INTRODUCTION TO ARCHAEOLOGY

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UNIT -I

- Definition, Nature, Aim, and Scope of Archaeology - Archaeology as a Source of Cultural Studies- Different kinds of Archaeology - Marine Archaeology, Aerial Archaeology, New Archaeology - Archaeology and its relations with allied disciplines

Objectives

- Understand the meaning and origins of Archaeology
- Establish the relationship between History and Archaeology
- Describe prehistoric archaeology
- Analyse historical archaeology

Definition:

The word archaeology has its origin in two Ancient Greek words 'arkhaios', meaning ancient, and 'logia', which stands for learning or study. Archaeology is the study of the ancient and recent human past through the recovery and analysis of material remains. Many consider it to be a subfield of anthropology (the study of all human culture and evolution), along with many other subfields comprising biological, cultural, and linguistic anthropology. Archaeology can be considered both a social science and a branch of humanity (the study of humans and their society). However, it also uses other branches of learning such as biology, chemistry, geology, botany, geography, and various other disciplines. By using all these disciplines, archaeologists can understand human civilizations of the past and recreate the main aspects of the environment in which these bygone societies lived.

Archaeology is the only method available for the study of human actions in the material world when other evidence such as a variety of written materials and oral traditions narrating certain phenomena fail. The survival of written documents is relatively limited and hence from the time that these documents become available, they provide additional tools to archaeology for its interpretation of past activities of man, based on material remains. Archaeology, from this point of view, has to not only interpret material remains of human activity but also throw light on the literary interpretations of the past phenomenon.

It helps us to appreciate and preserve our shared human heritage. It informs us about the past, helps us understand where we came from, and shows us how people lived, overcame challenges, and developed the societies we have today. The development of the field of archaeology has its roots in history and those who were interested in the past, such as kings who wanted to show past glories of their respective nations. In the 5th century BC, Herodotus, the Greek historian, was the first scholar to systematically study the past and perhaps the first to examine artifacts and test their accuracy. In the Song Empire (960–1279) of Imperial China, officials unearthed, studied, and cataloged

ancient artifacts. In the 15th and 16th centuries, there was a rise of antiquarians in Renaissance Europe who were interested in the collection of artifacts. The antiquarian movement shifted into nationalism and personal collections were used to create national museums. It developed into a much more systematic discipline in the late 19th century and became a widely used tool for historical and anthropological research in the 20th century. During this time there were also noteworthy advances in the technology used in the field. The exact origins of archaeology as a discipline are uncertain. Excavations of ancient monuments and collections of antiquities have been taking place since time immemorial. In ancient times, the tombs of the Pharaohs of Egypt were looted by grave robbers who probably hoped for financial gains from selling their plunder. We can distinguish this with the endeavors of the Italian Renaissance humanist historian, Flavio Biondo, who created a systematic and documented guide to the ruins and topography of ancient Rome in the early 15th century. He is seen as a candidate for consideration as an early founder of archaeology. He was inclined to treat the ruins and topography of ancient Rome with great respect. Tentative steps towards archaeology as a science took place during the Age of Enlightenment, also called the Age of Reason, in Europe in the 17th and 18th centuries. King Charles of the Two Sicilians employed an antiquities expert, Marcello Ventui, in 1738 to excavate the ancient city of Herculaneum. This first supervised excavation of an archaeological site was likely the birth of modern archaeology. In America, Thomas Jefferson supervised the systematic excavation of a Native American burial mound on his land in Virginia in 1781. During the Egyptian campaign in 1801, Napoleon Bonaparte brought many scientists and specialists in the fields of biology, chemistry, and languages to carry out a full study of the Egyptian civilization. During these campaigns, some soldiers rebuilding a fort discovered an unusual stone on which ancient scripts were engraved. This stone was known as the Rosetta Stone. Many decades later, the work of Jean-Francois Champollion in deciphering the Rosetta Stone led to the discovery of the hidden meaning of hieroglyphics. This discovery proved to be the key to the study of Egyptology. However, it was only in the 19th century that the systematic study of the past through its physical remains began to be carried out in a manner recognizable to modern students of archaeology. Richard Colt-Hoare (1758-1838) recorded the past of the countryside near his estate at tour head in Wiltshire. In his investigations and excavations of such neolithic barrows as Silbury Hill, Colt-Hoare used a terminology that was later adopted by other archaeologists. In later years archaeology continued as an amateur pastime and was pursued by persons such as Augustus Pitt Rivers who collected many artifacts and developed a typology scheme for dating archaeological remains in his personal collection in the second half of the 19th century. William Flinders Petrie (1853-1942) was another personality who may rightly be called the Father of Archaeology. His work on the ancient Egyptian civilization developed the concept of seriation, which allowed accurate dating long before scientific methods were evolved to testify his chronologies. Mortimer Wheeler was the next popular figure involved in the development of

archaeology. His highly disciplined approach to excavation and systematic coverage of much of Great Britain in the 1920s and 1930s brought the science on swiftly. His method of excavation still forms the basis of the excavation technique. The work of Sir Arthur Evans at Knossos in Crete in the early 20th century shed light on the Minoan Civilization. The archaeological findings from this site were cataloged and kept in a museum at Oxford. Archaeology was increasingly becoming a professional activity. Although the major chunk of the excavation's workforce consisted of volunteers, it was mostly led by a professional. Archaeology as a discipline was introduced in schools and universities, and by the end of the 20th century, nearly all professional archaeologists, at least in developed countries, were graduates in the subject.

Aims and Scope of Archaeology

Prehistoric archaeology has become an institution nowadays, encompassing several different scholars forming sub-disciplines. Each scholar propagates new theories and follows different methods having different approaches. In the recent past, there has been a growing realization that prehistoric archaeology has contributed a lot not only to studying the antiquities or relics of past societies but also to studying the modern people or contemporary societies with simple technology from the light of their practices set in prehistoric times. It can also help with specific archaeological studies when the ways of life of modern society are very similar to those of past life. It has become a current focus of research. In one way or another, we compare something from the past with an object in use today. For example, megalithism, or using megaliths to create monuments, is a dead cultural phenomenon in most parts of the world. It is still practiced by different tribal communities in the same way or in some modified form in North-East India, especially in Nagaland, Manipur, and Meghalaya. Megalithism is a living tradition among these tribal communities. Hence many specialists in the field of ethno-archaeology take a keen interest in reconstructing the past life of the ancient people of these regions in the light of this living tradition.

Different kinds of Archaeology.

The primary aim of archaeology is to unravel the human past through material remains. It is an interesting job of interpreting material culture in human terms. It requires hard work in the field as well as formulating hypotheses in the laboratory. Therefore, an archaeologist should be familiar with other related disciplines such as history, anthropology, and other related social and general sciences. Thus, one should have a multidisciplinary approach while practicing archaeology. Archaeology is of many kinds, and each type demands either specific or multiple specializations. The different kinds of archaeologies have been classified into two broad categories based on the nature of the work that is involved, and based on historical periods Archaeology has been classified into different types based on the nature of the work involved in the process of data collection and analysis. This depends largely on

the place of excavation or exploration, and the point of view of the archaeologist who wants to interpret history.

Maritime archaeology / Marine archaeology

Maritime archaeology (also known as marine archaeology) is a discipline within archaeology as a whole that specifically studies human interaction with the sea,[1] lakes, and rivers through the study of associated physical remains, be they vessels, shore-side facilities, port-related structures, cargoes, human remains, and submerged landscapes.[2] A specialty within maritime archaeology is nautical archaeology, which studies ship construction and use.[3] As with archaeology as a whole, maritime archaeology can be practiced within the historical, industrial, or prehistoric periods.[4] An associated discipline, and again one that lies within archaeology itself, is underwater archaeology, which studies the past through any submerged remains be they of maritime interest or not. An example from the prehistoric era would be the remains of submerged settlements or deposits now lying underwater despite having been dry land when sea levels were lower. The study of submerged aircraft lost in lakes, rivers, or in the sea is an example from the historical, industrial, or modern era. Another example is the remains of discovered and potential medieval bridges connecting the islands on the lake with the mainland.[5] Many specialist sub-disciplines within the broader maritime and underwater archaeological categories have emerged in recent years.[6]Maritime archaeological sites often result from shipwrecks or sometimes seismic activity and thus represent a moment in time rather than a slow deposition of material accumulated over years, as is the case with port-related structures (such as piers, wharves, docks, and jetties) where objects are lost or thrown off structures over extended periods. This fact has led to shipwrecks often being described in the media and popular accounts as 'time capsules'.
Archaeological material in the sea or other underwater environments is typically subject to different factors than artifacts on land. However, as with terrestrial archaeology, what survives to be investigated by modern archaeologists can often be a tiny fraction of the material originally deposited. A feature of maritime archaeology is that despite all the material that is lost, there are occasional rare examples of substantial survival, from which a great deal can be learned, due to the difficulties often experienced in accessing the sites.

There are those in the archaeology community who see maritime archaeology as a separate discipline with its concerns (such as shipwrecks) and requiring the specialized skills of the underwater archaeologist. Others value an integrated approach, stressing that nautical activity has economic and social links to communities on land and that archaeology is archaeology no matter where the study is conducted. All that is required is the mastering of skills specific to the environment in which the work occurs.

Underwater Archaeology

Underwater archaeology is also known as marine archaeology or maritime archaeology. It is a discipline within archaeology as a whole that particularly studies man's interaction with the sea, lakes, and rivers. It is concerned with the study of underwater evidence such as shipwrecks, water-buried cities, and other inundated archaeological sites. It is an expensive branch of archaeology and is much costlier than any terrestrial archaeological excavation. Archaeological remains in the sea or other underwater environments are typically subject to different factors than artifacts on land. Underwater excavations require knowledge of specific techniques and methods that need to be adopted. Underwater archaeologists try to discover submerged evidence by diving into the deep waters along with sophisticated archaeological tools. Sometimes an underwater excavation may also turn out to be a little risky because one cannot guess what the conditions under the sea would be like. However, it makes an exciting profession for adventure lovers. The Discovery and recovery of King Henry VIII's warship Mary Rose and Titanic are considered among the extraordinary achievements in the field of underwater archaeology.

