

The Methods and Recent Invented Tools and Techniques Used in Archaeology for Delicately Preserving the Past for the Future

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Abstract

The present paper attempted to detect the all possible methods used in archaeology and also tries to pick up modern tool which is to some extent less destructive to the archaeological sites in modern time. The methods can be put into three regions: selecting sites, collecting artifacts and ordering the past artifacts. The prehistoric time involves uses of organic and inorganic materials which may crumble to dust when exposed to atmosphere. So, it has also been explained in the present paper about the Ground Penetrating Radar (GPR) which is a Non-Destructive Techniques (NDT). Secondary sources served the purpose to track out all the possible methods. The methods help to discover archaeological sites and artifacts which are then dated by different dating methods and are arranged in an order. Later, the experts may trace about the prehistoric settlement pattern, trading system, religious belief, artworks and social organizations by interacting the artifacts.

Keywords

Methods, Sites, Excavation, Artifacts, Technology, Classification, Ordering, Interactions

1. Introduction

The world is a place of suspense which can be uncovered by layers of layers beneath the soil. Anthropologists have always been interested to know the early cultural pattern of the prehistoric people. This is not an easy task. To do so the different methods, tools and advanced technology have brought a revolutionary change in the field of archaeology. The study of this paper has been oriented by the following objectives:

- To track out all the methods used in archaeology in a nutshell.
- To detect the techniques and tools for identifying archaeological site, to excavate and ultimately to put the artefacts in an orderly manner.

2. Selecting Sites and Survey

The best place for finding the past is not-other than an “Archaeological site”. An archaeological site is a site where the past activity is preserved and it is traced by various things like food remains, structures, humanly manufactured objects and others. According to Jess Beck, “the areas with a large number of artifacts are good targets for future excavation, while areas with small number of artifacts are thought to reflect a lack of past human activity (Beck, 2015)”. A site may be varied from large area to small area and might be classified according to the activities that occurred there (Beck, 2015). There are some effective strategies in order to detect a site.

2.1. Survey

Survey in its simplest form can be defined as a way of walking across a landscape for searching artifacts (Beck, 2015). Survey can be divided into two aspects on the basis of its intensity carried out. One is large scale survey and another one is small scale survey. An intensive survey involves collecting as much information about as many sites possible from the local people or landowners or from the people residing in that area. Survey serves the purpose to know about the previous settlement pattern of the prehistoric people to a great extent. Surveys require a great deal of time and budget. It is not easy to manage and make a balance between these two in order to carry out for a particular archaeological site.

If we want to site an example of survey, then we may put the example of Cache River Archaeological Project (CRAP) which was under the contract of US Army Corps of Engineer. And, Schiffer and John House were the masterminds of the projects to conduct. The project undertook multistage survey programs and testing. The Cache River Basin is approximately two thousand square miles in extent and it took probability sampling strategy in the field survey (Schiffer & House, 1975). The survey helped out to explore many cultural resources, artifacts and predicted uncovered things which were important for the project.

Moreover, in 1967, with a team of eight members, Paul Martin and Fred Plog surveyed 5.2 square miles of the Hay Hollow valley in east-central Arizona and walked over the area at thirty-foot intervals, which helped them to find two hundred and fifty sites (Fagan, 1978).

2.2. Aerial Photography

Aerial photography is the overhead view of the past. Sites can be observed from many directions and altitude at different times of a day and at various seasons (Beck, 2015). Numerous sites have been discovered by using aerial photography. Military photographers have captured much of the world which serves a great

purpose to select a site. For example, in Viru Valley of Peru 315 sites have been plotted by the team led by Gordon Willey. There are many natural marks which can be used as a detector of a prehistoric site like shadow marks, crop marks, soil marks. These features may be meaningless from the ground but are highly visible from air. Roger Agache in Northern France, Antoine Poidebard in Syria, L. W. B. Rees in Jordan, O. G. S. Crawford in England and Sir Henry Welcome in the Sudan and Giacomo Boni in Italy can be called as the pathfinder of the aerial photography.

