

## Early Historic Sites in Orissa©

Paul Yule with contributions by others

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## Introduction

While art historians have long celebrated the intellectual and artistic achievement of the medieval temple art of Orissa, quantitatively and qualitatively its archaeology trails behind that of most of South Asia. Until recently archaeology has remained a matter essentially of local interest. One can point to a variety of causes including the general poverty of the area, until recently a lack of basic infrastructure, as well as the scarcity of routined and trained field professionals. Despite rare informational stepping stones, archaeologically early historic western Orissa and the adjacent Chhattisgarh region are best described as archaeological *terra incognita*. Moreover, other areas of Orissa such as southern Koraput and parts of Malkangiri are even less well explored and are relatively inaccessible to archaeologists (Fig. 1). A main task below is to make such sources available, build on this documentation, and catalyse future work. The dearth of scholarly attention to Orissa has nothing to do with its great archaeological promise.

Luxury is being the first to discuss major structures and sites only recently described, drawn, or photographed. What we in gratitude have returned to India are especially geoinformatic research methods, training of our colleagues, and the present study which hopefully makes Orissa more intellectually accessible to all. In any case, a cross fertilization of ideas hopefully will further the archaeology in Orissa, and move it beyond the increasingly paradoxical intellectual legacy of Sir Mortimer Wheeler and his students, for example with regard to the obsolete (300 years too low) dating for the founding of Arikamedu, which in effect lowered the entire regional iron age chronology. Some still regard this chronology as viable.

The present study does not belong to any particular archaeological school, *e.g.* American-style anthropology, with comparisons to other cultures far away in terms of time and space. It is written by and for cultural historians of both South Asia and the West. If there is any influence from the archaeology of Germany, where the author lives, then it is possibly reflected in his desire to visualize to the extent possible the subject - Early Historic Orissa. The author attempts to trace the steps from the "megalithic" iron age to the early historic period. The "scarlet thread" woven through the present report is the search for archaeological contexts as a historical basis, as opposed to one which rests on collectors' provenances and strayfinds, favoured by certain authors. Documenting our results to the extent possible is only the first step in a more thoroughgoing interpretative reconstruction of the early cultures of Orissa. The sites included in the following gazetteer were investigated in the hope of finding evidence for the issue of relations between eastern and western Orissa of our work (see below). They provide basic information but are meant not to duplicate other existing sources. Thus, certain potentially relevant sources are intentionally omitted (Dhauri, Languri, Ratnagiri, Udaygiri, etc.).

Foreign and local archaeologists alike have overwhelmingly favoured the western areas of India, and particularly the Harappa Culture as a subject of study. Owing to the high degree of repetition in the specialist literature, the author turned to eastern India as an area for research not as "overgrazed".

Spread over an enormous surface (156,000 km<sup>2</sup>, *i.e.* a little less than half as large as Germany) few prehistoric and early historic are proven or documented in Orissa. These are generally known only superficially, often only in lists which appear in survey articles. If analogously in Europe, one were to propose a topic such as "Early History in Germany", this suggestion no doubt would evoke involuntary mirth on the part of colleagues. But the state of research is vastly different in Orissa. Few populated parts of India are archaeologically so

little explored as is Orissa. The present-day population density gives an indication also in antiquity for the attractiveness of Orissa for settlement. With a recent population (1972) of some 77-135 persons per km<sup>2</sup> - below the average from all of India (173/km<sup>2</sup>) - western Orissa does not qualify as a population centre relative to certain other parts of India<sup>1</sup>. These same statistics can be projected into the past in order to estimate the attractiveness of Orissa as an area of settlement.

Naturally, my heartiest thanks go to the German Research Society (DFG) for its emphasis programme (SPP 1066 "Contested Centres: Construction and Change of Sociocultural Identities in the Indian Region Orissa"), conceived and nurtured largely by Hermann Kulke of the University of Kiel. In cases in which for formal reasons the University could account for certain expenditures, an anonymous private source is thanked here. Wolfgang Böhler of the Institute for Spatial Information and Surveying Technology of the University of Applied Sciences in Mainz for support and suggestions too numerous to mention, and for lending us a laser scanner in 2003. K.K. Basa organised as our local sponsor the Utkal University in Bhubaneswar. B.K. Rath, director of the Orissa State Archaeology was an understanding and most helpful friend and colleague, who stored the excavated finds in his storerooms. We also thank the Archaeological Survey of India for permission to carry out our work. My friend and colleague, Martin Brandtner, helped on historical and indological questions. A proven and most promising field archaeologist in Orissa, P.K. Behera, helped us at many steps along the way, particularly in getting the project off the ground in 2001. In 2002 the energy company e.on in Bamberg lent us a tachymeter. Kay Kohlmeyer, of the Technical University in Berlin provided us with a magnetometer during the season of 2003. Jitamitra Singh Deo pointed sites out us that we otherwise would not have found in the Nuapada Dist. Corinna Borchert, Tim Kühnel and Irene Steuer-Siegmund fashioned beautiful final drawings, if not otherwise indicated, the author made the photos and drawings. I should like to thank all of the members of my teams for excellent participation in the face of extreme conditions in the field. Heidrun Schenk gave me the benefit of her South Asia experience and kindly criticised a version of the present text. Lastly, Mechthild Kolb's loyalty, firm judgement, and seeming limitless understanding helped me to keep working.

#### Participants

04.11. - 10.12.2000	P. Yule archaeologist
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B. Misra historian	
P.K. Mohanty archaeologist	23.10. - 15.12.2002
P. Yule archaeologist	M. Blumenroth archaeologist
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<sup>1</sup> As similarly pointed out in B. Subbarao 1956, no pagination fig. 4.

01.11. - 12.12.2003

M. Bordas Vicent survey engineer  
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### Sources and State of Research

In recent years Orissa's prehistory has attracted increasing interest in all areas except for the south. Local archaeologists have contributed more to this picture than those from abroad. Surveys took place by Chottrai in the 1990s, P.K. Mohanty in the late 1990s, P. Behera also in the late 1990s, and the joint German Indian Mission from 2000 to 2003. A large anthology of contributions regarding the archaeology of Orissa, which K.K. Basa and P.K. Mohanty brought out in 2000, summarizes its archaeology making it available to readers also outside of Orissa<sup>2</sup>. Soon after, another anthology followed<sup>3</sup> which shows a dramatic increase in the awareness of the archaeology of this neglected region. With regard to settlement archaeology and fortifications lists and brief texts of M. Mohapatra were of some use for a start<sup>4</sup>. Last but by no means not least, D. Schlingloff contributed two well-researched studies on ancient Indian cities, which collect and evaluate the evidence of texts and archaeology, in which Orissa plays, however, only a peripheral role<sup>5</sup>. Unfortunately, despite its excellence, this well-hidden study is not commonly known outside of German indological circles. M. Smith and R.K. Mohanty surveyed in Sisupalgarh from 2001 in two seasons and began excavation in January of 2005<sup>6</sup>.

Characteristic of the archaeology of Orissa are gaping informational voids held together by notions of a linear development of artefacts within and between periods. For example, that we even know about iron age "megalithic" tombs in our area is a rare accident of preservation. Most, with the exception of scant remains at Karkabhat in neighbouring Chhattisgarh, for example, have been destroyed for their building material, or succumbed to cultivation. One of our greatest problems is that the funds granted for research in Orissa simply has been inadequate to achieve significant results in this large area. Moreover, the main obstacle to archaeology here remains a lack of basic documentation and/or an indifference to it on the part of many or even most colleagues. Happily, since 2000 this situation has improved somewhat in Orissa and the documentation has increased.

In 1998 Hermann Kulke, Burkhard Schnepel and Martin Brandtner began with the conception of a new Orissa Research Project. The archaeological unit was designed to emphasize the role of western Orissa - particularly the Balangir, Kalahandi, Nuapada, and

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<sup>2</sup> K.K. Basa/P. Mohanty 2000.

<sup>3</sup> G. Sengupta/S. Panja 2002.

<sup>4</sup> R.P. Mohapatra 1986a and idem 1986b.

<sup>5</sup> D. Schlingloff 1967; Idem 1969. This escaped the attention of F. Allchin, "no systematic study of architecture " (1995, 223).

<sup>6</sup> For a bibliography see M. Smith, Archaeological Research at Sisupalgarh, an Early Historic City in Eastern India, in: South Asian Archaeology 2003. Proceedings of the Seventeenth International Conference of the European Association of South Asian Archaeologists (7-11 July 2003, Bonn, eds. U. Franke-Vogt & H.-J. Weisshaar (Aachen 2005) 297-306.

Sonepur Districts - *vis à vis* coastal Orissa from the iron age into the twentieth century. Brandtner had spent considerable time researching the archaeology of western Orissa. It struck him that despite the undisputed pre-eminence of coastal Orissa from the subrecent time onward, western Orissa also showed indications of cultural achievements which suggested that it played a greater role in the regional history than commonly held. The Orissa research project was born in 2000, Brandtner fell ill, and no longer participated actively. The undersigned was encouraged to enter the project, and did so from the winter of 2000 and onward.

Our field survey began in the middle Mahandi valley in 2000 without knowledge of unpublished surveys which P.K. Behera had just begun in the same area. Once aware of these sites, we resurveyed them and others as well to get a comprehensive and precise picture of the nature of the sites in terms of our own documentary methods. We wanted to verify his results and at the same time elaborate on them by means of a more explicit method and survey norms. Team members excavated three trenches in western Orissa which yielded stratified pottery enable comparison between this and coastal area (see below).

One technical detail requires explanation. We did most of the mapping by means of a hand-held GPS receiver. The resulting plans show coordinates in the UTM (Universal Transverse Mercator System) system. As opposed to geographic coordinates, they measure in rectangular areas without curved lines, and are referenced in metres. Thus, they are advantageous for our purposes: they give the position of a given site in addition to a simple scale.

#### Geographical and Chronological Scope

From the iron age into the early centuries CE, given the modest quantity and quality of historical data, it is nearly impossible to correlate archaeological monuments or developments with historical events. An upper terminus for our inquiry, when western Orissa and present-day Chhattisgarh were politically combined as Daksina Kosala, up to the second half of the 10<sup>th</sup> century CE (this dating is contested) coincides with the conquest of the Somawamshis of Daksina Kosala over coastal Utkala. Given the sparsity of accessible sites, our original plan to centre on the work in the Tel and Mahanadi valleys, as the main thoroughfare between the coast and the interior, had to be modified (Fig. 1 and 2) in the hope of achieving a more complete historical picture consonant with the sites as they became known in greater detail. Older study materials on Orissa proved of little help<sup>7</sup>. Given the nature of the sources, a history of Early Orissa in the true sense is not possible, but a gazetteer of its sites is. Iron age so-called tombs, were to be investigated as a possible predecessor to the present day "megalithic" structures (owing to its vacuousness one of the great misnomers of archaeology)<sup>8</sup> - memorial stones to honour revered ancestors. This thin theoretical thread in our investigation was to bind the early and later contexts.

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<sup>7</sup> In late February 2002 176 inked drawings and two months later a few of Brandtner's catalogue slips regarding the iron age pottery of Orissa from the campaign of 2001 became available for study. These derive mostly from nine sites surveyed in 2000 in the Tel/Mahanadi system. Lacking are the descriptions of the wares.

<sup>8</sup> With "neoliths" or "neolithic axes" vying for second place.

### Purpose and Historical Hypothesis

Today, the coastal region of Orissa is superior economically and culturally to the back country of western Orissa, in part as a result of its more favourable climate. But Brandtner has cited certain evidence which points to a culture and state formation of early historic western Orissa pre-eminent over those to the east: In the interior the high technical quality of pottery in relation to that of the coast, of proto-urban settlements, the occurrence of luxury items (seal stones and jewellery made of semiprecious stone, a mould shell for casting either metal beads or rivets, knobbed ware, numerous grafitti, and high quality imported Northern Black Polished Ware)<sup>9</sup>. The information presented below illuminate the question of a regional advanced development now forgotten, but owing to their fragmentary nature, cannot answer it with complete clarity.

In addition to illuminating the early historic culture across all of Orissa, we attempted to differentiate the iron age and subsequent early historic potteries in terms of their constituent pottery shapes and fabrics. Excavation trenches yielded a certain amount of stratified pottery from sites along the middle Mahanadi which more clearly define the major pottery categories. Classical and well-known pottery categories (for example, iron age "Painted Grey Ware" and early historic "Northern Black Polished Ware") were developed in and for northern India, where these potteries occur, and the meager research on them has resulted in a picture which is oversimplified, for example in Orissa. Here they are reported as distributed here, one must admit that such sherds are only rare imports. The main problem, however, lies in differences in the sherds themselves (production quality, colour, preservation, etc.), which inevitably lead different scholars to differing characterisations of the wares. Moreover, since relevant archaeological find categories are rarely published in terms of their stratigraphy, specific wares could conceivably be dated to either the iron age or early historic periods, or both. Statistical analysis of artefacts is rare or usually altogether absent. Nor is the pottery sequence simply a matter of classifying isolated sherds. Needed is a generally transparent and comprehensible classification instead of "island solutions".

Despite some careful characterisations of the early historic pottery, most traditional ones are generally impressionistic, most specialists evidently believing that the ware definitions are self-evident. Comparison of more detailed excavation reports reveals that the ware definitions vary considerably with each other in scope, purpose, and degree of detail. A goal of the present brief contribution is to classify the pottery, as well as compare and contrast the different wares. The detailed scheme originally planned for this has been radically shortened.

At the outset, in their shared multivariate traits, individual early historic sherds nuance infinitely from one ware into the other, rendering the classification difficult. A great variable is the preservation of the sherd and its surface. Generally in the relevant literature, the pottery designations are abbreviations which describe marked characteristics of the surface treatment and of the fabric as well. The definitions vary greatly, some describing a decorative feature (*e.g.* rouletted ware, knobbed ware) without describing the ware itself.

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<sup>9</sup> M. Brandtner et al. in press.

Having hopefully established the need for more basic documentation in Orissa, as well as our spatial/temporal scope, the sites which we initially considered as potentially interesting for our research strategy, appear below as a gazetteer. The appended CD contains some 860 images listed alphabetically by site to illustrate the early historic archaeology of Orissa (see list of figures on the CD "0000 photo CD"). The reader can view, copy and republish these as he or she wishes. Most archaeological sites in Orissa are little known. Those which we recorded, but fall too far outside our time-frame, are omitted. Sites with excavated trenches follow surveyed sites in the text. Finally, although this report builds on that published by Yule and Böhler in 2004, it is intended not to duplicate that article, yet assumes a knowledge of it.

## Sites surveyed

At the outset of our project in 2000, our research strategy emphasised sites located along the middle Mahanadi valley (Figs. 1 and 2). These shed potentially the most light on the development of western Orissa owing to their visibility along this natural thoroughfare. In 2001 we surveyed systematically both banks of the Mahanadi, some 10 km east and west of its confluence with the Tel. Our activity extended as far south-east as Krishna-Mohanpur, just south-east of Boudh. But without radiocarbon assays from stratified sites, these proved of limited value for a history of settlement. During the first two years it became increasingly clear that except in the most superficial way the new sites could not be compared with those in the eastern coastal region since the latter were largely undocumented. Examination of the literature on large sites in the East, such as Sisupalgarh, Jaugada and Radhanagarh reveals them to be surprisingly little known<sup>10</sup>. Understandably, we decided to document these to the extent possible: "One picture is worth a thousand words". From March 2000 to January 2005 activities included in summary:

2000 November: survey of the middle Mahanadi sites,

2001 April: survey of the middle Mahanadi sites, test trenches at Budhigarh and Haldipali

2002 September: survey of all suspected early historic sites in Orissa

2003 April: measurement of Area D in Sisupalgarh, magnetometer prospection here and immediately south of Sisupalgarh. Test trench at Tentulipali.

2003 December: laser scanner recording of Area D.

2005 January: tachymetric survey of Area D, of the glacia near the excavated entrance SP IV and immediately east of it. We carried out ground radar prospection of these surfaces in addition to one on a surface immediately south of the southern glacia.

Not unexpectedly, survey-conditions vary greatly over all of Orissa, which influences the quality and quantity of information which such investigations yield. Particularly in western Orissa the intensity and thoroughness of our surveys vary in this way from site to site. The most intensively surveyed were Haldipali, Jamtangi, Manamunda, Pondkital, and Tentulipali - all with substantial early historic surface scatters. At Jamtangi, for example, the site was systematically searched, walking up and down fields in 1m intervals. Despite a ground cover of bean cultivation, it was still possible to see sherds in the tilled soil. Surface finds were as expected in pastures, but could be determined in ploughed fields varying in quantity proportionately with the amount of new vegetation cover. For these reasons, the author does not map his survey results.