Aerial Archaeology

Aerial archaeology is concerned with discovering historical remains of aircraft, air-borne weaponry, abandoned air bases, or runways. In brief, it deals with everything that has to do with the history of aviation. Sometimes, aircraft wrecks are found under the sea, which are ultimately recovered, recorded, and studied. It is because of this reason that many people consider aviation archaeology as a branch of marine archaeology. However, this may only be true to a limited extent as there are also numerous aviation archaeological remains found on land, in which case, it becomes a separate branch in itself. Crash sites vary largely in magnitude and remain. The remains can be military remains or civil remnants. Instances of ancient air bases discovered by aviation archaeologists have also been recorded. In so far as the actual professional practice of aviation archaeology is concerned, there may be some legal limitations, which can be overcome through sufficient paperwork and permissions.

Environmental Archaeology

Environmental archaeology is a sub-field of archaeology that deals with the study of interrelationship between the past societies and their natural environment. It is commonly divided into three sub-disciplines viz., zoo archaeology which deals with the study of ancient faunal remains, geo archaeology that deals with the study of soil, sediments, rocks, natural deposits, etc., and their relationship to the archaeological record, and archaeo botany that studies ancient floral remains. Environmental archaeology answers questions relating to the type of natural habitat that the past societies were surrounded by, the flora and fauna living in that age, varieties of wild and cultivated crops, animals hunted and domesticated, species of plants and animals that are now extinct, climatic changes that took place over some time, and the effects of changes in natural environment on the lives

of the people and their subsequent disappearance. Environmental archaeology includes field studies along with laboratory experiments. Karl Butzer (1934-2016) was a pioneer in this field.

Ethno-archaeology

Ethno-archaeology is the science that deals with the study of past societies, focusing on material remains rather than culture. It is sometimes called anthropological archaeology as it involves extensive application of anthropological methods. By applying ethno-archaeological methods, archaeologists, in a way, try to link the past with the present. It can provide insight into how the ancient people in a given region may have lived. By the application of the principles of ethno archaeology, one can get valuable insight into ancient social structures, religious and cultural beliefs, technology, etc. However, the connection between modern and ancient societies is certainly still very confusing. This is because, even if two societies share some common characteristics, they may be distinct from each other in many aspects, which tend to change by default over some time. Nonetheless, studying advanced techniques of modern communities may help to a certain extent to provide an insight into the rudimentary techniques, which may have been used by the ancients. Lewis Binford (1931-2011) and Ian Hodder (born 1948) have conducted ethno-archaeological studies among the Inuit (Eskimos) in Canada and in several parts of Africa to make a better understanding of pre-historic hunter-gatherers.

Aerial archaeology,

Aerial archaeology is a fascinating field that involves using various aerial techniques and technologies to study archaeological sites from above. This approach often employs tools like aerial photography, satellite imagery, drones, and even remote sensing technologies to survey, map, and analyze archaeological sites and landscapes.By capturing images from above the ground, researchers can identify patterns, structures, and features that might not be visible from the ground level due to vegetation, terrain, or other obstacles. Aerial archaeology allows for the discovery and documentation of ancient sites, settlements, burial grounds, crop marks, and other hidden archaeological features. The use of aerial techniques has revolutionized archaeology by providing a broader perspective and aiding in the understanding and interpretation of historical landscapes. It has helped archaeologists uncover and study ancient civilizations, track changes in land use over time, and even identify new sites that were previously unknown. This approach is constantly evolving with advancements in technology, enabling archaeologists to gather more detailed and precise data, thereby enhancing our understanding of past human civilizations and their interactions with the environment.

New Archaeology

New Archaeology, also known as procession archaeology, emerged in the 1960s and 1970s as a significant shift in archaeological thinking. It aimed to make archaeology more scientific and focused on understanding past human behavior through the analysis of cultural processes and ecological

relationships. One key aspect of New Archaeology was its emphasis on interdisciplinary connections. It sought to integrate knowledge and methodologies from various allied disciplines to gain a more comprehensive understanding of the past. Some of these allied disciplines include:

- **Anthropology:** Archaeology shares a close relationship with anthropology, particularly cultural anthropology. This connection helps archaeologists understand ancient societies, their social structures, belief systems, and cultural practices.
- **Geography and Geology**: These disciplines aid in understanding the physical landscape, geological processes, and how they might have influenced human settlement patterns and resource utilization.
- **Biology and Environmental Science**: By collaborating with biologists and environmental scientists, archaeologists can explore how ancient populations interacted with their environments, including the impact of climate change, subsistence strategies, and the use of natural resources.
- **Chemistry and Material Science**: Analytical techniques from chemistry and material science help in the analysis of artifacts, ancient materials, residues, and other archaeological remains, providing insights into manufacturing processes, trade, and cultural connections.

Statistics and Computer Science: The use of statistical methods and computational models has become increasingly common in archaeology for data analysis, pattern recognition, and simulations, aiding in the interpretation of archaeological findings. The integration of these disciplines allows archaeologists to approach research questions holistically, using a broader range of tools and methods to interpret and reconstruct past societies and cultures. This interdisciplinary approach has significantly enriched archaeological studies, leading to a more nuanced understanding of human history and cultural development.

Self Assessment Questions

1. Explain in detail the Definition, Nature, Aim, and Scope of Archaeology.

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2. Elaborate on its significance as a cultural study,

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3. Explain the different kinds of archaeology.

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UNIT II

- Beginnings in Archaeology from Antiquarianism to Archaeology - Process of Archaeology in the West - Growth of Archaeology in India- Archaeological Survey of India.

OBJECTIVES

- Understand the meaning and origins of Archaeology Antiquarianism
- Establish the relationship between History and Archaeology
- Describe Growth of Archaeology
- Analyse Archaeology survey of India

Beginning in Archaeology from Antiquarianism to Archaeology

Archaeology is a sub-field of archaeology which is related only to Greece and Rome. It deals with an in-depth study of the ancient civilizations of Greece and Rome. The Grecian Empire, the Roman Empire and the transitional period between the two, the Greco-Roman Period, together permit an almost 2,000-years long era of classical history. The period between 500 BC and 300 BC was known as the Classical period or Golden age of Greece. These short years have given us the great monuments, philosophy, art, literature and architecture that are now the building blocks of western civilization. Classical archaeology not only studies these two civilizations independently, but also in relation to other contemporary civilizations of that period. It also examines the influences of other civilizations on the ancient Greeks and Romans, and vice versa. It is a very exciting field of study, but because it pertains to specific regions, is limited in scope.

Antiquarianism:

An antiquarian or antiquary (from the Latin: antiquaries, meaning pertaining to ancient times) is an aficionado or student of antiquities or things of the past. More specifically, the term is used for those who study history with particular attention to ancient artifacts, archaeological and historic sites, or historic archives and manuscripts. The essence of antiquarianism is a focus on the empirical evidence of the past, and is perhaps best encapsulated in the motto adopted by the 18th-century antiquary Sir Richard Colt Hoare, "We speak from facts, not theory."

Despite the importance of antiquarian writing in the literature of ancient Rome, some scholars view antiquarianism as emerging only in the Middle Ages. Medieval antiquarians sometimes made collections of inscriptions or records of monuments, but the Varro-inspired concept of antiquitates among the Romans as the "systematic collections of all the relics of the past" faded. Antiquarianism wider flowering is more generally associated with the Renaissance, and with the critical assessment and questioning of classical texts undertaken in that period by humanist scholars. Textual criticism soon broadened into an awareness of the supplementary

perspectives on the past which could be offered by the study of coins, inscriptions and other archaeological remains, as well as documents from medieval periods. Antiquaries often formed collections of these and other objects; cabinet of curiosities is a general term for early collections, which often encompassed antiquities and more recent art, items of natural history, memorabilia and items from far-away lands.

The importance placed on lineage in early modern Europe meant that antiquarianism was often closely associated with genealogy, and a number of prominent antiquaries (including Robert Glover, William Camden, William Dugdale and Elias Ashmole) held office as professional heralds. The development of genealogy as a "scientific" discipline (i.e. one that rejected unsubstantiated legends, and demanded high standards of proof for its claims) went hand- in-hand with the development of antiquarianism. Genealogical antiquaries recognised the evidential value for their researches of non-textual sources, including seals and church monuments.

Many early modern antiquaries were also chorographers: that is to say, they recorded landscapes and monuments within regional or national descriptions. In England, some of the most important of these took the form of county histories.In the context of the 17th-century scientific revolution, and more specifically that of the "Quarrel of the Ancients and the Moderns" in England and France, the antiquaries were firmly on the side of the "Moderns". They increasingly argued that empirical primary evidence could be used to refine and challenge the received interpretations of history handed down from literary authorities.

Process of Archaeology:

Processual Archaeology is a form of archaeological theory that has its origins in 1958 with the work of Gordon Willey and Philip Phillips, ‘Method and Theory in American Archaeology’ in which the authors stated that ‘American archaeology is anthropology or it is nothing.’ Proponents of this archaeology assert that with the rigorous use of the scientific method it was possible to cross the limits of the archaeological record and know something about how the people who used artifacts lived. It was an intellectual movement which believes in logical positivism as a guiding research philosophy, modeled on the scientific method—something that had never been applied to archaeology before. Before the emergence of new archaeology in 1960, culture-history was a dominant point of view. In fact, the century before 1960 was the ‘long sleep’ of archaeological theory, in which very little explicit discussion of theory occurred. The inability of culture-history to answer the ‘how’ and ‘why’ of the past events was because of its mono-casual explanations and the descriptive level of this framework. Together these factors led to the emergence of new archaeology.

