SUDEEP
DASGUPTA

YCMSR-6
SPECIAL PROJECT (V.C.), Sudeep Dasgupta, Roll No. 89613019 VI thVC Batch (original)

APPROVAL

The Visual Communication project - iv entitled "EXCAVATION OF HISTORICAL SITES- A study of the technique and methodology, by Sudeep Dasgupta is approved in fulfilment of requirements for Master of Design Degree in Visual Communication.

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Chairman	:		
Internal Examiner	:		
External Examiner	:		

VCMSR - 6
(IIth VC Batch 89-91

EXCAVATION OF HISTORICAL SITES

Visual Communication Project iv

by

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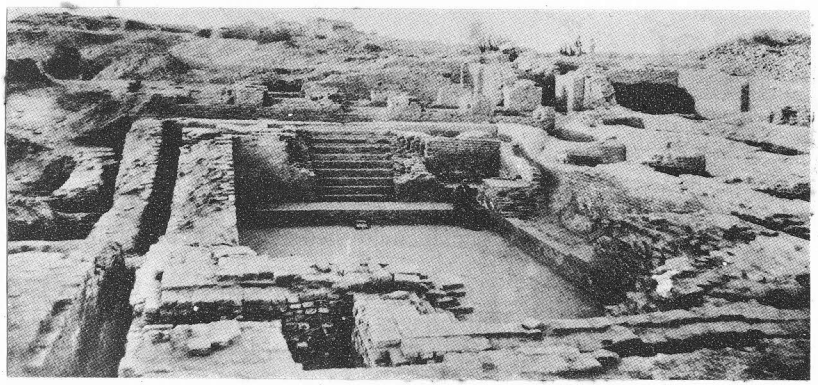
April, 92

EXCAVATION OF HISTORICAL SITES



ACKNOWLEDGEMENTS

First of all I want to thank Prof. S. Nadkarni for having realized the importance of this project and allowing me to take it up.

Prof. Nadkarni also reffered me to a very eminent scholar in this field, Prof.R. Sengupta, (who has received Padma Shri for his pioneering work in Archaeology).

Prof. R. Sengupta is a very warm and scholarly person and I am whole heartedly thankful to him for having made the time to give his invaluable guidance in my project.

I'm also thankful to Prof. B.M. Pandey of Archaeological Survey of India, for supplying me the study material for my project.

I don't want to miss this opportunity to thank the Librarian and Staff of A.S.I. for being so helpful.

Last but not the least I want to thank Mr. Saran of Antiquities Department (Archaeological Survey of India, Purana Qila) for the invaluable help extended by him in my project.

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ARCHAEOLOGY IN INDIA

ARCHAEOLOGY IN INDIA

The discovery of the great Indus Valley civilization at sites like Harappa and Mohenjodaro was an outstanding achievement of this century. Giyn Deniel rightly observes :"It is splendid story stretching back into the late nineteenth century to the heroic days of Petrie and Schliemann in Egypt and the Aegean to the north-west India and Transcaspia.... there emerges the tale of what Childe calls the Most Ancient East, the tale of the development of peasant village communities in the sixth and seventh millenium B.C. and the development of the great urban pre-historic or proto-historic civilization of Egypt, Palestine, Syria, Anatolia, Mesopotamia, Iran and the Aegean. It is this great story which Breasted described as the New Past of Man".

INTRODUCTION

INTRODUCTION

Some years back when I was in school, I had visited an archaeological site at Purana Quila. The excavations were carried out there since 1969, started by the renowned Prof. B.B.Lal of Archaeological Survey of India and were on for a few years.

This had revealed a vast treasure of excavated human settlement which dated back to hundred of years before the birth of Christ. The exhibit of the pottery and the other excavated material there had fascinated me enormously.

This was the very reason which inspired me to take up a project in this subject.

I am extremely thankful to Prof. S. Nadkarni for having realized my keenness in this matter and allowing me to take up this project.

This project is divided mainly in two parts :

I (a) Basic introduction to excavation and archaeology.
(b) Various factors which lead to an excavation and the method and technology involved in it.
(c) Excavation technology.
(d) Recording of archaeological finds.
(e) Dating methods.
(f) Preparing a report on excavation.

II A study on the excavations carried out at Purana Qila.

SURFACE EXPLORATION- NATURE METHODS, EQUIPMENT AND RECORD

I (a) BASIC INTRODUCTION TO EXCAVATION AND ARCHAEOLOGY

The location of a site of archaeological importance could be done in the following ways :

Textural : To carry out exploration of site related with ancient scripts, like Ayodhya and Hastinapur.

Surface : Exploration of sites where sufficient surface finds have indicated - the presence of ancient cultures.

Local Narratives : Local narratives stories, ballads, hymns which suggest of linkages with historical cultures.

Accidental : Chance of accidental discovery of a burried culture while carrying out of a road laying out, railway line laying or construction operation.

An outstanding example of an accidental but sensational archaeological discovery was that of the famous site of Harappa in Montgomery District of Punjab in 1921. Ancient brick structures were encountered there when the area was being cleared out for laying out railway lines.

Certain natural agencies like flood of river and sea erosion would suddenly uncover the presence of ancient sites and settlements.

EXCAVATION - PRINCIPLES AND TECHNIQUES

Once the ancient sites of mounds have been spotted and the field data about them collected, the archaeologist can choose the most important and interesting among them for excavation. General nature and the broad cultural overview of the site, succession of cultures as well as the material contents of the site.

(i) The vertical dimension of a site i.e. the total thickness of the cultural accumulation of a site from its earliest inception from the virgin soil upwards.

(ii) The different periods or phases in its history including the different occupation levels and building levels; and

(iii) The horizontal dimension: the material contents of each period like the layout of the town, the hospitals, nature of building and a host of human artifacts throwing valuable light on the material culture of the people.

Simply stated, excavation is the digging of the earth and removing the burried soil and, in its very nature, it is a destructive process. But, archeological excavation differs from ordinary excavation done for digging a well or laying foundation for houses. But the archeological excavator is interested to know every inch of the soil he digs below the earth to find out if it part of an occupation layer, or if it contains any vestige of human activity. By its nature, archeological excavation is a slow, systematic and planned digging to study the nature and the contents of the occupation layers in the reverse order in which they were laid down, gradually uncovering each successive stage in the history of the site.

The main characteristics of an archeological excavation are :

1. It is done with great care and planning so that every artifact be it a building or a bead is laid bare and preserved.

2. Its position in relation to the layers of deposits in which it is found (stratification) and in relation to other objects (associated finds) is documented in records for verification at any time;

3. The date relating to the environmental factors like flora, fauna, soil are recorded and studied to know the ecological setting.

Excavation was for a long time considered merely as a method of collecting antiquities "a glorious treasure hunt". It was Pitt Rivers in Britain and Petrie in the Near East who first placed emphasis on the context in which they were found i.e. the layers in which they were found and their relation to other layers and objects. Another factor that was neglected in the past is the chronology of the date as a whole. But today "no excavation can be considered satisfactory unless the excavator can make a reasonable assessment supported by evidence, of the period and circumstances of laying down of each deposit and the construction of each feature, and of their correlation. In other words, he must ascertain what was done there, when and by whom" (Graham Webster). So, the context, the cultural sequence and chronology are important in an excavation and after some trial and error, the stratigraphical method has been evolved to obtain these requisites. Let us first examine the methods of dating.

DATING METHODS

ABSOLUTE AND RELATIVE DATING

As in history, though in a lesser degree, the time factor is quite important and relevant to know the correct sequernce of events or cultural movements and their inter relation. Time factor also become necessary when we compare the same cultural stage in two different countries or different areas within the same country. For example, if we know the earliest occurence of a particular cultural trait, we can know something about the possible source of diffusion. Similarly, within a country or a cultural zone, the time of occurence of a particular trait like the use of iron, or the use of wheeled pottery or the invention of a script becomes vital in order to build the sequence of techniques, types and cultures and trace the tempo of human progress in a given society. In historical archaeology, we often get evidence for absolute dating with the help of a datable object like coin or inscription or textual correlation.

TYPOLOGICAL METHOD

In this method, artefacts are classified according to their form or shape and their relative antiquity assigned on the presumption that the main criterion - simple to elaborate, poorly preserved to well preserved, crude to refined - is correlated with age. In every artefact, we can have type series indicating a particular form or shape and the date and further finds can be described simply by reference to the types already recognised. The distribution of the types in space and time would indicate the diffusion of a culture. This is a logical evolutionary arrangement constructed by the archaeologists and this is called Seriation. The (typological classification) values are liable to be local rathar than universal and must be established afresh and objectively for every first locality. This method serves as a very useful tool to understand the different forms and traditions in the manufacture of different classes of artefacts. For example, the close similarity seen between the handaxes and cleaves found in South India and South Africa or the Neolithic shouldered axes of South East Asia and Eastern India would open up possibilities of ethnographic links and even pre-historic migrations.

RADIO-CARBON DATING (CARBON-14)

This method of C-14 dating was devised in U.S.A. by Willard F. Libby in 1948. Carbon 14 which is radio active heavy isotope of Carbon is present in the earth's upper atmosphere. The C-14 atoms combine with oxygen to form carbon-dioxide and become mixed in the earth's atmosphere and enter into all living organisms

like plants and animals. All living organisms absorb C-14 (the radio active carbon) and C-12 (ordinary carbon) in a constant proportion till the moment of death, after which the radio-carbon already absbed starts decaying at a rate determined only by the half life of the isotope. The carbon-14 is reduced to half in 5568 + 30 years. It is possible to determine the age of an organic sample by ascertaining the specific Carbon-14 activity in the sample. The amount of C-14 remaining in the dead organic matter as indicated by its radio-activity is proportional to the time that elapsed since death. The dating of an ancient organic sample results from the amount of disintegration that has occured since death. This dating is possible on the basis of the present day C-14 content of living matter and the known half-life of C-14. "The laboratory procedure consists of burning the sample, reducing it to pure carbon and measuring the radio activity in a specially constructed radiation counter".

The materials that are found suitable for this examination are : wood, charcoal, charred bone, textile piece, leather, hair, skin, antler, tusk, shell, drug charred grains etc. Care should be taken at the time of sample collection to see that contamination from organic material (like cotton or other fibrous material) of more recent derivation is avoided. Samples should be collected in moisture-free jars or aluminium or plastic foils, labelled and kept with the necessary field data like the name of site, strata etc.

This method is not without defects. The assumption that the rate of production of C-14 has been uniform through out the past is now challenged. There are possibilities of error in sampling or calibration of the counter or countering error. In order to correct this error, the final count is expressed by the plus or

minus figure appended to a C-14 date. Some recent advances have also been made in evolving correction methods to eliminate contamination.

There are a number of centres in U.S.A. and U.K. having laboratory facilities for Carbon-14 analysis. They are extensively used by the archaeologists. In India too, we have a few institutions undertaking these analysis such as the Tata Institute of Fundamental Research, Bombay, the Birbal Sahni Institute of Palaeo-Botany, Lucknow and the Physical Science Laboratory, Ahmedabad. Thanks to these institutions, we have quite a long list of Carbon-14 dates for different cultures and sites in India which by and large cocroborate the archaeological datings. There are however a few cases where the carbon dating is found to be at variance with the archaeological dating. This is attributed to contamination of the sample. As pointed out by Harold Barker, there are some limitations in the method but he rightly concludes : "One must accept the fact that the method is not able to resolve age difference of less than several hundred years and is therefore more useful in fixing the broad outlines of a chronology rather than the fine detail" (The Scientist and Archaeology (1963) p. 135)" Another writer remarks : "The method has given the first universal means of absolute dating quite independent of archaeological methods".

THERMOLUMINESCENCE DATING (T.L)

This method is helpful in dating the ancient clay objects like the pottery, bricks and the ceramics. All clays contain crystalline constituents and also traces of radio active materials, the decay of which leads to the accumulation of energy at a constant rate with in the materials. This accumulated

energy is released as a flash of light when the clay material is heated to a very high temperature. This phenomenon is called thermoluminescence. The amount of light thus emitted is measured by sensitive photo electric equipment. When pottery is made and fired, the accumulate radiation in the clay is released as thermoluminescent light emitted on heating it should be possible to relate this to the time that has elapsed since the pottery was originally fired. There are certain practical difficulties in applying this method widely but attempts are being made to improve it for wider application. It is still in the experimental stage. "Once the method is perfected it will give a valuable check on radio carbon dating for all periods of the past when pottery was in use."

ARCHAEMAGNETISM

A technique has been developed for dating baked structures such has klins, hearths and burnt clay walls if they have remained in situ. This method is based on the behaviour of iron particles in the clay when it is in plastic state prior to its hardening during the process of finding or application of heat. Any object in whcih there are bits of magnetic iron is given magnetic power by earth's magnetic field.

When a clay object is heated above a certain temperature its magnetism is lost; but it is regained when it is cooled. While regaining it thus, the orientation and strength of the regained magnetism are determined by the earth's magnetic field at the moment of their last cooling, and hence it is called archaeo or remnant magnetism. "Let us take an example of an earthern jar that was hardened near London in a very hot stove and then was allowed to cool. Centuries later, a scientist finds that jar and

wants to date it. If he can measure the direction of the remnant finds that jar and wants to date it. If he can measure the direction of the remnant magnetic line in the pot and if he knows what year the magnetic lines of the earth pointed in this true direction, he can date the year when the jar was heated in the stove. He will then know how old the jar is" (Lyrn and Gray Poole, Science Dates the Past, 1964, p.100).

The instrument for measuring the direction and strength of the remnant magnetism was designed by Profs. Cook and Balsha. It is called Magnetometer. With its help, the scientists search the true magnetic north and discover in what century and almost in which year true magnetic north was pointing exactly in that direction. Then they can arrive at the near date for the object.

The dates obtained by archaeomagnetić methods are very encouraging and agree with the known dates of the objects tested. This was tested on the objects from the Roman sites in England and the dates obtained tally well with known dates.

POTASSIUM-ARGON DATING

This method resembles closely the Carbon-14 method. The earth's crust contains potassium of which Isotope K 40 decays to Argon 40 at a known rate, its half life being 1,300 million years. The date of a sample is determined by measuring both i.e. Potassium-40 and the Argon-40 present. Volcanic ash and basalt which have come out of the volcanic eruption serve as good samples for this method. This method was applied to date samples of Early Plestooene period in the Olduvai George. This is useful for dating materials 23 to 26 million years old.