Prospection along river courses means largely "ghat archaeology", since settlement sites are most readily visible here. Classic cases include ghats which rise to a height above the flood basin of some 8m. Just behind the crest of the ghat the terrain gradually lessens in height as a result of the alternating sedimentation and erosion history peculiar to this flat riverine area. But the ghats are only a small percentage of the surveyed surface - and not necessarily a representative one. Ghats planed by erosion confound our sampling of sites, because they are

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<sup>10</sup> Several sites which we studied and mapped do not appear in the catalogue since they lie outside the scope of our investigation: Athagada, Dist. Ganjam; Deulga, Dist. Sambalpur; Ganjam, Dist. Ganjam; Golabai Sasan, Dist. Khurda; Khurdagarh, Dist. Khurda; Komnagarh, Dist. Nuapada; Mariha Taila Pahar, Dist. Sambalpur; Raibania, Dist. Balasore; Tangri Parvat, Dist. Sambalpur; Viratgarh, Dist. Keonjhar.

incomplete. Good examples of such are the eroded Asurgarh at Manmunda and the building at Tentulipali. In the ghats the settlement deposition seldom reaches up to 2m thickness. Even in cases in which only few sherds and other anthropogenic finds are observable in the soil debris, there can be little question of the nature and origin of the deposition. The soil of ancient habitations differs from that outside them, containing as it does organic and inorganic materials. On the other hand, in important and conspicuous geographic nodal points such as Sonepur, at the confluence of the Tel and Mahanadi, one expects massive early historic settlement deposits. But unfortunately, these are disturbed and eroded to such an extent that survey proved fruitless here even in open lots in and around the town. A picture of the settlement of the region must proceed by means of continued extensive survey of the area.

### Surveyed Early Historic Sites

Previous studies of the archaeological sites of Orissa listed them alphabetically within each district. Given their fewness, the author has chosen to list them altogether alphabetically, for ease of finding a given site.

#### ***Badmal, ruined fort, Dist. Sambalpur*** (21°06'22.1"N; 84°03'37.6"E)

Badmal lies 41 km south of Sambalpur. Its lozenge-shaped plan measures inside 220 x 80m =4ha (Fig. 3 and 4, see CD for further images). The Harihar Nullah, which flanks the northern glaxis is a natural barrier in addition to the anthropogenic defences. As preserved, the glaxis rise c 5m above the surrounding plain averaging 15m in width. A gravel road transects the south-eastern glaxis. In addition to the main fortification, two smaller glaxis are located on the north-western side towards the river. Entrances can clearly be identified on the south-west, north-west and north-east sides, the south-eastern one obscured by damage. Furthermore, the glaxis is distressed in places as a result of surface agricultural activities. On the northern corner a border stone of recent date is located.

In 2001/02 P.K. Behera tested this iron age and early historic rampart site first by means of three trenches and obtained stratified charcoal, usable for a first dating<sup>11</sup>. Beside pot sherds, semi-finished beads and splinters of semi-precious gem stones came to light. In particular a high percentage of Black and Red Ware came to light. Though building structures were not recognisable in the interior of the enclosure, assumed is a craft area for working semi-precious stones.

#### ***Baidyanathapur, archaeological site, Dist. Sonepur*** (20°48'35.8"N; 84°47'54.3"E)

This protohistoric and medieval site lies on the north bank of the Tel, not far from Sonepur<sup>12</sup> (see CD). Baidyanath, as it is locally called, is noted for its Hindu sacral architecture. A large

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<sup>11</sup> Radiocarbon calibrated assays of charcoal:

1 Badmal trench BDMII Stratum (5) -125cm b.s.

σ1 standard deviation 799-766BCE, lab no. KIA20153

2 Badmal trench BDMII Stratum (5) -115cm b.s.

σ 1 standard deviation 799-766BCE, lab no. KIA20154

3 Badmal trench BDMII Stratum (3) -50cm b.s.

σ 1 standard deviation 640-588BCE, lab no. KIA20155

The stratigraphy between the glaxis and the trenches will be investigated in the near future. <sup>14</sup>C which accumulated between 700 and 350 BCE calibrates erratically. These dates may not be taken literally.

<sup>12</sup> In November 2001 P.K. Behera led the joint team to this site.

temple tower collapsed here on 07.08.1967. A squarish pit in the south-eastern part of the site is one of the few possibly early historic features. Unfortunately, it cannot be dated. Survey yielded sherds of Black Slip Ware. The western edge of this site is believed to contain intact early historic architectural remains.

***Berhampura, stone enclosure, Dist. Sambalpur*** (21°25'01.4"N; 83°57'30.2"E)

The wall of this fragmentary structure stands on the north (length 60m), west (length 64m) and south (length 26m) sides, and was incomplete to the south-east and east (Fig. 5, see CD). This dry stone wall reaches a maximal height of 1.60m and an average width of 0.70m. An entrance pierces the western wall. Interior structures are not in evidence. Given a lack of surface finds, the only indication for dating is the stone masonry itself. P.K. Behera (oral information) ventured a possible dating in the Gupta period on the strength of the particular kind of dry-stone masonry.

***Bhairapadia near Junagarh, possible ruined tomb, Dist. Kalahandi*** (19°52'11"N; 82°56'05"E)

An isolated and irregular 5m wide circle of stones lying in a copse near the town of Bhairapadia near Junagarh presumedly represents the remains of an iron age "megalithic" tomb (Fig. 6 and 7, see CD). But no artefacts of any kind are visible on the grassy surface. The stones of the ring are smaller than those of well-known published iron age tombs, for example at Brahmagiri. Nonetheless, this is one of the only examples of a possible "megalithic" circle in Western Orissa.

***Budikon, ruined prehistoric cemetery, Dist. Boudh*** (20°04'45"N; 83°20'56"E)<sup>13</sup>

Striking in terms of the number of tomb remains, but thoroughly eroded of soil (Fig. 8, see also CD) is the site of Budikon near Puramunda. The large stone structures are completely disintegrated. Few or no pottery sherds lie on the surface.

***Jamsaragarh, ruined fort, Dist. Sundargarh*** (22°16'25.5"N; 84°54'28.6"E)<sup>14</sup>

According to sources in northern Orissa, a fortification of early historic date named Kishorgarh was said to lie in the immediate area of Jamsaragarh village. Six kilometers east of the eastern edge of the big industrial town of Raurkela, the site of Jamsaragarh is formed by a natural escarpment lying some 16m above the confluence of the rivers Koel to the north and Bisra Nullah to the south (Fig. 9, see CD). The defences form in plan an irregular rectangular and are east/west oriented. North/south it measures maximally 90m and east/west 250m. Immediately to the east an open field measuring some 100 x 100m is the probable place of the associated settlement. At the south-western corner gully-erosion and probably brick robbing have unearthed baked brick foundations of over 3m depth. The bricks measure

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<sup>13</sup> S. Pradhan 1988, 17-18.

<sup>14</sup> R.P. Mohapatra 1986a v. 2, p. 195. The published description hardly corresponds with the remains.

some 20 x 20 x 6cm.

Brick fortifications are visible on the north and south-east sides, complementing the natural slope. On the north slope lay a concentration of early historic Plain Red Ware sherds. A large cultivated meadow east of the defences could not be surveyed properly during our visits. This seems, however, to contain early historic settlement debris. By virtue of the Plain Red Ware strewn across the surface, a possible early medieval dating rests on type of bricks used. Recently, with or without any documentation, the State Archaeology placed the site under its protection<sup>15</sup>.

***Jamtangi, sherd scatter, Dist. Boudh*** (20°48'46.0"N; 84°02'40.9"E)

The survey took place here in 2001 at the west-south-west end of the pipeline to the north-eastern corner at the Bag Jhor proved largely free of anthropogenic remains (see CD). At the time of surveying the field area lay under a cover beans and was partly used for grazing. Two adjacent surfaces were selected for survey nos. 1 and 2). Surface 1 (140 (NW-SE) x 60m (NE-SW)) was planted mostly with beans, and 2 (40 x 40m) was pasture.

***Jaugada, ruined fortress, Dist. Ganjam*** (19°31'21.2"N; 84°48'44.1"E)<sup>16</sup>

Jaugada ("Jaugarh", ancient Samapa) lies 35km north-west of Berampur and 160km south-west of Bhubaneswar by car. Once a provincial Mauryan fortified capital of the newly conquered province of Kalinga, Jaugada is famed by its version of the monumental stone-cut edicts in Prakrit of the Mauryan emperor Asoka. Despite J.D. Beglar's description during the later 19<sup>th</sup> century of the extant fortification towers and moat ("The walls had towers, also of earth, at each of the four corners, and also on each flank of each of the eight entrances"), without photos and drawings, the remains are difficult to visualize and comprehend<sup>17</sup>. In 1956 Debala Mitra of the ASI transected the northern glacis with a trench<sup>18</sup>. The now collapsed trench of this investigation appears to lie just east of the eastern gate of the north wall.

Visits to Jaugada in November of 2002, April and November of 2003 revealed a ruined early historic quadrangular rampart, in plan tipped 10° clockwise of north. About 40% of it (interior dimensions 700 x 850m = 72ha) are obliterated, but become recognisable by means of careful repeated observation (Fig. 10, see CD). Beglar's fortification towers, have long since disappeared without a trace. In 1956 Debala Mitra reported the glacis to measure 23 x 4.75m, extant maximal width to height. But new measurements exceed these figures with a maximum of 60 x 6m on the surface, naturally in its weathered and eroded state (Fig. 11). The famous stone cut edict of the Mauryan king, Ashoka, lies close to the northern glacis (see

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<sup>15</sup> Oral information, B.K. Rath 10.12.2003.

<sup>16</sup> J.D. Beglar 1882, 112; D. Mitra 1957, 30-31; D. Schlingloff 1967, 55; R.P. Mohapatra 1986a, v. 1, 224-226; R.P. Mohapatra 1986b, 275-277; A. Ghosh 1989, v. 2, 183-184; M. Brandtner 2000, 372-377.

<sup>17</sup> J.D. Beglar 1882 [1970]: 112.

<sup>18</sup> Excavation report: D. Mitra 1957: 30-31, pls. 40-44.

CD). Farmers have flattened much of the latter to create a threshing ground. Preservation is best on the west side and worst on the built-over southern and eastern sides. Borings into the northern glacis provide an idea of its build (Fig. 12).

The southern and northern gates of the western glacis are the best preserved. The eastern one in the southern glacis and southern one in the eastern glacis exist only in traces. The position of the former corresponds to the main entrance to the village, which forms an axis where one expects the gate of this symmetrical fortress. A tarmac road passes some 20m west of the original position of the eastern entrance in the northern glacis. Traces of the original moat are strikingly well preserved particularly on the south-eastern and south-western sides. They have a width of some 40m.

Proceeding to the interior of the fortified area, the main rock formation lies in the north of the complex, which bears a nearly complete version of the famous edict, mentioned above. This lies on the east side of the main rock formation. The ASI built a shelter with a path of flagstones leading to its entrance on the south. The shelter's iron bars lie some 0.5m in front of the inscription protecting it from elements human and natural.

Prior to the building of this protective structure, the rock-cut inscription was vandalised, weathered and the letters can only be seen or read in a raking light for a short time in the late morning and early afternoon. Only the left (southern) part of the edict is clearly recognisable and even this is disfigured by a diagonal lighter coloured stripe (see CD) and discolourations from previous protective plates that were applied and removed at some point in the past. Iron corrosion stains from the bar construction also stream down the stone panels thus discolouring the inscription. The stone panels seem to have been cleaned in recent times which also may have exacerbated the weathering of the inscriptions.

Despite the poor preservation of Jaugada's fortifications, with intensive study its plan becomes clear. On paper it and its nearby relative, Sisupalgarh, at first glance are all but indistinguishable. Further work may reveal the position of earlier buildings inside the enclosure. Measures must be taken to preserve its remains and to prevent further destruction.

***Khameswaripali, partly excavated multi-period site, Dist. Balangir*** (20°50'14.6"N; 84°00'10"E)

Khameswaripali is located on the northern bank of the Mahanadi some 11km east of Sonapur and 4km south of Birmaharajpur<sup>19</sup>. P.K. Behera reports settlement remains here and all along the mid-Mahanadi. Three trenches brought to light a 2m thick layer of cultural debris ranging in date from the chalcolithic to early historic period. They ranged in size from 3 x 3m (KSP-I and KSP-II) and 2.5 x 2m (KSP-III) and not surprisingly contained a large sample of pottery. Early historic remains came to light in KSP-I in a 0.3m thick layer which also included iron finds. While this may not appear to be a large amount of pottery and other material, owing to its publication, Khameswaripali is the main informational site in the area. The iron age interfaces here with the early historic period. Black and Red Ware bowls, Black Slip Ware

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<sup>19</sup> P.K. Behera 2001, 13-34.

funnel-mouth bowls, Red Slip Ware and Plain Red Ware vessels of diverse shape with complicated rims comprise the pottery assemblage<sup>20</sup>.

***Khariar/Nehena, settlement site, Dist. Nuapada*** (20°15'17"N; 82°46'17"E)

Several archaeological sites cluster in the plain surrounding Khariar. In the 1980s 100m south-east of Nehena<sup>21</sup> (see CD) a polisoir (grinding) stone was recognised for the fashioning of ground stone axes. Brandtner dug a test 2 x 3m trench and recorded the pottery stratigraphically. He notes close similarities with the early historic pottery of western and Chhattisgarh, not to mention those in Sisupalgarh, in coastal Orissa. Not surprisingly, early historic pottery found on the surface has several comparisons with dated examples in Andhra and Karnataka. Nehena finds mention in a 7<sup>th</sup> century CE copper plate inscription as "Navannaka"<sup>22</sup>.

***Khariar/Sandohel, iron age tombs, Dist. Nuapada*** (20°15'23.9"N; 82°47'03.7"E)

In the late 1980s three stone circles near the north bank of the Sundar (or Indra) were identified as iron age megalithic tombs. The site lies 900m west-south-west of Sandohel village immediately north of a levy road. Unfortunately, in 1990 students from Khariar College "excavated" two of these without any form of documentation<sup>23</sup>. Public notice of the tombs followed in 1994. In 2001 three ruined iron age tomb circles were still visible, one of which (Fig. 13, see CD) was cleaned and drawn. Plan and profile (Fig. 14) show that plate-size outwardly leaning flat stones are the building material of the 7m wide tomb circle. This means of wall construction is otherwise unknown for "megalithic" tombs on the Subcontinent. The chamber walls are no longer recognisable.

During the cleaning, an iron sickle of iron age date (see CD) came to light outside stone circle no. 1 below one of the stones. This piece derives from this tomb or from a neighbouring one. Finds preserved in Khariar College, which are said to derive partly from the tomb, comprise a mixture of iron age pottery and iron fragments, among them a large iron spear. The exact provenance of these finds is unclear, but may also derive from the tomb(s). But members of the department inform us that the finds also derived from other sites.

Closer inspection in 2002 revealed traces of one or more stone circles in the paddy in the south-east part of the plot - the scant remains of circular tombs similar in size to the two which are known<sup>24</sup>. In 2003 the undersigned applied for an excavation permit from the ASI, which was denied. A few days thereafter most of the 30 x 60m site (east/west x north/south)

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<sup>20</sup> P.K. Behera 2001, 30 fig. 11.

<sup>21</sup> M. Brandtner 1994, 101-104.

<sup>22</sup> M. Brandtner 1994, 102 for the sources.

<sup>23</sup> M. Brandtner 1994, 102-103, fig. 8.1b; J.P. Singh Deo 2000, 421.

<sup>24</sup> Cf. R. Subrahmanyam 1975, fig. 71 for a typical iron age tomb field at Nagarjunakonda.

had been destroyed in order to obtain clay for the firing of bricks, including the still preserved north-east corner of the plot.

***Khariar/Sibedi mountain, possible fortification, Dist. Nuapada*** (20°16'47.3"N; 82°49'41.5"E)

A "megalithic fort" on top of the Sibedi mountain (c. 307m altitude) is naturally defensible as a result of its height (c. 80 m) and flanking stones<sup>25</sup>. On the back of the eastern end of the long mountain is a natural stone enclosure, the western end of which is walled. The wall is oriented north-east/south-west (Fig. 15, see CD). Its stones were set in mud mortar. Up to six courses were preserved (1.1 m height) and the sandwich construction was c. 1.2m in maximal width.

***Kharligarh, ruined settlement with defences, Dist. Balangir*** (20°27'37"N; 83°33'38"E)<sup>26</sup>

A key site for the early history of western Orissa is Kharligarh 1.5km east of Bhuampada, near the confluence of the Rahul and the Tel<sup>27</sup>. The antiquity of this naturally defensible site has been recognised since the 1930s. This 600 x 300m (14 ha *intra muros*) site lies in a meander of the Rahul (Fig. 16, see CD) the western open end of which is sealed off by a 10m high wall some 50m in width. The western fortification, including a ruined tower, is the most prominent feature of the site.

Examining the site more closely, inside the meander to the north-west, near the fortification wall on the most elevated part, settlement remains lie visible on the surface. The steep edges of the settlement are eroded by dozens of gullies, the largest of which is located in the north-west corner of the site. Building debris protrudes from those gullies on the north, east and south slopes of the naturally fortified settlement area. At first sight, on the north-western bank of the settlement a flat stretch of the embankment suggested a possible boat landing. But further observation and survey counter this idea. Presumably primarily geological terracing is visible on the north bank which now is gardened. Closer investigation reveals the presence of accumulated stone in the river frontage. This appears to be debris fallen from the escarpment or a reinforcement of the river bank. The main question regarding the settlement is to what extent the embankment is of geological origin or to what extent, if any, its form is anthropogenic. Kharligarh does not appear to have been densely populated to judge from the meagre amount and depth of settlement debris visible on the surface.

