an ethyl silicate based stone strengthener Wacker OH-100 for the consolidation. Oil repellent Wacker Silres BS 28 N was applied wherever necessary. 2% sodium pentachlorophenate was used as fungicide and finally on dry surface 1:14 mixture of Wacker SMK 1311 diluted with water was applied as water-repellent. The work was completed.

87. ROCK-CUT SIVA TEMPLE, KUNANDARKOIL, DISTRICT PUDUKOTTAI: The interiors as well as exteriors of this temple were covered with superficial

accretions of dust, dirt, soot, oily and greasy deposition, bats excreta and calcareous deposits. 1:3 mixtures of nonionic detergent and ammonia were used for the removal of dust, dirt, oily sooty accretions and micro-vegetational growth. 5% glacial acetic acid was used for the removal of lime wash. The surface of the stone portion in some places were weakened due to weathering action, hence an ethyl silicate based stone strengthener Wacker OH-100 was used for consolidation. 2% sodium pentachlorophenate was used as fungicide and finally on dry surface Wacker SMK 1311 diluted with water in 1:14 ratio was applied as water repellent. The work was completed.

88. SRI AIRAVATESWARA AND AMMAN TEMPLE, DARASURAM, DISTRICT THANJAVUR: The area was chemically treated to remove dust, dirt, micro-vegetational growth using 3:1 aqueous ammonia and nonionic detergent solutions. The interior portions of both the main shrine and *amman* shrine like ceiling, lintel, inner walls, pillars etc., were also chemically treated to remove the accretions like dust, dirt, lime wash using 5% acetic acid and oily/greasy accretions, sooty accretions using 1% solutions of sodium carbonate and its bicarbonate followed by treating with 3:1 aq. ammonia and nonionic detergent by chemico-mechanical process. The sculptures, exterior portions of *mandapa* walls, and Sri Chandikeswara shrine were in fragile and deteriorated condition. To consolidate them an ethyl silicate based stone strengthener Wacker OH-100 was used. After removing the accretions, the exterior portions were given 2% solution of sodium pentachlorophenate as fungicide and Wacker SMK 1311 diluted with water in 1:14 ratio in two coats wet on wet as water repellant at proper interval of time. Some of the paintings on the exterior wall of *vimana* of *amman* shrine was also preserved using 1% solution of poly vinyl acetate in Toluene after the removal of dust, dirt accretions on the painted surface using toluene with cotton swabs. The work was completed.

89. SRI BRIHADESWARA TEMPLE, G.K.C. PURAM, DISTRICT PERAMBALUR: The chemical treatment and preservation work was carried out on both exterior and interior portions. The area was chemically treated to remove the accretions like dust, dirt, micro-vegetational growth, birds droppings, etc. using 3:1 aqueous ammonia and non-ionic detergent by chemico-mechanical means. After removing the accretions from the exterior portions, a 2% solution of sodium pentachlorophenate was applied as fungicide. When the surface became dry Wacker SMK 1311 (silane and siloxane mixture) diluted with water in 1:14 ratio was applied as water repellant. The interior portions were also treated to remove dust, dirt, sooty, oily and greasy accretions using solutions of sodium carbonate and its bicarbonate as 1% each followed by treatment of 3:1 aqueous ammonia and non-ionic detergent by chemico-mechanical process. An ethyl silicate based stone strengthener Wacker OH-100 was applied on the fragile portions of the shrine. The work was completed.

90. SRI SIVA (SVAYAMBUNATHASWAMY) TEMPLE, NEDUNGADU, DISTRICT KARAIKAL: The lower portion of this temple

was made of granite and the upper portions like *vimana* of main and *amman* shrine, entrance *Gopuram, mandapa* were all made up of stucco (brick & mortar). The exterior walls of these monuments were covered with thick micro-vegetational growth, dust, dirt, birds droppings. Micro-vegetational growth was removed by chemico-mechanical process using 3:1 aqueous ammonia and nonionic detergent solution. Similarly, the interior portions like inner walls and pillars of main shrine was treated with 5% acetic acid for the removal of lime wash accretions and treated with neutral detergent and ammonia solutions for neutralizing the acid. Exterior portions were given 2% solution of sodium pentachlorophenate as fungicide. After color matching with suitable colors on the colour faded portions of stucco Wacker SMK 1311 (silane and siloxane mixture) diluted with water in 1:14 ratio was applied as water repellent. The work was completed (pls. 186-187).

91. Sri Rajendracholeswara Temple, Ponnamaravathi, District Pudukkottai: The scientific conservation work was taken up on this monuments which is made of granite stone blocks, bricks and mortar. Both the exterior and interior portions of this temple were taken up for the removal of dust, dirt, micro-vegetational growth, birds droppings, etc., using 3:1 aqueous ammonia and nonionic detergent solutions. 2% solution of sodium pentachlorophenate was applied as a fungicide. A silicone based Wacker SMK 1311 diluted with water in 1:14 ratio was applied as water repellant. Similarly, the interior portions like walls of *prakara mandapa, Navagraha mandapa, Bala Dhandayuthapani* shrine was also treated with 5% acetic acid solution for the removal of lime wash accretions and treated with neutral detergent and ammonia solution for neutralizing the acid and to remove dust, dirt, accretions etc. Work is in progress.

92. Sri Erumbeeswara Temple, Tiruverambur, District Trichy: The main conservation problem was deposition of dust, dirt, oily sooty accretions and micro-vegetational growth, Neutral detergent and ammonia solutions in 1:3 ratio was used to remove all the superficial accretions. 5% glacial acetic acid was used for the removal of lime wash. Mixtures of sodium carbonate, sodium bi carbonate and fuller's earth was used to remove oily accretions by clay pack method. An ethyl silicate based stone strengthener Wacker OH-100 was used for the consolidation. Oil repellent Wacker Silres BS-28N was applied wherever necessary. 2% sodium pentachlorophenate was applied as a fungicide and finally, on dry surface Wacker SMK-1311 diluted with water in 1:14 ratio was applied as water repellent. The work was completed.

93. Sri Brihadeswara Temple, Thanjavur, District Thanjavur: Paintings around this temple were covered with old preservative, dust, dirt and fungal growth and these were removed by using toluene, diacetone alcohol and triethanolamine mixture. Bulging portions were fixed with plaster of paris and adhesive. Edging work and colour re-integration was attended wherever required. Finally 1% poly vinyl acetate in sulphur free

Plate 186-187



186



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Sri Siva Temple, Nedungadu, before after scientific treatment, Karaikal.

toluene was applied as preservative. The stone surface was cleaned using 3:1 ratio of ammonia and non-ionic detergent followed by 2% sodium pentachlorophenate solution was applied as fungicide and finally on dry surface two coats of Wacker SMK 1311 diluted with water in 1:14 ratio applied as water-repellent. The work was completed.

94. SRI KAILASANATHA TEMPLE, KANCHIPURAM, DISTRICT KANCHIPURAM: Stone portions were in very fragile condition, hence, initially removal of dust and micro-vegetational growth was carried out with soft coir nail brush and then an ethyl silicate based stone strengthener Wacker OH-100 was applied in two coats in interval of 15 days for the consolidation. Cracks were also filled with the mixture of suitable stone powder and Wacker OH-100. 1:3 mixtures of non-ionic detergent and ammonia were used for the removal of micro-vegetational growth and dirt. 2% sodium pentachlorophenate solution was applied on dry surface as fungicide and finally, on dry surface, two coats of Wacker SMK 1311 diluted with water in 1:14 ratio were applied as water repellent. Work is in progress. Paintings in cells around the inner *prakara* were covered with old preservative, dust, dirt and fungal growth. These were removed by using sulphur free toluene, diacetone alcohol and triethanolamine mixture. Edging work was carried out with the casein and calcium hydroxide mixture and colour re-integration was carried out wherever necessary. Finally, 1% polyvinyl acetate in sulphur-free toluene was applied as preservative.