FLUORINE, URANIUM AND NITROGEN DATING OF BONES

The basis for this analysis in the words of Kenneth Oakley is "The fluorine an Uranium content of the mineral matter of buried bones and teeth increases with the passage of time whereas the organic (protein) content measured as nitrogen decreases. Thus, the comparison of the fluorine, Uranium, and/or nitrogen content of bone or teeth of questionable age with the ranges of these elements in other bones or teeth of known age and in similar matrix at the same site, sometimes indicates clearly the relative antiquity of the specimen in question" (The Scientist and Archaeology-P. 111).

FLUORINE DATING

The Fluorine that is present in the ground water is gradually absorbed by the buried bones or teeth. It replaces the hydroxyl content. The greater the fluorine content of a bone, the greater is its antiquity. But rate at which this absorbtion happens, depends on the fluorine in circulation, climate and similar factors and therefore, this method may not be useful in comparing the bones of different areas of hydrological conditions. However, in a given area, the fluorine test will give us the relative age of bones of different geological ages.

The test in combination with uranium content test and radio-carbon test has proved of great value notably in detecting the fake claim of the Piltdown Man and also confirming the Acheulian age of the Swanscombe skull.

URANIUM DATING

Like fluorine, uranium is also present in the ground water and is absorbed by the mineral matter of bones and teeth. This uranium content of the bones can be measured and the method known as radio-metric assay whcih takes the form of exposting a sample to a Geiger counter and counting the radiations per minute. This test helps us to distinguish between fossil bones and the recently introduced bones in old gravels or sands.

NITROGEN OR COLLAGEN DATING

Bones basically consist of calcium phosphate, fat and bone protein or collagen. On death, the fats gradually disappear. The collagen survives much longer though it decays at a uniform rate. This can be measured by a nitrogen assay. The rate of decay depends on physical, chemical and other factors and therefore cannot be universal, but bones of different dates in a single deposit can be distinguished on the basis of bones of several ages (preserved in identical conditions) in cases where they are too recent to be within the range of fluorine or uranium methods. It is very valuable as a means of cross-checking the results of uranium and fluorine analysis of the bones believed to be of the pleistocene age on open sites.

PHOSPHATE ANALYSIS

Decay of animal and organic matter leaves a residue of phosphates. Chemical analysis can reveal their presence. It has been employed particularly in the study of cave deposits to show human or animal occupation, settlement sites and burials.

Chemical analysis of ancient metallic objects gives us information regarding the technological development of ancient civilisations. In particular, the methods used in metal casting and facbrication can often be reduced through chemical analysis and metallographic examination of the object. Information regarding the area of provenance by comparison with well-authenticated objects or with raw material obtained from the area in question can be obtained. Various physical methods of chemical analysis such an optical emission spectrometry, X-ray fluorescence analysis, neutron activation analysis etc. have been developed and have yielded valuable data (E.T. Hall, The Scientist and Archaeology, pp.168 ff).

STRATIGRAPHICAL METHOD

The human occupation of a site normally results in the accumulation of material of one kind or another on and about the area occupied. Objects are lost or discarded and become embedded in the earth. Floors are renued and old ones buried. Buildings crumble and new ones are built upon the ruins. A flood may destroy a town and deposit a layer of alluvium upon its debris, and later, when the flood has subsided. The levelled site may be occupied. Method of determining the order of succession of events and cultures in a given site and hence, it is a major tool for archaeological interpretation of a site. One of the first tasks of an excavator is to understand the principle of stratigraphy. Wheeler has aptly compared the strate of a site to the pages of a book and each stratum is a link in the cultural sequence of a site.

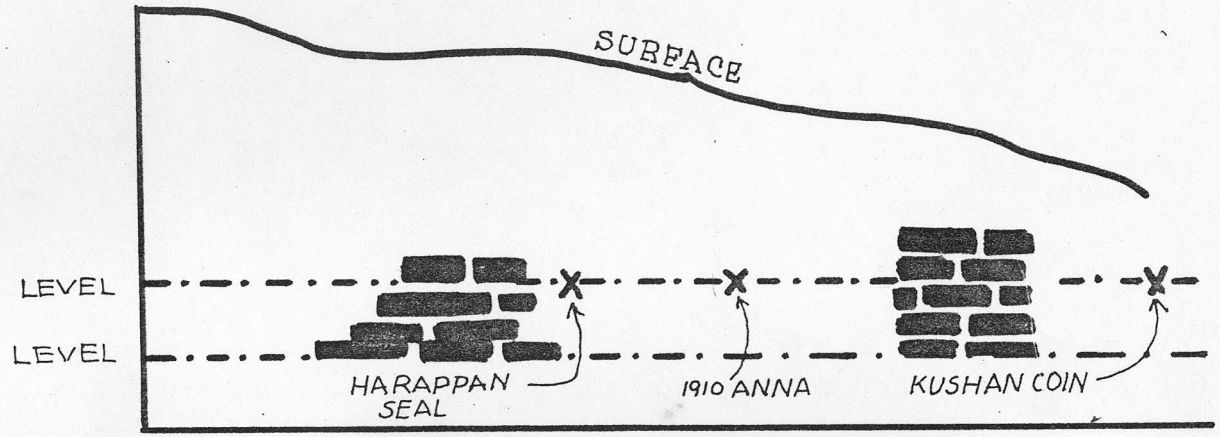
Stratigraphical Method

This method implies the recognition of occupation of habitation layers as well as the layers formed naturally in an excavation so as to determine their sequence of formation. Archaeological layers are deposits of materials laid down by man. An occupation layer or level may consist of artefacts and used and left by man such as pottery, charcoalm coins etc. Stratigraphical excavation means excavation layer by layer, keeping all the artefacts from each deposit in separate groups. The procedure is to peel off the succession strata in conformity with their bed lines ensuring the accurate isolation of structural phases and relevant artifacts. The excavation should "proceed in precisely the reverse order of deposition" i.e. the last laid deposit must be removed first and the earlier ones successively until the natural soil is reached.

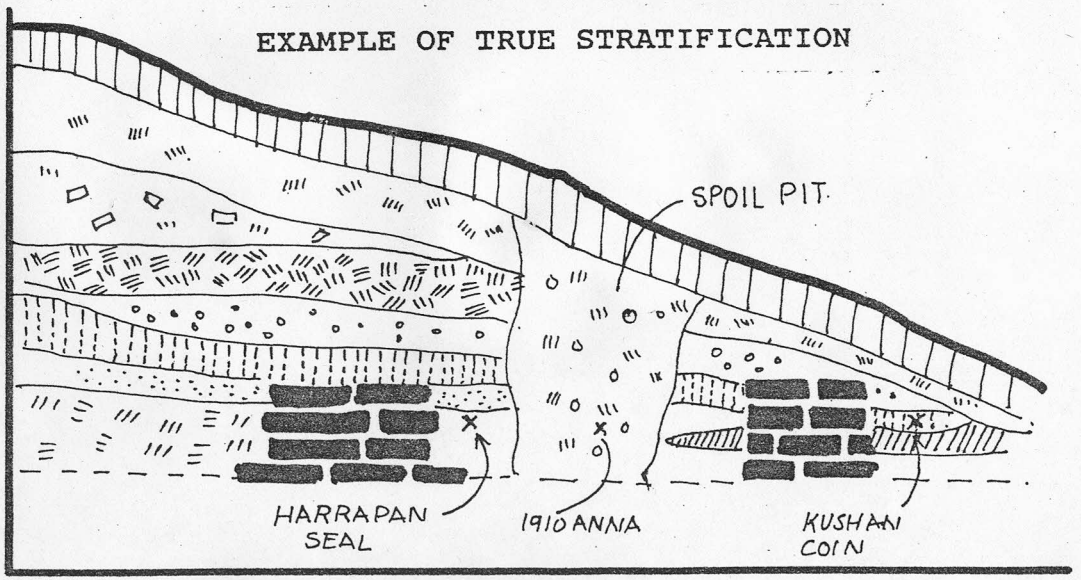
Layers are deposits differentiated by variations in colour or texture or content. The change of the colour or the surface of the layer can often be detected as the digging proceeds. But when it is difficult, scraping the vertical sides or sections of the excavated trench with the help of excavation knife and sometime by clean vertical cut by bale would help in detecting the finer lines of separation of one deposit from the other. The variations in colour, compactness and composition would be visible in sections. As the excavation knife runs on the vertical section it can feel the differences in the texture as well as the contents. Different kinds of soil depending upon the cause of the deposition natural or human, like the layers of sand, clay, silt, gravel or lime (chalk) can be identified. If there was any flooding by the rivers on the settlement, it would have left a layer of sand and silt. Regarding the contents of the layer. We usually encounter layers containing such or charcoal, gravel or pottery pieces, layers of brick bats etc.

STRATIFICATION

EXAMPLE OF FALSE STRATIFICATION

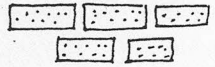


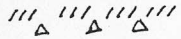
EXAMPLE OF TRUE STRATIFICATION

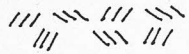


SYMBOLS FOR SECTION

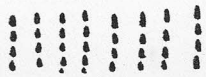
BURNT BRICKS 

MUD BRICKS 

LOOSE GRAVEL EARTH 

LOOSE EARTH 

COMPACT EARTH 

LOOSE CLAY 

POTTERY SHERDS 

BRICK BATS 

ASH 

MUDDY BANDS 

SAND 

GRAVEL 

DISTURBANCE TO THE STRATA

Depending on the contents, the texture of the layer may be loose (if it is sandy) or hard (if it has gravel or pebble) within the layers we may find some local patches - a patch of plaster or lime-flooring which need not confuse us. Such local patches may look like layers especially if the area of the dig is small but when extended they may be found to terminate at short length and be part of a layer.

DISTURBANCE TO THE STRATA PITS

There are many factors which cause disturbance to the strata and they have to be recognised by the excavators. Any pit dug at a time either as a refuse of storage pit or for a well or as a foundation trench for a structure causes disturbance to the layers that had already accumulated at the spot. The material in the pit would be coveval with the time when the pit was dug and not with the materials found in the layers it had cut through. The antiquities found in the pit-filling should be separated from those found in the layers. Though they may be found in the same level they belong to two different periods. Therefore, it is essential to prepare the history of every pit in an excavation inducation the working level of the pit, i.e. the period when the excavation of the pit was started, secondly, the layers which it had cut through and lastly, the layers not disturbed by the pit. The dimensions and the depth of the pits are also recorded and marked in the section and labelled. The pits are all to be numbered serially like Pit No. 1,2 and 3 as we proceed from the top downwards. The history of each pit has to be reconstructed in the record note book and its purpose determined as it was part of the history of the site.

EXCAVATION - PRINCIPALS AND TECHNIQUES

POST-HOLE AND ROBBER TRENCH

Two other items often cause intrusion into the strata are the post-holes and robber trenches. A robber trench is generally a trench for removal of stones from an ancient wall for re-use. Post holes are the small pits or depressions on which posts were planted to carry a roof or a fence. All these cause disturbance to the earlier strata and hence they have to be carefully isolated as a separate unit for study.

The contents of the pits and post holes have to be carefully searched for the packing materials or remnants of wooden poles which would be useful for carbon dating.

BENCH LEVEL OR DATUM LINE SYSTEM

The value of the stratigraphical method of excavation can be appreciated better when it is contrasted with the earlier method that was practised in the early decades of this century by some archaeologists in the sites of Egypt and Mesopotamia and also by Sir John Marshall in Mohenjodaro. The emphasis was not on the recognition of the strata levels in a site; "the mechanical recording of every object and structure in relation to a fixed bench levels. The levelling instruments were set up at the excavation site and the level of each object or structure was recorded with reference to the fixed points. The basic assumption in this method is that all objects and structures found in a level belong to the same period. Mortimer Wheeler has described this system "outworn"and as "the very parody of scientific method". It fails to take note of the changes in soil or strata and the later intrusions to the earlier strata like the

pits and blindly puts all the antiquities and structural phases in the same period because they are in the same level. Stratigraphical method does not go by the sea mean levels but is based on the recognition of the habitation deposits and the process of their accumulation. Mixing up of the earlier and later materials can be avoided in the stratigraphical method. Industry is present, uniform layer 6 to 9 cms., thick are removed". American archaeologists also do not decry the "mechanical" or metrical stratigraphy. As has been observed by Heizer, "No archaeologist will quarrel with wheeler's insistence on employing visible stratification. The fact remains that there are many instances where archaeologist finds himself dealing with a deposit which does not contain such stratification ..... Where the excavator can find the natural stratigraphy. He must follow the strata but where such evidence can not be observed, he will be forced to collect his material by some sort of vertical grid levels to enable culture stratigraphy to be determined in the laboratory analysis". A few other American archaeologists plead for the application of both the "natural" and "metrical" stratigraphy or arbitry level excavation.

LAY OUT OF TRENCHES

SECTION - 2

LAY OUT OF TRENCHES

The most elevated part of the site would be preferable as it would give the maximum accumulation of the occupational strata and therefore a full cross section of the cultural history from the earliest to the latest phases of its history. But in certain cases, the excavator may not be interested in the modern accumulation and his main interest might be in the earlier cultural horizone and accordingly, he may choose the slopes of the lower areas of the mound.

Different strategies and methods have to be adopted in the excavations depending upon the aims, the area and the time available for excavation. An accurately laid out trench system is essential for precise record because all artefacts and structures found in the excavations are described according to their position within the trenches and to the page that outline the areas. The different types of lay out are :

(i) TRIAL TRENCHES OR SONDAGES

Trial trenches serve as preliminary sounding before regular excavation and give us some glimpases of the nature, depth and contents of the archaeological deposits in a given site. They have to be considered as exploratory in nature and they are only a means to an end not an end in themselves. The dimensions may be one meter in width for equal measure of depth. They should be laid out and oriented with the grid so that if they produce promising results, the areas can be extended into a square

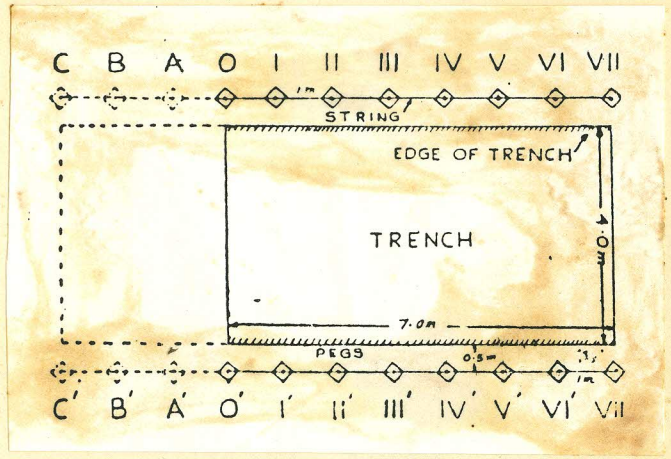
excavation. Induscriminate trial trenching should be avoided as it would affect the perspective that would be gained by a fuller area excavation. At any given place, it may serve to give a view of the culture sequence of a site in a short time, but it should be used with caution since the area of the dig is small and hence its value limited. It is not a substitute for a more detailed excavation.