In 2002 trenching carried out by the Sambalpur University yielded the ware typical of the area: Black and Red Ware, Plain Red Ware, Red Slip Ware, Black Ware, Black Slip Ware, Burnished Black Ware<sup>28</sup>. These suggest a possible settlement as early as the 3<sup>rd</sup> - 2<sup>nd</sup> centuries

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<sup>25</sup> J.P. Singh Deo pointed this site out.

<sup>26</sup> First mention: S.K. Mukherjee 1968-69 [1971], 68.

<sup>27</sup> R. Mohapatra 1986a v. 2, 221-222. Our first GPS mapping took place in 2000 and was completed in 2001. The site was trenched in 2002 by members of the Sambalpur University.

<sup>28</sup> Oral information of P.K. Behera.

BCE and an end terminus in the early medieval period.

***Lokapada, hoard of punch-marked coins, Dist. Balangir*** (20°49'40"N; 83°36'42"E)<sup>29</sup>

In 1991 near the village Lokapada a hoard of silver punch-marked coins were discovered on the banks of the Suktel. Although the police confiscated about 970g of these coins, prior to this reportedly the villagers had already melted down a considerable part of them. This hoard have not been studied, but on the strength of oral description, at least a part of the coins are certainly Mauryan in date.

In 2001 inquiries at the police department in Lokapada revealed the presence of some 30 coins, the rest having been "lent out". Following further inquiries, the some 300 coins were returned to the police station. Thus, the provenance of these coins is not above question, and the importance of the hoard for historical inquiry is compromised.

***Asurgarh near Manamunda, settlement traces, Dist. Boudh*** (20°50'00"N; 83°56'02"E)<sup>30</sup>

This badly eroded classic ghat site (Fig. 17) lies 6km east of Manamunda on the main road. It appeared to others and initially to us to have promise for excavation, owing to the chronologically and qualitatively varied surface finds. It offers a broad spectrum of pottery sherds ranging possibly from the neolithic/chalcolithic to the early medieval period - thus spanning more than 2000 years. In 1973 N.K. Sahu from Sambalpur University sunk several trenches in this "settlement" which today are visible, but which essentially remain unpublished.

On first viewing this Asurgarh, it seemed that possibly only the south wall of a quadratic fortification is preserved. The majority of the walls to the north would appear to be eroded away. More particularly, the ghat declines in height south (see CD). Immediately south of this elongated "ghat settlement" the soil is more deeply eroded. Following more careful scrutiny, it seems that the protuberance is simply a freak geological formation resulting from differential resistance of the ghat to the river erosion on its northern and southern faces. This erosion partially explains the lack of structures in the excavations - which never existed in the first place. As defined in the present study, the site measures 340m long instead of 1500m, as first mentioned in the report of 1982. One also can consider the originally reported dimensions to comprise more than one site since to the east and west of the main ghat site pottery sherds lay on the surface.

The published description reveals little about the stratigraphy or build of the site. Among the finds of outstanding importance are painted sherds, some of them handmade and painted after firing, others consist of wheel-thrown, pre-firing painted Black and Red Ware. A large variety of graffiti is also encountered with. Knobbed ware indicates the possible early presence of Buddhist monks who used or traded such vessels.

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<sup>29</sup> Personal communication, S. N. Agrawal in Menda (Dist. Sonepur). Brandtner photographed some of these coins in 1984.

<sup>30</sup> S.C. Behera 1982, 16-22; S. Pradhan 1989-90 [1994], 80-86. P. Mohanty/B. Tripathy 1997-98, 90; P. K. Chhotray 2000.

The dating of the mound remains somewhat unclear. Given a lack of a documented stratigraphy, essentially any finds from there can only be treated as surface strays. Sherds of iron age and early historic date are proven. More particularly, the uncertainty lies in the dating of possible chalcolithic pottery.

***Karmapadar (Karumpadar) near Manamunda, diverse ruins, Dist. Boudh*** (20°49'44"N; 83°58'10"E)<sup>31</sup>

Karmapadar (Kurumpadar) lies on the eroded south bank of the Tel/Mahanadi 7km east of present-day Manamunda on the main river road. It is interesting as a potential object for excavation. Close to each other lie small mounds, possibly a destroyed dolmen, and several stone circles of uncertain date (Fig. 18, see also CD). Visible remains spread over 3 or 4 ha. Stone settings are circular and of no recognisable form. The surface finds are largely chalcolithic and iron age potteries. Of special interest are fragments of a four-legged vessel and white-painted Black and Red Ware sherds, as they find parallels among the finds from the early chalcolithic period at the recently excavated site of Khameswaripali<sup>32</sup>.

***Marykud island near Boudh, sherd scatter, Dist. Boudh*** (20°50'12.6"N; 84°20'18.6"E)

On the northern and central part of the island few if any archaeological materials are visible on the surface (see CD). The site of Guriamunda is located in the the southern part of the island<sup>33</sup>. The pottery "from the section scraping" is described as Black and Red Ware (60%), Black Polished Ware (20%), Red Slip Ware (10%), and Dull Red Ware (10%), thus placing it in the early historic period<sup>34</sup>.

***Mohabhoi Sasan, mud fort, Dist. Khurda*** (20°14'01"N; 85°50' 49"E)

Mohabhoi Sasan (Fig. 19) lies immediately north-west of the north-western corner of Sisupalgarh. In plan it is a relatively regular rectangular mud wall which measures at its perimeter 400 x 300m. Its walls are oriented to the north. Located in swampy ground, which is watered by the Gangua Nala, until recently only a few houses stood here. But with the rise in local real estate prices, it has become prime building property which is not effectively protected by antiquities laws. The site appears on the municipal map (Fig. 20) as a 3m high rectangular enclosure. As drawn, it is steeper on the outside than the inside.

Survey in January 2005 revealed an alarming land grab, particularly on the south wall of the enclosure (see CD). Over a dozen houses suddenly were begun behind the ancient glacis, and the digging for foundations exposed sections through the mud wall (Fig. 21). Within a few

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<sup>31</sup> S. Pradhan 1988, 18-19 "Kurumpadar".

<sup>32</sup> P. K. Behera 2000-01, 21, figs.3 and 4.

<sup>33</sup> B. Tripathy 2000, 401-414.

<sup>34</sup> B. Tripathy 2000, 404. The total number of sherds is not given.

days most of the southern wall was built on intensively and denatured. Inside the ancient defences other recent untoward changes are visible, most notably a canal cut diagonally through the centre as part of a housing development scheme. This channel exits the walls by means of a culvert to the south-west.

The form and size of the walls suggests the ancient structure to be a mud fort. On the other hand, it has been identified as a theater by virtue of a text which mentions that king Kharavala built one in his third regnal year<sup>35</sup>. But a cross section (Fig. 19) through the southern wall and observations of the above-mentioned building trenches (see CD) show no traces of seating which one would expect for the spectators.

No clear evidence exists for the dating of Mohabhoi Sasan. Presumably it postdates nearby Sisupalgarh. Regarding its purpose, a guess is that the fort was built for a siege of Sisupalgarh by an invader. This might explain the close proximity.

***Narla/Asurgarh ("fort of the giants"), Dist. Kalahandi*** (19°54'32"N; 83°21'02"E)

The impressive (interior east-west by north-south: 410 x 250m=10.2ha) early historic rectangular glacis lies on the right bank of the Sandul, just 5km west of the Narla Railway Station. The largest glacis of its kind in western Orissa (Fig. 22 and 23, see also CD), it has been known to the outside world at least since the 1940s<sup>36</sup>. Subsequently it was placed under federal protection, although at that time it still was not properly documented. The 50m wide glacis measured in the interior are 6m in height, and 10m in height in the exterior. A prominent entrance is let into each of the four glacis (see CD). These vary somewhat in their form and size, but at the base range between 4m (south side) and 8m (north side) in width. The glacis differ somewhat in their preservation and dimensions from each other. They reflect only indirectly the original appearance of the gates, which are positioned asymmetrically in them. For whatever reason, the structure itself is slightly asymmetrical; the south-west corner measures 10° more than a right angle. The north wall is best preserved, and erosion has disturbed most badly the west side and its entrance. The base of the glacis seems best preserved at the south-east corner, where it gradually rises to the crest. But especially in the east and north, the original rampart foot is truncated by the encroaching rice fields, thus obscuring its original shape and size. Inside the enclosure the ground is fairly flat except where farmers have channelled to let water into the rice paddies. On the average, the interior level is 3m higher than that of the exterior. The corners are slightly higher than the middle of the glacis walls, and irregularities in the height suggest the one-time presence of towers or bastions.

The first known plan from 1950 optimistically identifies the remains of a "palace" attributed to the Harappa culture. The large adjacent tank (named Udai Sagar) which to the east overshadows the rampart remains, was explained in the following way, "*It was so arranged*

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<sup>35</sup> Oral information B.K. Rath.

<sup>36</sup> P.C. Rath 1947, 387; S.N. Rajguru 1950, 245 fig. 2. These authors do not mention any previous research. R.P. Mohapatra 1986a v. 2, 234-236 for a summary.

*that when the fort was surrounded by enemies a secret sluice might be opened so that the whole inside and outside the fort would be flooded with water, and consequently the hostile army would be washed away by the water current, which could be increased in the main course of the stream, the Chandal, which flows to the opposite side of the tank*<sup>37</sup>. This charmingly naive explanation is all the more dubious since the tank was built after the ramparts had gone out of use. The glacis only makes sense when the defending archers have a clear field of fire in all directions. Inhabitants would never have built a fortification directly overshadowed by a high levy. This establishes the relative chronology of the two earthworks. After the rampart had lost its *raison d'être*, with the intensification of rice cultivation, greater sources of water were necessary, and the tank was enlarged.

In 1973 N.K. Sahu (Sambalpur University) sunk two small trenches of unknown size, description, and location near the centre of the enclosure drawing as known from an unpublished sketch of the site lodged in the papers of the Department of Archaeology of the Sambalpur University. In an area now under cultivation, the trenches are said to have yielded Black Polished Ware and Black and Red Ware. The uppermost strata contained sherds of Plain Red Ware of the early medieval period<sup>38</sup>.

We must go beyond the preservation of the glacis in order to understand its original appearance. Isolated brickbats reveal themselves on top of the glacis which suggests that whatever revetment was built probably consisted at least partly of fired brick. The corners are higher than the glacis itself. Especially on the northern side, the long ridges give an indication of the size and position of the original moat, which was clearly a part of the defensive system. The site was selected for its source of water and drainage for the moat. The adjacent Sandul probably has not changed its bed much since the erection of the fort.

In 2000 we mapped the glacis by means of a simple hand-held GPS receiver. In this way we also could monitor in point of time the preservation of this little-documented but important site. We paced around the outside perimeter of the wall, around the interior, and around the top. A sketch map arose, but it had one main weakness. The z-axis (altitude) measured by the GPS receiver is subject to greater inaccuracy than are the x and y axes. The error proved so great that there was no way to rectify it.

In 2001 we resurveyed the glacis by means of a new GPS receiver (Garmin Etrix Summit) with a barometric altimeter, which according to the manufacturer's specifications, had an accuracy of  $\pm 3\text{m}$  in the vertical axis. After calibrating the instrument, we measured the Asurgarh again. Within the vertical dimension a 1 - 10m error proved occasionally larger than that made with the other GPS receiver. The problem then became to know exactly where the instrument was accurate and where not. The resulting map was more accurate than its predecessor, but only because one had learned the local topography and had adapted the measuring to this new data. We decided to re-measure the site by means of an infrared tachymeter. Instrument height was determined by a GPS measurement which was corrected

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<sup>37</sup> S.N. Rajguru 1950, 246, 245 fig. 2.

<sup>38</sup> J.P. Singh Deo 2000, 422, probably citing S.C. Behera 1982, 2-8.

with reference to the local topographic sheet. The resulting tachymetric map is a definite improvement over the GPS-based sketch, rendering the size, shape and positions of the walls as well as their four gates. Most particularly the asymmetry of the plan and the shape of the walls is clearer.

Despite a probable early historic origin, this fort is ahistoric since it is not mentioned in written sources. Could this be one of the fortified settlements mentioned by Samudragupta in the Allahabad inscription?<sup>39</sup>

***Pendrupekan village area, stone enclosures, south-east of Tarbor post office, Dist. Nuapada*** (20°35'13.4"N; 82°38'38.0"E)

J.P. Singh Deo led us to this hill site, which lies 11 air km north of Komna. Two separate dry stone enclosures (Fig. 24, see also CD) are situated respectively at mid-height of the hill and the other at the top (Fig. 25, see also CD).

*Enclosure 1* is rectangular in plan with a maximal width of c. 38m stretching north-west/south-east and a maximal length of c. 45m, north-east/south-west (interior 1.7ha). The interior is divided into three sections: (1) the main area, which contains a well, two recent graves and a presumed megalithic burial, (2) an upper and a (3) lower sanctuary, separated from the main area by walls. The entrances to the sanctuaries lie to the east.

On top of the enclosure wall stone "poles" are visible, which seem to run vertically through the wall. The wall had a maximal height of 1.30m and a maximal width of 0.80m. The way leading to the enclosure is partly flanked by a small stone wall.

*Enclosure 2* consisted of boulders encircling a plateau on the hilltop. North-east/south-west it maximally measured 34m, north-west/south-east 43m (interior 1.4ha). In parts the wall was badly preserved and had a maximal height 1.30m and a maximal width of 1.20m. Neither does a path lead up to the enclosure, nor can an entrance be clearly recognised. The interior as well as the surrounding area is overgrown with thorny plants, therefore no structures are visible. The Hindu structures inside the second enclosure, need not necessarily date both enclosures, the dating of which is uncertain.

***Pondkital, sherd scatter, Dist. Sonapur*** (20°54'21.0"N; 83°49'19.4"E)

This site, located on the left (north) bank of the Ong consists of three main concentrations of pottery sherds which are spread out over some 250m (see also CD). Settlement layers of 1m thickness are visible in eroded parts of the ghat.

***Radhanagarh, ruined fortress, Dist. Jajpur*** (20°44'50.4"N; 86°10'39.4"E)

Some 50km north-east of Bhubaneshwar in the Jajpur Dist. lies a further contemporary ruined glaciis (780 x 1040m = 81ha) of which Radhanagarh village occupies the north-western corner (Fig. 26, see also CD). K.S. Behera of the Utkal University (retd.) first mentioned this site publicly in the local newspaper about 10 years ago<sup>40</sup>. The ruins show a different and

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<sup>39</sup> M. Brandtner, oral communication.

<sup>40</sup> We thank B.K. Rath and H. von Stietencron for this oral information, which Shri Behera confirmed. Regarding this site see also J. Mishra

irregular ground plan relative to other early defences in Orissa and of India. Unfortunately, the south-west corner is incomplete or not preserved. Whereas the worn glacis is preserved to a height of 3.5m in its northern segments, it measures only some 2.5m in the south-east. In its weathered condition, its width comprises maximally 40m. Inside and outside the defences, the surface is of equal height (see plan and photos on the CD). Unusual is that the interior and exterior are of nearly the same height. Perhaps it was only a temporary bastion. The present-day northern glacis is marked by a line of trees visible from the Kayma hill about 1km to the north. Till now, this large fortified settlement has hardly been discussed in the context of early historic foundations. Three, possibly four entrances seem to have existed in the north and east, to judge from size and position of lacunae in the glacis. Despite published claims to the contrary, to my knowledge no controlled archaeological excavation has taken place here.

Radhanagarh's early historic dating rests on the abundant surface pottery, reported Roman bullae and coin impressions, and reported punch-marked coins. The wares include Black Polished Ware and Plain Red Ware<sup>41</sup>. The shape of the defences bears little resemblance to those of Narla/Asurgarh, Jaugada/Samapa, or Sisupalgarh. The finds and pottery from the surface speak for a later dating than for the other fortifications.

***Ramgarh, stone enclosure, Dist. Nuaparha*** (20°08'46.1"N; 82°41'55.2"E)

J.P. Singh Deo pointed this site out to our team in 2002, which he identified in the 1970s. Located atop a mountain, the site is (Fig. 27, see also CD) partially encircled by two stone walls which discontinue where the slope is steeper. Neither continues at just one height, but rather follow the topography. Up to five courses of stone were preserved in the lower wall on the eastern side; in the upper wall as many as four courses were extant (see CD). The wall was one course thick. The upper enclosure measures maximally 68m (east/west) by maximally 53m (north/south). The lower wall has a maximal south length of 30m and 35m in the east. No interior structures are visible. No references exist for the dating.

***Sisupalgarh, ruined fortification, Dist. Khurda*** (20°13'45.9"N; 85°50'50.6"E)<sup>42</sup>

Sisupalgarh is the largest (interior: 1125 x 1115m=125.4ha) and best preserved early historic fortification in India. As at Jaugada, in plan, the quadrangular glacis tips 10° clockwise of north (Fig. 28). Its defences are the highest known (Fig. 11) of this period. Two gates pierce each of the glacis. The gates themselves measure over 90m in length from the inside to outside and vary considerably in size, shape and in details of building. The western gate in the northern glacis seems to be the largest and/or best preserved. The two in the southern glacis are the smallest. But as year for year the encroaching rice paddies increase in size, these and the other gates decrease in size (see below). Excavation facets in the gate structures can be seen from the windows of commercial aircraft which pass by Sisupalgarh on the way

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2000: 507-550, also for further sources.