The processes lists discarded the cultural-historical belief that culture was a set of norms held by a group and communicated to other groups by diffusion and instead maintained that the archaeological remains of culture were the behavioral results of a population's adaptation to particular environmental conditions. Theory in the new archaeology attempts to explain change and recognize the process by which it came about. Thus, it represents an important movement from the main traditions of archeology, in which the description was considered to be more important than the explanation of change. It was time for a New Archaeology that would apply the scientific method to find and make apparent the laws of cultural growth in the way that societies responded to their environment. Archaeologists have generally recognized the works of Colin Renfrew, Kent V. Flannary, Ian Hodder and L.R Binford as indicative of the growth of processual school of archaeology. The New Archaeology laid emphasis on theory formation, model building, and hypothesis testing in the pursuit of general laws of human behavior. According to processualists cultural history cannot be repeated: it is futile to tell a story about a culture's change unless you are going to test its inferences. There is no scientific ground to determine as to whether a culture history one has built is correct. The processes lists clearly wanted to go beyond the cultural-historical methods of the past (simply building a record of changes) to focus on the processes of culture (what kinds of things happened to make that culture). In processual archaeology, culture is considered basically as the adaptive mechanism that permits people to adjust with their environments. The processes lists had two tools to strike out in this new archaeology Ethno-archaeology and the rapidly growing varieties of statistical techniques. Ethno-archaeology is the study of the social organization and other ethnological features of present-day societies based on their material culture, in order to draw conclusions about past societies from their material remains. It is the application of archaeological techniques on deserted villages, settlements, and sites of living people. Lewis Binford conducted the classic procession ethno-archaeological study by examining the archaeological remains left by mobile Inuit Upper Palaeolithic hunters-gatherers.

Since the processua lists uses scientific method so there arose a need for examination of huge amounts of data. Processual archaeology came about during the quantitative revolution, which comprised an explosion of complicated statistical methods fueled by growing computing powers and growing access to them. Data collected by processualists (and still today) comprised both material culture characteristics (like artifact sizes and shapes and locations), and data from ethnographic studies about historically known population make ups and movements. This data was utilized to build and ultimately test a living group's adaptations under particular environmental conditions and thus to explain prehistoric cultural systems.

Processualists were concerned with the dynamic relationships (causes and effects) that operate among the components of a system or between systematic components and the environment. The process was by definition repeated and repeatable: first, the archaeologist observed

phenomena in the archaeological or ethno-archaeological record, then they employ those observations to form clear hypotheses about the connection of that data to the events or conditions in the past that might have caused those observations. Next, the archaeologist would decipher what kind of data might support or reject that hypothesis, and finally, the archaeologist would go out, collect more data, to test the validity of the hypotheses. If it was found to be valid for one site or circumstance, the hypothesis could be tested in another one. Since there was a plenty of data and so much variability, the search for general laws rapidly became difficult. As a consequence the archaeologists found themselves in sub-disciplinary specializations to be able to manage :spatial archaeology dealt with spatial relationships at every level from artifacts to settlement patterns; regional archaeology required understanding trade and exchange within a region; inter-site archaeology sought to identify and report on socio-political organization and subsistence; and intra-site archaeology planned to understand human activity patterning.

Before procession archaeology, archaeology was not naturally seen as a science, because the conditions on one site or feature are never similar and so by definition not repeatable. Richard Gould states that one of the dictums of archaeology is that every site is unique. What the new archaeologists did was to make the scientific method practical within its limitations.

However, what processual archaeologists found was that the sites and cultures and circumstances varied too much to be simply a reaction to environmental conditions. It was a formal, Unitarian principle that archaeologist Alison Wylie called the 'paralysing demand for certainty'. There had to be other things going on, including human social behaviors that had nothing to do with environmental adaptations. The weakness of processual archaeology appeared from the beginning of its approach. The archaeologists believe that it is difficult to dig up a social system, ideology, a kingship terminology and a philosophy. Apart from this it is very complicated to reconstruct the social organization and ideology of a society. This is the most important reason for them to discard procession archaeology. The critical reaction to processualism born in the 1980s was called post-processualism, which is a different story but no less influential on archaeological science today. The post-procession archaeology, which identifies itself as an interpretative perspective and is against processualism, stresses the subjectivity and historical particular; anti-science and objectivity; symbolism, ideology; relative position and highlights the plurality of events and individuality.

Growth Of Archaeology In India

Since India was part of British Empire, during this period, a systematic study of archaeology in India began. The immense epigraphically, architectural and sculptural wealth of India was the subject of the attraction for the foreigners. Especially, the holy religious Centre's were always the subject of reverence for Indians and the curiosity for the foreigners who visited India as traders, travelers and rulers. As a matter of fact, Indians had respect and interest for preserving the old objects and their

epigraphically records. But we do not get evidence for any effort to study them in an orderly manner until the Brahmi script was successfully deciphered. From the 18h Century onwards the Officers of British East India Company began to take keen interest in the antiquarian wealth of India. In 1784, under guidance of Sir William Jones, a Judge of the Supreme Court, the 'Asiatic Society' was started in Calcutta for the study of history, the Antiquities, Art, Sciences and Literatures of Asia. This Society started publishing its own journal i.e. 'Asiatic Researches' in 1788. This gave a Phillip to Ideological studies in which archaeological methods were also applied. Archaeological work was limited to the preparation on notes on monuments in its initial stages. But the explorations done by H. H. Wilson in Afghanistan and Francis Buchanan in Bengal and Mysore brought to light many interesting antiquities such as coins, structural remains to temples etc. James Fergusson conducted an architectural survey of India between1829-1847. After the survey, he classified the monuments mainly concerned with field work, collected coins, and some of them tried to study them. Many epigraphic records were also found in almost all parts of India. Unfortunately the script remained undeciphered in which the records were written. It was successfully deciphered by James Prince pin 1838. He was an officer of Calcutta mint. He deciphered the brahmi script in which Ashokan edicts were written. This opened a new vista in the historical studies in India. India. Many other people, who were Alexander Cunnigham is known as Father of Indian Archaeology. He, as an army engineer had worked with Princep in his work on the decipherment of Brahmi script. He took keen interest in the study of ancient monuments and cities of India. He insisted on the systematic exploration and approached Lord canning the Governor General of India. Accordingly in 1861, Governor General established the 'Archaeological Survey of India' and appointed Alexander Cunningham as the Archaeological surveyor. He and his surveyors visited several historical monuments and remains and published reports with photographs and drawings. He identified the Chief Cities ad sacred places of ancient India such as the City of Taxila, Sravasti, Kausambi, all connected with Buddha, the Great Stupa of Bactrian, the inscriptions of Ashoka on the new rock edicts in Barhaut, characters. He published all his discoveries through which many scholars were attracted towards the field of archaeology. As a matter of fact, the archaeological techniques were not advanced, but Cunningham and his assistants had a great enthusiasm to explore and study the glorious past of India. They were the pioneers of Indian Archeology. The other Pioneers were K.F. Fleet Government Epigraphist Hultzsch - epigraphist for South Indian inscriptions. They made a wonderful job in discovery, study and publication of many inscriptions. Others were Meadows, Taylor and Bruce Fotte. They contributed to the study of geology of peninsular India and took keen interest in archeology. They discovered numerous Paleolithic, Neolithic and Megalithic sites. His collections of antiquities were published in two volumes in 1914. James Burgess succeeded Cunningham as the archaeological surveyor. He made many contributions in Indian Archeology. He started publishing two journals viz. 'Indian Antiquary' in 1872 'Epigraphic India' he also published the results of his elaborate surveys in

'Archaeological Survey of India' and "New Imperial series' in twenty volumes. Lord Curzon (1899-1905) also had sympathetic attitude from the preservation or ancient cultural relics and archaeological researches. His program included exploration, excavation, research, epigraphy, publication and preservation of monuments. He recognized and enlarged the archaeological survey of India. Sir John Marshall (1876-1958) was appointed as the District General in 1902 at very young age when he was just 26 years old. He placed Indian archeology on a permanent footing. During his tenure an administrative department was formed to maintain the monuments. He led many excavations. A number of historical and Buddhist sites were excavations was the discovery of many sculptures, inscriptions seals and coins. Besides, impressive structural remains of the Mauryan palace were discovered at Pataliputra and a fine town planning system under indo-Parthians at Taxila, It was during this period that the great Indus Valley Civilization was discovered at Harappa and Mohenjo - Daro in Sind. The work of the excavation of these sites was done earlier by D. R. Sahani and R. D. Banerjee. Later on the sites were extensively excavated by John Marshall and his assistants K. N. Dikshit, M. S. Vyas and Hargreaves. This discovery of Indus Valley Civilization created widespread interest in archeology in India which led to further more excavations in India, in 1939, the distinguished British archaeologist Sir Leonard Wooley was invited to advise on further policy on exploration 11 and excavation. He criticized the excavation techniques as outdated and propounded the need for the latest techniques adopted in Europe and America. It was in this situation that Mortimer Wheeler was appointed as Director General of Archeology in 1944. He recognized the department of archeology and expanded its activities in many branches such as excavation and conservation. He invited the scholars from the Universities to participate in the excavation. His sleeked le stated final DIKST, M. S. vyasano Hargreaves. TIS discovery or incus Valley Civilization created widespread interest in archaeology in India which led to further more excavations in India. In 1939, the distinguished British archaeologist Sir Leonard Wooley was invited to advise on the further policy on exploration 16 11 and excavation. He criticized the excavation techniques as outdated and propounded the need for latest techniques adopted in Europe and America. It was in this situation that Mortimer Wheeler was appointed as Director General of Archaeology in 1944. He recognized the department of archaeology and expanded its activities in many branches such as excavation and conservation. He invited the scholars from the Universities to participate in the excavation. His excavations gave significant results and were published. He started a new series of publication. They were Ancient India and Indian Archaeology. HE realized the need to train young scholars in the field of archaeology and started the training center at Taxila. In post-independence period in 1960, this centre was transformed into the 'School of Archaeology' Archaeology was introduced in Indian Universities. Indian archaeologists were sent abroad to learn the latest techniques. In brief, wheeler brought Indian archaeology in line with the best International Standard. After Wheeler the Archaeological survey of India is practically manned by