(ii) RECTANGULAR TRENCHING SYSTEM OR VERTICAL EXCAVATION

One of the popular methods in excavation lay-out is the rectangular trenching method. Wheeler calls it as "Substantive trenches" since they are not tentative cuttings but regular method with definitive objective. This is useful when the area of dig is small and the objective is more to know the vertical sequence of cultures than to have to fuller picture of each and every phase. This method is also useful for cross trenching a line of fortification to correlate its stratigraphical sequence with that of the enclosure within. This method was adopted in Harappa to establish the stratigraphical relationship between two cemetries far away from each other.

Generally, in this system a rectangular trench of say 10′ x 8′ or 30′x 20′ may be laid out, lined with two parallel rows of pages every one metre. The pegs on one side may be numbered as 0, I, II,III,IV and so on whereas the corresponding pegs on the other side as 0′, I′,II′,III′,IV′. If in the course of excavation it is felt necessary to extend the trench backward from zero, the pages of the extended sides can be marked A,B,C,D of one side and A′,B′,C′,D′ on the other. The pegs should be diagnolly planted with a central nail at the top which marks the correct measuring point. The peg line acts as the datum line for all measurements

(ii) Rectangular Trenching System or Verticle Excavation

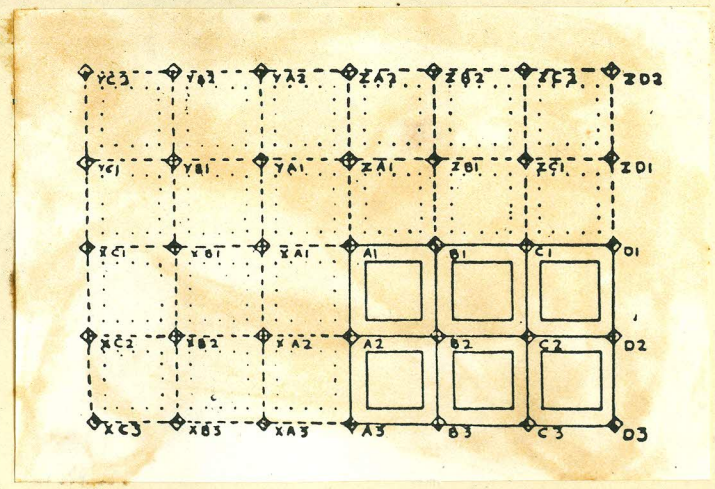


in recording acts the antiquities. The actual excavation should be done about 10 cms. inside the peg line on all sides. In fact, the actual area to be excavated should be marked with the string lines all around. Digging should not be extend upto the peg line but should stop with the cutting line. This is done in order to keep the pegs and the peg line undisturbed throughout excavations. The peg line is also marked by a running string fairly nailed to the ground. The peg line service as the datum line for all measurements.

Another important feature in this method is to leave a number of intermediarybalks at regular intervals - say after every 3 metres. This helps having proper control over the digging and correlating the sections besides facilitating access to different parts of the trench for the supervisors and labourers.
Recording the artefacts and other features in the excavations is done by what Wheeler calls as the three dimensional measurement. The three measurements serve to pinpoint the exact location of each object found in the trench and help record the stratigraphical position. Longitudinal measurement records the distance along the trench from the nearest peg. An angle measure is used in Sucha way that one arm is held along with datum string and the other goes at right angles inside and perpendicular to the object. The vertical or perpendicular line is obtained with the help of a plumbob suspended over the drawn a Comparison between the vertical and horizontal excavations and stated :

"Vertical excavation along with supplying a key to the length of an occupation, can not be expected to reveal, save in the most scrappy fashion, the significant environment economic, religious, administrative. In other words, it leaves us in the dark as to these very factors which fit a past culture of civilisation".

(iii) Grid System or Horizontal Excavation



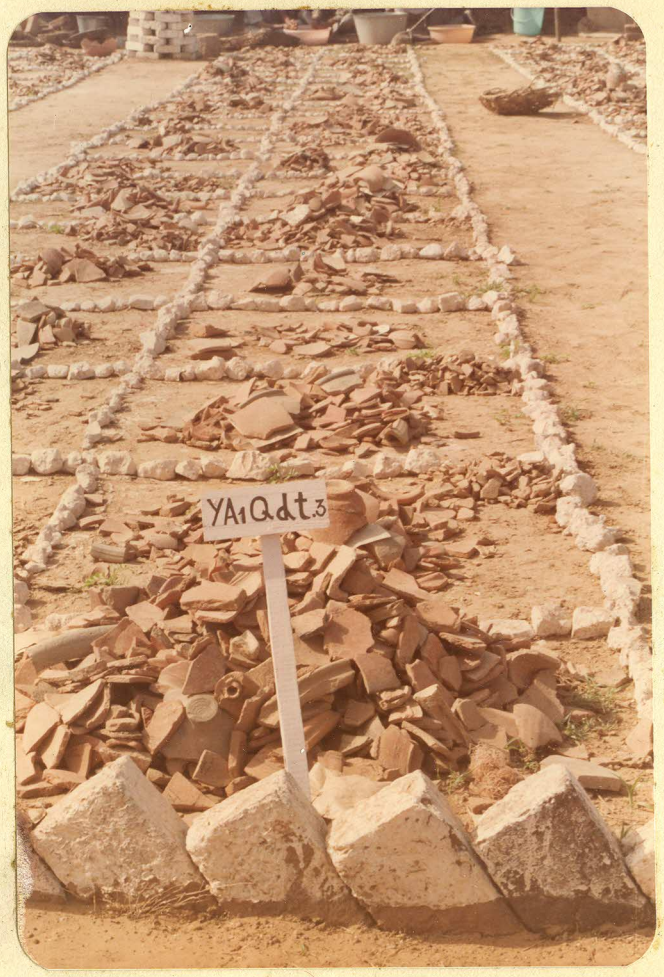
Mohenjadaro could never have taken its high place in history of urban development with its rectilinear stret plan, elaborate drainage had it not for the far-reaching horizontal excavation to which it was submitted. But it should be boted that vertical and horizontal excavations are not mutually exclusive but complementary. The former should precede the latter. The vertical dig reveals the stratified deposits and funishes the sequential framework whereas the horizontal dig reveals the contents of the deposit.

(iii)GRID SYSTEM OR HORIZONTAL EXCAVATION (Fig.3):

For horizontal or area excavations two ways of investigation or lay-out area followed-one by the grid system in which a series of squares of uniform size is laid out and the other is stripping complete area without the aid of as square divisions or balks. The former method was popularised by the British archeologists including Wheeler and Kenyon. But the latter method open stripping has gained popularity in recent years especially in the U.S. The grid divides the area into a series of exact squares which are parallel to the site baseling (or latitude) and to the datum line (or true meridian longitude). The Surveyor lays out the metric grid parallel to the datum line. This orientation is necessary because it enables the archaeologist to describe accurately any point on the site in relation to the north-south axis. The size of the square boxes will depend on the depth to be excavated. Normally, 5 to 10 metres square will be reasonable. The squares are separated by the balks (unexoated strips of partition) of uniform width of 50 cms, or 1 mt. depending on the nature of the soil. The balks are to be retained till the end of the excavation work because besides providing access to different boxes they preserve four vertical

RECORDING ANTIQUITIES - A STANDARD FORMAT

DATE
SITE
LOCUS —— IN RELATION TO GRID
DEPTH
LAYER
OBJECT
MATERIAL


YA1Qdt3

sections whcih establish relation between the layers and features. They help the excavator in the correlation of stratigraphy from the different parts of the sites. Ultimately, the balks have also to be removed if necessary as they should never be allowed to obscure of cover any structual features or other important details. Besides the primary balks, secondary balks, wherever necessary, to have a section across the structures whithin a square, can be had.

After the grid is laid and the peg marking done accurately, they can be convenintly named by means of letters on one direction and by numbers in the other. This would enable us to designate and mark the square individually as A1, A2, A3, etc. or B1, B2, B3 and so on. The peg at the junction of four squares will have four diffrent names for its four faces A1, A2, & B1, B2.

A great advantage in this grid system is that is lends itself to expansion in any direction without hampering the basic datum line of sections, as shown in Fig.2. Therefore, this is a very convenient system to excavate a

object. This provides the lateral or inward distance of the object from the datum string; and the third measurement records the depth of the object from the intersection of the inward arm and the vertical plumbob line. A double purpose would be served if we attach the plumbob to a measuring tape and suspend it over the object. It would mark the intersection with the inward arms as well as indicate the vertical depth of the object. The ultimate measurement recorded would have three dimensions, the longitudinal,the horizontal or lateral and the downward or depth. The measurement of each object can be recorded thus; V1.2 x .50 x 2.5. The first unit represents the

peg number and the other three represent the three measurements. The envelops into which the antiquities are kept or he lable thereof should contain these measurements so that at any time their exact location and their stratigraphical position can be known without doubt or ambiquity. With the help of the measurements we can reconstruct the location of the objects according to the plan and according to the strata. The same method of measurement is applied to plot the structures and other features that are discovered in the excavation.

The trench system described above is suitable more for vertical excavation than horizontal excavation; one of the defects in this system is that it does not lend itself to laterial expansion. Expansion is feasible only on the longitudinal direction. To that extent the excavator's freedom is restricted. Secondly, the scope of getting fuller picture of material culture of a phase is certainly, the scope of getting fuller picture of material culture of a phase is certainly limited. Its great advantage is that within a comparatively shorter time and with less labour and expense, the excavator can obtain the vertical sequence and also a few glimpses of the meterical culture. Wheeler has vast area or a town site and very part of it could be pollted and intergreated in the over-all site grid.

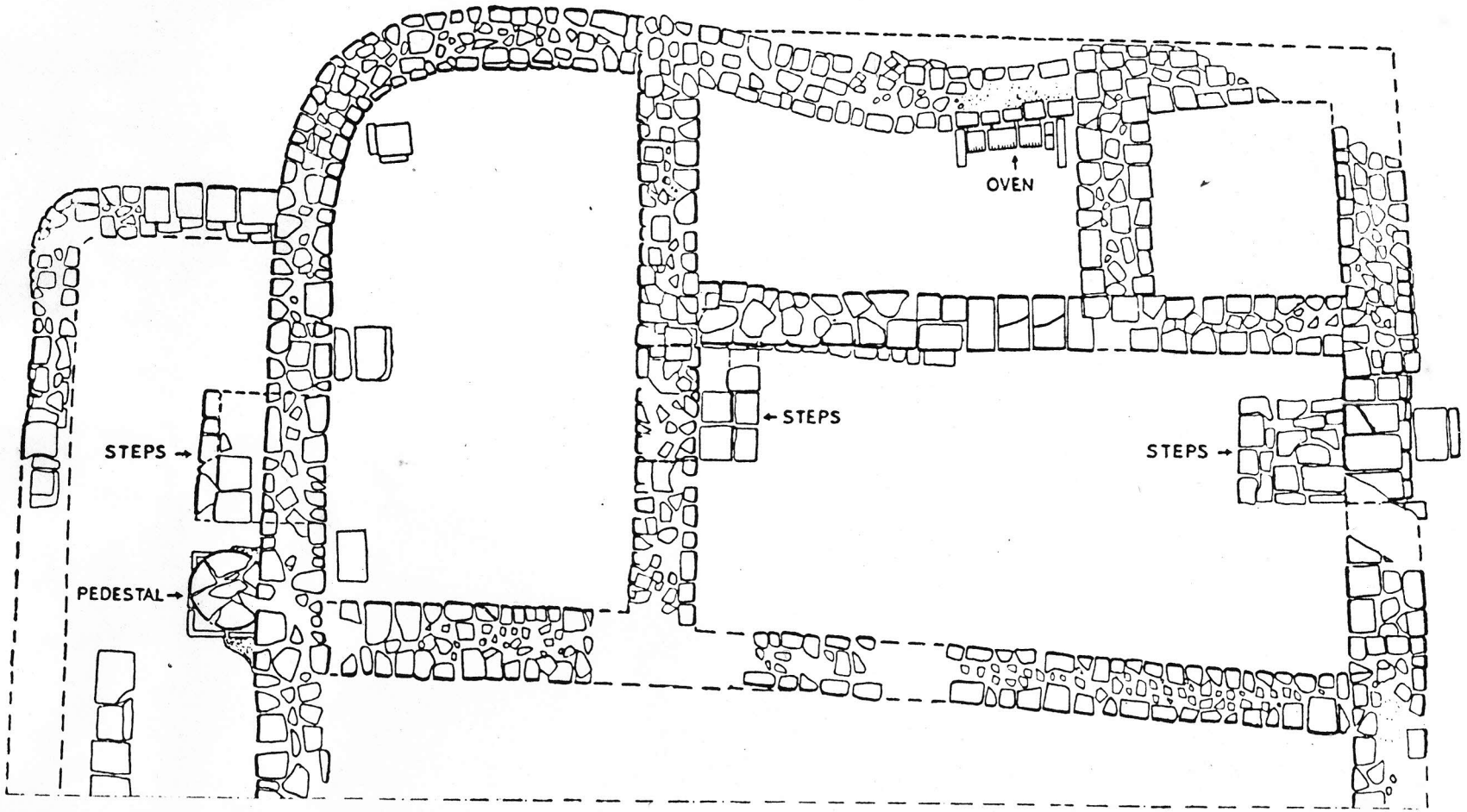
EXCAVATION AT PURANA QILA

PURANA QILA, DELHI

EXCAVATED STRUCTURE

(GUPTA PERIOD)

1 0 1 M.



EXCAVATION AT PURANA QILA. DELHI

The discovery of purana Quila as a potential for location of burried cultures was accidental.

A.S.I.B.B. Lal had accidentally found some pieces of painted graware (PGW) and realized that this would be related to the other sites where PGW was found.

The escavation was carried out by B.B. Lal, B.K. Thapar and M.C. Joshi, assisted by Sarvashri K.S. Ramachandran, W.H. Siddiqi, J.S. Nigam, N.C. Ghosh, B.M. Pande and S.B. Banerjee. Besides the imparting of field training to the students of the school of Archacology, this season's work had two objectives in view: (i) to expose the pre-Mauryan strata including the regular horizon of the Painted Grey Ware; and (ii) to lay bare larger areas of the already exposed cultural phases.