95. SRI VENKATESAPERUMAL TEMPLE, THIRUMUKKUDAL, DISTRICT KANCHIPURAM: The granite stone walls, pillars and ceiling of Sri Venkatesa Perumal temple, Thirumukkudal and Sri Vaikunta Perumal Temple, Uthiramerur were covered with dust, dirt, oily accretions and micro-vegetational growth. Neutral detergent and ammonia solution in 1:3 ratios were used for the removal of these accretions. Sodium-carbonate and sodium bicarbonate solutions were used for the removal of oily accretions. After removing the accretions, the complete area was washed with plenty of water. In some places, surface of granite portion was in fragile condition. To consolidate it an ethyl silicate based stone strengthener Wacker OH-100 was applied as consolidant. On exterior portions, 2% sodium pentachlorophenate solution was applied as fungicide. Finally, on dry surface, Wacker SMK 1311 diluted with water in 1:14 ratio was applied as water repellent. Work has been completed.

TRIPURA

96. SCULPTURES AND ROCK-CUT RELIEFS, UNAKOTI, DISTRICT NORTH TRIPURA: The work of chemical treatment and preservation of sand stone rock-cut sculptures and carvings at Unakoti (North Tripura) was taken up for eradication of micro-vegetational growth, dirt, dust, birds excreta, etc. with the help of dilute ammonia and non-ionic detergent mixture. The cleaned surface free from all deteriorating accretionary deposits was given water repellent treatment using silicon based Wacker BS-290 in MTO. Besides loose and fragile stone surface was strengthened with Wacker OH-100 solution. The work was completed.

97. GUNAWATI GROUP OF TEMPLE, RADHA KISHORPUR, DISTRICT SOUTH TRIPURA: Brick built, lime plastered Gunawati group of shrines was under taken for chemical treatment and preservation work for eradication of micro-vegetational growth, dirt, dust and bats' dropping using a mixture of ammonia and non-ionic detergent (5% solution) including bleaching powder treatment on lime plastered surface. The surface free form all accretionary deposits were then subjected to water repellent treatment with double coat of Wacker BS-290 in MTO (1:14). The weak and fragile area was strengthened with Wacker OH-100 at selective places. Work has been completed.

98. CHATURDASA DEVTA TEMPLE, RADHA KISHORPUR, DISTRICT SOUTH TRIPURA: The brick built Chaturdasa Temple was subjected to chemical treatment for the removal of birds' excreta, dust, dirt and micro-vegetational growth with 5% solution of ammonia and non-ionic detergent. The treated surface was then given fungicidal treatment with 5% aqueous solution of santobrite followed by application of double coat of Wacker BS-290 in MTO (1:14) as preservative. An ethyl silicate based stone strengthener Wacker OH-100 was used for consolidating loose and fragile surface. The work was completed.

99. BHUBENSWARI TEMPLE, RAJNAGAR, DISTRICT SOUTH TRIPURA: For eradicating micro-vegetational growth, present on the exterior of the shrines, chemical cleaning was carried out by using mixture of 5% ammonia solution and non-ionic detergent. The cleaned surface was given fungicidal treatment with 5% solution of santobrite in water. Finally, the surface was preserved with a silicone based Wacker BS-290 in M.T.O. (1.14) double coat wet on wet. Loose and fragile surface was strengthened using an ethyl silicate based stone strengthener Wacker OH-100 selectively. The work was completed.

UTTAR PRADESH

100. TAJ MAHAL, DISTRICT AGRA: The marble surface of Taj Mahal had become dull in appearance due to deposition of accretions like smoke, fine complex dust, dirt, suspended particulate matters and greasy matter. Apart from these, brown patches were formed due to rusting of iron dowels. Removal of superficial accretions was carried out by application of fuller's earth. Traces of cellosolve, glycerol and sodium bicarbonate were added to the paste as and when required depending upon the nature and quantum of accretions. Paste was covered with polythene sheets and left to dryness for at least 48 hours and when it started falling on its own after drying, the surface was finally washed with plenty of distilled water to make the stone surface free from residues. The work was completed (pls. 188-189).

101. MOTI MASJID, AGRA FORT, DISTRICT AGRA: The marble portion of the mosque had become pale and dark brownish in appearance due to the deposition of dust, dirt, smoke, tarry matters and micro-biological accretions on the exterior surface. The marble surface was scientifically treated by applying the paste of Fuller's earth containing little quantity of some suitable

organic solvents in appropriate proportion in order to soften the greasy and tough accretions. The paste was covered with polythene sheets for about 48 hours or till the paste was completely dried. When the paste got dried, it is uncovered by removing the polythene sheets and the dried paste was brushed off with soft nylon/foam pad followed by washing with distilled water. The surface so prepared was burnished with cotton cloth to achieve its original texture. The work was completed.

102. NAGINA MOSQUE AND PIGEON HOUSE, FATEHPUR SIKIRI, DISTRICT AGRA: The micro-vegetational accretions on stone surface were removed by using a mixture of aqueous ammonia solution and non-ionic liquid detergent with the help of soft nylon brushes. The lime plastered surface was treated with bleaching powder. The chemically treated sand stone and lime plastered surface was given fungicidal treatment by applying approximate 2 % solution of sodium pentachlorophenate in water to arrest micro-vegetational growth. Lime coating on interior side of mosque was removed by using 1% of glacial acetic acid solution. Finally, the above treated surface, on being completely dry was preserved with the a silicon based Wacker BS-290 diluted in MTO in the ratio of 1 part of Wacker BS-290 to 16 parts of MTO.

103. SANGIN BURJ, FATEHPUR SIKRI, DISTRICT AGRA: The Sangin Burj is made of red sand stone having deposition of dust, dirt and dried micro-vegetational growth. The harmful accretions were eradicated by using aqueous solution of sodium pentachlorophenate. After complete drying the surface was preserved with silicon based Wacker BS-290 diluted in MTO. The work was completed.

104. FATEHPUR SIKRI, DISTRICT AGRA: The walls of exterior surface of the water tank had become grey black at many places due to the deposition of dust, dirt and dried micro-biological growth and stone chipping was also observed. The loose dust and dirt, was cleaned using soft nylon brushes, from the exterior surface of the water tank. Micro-vegetational growth was eradicated by treating with 2 % aqueous ammonia solution containing a little liquid non-ionic detergent. Fungicidal treatment was given to stone surface by using 2% aqueous solution of sodium pentachlorophenate. Consolidation of weak and fragile portion was carried out using an ethyl silicate based stone strengthener Wacker OH-100. Finally the treated surface was applied with a coat of a silicon based accretions were eradicated by using aq. Wacker BS-290 diluted in MTO as water repellant. The work was completed.

105. AKBAR'S TOMB, SIKANDRA, DISTRICT AGRA: The Akbar's Tomb is made of red sand stone with some marble structures also. The exterior as well as interior portion of sand stone surface had become grey black at many places due to the deposition of dust, dirt and dried micro-biological growth. Some portions of red sand stone surface had also become fragile and weak at some places. The loose dust and dirt was brushed off using soft nylon brushes from the exterior surface of the monument. The micro-vegetational growth was removed by treating with 2-3% aqueous. ammonia solution containing nonionic liquid detergent. The chemically treated surface was subjected to biocidal treatment by

Plate 188-189



188



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Taj Mahal, before and after scientific treatment, Agra.

applying 2% sodium pentachlorophenate solution. An ethyl silicate based stone strengthener Wacker OH-100 was applied on weak stone surface in order to consolidate and strengthen them. Finally, the exterior surface was preserved with Wacker BS-290 diluted in MTO in appropriate ratio. The work was completed.