<sup>41</sup> Cf. those in Rajghat: A.K. Narain 1978: 62 fig. 60. Source regarding the unpublished small finds: oral communication von M. Brandtner and H. von Stietencron.

<sup>42</sup> Main sources: B.B. Lal 1949, 62-105; M. Brandtner 2000.

in and out of Bhubaneshwar.

Damage: Fig. 28 maps several recent breaches in the glacis. The eastern gate in the southern glacis is the most badly damaged. Owing to intensive rice cultivation, where the moat must have lain is most badly damaged to the north and north-east of the quadrant. Although in January 2005 the *nala* was desiccated here, its course is, however, still largely visible. More serious is the encroaching housing inside and outside the ramparts, which is documented photographically (on the CD see Sisupalgarh\05spg illegal bldg). The yellowish-green surfaces reflect illegal building inside and outside of the ancient defences. This documentation has been turned over to the state and federal authorities.

In 1947, B.B. Lal of the ASI excavated three sites at Sisupalgarh including the northern gate of the western glacis (SP IV), an interior building 200m east of it (SP I), and a section of the western glacis (SP II) 200m to the south of the gate. During the dry season in the western glacis Lal dug more than 3m below the water table and reached virgin soil, but he did not locate a moat and/or defensive trenches, which certainly existed, but lay outside the limits of his trenches. Thus, we attempted to more precisely determine the size and position of the moat. It corresponds only roughly to the present-day Gangua Nala, which flows around Sisupalgarh, and which anciently fed and drained the moat. Effective moats are simple, hold attackers at a distance and provide them no possible protection. There is a written source on this very subject, Kautiliya's *Artashastra*, a largely 4<sup>th</sup> century BCE handbook on statecraft with a chapter on the building of fortifications. Prescribed dimensions for triple defensive trenches are 25.20m, 21.60m, and 18.00m (=64.8m), which for South Asian fortifications are not archaeologically verifiable. According to this source, their depth should come to between 1/2 and 3/4 of the breadth, which would represent an engineering wonder in antiquity. The moats are to be lined with gravel or bricks. They are to be fed from (spring-)water, or are to be filled and drained with water from a river. Lotus and crocodiles give the final touch. In terms of the preserved defences, the length of the external gates provides a partial indication for the position of the moat. A educated guess of 30m for the moat width takes this into account and the width necessary to keep enemy archers far enough at bay to be useful. According to the *Artashastra*, the earth displaced from the moats serves to form the glacis, which is plausible.

First, a simple circumspect observation of the nala bank and the entire area reveals no remains of a moat reinforced with stone or brick - anywhere. In order to verify this, in 2005 on the south side of the defences we investigated a 20 x 100m north-south transect where the moat would have been positioned. Please turn to the report by C. Meyer below for the ground penetrating radar investigation of the moat, Area D and Area SP IV (and CD images).

Aside from the moat, other features not preserved in the defences, which certainly existed, including galleries, merlons, towers, and/or uppermost fortifications, can be simulated with the computer. As reconstructed here at its historic apex, the highest city wall measures some 35m width and is 16m in height (Fig. 29)<sup>43</sup>. The northern glacis is lower in places. Two strands of information illuminate the question of the reliability of our simulation: First, other

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<sup>43</sup> B.B. Lal 1949, 73 fig. 3.

excavated early historic forts and secondly, the *Artashastra* and other literary sources. The size and shape of the glacis of Sisupalgarh have been carefully compared to other early historic fortifications in India, whereby a stone wall without a glacis, as at Rajagrha also seems typical<sup>44</sup>. Moreover, regarding the original appearance of the fortifications, we must consider the often-cited description of Megasthenes, ambassador of Seleukos Nikator to the court at Pataliputra (present-day Patna), in reference to the wooden fortifications there, in antiquity the largest city in the world. Confirmation of the wooden defences by means of excavation came in the early 20<sup>th</sup> century. Both sources effectively contradict the ban on wood for fortifications suggested in the *Artashastra*. Should there still be doubt, one need only view the brick/stone and obviously wooden fortifications reproduced on the Mauryan gate reliefs at Sanchi to dispel such notions<sup>45</sup>.

The excavated and consolidated northern gate of Sisupalgarh's western glacis provides a good idea of such key parts of the defences (Fig. 30 and 31, see also CD). The two faces of the projecting stone structure/stone blocks gate extend c. 65m to the west, preserved to a height of 5.10m. B.B. Lal's published excavation profile of his trench SP II shows the basic stratigraphy of the glacis, which is confirmed by recent bore profiles also in the western glacis. These show the main component to be mud and a denser clay. The bore cores confirm the upper layers to be stratigraphically more heterogeneous than the lower ones.

At mid-length high platforms made of baked brick flank the gates which served as parapets for archers. Originally two pairs of doors inside and some metres toward the outside the gate(s) kept intruders at bay. Of these a single cubic pivot stone inside the southern gate wall bears witness to this. The entire structure of the gate SP IV is bilaterally symmetrical in plan with certain asymmetrical features. Set behind a big rectangular block on the north side, a passage allowed individuals to pass without opening the main gate. Its cut laterite blocks show a great variety in shape and dimensions. A few years ago they were capped and pointed with mortar in course of restoration. The floor of the gate consisted of packed laterite.

The south half of the gate is less well-preserved than the northern one, and as a preservation measure also was capped with concrete. Stone robbing has caused destruction of several parts of the gate so that some structures, *i.e.* the guard house, are no longer visible. On the eastern (interior) side of the gate stairs built with a 90° angle, give access to poorly preserved terraces on both sides. The east end of the gate leads into the glacis without a visible transition. The upper wall in our simulation is rendered white, the glacis darker and covered with thorns. The merlons are the rounded "monkey heads" of the *Artashastra*<sup>46</sup>. These unfortunately have not survived in the archaeological record.

A main mystery at Sisupalgarh is the column structure which appeared in the excavation report of 1949 as a tiny photo, awakening little attention until recently. A group of thirteen

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<sup>44</sup> D. Schlingloff 1967, 53, fig. 11, citing Rajagrha as typical. R.E.M. Wheeler 1948, 93 fig. 2 for the plan and section drawings.

<sup>45</sup> I am indebted to D. Schlingloff for ferreting out for me several scenes of city defenses from the publications on Sanchi and Amaravati.

<sup>46</sup> Colour of the wall on glacis after a text by Kalidasa comparing the fortifications with a snow-capped mountain. Personal communication D. Schlingloff 12.08.2003.

standing laterite columns is what remains of a larger complex which is oriented in the same direction as the glacis and other features of the site<sup>47</sup>. Locally known in Oriya as "sixteen columns", this site is preserved as an elevated island amidst the rice paddies west of centre in the site (Fig. 32, see CD). In the immediate area several other columns stand which belonged to buildings of seemingly palatial format. Two main kinds of octagonal columns are represented, which at the base and at the capital are in section square. Simple ones have a plain shaft (Fig. 33) and more elaborate columns have medallions at mid-length, such as are known at 1<sup>st</sup> century CE Sanchi and other sites. Hand-drawn columns, such as Fig. 33, proved to be not as exact as machine-drawn ones. Immediately west of the northern row of in plan east-west oriented columns clearly visible in the brush are fresh deep trenches in the same axis as the columns. These at first appeared to be those which stone robbers left behind, but could as easily be the remains of a furtive house-building attempt.

For unknown reasons the southern row of columns stand on a ridge 2m higher than the northern one (see CD) and are less symmetrical in their positioning. Broken columns in Area D do not help to reconstruct the appearance of the original building, since they are positioned irregularly (Fig. 34 and 35). As are those of the northern row, the sides of their bases are not always oriented to the north. The column capitals are slotted at the top as yokes in order to accommodate heavy beams. Horizontally positioned slots in the capitals suggest a secondary use of the columns. Clearly, no simple explanation suffices to explain the use of this southern irregular group of columns perhaps at a time when this part of the site probably was already under cultivation. Archaeological investigation of the surface might reveal post holes and more about the plan of the original structure which the ground penetrating radar does not give exactly. The latter at least establishes that building ruins lie below the surface.

Speculation about the use of this ruin as originally a temple or a palace rests on the use of the columns. Reference to the *Artashastra* suggests a palace, which ideally should lie in the centre of the settlement. Within the glacis of Sisupalgarh Area D lies somewhat west of centre which is not a serious argument against its identification as a palace.

***Sitabhinji, diverse ruins, Dist. Keonjarh*** (21°30'39.7"N; 85°46'39.8"E)<sup>48</sup>

Sitabhinji lies 35 km east of Keonjarh city just north-east of the river Sita. Five sites here, although of considerable interest, are little known (Fig. 36). On arrival from the main road, some 50m from the road one encounters first an enormous egg-shaped boulder called "Sitabhandargarh" (see CD). It has an approximately oval base, and a height and width both of some 50m. On the south to south-west sides at the foot scarce baked bricks as laid, roughly quadratic in plan, seem to reflect a wall and/or pavement. On the surface, beside these remains, no evidence of human activity is visible. Given its striking shape and size, it may well have had a religious significance as it now does, to judge from the local villagers who worship it. A paved path leads from Sitabhandargarh to the south.

<sup>47</sup> These have been thoroughly documented in P. Yule/W. Böehler 2004; W. Böehler/M. Bordas Vicent/P. Yule 2004.

<sup>48</sup> B. Misra/P. Panigrahi 1938, 301-304; T.N. Ramachandran 1949, 191-202; R.P. Mohapatra 1986a, v. 2, 173-175, 252; A. Ghosh 1989, 2, 414; www.orissagate.com. I thank M. Zin for some of these titles, not all of which can be cited here. T.N. Ramachandran's site map published in 1952, deviates completely from our's.

After 200m and on the right hand side lies another conspicuous group of enormous boulders, one of which bears a rock painting, designated "Ravanchhaya", on the ceiling of an abris, which is located on the south-western side of a largest rock (Fig. 37 and 38)<sup>49</sup>. The painting measures 3.70m in width and 1.90m in height. The Orissa State Archaeology has built a stair and has channelled into the underside of the rock ceiling in order to prevent water from coming into contact with the painting (see CD).

The upper portion of the composition is no longer recognisable (see CD). The main scene depicts a royal procession comprised of four attendants, a mounted escort, and the main figure on an elephant. To the left a second red elephant is visible in traces. Behind the king are a page with a fly whisk and to the extreme right, a female figure. The king, clad in a loin cloth with a band around the waist with a dagger or sword stuck in it, bears a lotus in his left hand and a crop in his right. He wears a necklace and his upper body is unclad, his elaborate headwear is hardly recognisable. The king sits on a saddle blanket.

The foot soldiers that run before the king also are clad in loin cloths. Judged from the angular arrangement of the legs the individuals are moving at a quick tempo. As at better-known Ajanta, they are armed. They bear a large, flat device, probably a drum. The individual furthest to left, has a bare torso as opposed to the next two. Incompletely preserved are the upper parts of the figures; their apparel is not recognisable. This also holds for the rider to the immediate right. The horse is bridled, and has a saddle blanket. The attendant behind the king has a staff in his right hand. Behind the elephant a female attendant is depicted, to judge from her garb. She wears a necklace and a striped skirt. In her left hand she holds perhaps a tablet. Her weight is poised on her right leg.

A painted caption below the scene, no longer visible, gives the name of the king as "Maharaja Sri Disabhanja" (*ma haa ra jaa srii disaabhamjii*) of Sitabinji<sup>50</sup>. The image may depict the earliest Bhanja king in the 4<sup>th</sup>-5<sup>th</sup> century CE. The letters resemble those of the so-called shell script (see below). Some consider the Bhanjas to have ruled in Orissa almost continuously at this time.

Proceeding a further 130m to the south-east, on the left-hand side a previously brick-paved path branches off. In patches the bricks are preserved. After some 50m one arrives at another large rock with a cave (Fig. 39). Inside visible are the remains of a structure built of early historic quadratic bricks. The cave is paved and an altar or fireplace is probably of recent date. At this ruin one encounters the greatest baked brick ruin in the entire complex.

Returning to the main path, some 200m south-east of the painting, a shelter with iron bars erected to the right of a large rock houses a statue of an elephant as well as the top of a column (see CD). 150m on the path further east of these sculptures a fenced in area (Fig. 40, see CD) contains stone remains, of which twelve show Pali inscriptions in the undeciphered

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<sup>49</sup> Ravanchhaya: Ravana's Schatten (?), Ravanjaya: Ravana's victory (M. Zin).

<sup>50</sup> H. Falk's reading (letter 04.01.2004) is confirmed by Monika Zin. The dating might lie around 600 to 900.

so-called "shell script". These may date to the 5<sup>th</sup>- 6<sup>th</sup> centuries CE (Fig. 41, see also CD). These inscriptions are sometimes attributed to Saiva followers. Certain inscriptions are very poorly preserved, due to natural erosion as well as recent attempts to clean them. One stone bears two (see CD) and another one three inscriptions, whereas the other carved stones show only one inscription.

***Ulapgarh, settlement site, Dist. Jharsuguda*** (21°51'49.5"N; 83°50'01.4"E)<sup>51</sup>

Located some 85km north of Sambalpur, this site features rock art, which the Orissa State Archaeology has protected by means of a fence (Fig. 42, see also CD). The east/west oriented abris in which the images are preserved measures some 25m wide and up to 4.5m in height. Some of the designs are of a surprisingly high artistic quality. They include painted and incised animal as well as geometric designs. The animals are composed horizontally to the ground line. Incising predominates in the lower zone, painting in the upper one. The syntax of the images to each other is nearly random. For the chronology there are no points of orientation.

Atop the escarpment an abandoned dwelling survives as a ruin. A north-west/south-east oriented wall is preserved to a length of 38.4m. A second wall extends to the north-east, joins one end at a 90° angle. At this end an entrance is located which follows the L-shape of the wall. The structure appears to be incomplete. No references exist for the dating including nearby examples of rock art.

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<sup>51</sup> R.P. Mohapatra 1986a v. 2, 213; R.P. Mohapatra 1986b, 1, 287.

## Sites Excavated

***Budhigarh near Rampur, Dist. Kalahandi*** (20°18'29"N; 83°32'09"E)<sup>52</sup>

With its thin distribution of sites over 10ha (Fig. 43), Budhigarh attracted the attention of B. Misra and P. Mohanty, owing to the occurrence of early historic pottery sherds and finds reportedly acquired there. Some of these found their way into the collection of Dr M.P. Singh Deo, Rampur/Kalahandi. Notwithstanding the problematic nature of such provenances, notable is that at this site Northern Black Polished Ware in different colour nuances (cf. file bud00~08 on the CD) imported from the Gangetic valley is clearly identifiable<sup>53</sup>. This excellent luxury pottery, a index fossil for the early historic period in Northern India and dated to c. 500 to 100 BC, *nota bene* occurs in the so-called Western Orissa "periphery", and not from the coastal strip. Again, locally produced Knobbed Ware, bearing owner's marks point to the presence of Buddhist monks (as *e.g.* at Manamunda/Asurgarh). Other luxury goods are in evidence: for instance, fragments of an ivory comb, seals fashioned from jasper (one of them bearing the 'tree in railing' motive of Mauryan and post-Mauryan punch-marked coins, see CD), another jasper seal with a problematic inscription, a jasper earring, one half of a double shell mould for casting metal beads or rivets. Aside from this, numerous beads fashioned of semiprecious stones derive from this site.

Budhigarh lies on the left bank of the Rahul, a southern tributary of the Tel. The ancient settlement area extends north of the present-day village south toward the south. Located in the north, the settlement extends to the river bank, in the south it extends further to the west. The edges of the river-cut terraces are cut by deep erosion gullies. The excavation surface lies in the southernmost part of the settlement area on a plateau. On all sides the site is surrounded by erosion gullies. Its surface is nearly flat and today is covered with grass and shrubs, and is used for grazing.

## Goals

Our goal in a first test excavation was to determine the state of preservation and in the shortest possible time to gain data regarding the artefactual sequence as well as to obtain sufficient stratified material for study.

## Procedure

A spur-like excrescence of the eroded plateau was selected for excavation. It appears to be the highest-lying part of the area. Since at present agriculture is not practiced here, we hoped for better preservation of the underlying finds. Heavy brush prevented excavating on slopes, which otherwise seemed suitable for research purposes.

Overseen by P. Mohanty and assisted by six labourers, J. Pechtl (Heidelberg) sunk a small test trench into a flattish area in the south of the site. Following a survey of the surface, excavation commenced on 28.11.2001 and continued until 05.12.2001. On 6.12.2001 the profiles were drawn and on the following day the trench was filled. A 4 x 4 m trench was laid out which we later subdivided into four 2 x 2 m squares without a balk. Having removed the

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<sup>52</sup> First mention: P. Mohanty/P.P. Joglekar/B. Misra 1998-99, 121-2.