The excavation not only confirmed the cultural sequence (from the Mayurayan to the Mughal Period) obtained during the previous season but brought to light interesting data about each successive period. Trial digs at three different areas of the site fialed to yield the regular cultural horizon of the Painted Grey Ware. Nevertheless, the occurrence of some sherds of his Ware, some of them used as hopscotches, did indicate that the regular deposits of this Ware must have existed hereabouts.

The Mauryan Period was marked by the use of the N.B.P. Ware. In the area under excavation, the deposits of this Period were found to verlic the natural soil. The structural remains were represented by (i) a series of hearths fire place (Fig.1) and a

of two of the rooms, which were fully exposed, was 2.40 m.sq. and 2.50 x 2.25 m. The width of a doorway was also available at yet another point.

Amongst the notable finds of this Period mention may be made of : (i) a small spounted anthropomorphic pot (Fig-8) (ii) a large number of terracotta plawques (Fig-9) showing yakshas, yakshis dives, mithuds and a female luteplayer (Fig-10) besides animal figurines; (iii) beads; (iv) bobe points; and (v) a seal and several sealings in Brahmi script, some of whcih read; patithakasa, Svatigutasa, Usasenasa, Thiyasa, etc. (Fig-11). The last one may be a transliteration of the Greek name theose. A peculiar sealing, of whcih four specimens were found, bore only one Brahmi latter pe and four symbols (Fig-12) .

The Saka-Kushan Period was sistinguished by the remains of regularly-built structures of baked bricks (Fig-13). Evidence of the use of mud-bricks was not wanting. The size of two rooms, whcih could be exposed fully, was 1.80 x 1.80 and the width of doorways was 75 cm. Traces of a brick-paved floor were also noticed inside a house. The size of most of the baked brocks was the same as reported last year, the only variation being 38 x 23 x 5 cm, or 37 x 27 x 5 cm. The associated finds of the period included : (i) sherds of stamped pottery; (ii) fragments of a votive tank; (iii) skin rubbers; (iv) terracotta figurines including an impressive human head wearing a decorated cap (Fig-14); (v) a plaque showing three elephant-riders (Fig-15) (vi) a small piece of an ivory handle; (vii) crucibles; and (viii) a few copper coins of the Kushans and the Yaudheyan.

The Gupta Period was represented by structural remains built of baked bricks robbed from the houses of the preceding period

(Fig-16). Of such remains, the most remarkable was a structure showing three to four phases of construction. Initially, the building was oblong on plan with a partition wall. Subsequently, a verandah or a room with a rounded quoin was added to the front (Fig-17). In the third phase, floor-levels were raised, steps were provided and two lonitudunal partition-walls were erected inside. A brick pedestal (height 60 cm.) with a stepped base was built against the wall on one side of the entrance. The exact purpose of the pedestal, however, could not be ascertained. During the last phase, a new rerandah was addes on the front side, earlier floor-levels were considerably raised and steps were added. Below the debris of the last phase were found a sealing in the Gupta Brahmi and a gold-plated coin (Fig-18) of the archer type with Shri Vikrama legend on the Imperial Guptas, Other antiquiters of the Period included: (i) a few terracotta human figuringes (Fig-19) (ii) a broken shell bogle with decorative varving; (iii) a small, damaged mukha-linga in Madhura sandstone (Fig-20); (iv) moulded and painted pots; and (v) sealings (pl.XXIV,8-10) reading Sri Makarasya, Sri Aryyavama (?) with a Sassanian fire altar above and Sri Gudhadsah bering a set of foot-prints above.

The excavation was resumed (1970-71) at Purna Qila for the thrid season. The objective of this season's work were: (i) to impart feiled training to the students of the School of Archaeology; (ii) to expose the structures of the Mughal Period; and (iii) to acertain the cultural content of the site prior to the third/fourth century B.C. For this purpose two separate areas (Fig-25) were taken up to the south-east and south of the Qila Kuhana Mosque.

The excavation reveated two distinct structural phases of the Mughal Period. Belonging to the first phase were:(i) remains of a stone-flagged court (Fig-26) and an adjoining large brick structure (Fig-27) with about 1.2-m thick wall and houses with lime-plastered floors and sunken basins. Most of the structures, however, were built of re-used bricks and rubble, occasionally finished with lime plaster. The structures of the second phase were representated mainly by a hammam-complex (Fig-28) Structurally, it consisted of an underground chamber, showing five rows of dwarf piers of bricks, plastered with mud and bearing marks of burning and with a semi-circular projection towards its eastern side and two other side rooms and an overground drain and parts of floors. Belonging to this phase was also a house with a square cistern (Fig-29). In the construction of both these structures, lakhauri bricks were employed, although rubble in lime mortar was used in the walls of the hammam.

Notable antiquities from the deposits of the Mughal Period consisted of fragments of coloured tiles, terracotta finials (Fig-30) with numbers incised and stamped designs and sherds of Glaxzed were, Chinese Porcelain (Fig-31), Celadon ware and a paper-thin deluxe grey ware, pieces of glass bottles, terracotta lamp-stand and one gold and several copper coins. The gold coin (Fig-32) bearing a dipastambha (?) flanked by asankha and chakra smbols on the reverse has the following Nagari legend on the obverse; 'Sri Singhana-Kava (...) Devi'. Other important coins included the issues of some of the Mamulik and Khalji Sultans and of the East India Company.

A board of twenty coins (Fig-33) containing the issues of late (medieval) Rajput and early Sultanate rules, was significant find

FIG: 3

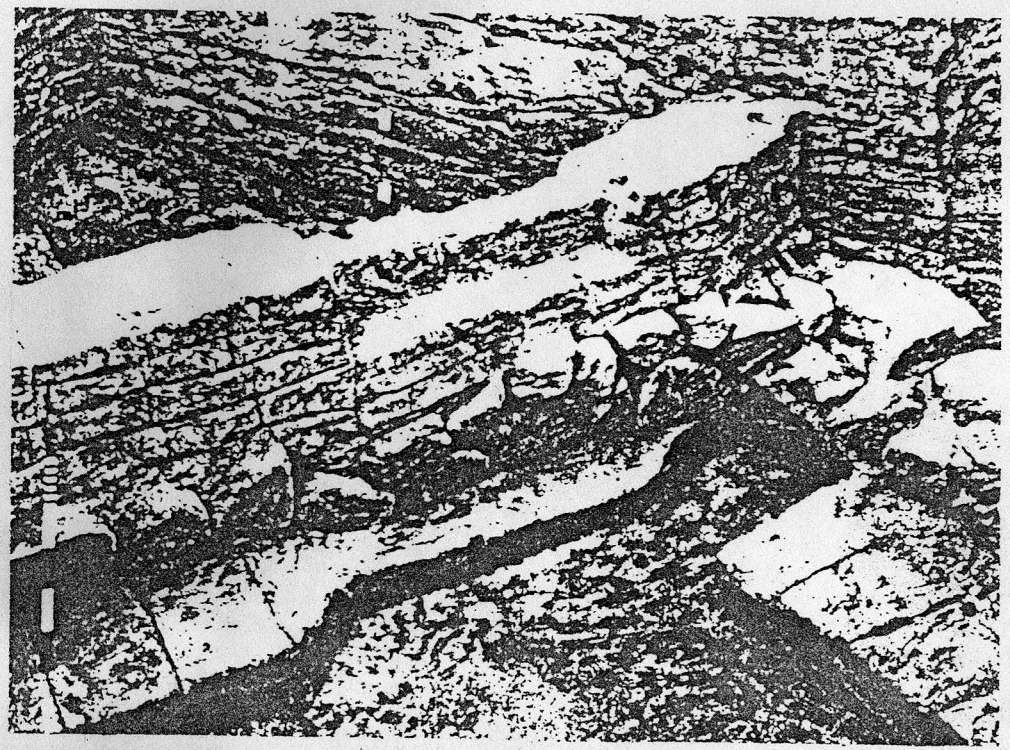
BAKED BRICK DRAIN (Maurya Period)

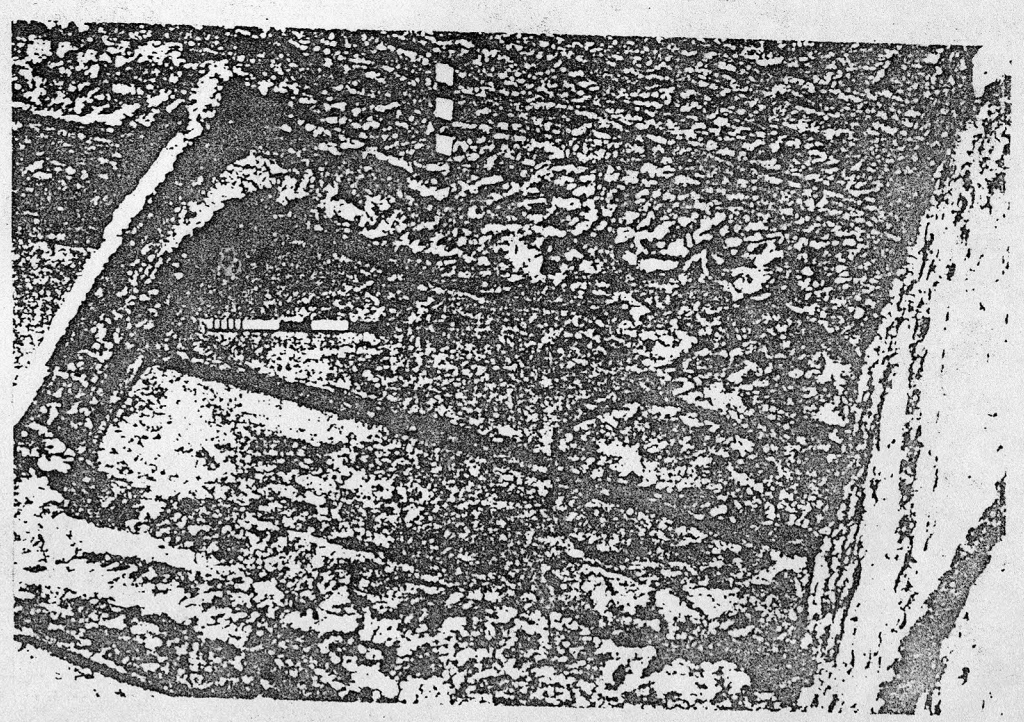
FIG: 1

SERIES OF HEARTS (Fire Plaec) (Maurya)

FIG. 2

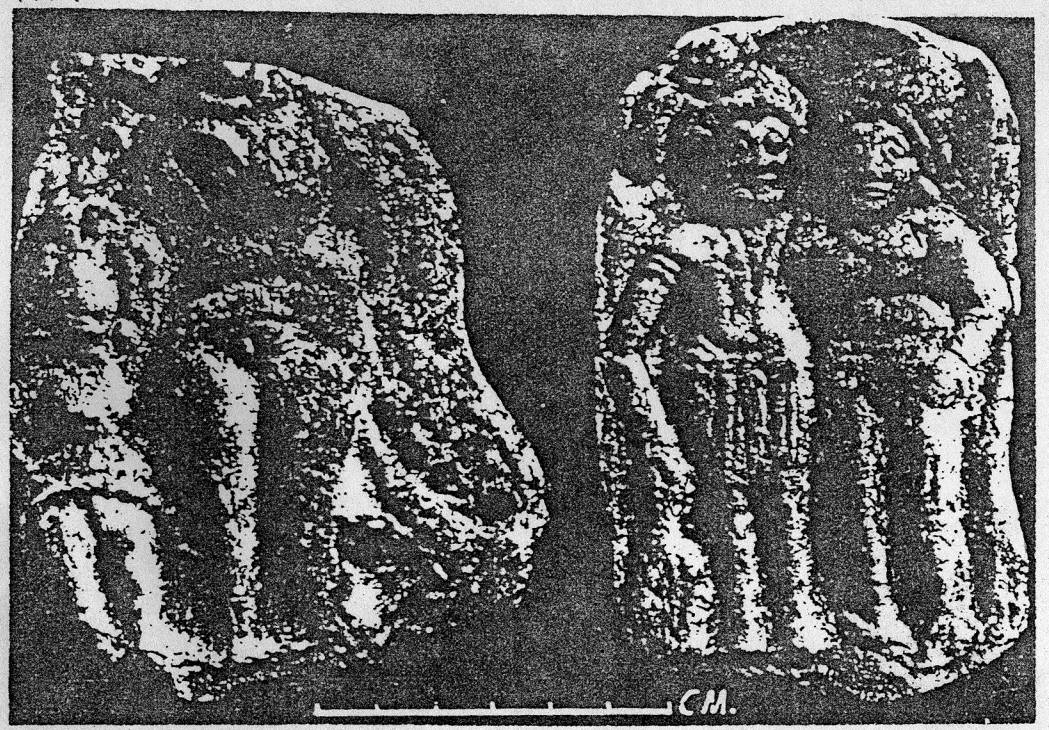
MUD AND BRICK STRUCTURE (Maurya)





DAUB AND WATTLE STRUCTURE

FIG:9



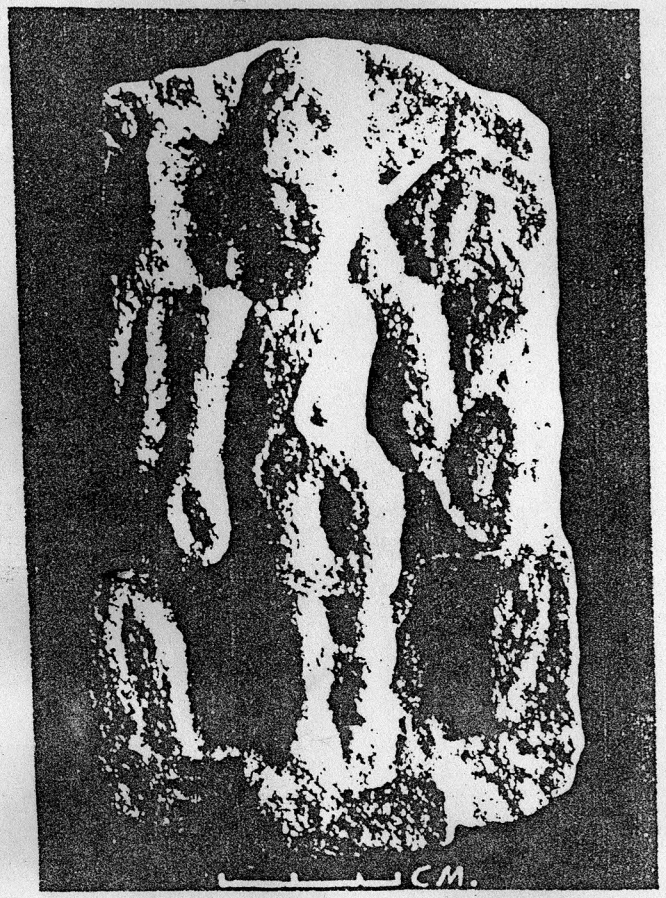
TERRACOTTA PLAQUES (Sungha Period)