106. GOVIND DEO TEMPLE, VRINDAVAN, DISTRICT MATHURA: The stone surface of the temple was infested with excreta of bats and monkeys. The exterior surface of the temple had become grey black at many places due to the deposition of dust, dirt and microvegetational growth and other deleterious accretions. Some portion of sandstone surface had become fragile and weak which needed to be consolidated and strengthened to check the further decay. Scientific cleaning was carried out, using 2-3% aqueous ammonia solution mixed with little non-ionic liquid detergent, for eradication of biological and microbiological accretions. The cleaned and dried surface was subjected to fungicidal treatment. An ethyl silicate based stone strengthener Wacker OH-100 treatment was given to weak portion in order to consolidate them. Finally, the stone surface was preserved with a silicon based Wacker BS-290 diluted in mineral turpentine oil after complete drying. Work is in progress.

107. JUGAL KISHOR TEMPLE, VRINDAVAN, DISTRICT MATHURA: The scientific treatment and preservation was taken up for *garbhgriha* and entrance porch which had become quite black in appearance due to burning of *oil/ghee* lamps and incense sticks. The blackish appearance of the stone surface was due to thick deposit of soot, smoke and bats excreta. The harmful accretions were eradicated by using 3-5 % aqueous ammonia adding a little non ionic detergent with the help of soft nylon brushes. The soot, smoke and thick layer of hard accretions of bats excreta were removed by applying clay pack method. The work was completed.

108. TEMPLE (BARI AND CHHOTI KACHERIS) MADANPUR, DISTRICT LALITPUR: The stone surface of both the temples had become blackish in appearance due to deposition of dust, dirt and dried micro-vegetational growth on exterior as well as interior portions. In order to remove these micro-vegetational growth scientific treatments was carried out. Treated surface was applied with fungicide using 2% solution of sodium pentachlorophenate followed by application of Wacker BS-290 solution in mineral turpentine oil. The work was completed.

109. TOMB OF BAHU BEGUM, FAIZABAD, DISTRICT FAIZABAD: The exterior surface of the tomb is lime plastered. The lime plastered surface of the tomb had become black at many places due to the micro-vegetational growth. The cornices, brackets, and parapet walls, were deteriorating due to the depositions of above mentioned accretions. To check the decay of the plastered surface, the micro-vegetational accretions and other depositions were eradicated by treating with 3 to 5% aqueous ammonia solution containing a little non-ionic detergent. The chemically treated surface was applied a coat of 2% solution of sodium pentachlorophenate. Finally, the surface was preserved with a silicone based

Wacker BS-290 diluted in MTO. Work is in progress (pls. 190-191).

110. WALL PAINTING OF SAADAT ALI KHAN'S TOMB, LUCKNOW, DISTRICT LUCKNOW: The surface of the paintings had cracks and crevices at many places and lost its colour due to weathering. Cracks and crevices were filled by using semi-liquid paste of plaster of Paris. The work involved filleting, fixing and edging of base of painting. The chemical treatment work over the painting was carried out, by using suitable organic solvents, in order to remove superficial dust, dirt and other accretions on surface of painting. Colour reintegration was also done to maintain uniformity. Finally, the surface was preserved with 1% solution of poly vinyl acetate in sulphur-free toluene. Work is in progress.

111. MARIAM'S TOMB, SIKANDARA, DISTRICT AGRA: The exterior surface of the tomb had deposition of dust, dirt and dried micro-vegetational growth. There was also lime deposit in some arches of tomb. The micro-vegetational growth was eradicated by using 2 % aqueous ammonia solution containing a little liquid non-ionic detergent. The lime coating was removed by using 1% glacial acetic acid. The plastered surface of tomb was treated with bleaching powder in order to clean and preserve it. The chemically treated surface was applied a coat of 2% of sodium pentachlorophenate. The surface so treated was preserved with a silicone based Wacker BS-290 diluted in MTO in appropriate ratio. Work is in progress.

112. CHAUKHANDI STUPA AT SARNATH, DISTRICT VARANASI: Brick built Chaukhandi Stupa was subjected to chemical treatment and preservation of micro-vegetational growth, dirt, dust, and birds excreta. Chemical cleaning was carried out for eradication of all unwanted deposition by using a mixture of aqueous ammonia and non-ionic detergent applied gently with very soft nylon brushes. The surface so cleaned were then given fungicidal treatment with 5% aqueous solution of sodium pentachlorophenate to arrest its re-growth, followed by application of double coat (wet-on-wet) of Wacker BS-290 in MTO. Work is in progress.

MONITORING OF AIR POLLUTION

1. AMBIENT AIR QUALITY MONITORING STATION, TAJ MAHAL AND OTHER MONUMENTS IN AGRA: Air pollution monitoring laboratory at Taj Mahal, Sikandara and Red fort Agra has been monitoring the presence of sulphur dioxide and nitrogen dioxide gases in the ambience of Taj Mahal in addition to suspended particular matter, sulphation rate, dust fall rate and certain meteorological parameters viz temperature, relative humidity, rain fall, wind speed and wind direction, etc. (figs. 11-16).

2. MONITORING OF AMBIENT AIR QUALITY AT CHARMINAR, HYDERABAD: Monitoring work continue to study the Suspended Particulate Matter (SPM) and important