On the other hand, we can also analyse the private collection of the aerial of photography which was taken by Dr. Pouchin Mould. She is an author and has got interest in archaeology. As she is a flying instructor, she has been taking oblique aerial photography (**Figure 1**) for more than forty years (Lambrick, 2008). She has got collections of the parts Tipperary, Cork, Kerry and also other extend parts of Southern Ireland. The collections include thousands of images and are preserved for future inquiries and research work.

2.3. Remote Sensing

Remote sensing techniques in the field of archaeological research is an important and valuable tool (Rindfuss & Stern, 1998). Infrared films which three layers sensitized to green, red, and infrared detects reflected solar radiation at the end of the electromagnetic spectrum. The different reflection indicates the different cultural and natural features (Fagan, 1978). There are other tools like radar sensors, scanners which is used for this purpose.



Figure 1. This is a picture containing the outline of the enclosing bank of the early medieval ecclesiastical site at Tullylease, taken by Dr. Mould in December 1992. [Source: Lambrick, G. (2008). *Air and Earth: Aerial Photography in Ireland.*]

The sophisticated technology such as satellite is also being used here. The satellite archaeology is now an emerging field of archaeology. It uses high resolution satellites with thermal and infrared capabilities to point out the possible sites of interest in the earth (Bloch, 2013). Satellite can make a 3D image which helps to detect man-made structures beneath the soil. Moreover, according to National Oceanic and Atmospheric Administration (NOAA, 2013), LIDAR (Light Detecting and Ranging) measures distance to a target by illuminating that target place with a pulsed laser light and also measures the reflected pulses with a sensor. Differences in the returning of the laser times and wavelengths is used to make digital 3D representation.

On the other hand, a resistivity survey meter can be used to measure the resistance of the ground to the electric current. For example, stone walls retain less dampness than a deep pit filled with earth and these differences can be measured accurately by a resistivity meter.

Mine detector is a well-known device for many purposes like detecting natural resources, wealth or treasures. This device is also very helpful to the archaeologists to track the iron objects, fire clay materials, and pottery etc. There is a fact that, heated features retain a weak magnetism so there is a device called proton magnetometer which may be used for measuring the differences between undistributed soil magnetism and heated pottery materials which have been heated somewhere in the past.

Identification of Walls and Moats of Fort of Srirangapatna

Srirangapatna, the head-quarter of the taluk of the same name in Mandya District, Karnataka, is an island in river Cauvery with an area of 8.6 sq-kms (Rajani, 2016). It is a historical place and has a history back from 9th century AD where The Gangas, Hoysalas, Vijayanagar Kings, The Wodeyars of Mysore and Hyder Ali & Tipu have left their sign. It is also a place where ancient monument ranges from 894 AD's Sri Ranganathan temple to British period bungalows and memorials (Rajani, 2016). The fort of Srirangapatna contains concentric layers of walls and moats which made the fort unique from other historical places. But due to the ignorance, the fort has lost its importance. The thick vegetation has covered most of the parts which is difficult to uncover on the ground. A research team which includes the personalities Dr. M.B. Rajani, Ms. Ekta Gupta and Ms. Sonia Da has tried to cull out the history again through the addition of the value of remote sensing and GIS into the area. The research team has identified the presence of the vegetation on the walls via the high-resolution multispectral image as linear positive crop mark. The team used interpretation keys crop-mark, pattern, tone, texture etc. and anaglyph image to identify layers of walls and moats on the high resolution. They also formed a virtual 3-D visualization (Figure 2) in Erdas Imagine (Rajani, 2016). The 3-D visualization is as Figure 2.

2.4. GIS (Geographic Information System)

Since 1990, the GIS has been playing an important role in the field of archaeology



Figure 2. The 3-D visualization using Erdas Imagine. [Source:-Rajani, M.B. (2016). Cultural Heritage of Karnataka: A Remote Sensing and GIS Perspective. National Institute of Advanced Studies (NIAS) IISc Campus, Bangalore-560012].

(Conolly & Lake, 2006). Therefore, it is an important means for selecting or tracking an archaeological site. The mapping for the target area can be accurately identified by this system. GIS can answer not only mapping of the target area but also to the basic and main questions about the location, condition trend, routing, pattern and modelling.