<sup>53</sup> Thus correcting most works dealing with the distribution, for example, B.K. Thapar 1985, map on p. 122.

ground cover, the actual excavation began. The workmen worked with large hoes used for agricultural work. In places where the soil was harder, the labourers used a heavy 2 m long bar. Fine work was executed with the trowel, knife, and excavation chisel. In the upper dry layers the excavated surface was cleaned with a broom. For time reasons, it was not possible to excavate by means of natural stratigraphy. Alternatively, we excavated in horizontal excavation units (spits) of 5 to 17 cm thickness. As definite layers first appeared, we stopped excavating and began cleaning and documenting the surface. The documentation took place by means of hand drawing. Heights were determined with the help of a level in relation to the north-east corner. In addition the plans and profiles were photographed. The pottery of the individual squares were documented by spit and other finds were measured according to their approximate depth.

The 4 x 4m excavation surface was reduced in size to 2 x 4m after 3 spits had been removed. (Fig. 44-50, on CD see bud01~25 to ~31) which contain part of a dwelling). We continued the two southern squares. At a depth of 1.47m, below spit 8, the trench again was reduced in size to 2 x 2m. In the allotted time we reached a depth of 2.15m (25 spits).

### Results

The good preservation of the finds excavated is encouraging. The disturbed surface is only a few cm in thickness. Four cm below the present-day surface small finds came to light in situ. In the southern part of the excavation surface a presumably burnt dwelling was in evidence. On a floor consisting of fired clay and straw a 20 cm layer of burnt debris appeared. Imbedded in this flooring a row of crushed storage vessels were filled with earth (see south profile, Fig. 50). Numerous iron nails occurred here.

Below, in an 80cm thick stratigraphic unit, alternating sandy clay and clayey layers were evident. At different heights therein horizontally lying sherds were stratified, which indicate several walking surfaces. Several gravel packings were evident. At least one appears to be part of a fireplace. From 110-160cm depth the sediments change in their appearance. While the uppermost sediments are brownish heavy clay, beneath they are darker in shade, contain more sand and are less sticky. It contains a high proportion of settlement debris. The pottery sherds are relatively large in size. From 160 to 215cm depth the clay is similar in consistency. Here there is far less settlement debris. Several walking surfaces are in evidence (see south profile).

### The Pottery

The burnt structure of the upper layers contains medieval pottery. Underlying layers contain poorly fired Red and Red Slip Wares. Gradually the quality of the wares improves as one goes deeper (Fig. 51 and 52 and on the CD: bud01~32 and bud01~33). Dark-coloured pottery increases in its proportion. This can be taken as indication of late early historic to early medieval pottery. Significantly, the Plain Red Ware is of poorly fired and, in fact, not of a better quality relative to the early contemporary pottery of the coastal East, as Brandtner originally claimed for the pottery of all of western Orissa. Certainly, the earlier part of the early historic period or even the protohistoric layers were not reached in the trench. Nor did it reach virgin soil.

Down to and including spit 16 the trench yielded 76 kg of Plain Red Ware which comprises

70% of the pottery at Budhigarh.

Spits 17 to 19 yielded black and red ware, plain black ware and miscellaneous other wares.

Below spit 16 there is no plain red ware occurred in the 5 kg of sherds. Hard Red Ware (14% of the sherds recovered), and Red Slip Ware (2%) are stratigraphically earlier and numerically more important than other categories.

The ceramics recovered appear stratigraphically ordered by fabric in Table 1.

Spit	Brw	bsw	bw	hrw	prw	rpw	rsw	pbw	varia
1	2				52				55
2					733				15
3					280				
4		1			519				
5					183				
6					130				1
7					603				
8					102				
9					235				
10					20				
11		2			175		1		
12					250		2		
13	5		2		120		2		
14		3			157				62
15	4	16		26	160	3	2		80
16	3	6		26	60		9		
17	3	11		251			100		7
18	2	12		250			12		130
19	1	9		50			11		76
20	15	12		116				11	
21			10	27			1		60
22		5	2				3		11
23	1	6		13			1		
24									
25		7	4				1		22

brw = Black and Red Ware

bsw = Black Slip Ware

bw = Plain Black Ware

hrw = Hard Red Ware

prw = Plain Red Ware

rpw = Red Polished Ware

Table 1. Sherd count of pottery wares from the test trench at Budhigarh.

## Summary

Excavated and stray finds suggest continuous habitation at Budhigarh during the early medieval (Gupta) period. The preservation of structures in these layers is good, for example few later structures disturbed the context. Instead the sediments show a regular sedimentation in horizontal layers. Fine stratigraphic excavation is thus possible and a corresponding good chronological structuring seems likely at first glance.

### **Haldipali near Sonapur, Dist. Sonapur (20° 49' 17.9N"; 83° 53' 23.4"E)<sup>54</sup>**

The pasture and sometime cultivated area of Samail Ghati, 900 m south-south-west of the village Haldipali, P.K. Behera selected this site for archaeological testing owing to its proximity to Sonapur and owing to its relevance to our early historic emphasis (Fig. 2 and 53, see CD). Samail Ghati, near the present-day village of Haldipali is a classic ghat settlement. The dark grey "settlement" soil contrasts with the sterile laterite which surrounds the site.

The east-west dimension of the Haldipali settlement site can be determined in the eroded profile of the ghat by means of the density of pottery sherds and the occurrence of a dark grey sandy clay containing settlement finds as known from P.K. Behera's test trenches 1 and 2. An area 130 m in width contains a more regular distribution of settlement debris. Measuring from its eastern and western extremes the site is 250 wide. At the edges the density of the sherds is spotty and thin. In this a core some 40 m in width contains more concentrated remains. The two trenches lie at the eastern edge of the sherd scatter<sup>55</sup>. The dark grey "settlement" soil contrasts with the sterile laterite which surrounds the site. The former contains a goodly proportion of tiny potsherds, in contrast to their absence in the surrounding laterite. The complicated depositional and erosional history of the area, as determined by numerous irregular layers of soil and of alluvial sand conditions our understanding of the history of settlement. For reasons of preservation, the early finds available obviously are not completely representative. At times the entire site must have been flooded and eroded. Cultural remains are visible in the ghat, but the extent away from the river bank north cannot be determined without excavation. As at many places along the Tel, the height of the bank gradually decreases from the edge of the ghat. This decline is not a result of anthropogenic tell formation increasing toward the river bank, as might be assumed, but rather is a result of deposition and erosion behind the ghat. Settlement deposition is hardly thick enough to explain the gentle rise as being anthropogenic.

### The Trial Trench

The site is located on the steep northern ghat of the Tel some 8 m above the river bank (Fig. 54, see also CD). The immediate area around the trenches is relatively flat. It measures some 120 m in width to the edge of fields with isolated trees and bushes. Recently the area has been used for grazing. Investigation at Haldipali, sector 1 began on 4.11.2001 and ended on

<sup>54</sup> Bhubaneswar Purohit first reported the site in 1999. The team took up work as part of the Sambalpur University project. Excavation took place from 07.11. to 14.11.01 using five workmen.

<sup>55</sup> GPS reading with a resolution of 8 m; map projection: WGS 84; UTM coordinates: E <sup>08</sup>00800; N <sup>23</sup>05089, barometric height: 115 m. Reading from the 1:50000 map no. 64 p/13: N20° 49' 17"; E83° 53' 20" height: 110-115 m

13.11.2001. On the following day the north and west profiles were documented. On the 15th and 16th the plan and the pottery were drawn. On the following day the trenches refilled.

#### Procedure

Prior to beginning excavation, the three zones, which are divided by small gullies from each other were covered by pottery sherds which we collected. Subsequently, over the entire surface the loose topsoil was hoed away. Since with exception of a fired brick (later recognised as a fireplace), which was visible on the surface, no structures were visible on the surface, it was decided to dig in the zones 1 and 3 (but not in zone 2) in a 10 cm spit. In zone 3 we designated the two cuttings as "trench 1" and "trench 2". Trench 1 was excavated with spits 1 to 9; trench 2 with spits 1 to 4. The hard soil was loosened with a heavy iron. Since the soil was completely without structure and without recognisable soil layers, layers of 10 cm were removed and each corresponding spit planed and cleaned. It was hoped in this way that a stratification of the finds could be determined. We reached there the sterile sedimentary soil layers.

#### Results

In zone 1 a fireplace (Fig. 55 - 57, see also CD) fashioned of baked bricks and a diorite stone came to light which inside was smeared with mud. A layer of fist-sized pebbles appeared in zone 3 (trench 1). Both contexts lie above early historic levels. In the soil below the root-filled topsoil numerous pottery sherds mostly of fingernail-size were recovered. On the other hand, below these soil layers larger sherds and a smashed vessel occurred. The floor in which the sherds were imbedded was completely without recognisable structure. Its lower edge in an area of 20 cm was featureless. For a lack of structural remains, we terminated the excavation.

#### The Pottery

Preliminary field results can be briefly summarized. As comparatively few sherds display typologically relevant features (and could, therefore, be drawn) the following rests basically on technological aspects of the material. Thus, the largest category of wares is *varia*, which is not classifiable. Occurrence, relative quantity, and development of the wares defined below are characteristic for the early historic period, although an iron age date for the earliest layers cannot be ruled out. More specifically, the earliest wares bear a certain resemblance with some ones from neighbouring Khameswaripali level III which is dated to the early iron age, but on the whole seems to be of a later date. Black and Red Ware and Black Slip Ware dominate all of the nine spits. The occurrence of Painted Red Ware in the upper levels is perhaps significant. The pottery wares appear ordered stratigraphically in Table 2.

It may be debated whether a statistical analysis of a material derived from such a small trench makes any sense. Still, on the basis of the occurrence and frequency of certain wares considered to be of diagnostic value three periods can be distinguished:

Phase I includes spit 9 in trench 1, *i.e.* 80-111cm below the present-day surface. It is characterised by a comparatively fine Black and Red Ware with a generally well-slipped and polished surface which, nevertheless, is of lesser quality which one encounters in earlier Iron

age contexts. It accounts for more than one third of the sherds belonging to identified wares. Others include a Black/Brown Burnished Ware and a Red Slip Ware. Plain Red Ware is nearly absent in this period.

spit	Brw	bsw	hrw	prw	rsw	varia
surface	12	25	1	130	4	277
1		6		143		42
2		1		3		27
3		2		75		151
4	1	4			12	100
5	7	34	10		18	120
6	1	30	2		8	36
7	2	12	3	2	1	140
8	10	12	5		3	34
9	9					15

brw = Black and Red Ware

bsw = Black Slip Ware

hrw = Hard Red Ware

prw = Plain Red Ware

rpw = Red Polished Ware

rsw = Red Slip Ware

Table 2. Sherd count of pottery wares from the test trench at Haldipali.

Phase II covers approximately spits 8 and 9 in trench 1, *i.e.* 80-111cm below the present-day surface. It is characterised by a comparatively fine Black and Red Ware with a generally well-slipped and polished surface which, nevertheless, is of lesser quality which one encounters in earlier Iron age contexts. It accounts for more than one third of the sherds belonging to identified wares. Others include a Black/Brown Burnished Ware and a Red Slip Ware. Plain Red Ware is nearly absent from this period. In the following period II, extending over spits 5 to 7, *i.e.* 50 to 80cm below the modern surface, the picture is considerably different. A Plain Red Ware, partly very rough in appearance and generally without any sophisticated finishing of the surface, dominates, with its relative quantity amounting to one third of the identified wares. Although other wares such as Black and Red Ware, Black Slip Ware, Black/Brown Burnished Ware and Red Slip Ware still continue to exist, their quantity has decreased drastically, and to a large extent their quality is less than that of the earlier sherds belonging to these categories. Whereas in the still later levels at Haldipali decorative elements are conspicuously absent, we encounter here some sherds bearing a comb-stroke design consisting of semicircles below horizontal grooves, a Black and Red Ware sherd with a graffito, and an incised spiral motive on the interior of a foot sherd of Black Slip Ware.

Between 25 and 50 (Phase III) cm below the modern surface, in spits 3 and 4, the number of identified wares is much lower than in the preceding levels. Black and Red Ware, Black Slip Ware, Black/Brown Burnish Ware and Red Slip Ware do not occur anymore (with very rare

and doubtful exceptions). Approximately two thirds of the pottery consists of the above-mentioned Plain Red Ware, including its rough variety. In spit 3 a particularly crude Rough Brownish Grey Ware appears for the first time. Surface treatment, if at all detectable, is limited to wet smoothing. Not unexpectedly, grey pottery, which made its first appearance in spit 5, gains importance in the upper levels. The pottery from the two uppermost spits documents the disturbed nature of the deposit, as it resembles that which can be collected from the surface. It consists of a mixture of practically all the wares found at the site.

***Tentulipali/Kurumpadar 24km west of Boudh, Dist. Boudh*** (20°49'44.5"N; 84°06'07.2"E)

This early historic settlement area includes sherd-scatters dating into the recent period which are strung out along the southern ghat of the Mahanadi (see CD). At the western end of these (the coordinates cited above) a stone building is exposed in the ghat (Fig. 58 and 59, see also CD). This is the most interesting of the archaeological sites around the village. Pottery sherds of the early historic period predominate in the dark grey soil. The area is littered with Black Slip Ware, Black and Red Ware and other typical early historic wares and pottery forms. It is taken to be a single period site.

Sherd scatters occur 2km east to 20°50'10.1"N; 84°07'03.9"E. In the ghat we counted some 10 recent Hindu burials. Villagers there recount that the deceased once lived in the present-day village of Tentulipali. The skulls of the extended burials point to the north. Such burials, marked with a row of three to five stones occur at 20°50'01.1"N; 84°06'44.5"E. The usual cremations also are in evidence at numerous points along the ghat.

### **Introduction**

In the late 1990s P.K. Behera reported the site at Tentulipali and later excavated three small test trenches here<sup>56</sup>. Located in the middle Mahanadi valley on the right southern ghat, more precisely Tentulipali lies 24km west of Boudh. In 2000, 2001, and 2002 the joint team had prospected about 1km west of Tentulipali village in a place known as Kurumpadar (geographic: 20°49'44"N; 84°06'07"E, UTM: 45q 0198161, 2305931). The name is that of a local goddess, which is thought to reside here in or beneath a tree considered to be holy. At least one other nearby archaeological site bears this same name. Numerous pottery sherds, most notably of black polished ware and other early historic pottery, lay strewn about in quantity at the foot of the ghat below the house relict. We suspected that other early historic stone houses might be found here, part of a settlement. On the other hand, desirable was a study sample of early historic pottery excavated from a surface of known dimensions, stratigraphy, and geographic position. The only such partially published samples available are from Kumersingha and Kamaswaripali, both in the Sonapur District. Our project goal was to illuminate the settlement history of the middle Mahanadi and refocus the pottery designations local to the area.

### **Preliminaries**

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<sup>56</sup> P.K. Behera 2000-01, 13-34; P.K. Behera 2002-03, 87-103.

The staked out a 40x20m area in Kurumpadar aligned parallel to the ghat, was followed by a subsurface investigation by means of a magnetometer. The evaluation showed no anomalies which might indicate anthropogenic structures, such as stone foundations.

Normally cotton is cultivated here. Since ploughing is done with cattle and the ard, the damage to underlying structures is minimal (share depth 10cm). The sticky surface soil contains a heavy amount of clay and organic matter, not to mention settlement debris ("black cotton soil"). When dry, it is dark grey. Beneath it lay a middle brown soil in which far fewer sherds and other debris occur. This underlying soil is not nearly as dry, has a higher percentage of sand, and consequently is easier to excavate. At 1m depth no more sherds or other debris were forthcoming. With the documentation complete, we refilled the test trench.

### **The Test Trench**

Excavation proceeded in five spits each of 20cm thickness, which were numbered 1 to 5 from the surface downward in the 5x5m trench (Fig. 60-64, see also CD). We excavated the northern half down to spit 5. The southern half stopped at spit 3. The surface was divided into four quadrants, "a " to "d ", clockwise. "A" was located in the south-west corner. On the basis of the amount and kind of pottery combined with the two soil types, two layers/periods (a=spits 4-5 and b=spits 1-3) were manifest.

Given the extreme hardness and dryness of the soil, as well as disturbances, it proved difficult to document postholes in the plan. However, in profile, postholes were in evidence from dwellings and for other less specifically identifiable domestic reasons. These occurred at the same level with a fragmentary lightly built pavement of small stones in quadrant b spit 3. No stone dwellings, as in the ghat, came to light. In the middle of the surface a storage jar came to light in situ, the lower half of which (height 36cm) was mostly intact. Evidently, there have been changes in the elevation of the surface since the time of the settlement: The storage jar stood on the ground of layer a (bottom of spit 3) at the same depth as the aforementioned paving, and was approximately at the same depth as the postholes. To judge from the preserved height of the vessel, the area experienced the deposition of wind and water-laid soil over the centuries.

### **Profile of the stone house foundation**

The foundation of an early historic stone house is a rarity in our area. All that survived is the northern wall, the river having eroded the others away. The stratigraphy of the ghat face and that of our trench correspond in a general way: the lower parts of the trench contain a brownish grey clayey soil.