Plate 190-191



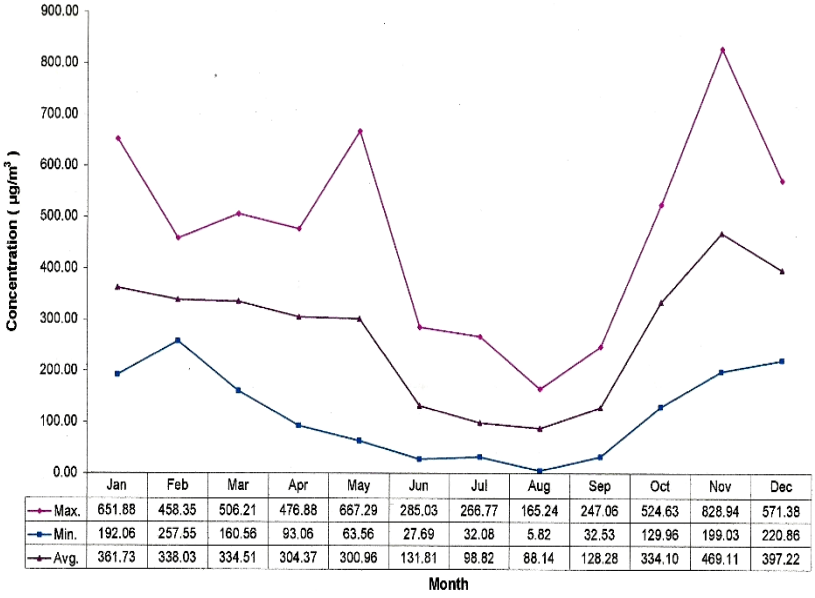
190



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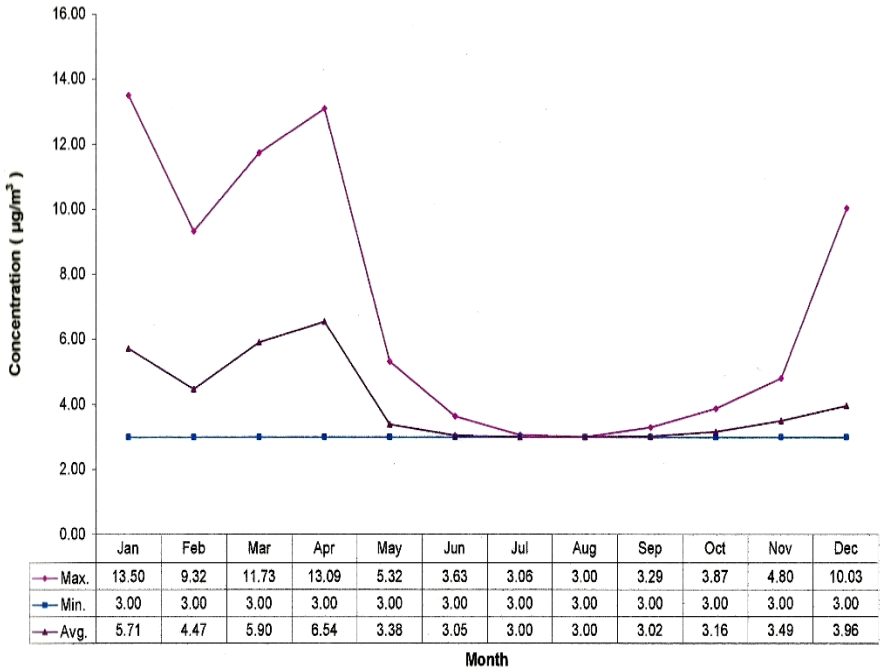
Tomb of Bahu Begum, before and after scientific treatment, Faizabad.

Fig. 11-12



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	651.88	458.35	506.21	476.88	667.29	285.03	266.77	165.24	247.06	524.63	828.94	571.38
Min.	192.06	257.55	160.56	93.06	63.56	27.69	32.08	5.82	32.53	129.96	199.03	220.86
Avg.	361.73	338.03	334.51	304.37	300.96	131.81	98.82	88.14	128.28	334.10	469.11	397.22

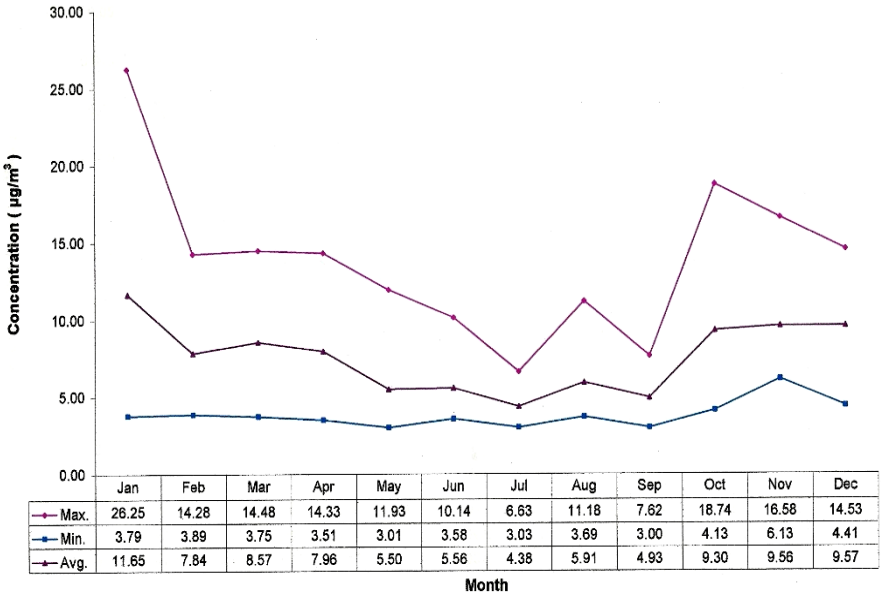
Concentration of S.P.M. (ug/m^3) in the ambience of Taj Mahal.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	13.50	9.32	11.73	13.09	5.32	3.63	3.06	3.00	3.29	3.87	4.80	10.03
Min.	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Avg.	5.71	4.47	5.90	6.54	3.38	3.05	3.00	3.00	3.02	3.16	3.49	3.96

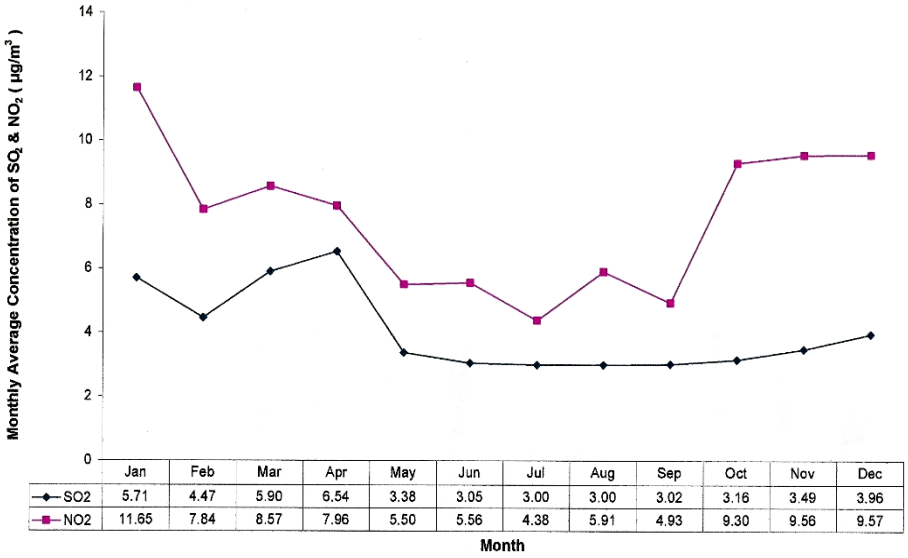
Concentration of SO_2 (ug/m^3) in the ambience of Taj Mahal.

Fig. 13-14



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max.	26.25	14.28	14.48	14.33	11.93	10.14	6.63	11.18	7.62	18.74	16.58	14.53
Min.	3.79	3.89	3.75	3.51	3.01	3.58	3.03	3.69	3.00	4.13	6.13	4.41
Avg.	11.65	7.84	8.57	7.96	5.50	5.56	4.38	5.91	4.93	9.30	9.56	9.57

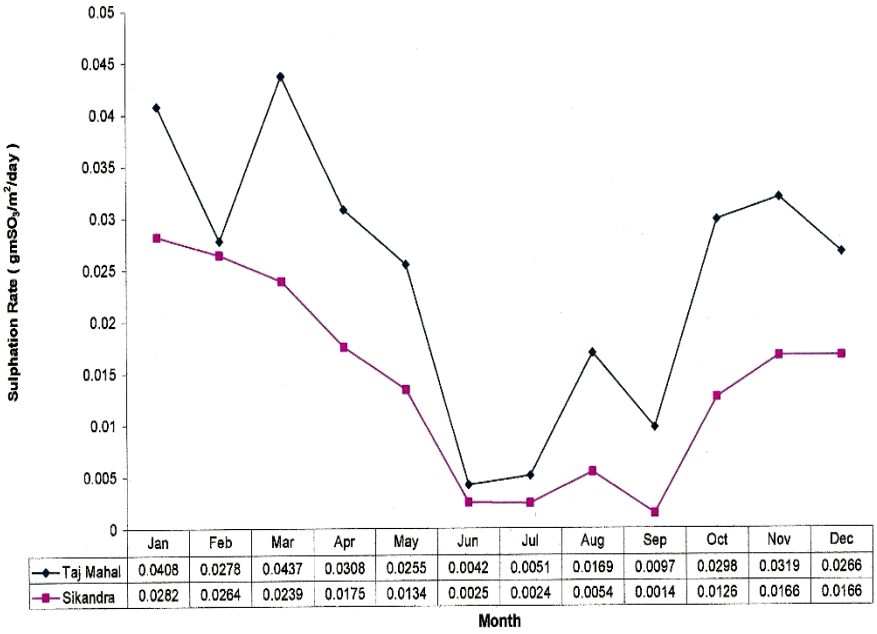
Concentration of NO_2 (ug/m^3) in the ambience of Taj Mahal.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SO2	5.71	4.47	5.90	6.54	3.38	3.05	3.00	3.00	3.02	3.16	3.49	3.96
NO2	11.65	7.84	8.57	7.96	5.50	5.56	4.38	5.91	4.93	9.30	9.56	9.57