The GIS can have four typical application in Archaeology (Conolly & Lake, 2006) which are as follows:

- Management of Archaeological Resources
- GIS and Excavation
- Landscape Archaeology
- Spatial and Simulation Modelling

2.4.1. Management of Archaeological Resources

This is most appropriately run by the government bodies and the archaeologist who have been given the charges and tasks for recording and managing different archaeological resources. For instance, the UK archaeological databases termed “Sites and Monuments Records” (SMRs) for including information like historic buildings, fort, parks, gardens, etc. (Conolly & Lake, 2006).

2.4.2. GIS and Excavation

Archaeology has many things to do in pre-excavation, excavation and post-excavation period. There are many works after returning to an excavation like ordering the photographic records, detail analysis of the artefacts, environmental sample, etc. From a GIS perspective, the research nowadays involves massive digital recording methods for spatial data. Many tasks which were taken out in the post-excavation period are now being carried out during the excavation and GIS in this regard, plays an extra ordinary role as a data management tool and allows rapid visualization of spatial data at or soon the collection process during or after the excavation (Conolly & Lake, 2006).

1) The West Heslerton Project

In “Geographical Information Systems in Archaeology”, Conolly and Lake had put a case study called “The West Heslerton Project” which may help us to have a better understanding regarding GIS in the archaeological field. The project was directed by Dominic Powlesland in West Heslerton, a village in Yorkshire, England, which is a great setting for the English Heritage rescue archaeological projects. The project is of a great importance for both the Late Roman/Early Anglo-Saxon and Early/Middle Anglo-Saxon transitions (Conolly & Lake, 2006). The data involved nearly 30,000 context records and plans, 90,000 objects records and around a million animal bone fragments alongside the photographic, stratigraphic, geophysical and other datasets (Conolly & Lake, 2006). The thing which made West Heslerton different from other projects are the use of digital recording techniques and GIS to manage, visualise, facilitating and analyse archaeological spatial data. GIS also helps to exceed in the publication process.

2.4.3. Landscape Archaeology

The projects which are being carried out regionally, are of great importance to the GIS as the tool of the GIS readily associates the work of the projects. The landscape archaeologist is facing one of the major challenges regarding ordering of data from various projects after the data collection via different methods and systems (Conolly & Lake, 2006). Here, GIS can provide great advantages to the solution of these challenges and a better spatial resolution of an area.

Moreover, digital acquisition of the background such as extant field system, walls, buildings, roads, pathways, etc are the starting point for any landscape scale project (Conolly & Lake, 2006) and these background needs a good resolution to carry the project smoothly and GIS is a potential useful tool in landscape archaeology.

2.4.4. Spatial and Simulation Modelling

The term spatial modelling refers the use of geospatial data to simulate a process, understand a complex relationship, predict an outcome or analyse a problem (Conolly & Lake, 2006). Spatial modelling helps the archaeologists in the use of elevation models to understand visibility, elevation and terrain data to understand movement across landscape. It also helps to understand ecological modelling of the objects (Conolly & Lake, 2006). Conolly and Lake has mentioned about some approaches:

- Data extraction from a spatial database
- Mathematical manipulation of one or more datasets
- Dynamic modelling

2.5. Unexpected Discoveries

Some prehistoric sites have been found by the dint of accidental discoveries. Where, any caches of buried weapons, coins, bones, and treasures which is bur-

ied in times of stress by the people from the past is yielded. For this, no methods or techniques were used, rather the discoveries were spontaneous. For example, when the Mexico city's metro was tunnelled down under the modern city the workers naturally uncovered that the city is built on the site of Aztec city, Tenochtitlan. Moreover, 40 tons of pottery, 380 burials, and even a small temple was recovered (Fagan, 1978). Bolors, a site in Portugal was discovered when a farmer noticed some concentrations of artifacts and bones along the border of his fields (Beck, 2015).

The mother nature has also opened up many sites which is then studied very carefully by the archaeologists. A great example in this regard can be the Olduvai Gorge's campsites of the past. Earthquake is one of the natural calamities which has discovered many great archaeological sites.