Indian Archaeologists. Most of them were trained by Wheeler. In 1960 a School of Archaeology was established under the Archaeological Survey of India. In present days it is functioning as the Institute of Archaeology. In addition, many universities offer archaeology as a subject. There are many state level and University departments of archaeology. May universities such as Deccan College (Pune), Karnataka University (Dharwar), Calcutta University and many other Indian Universities have their departments of ancient history and archaeology. In these universities a large number of young scholars are trained in many branches of archaeology such as explorations, excavations, art and architecture, Numismatics, etc. the work now is carried on by may research institutes such as "Deccan College Post Graduate and Research Institute", Pune, "Jayaswal Research Institute", Patna. The eminent archeologists viz, H. D. Sankalia and his associates such as S. B. Deo, A. Ghosh, V. D. Krishnaswami, B. Subba Rao, B. B. Lal, G. R. Sharma, K. R. Srinivasan, M. N. Deshpande, B. K. Thapar, S. R. Rao, K. V. Sunder Rajan, R. V. Ghosh, K.N. Dikshit, J. P. Joshi, SurajBhan and others. All these institution and individuals have made a valuable contribution in the field of archaeology.

Archaeological Survey of India:

A survey of archaeological remains throughout India is indispensable to the study of history. For the period when writing was unknown, we have to rely only on archaeological remains to trace the history. Moreover, ancient records have perished with the passage of time. The first systematic research into the subcontinent's history was conducted by the Asiatic Society, which was founded by William Jones on January 15, 1784.

Prominent among the early members of the society was Charles Wilkins who published the first English translation of the Bhagavad Gita in 1785 under the patronage of the then Governor-General of India, Warren Hastings. However, the most important of the society's achievements was the decipherment of the Brahmi script by James Prinsep. This successful decipherment inaugurated the study of Indian palaeography. Alexander Cunningham, a protégé of Prinsep, carried out a detailed survey of the Buddhist monuments. Inspired by early amateur archaeologists like the Italian military officer, Jean-Baptiste Ventura, Cunningham excavated many stupas of India. Cunningham funded many of his early excavations himself. However, he gradually realized the need for a permanent body to oversee archaeological excavations and the conservation of Indian monuments and used his stature and influence in India to lobby for an archaeological survey. Thus, the Archaeological Survey of India was eventually formed in 1861 by an act passed into law by Lord Canning with Cunningham as the first Archaeological Surveyor.

Between 1865 and 1871, the survey was abolished briefly due to the lack of funds but restored by Lord Lawrence, the then Viceroy of India. In 1871, the Survey was revived as a separate department and Cunningham was appointed as its first Director-General. Continuing until today, Alexander Cunningham is regarded as the 'Father of Indian Archaeology'.

In 1885, Cunningham was retired and was succeeded as Director- General by James Burgess. Burgess started a yearly journal The Indian Antiquary (1872) and an annual epigraphical publication Epigraphic Indica(1882) as a supplement to the Indian Antiquary. Under Burgess much attention had been devoted to the great monuments of Agra, Jaunpur, Delhi, Lahore etc. The post of Director General was permanently suspended in 1889 due to paucity of funds and was restored in 1902. During this period, conservation work in the different circles was carried out by the superintendents of the individual circles.

Lord Curzon restored the post of Director-General in 1902. Breaking with tradition, Curzon appointed John Marshall, a professor of classical studies at Cambridge University, to head the survey. Marshall served as Director-General from 1902 to 1928. He replenished and revived the survey whose activities were fast dwindling into insignificance. He modernized the approach to archaeology, introducing a program of cataloguing and conservation of ancient monuments and arte facts. He initiated the practice of allowing Indians to participate in excavations in their own country.

Marshall created the post of Government epigraphist and encouraged epigraphical studies. However, the most noteworthy event of his tenure was the discovery of the Indus Valley Civilization in 1921. The success and level of the discoveries ensured that the progress made in Marshall's tenure would remain unsurpassed. Harold Hargreaves succeeded Marshall in 1928. Hargreaves was succeeded by Daya Ram Sahni, supervisor of Marshall's excavation of Harappa in 1921, who in 1931 became the first Indian Director General of the Archaeological Survey of India.

Daya Ram Sahni was succeeded by J. F. Blakiston and K. N. Dikshit both of were involved in the excavations at Harappa and Mohenjodaro. In 1944, Mortimer Wheeler, a British archaeologist and army officer, took over as Director-General and served till 1948. During his tenure, Wheeler excavated the Iron Age site of Arikamedu and the Stone age sites of Brahmagiri, Chandravalli and Maski in South India. Wheeler established a new archaeological journal, Ancient India in 1946 and presided over the partitioning of ASI's property during the Partition of India and helped establish an archaeological body for the newly-formed Pakistan.

Wheeler was succeeded by Niranjan Prasad Chakravarti in 1948. On 15 August 1949, the National Museum was inaugurated in New Delhi to house the artifacts displayed at the Indian Exhibition in the United Kingdom. Chakravarti was succeeded by MadhoSarup Vats and Amalananda Ghosh Ghosh's tenure, which lasted until 1968, is renowned for the excavations of

Indus Valley sites at Kalibangan, Lothal and Dholavira. In 1958, the Ancient Monuments and Archaeological Sites and Remains Act was passed which brought the archaeological survey under the aegis of the Ministry of Culture. A. Ghosh was succeeded by BrijBasiLal who conducted archaeological excavations at Ayodhya to examine whether a Ram Temple preceded the Babri Masjid. During his tenure, the Antiquities and Art Treasures Act (1972) was passed advocating central protection for monuments considered to be 'of national importance'.

Lal was succeeded by MadhusudanNarhar Deshpande whose tenure lasts from 1972 to 1978 and BalaKrishanThapar who served from 1978 to 1981. On Thapar's retirement in 1981, archaeologist DebalaMitra succeeded him and became the first woman Director- General of the Archaeological Survey of India. Mitra was succeeded by M. S. Nagaraja Rao. Archaeologists JagatPati Joshi and Munish Chandra Joshi succeeded Rao. When the Babri Masjid was demolished in 1992, Munish Chandra Joshi was the Director- General of ASI. The demolition generated Hindu-Muslim riots all over the India. As a result of the demolition, Joshi was terminated in 1993 and controversially replaced as Director-General by Indian Administrative Service (IAS) officer Achala Moulik, a step which initiated a tradition of appointing IAS bureaucrats in place of the appointment of archaeologists to head the survey. The tradition finally culminated in 2010 when Gautam Sengupta, an archaeologist, replaced K. M. Srivastava, an IAS officer, as Director- General. He was again succeeded by Pravin Srivastava, another IAS officer.

Srivastava's successor Rakesh Tiwari was also a professional archaeologist. He was succeeded by another bureaucrat Usha Sharma who is the present Director General of Archaeological Survey of India.

The Archaeological Survey of India functions as an attached office of the Ministry of Culture. Till date, it has declared 3,686 monuments to be of national importance to the country. The major activities of ASI are-

1. Maintenance, conservation and preservation of centrally-protected monuments/sites and remains;
2. Conducting archaeological explorations and excavations;
3. Chemical preservation of monuments and antiquarian remains;
4. Architectural survey of monuments;
5. Development of epigraphical research and publications;
6. Setting up and reorganization of site museums;

7. Training in different areas of Archaeology.

THE ASIATIC SOCIETY:

The Asiatic Society was founded on 15 January 1784 by Sir William Jones in a meeting presided over by Sir Robert Chambers in the Grand Jury Room of the Supreme Court at the Fort William in Calcutta, then capital of the British, to enhance and further the cause of Oriental research. At the time of its foundation, this Society was named as 'Asiatick Society'. In 1825, the society dropped the antique k without any formal resolution and the Society was renamed as 'The Asiatic Society'. In 1832, the name was changed to 'The Asiatic Society of Bengal' and again in 1936 it was renamed as 'The Archaeology in India – I Royal Asiatic Society of Bengal.' Finally, on 1 July1951 the name of the society was changed to its present one. The main objectives of the Society were as follows:

- To organize lectures, seminars, symposia, discussions, meetings and award of medals, prizes and scholarships in furtherance of the objectives.
- To establish, build, erect, construct, maintain and run research institutions, reading rooms, museums, auditoriums and lecture halls
- To organize, initiate and promote researches in Humanities and Science in Asia

On September 29, 1796 the Society decided to have its own building. J.H. Harrington, then Vice-President selected the corner of Park Street and Chowringhee Road Kolkata (present location) for the Society's house and the site was granted to the Society. The original plan for the new building was prepared by Captain Thomas Preston and modified by the French architect, Jean-Jacques Pichou. The first quarterly meeting of the Society was held at its new building on 3 February1808. The Society is housed in a building at Park Street in Kolkata (Calcutta). The Society moved into this building during 1808. In 1823, the Medical and Physical Society of Calcutta was formed and all the meetings of this society were held in the Asiatic Society.

Charles Wilkins and Alexander Hamilton were the distinguished early members of the Society. Initially, the Grand Jury Room of the Supreme Court was used for the meetings of the members, who were required to pay a quarterly fee of two mohurs. The members were elected by means of ballot-voting.