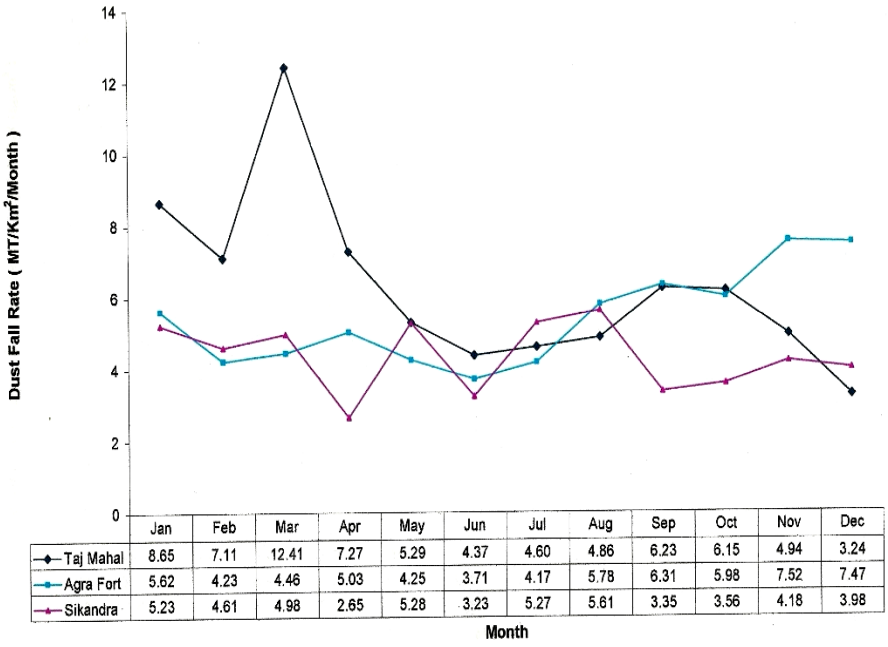
Monthly average concentration of SO_2& NO_2 (ug/m^3) at Taj Mahal.

Fig. 15-16



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Taj Mahal	0.0408	0.0278	0.0437	0.0308	0.0255	0.0042	0.0051	0.0169	0.0097	0.0298	0.0319	0.0266
Sikandra	0.0282	0.0264	0.0239	0.0175	0.0134	0.0025	0.0024	0.0054	0.0014	0.0126	0.0166	0.0166

Sulphation rate ($gmSO_3/m^2/day$) in the ambience of Taj Mahal and Sikandra.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Taj Mahal	8.65	7.11	12.41	7.27	5.29	4.37	4.60	4.86	6.23	6.15	4.94	3.24
Agra Fort	5.62	4.23	4.46	5.03	4.25	3.71	4.17	5.78	6.31	5.98	7.52	7.47
Sikandra	5.23	4.61	4.98	2.65	5.28	3.23	5.27	5.61	3.35	3.56	4.18	3.98

Dust fall rate ($MT/Km^2/Month$) at Taj Mahal, Agra Fort and Sikandra.

gaseous pollutants in the ambient air around Charminar and their impact on the stability of the structure.

3. MONITORING OF POLLUTION AT BIBI-KA-MAQBARA, AURAGABAD: Monitoring work continued to study the Suspended Particulate Matter (SPM) and important gaseous pollutants in the ambient air around Bibi-ka-Maqbara, Aurangabad and their impact on the stability of the structure.

INSTALLATION OF AUTOMATIC WEATHER STATION AT WORLD HERITAGE SITE

Automatic weather station installed at Ajanta Caves, Ajanta, Se' Cathedral Church, Velha, Goa' Ellora Caves, Ellora, Elephanta Caves Mumbai, Fatehpur Sikri, Agra, Sri Brihadeswara temple, Thanjavur, Red Fort New Delhi and Kevda Masjid, Pavagarh.

Automatic weather station generates the data of parameters, temperature, and relative data of parameters, temperature, relative humidity, rainfall, atmospheric pressure, wind speed, wind direction and sun shine.

The main objective of these installations is to collect information on climate events and its impact on world heritage site in the long term basis.

TREATMENT OF EXCAVATED OBJECT AND MUSEUM EXHIBITS

1. ARCHAEOLOGICAL MUSEUM, CHANDRAGIRI: The bronze and brass sculptures were heavily encrusted with copper chlorides and sulphates. In some places, oily accretions were also found. The sculptures were coated with paper pulp admixed in sodium-hexametaphosphate (3%) for removal of hard mud adhering to sculptures. The paper was removed on drying; sculptures were washed and passed in triply distilled water and admixed in 5% sesquicarbonate (ammonium carbonate and ammonium bicarbonate) aqueous solutions. The cleaned sculptures were kept in 2% benzatriazole in methanol. The sculptures were given 1% coat of poly vinyl acetate in toluene as a preservative. Work is in progress.

2. FORT MUSEUM, FORT ST. GEORGE, CHENNAI: Museum antiquities like marble statue of Lord Cornwallis, various kinds of pistols, axes, different kinds of guns, canon balls, steel helmets, bronze helmet, etc. were covered with dust, dirt and old preservative coat. Marble statue was chemically cleaned by clay pack method using sodium carbonate, sodium bicarbonate and Fuller's earth in theratio of 1:1:100. After removing the accretions completely 1% poly vinyl acetate in toluene was applied as preservative. Metallic antiquities were preserved using various chemicals like sodium carbonate, sodium bicarbonate, alkaline sodium potassium tartrate solution etc., and finally, a preservative coat was given. Daniel prints and some paper manuscripts were in very dirty and fragile condition. For the removal of their acidity

and to bleach them, they were treated with sodium chloride and formaldehyde solutions and washed them with plenty of demineralised water to remove the residue chemicals. Finally, mountings have been carried out. Work has been completed. Conservation treatment of some antiquities including copper coins which belong to Shalavankuppam, Mahabalipuram excavation site in the laboratory of office of the Dy. SAC, Chennai.

3. CENTRAL ANTIQUITY SECTION, PURANA, QILA, NEW DELHI: Chemical treatment of the antiquities was carried out in Red fort, Delhi. The metal antiquities received from excavations at Dhalewan, district-Mansa, Punjab. The chemicals used for the treatment of antiquities were Rochelle's salt (alkaline solution of sodium potassium tartarate), dilute solution of ammonia, and sodium hydroxide, etc. Finally these were allowed to dry and then preserved with 2% solution of poly vinyl acetate in toluene.