3. Methods Used in the Process of Collection of Artifacts or in Excavation

The human of all ages had the passion and curious mind to excavate and thus to reveal the early human's culture and settlement pattern which not only serves to the field of anthropology alone but also to the field of archaeology as a separate field of study. Sir Flinders Petrie noted that there were two objects of an excavation, one is to obtain plans and topographical information and another one is to obtain portable antiquities (Petrie, 1904). The aim of the early was at the recovery of information about the major structures and the artefacts (Harris, 1989). The history of excavation methods reflects the changing attitudes of generations about considering the valuable objects. We can know about this from the book named "Principles of Archaeological Stratigraphy" written by Edward C. Harris where it was clearly written as, "When the early nineteenth-century excavator, Richard Colt Hoare, 'merely dug holes in barrows to procure the chief relics at the greatest possible speed' (Gray, 1906: p. 3), his interest was not in the potsherd or in the stratigraphic detail, but in the whole pots, objects of precious metal and other complete artefacts" (Harris, 1989).

The first principle of excavation is that "digging is destruction" (Fagan, 1978). It is very hard work to uncover the artifacts beneath the soil without harming or injuring to a little part of the artifacts. So, an archaeologist has to be so careful and has to follow some methods in order to examine during a dig.

3.1. Research Design

A sound research design is a first and necessary step in order to excavate a site in a proper way. This is prepared in the first stage of investigation before a single trench is made on the ground. The different and possible excavating problem is analysed while the design is made. A research design involves procedures of excavation which is need to be made in the site, tools which might be needed and other safety issue regarding the excavation. It may also include a statistical validity of the excavation. For example, in the Koster research design, Stuart Struever

and James Brown needed to control a mass of complex variables that affected their data. The Koster site is a fine example of having an elaborate research design which comprises of complex computer technology.

3.2. Types of Excavation

By observing a site and the research design, the type of the excavation is chosen. Moreover, in the present days where the cost of digging is comparatively high, the archaeologist tries to complete the investigation with the availability of the total budget and tools.

3.2.1. Vertical Excavation

Vertical excavation involves digging relatively small-scale horizontal areas of a site where the past culture is deposited. Most of the investigation has to be carried out by a minimum expenditure of time and money. So, a vertical excavation process might be suitable for a minimum expenditure (Fagan, 1978). Some of the world's most significant site was excavated through this method like; Coxcatlan Cave in Tehuacan Valley, Mexico. This method is used to obtain artifact samples and sequencing the ancient building construction or histories (Fagan, 1978). A hypothetical image of digging by using vertical excavation is given below as (Figure 3).

3.2.2. Area Excavation

In the paper named "Excavation techniques in Historical Anthropology" by Edward Higginbotham, it has been written that the substitute name of horizontal

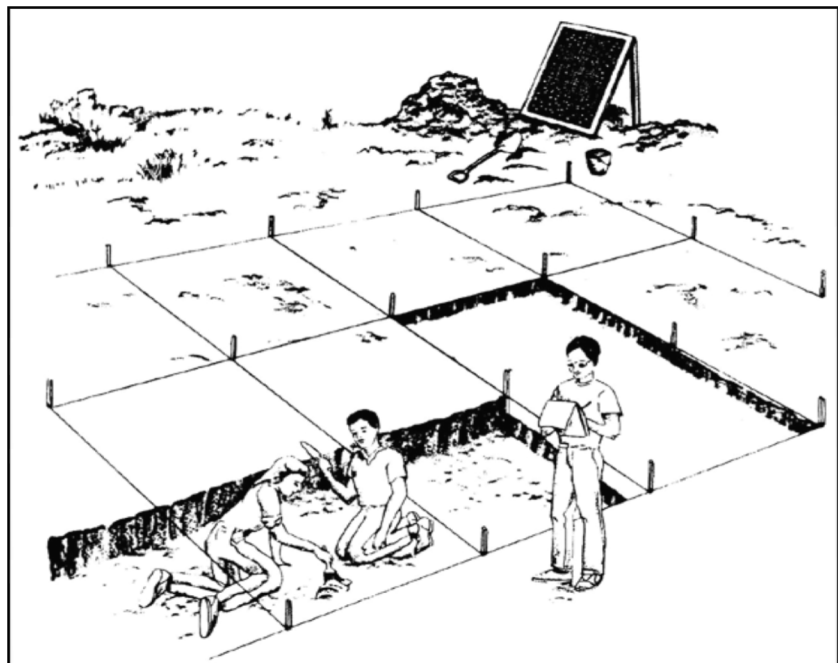


Figure 3. Vertical excavating an archaeological site. (Source: Ward, H. T. and R. P. Stephen Davis, Jr. (1999). *Time Before History: The Archaeology of North Carolina*. Chapel Hill University of North Carolina Press. [Figure 5.18.])