Initially, only the Europeans were elected members of the Society. However, at the initiative of Hoarse Hayman Wilson, a number of Indians were elected members in 1829, which included Dwarakanath Tagore, Sivchandra Das, Maharaja Baidyanath Roy, Maharaja BunwariGovind Roy, Raja KalikrishnaBahadur, Rajchunder Das, Ram ComulSen and Prasanna Coomar Tagore. Ram Comul Sen was elected 'Native Secretary' on December 12, 1832. Later on, RajendralalMitra became

the first Indian President of the Society in 1885. Both the oriental's, Brajendranath De, and one of his grandsons, the historian, Barun De, were for some time vice president of the Asiatic Society.

Collection of the old manuscripts was one of the main activities of the Asiatic Society. There was a vast collection of Sanskrit manuscripts with the society. At present, the library of the Asiatic Society has a collection of around 117,000 books and 79,000 journals printed in almost all the major languages of the world. It has also a collection of maps, microfilm, paintings, pamphlets and photographs. The earliest printed book preserved in this library is JuliFirmici's Astronomic rum Libriwhich was published in 1499. It also has a large number of books printed in India in the late 18thand early 19th centuries. The library also possesses many rare and scarcelyavailable books. It has a rich collection of about 47,000 manuscripts in 26scripts. The most noteworthy amongst them are an illustrated manuscript of the Qur'an, a manuscript of the Gulistantext, and a manuscript of Padshah Nama bearing the signature of Mughal Emperor Shahjahan. At present there are around 80,000 journals in the library.

The Society also proved to be a key centre of Oriental studies and research and extended its helping hand to the other two major centers of activity that paved the way to the Indian Renaissance, namely, the College at Fort William and the Sera pore Mission of William Carey. A proposal came to the Asiatic Society from the Sera pore Mission in 1805 to publish classical Sanskrit works with their English translations, and Ramayana was the first book chosen for this. The Society spent five thousand five hundred rupees from its fund for this purpose. From 1788 till its end in 1839 the journal Asiatic Researches ran into twenty volumes and was superseded by the Journal of the Asiatic Society, henceforth the official organ of the Society.

The Library of the Asiatic Society is its most important asset and its importance lies not only in numerical strength of its holdings but also in its rich and unique contents.3 Contribution of the Society members enrichedthe library. Henry Richardson provided seven Persian manuscripts to thelibrary on March 25, 1784. William Mardsen gifted his book The Historyof Sumatra (1783) on November 10, 1784. Robert Home, the first Library in-Charge (1804) donated his valuable collection of works on art. The first accession of importance was a gift from the Seringapatam Committee on February 3, 1808 consisting of a collection from the Palace Library of TipuSultan. Surveyor-General Colonel Mackenzie contributed to the library by donating his collection of manuscripts and drawings in December 1822.

Since 1849, the Society has printed Bibliotheca Indica, a collection of rare and unpublished works belonging to Oriental literature and containing original text-editions as well as translations into English, and also grammars, dictionaries, bibliographies, and studies.4 In the 20th century, valuable collection of books were donated by Dr. B.C. Law, Dr. G.W. Gurner, RamaPrasad

Chanda, Dr. Pratul Chandra Gupta, Dr. Nirmal Kumar Bose, Dr. PratapChandra Chunder and several individuals.

The Asiatic Society announced its intention of establishing a Museumin 1796 and it was actually established in the beginning of 1814 under the superintendence of Dr. Nathaniel Wallich, a Danish botanist. The rapid growth of its collection is evident from the first catalogue, published in Archaeology in India – I1849 and other descriptive catalogues of different sections. In 1839, theSociety proposed to the Government for setting up a public museum at Calcutta and the Indian Museum of Calcutta was established in 1866. The Society handed over its valuable collections to it. The Society however still maintains a museum of its own possession of Ashokan Rock Edict (250 BC),copper plates, coins, sculptures, manuscripts and archival records. Some works of genius, like Joshua Reynolds' Cupid asleep on Cloud ,Guide Cagnacci's Cleopatra, Thomas Daniell'sA Ghat at Benares and Peter PaulRubens' Infant Christ are also in the possession of this museum.

Three historical factors explain the success of Asiatic Society. Firstly, it was evident that the early British role of the trader would be replaced by that of a territorial ruler, and the time was ripe for a systematic investigation of the country. Secondly, as Poliakov has shown, in their effort to free themselves from Judaeo-Christian thought, Western philosophical thinking turned to India for the origin of culture and religion. This approach is well reflected in the works of Voltaire, who was 'convinced that everything has come to us from the banks of the Ganges, astronomy, astrology, metempsychosis, etc.' This image of India considerably influenced German Romanticism. Thirdly, the closing years of the 18th century witnessed the growth of many literary and philosophic societies in Britain. By 1815 every important provincial town had its society, supported by both the local aristocracy and the local manufacturers who were equally aware of the social value of scientific discovery. The results of this activity were vast and valuable. The flora and fauna of Britain,the nature of its soils and rocks, were examined in detail, catalogued, and given a scientific order and arrangement. The foundation of the Asiatic Society in Calcutta was totally in keeping with the scientific spirit of late eighteenth century Britain.

Check your Process

1. Trace the evolution of archaeology from Antiquarianism to its modern form.
   ……..
2. Detail the process of archaeology in the Western context, emphasizing its growth in India.
   ……..
3. Evaluate the role and contributions of the Archaeological Survey of India in the development of archaeology in India.
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Unit-III

- Archaeological Studies – Educational Institutions - Early Archaeologists in India –Robert Bruce Foote – Alexander Rae – Alexander Cunningham, Sir John Marshall, Sir Mortimer Wheeler, Jean Mariacastle, H.D.Sankalia

Objective

- Understand the method of site survey
- Examine the Early Archaeologists in India
- Analyse the process of Sir Mortimer Wheeler Archaeology Contribution work

EARLY ARCHAEOLOGISTS IN INDIA

❖ ALEXANDER CUNNINGHAM

Alexander Cunningham was born in London on 23 January 1814 to Allan Cunningham and his wife Jean née Walker. He received his early education at Christ's Hospital, London. Through the influence of Sir Walter Scott, Alexander Cunningham obtained cadetship at the East India Company's Add is combe Seminary (1829–31), and received technical training subsequently at the Royal Engineers Estate at Chatham. At the age of 19, he joined the Bengal Engineers as a Second Lieutenant and spent the next 28years in the service of British Government of India.

Cunningham arrived in India on 9 June 1833. Those were the days of Orientals in India. He met James Prinsep and during 1837 and 1838,he was in daily communication with Prinsep. Soon, Cunninghum became Prinsep's intimate friend, confidant and pupil. Prinsep passed on to him his lifelong interest in Indian archaeology and antiquity.

He served as an aide-de-camp (ADC) to Lord Auckland, the then Governor-General of India, from 1836 to 1840. He paid his visit to Kashmir during this period. In 1841, Cunningham was made executive engineer to the king of Oudh. In 1842, he was called by the ruler of Jaipur to serve in the army for suppressing an uprising in Bundelk hand. He was then posted
At Now gong in Central India before he saw action at the Battle of Punniar in December 1843. Then he joined as an engineer at Gwalior and in 1844-45, he got constructed an arched stone bridge over the Morar River. In1845–46, he was sent to Punjab where he helped construct two bridges of boats across the Beas River prior to the Battle of Sobraon. In 1846, he was appointed commissioner to demarcate boundaries. Letters were written to the Chinese and Tibetan officials by Lord Hardinge, but no officials joined. In 1847, a second commission was set up which was led by Cunningham to establish the Ladakh-Tibet boundary, which also included Henry Strachey and Thomas Thomson. The commission aimed at delimiting the northern boundaries of the Empire after the First Anglo-Sikh War, concluded with the Treaty of Amritsar, which ceded Kashmir as war indemnity expenses to the British. His work

Essay on the Aryan Order of Architecture (1848) resulted from his visits to the temples in Kashmir and his travels in Ladakh duringhis tenure with the commission. He also explored the Buddhist monuments of Central India along with Lieutenant Maisey in 1851 which is mentioned in his account.

In 1856, he was assigned the duty of Chief Engineer in Burma, which had just been annexed by the British. But archaeology remained his obsession. He stayed there for two years and from 1858 served for three years on the same post in the North-Western Provinces. In both regions, he established public works departments. He was therefore absent from India during the Revolt of 1857. In 1860, he was appointed Colonel of the Royal Engineers and retired as Major General on 30 June 1861.

Alexander Cunningham's contribution towards Indian Archaeology:

Cunningham had showed keen interest in antiquities early in his career. Excavations became a regular activity among British antiquarians after Jean-Baptiste Ventura, general of Ranjit Singh, who inspired by the French explorers in Egypt had excavated the bases of pillars to discover large stashes of Bactrian and Roman coins. In 1834, Cunninghum wrote to the Journal of the Asiatic Society of Bengal, an appendix to James Prinsep's article on the relics in the Manikyala Tope. He had conducted excavations at Sarnath in 1837 and made careful drawings of the sculptures. In 1842, he excavated at Sankissa and at Sanchi in 1851. He published The Bhilsa Topes in 1854 in an attempt to establish the history of Buddhism based on architectural evidence.

The need for a methodical survey under government sponsorship was being increasingly felt by Cunninghum and by 1851 he initiated communication with the East India Company on the value of an archaeological survey.

After Cunninghum's retirement from the military service, the Viceroy of India Lord Canning appointed him as an archaeological surveyor to the Government of India in 1861. He held this post from 1861 to 1865. Most antiquarians of the 19th century who took interest in identifying the major cities mentioned in ancient Indian texts did so by gathering clues found in classical Graeco-Roman records and the travelogues of travellers to India such as Fa-Hein and Hsuan-Tsang. Cunningham succeeded in identifying some of the places mentioned by Hsuan-Tsang and counted among his major achievements the identification of Aornos, Taxila, Sangala, Srughna, Ahichchhatra, Bairat, Sankisa, Shravasti, Kaushambi, Padmavati, Vaishali, and Nalanda.