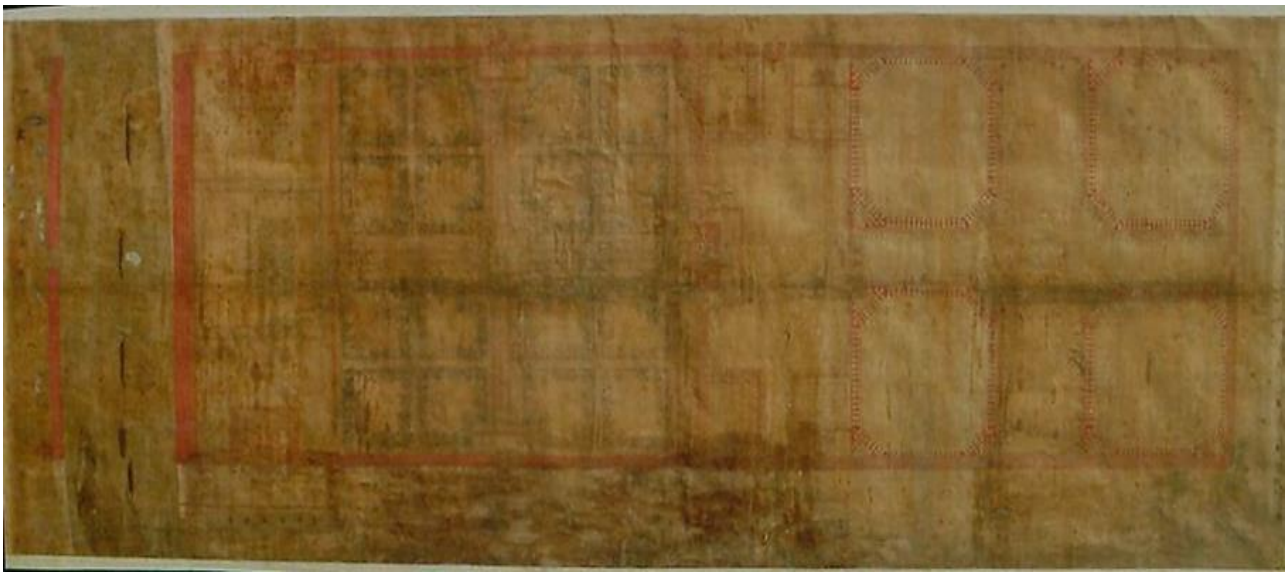
4. RESTORATION AND PRESERVATION OF ARCHIVAL MATERIALS: Restoration of 16 archival materials including a ground plan map of Taj Mahal on paper received from Taj Museum Agra, a printed book, "Conservation notes on buildings of Delhi", an old hand written and coloured map of Almora city on paper lined on clot, a printed book, *"Illustration of Ancient Building in Kashmir",* an old black and white photograph with wooden frame were carried out in laboratory of Director (Science), Dehradun (pls. 194-195).

Conservation treatment of wooden objects received from SA, Central Antiquity Section, Purana Qila, New Delhi was carried out in the laboratory of Director (Science), Dehradun (pls. 196-197).

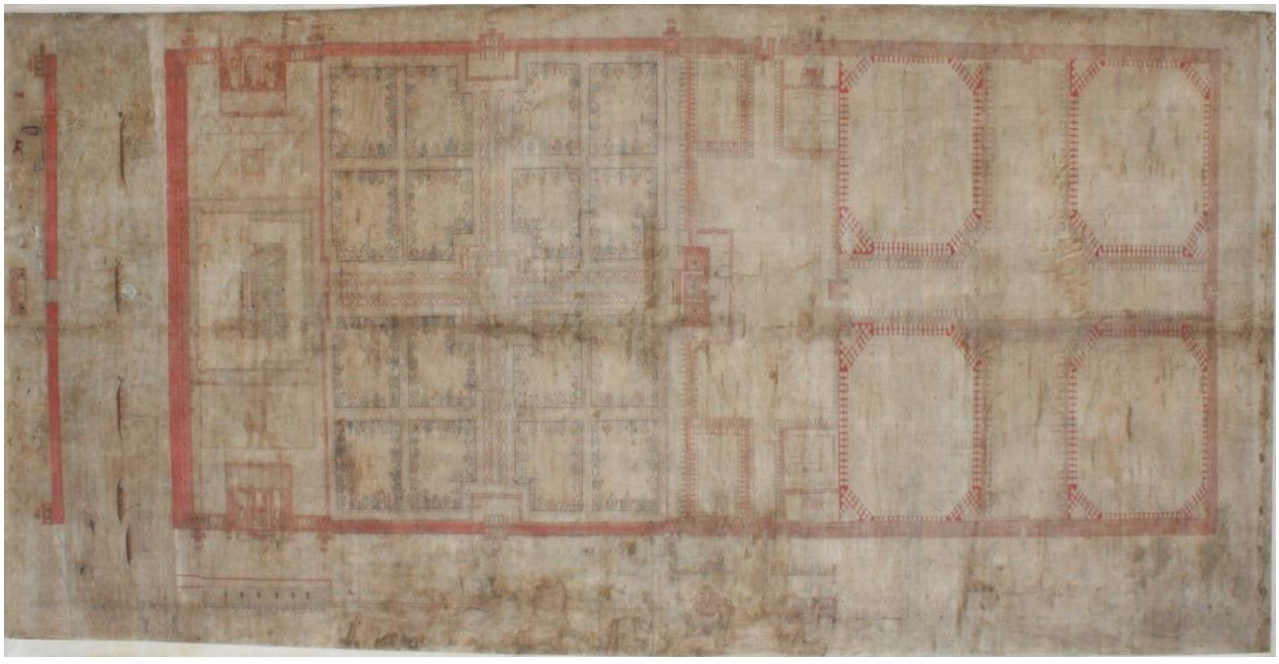
5. ROPAR MUSEUM, DISTRICT RUPNAGAR: Twenty-seven antiquities and artifacts consisting of pottery, stucco figures, bronze and ivory objects of the museum were taken up for chemical treatment and preservation work during the period under review. Pottery, stucco figures and ivory objects were in deteriorated condition and covered with hard accretions of calcareous deposition while bronze objects were covered with dark greenish accretion. These depositions were removed, adopting controlled mechanical and chemical techniques using different mixture of chemicals and solvents for each kind of antiquities. Broken and loose pieces were fixed at their appropriate places with suitable adhesive. After the removal of these accretions, preservation work on all theses chemically treated antiquities were completed with suitable preservative. Work has been completed.

6. MUSEUM OBJECTS AT KAYAVAROHAN, DISTRICT VADODARA: This museum housesd important sculptures some of which are kept in reserve collection and 33 sculptures are displayed in museum gallery. All these sculptures were covered with dust, dirt, dried micro-vegetation and lime remnants, etc. were removed by using 3% ammonia and 1% non-ionic detergent in water with the aid of soft nylon brushes. The consolidation treatment work was carried out using an ethyl silicate based stone strengthener wacker OH-100 in the deteriorated part. The work was completed.

Plate 194-195



194



195

Ground plan map of Taj Mahal, before and after treatment, Agra.

Plate 196-197



196



197

Wooden antiquity received from Purana Qila, before and after restoration, New Delhi.

RESEARCH AND ANALYSIS

1. SCIENTIFIC STUDIES PERTAINING RANI-KI-VAV, PATAN, DISTRICT PATAN: During the period under the review, detailed scientific analysis of stone, soil and water samples of Rani-ki-Vav was carried out in connection with the submission of nomination dossier to UNESCO to list it in the World Heritage list of monuments. Stone samples analyzed through different instrumental techniques, viz, X-ray diffraction and X-ray fluorescence and petrography studies to assess the causes of deterioration and to know the nature of stone, besides the bedding plane arrangement in the stone. The soil and water samples were also analyzed. The nature of the soil is alkaline with the predominance of calcareous salts.