excavation is the area excavation. Wheeler termed the grid layout an area excavation. Mainly area excavation is a large-scale excavation carried out in a large and wider area of a site. This is mainly used to uncover house plans and settlement layouts. It is also expensive. The excavators use a grid of sequences with its own letter and number to participate in digging and recording of the past (Fagan, 1978). **Figure 4** is showing an area excavation Haft Tappeh archaeological site in south western Iran.

3.3. Non-Destructive Technique (NDT)

Excavation is risky because there always prevails a chance of damage to the site. So, non-destructive technique nowadays is an increasing technique to the field of archaeology which can also be applied even to the field of south Asian archaeological site. Non-destructive technique or NDT allows the future researcher to verify or re-verify a site by causing a minimal damage. According to, *The American Society for Non-destructive Testing* (2017), Current NDT methods are: Acoustic Emission Testing (AE), Electromagnetic Testing (ET), Guided Wave Testing (GW), Ground Penetrating Radar (GPR), Laser Testing Methods (LM), Leak Testing (LT), Magnetic Flux Leakage (MFL), Microwave Testing, Liquid Penetrant Testing (PT) etc. But the six most frequently used NDT methods are eddy-current, magnetic-particle, liquid penetrant, radiographic, ultrasonic, and visual testing.

Ground Penetrating Radar

Ground penetrating radar is one of the tools of NDT. Within the methods used in archaeological excavation GPR is a unique both in its ability to detect small



Figure 4. Excavation area of the Haft Tappeh archaeological site in southwestern Iran. Photo Taken by Behzad Mofidi-Nasrabadi.

objects at great depths, and in distinguishing the depth of sources. Ground penetrating radar is used to detect and map subsurface archaeological artifacts, features, and patterning (Lowe et al., 2014). The radar uses radio waves of frequency of range of 10 - 3000 Mhz in order to map structures and burial objects in the ground. Radar transmitting antenna emits an electromagnetic impulse which is reflected by a dielectric discontinuity in the ground, and gathered by receiving antenna. **Figure 5** is showing a designed GPR technique.

3.4. Digging and Tools

Excavation needs to be carried out with the help of some tools. Archaeologists use many digging tools in their field. Picks, shovels, pick axe, mattock, and long-handled spade are also used. Moreover, the most common tool is the diamond-shaped trowel. Trowel is used for tracing layers in walls, clearing pits and other small objects.

On the other hand, paint brushes are often handy and used in this purpose. Several note books and graph papers, tapes are also used (Fagan, 1978). Camera is also a common and important tool for clicking photographs for the field which is to be excavated.

3.5. Recording of the Data

Recording is an important aspect and method in the process of excavation of a site cause without records the excavation is not worthy. The excavation note-books record each day's trench. Important finds about valuable artifacts are kept in the recordings.