### **The Finds**

The two most conspicuous pottery wares from the trench are Plain Red Ware and Red Slip Ware dominate numerically (Fig. 65-68). The heavy concentration of Black and Red Ware in spit 4 indicates the earlier phase. Striking shapes include Black Slip knobbed ware, and other bowls, Black and Red Ware bowls, Red Slip Ware large bowls and jars. This pottery is wheel-turned and mineral-tempered. Little recent pottery was in evidence. The small finds include pestles, gaming pieces, and a worn coin (spit 1) of uncertain date. Table 3

summarizes by spit the pottery wares encountered in the trench.

Spit	Brw	bsw	prw	rpw	rsw	varia
1	1	1	6		1	17
2	10	2	36		22	68
3	30	10	24	1	57	24
4	198	4	29	3	45	17
5	8	2	13	1	16	11
6	2		2		3	1

brw = Black and Red Ware

bsw = Black Slip Ware

prw = Plain Red Ware

rpw = Red Polished Ware

rsw = Red Slip Ware

Table 3. Sherd count of pottery wares from the test trench at Tentulipali.

## Observations on the Main Pottery Wares from the Test Trenches

### Black and Red Ware (BRW)

BRW occurs so universally and in a variety of manifestations as to be no ware at all. Its surfaces can be slipped/burnished/polished, or can be untreated. It is also characteristic of different periods on the Subcontinent. Most writers refer to the connection with the iron age of southern India, a term which unfortunately persists as the "megalithic period", owing to the stone cairns which contain such pottery. The interior and/or exterior of BRW may be slipped and burnished. Representative hues include dark reddish tones, weak red, dark brown, dark grey to black. The temper ranges from a light amount of fine particles to a middle amount of middle-sized ones. All of the examples are wheel-turned. Unlike BSW and RPW, the quality of this ware varies considerably, in terms of the regularity of the shapes and quality of the surface treatment.

### Black Slip Ware (BSW)

Owing to its shiny black exterior and/or interior treatment, surface decoration, and elaborate regular forms, the most striking ware of the assemblage in Orissa is BSW. In terms of quality, it is comparable with the Red Polished Ware (RPW) which follows below. The surface is thin slipped and polished prior to firing. The question seems appropriate whether or not one may speak here of self-slip? Qualitatively better pieces show a higher polish, more elaborate forms as well as decoration, and thinner walls. The difference between pre-fired polishing or burnishing is gradual. The fabric is reddish, brownish, dark grey, or black. It is hard and clinky. A light amount of fine mineral temper is typical. The dominant forms are bowls turned on a fast wheel and fired in a reducing atmosphere. The most notable decoration appears on bowls is knobbed ware, which seem to have a ritual purpose.

### Red Polished Ware (RPW)

Typical are reddish slipped and polished interior or exterior surfaces, depending on the exact vessel shape. The orange to reddish colour brings to mind that of *terra sigillata* which it seems to imitate. The fabric may be light orange, dark brownish grey, or brownish orange. Invariably, a light amount of fine temper occurs. The sherds reveal a turning on a fast wheel. Represented in the trench were open bowls. No sprinklers occurred, a typical form for this ware.

### Red Slip Ware (RSW)

Characteristic for RSW is a slipped surface less smooth and shiny than that of RPW. The surface ranges from orange to dark orange and brown in hue. It brings to mind that of *terra sigillata*, which it seems to imitate. The slip may be applied thinly or fairly heavily. The shapes are less regular than in the case of RPW, a result from slower rotating pottery wheels. The finish is also inferior to it. A light amount of fine mineral temper ranges into a middle amount of middle-sized temper particles. The fabric may be light orange, dark brownish grey, or brownish orange. Firing occurred in a partly reducing atmosphere. The shapes represented are similar to those of RPW. Invariably, a light amount of fine temper occurs. The sherds

reveal a turning on a fast wheel. Open bowls were represented in Haldipali and Tentulipali in the trenches. No typical sprinklers occurred.

#### Plain Red Ware (PRW)

This wheel-turned pottery is readily recognisable. The untreated or minimally treated surface of this ware characteristically ranges over a variety of hues including orange, khaki, and light grey. The usually untreated surface is matt, although in some cases light burnishing or slipping took place. The red-orange slip is fugitive owing to a low burning temperature. The fabric is light to dark brown in hue, and nearer the surface is frequently red. The quality of this wheel-turned ware is less than that of BSW, RSW, or RPW. Some of the sherds have thin walls and may be spalted. The temper is decidedly sandy and variable in size. This ware occurs in a variety of forms including (especially at Budhigarh) tall jars, cooking kettles, and large bowls. High and beaded rims are common. The interiors or exteriors of cooking vessels may be smoked. Exterior surfaces frequently show signs of burning. The temper consists of a light to heavy amount of fine to coarse sand. Many sherds contain tiny mica flakes. In some cases the fugitive surface was fired along with the vessel, in others it is post-fired. The generally poor preservation results from low-temperature firing. The pottery shows a predilection for highly profiled rims. Decoration consists of multiple horizontal lines on an estimated 2% of the vessels, which is not scratched but rather is burnished. The main forms include large-mouth jars, cooking vessels and large bowls.

#### Plain Black Ware (PBW)

This readily recognisable ware is best known from Budhigarh, where it forms less than 1% of the total, and this from the lower levels. The exterior of these wheel-turned vessels is slipped. The exterior is very dark grey (7.5yr n3/) and may show traces of reddish yellow (7.5yr 6/6). The fabric contains little or no temper.

#### Hard Red Ware (HRW)

This sturdy slipped and wheel-turned fabric is hard-fired. The surface ranges from reddish brown (5yr 5/3) to dark brown (7.5yr 4/4) and is not as red as is RPW. The dark grey to black fabric shows oxydising firing conditions. The fine to middle coarse temper occurs in an amount which is somehow typical for the pottery of the age. The fabric blends into Red Slip Ware with imperceptible nuances. From the lowest levels of the trench in Budhigarh, this ware forms some 14% of the total there.

In addition to the 5322 sherds recovered from the Budhigarh trench, other artefacts, mostly in iron came to light. These seem largely to be clamps to hold heavy wooden door boards together.

The pottery statistics of the three trenches (see above) suggest that the latest of the three sites is clearly Budhigarh. The heavy proportion of Black and Red Ware at Tentulipali make it the earliest.

Future work should be directed at excavating large areas which provide a stratigraphic basis

for developing a pottery chronology. Our small trenches were only a first step. They could not provide enough structured data in order to develop a sequence of vessel forms which is a prerequisite for the development of the study of pottery.

## Discussion

New data help to characterise the development from the iron age to the early historic period in western and eastern Orissa. Is Orissa, as B. Subbarao in his geographic determinism once put it, an area of historic relative or even strong isolation, or is this image simply the result of a lack of research<sup>57</sup>? The population figure and characterisation of the infrastructure support Subbarao's general description of Orissa relative to India's main population centres.

Although numerous iron age and early historic sites along the Tel and Mahanadi have come to light in the past five years, owing to a lack of radiocarbon dates in large differentiated and stratified contexts as well as a precise pottery chronology, they help us little. Moreover, climatically, eastern and western Orissa contrast with each other and are not a single geographic unit. The higher present-day population density in the East over the West gives us a first hint of the probable earlier distribution with its ramifications for state formation<sup>58</sup>. This results in the East from a greater agricultural potential enabled by heavier rainfall. Multi-cropping every four months is possible in the East, at least nowadays. Concomitantly, in the East the infrastructure and communication are better, and thus cities have grown here.

With regard to the early historic defensive architecture, two main kinds of fortifications are in evidence in Orissa and generally in India: Some use to advantage river meanders, but others are quadratic in plan, landscape as needed and include a moat. Obviously a water barrier of some kind offers a clear field of fire for the defenders. Good examples of the first kind are located at Jamsargarh and Kharligarh; the second comes to the fore in Sisupalgarh and Jaugada. A third kind of plan at Radhanagarh is unique with projecting bastions on its northern side. The finds indicate that this defense postdates others and its form belongs possibly in the 2<sup>nd</sup> or 3<sup>rd</sup> century CE. While more fortifications are located in western Orissa than in the coastal area, these are seldom narrowly datable and some may extend into the recent age. Those in eastern Orissa are larger than in the West. Badmal, Kharligarh and Narla/Asurgarh date by means of Black and Red Ware into the centuries just prior to the turning of the modern era. Prominent in discussions of early architecture appear in Kautiliya's *Artashastra*. Whatever the date of individual parts of the text, this is one of the sole textual sources available for architecture. Research shows that his instructions on how to build a defensive gate, a moat and a defensive wall are entirely theoretical to the point of being simply silly or even counter productive. For example, Kautiliya wrote that wood should not be used for the fortifications, although archaeology (cf. Bulandibagh, Patna) and other texts (cf. Megasthenes) prove that in South Asia and all over the world in pre-recent times, this was a standard practice. Wood was a ubiquitous building material. Kautiliya's instructions on the building of deep multiple moats of enormous, while theoretically good, are hardly executable with the manpower and technology at hand. Similarly, his discussion of gate construction finds no supporting evidence in South Asia. In other words, the *Artashastra* is a dubious source for all but the most obvious observations on ancient South Asian defensive architecture<sup>59</sup>. Moreover, instead of having or using any economic information (sources of

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<sup>57</sup> B. Subbarao 1956. Including lower Indus and Rajputana, Western Littoral, Gujarat, Assam, and Kerala. These contrast with the Indus basin and Punjab, Bengal, Malwa plateau, Maharashtra, Central Deccan (Andhra-Karnatak), Tamilnad.

<sup>58</sup> J. Schwartzberg 1992, 117 fig. a, census of 1971-72.

<sup>59</sup> Contra: F.R. Allchin 1995, 192, 216, 222-228, unfortunately ignoring D. Schlingloff's detailed studies of 1967 and 1970 of the settlement archaeology. Regarding defensive architecture see P. Yule/W. Böhler 2005 and P. Yule et al 2005.

material) it would appear that agriculture is the only resource to merit mention.

With the exception of the excavation of Sisupalgarh in 1948 and Ratnagiri in 1955, little prehistoric or early historic excavation in eastern India has been realized in terms of publication<sup>60</sup>. The most extensive excavations, those in Bangladesh and Tamluk (Dist. Midnapur), West Bengal will provide a broad-based pottery chronology for the early historic eastern India when these are published. Several other excavations provide some documentation, such as the newer excavations at Mahasthangarh in Bangladesh<sup>61</sup>. On the other hand, detailed stratigraphic data are available for the early historic period from recent excavations in Arikamedu (Tamil Nadu) and at some distance on Sri Lanka, the site Tissamaharama (ancient Mahanaga, capital of Ruhuna) being the case in point. Most of the early historic ceramic categories known from India occur there in stratified settlement layers. The sequence of cultural remains continues in numerous contexts from the late 4<sup>th</sup>-early 3<sup>rd</sup> century BCE to the 9<sup>th</sup> century CE, and provides chronological evidence for the early history of the entire region. Thus, for the early historic period, comparisons with the archaeology of Sri Lanka (from Orissa more than 1100 km away) are often more precise than those from sites nearer owing to the intensive documentation of the finds and stratigraphy, not to mention the lavish publication.

Any representation of the archaeology of Orissa is bound to be limited owing to the fewness of published excavations and a lack of detailed documentation. The first clear information from a stratified context illuminates the chalcolithic of what has become Orissa, the neolithic period being represented only by two small excavations (Kuchai, Dist. Mayurbanj and Bonaigarh, Dist. Sundargarh)<sup>62</sup>. These present a rough red pottery with nearly no associated context. Gopalpar (Dist. Nayagarh) and Golabai Sasan (Dist. Nayagarh, both sites just north of Chilka Lake) contain limited neolithic remains of unclear stratification<sup>63</sup>. The rest consists of surface collections which inevitably are dated largely by preconceived notions of a linear development (chipped stone to ground stone to metal), despite the evidence of stratigraphy. Paradoxically, in the large area of what has come to be called Orissa, the chalcolithic period is represented by only two tiny excavations: Golabai Sasan measures 13 x 13m (175 per metre (sic)) and Gopalpur is of small but unknown dimensions<sup>64</sup>. Neither are single-culture sites. Not surprisingly, the contexts in Orissa are not particularly useful for dating, but rather are dated by others outside. In any case, the pottery from the sites of Golabai and Gopalpur are difficult to compare with each other on the basis of the published information. Moreover, the finds from Gopalpur are not described by period<sup>65</sup>. Instead, those from Golabai are

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<sup>60</sup> An exception is D. Mitra's excavation report of 5th CE century Ratnagiri which borders the chronological scope of the present work. D. Mitra 1981, 1983.

<sup>61</sup> Chirand, Bi.: B.S. Verma 1969, 102-111; Eran, M.P.: Anon. IAR 1963-64 [1967], 15; Pandu Rajar Dhibi, W.B.: P.C. Das Gupta 1964, 1-81; Senuwar, Bi.: B.P. Singh 1990, 84-85; Taradih, Bi.: Anon. 1977-78 [1980] 17-18; Mahasthangarh, Bangladesh: M.S. Alam/J.-F. Salles (eds.) 2001.

<sup>62</sup> For the literature see P. Yule/B. Rath/K. Hojgaard 2000, 316 note 60.

<sup>63</sup> S.K. Kar 2000, 368-386; B.K. Sinha 2000, 324, "...a very small area belonging to this period has been exposed".

<sup>64</sup> B.K. Sinha 2000, 324.

<sup>65</sup> S.K. Kar 2000, 384-385.

described as a point of reference for the dating. The authors falsely assume that the wares require no description and are generally comprehensible. However, excavations at Khameswaripali shed light on the iron age-early historic pottery sequence<sup>66</sup>.

### Iron Age

The iron age in Orissa is known largely from unstratified survey finds characterized most notably by a fine grey ware and Black and Red Ware. Until now the well-known, high quality Painted Grey Ware of the Ganges-Yamuna doab and surrounding area has not been reported. Informative but limited excavation took place at Khameswaripali on the middle Mahanadi<sup>67</sup>. While the excavator describes "extensive settlement remains", he reproduces a trench profile of 3 x 3m width and depth. Levels IA to III yielded a small sample of iron age pottery. In this preliminary report there seems no awareness of the need to make public one's stratigraphy and possible related anomalies. Black and Red Ware occur so universally and in a variety of manifestations as to be no ware at all. Its surfaces can be slipped/polished, or can be untreated. It is also characteristic of different periods on the Subcontinent. Most writers refer to the connection with the iron age of southern India, a term which persists as the "megalithic period", owing to the stone cairns which contain such pottery.

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<sup>66</sup> Data: P.K. Behera 2001, 18-29.

<sup>67</sup> P.K. Behera 2001, 18-31.

key:

Layers	Wares	Shapes	Periods
III	BRW BSW RSW RW	BRW bowls BSW vases/handis, bowls RSW storage vessels, lids, platters RW storage jars, shallow bowls on stand, lids, platters	early historic
II	white painted BRW rare BBW BRW RSW RW	BRW bowls BBW handis RW bowls	iron
IB	BBW BRW BSW RSW RW	same as IA BRW bowls BSW dish on stand RSW hole-mouth vases	iron
IA	BBW BRW RSW RW	BBW vases/handis BRW bowls basins RSW vases/ handis, bowls on stand RW vases/handis	chalcolithic-iron

BBW= Burnished Black/Dark Ware

BRW= Black and Red Ware

BSW= Black Slip Ware

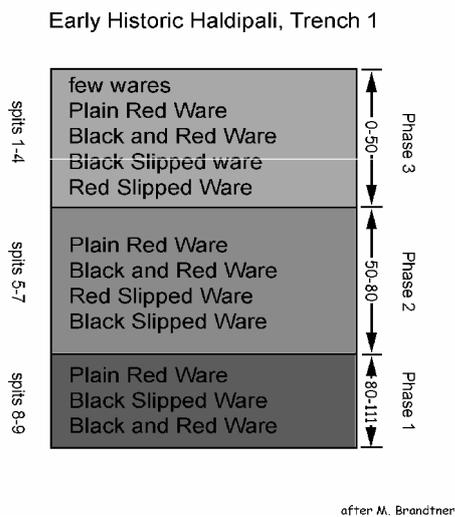
RSW= Red Slip Ware

handi= common cooking vessel

EIA= Early Iron Age

EH= Early Historic

Table 4. Wares from Khameswaripali ordered stratigraphically (after Behera).



Interesting is a high degree of continuity over time of the different wares at Khameswaripali, especially Burnished Black Ware (Table 4). In the Period IA the excavator refers to Black and Red Ware, Black Burnished Ware, Red Slip Ware, and Polished Red Ware. This pottery continues into the succeeding period, but for a single new ware (Black Slip Ware). Black and Red Ware usually is referred to as a "megalithic" ware - and at Tissamaharama/Sri Lanka it discontinues in the 1<sup>st</sup> century CE. At the end of the 1<sup>st</sup> millennium there half of the pottery is Black and Red and the other half is Fine Red Ware. Black and Red Ware occur in the South Indian iron age tombs with Red Ware and Black Ware.

Table 5. Schematic of the stratified wares at Haldipali.