Cunningham would also regularly corroborate his identifications through field surveys unlike his contemporaries. Particularly the identification of Taxila was made difficult partly

due to miscalculation of the distances recorded by Pliny in his NaturalisHistoriawhich pointed to a location somewhere on the Haro River, two days march from the Indus. Cunningham noticed that this position did not match with the route of Chinese pilgrims. His subsequent explorations in 1863-64 testified his hypothesis.

After his department was disbanded in 1865 due to lack of funds, Cunningham returned to England and wrote the first part of his Ancient Geography of India (1871), covering the Buddhist period; but failed to complete the second part, which covered the Muslim period. In 1870, Lord Mayo revived the Archaeological Survey of India, wherein Cunningham served as the Director-General from 1 January 1871. So he returned to India and made field explorations each winter, conducting excavations and surveys from Taxila to Gaur. He produced twenty-four reports, thirteen as author and the rest under his supervision by others. Other major works included the first volume of Corpus inscriptionumIndicarum(1877) which included copies of the edicts of Ashoka, the Stupa of Bharhut(1879) and the Book of Indian Eras (1883) which allowed the dating of Indian antiquities. No archaeologist in India, before or since, has had such a close personal familiarity with such an impressive stretch of territory. In his Memorandum of Instructions to his assistants written in 1871, Cunningham set a high ideal for archaeology:

'Archaeology is not limited to broken sculptures, old buildings and mounds of ruins, but includes everything that belonged to the world's history …. But our researches should be extended to all ancient remains whatever that will help to illustrate the manners and customs of former times'.

Cunningham collected a large number of coins, but much of that was lost when the steamship he was travelling in, the Indus, was wrecked off the coast of Sri Lanka in November 1884. However, the British Museum obtained most of the gold and silver coins. He had suggested to the British Museum that they should use the arch from the Sanchi Stupa to mark the entrance of a new section on Indian history. He also contributed numerous papers in the Journal of the Asiatic Society and the Numismatic Chronicle. He retired from the Archaeological Survey on September 30, 1885 and returned to London to continue his research and writing and wrote two books on numismatics. He was knighted in 1887. He died on 28 November 1893 in London.

SIR JOHN MARSHALL:

Sir John Hubert Marshall was the Director-General of the Archaeological Survey of India from 1902 to 1928. He was born on March 19, 1876 at Chester in England. He was educated at Dulwich College, London as well as King's College, Cambridge. In 1902, the Viceroy of India, Lord Curzon, hired John Marshall immediately after he finished his degree at Cambridge on the basis of his

archaeological experience in Greece and Turkey. He was appointed as the Director-General of Archaeology within the British Indian administration. Marshall modernized the approach to archaeology introducing a program of cataloguing and conservation of ancient monuments and artefacts. He was at the forefront of the archaeology era in India becoming a prominent scholar who focused on the Indian archaeology scene. It was under the direct patronage of Lord Curzon that John Marshall began work. It was he who laid down the basic guidelines of this work:

It is in the exploration and study of purely Indian remains, in the probing of archaic mounds, in the excavation of old Indian cities, and in the copying and reading of ancient inscriptions, that a good deal of the exploratory work of the archaeologist in India will in future lie . . . It is in my judgment equally our duty to dig and discover, to classify, reproduce, and describe, to copy and decipher, and to cherish and conserve."

Marshall initiated the practice of permitting Indians to participate in excavations in their own country. In 1913, he started the excavations at Taxila, which lasted for two decades. In 1918, he laid the foundation stone for the Taxila Museum, which today hosts many artefacts. He then moved on to other sites, including the Buddhist centres of Sanchi and Sarnath.

Marshall's work gave evidence of the age of Indian civilization especially the Indus Valley Civilization and the Mauryan age. He started the excavation at Harappa with Daya Ram Sahni as the director and Harappa was discovered in 1921. In 1922, work began at Mohenjo-Daro with Rakhal Das Banerjee. The results of these excavations, which revealed a seeming ancient culture with its own writing system, were published in the Illustrated London News on September 20, 1924. Researchers linked the artefacts found at the two sites with the ancient civilization of Sumer in Mesopotamia. John Marshall announced the discovery of a new civilization in the Indus valley to the world. As S.N. Roy noted in The Story of Indian Archaeology, 'Marshall left India three thousand years older than he had found her.' This was because similar, till-then-unidentified seals were found at excavations at Mesopotamian sites. It was then that the world knew not only of a new civilization, but also of one contemporaneous with Mesopotamia. John Marshall also conducted excavations at the prehistoric site of SohrDamb mound near Nal in Baluchistan. He is also known for his important role in the excavations at Knossos and many other sites on Crete between 1898 and 1901. Marshall was appointed a Companion of the Order of the Indian Empire (CIE) in June 1910 and knighted in January 1915.

A new era of archaeology dawned with John Marshall. He reorganized the administrative structure of the Archaeological Survey of India and gave it a permanent footing for, 'the work of the archaeological officers is of a kind which cannot be discharged by any other existing agency and it can only cease if the government cease to admit their responsibility for the preservation of the ancient remains in the country.'

Marshall directly shaped the course of Indian archaeology. Conservation of ancient monuments and objects was among his main concerns and the basic principles of conservation laid down by him in the Indian context are still pursued by the survey. The survey was reorganized and centrally consolidated. The whole of the Indian sub- continent was divided into a number of archaeological circles, each with its complement of officers and men. Under John Marshall, the Archaeological Survey of India became the largest single organization of its kind in the history of archaeological research and witnessed it's most magnificent period. The details of the discoveries and excavations conducted in India during this period by Marshall and his colleagues perhaps do not fit into the present survey of archaeological traditions, but a few significant points cannot be ignored. Firstly, the Annual Reports reveal that each and every part of India was given due attention. Secondly, a study of the number of memoirs published shows that specialized studies of monuments, sites and areas were not ignored. Thirdly, some of the discoveries and excavations revolutionized the study of Indian archaeology and ancient history-the discovery of the Indus Valley Civilization, explorations of Aurel Stein in Baluchistan and of N. G. Majumdar in Sind, and the excavations at Taxila and at some of the most important early historical sites of the Gangetic valley.

Fourthly, it was during this period that the people of the Indian subcontinent were appointed to superior positions in the Survey and associated with both excavations and discoveries. Many Indian scholars like BhagawanlalIndraji, Ram Raj, and RajendralalMitra had shown their merit in the field of Indological studies in the nineteenth century and the help of the traditional Indian scholars was indispensable for the early decipherment of inscriptions. However, it was during this period that archaeology became a renowned part of Indian academic thinking.

Historical scholarship about India had already come of age when John Marshall was directing the Indian archaeological scene. Political history, religion, economy and culture of ancient India had been established on the basis of textual, inscriptional, numismatic, architectural, sculptural and other sources. Important sites associated with the course of ancient Indian history remained largely unexcavated so the historical image of ancient India was not clear. However, the excavations conducted by Marshall at the sites of Taxila, Bhita, Sravasti, Vaisali, Rajagriha, Sarnath

and Nalanda unveiled the curtains. The work started by Marshall suddenly made the Buddhist period alive in the Indian cultural consciousness. In the field, Marshall was primarily concerned with the horizontal exposure of sites. This had not been earlier attempted in the Indian context. In fact, except the work of Bellasis at Brahminabad in Sind, no archaeologist had even thought about the total picture of the site.

Under Marshall's leadership, structures were separately described and their positions plotted in relation to the total plan of the site. Their history was determined on the basis of successive structural phases. Plans were drawn of the excavated settlement all together and the main cultural occupations were recreated both on the basis of structural remains and antiquities.

Marshall's excavation methods have been criticized on the ground that the depth of antiquities and 'strata' was interpreted in relation to a fixed bench-level on the top of the mound, in defiance of the principles of modern stratigraphic excavation. However, he achieved what he desired: a total picture of the site and its main historical-cultural periods. This point was later on accepted by Mortimer Wheeler who the strongest critic of Marshall's excavations.4 He retired in 1928 and passed away on August 17, 1958.

SIR MORTIMER WHEELER:

Sir Robert Eric Mortimer Wheeler was a British archaeologist and officer in the British Army. He was born on September 10, 1890 in Glasgow to a middle class family. He was raised largely in Yorkshire before relocating to London in his teenage years. He studied the Classics at University College London (UCL) and started working professionally in archaeology, specializing in the Romano-British period. During the First World War he volunteered for service in the Royal Artillery. Later on, he obtained his doctorate from UCLbefore taking on a position at the National Museum of Wales. In 1926, he was appointed Keeper of the London Museum. In 1934, he established the Institute of Archaeology as part of the federal University of London, adopting the position of Honorary Director. During the Second World War, he re-joined the Armed Forces and rose to the rank of brigadier.

In 1944, he was appointed as the Director-General of the Archaeological Survey of India. From the beginning of his tenure, he sought to distance himself from previous Directors-General and their administrations by criticizing them and tried to introduce new staff who had no loyalty to his predecessors. He was assigned with a four-year contract (1944-48). He then toured the subcontinent, seeking to meet all of the Survey's staff members. He had drafted a prospectus containing research questions that he desired the Survey to lay emphasis on. These comprised

understanding the period between the Indus Valley Civilization and the Achaemenid Empire, discerning the socio-cultural background to the Vedas, dating the Aryan invasion, and establishing a dating system for southern India before sixth century A.D. His tenure also witnessed a 25 per cent budget increase for the Archaeological Survey, and convinced the government to agree to the construction of a National Museum of Archaeology, to be built in New Delhi.