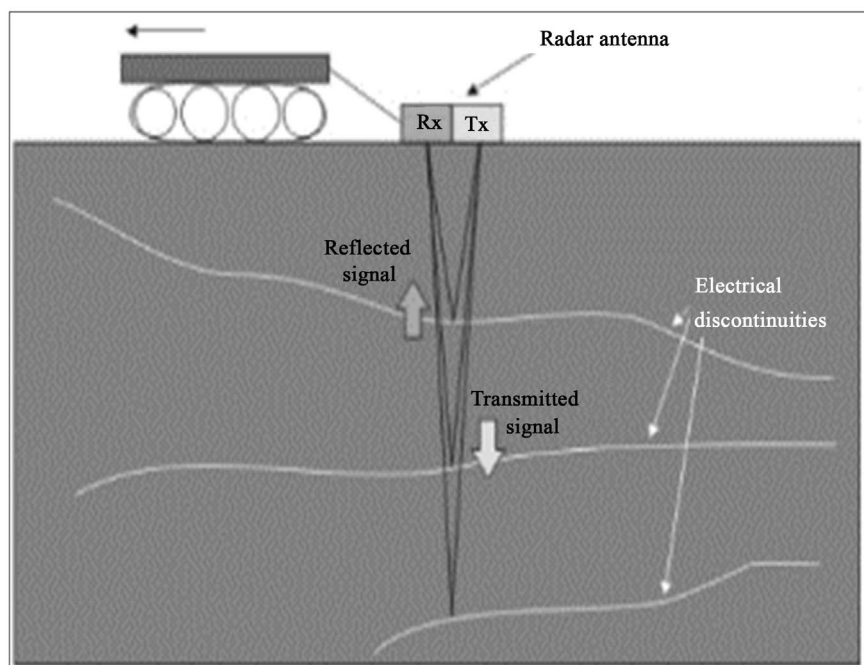


Figure 5. Designed GPR technique. (Source: Pettinelli, E. and Barone P. M. (2014) non-destructive techniques in archaeology: recent gpr investigations in crustumerium).

4. Identifying the Age of the Artifacts

After a well and sound excavation, a huge responsibility goes to date the age or time of valuable artifacts which has been found during an excavational work. People have tried to find out and date the past in a chronological sequence. And in this regard, dating method has played a significant role. There are mainly two types of dating methods. One is relative dating method and another one is absolute dating method.

4.1. Relative Dating Method

It is a method which compares artifacts in order to classify them according to their similarity or dissimilarity by linking them in a particular time. This technique is used when it is not possible to carry out absolute dating methods. Archaeologists identify the cultural objects by comparing one artifacts to other. This method or task may be treated as one of the most time consuming archaeological research.

4.1.1. Stratigraphy

Stratigraphy is a relative dating method and also used in the modern field of archaeology. It can fix events represented by contexts and by time (Harris, 1989).

4.1.2. Seriation

It is a relative dating method. The artifacts from various sites, in different culture, are placed in chronological order with the help of this method. Seriation is a standard method of dating in archaeology. It may be used to date stone tools, pottery, different fragments, and other artifacts. In Europe, it has been used frequently to reconstruct the chronological sequence of graves in a bone-yard (Jorgensen, 1992).

4.2. Absolute Dating Method

Absolute dating methods are generally available to the archaeologist and they are well tried techniques such as, tree-ring dating (dendrochronology), potassium argon dating and there is some experimental method like, obsidian hydration, amino acid racemization and thermoluminescence.

4.2.1. Radiocarbon Dating

This is known as the best of all chronological methods. It was pioneered by physicist J. R. Arnold and W. F. Libby in 1949. When an organism dies the carbon 14 atom starts to decay and forms carbon 12 at a known rate, so that after 5568 years, only half the original amount will be left and to be continued. The radiocarbon samples might be charcoal, burnt bone, shell, hair, wood or other organic substances. The samples are then kept to laboratory where it is converted to gas and pumped into a proportional counter. The amount of C14 is then counted and compared to the modern sample (Fagan, 1978). Therefore the age of the artifacts are identified.

4.2.2. Dendrochronology

It is a scientific study of dating tree-rings. This method is based on the variation in tree growth from one year to another which is influenced by sunshine, temperature, soil type and all other environmental conditions. It has a significant role in archaeology. Each year a tree grows a ring. The seasonal weather can be marked by studying this tree-ring. The tree rings are taken with a borer from living or felled trees. The sequences of the rings are compared with other and with a master chronology of rings which is then dated on the basis of an accurate master sequence. The tree-rings dating not only give the information about the time or the date but it also reveal about the existed seasons of a particular area.

4.2.3. K-Ar Dating (Potassium-Argon Dating)

Archaeological sites can be dated by a radioactive counting technique known as potassium argon dating. This is used by geologist to date rocks as early as four to five billion years ago. Potassium is an element presents in most of the minerals. And its natural form contains small amount of radioactive ^{40}K atoms. The process of decay over time of ^{40}K continues so it is possible to measure the amount of concentration of Argon 40 that has accumulated since the rock formed using a spectrometer.