2. LABORATORIES OF OFFICE OF THE DIRECTOR (SCIENCE) DEHRADUN: Under scientific research project "Evaluation of efficacy of water and oil repellent products" for hydrophobization of different building materials and studies have been completed for evaluating performance behavior of five water repellent products against seven different kinds of building materials from Archaeological point of view. Chemical analysis of samples from protected monuments at Chandpur, Ghari, Adibadr, Sun Temple, Katarmal, Almora, bricks samples of excavation site at Purola and Lakhamandal; 11 nos. of potsherds from Dhalewan excavation was carried out. Microscopic studies and studies related to determination of surface characteristics, physical properties of pot Shreds from Dhalewlan excavation site were undertaken.

3. STONE COSERVATION LABORATORY, AGRA FORT: The experimental work to evaluate the performance of Remmer's Products like water repellents, consolidants, cleaning pastes for marble and sandstone has been carried out in the laboratory. The marble cleaning paste, Arte Mundit, was applied in situ in a test area in Moti Masjid. The change in gloss of the surface was measured before and after application of change in gloss of the surface was measured before and after application of the paste. The water repellency was tested with the help of Kartsen test tube method and stone strengthener was tested by measuring the improvement in compressive strength of stone samples after application of the consolidant.

The Stone Conservation Laboratory has been carrying out the research work to assess the weathering problems of World Heritage Monuments of Agra and other archaeological monuments. The petrological studies of stone samples of Hyderabad, Dwarhat and Fatehpur Sikri (pls. 198-200) were carried out in the Stone Conservation Laboratory to identify mineralogical composition, cementing material, texture and size of grains etc. The study helps in estimating the weathering pattern of the constituent grains and cementing material of the rock. The photo-micrographs of stone samples of Hyderabad, Dwarhat and Fatehpur Sikri showing constituent minerals.

4. COLLABORATIVE STUDIES: Studies on conservation of mural paintings of Ajanta and Ellora Caves were made in collaboration between ICR, Italy and ASI to conduct non-invasive methods for analysis of pigments/materials used for execution of paintings as well as identify conservation problems in Ajanta Cave 17.

Indo-Japanese project for conservation of the mural paintings at Ajanta caves have been initiated during the period under review. The purpose of the project is exchange of technical expertise in cleaning and preservation of the mural paintings ofAjanta. Basic diagnosis of the mural paintings and their constituent materials and techniques, research, documentation, dating environmental monitoring, and any other research to increase the longevity of the paintings. Research on adequate conservation methodologies, particularly for conservation problems of the mural paintings of Ajanta. Information was shared through research and continuous monitoring in the forms of workshops, symposia and publications.

The first mission of the studies was concluded on March 2009. The studies, which were carried out during the 1st mission, was on the status and causes of decay of the mural paintings. The cleaning technique is currently being employed by ASI: Investigation of the constituent materials of the paintings using non-invasive techniques with portable XRF analyser and environmental monitoring of the Cave 2 & 9. (III) Joint project between Science Branch of ASI and NRLC, Lucknow in the following areas remained under progress to studies on Bio-deterioration of World Heritage Monuments were carried out. Work on Khajuraho group of temples is initiated; studies on coating materials and scientific investigation into the materials and techniques of paintings at Daria Daulat Palace, Srirangapatana and Bangalore Palace, Bangalore.

Plate 198-200

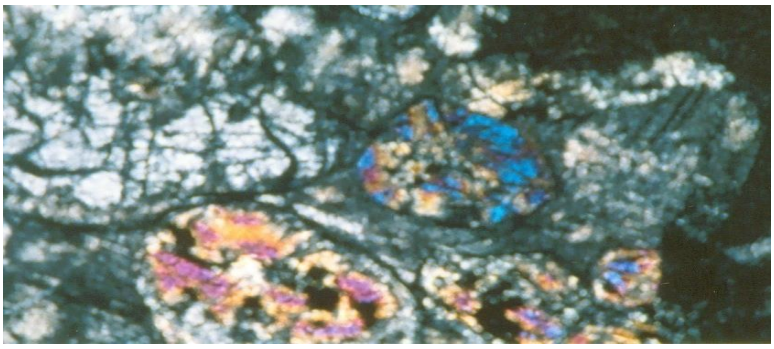


Photo-micrograph of Hyderabad granite sample showing inclusion of olivine into plagioclase mega schist.

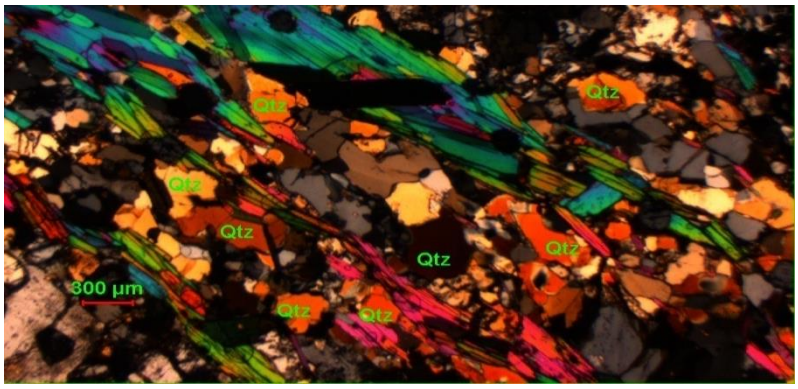
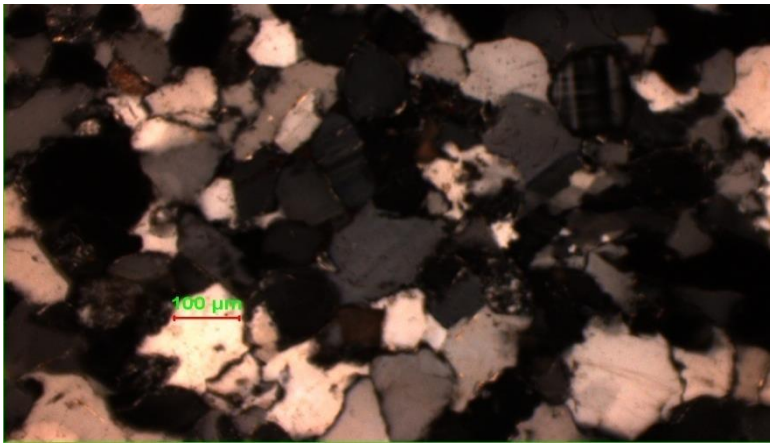


Photo-micrograph of Dwarhat sample showing the nature of quartz-plagioclase (marked Plag)-muscovite-biotite assemblage.



Photomicrograph of Fatehpur Sikri sandstone.

X. ARCHAEOLOGICAL GARDENS[1]

ANDHRA PRADESH

1. Siddhout Fort, Siddhout, District Cuddapah: Horticultural activities initiated in previous year have been completed. Now, both sides of the entrance of the fort have beautifully landscaped gardens. Attempts at garden development in the remaining area are in progress.

2. Hariti Temple, Stadium and University Complex, Anupu, District Guntur: The area around these transplanted monuments has been beautifully landscaped.

3. Monuments at Anupu, District Guntur: The work of tree plantation which was initiated in 2006-07 in phased manner is still in progress.

BIHAR

4. Nalanda, District Nalanda: Re-grassing work was taken up around the excavated remains to replace the old lawns, which were full of weeds and wild grass. The regrassing work included trenching the ground up to a depth of 45cm. Grass has been laid on the trenched ground after providing good earth and *neem* shield for better growth of lawn grass. The work was completed.