A further context with which we can orient ourselves is the period IIb at Golabai Sasan in which an iron object was found together with rough Black and Red Ware, particularly tumblers in this ware. The excavator informs us that there is no connection with the succeeding corpus of dated information, the earliest Sisupalgarh level I<sup>68</sup>. The existence of "megalithic" tombs in Khariar gives the iron age further profile, although encroachment has destroyed most of the physical evidence.

The test trench at Haldipali (Table 5) replicates the sequence at Khameswaripali. Its shallow stratigraphy does not reflect a long expanse of time. Probably it reflects an early historic occupation and not a prehistoric one, despite the occurrence of Black and Red Ware sherds. The heavy occurrence of Plain Red Ware places Phase 3 in the mid 1<sup>st</sup> millennium CE. Plain Red Ware is, however, difficult since many sherds so classified are simply weathered and originally belonged to other wares.

Given the high proportion of Black and Red Ware at Tentulipali (Table 3), it is the earliest of our three trenches. On the other hand, owing to the high percentage of Plain Red Ware, Budhigarh seems the latest of the three trenches. This kind of pottery forms the vast majority of the pottery.

At face value, calibrated radiocarbon determinations for the "iron age" (over 26) for all of South Asia scatter over the entire 1<sup>st</sup> millennium BCE (Table 3). These are of little value for different reasons. First, between 750 and 400 BCE carbon measurements show the same amount of 14C and thus calibrates erratically. Within this time-space we cannot differentiate

<sup>68</sup> At Sankarjang iron age settlement remains are the subject of investigation (K.K. Basa oral information).

chronologically. Over 30 from "megalithic" contexts (see below) deviate far more widely than the time frame which they purportedly date, which probably reflects the contamination of the contexts or "target" phenomena. That is, the sample is presumably correctly measured, but has no genuine historic bearing with the primary context to be dated. In any case, those from alleged iron age contexts cluster from 1200 to 385 BCE. Those from so-called megalithic contexts, on the other hand, scatter so wildly that the majority are dubious, and are of no real help. In the worst case scenario, some of the radiocarbon samples were simply picked up on the surface and are unstratified.

There is no reason to date Orissa's iron age earlier or later than other parts of India. The solution to this problem lies in the acquisition of further 14C determinations from stratified contexts. For years only two assays existed for all of Orissa, from prehistoric burial material sampled at Sankarjang, Dist. Denkanal<sup>69</sup>. Unfortunately the associated finds from this context do not fit into the artefactual sequence of the chalcolithic or iron age. The acquisition of further stratified 14C samples is thus a first priority matter. In terms of actual iron age sites, the only documentation available at the moment is for the Khariar/Sandohel grave site (Figs. 13 and 14). That at Junagarh/Bhairapadia (Figs. 6 and 7) is not sufficiently known. Wares generally designated as iron age and those from the early historic rise of large settlements

calib sigma 1	Site	lab no.	calib sigma 1	Site	lab no.
ad 668 (789) 979	Hatikra	prl-1195	ad 1646 (1673 1779 1797) 1954	Kakoria	tf-179
ad 654 (685) 789	Hatikra	prl-1190	ad 1643 (1672 1781 1795) 1954	Kakoria	tf-183
bc 192 (157 137 125) 53	Katelai	r-279	ad 1638 (1666) 1954	T Narsirpur	tf-414
bc 385 (365 275 264) 201	Katelai	r-479	ad 1636 (1666) 1954	Kotia	tf-318
bc 405 (544) 651	Hatikra	prl-1193	ad 1401 (1436) 1480	Kotia	tf-320
bc 480 (403) 393	Loebanr I	r-278	ad 1301 (1403) 1437	Kotia	tf-322
bc 534 (605) 657	Hatikra	prl-1194	ad 1183 (1271) 1294	Paiyampalli	tf-824
bc 600 (654) 686	Hatikra	prl-1189	ad 993 (1034) 1212	Kotia	tf-321
bc 751 (405) 391	Loebanr I	r-474	ad 544 (635) 672	Satanikota	bs-202
bc 763 (750 746 526) 409	Loebanr I	bm-276	ad 340 (427) 554	Satanikota	bs-201
bc 766 (753 699 533) 412	Anuradhapura	bm-2509	ad 83 (249) 420	Verapuram	prl-725
bc 791 (765) 532	Anuradhapura	bm-2508	bc 47 (cal AD 59) cal ad 133	Halingali	tf-685
bc 827 (805) 792	Anuradhapura	beta-33280	bc 170 (38) ad 70	Polakonda	bs-97
bc 1022 (1165) 1255	Hatikra	prl-1192	bc 333 (102) ad 9	Paiyampalli	tf-828
bc 1040 (820) 536	Hotu cave	p-14	bc 359 (169) 33	Kotia	tf-319
bc 1040 (825) 550	Hotu cave	p-32	bc 369 (181) 36	Togarappalli	prl-135
bc 1254 (1009) 868	Hatikra	prl-1191	bc 377 (196) 58	Togarappalli	prl-134
bc 1257 (999) 827	Loebanr I	bm-196	bc 782 (522) 398	Naikund	bs-92
bc 1387 (908) 526	Hotu cave	p-15a	bc 782 (522) 398	Naikund	bs-92
bc 1392 (927) 765	Hotu cave	p-17	bc 797(759 676 658 641 550)405	Naikund	bs-94
bc 1405 (1251 1248 1205) 943	Loebanr I	bm-195	bc 800 (764 614 606) 410	Paiyampalli	tf-823
bc 1429 (1125 1149 1130) 837	Hotu cave	p-33	bc 1197 (987 956 944) 822	Verapuram	prl-729
bc 1513 (1196 1181 1165 1141)	Hotu cave	p-44	bc 1259 (1009) 842	Verapuram	prl-728
bc 1518 (1034) 765	Hotu cave	p-41	bc 1525 (1414) 1227	Verapuram	prl-730
bc 2131 (1945) 1779	Gufkral	bs-433	bc 1702 (1955) 1955	Hathinia hil	tf-109
			bc 1888 (1747) 1674	Gufkral	bs-371
			bc 2131 (1945) 1779	Gufkral	bs-433
			bc 2195 (2035) 1900	Gufkral	bs-434
			bc 6458 (6372) 6182	Satanikota	bs-203
			bc 8081 (8018) 7927	Satanikota	bs-204
total: 26			total: 30		

Table 6. Left: South Asian calibrated radiocarbon assays from "iron age" contexts. Right: from South Asian "megalithic" contexts. The dates in brackets are the preferred ones (after Calib 3; Possehl 1994).

<sup>69</sup> P. Yule B. K. Rath/K. Hojgard 2000.

overlap, a subject worthy of further study. Table 6 shows the situation regarding carbon dating. Few dates exist in the eastern Subcontinent. Strikingly, and opposed to the "iron age" contexts, about one third of the "megalithic" calibrated determinations occur in the common era. The overlap between iron age and megalithic is poor. Equally important for chronology are the imported wares in Orissa. The most prominent among these are Northern Black Polished Ware. Differences in the classification of this attractive ware arise especially in the case of small sherds of less than perfect quality<sup>70</sup>. Given the rarity of these sherds at Sisupalgarh IIB and perhaps from Budhigarh, they seem to be imports (see bud01~08 on the CD). Mapping the distribution of this ware at more than 415 sites is a risky undertaking<sup>71</sup>, since no classification of the sherds has taken place and owing to minimal documentation, all but sherds of classical type can be called into question. In the field sherds of Northern Black Polished Ware also can easily be mistaken for Black Slip Ware or Red and Black Ware, depending on the size of the sherd and its preservation.

#### Early Historic Period

The archaeology of early historic Orissa rests strongly at Sisupalgarh (ancient Kalanganagari or Tosali, the Asokan provincial capital) in the last centuries before the turning of the ages. It still provides basic information and serves as a chronological benchmark for the entire region which holds to the present day, despite some developments in the dating of the pottery. Recently, Tissamaharama became even more important owing to numerous stratified contexts coupled with a thoroughgoing analysis of the pottery dated by radiocarbon and coins (cf. Table 7 and 8).

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<sup>70</sup> T.N. Roy 1989, 253 regarding the quality grades I-III; M. Brandtner 1994, 107-110, "inferior variety of NBP".

<sup>71</sup> For example, B.K. Thapar 1985, 122.

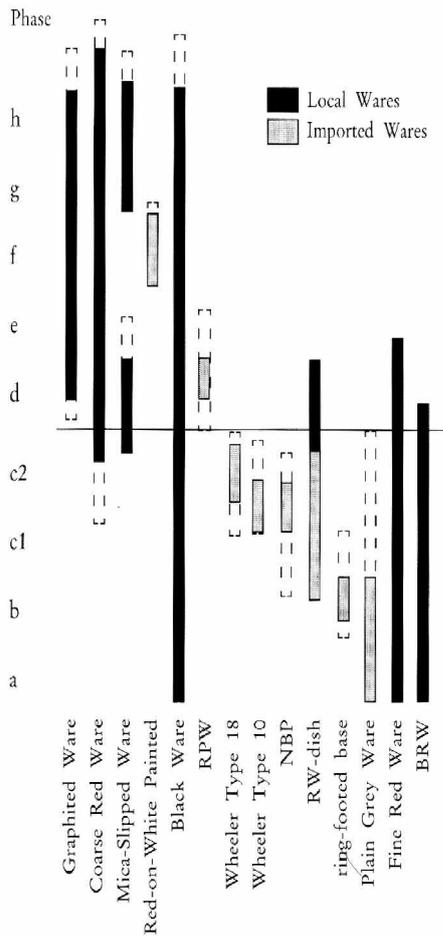


Table 7. Tissamaharama. Duration of imported and local pottery.

rel. chron.	date	14C/TL, coin dates	
i	recent-9th cent. CE	14C TL	bln-4530 820CE+-130
h	7-8th cent. CE	TL	810 CE+-110
g	450-7th cent. CE	14C coin	bln-4592 utc-6429 t.p.q. 450 CE
f	300-450 cent. CE	coin	351-361 CE
e	2nd/3rd cent. CE	-	
d	1st/2nd cent. CE	14C 4869	bln-4864, beta-100035 hd-19381, 19488, 19379
c2	1 <sup>st</sup> cent. BCE	14C 4867, 4875	bln-4590, 4867, 4875
c1	2 <sup>nd</sup> cent. BCE	14C 5057, 5067	bln-4865, 5057, 5067 kia-512, 513
b	3 <sup>rd</sup> cent. BCE	14C	utc-6428, beta-100034
a	3rd/4th cent. BCE	14C 4868, 5046	bln-4870, 4868, 5046 hd-19520, beta-100033

Table 8. Tissamaharama. Stratigraphy and corresponding dates (Schenk 2001a).

Problematic for this age in Orissa and elsewhere is the beautiful early historic Red Polished Ware, which seems to be imported largely from Gujarat because it is usually associated with the western Subcontinent from no less than an estimated 400 sites in<sup>72</sup>. But doubts as to the identity arise when we raise the question which types are diagnostic. This high quality slipped and polished ware usually is identified in terms of wheel-turned manufacture and particular forms, especially the sprinkler. The Sisupalgarh report contains of the first mentions of a "brightly polished red ware", dubbed in 1953 by B. Subbarao as "red polished

<sup>72</sup> H.D. Sankalia/M.-G. Dikshit 1952, 61; P. Yule/B. Kazenwadel 1993, 264 Fig. 4-5 (from Suhar and Khor Rori/Oman). Figs. 5.6-8 on the same page are actually Red and Black Ware. Distribution of Red Polished Ware: p. 257). D.W. McDowall 1996, 80 fig. 1 map of Red Polished Ware after Rao 1966: 53-59 fig? Cf. N.P. Orton 1992, 46-81 for an extensive documentary catalogue.

ware", with its love of elaborate forms<sup>73</sup>. As early as in Sisupalgarh I Red Polished Ware is clearly in evidence, despite the absence of sprinklers<sup>74</sup>. In S.R. Rao's concise treatment of Red Polished Ware in his excavation report on Amreli (Gujarat), he expanded the definition from sprinklers to include miniature vessels, diverse standing bowls, jars and other bowls, and notes the diverse range of colours, ranging into grey and even black<sup>75</sup>. The repertory of shapes associated with this ware is wider than commonly believed for three reasons: First, in early publications (*e.g.* Brahmapuri) the ware had not yet received a name<sup>76</sup>. Second, seemingly unaware of the early excavation reports, there is a tendency to falsely consider it to be defined exclusively by the sprinkler form, or exclude non-canonical colours. Moreover, Red Polished Ware shares some forms with Black and Red Ware, which for some may blur the distinction.

Finally, the dating of the early historic capital of Sisupalgarh is of key importance for any treatment of the early historic period of Orissa (Table 9). Without repeating all of the evidence, suffice it to say that in Sisupalgarh B.B. Lal describes three large trenches. From them he names five diagnostic stratified finds/classes<sup>77</sup>:

- 1 rouletted ware in periods IIA, IIB, III
- 2 "megalithic" Black and Red Ware in period IIA
- 3 copper coin Huviska in period III

<sup>73</sup> B. Subbarao 1956, 32-33. Cf. H. Rydh 1959, 110: Type 5 at Rang Mahal (Guj.) "Sprinklers=red polished ware": 111 fig. 68; pl. 50 diagnostic forms. B.B. Lal 1949, 81 fig. 6.7, 8.

<sup>74</sup> Lal 1949, 78, fig. 6; fig. 7.27, 46.

rpw	form	per.	Comparison
Fig. 6.8	open bowl	I+all	Rang Mahal: Rydh 1959 125 fig. 86.6, type 20
7.27	lid	IIa	Suhar: Yule/Kazenwadel 1993, 264 Fig. 5.6
7.28	lid	III	Khor Rori: Yule/Kazenwadel 1993, 264 Fig. 5.6
7.29	lid (pinkish buff)	IIa	Khor Rori: Yule/Kazenwadel 1993, 264 Fig. 5.6
7.30	bowl	IIb	-
7.34	cf. sprinkler	IIa	Rang Mahal: Rydh 1959 111 fig. 685,2 type 5
7.46	neck	IIb	-

<sup>75</sup> S.R. Rao 1966, 11,-12, 51-54.

<sup>76</sup> Sankalia/Dikshit 1952, 61, 141, "...bright red slip on the exterior."

<sup>77</sup> B.B. Lal 1949, 70-71.

4 gold Kushana coin in period III

5 copper Puri-Kushana punch-marked coin in period IIB (and others, in all 31 coins)

At the time he wrote in 1948, it appeared that the 20 rouletted ware sherds from Sisupalgarh IIA-III dated to the first or second quarter of the first century CE<sup>78</sup>. Years later it was shown stratigraphically and by means of 14C determinations at Tissamaharama (241 sherds) and Arikamedu to date from c. 250 BCE and later<sup>79</sup>. Equally as important, the "megalithic" Black and Red Ware which Lal recovered from his period IIA now appears securely to run out in the 1<sup>st</sup> century BCE/early 1<sup>st</sup> century CE at Tissamaharama (Tables 3 and 4). Schenk writes that the last developmental phase of Black and Red Ware includes imitated Rouletted Ware. Others have used this pottery to raise the dating of period IIA even back to 500 BCE, which contradicts the main body of information<sup>80</sup>. In other words, the dating of Black and Red Ware dates later than previously believed and the dating of rouletted ware has extended in both directions subsequent to Lal's study of 1948.

Of the 31 coins, Lal describes two from the defences at SPII as deriving from clear contexts: a copper coin of Huviska lay in "layer 3b about 5<sup>1</sup>/<sub>2</sub> feet below the surface...dated last quarter of the second century AD" (p. 72). A gold coin bearing a standing Kushana figure on the obverse and a 'Roman' bust on the reverse atop layer 3 (period III) dates approximately to the 2nd-3rd quarters of the 3<sup>rd</sup> century CE (p. 72).

The main wares at Sisupalgarh at the present state of our studies bear little resemblance to those which came to light in the trench at Haldipali in 2001. One reason is that there are no imports there (Northern Black Polished Ware). But identifiable in both are Black and Red Ware, Plain Red Ware, and Black Slipped Ware. Further study of the shapes is in preparation.

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<sup>78</sup> B.B. Lal 1949, 71.

<sup>79</sup> V. Begley 1983, 461; V. Begley 1988, 427; H. Schenk 2001a, 128-134; H. Schenk 2001b, 131.

<sup>80</sup> F.R. Allchin 1995, 142.

per.	layers	diagn. finds	structural remains	notes	Labs date	new date
III	1-5	rpw assoc. ware knobbed ware rouletted ware Au Kushana coin (top of lay 3) Cu Huviska coin (in lay 3b) iron	baked brick revetment ramparts	degenerate pottery	200-350 CE	200-350 CE
IIB	7-10	nbp (3 sherds) rouletted ware rpw assoc. ware knobbed ware iron	ramparts	bright red polished slip degrades	100-200CE	100-200 CE
IIA	11-14	rpw Brw Nbp rouletted ware knobbed ware iron	brickbats laterite block structures ramparts	full bloom Kharavela inscription	200BCE-100CE	200BCE-100CE
I	15-25	wheel-turned dull grey, TC red plain knobbed ware BPW rpw assoc. ware	none clay rampart -	in SP I: 2 x 4 m 8 m depth no ramparts found	300-200BCE	500-200BCE
		natural soil				

Table 9. Stratigraphy of Sisupalgarh/Tosali/City of Kalinga (after Lal 1949).