FIG: 10

TERRACOTTA FLUTE PLAYER

FIG: 8

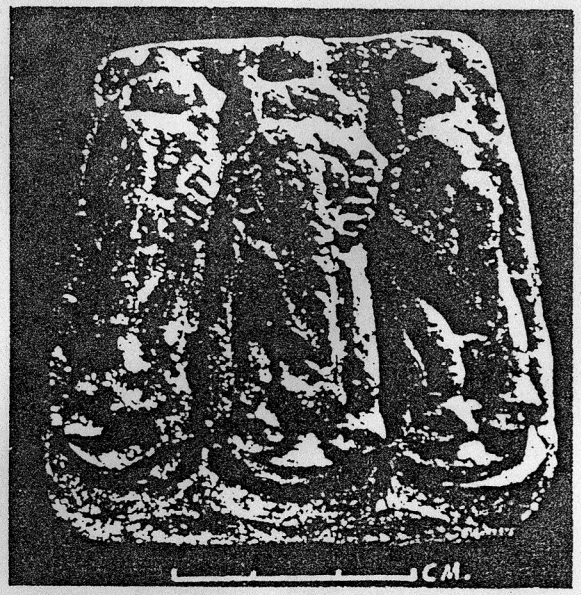
ANTHROMORPHIC POT (Sungha Period)



VISHNU FIGURE SANDSTONE (Rajput)

TERRACOTTA HUMAN HEAD (Mughal)

FIG:15



TERRACOTTA PLAQUE

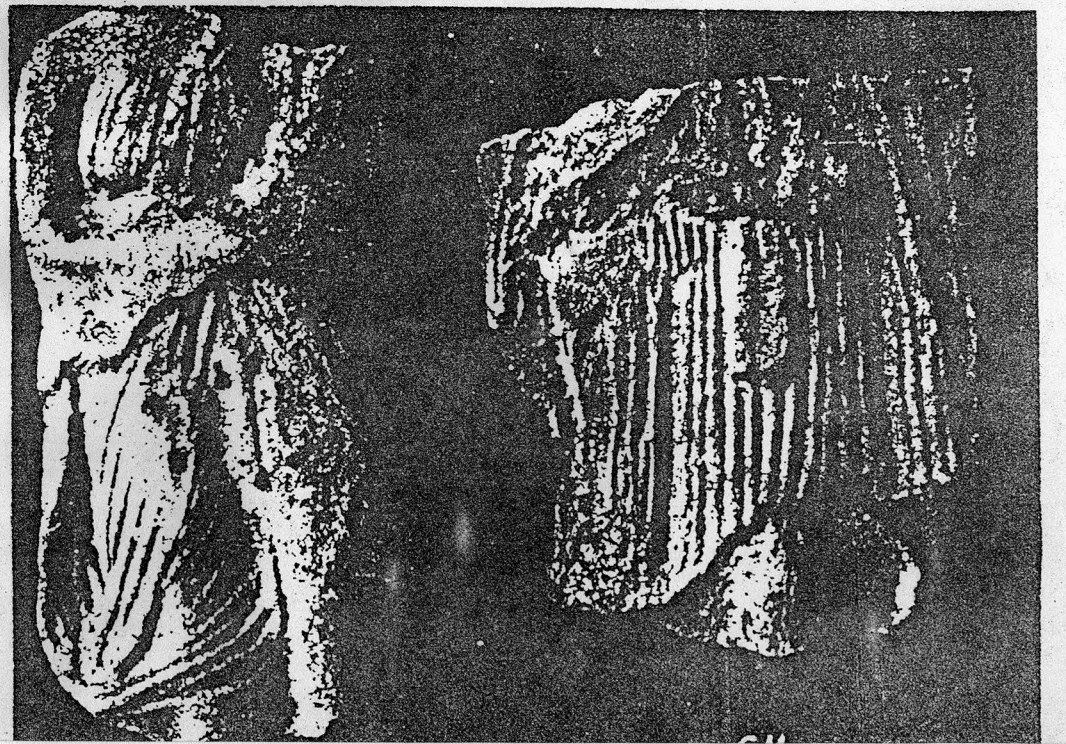
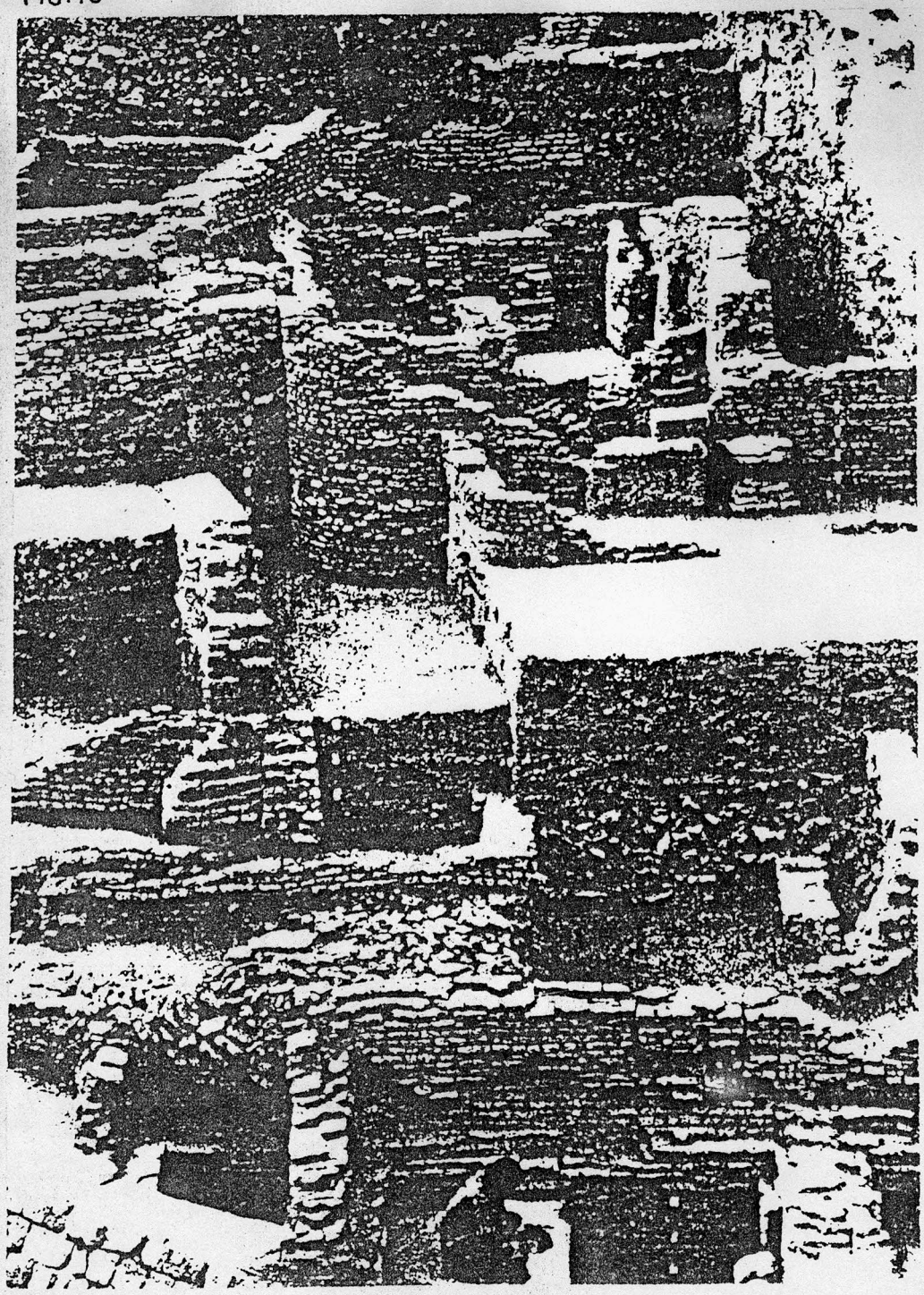


FIG:14

HUMAN HEAD (KUSHAN PERIOD)

TERRACOTTA COSTUMED FIGURES (Gupta)

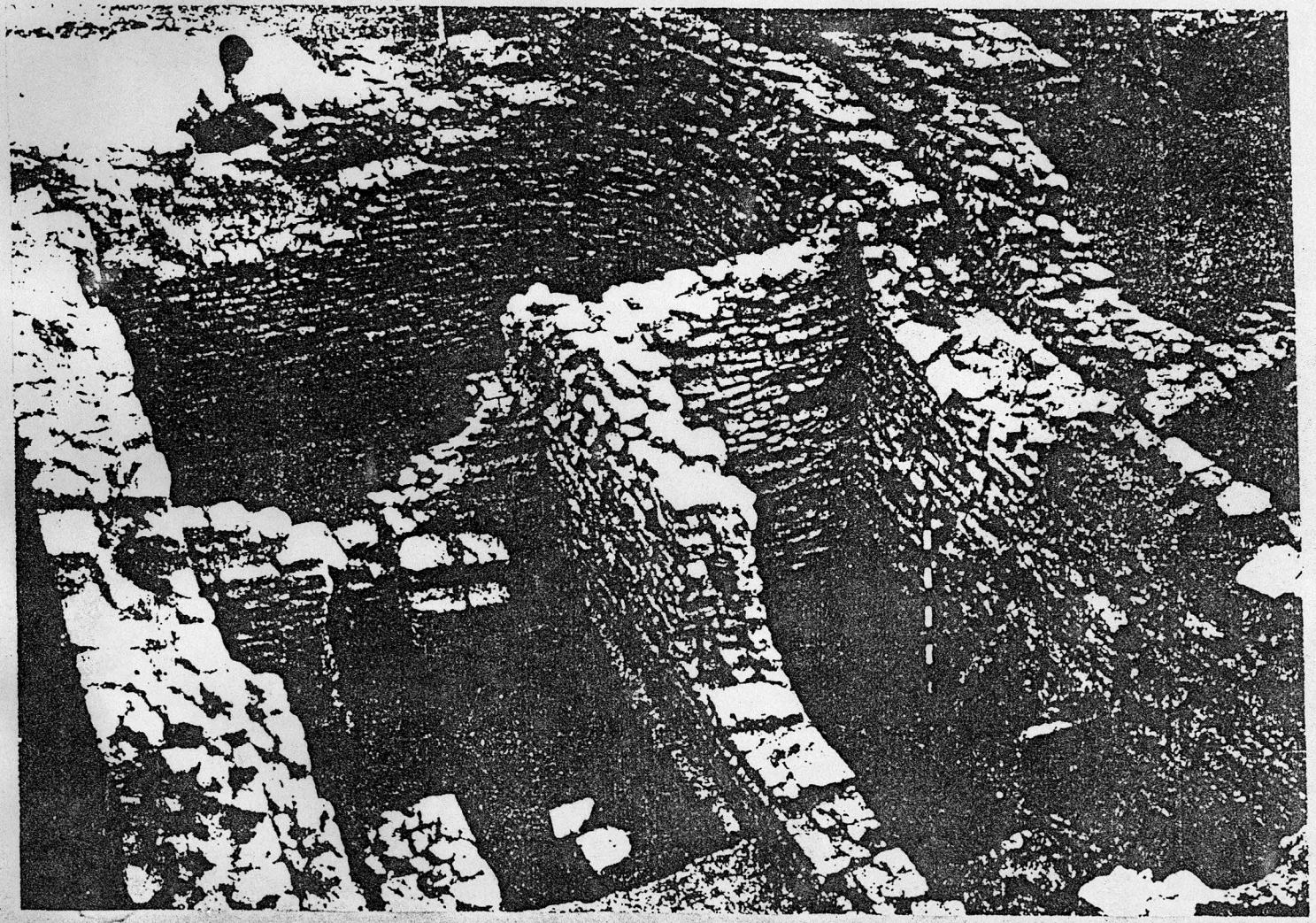
FIG:16



PURANA QUILA
Structures of Kushan (foreground)
and Gupta (background)

FIG : 17

FIG: 17

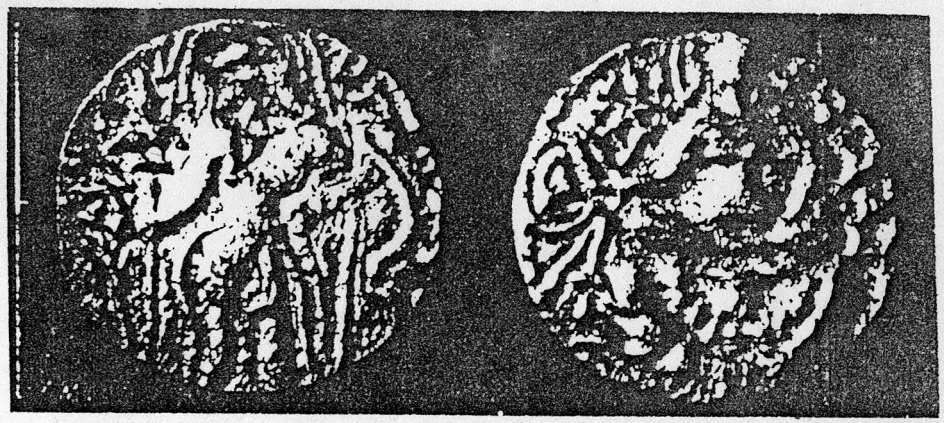


STRUCTURE OF THE GUPTA PERIOD
(Circulated & Rectangular)