His work was exceptional in many respects. First, he took an overall view of archaeology beginning with the Palaeolithic Age and stressed the need for scientific analyses in archaeology. For example, the study of animal, human and crop remains at the Indus Valley cities of Mohenjo-Daro and Harappa, and the chemical analyses of metal samples from some sites. It was Wheeler who first argued the basic necessity of scientific aids in archaeology in India. Second, he emphasized the need for careful archaeological planning which was something new for India. Third, by conducting excavations at Taxila, Harappa and Arikamedu he not only demonstrated the importance of such planning by solving major problems associated with these sites but also introduced the modern concept of archaeological stratigraphy to India. He also introduced there for the first time the importance of the study of stratified ceramic material for determining the cultural succession at excavated sites and its importance in comparative study of material between different sites. Fourth, he gave field training in his methods to a large number of Indian students who have kept his excavation techniques alive since then. He also wrote many articles on the excavation methods. Fifth, he realized that in such a large country like India it was not possible for Archaeological Survey alone to do the work. So he introduced effective participation by the universities and it was under his guidance and inspiration that several Indian universities started archaeological research.

Among other innovations, he developed the use of a Cartesian coordinate system, or three-dimensional grid, with which the materials found in archaeological excavations, could be recorded. Wheeler's final contribution to the tradition of Indian archaeological research is something indescribable and can be cherished only by those who have felt it, directly or indirectly. He was at the helm of the Survey for only four years; despite this he infused an element of urgency into the Indian archaeological research. Archaeology in India became more exciting under him. He retired from the University of London in 1955 and died on July 22, 1976 in Leatherhead, near London.

Sir William Jones:

Sir William Jones was an English philologist and a student of ancient India, particularly known for his proposition of the existence of a relationship among Indo-European languages. He was born at

Beaufort Buildings, Westminster, and London on 28 September 1746. His father William Jones, F.R.S, an able mathematician, died in 1749 and William Jones was raised by his mother Marie Nix Jones. He was sent to Harrow School in September 1753 and then went on to Oxford University. He graduated there in 1768 and completed his post-graduate degree in 1773.

He was a linguistic prodigy. Alongside his studies he learnt Greek, Latin, Persian, Arabic and the basics of Chinese items at an early age. He then embarked on a career as a tutor and translator. During this time at the request of King Christian VII of Denmark he published Histoire de Nader Chah(1770), a French translation of a work originally written in Persian by Mirza Mehdi Khan Astarabadi. At the young age of 24, he acquired a reputation as an orientalist. In 1770, he joined the Middle Temple and studied law which ultimately led to his appointment as puisne judge to the Supreme Court of Judicature at Fort William in Calcutta, Bengal in March 1783. He arrived in Calcutta on 25 September1783.

As mentioned earlier, Sir William Jones established the Asiatic Society in January 1784. Governor-General Warren Hastings was its patron and William Jones was its founding president. Jones was a great philological scholar who was proficient in Arabic and Persian languages when he was appointed to India and he knew 28 languages by the end of his career there. He gradually developed interest in Sanskrit, translating significant pieces of Hindu literature and Hindu and Arabic/Muslim legal texts, which contributed to the establishment of a civil law code in India. His Digest of Hindu and Muslim Laws (completed by Henry Colebrooke) was his major contribution. The aims of Asiatic Society were to inquire into history, antiquities, arts, sciences, and literature of Asia, and from the beginning it was envisioned that the learned Indians would become its members. Between 1788 and 1839, the Society collected and published on oriental manuscripts, coins and antiquities in Society's journal Asiatic Researches which set the standard for oriental research of the day. In 1847, the Society started making a wide variety of oriental literature more broadly available in Bibliotheca Indic series. It served as a model for the foundation of the Royal Asiatic Societies in the West.

The foundation of the Asiatic Society in India was the consequence of European Enlightenment. It was the belief in the value and benefits of knowledge and science and in universal history. Biblical history and chronology was based on the belief that all humans were related and one of the major tasks of the Society in India was to prove it. William Jones believed that Indian's were descendents of Noah's son Ham and that Sanskrit was related to other ancient languages, such as Phoenician, Egyptian, and Celtic. He pointed out that Sanskrit was the fountain head of many languages: "The Sanskrit language whatever be its antiquity, is of a wonderful structure more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could possibly have been produced by accident."

He further believed that for 3,500 years Sanskrit was the language Archaeology in India – I of philosophy, religion, medicine, astronomy, mathematics, literature and of all branches of learning not only in India, but also in every other region influenced by the Indian culture until their conquest by Muslims and the use of Arabic by the new ruling class and religion. Through his knowledge of Sanskrit language, a mixture of many older Indo-Aryan dialects, and by comparing it with the history and developments of other languages, he created Indo-European linguistics.

By associating Sanskrit to the European language family, William Jones integrated Hindu civilization to that of Europe. He had an indirect influence on the growth of the science of comparative philology. He collected evidences to prove that the game of chess was discovered in India. He supported the premise that Plato and Pythagoras borrowed their philosophical ideas from India. The two principles of non-duality of God (advaitavada) and the transmigration of the soul of Hinduism fascinated William Jones. He showed that India excelled in logic, geometry and arithmetic. In his last discourse to the Society he observed that Newton's theory and part of his philosophy may be found in the Vedas.

By means of his works, William Jones changed the public opinion towards India. He showed that the Indians had a civilization when Europe did not. He and his co-workers at the Asiatic Society were evidence of a type of intellectual archaeology, of exploring and appreciating South Asia through the history of its culture. They believed in the great contribution of oriental civilization to world history and made it accessible to Europe and to India itself. The oriental studies became a respected discipline as a result of the efforts of Society's members.10 Indian archaeology is highly indebted to Sir William Jones. His discovery of the synchronism between Chandragupta Maurya and Alexander the Great provided Indian archaeology with its first positive date i.e., 326 BC. In 1788, Charles Wilkins, a close associate of William Jones, revealed the mysteries of the Gupta as well as the Kutila scripts and laid the foundation of epigraphically studies in India.

Thus, William Jones is one of the most interesting figures in the history of India. He was not only an erudite scholar who knew more than two dozen languages but made a number of great discoveries in Indian studies. He died in Calcutta on 27April 1793 at the age of 47 and is buried in South Park Street Cemetery. The Asiatic Society survived William Jones's death and opened its doors to the members of the Bengali intelligentsia in 1829. Dwarkanath Tagore was among the first Indian members of the Society. By promoting Indian culture, William Jones gave India a weapon in their hands which could be used against the Europeans whenever they attempted to belittle the Indian civilization.

H. D. Sankalia

Dr. Hasmukh Dhirajlal Sankalia, known as H. D. Sankalia, was a prominent Indian archaeologist who made significant contributions to the field of archaeology, particularly in the study of prehistoric and protohistoric cultures in the Indian subcontinent.

Born on December 10, 1908, in Maharashtra, India, Sankalia's academic journey began at Elphinstone College, Mumbai, where he pursued studies in history and archaeology. He later earned his Ph.D. in archaeology from the University of London in the early 1930s.

Throughout his career, Sankalia conducted extensive archaeological fieldwork and research across various regions of India. He focused primarily on the prehistoric cultures of the Indian subcontinent, studying their material culture, settlements, and technological advancements.

Sankalia held several key positions in academia and research institutions. He served as the Director of the Deccan College Postgraduate and Research Institute in Pune, India. Under his leadership, the institute became a prominent center for archaeological research and education in India.

His notable contributions include studies on the Stone Age cultures of India, particularly the Acheulian, the Soanian, and the microlithic cultures. Sankalia's research shed light on the early human occupation of the Indian subcontinent, the evolution of tools and technology, and the cultural developments of ancient societies.

He also made significant efforts in establishing the importance of interdisciplinary approaches in archaeology, advocating for collaborations with geologists, anthropologists, and other scientists to gain a comprehensive understanding of ancient cultures.

H. D. Sankalia authored numerous scholarly works and research papers, contributing significantly to the understanding of India's prehistoric and protohistoric past. His dedication to archaeological research and his efforts in advancing the study of ancient Indian cultures have left a lasting impact on the field of archaeology in India and beyond.

Sankalia passed away on December 28, 1989, leaving behind a legacy of groundbreaking research and a deep influence on the study of Indian archaeology.

Check Your Process

1. Discuss the educational institutions involved in archaeological studies.

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2. Highlight the contributions and significance of early Indian archaeologists such as Robert Bruce Foote, Alexander Rae, Alexander Cunningham, Sir John Marshall, Sir Mortimer Wheeler, Jean Maria castle, and H.D. Sankalia in shaping Indian archaeology.

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Unit-IV

- Exploration- Aims –Methods - Manual and Scientific Excavation – Methods of Excavation – Vertical, Horizontal, Quadrant Method, Underwater Archaeology; Stratigraphy: Definition, Scope and Methodology; Recording Methods: Photography, Plan and Section Drawing, Three Dimensional Measurements; Dating Methods: Absolute Dating Methods: Radio Carbon and AMS Dating – Thermo luminescence and OSL Dating – Potassium Argon – Uranium Series – Fission Track – Electronic Spin Resonance – Dendro chronology – Relative Dating: Flouring Method – Nitrogen Method – Varve Analysis – Stratigraphy – Serration – Historical Dating.

Objective

- Understand land survey
- Examine topographical survey
- Discuss stratigraphy and its importance

Exploration- Aims –Methods

Archaeological exploration involves the systematic study and investigation of past human cultures and civilizations through the analysis of material remains, artifacts, structures, and landscapes.