4.2.4. Thermoluminescence

Firstly, it is needed to mention that this technique is applicable to the pottery materials which were burnt or baked in the earlier time. The things could be burnt stone, burnt clay pot, volcanic products, baked hand made things and others. Various pottery materials and other burnt things emits thermoluminescence when heated to 500°C . This thermoluminescence is received by the photomultipliers. The emitted light comes from the mineral grains which resides in the pottery. The sources of radioactivity are ^{40}K , ^{87}Rb , thorium, and uranium. In order to calculate the rate of emission, a “thermoluminescence clock” is set to zero first. And when the heated samples started cooling down, the thermoluminescence begins to gather and therefore measured by photomultiplier (Atiken, 1997). “The natural TL measured in the laboratory now is directly related to the total radiation the ceramic has experienced since a ‘time zero’ was set up by the original firing” (Fleming, 1976). Therefore, the chronological age of the burnt pottery materials can be known.

4.2.5. Obsidian Hydration Dating

Obsidian was a preferred material for many past cultures of human for making stone tools. It is high in potassium and silica and derives from volcanic eruptions. In the year 1960, geologists Irving Friedman and Robert Smith introduced obsidian hydration dating. This technique depends on the fact that obsidian contains only 0.2 percent water. When a piece of obsidian is broken, it catches water at a uniform rate until a saturation point of 3.5 percent water comes. The rate of hydration is affected by various climatic condition. Obsidian artifacts are hydrated when human being works on them by flaking techniques so that the

date be determined by measuring the extent of hydration (Barnouw, 1971).

4.2.6. Paleomagnetism or Archaeomagnetism

This method is associated with the shifts in the earth's magnetic poles. It works best with the fireplace or the pottery making places. This method has been applied for dating to the site of Paleolithic and Mesolithic sites of the Old world. "When baked clay cools down from firing it acquires a weak permanent magnetization in the same direction as the field and of a strength proportional to the intensity of the field. To be a useful record of direction the clay must be part of a kiln, hearth, or oven so that it has exactly the same orientation today as when it cooled down" (Barnouw, 1971).

4.2.7. Racemization

This dating method has been used for artifacts dating between 40,000 - 100,000 years ago. It includes analysis of arrangements of amino acids in the organic materials. The 20-amino acid found in the living things have the same configuration and they undergo a change after their death. This process is the basis of "protein clock". This method was tested by Jeffry Bada (Barnouw, 1971).

5. Methods for Ordering the Past

After locating the archaeological site, collecting the artifacts and dating the samples by different dating methods, the main and most important part is to order the human manufactured and used object in a chronological way. It may take weeks after weeks or even months after months to classify and order a brief excavation event.

5.1. Classification and Taxonomy

Every scientific field needs classification. Classification helps to arrange the data or information in a particular by the dint of anything's particular attributes or characters or features.

Archaeology uses classification as a research tool for ordering the large quantities of artifacts. So, classification may serve the purpose to be the solution of possible problem which might be faced later.

There is no well recognized archaeological taxonomy throughout the world. But the British archaeologists refer to "cultures", North-Americans to "phases" and the French to "periods". All the archaeologists do agree that the purpose of taxonomy is to make both the chronological and cultural relationships between different sites and areas to understand (Fagan, 1978).

The different artifacts assemblages which are found in the excavation field may be classified by the attributes it possesses. Each sample has their attributes like they might have different colour combinations, shapes, sizes and decoration. Moreover, clay structures may vary within different types of pottery objects, so, by the attributes it is easier to identify and to put a particular form of object in a particular classification group. A comprehensive attribute list may be made based on the entire collection of the artifacts.

Natural type of classification may also be carried out by the dint of own's cultural experience. Basically, the prehistoric people obviously had the idea of "right" artifact design. But it is a matter to think that, the design that a particular artifact have, does it reflect the same cultural experience that we have or not. So, the **analytical type** may serve the purpose to a great extent to classify the artifacts in a more analytical way. The associations found with an artifact helps to understand and to make a comparatively authentic classification.