FIG: 20

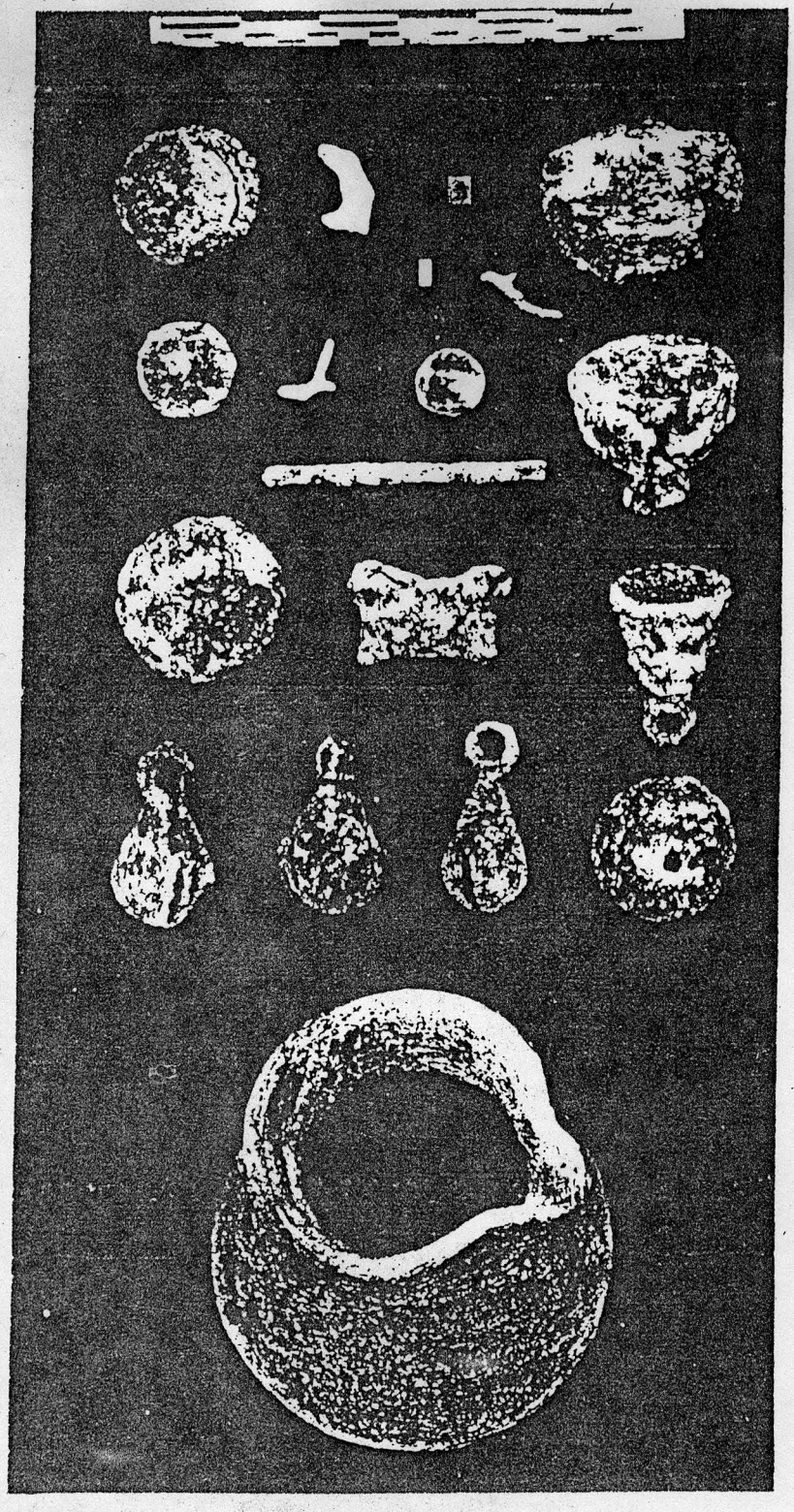
MUKHAINGA IN SAND STONE

FIG: 18



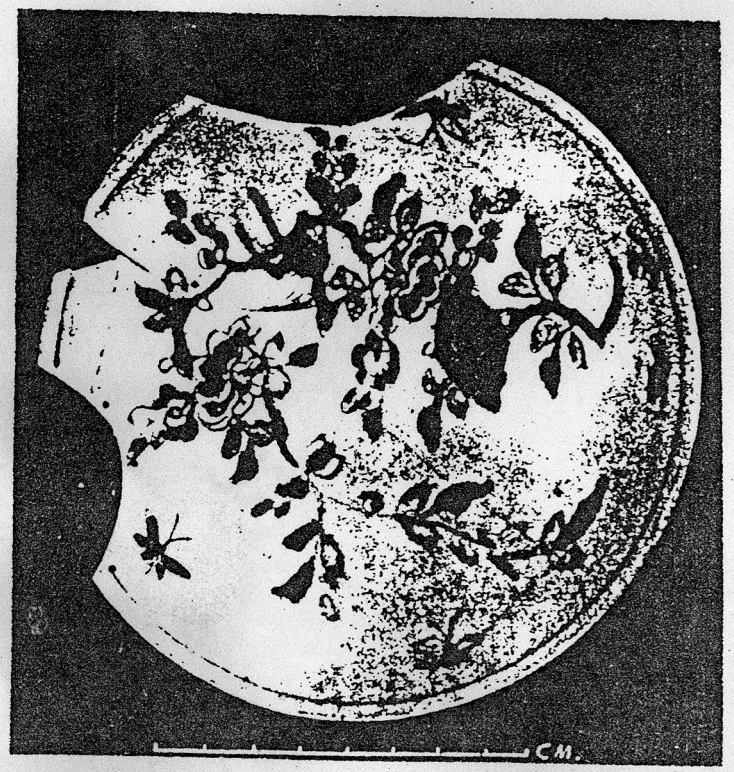
GOLD PLATED COIN Shri Vikrama Gupta

FIG: 22, 23

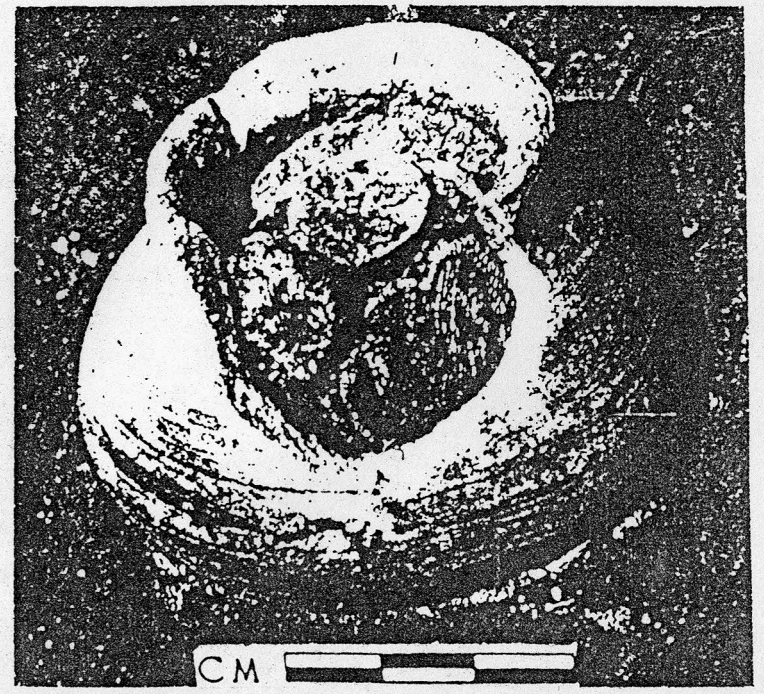


PRANALA SPOUT Gupta
POT AND ITS CONTENTS (Rajput Period)