Name	District	coordinates	int. ha	topographic situation
Badmal*	Sambalpur	21°06'22"n; 84°03'38"e	4	confluence of rivers
Berhampura+	Sambalpur	21°25'01"n; 83°57'30"e	>.36	on river bank
Jamsaragarh*	Sundargarh	22°16'26"n; 84°54'29"e	2.5	confluence of rivers
Jaugada*	Ganjam	19°31'26"n; 84°49'44"e	72	in well-waterd plain
Kharligarh*	Balangir	20°27'37"n; 83°33'38"e	14	confluence of rivers
Manmunda/Asurgarh*	Sonepur	20°50'00"n; 83°56'02"e	-	on bank of Mahanadi
Narla/Asurgarh*	Kalahandi	19°54'32"n; 83°21'02"e	10.2	in well-watered pain
Pendrupekan 1+	Nuapada	20°35'13"n; 82°38'38"e	1.7	on hill slope
Pendrupekan 2+	Nuapada	20°35'13"n; 82°38'38"e	1.4	on hill top
Radhanagarh*	Jajpur	20°44'50"n; 86°10'39"e	81	in well-watered plain
Ramgarh+	Nuapada	20°08'46"n; 82°41'54"e	3.2	on moutain top
Sisupalgarh*	Bhubaneshwar	20°13'46"n; 85°50'51"e	125	in well-waterd plain
Ulapgarh+	Jharasuguda	21°51'50"n; 83°50'01"e	-	on mountain top

\* early historic

+ dating unclear

Table 10. Early historic fortified enclosures in Orissa.

## Excursis: Cornelius Meyer, Geoprospection in Sisupalgarh 2005

The associated images for this study are to be found on the appended CD in the subdirectory for Sisupalgarh "radar":

05spg area d data  
05spg area d interpretation  
05spg area c data  
05spg area c interpretation  
05spg area south data  
05spg area south interpretation

### **The Task**

Since the first excavation at the early historic fortress of Sisupalgarh (District Khurda, Orissa, India) in 1948, this interesting and unique site has been investigated by Indian and more recently German and American researchers. The idea arose initially to apply geophysical prospection methods due to the entire fortress (130 ha, 1190 m x 1150 m). In January 2005, we started the first prospection campaign using GPR (Ground Penetrating Radar) at three different sites of special interest. This is the first application of GPR in archaeological research in the state of Orissa. The main goals were first to understand the special measuring conditions in a geological area dominated by Laterite and, second to detect possible archaeological features in order to describe the site more exactly. These three measuring areas are located in:

1. Area D, around the monolithic columns (60 m x 60 m)
2. Area C, inside the glacis close to the excavated eastern gateway (30 m x 17 m and 45 m x 25 m)
3. Area South, outside the southern side of the glacis (100 m x 11 m)

Another point of interest was to determine if large-area geomagnetic mapping would be suitable and deliver satisfying results for archaeological research. The expanse of Sisupalgarh as well as the largely favourable surface conditions in more than 50 % of the inner fortress is (still) covered by grassland or paddy fields and require a fast and inexpensive but precise prospection method, thus geomagnetic mapping using a multi-sensor equipment. An open question is the geomagnetic behaviour of laterite which contains a wide variety of iron-bearing minerals. The existence of constructions made of laterite stones in a lateritic soil may cause problems concerning the magnetic recognisability of those structures. But laboratory tests to define the magnetic susceptibility of laterite samples from Sisupalgarh helped to consolidate the argument either pro or contra toward geomagnetics.

### **Ground Penetrating Radar**

The ground penetrating radar (GPR) method is based on the propagation of high-frequency electromagnetic waves into the ground. GPR is particularly sensitive to contrasts in the specific dielectric constant  $\epsilon_r$  which defines both the reflection coefficient R and the

propagation velocity of electromagnetic waves  $v$ . The waves are reflected and refracted by different soil layers and underground objects like stones or foundations. The registration of travel-time differences of the electromagnetic waves gives information about position, depth and specific properties of buried objects and layers. To obtain accurate depth information it is necessary to know the velocity of the electromagnetic wave. Typically wave velocities are specified by means of CMP measurements (Common Mid Point) using two antennas or through an overall estimation for the measuring area.

Spherical resolution and depth range depend on the GPR antenna's frequency and the electromagnetic properties of the ground. A rule of thumb is the higher the frequency, the better the spherical resolution, but with falling depth range.

At Sisupalgarh we used a SIR-2 GPR system and a 500 MHz antenna which is widely used in archaeological prospection. In all investigated areas the profile distance was 0.5 m and the inline distance of measuring points about 0.05 m. The post-processing of the GPR data changes the vertical profiles (radargrams) to horizontal maps called time slices. These maps show the distribution of reflecting objects and structures in different depths in a certain time interval. Data were processed using the REFLEXW program package from Sandmeier, Karlsruhe (Germany). The resulting time slices were transformed into image files in order to embed them in AutoCAD maps.

## **Georadar prospection and archaeogeophysical interpretation**

### *Area D, column structure*

Area D houses the most striking architecture of the whole site, a complex of monolithic columns. The main goal of the GPR investigation was to find out if there is more architecture hidden in the ground which could better explain the character of this remarkable structure.

Around the columns, a measuring area of 60 m x 60 m was laid out (see map 501-101). The area was divided into an even part covered with grassland and rice paddies and an undulating one where the origin of the mounds remains unclear. The even part shows very favourable measuring conditions while the undulating part presents measuring problems such as bad antenna coupling to the ground or side reflections.

### Results and archaeological interpretation

The plan nos. 501-102 to 501-106 show the GPR data in five time slices. Each time slice contains the sum of reflection amplitudes in a time frame of 16 nanoseconds. The estimation of an average velocity of 6.25 cm/ns of electromagnetic waves in the ground yields a layer thickness of approx. 0.5 m of each time slice. The reliability of the estimated velocity value has to be verified.

<sup>81</sup> Hence, the maps show the distribution of underground reflectivity from the surface to a depth of approx. 2.5 m. The enclosed plans nos. 501-107 to 501-111 contain the interpretation for each individual time slice drawn in different colours.

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<sup>81</sup> Mineral composition of laterite is highly variable. Iron content and mineral occurrence change highly. Hence, there is a lack of reliable reference values for petrophysical parameters of laterite and lateritic soils in relevant literature.

The top layer contains several highly reflective zones, mainly outside the area enclosed by the laterite columns. The most eye-catching anomaly is located in the eastern edge of the investigated area, opposite the head of the column-housing mound. Some smaller anomalies lie in the northern part inside the rice paddy. However, also within the mound, are zones of higher electromagnetic reflectivity that do not display a regular structure suggesting an accumulation of rubble, potentially coming from a construction related to the columns.

The second layer between approx. 0.5 and 1 m depth shows that the anomalies in the east and north of the grid continue and in the northern part they even intensify. Between the columns are only a few small and irregularly arranged anomalies. Inside the mound the strong anomalies disappear, with only the edges showing some higher reflectivity. Generally however, the data quality is lower in those zones because of weak antenna coupling to the ground.

Overall, the images do not vary significantly at the final depth of approximately 2.5 m. The anomalies in the northwestern corner continue and intensify while the strong anomaly in the eastern edge of the grid fades away. Between the two eastern heads of the column alignments, reflection areas increase and point to buried building material related to a construction in this position.

Although a number of georadar anomalies occur, it is hard to recognise archaeologically relevant structures in the images of Area D. Inside the mound there is obviously an accumulation of building material. Further, major and deep-ranging anomalies are located in the north of the grid. The eastern edge displays a relatively shallow anomaly. The accumulation of reflection anomalies between the column alignments at a depth between approx. 1.5 and 2.5 m deserves closer attention.

*Entrance SP IV (Area C on map)*

Entrance SP IV marks an excavated and partly reconstructed area around the northern gateway on the west side of the fortress. Two irregularly shaped investigation areas were laid out, one on the top of the glacis of 455 m<sup>2</sup> and the second in the even part associated with the gateway of 427 m<sup>2</sup>. The even part provided almost perfect measuring conditions while in the part on top of the glacis some obstacles like termite hills constrained the measurements.

#### Results and archaeological interpretation

The data obtained in SP IV is displayed in the enclosed plan nos. 501-201 to 501-206. The time slice parameters are the same as those seen in Area D. Again, the interpretation of each individual time slice is added in the form of plan nos. 501-207 to 501-211.

The lower investigation area shows highly reflective zones at its eastern and western edges. Both anomalies continue from the surface to approx. 2 m depth. From 1.5 m to 2.5 m depth a curved structure leading to the south stands out. It is most likely a continuation of the gateway constructions in the east. Close to the base of the slope some irregularly arranged

anomalies appear whose archaeological relevance is not immediately obvious.

At the top of the glacis there is a particularly large concentration of highly reflective material in the eastern part close to the gateway. This strong anomaly is recognisable to a depth of 2.5 m. A possible interpretation could be that this is due to the remains of a laterite stone defence wall.

Between this anomaly zone and the similarly investigated north-bearing section of the glacis there is a gap in the anomaly distribution. However, the north-eastern part of the grid displays an anomaly pattern that may point to a construction related to a defence wall. The structure resembles a square ground plan of 5 m by 5 m. This structure appears at a depth of approx. 1.5 m and continues to at least 2.5 m depth.

At the eastern edge of the measuring grid more reflection anomalies appear, lacking any regular distribution. This data is most likely influenced by the termite hills occurring at the glacis.

#### *Area South, MoatArea South, MoatArea South, Moat*

Area South is situated outside the southern glacis directly east of its eastern gateway. The transect covers a strip of 100 m by 11 m. The goal of the investigation was to find possible evidence of a moat which originally surrounded the fortress. Today the southern side of the quadrangle is the only measurable part which is not impinged by the river.

#### Results and archaeological interpretation

The results of the investigation are displayed in the plan nos. 501-301 to 501-306. Interpretive drawings are shown in the plan nos. 1-307 to 501-311. The time slice parameters correspond to those displayed in Area D.

The data of the area are quite simply structured. The northern part of the strip is almost entirely free of georadar anomalies. The southern part shows some shallow and strong anomalies most likely due to modern construction activities in this area.

The most striking feature of the area is the increasing reflectivity in the centre of the strip. Beginning at the first depth slice (0 to 0.5 m) and continuing to a depth of 2.5 m, the anomaly is regularly shaped and forms a strip of approx. 14 m width. It continues from the surface down to a depth of 2 m with more or less the same intensity. In the lowest depth slice between approx. 2 and 2.5 m the amplitudes of the anomaly fade out. The most obvious interpretation is that this is a filled ditch, composed of stones potentially coming from dismantled constructions. The course of the presumed moat appears logical, particularly in comparison to the corresponding course in the opposite north-eastern corner of the fortress.

### Magnetic susceptibility studies

In order to evaluate the effectiveness of the geomagnetic prospection method the magnetic susceptibility  $\hat{\epsilon}$  of typical topsoil and construction material was investigated. Samples of laterite stone and lateritic soil were taken at SP IV. In four samples, two of laterite stone and two of lateritic soil, the specific magnetic susceptibility  $\hat{\epsilon}$  was determined at the petrophysical laboratory of the Institute of Geophysics and Geology of Leipzig University by Burkart Ullrich (Eastern Atlas). The values of susceptibility are in a typical range for natural and anthropogenically influenced soils (Fig. 1).

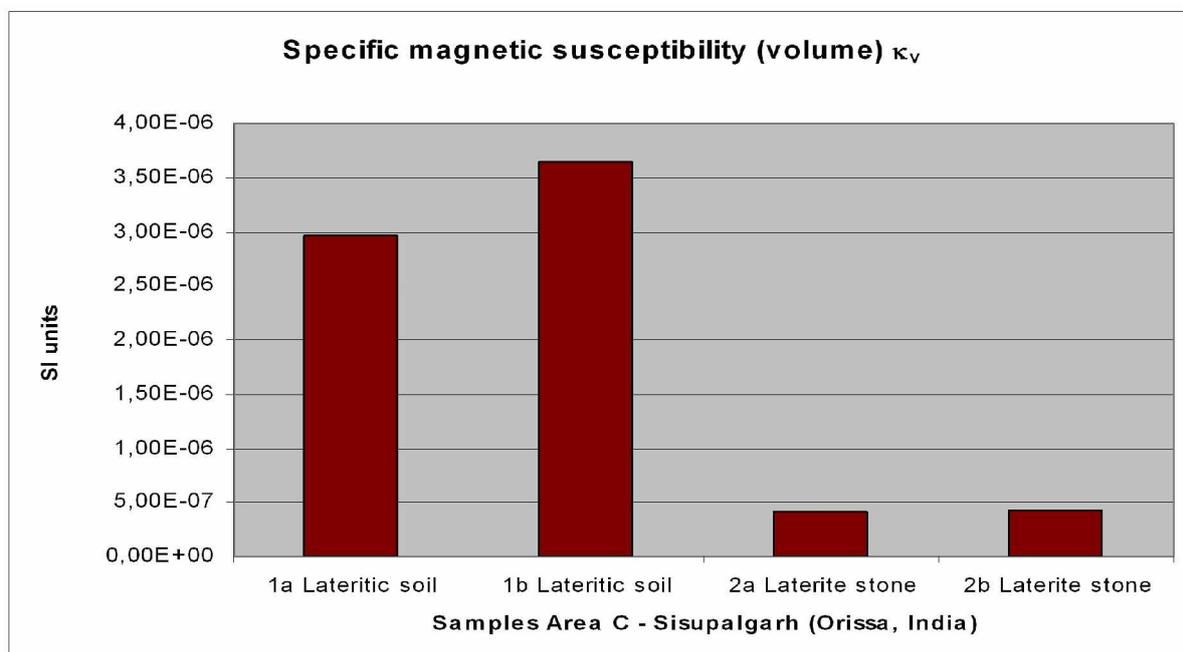


Fig. 1. Specific magnetic susceptibility  $\kappa_v$  of laterite samples from sp iv.

Specific magnetic susceptibility is mainly determined by the content of ferrimagnetic iron minerals. Laterite contains relatively little magnetite ( $\text{Fe}_3\text{O}_4$ ), which is strongly ferrimagnetic. The usually high iron content of laterite is bound in ferrihydroxides that have antiferromagnetic (goethite  $\alpha\text{-FeOOH}$ ) or quasi-paramagnetic (lepidokrokit  $\gamma\text{-FeOOH}$ ) characteristics (Faßbinder 1994). Goethite is primarily responsible for the red colour of lateritic soils.

The samples coming from the top soil show susceptibility values around  $300 \cdot 10^{-8}$  SI units while the values of the Laterite samples are in the range of only around  $40 \cdot 10^{-8}$  SI units (see Fig. 1). The elevated values of the top soil can be explained by anthropogenic and biogenic oxidation processes that have resulted in a concentration of ferrimagnetic maghaemite ( $\gamma\text{-Fe}_2\text{O}_3$ ). This first rough evaluation of magnetic properties in Sisupalgarh soil samples

promises good prospects for a successful geomagnetic mapping<sup>82</sup>. Inside the fortress, approximately two thirds of the area are still suitable for geomagnetic prospection, though the steadily outspreading village will make magnetic prospection increasingly difficult.

### Summary and Conclusions

The 2005 geophysical prospection campaign at Sisupalgarh indicates the following:

1. The subground in Area D, around the monolithic columns, contains more or less irregularly distributed anomalies. There was no evidence for well-preserved construction remains. The mound did not display an anomaly pattern that points to archaeological structures. Measuring conditions were acceptable in the paddy fields, but less favourable in the undulating zones.
2. In Area C, east of the gateway, some structures appeared in the entrance of the fortress as well as along the glacis at depths of approx. 1.5 to 2.5 m. Possible remains of an underlying defense wall were detected. Measuring areas should be enlarged for further investigations. The measuring conditions were optimal in the even parts and less favourable on the glacis due to the undulation of terrain and numerous termite hills.
3. In the southern area, evidence for the existence of a defensive moat was found. The probable course of the moat and its width of around 14 m match the course and the features of the still existing moat outside the northern section of the glacis.
4. Generally, georadar proved to be a suitable but limited tool for the investigation of a spacious and complex site like Sisupalgarh. High clay content of laterite (McFarlane, 1976) may be one reason for weak resolution and weak georadar signals. For further prospection projects of the fortress alternative large-scale prospection methods would be chosen.
5. The investigation of the specific magnetic susceptibility of four soil samples yielded encouraging results. The size of the site and the archaeologically reasonable susceptibility values promise satisfying results for future geomagnetic prospection. In addition, the open landscape is very well suited for a combined geomagnetic and DGPS survey.

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<sup>82</sup> Decreasing magnetic field strength and inclination towards the equator can be a reason for weak signals in the classical gradiometer prospection (in vertical configuration). In tropical latitudes it is necessary to take total field and multi-component measurements in account. The latitude of Sisupalgarh is approx. 20V.

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