5. Relic Stupa Garden, Vaishali, District Vaishali: Regressing work was taken up to replace the old lawns, which were full of weeds and wild grass. It included trenching the ground up to a depth of 45cm. The trenched ground has been grassed after providing good earth and *neem* shield for better growth of the lawn grass. The work was completed and the lawn is being maintained in good condition.

KARNATAKA

6. Mallick-e-Maidan, Bijapur, District Bijapur: A beautiful garden was developed here during the period under review.

7. Srirangapatna, District Mandya: A beautiful garden was laid out in the area adjacent to the fortification wall.

8. Thomas Inman's Dungeon, Srirangapatna, District Mandya: A beautiful garden has been laid out in the area adjacent to the fortification wall.

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1. Information from Horticulture Branch of the Survey which maintains gardens all over India. Important works carried out during the period under review are included here.

KERALA

9. BEKAL FORT, BEKAL DISTRICT KASARAGODU: Laying out of a garden inside the fort has been initiated and the works on Phase I, II and III were completed. Attempts are being made for further developments.

TAMIL NADU

10. MOVERKOIL, KODAMBALURCHATIRAM, DISTRICT PUDUKOTTAI: The garden around the monument was laid and completed.

ODISHA

11. SIDDHESWARA MAHADEV AND NEELMADHABA TEMPLES, GANDHARADI, DISTRICT BOUDH: Environmental development work was completed by way of laying of lawn, dot plantation, shrubbery border and flower beds.

12. SATYABRATA STADIUM COMPLEX, CUTTACK DISTRICT CUTTACK: The work of garden development was completed and is being maintained in good condition. The work included lying of lawn and plantation of hedges.

WEST BENGAL

13. COOCH BEHAR PALACE, COOCH BEHAR, DISTRICT COOCH BEHAR: An ornamental grill was provided around the inner courtyard of the palace for the proper maintenance of the garden by checking trespassing.

14. DUPLEIX PALACE, CHANDERNAGORE, DISTRICT HOOGHLY: Garden development work was completed. The works include laying of lawn, dot plantation, shrubbery border and flower beds. A bore-well, of 150mm dia, was drilled to meet the water requirement for garden development. A sprinkler irrigation system has been installed which is for irrigation of lawns.

15. AZIMUNNISHA BEGUM TOMB, MURSHIDABAD, DISTRICT MURSHIDABAD: Laying-out of a garden was completed. The garden development work includes lying of lawn, dot plantation, shrubbery border and flower beds.

16. YELLOW MOSQUE, MAHIMAPUR, DISTRICT MURSHIDABAD: Garden development work was completed by way of laying of lawn, dot plantation, shrubbery border and flower beds.

17. TWENTY-SIX SIVA TEMPLE, KHARDAH, DISTRICT NORTH 24 PARGANAS: Garden development work was completed and the garden is being maintained in good condition. It included lying of lawn, dot plantation, shrubbery border and flower beds. A sprinkler irrigation system was also installed and it is being used for irrigation of lawn grass.

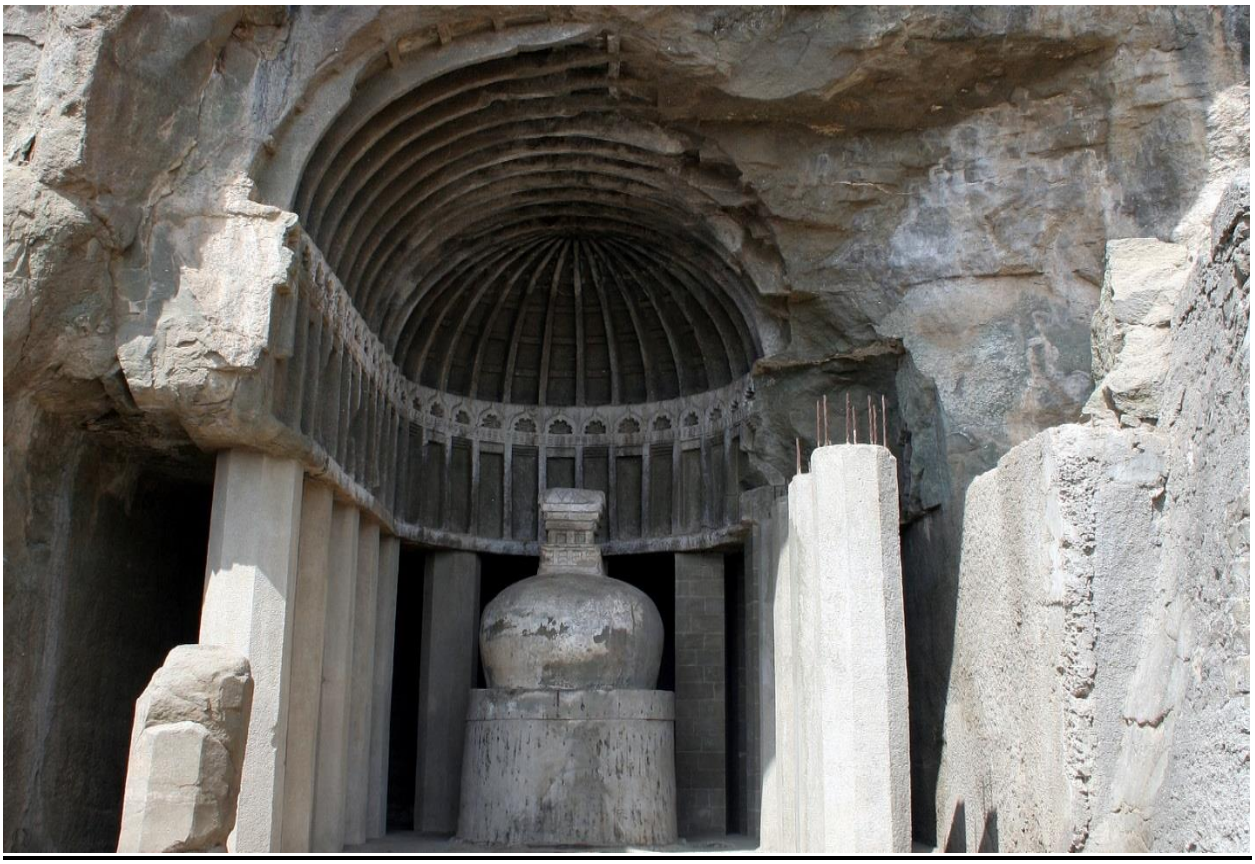
XI. PUBLICATIONS

PUBLICATIONS OF THE SURVEY

1. Indian Archaeology – A Review- The issue for 2001-2002 was published.
2. Guide books -Pattadakal, Agra Fort and Bhimbetka under World Heritage series were brought out.
3. Brochures on Majuli Island was printed.
4. Dynastic list of Copper plate Inscriptions was brought out.
5. Brochures on monuments of Dabhoi, Surat, Daman, Dholka and Rani-Ki-Vav in English, were printed for free distribution to visitors by the Vadodara Circle of the Survey.
6. Brouchers on *Rajasthan Ke Kendriya Sanrakshit Devalayon Ki Ek Jhalak* in Hindi and Chittaurgarh Fort, Deeg Palaces and Kumbhalgarh and Bilingual were brought out by the Jaipur Circle of the Survey.

OTHER PUBLICATIONS

Karnataka – The Archaeological and Folklore Museum, Kannada University, Hampi, published two books on *Temples of Bellary District* and *Temples of Koppal District*.





Archaeological Survey of India