FIG:24



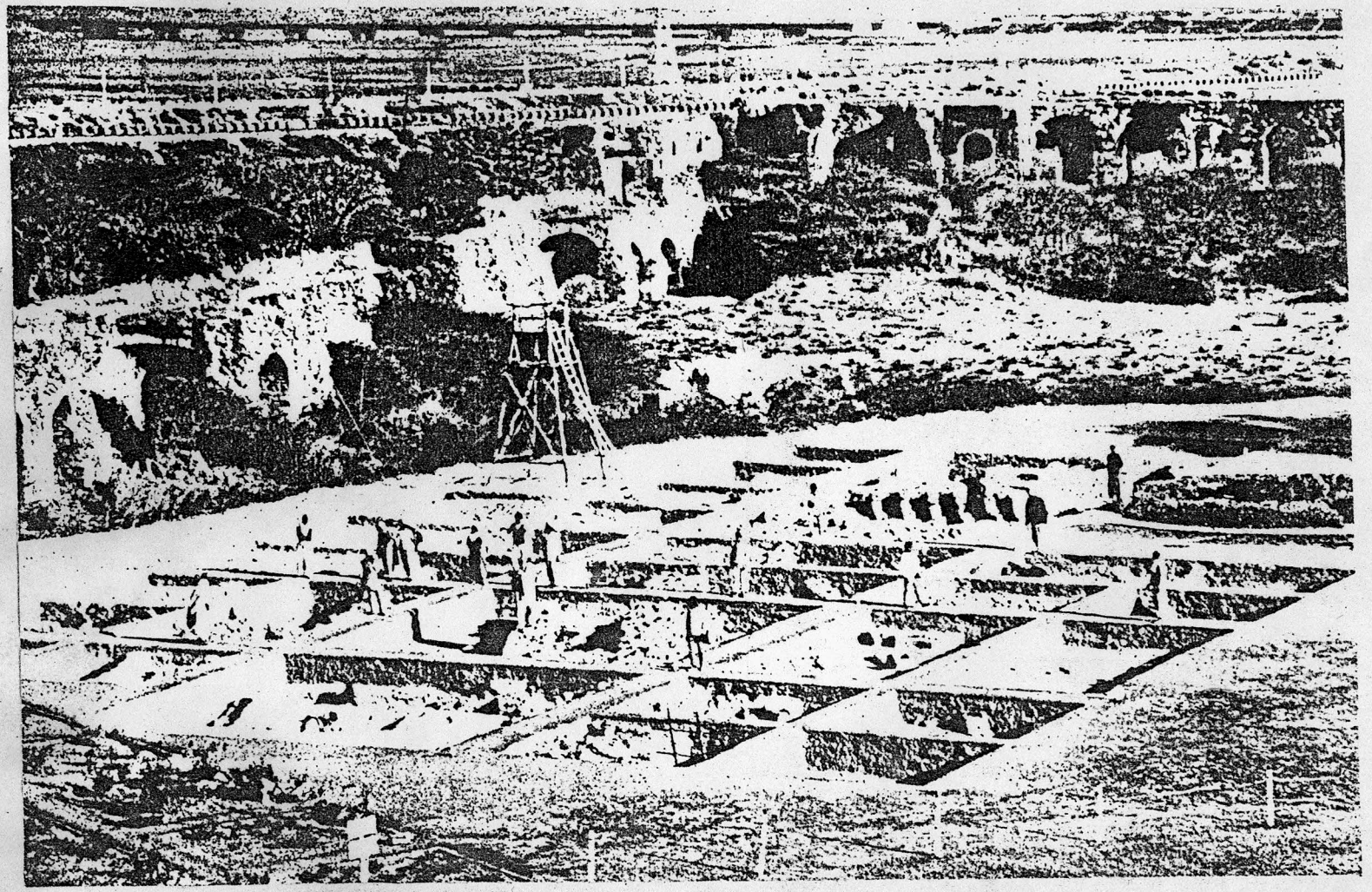
a



b

PURAN QILA : a. CHINESE PORCELIEN
b. COIN HOARD Rajput early structure

FIG:25



PURANA QILA : VIEW OF THE ESCAVATED TRENCHES

FIG:26

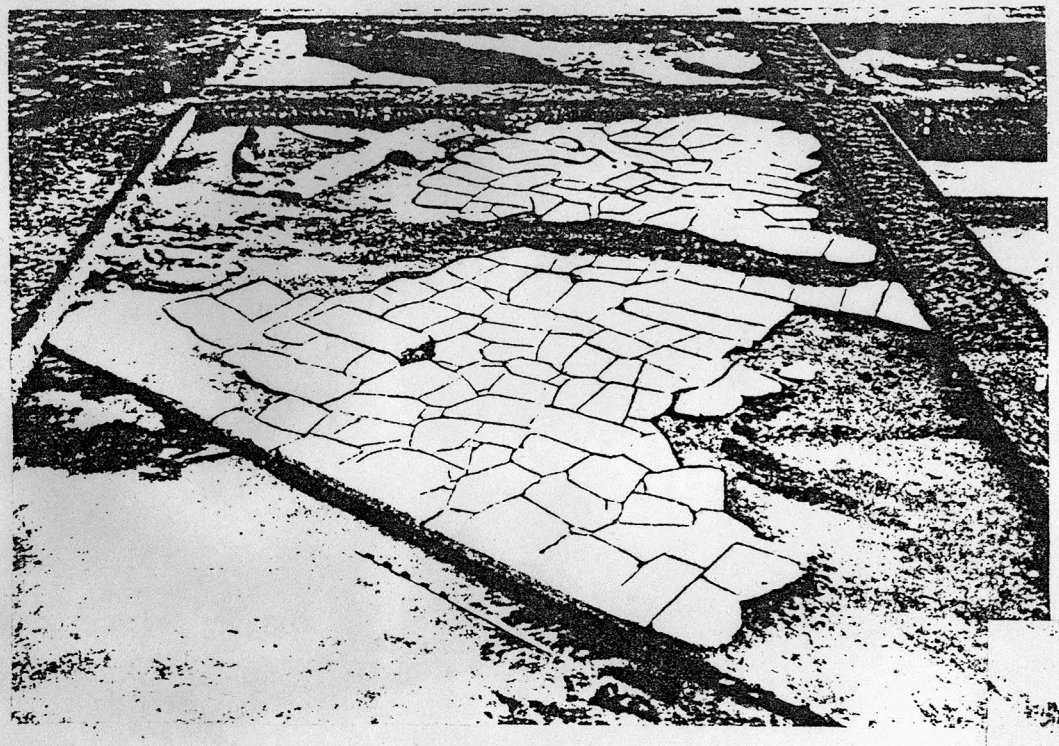


FIG 26

FIG:27

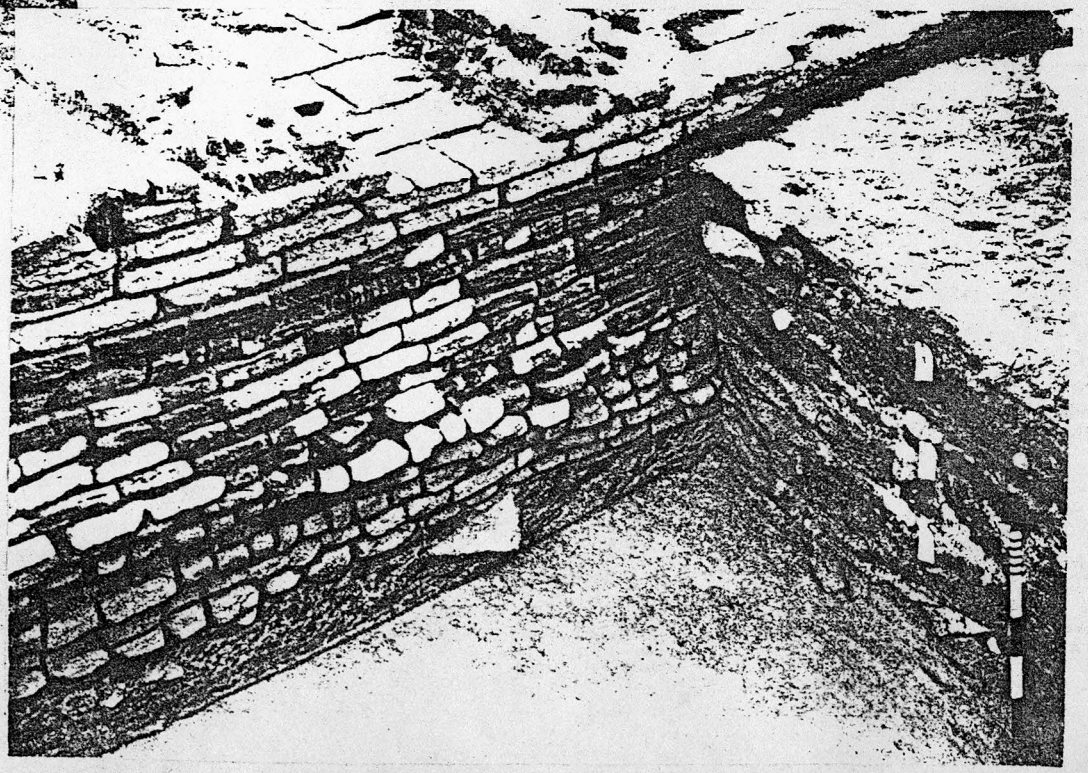
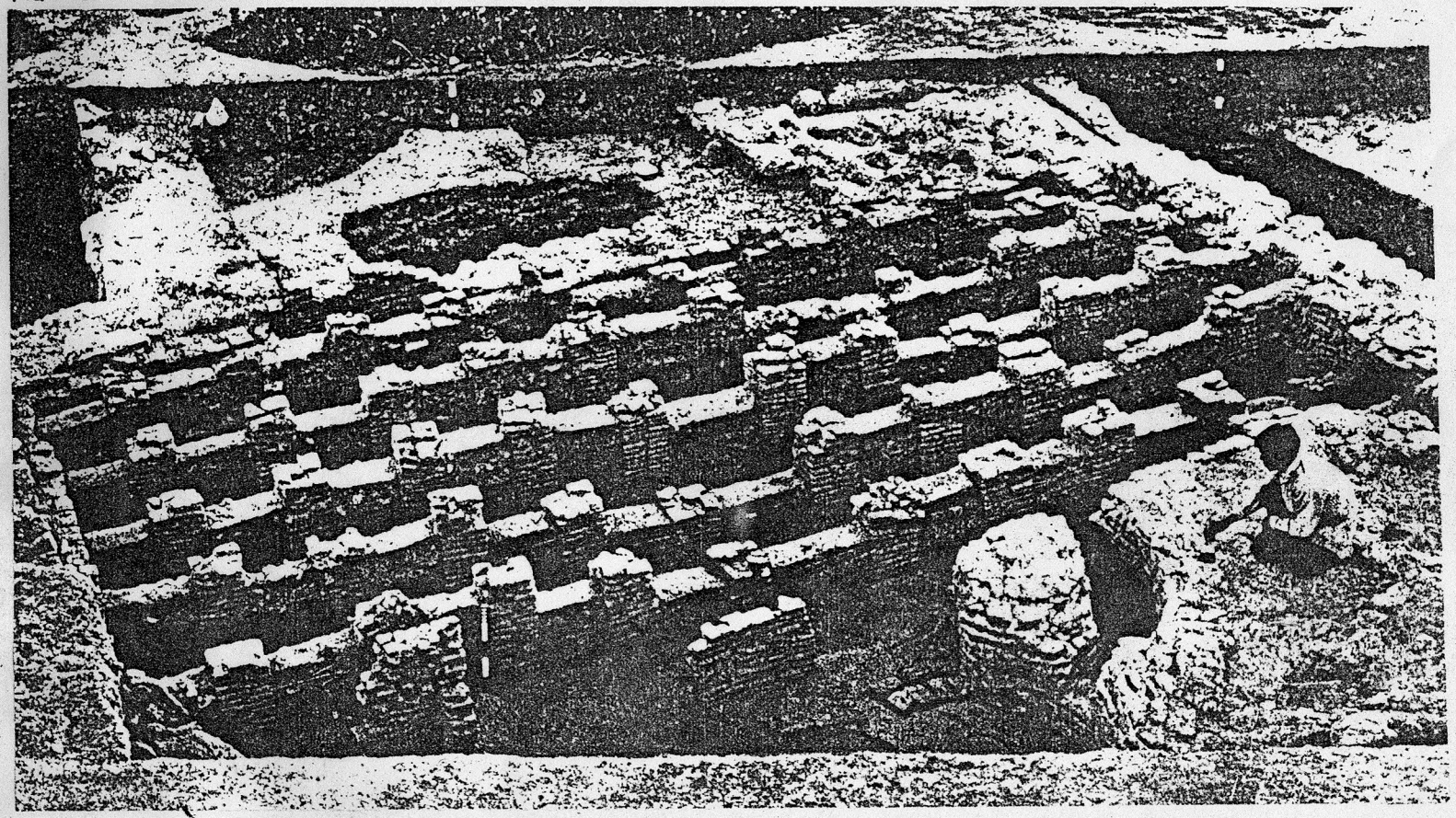
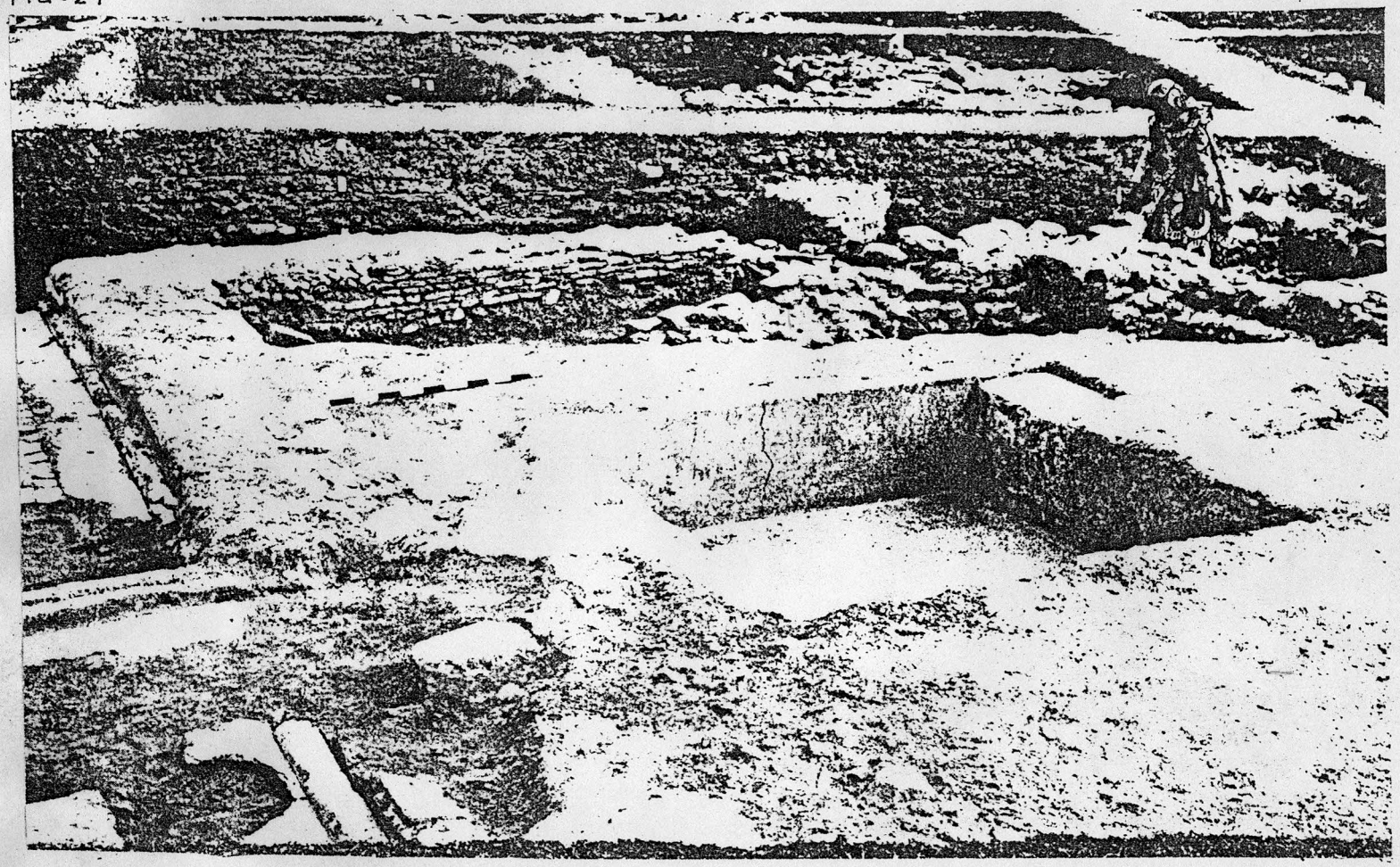