5.2. Units of Ordering

When the artifacts and its associations are analysed and classified, they are ordered in space and time. Site is the fundamental unit for all stratigraphic studies in archaeology. Phase or culture serves for the unit as well. Phase or culture is normally named after a key site.

Large archaeological unit is helpful to handle a situation when a particular form of cultural style is found throughout the different parts of the world. For instance, the technological stages of prehistory developed by Chriatian Jurgensen are: stone age, bronze age and iron age. These ages are labelled by the large archaeological unit of ordering.

Actually, the units and concepts used in the ordering are highly explanatory and descriptive. **Explanatory ordering** is very helpful to study the cultural change throughout the past to the present. This units puts artifacts and other culture traits into a correlation in time and space.

6. Interactions and Knowing about the Past

A cultural material which is recovered from a site, when arranged and analysed, the different associate matters and facts relating to that object can be known. The patterning of an artifact, remaining food remains, animal's bone, different pottery, hunting tools and weapons—all these gives an indication to the past settlement patterns, catchment areas, trade, subsistence patterns like prehistoric diet, domestication system, rock art (**Figure 6**), social organizations and religious beliefs.

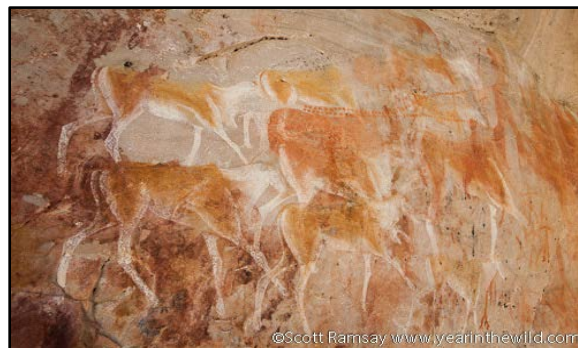


Figure 6. Rock art-Cederberg-South Africa (Source: Ramsay, Scott (2011). Secret Rock Art in The Caderbarg. Accessed [January 22, 2018]. Year in The Wild Blog. Link—<http://www.yearinthewild.com/secret-rock-art-in-the-cederberg/>)

If we start from the past diet pattern, the remaining of food not only give us the scope to relate about how the people obtained their own food but also give us the scope to identify about their diet plan. The analysis of animal bone helps to know about the domesticated animal which was then in practise. Not only this, we can also trace about the then human occupation. For example, Richard MacNeish obtained a sequence of human occupation for the period 10,000 years ago to the Spanish Conquest from Tehuacan Valley in Mexico (Fagan, 1978). Moreover, the rock art gives an idea both of cultural art history and the way of obtaining their food. A hunter-gatherer or a fisherman might have left a painting on the wall of rock in the caves.

Apart from this, the archaeologists may have a vivid insight about the patterned structures of earlier houses, storage pits as they study the artifacts and other remaining tools of prehistoric people which gradually will reflect about the previous households and communities. And there is of course a relation between the then communities and towns. In 1993, the German geographer Walter Christaller developed statement about the relationships between South German towns and the rural communities which is later known as **central place theory**. So, it can be understood that in the previous time of human being, the communities of different areas have a connection to a central place which did meet some functions and might have provided some service to others local places. Therefore, it becomes helpful to find out the different forms of communication which is interlinked to one place to another.

7. Conclusion

The analysis of artifacts and its associates is a great way to study about the past social structures and settlements. From the very first step of finding site by different methods through collecting artifacts in the fields to ordering the past in the lab, all are interlinked to each other. From the very early time, different methods were used in the field of archaeology. And by the time, there developed many modern tools which served and helped the existing and new methods in a sophisticated way. The astonishing diversity of the living past can be best represented by the interactions of the artifacts and other remaining tools used by the prehistoric people. By studying the artifacts and its patterning style we can gain a deep insight about the society's changing religious and cultural beliefs and characteristics. And in this regard the significance of innovative research which formulates new idea in the vast field of archaeology has no boundary. From the hunter gatherer society to the complex societies of the modern time, archaeological research is the best way to study and to explore the human society with the artefacts and material remains of the past.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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