FIG: 28



PURANA QILA : HAMMAM MUGHAL PERIOD

FIG : 29



PURANA QILA : HOUSE WITH CISTERN MUGHAL PERIOD

TERRACOTTA FINDS MUGHAL PERIOD

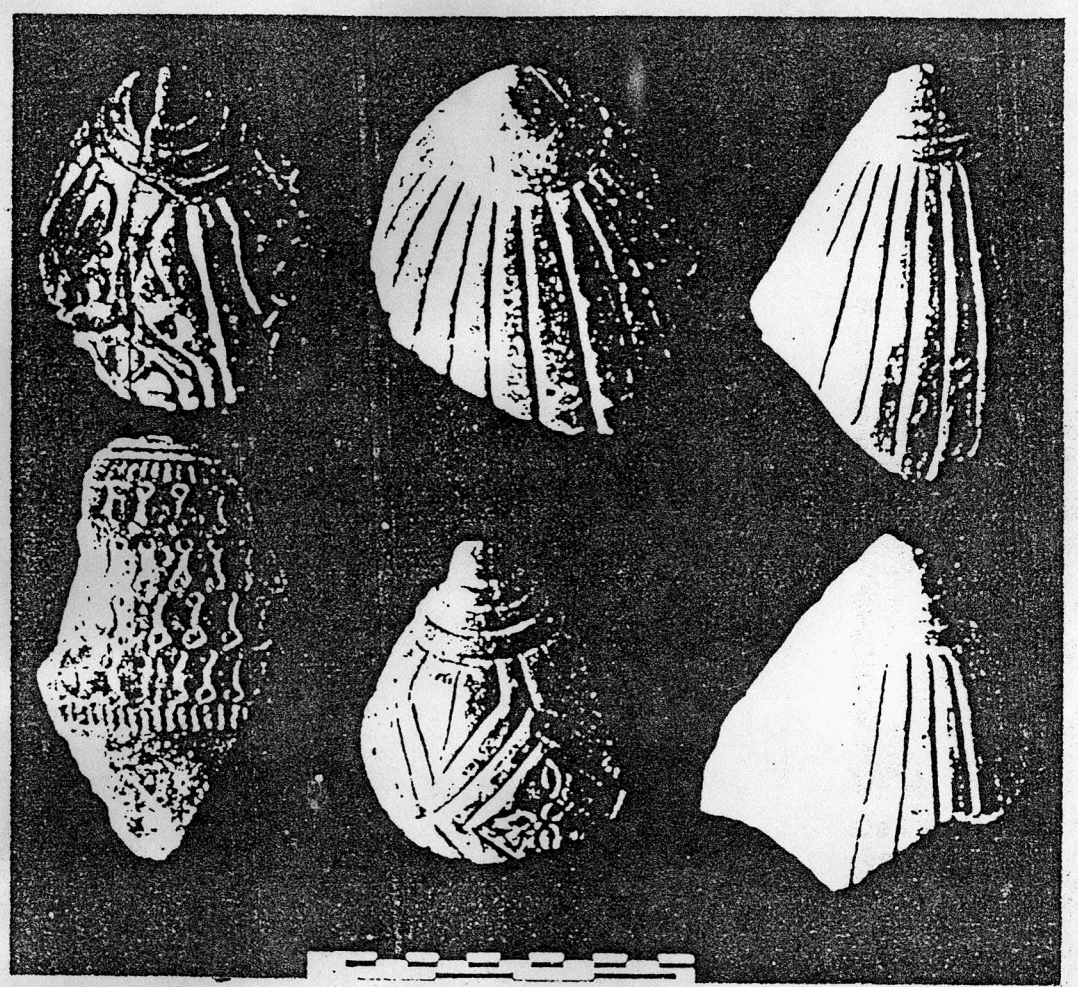


FIG:30

FIG: 32

GOLD COINS MUGHAL

PAINTED POTTERY

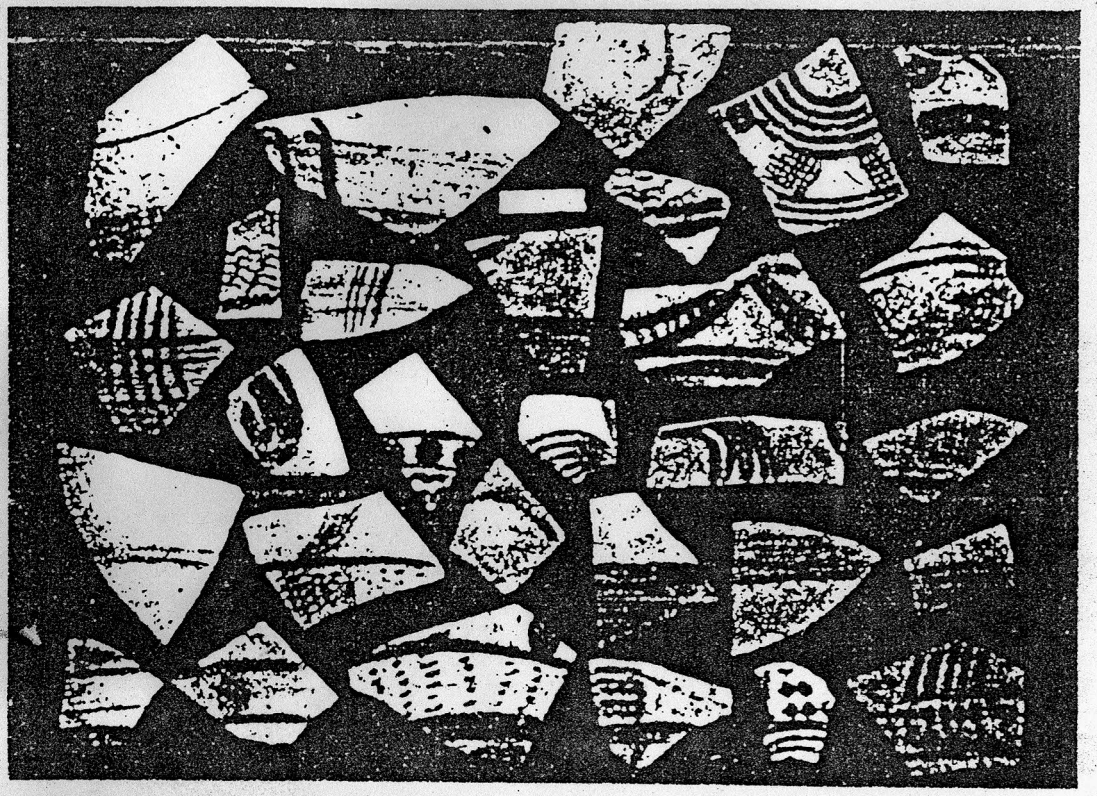
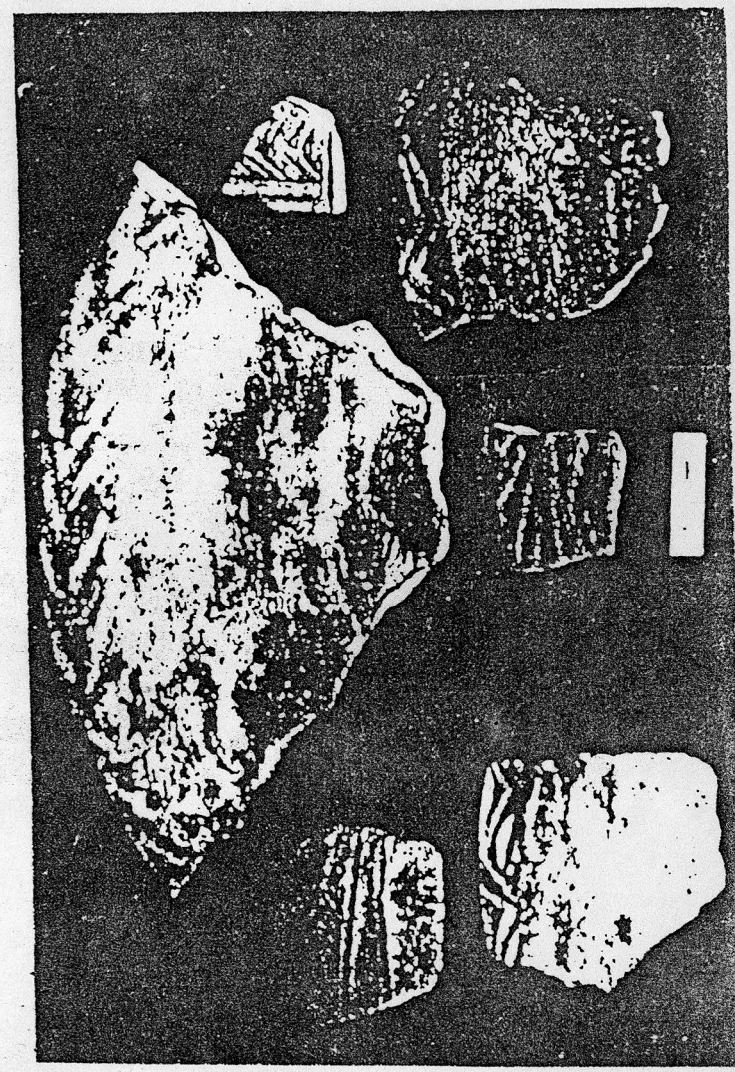


FIG: 31



INCISED POTTERY

LATEST IN ARCHAEOLOGICAL FINDINGS

LATEST IN ARCHEOLOGICAL FINDS

II CENTURY A.D. SITE NEAR QUTAB MINAR

STONE AND CLAY HEARTH

DATING BACK TO THE TIME OF MOHD. KHILJI
ARCHELOGISTS SUSPECT THEM TO BE SOME
SORT OF PRISON FOR CRIMINALS

Since the Archeologists are yet to publish any detail report on the site, it was not possible to get a clearer picture of the various cultural layers in this site, any how for the interest of others I have taken some photographs of teh escavation whcih are shown in the following pages.

CONCLUSION

This project initially was trigerred off due to my accidental interaction with a Archelogical site, but as I progressed with the project, I realized how immensely interesting is to study and decode the hidden mysteries in the layers of the earth. These layers of earth can tell us so much about our ancestors and our past - the layers of earth can actually be read as the pages of a book by an experienced and sensetive escavator.

As this project has beeen extremely interesting and enjoyable for me, I expect some other people will also get interested in this field and do further work in this direction.

POTTERY

THE VOCABULATRY OF AN ARCHEOLOGIST

N.B.P.W.	Northern Black Polished Ware. Pottery which have been found in northern India and have a black coloured polished to it.	600-200 B.C.
P.G.W.	Painted Grey Ware. Found in the Ramayana Sites. Thin Grey pottery with grey painting on them.	1000-700 B.C
Harrapan Ware	Having a particular Texture and Colour.	2000-1400 B.C.
Early Mediaeval Ware		11th - 15th Century A.D.

burnt daub-and-watle structure (Fig.2) (ii) drains baked bricks (Fig.3) of both rectangular (size : 44 x 22 x 6 and 50 x 25 x 7 cm) and wedge-shaped variety (size : 45 x 30 and 17 x 7 cm) the latter perhaps intended to be used originally for the construction of a well or a similar circular structure, and (iii) houses of mud bricks (size : 25 x 20 x 6 cm). A significant feature of the Period was the occurrence of terracoota ring-wells, 75 cm. in diameter. The technique of sinking these ring-wells seems to have been as follows: an oblong pit with a narrow rounded end was dug to the requird depth; the terracotta rings were thereafter fitted one above the other towards thereounded end by a workman standing in the remaining part of the pit; after the completion of the ring-well, the pit was filled up to the brim.

Other finds of the Period comprised: (i) a fragment of a sculptured ring-stone (Fig-4) associated with the mother gooddess; (ii) terracotta human (Fig-5) and animal figurines; (iii) a house-rider wearing armour : (iv) a terracotta seal reading Seyankarasa and another Svati (?) rakhitasa; (v) a sish of the N.B.P. Ware, showing a stamped figure of an elephant on the inner base (Fig.6); and (vi) small rings and disc of baded a gate.

The Sunga Period was represented by three structural phases, of whcih structures of the first two were built of quartzite rubble, set in mud mortar and those of the third were of mud-bricks (Fig-7) (size : 50 x 26 x 6 cm) on one of the walls of the laste mentioned category, a patch of burnt mud plaster, indicative of burning of the structure, was also found. The floord were made of rammed earth, occassionally flagged with mud bricks. The area

A SCULPTURED RING STONE,
Letters inscribed on its back

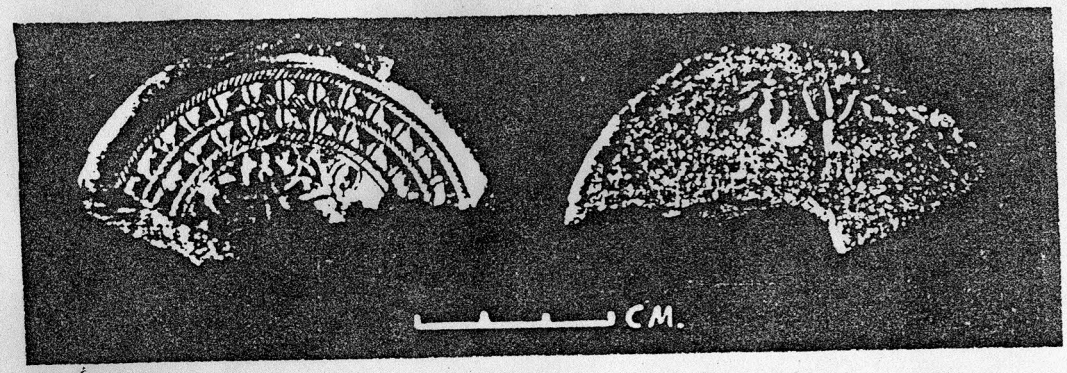
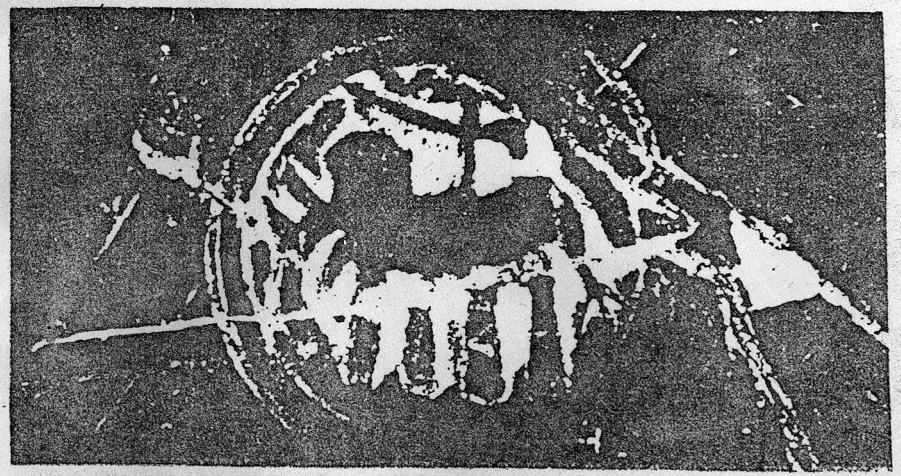


FIG: 4

FIG: 6

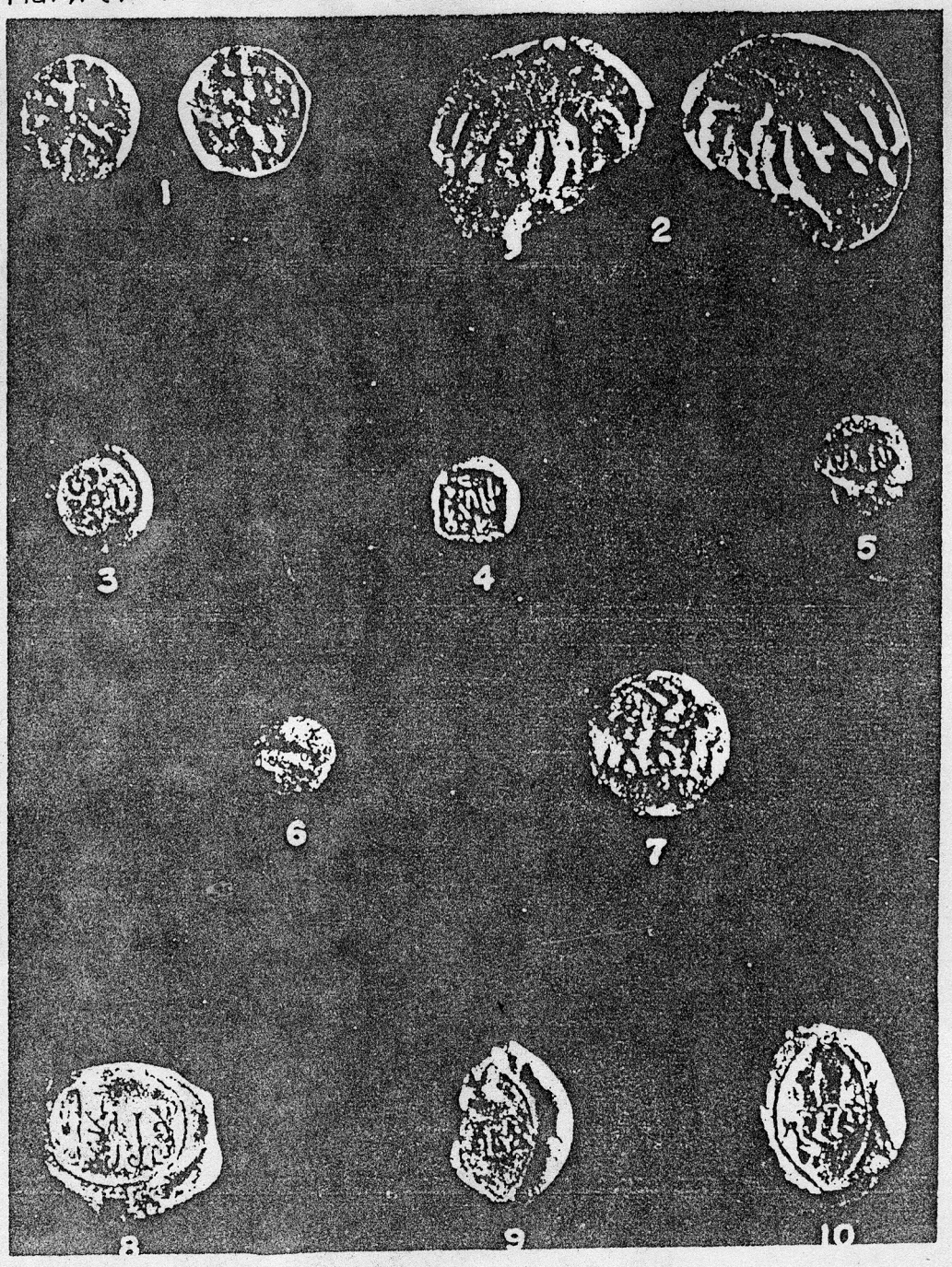


NBP (Northern Black Polished Ware)

TERRACOTTA HUMAN FIGURES (Maurya)

FIG: 5

FIG: II (4-7)



SEALS AND SEALINGS - PURANA QILA

from the pre-Mughal levels. This board was found inside an earthern pot in a piece of cloth.

Deep digging at a few places confirmed the earlier known sequence. However, in one of the trenches, in the levels associated with the N.B.P. Ware, a few fine and thin grey ware sherd, closly affiliated to the Painted Grey Ware, and fragment of an offiring stand (?) in red ware were found of the interesting finds obtained from the deep digging, mention may be made of a circular seal with early Brahmi characters, a broken terracotta plaque of the Sunga Period, bearing a representation of Lakshmi and a terracotta figurine of a nude headless standing male in Greek style, holding some industinct object in the right hand.

LATEST ARCHELOGICAL FINDS

Just as I was giving finishing touches to my project on escavation and Arecheology, I got the news of the discovery of an Archeological site near the Qutab Minar in Delhi.

I rushed to the site and realized that Archeological work is at the initial stages and escavations are at full swing.

This gave me an opportunity to view more closely and carefully the escavation process.
This site dates back to the 11 cent AD, the time of Muhammad Khilji. The Archeologists have discovered some interesting pieces of pottery, clay tablets, plates, plaques and a fire place.