Aims of Archaeological Exploration:

- **Understanding Human History:** Archaeology aims to reconstruct and understand the history, lifestyles, and behaviors of past human societies.
- **Preservation:** It seeks to preserve and protect cultural heritage for future generations.
- **Contextualization:** Archaeologists aim to place discoveries within their cultural, temporal, and environmental contexts to comprehend their significance.
- **Knowledge Generation:** Exploration in archaeology aims to generate new knowledge about ancient civilizations, technologies, social structures, and practices.
- **Methods of Archaeological Exploration:**
- **Excavation:** Controlled digging to uncover artifacts, structures, and other material remains buried beneath the earth's surface.
- **Surveying:** Systematic examination of landscapes or sites to identify and document surface artifacts or features without excavation.
- **Analysis:** Examination and study of artifacts, eco facts, and features found during excavation or survey, including dating methods, material analysis, and contextual interpretation.
- **Documentation:** Detailed recording, mapping, and photography of excavation sites and artifacts for documentation and analysis.

- **Interdisciplinary Approach:** Collaborating with various scientific disciplines like geology, chemistry, and biology to analyze findings comprehensively.

Archaeological exploration involves meticulous planning, adherence to ethical standards, and a combination of fieldwork and laboratory analysis to piece together the puzzle of human history from the remnants left behind by ancient societies.

EXPLORATION -

Exploration is an interdisciplinary investigation, which end eavours to locate and understand the potentials of an archaeological site. An archaeological site is based on many factors. Generally, an archaeological site has a deposit formed as a result of cultural and natural processes. Different techniques are applied for the retrieval of archaeological materials from archaeological sites, such as exploration and excavation. Archaeological exploration implies non-destructive scientific survey and documentation of sites.

The important task of an archaeologist is the identification of a site. An archaeologist should have an eye to be able to locate the cultural and natural processes. So before going for exploration an archaeologist should have an overall idea of the region under investigation. Maps can be helpful for attaining this knowledge. Maps showing various geographical features with the help of symbols can be useful. Other maps include geological maps, vegetation maps, agricultural maps, rainfall maps, soil maps, maps depicting natural resources and maps that indicate isolated but specialized features. An archaeologist should have an ability to understand these maps.

The nature of an archaeological site changes according to the cultural periods. So, when one looks for an archaeological site, the parameters under consideration changes from areas to areas, and from cultural periods to cultural periods. The artificial mound found in an archaeological site is a relic of the original site and differs a lot from the natural mound. Artificial mound can be located in several ways. It can be located with the help of religious literature. Exploration of Buddhist antiquity sites conducted by Sir Alexander

Cunningham is the best example of this kind of exploration. It was done by using Buddhist sacred literature, Tripitakas and accounts of Chinese travelers FaHsien and Hiuen Tsang. Another way to locate the mound would be to conduct village to village surveys and enquire with the local people about visible potsherds there. Sometimes, the folklores and certain terms in local dialects are useful to locate archaeological sites.

MANUAL AND SCIENTIFIC EXCAVATION

Field Survey:

Also called Pedestrian Survey it is one of the oldest and authentic site survey methods in archaeological explorations. In this, a team of archaeologists surveying an area simply walk over the surface of the site covering almost all parts, observes, and collects material remains. This method is advantageous in the way that the chances of missing out even a small activity area are less.

Magnetometer Survey:

In this method an instrument known as proto-magnetometer is used to identify structures or features which show the property of thermo remnant magnetism (e.g. hearths, brick structures etc.). It detects variance between the general magnetic field of an area and the one above or near the buried features or structures. The use of proton-magnetometer is based on the electrodes fixed into the ground at regular intervals and the variance between the electrodes can then be plotted.

Remote Sensing:

It is a modern technique used to obtain archaeological data with the help of aerial photography and satellite imageries. This method enables the archaeologists to uncover unique data that is unobtainable using traditional archaeological techniques and have an overall idea of the features on a given landform, which is otherwise difficult to view while standing on the field. A series of ground-based geophysical methods such as Ground Penetrating Radar (GPR) and Magnetometer are also used for archaeological imaging.

Aerial Photography:

It is the earliest and perhaps the most important remote sensing tool available to archaeologists looking for new archaeological sites. This survey uses airborne and space borne remote sensing tool. It has two components -- Data Collection, which comprise capturing photographs or image from aircraft or satellite, and Data Analysis, in which such photographs are analyzed, interpreted and integrated with other evidences. This method allows an archaeologist to have a bird's eye view of the mound and gives the outline of any aspect. It plays a key role in distinguishing features which are otherwise invisible when looked from the ground level.

EXCAVATION METHODS:

Excavation is the most traditional archaeological tool for understanding the human past, and it undoubtedly represents the type of activity that most people attribute to archaeology.

Excavation methods are the different techniques employed within archaeology to dig, expose, identify, process, and record archaeological remains. It involves the removal of soil, sediment, or rock that covers the artefacts or other evidences of human activity. Early excavation methods involved destructive random digging and removal of objects with little or no location data recorded. Modern excavations generally involve slow, careful withdrawal of sediments in very thin layers, detailed filtering of sediment samples, and exacting measurement and recording of artefact location.

An archaeological project often commences with a survey of the site under examination. Geological surveys have proved to be useful in various archaeological researches. Human burials comprise a major source of evidence for human history. Burials excavated by archaeologists may report on both the individual commemorated and on society at large.

Two methods of excavations are generally followed—vertical excavation and horizontal excavation. Horizontal excavation refers to excavating a broad area with the purpose of exposing the remains of a single point in time. Archaeological excavation is innately destructive because it permanently removes both artefacts and the surrounding soil matrices from their original context. Therefore, responsible and accurate recording is the most vital component of any project, and excavation has no meaning without written and visual records.

Archaeology has undergone far-reaching changes since the time when an excavation was simply a mining of arte facts. Nowadays, the removal of arte facts requires that the spatial relationships and context in which they are found be fully documented.

HORIZONTAL EXCAVATION:

Excavation is a destructive, but a most systematic and scientific, documentation of archaeological sites. Through this process the cultural remains are brought out very carefully. It is a time consuming and expensive field activity. Generally, excavations are team efforts and require enormous funds for their successful completion. Augustus Pitt Rivers was the British Archaeologist who contributed to the development of different excavation methods. In the present scenario of the problem oriented archaeology, archaeologists plan excavation according to the imminent problem. For the excavation team, it is now almost essential to engage a palaeo-zoologist, palaeo-botanist, geo archaeologist, archaeological chemist and other such experts. Before the commencement of excavation, the contour map of the site is prepared.

The nature of the excavation depends basically on the character and needs of the site and the methods of excavation can also vary depending on its objectives. It is very important to have an index trench in any excavation which goes up to the natural soil and gives an idea about the cultural sequence of the site. On the basis of the nature of the site, such as, architectural features, diverse activity areas etc., it is to be decided whether the site is needed to be excavated horizontally or vertically. Two types of excavations are generally conducted—vertical excavation and horizontal excavation. Of these, a vertical excavation is generally undertaken at a limited scale. Due to their limited nature, these are restricted to providing only patchyinformation regarding the social, economic and religious practices of the people of a particular culture. Therefore, for getting further details horizontal excavations are meticulously planned and conducted in a systematic manner. A horizontal excavation is a method of excavation in which full horizontal extent of a site is cleared and large areas are open while preserving a stratigraphic record in the balks between large squares. A gradual probe may then occur. So the horizontal excavation aims at exposing the deposits horizontally. Sir Mortimer Wheeler is one of the chief opponents of this excavation by using the grid method.

Extensive horizontal excavations are conducted to obtain detailed knowledge of the cultural periods or phases present at an archaeological site. Unlike the vertical excavation which is not extendable towards the area away from the parallel peg lines, the horizontal excavation is definitely advantageous in that it is extendible in all directions, thus, expanding the scope of the excavation. As a result, horizontal type of excavation is followed to unearth the town planning of a site.

Horizontal excavation is generally conducted for a habitation site in order to know the area of its extent.1 However, to conduct a horizontal excavation some fundamentals are required to be considered:

(i) Easily and clearly sub-divide the site for record and control;

(ii) Capable of progressive expansion in any direction without breaking down or weakening preliminary datum lines;

(iii) Ability of preserving for constant reference at a maximum number of points, complete vertical sections until the last phase of excavation;

(iv) Capable, ultimately, of easy integration into a continuously exposed regional excavation; Readily accessible at all points for the soil removal, without impediment from intervening cuttings or traffic across excavated surfaces; and

(v) Adequately open to the sky to make certain the easy inspection of well-lighted sections at all the required depths.

Laying out a trench:

The layout of the horizontal excavation is based upon a square. After the contour mapping of the site, the entire mound is divided into a grid of square trenches. The squares or grids are separated by a baulk measuring around 50cm. the baulk is the unexcavated region and is held intact till the end of the excavation and this act as the four sides of each trench. It also allows the preservation of the vertical sections of the site. To impose a grid of square trenches, reference lines are drawn from the centre of the single mound type sites. These lines intersect each other at a right angle leaving the mound divisible into four quadrants. Each of these four quadrants is further divided into equal sized small squares. Each of these squares is referred by the reference peg located towards the left side in the north. The central peg marked by the intersection is generally referred to as the peg A1. Towards the south the pegs are traditionally numbered A2, A3, A4…..from A1. Towards east, the pegs are marked A1, B1, C1….. It is recommended that the director of excavation himself should excavate a small control pit in each trench. Both the vertical and horizontal excavations are complimentary to each other.

Vertical excavation

Vertical excavation, also known as vertical stratigraphic excavation, is a method used in archaeology to uncover and study the different layers of soil or sediment at an archaeological site in a systematic and controlled manner.

In this type of excavation, archaeologists dig a vertical trench or pit, usually in a carefully chosen location within the site. The goal is to expose the stratigraphy, which refers to the layers or strata of soil or sediment that have accumulated over time. Each layer represents a distinct period in the site's history, and by examining these layers, archaeologists can create a chronological sequence of events.

The process of vertical excavation involves several key steps:

Planning and Preparation: Archaeologists conduct thorough research and survey the site to determine the most promising areas for excavation. They then mark out the boundaries of the trench or pit to be dug.

Excavation: Digging begins in a controlled manner, with the soil being removed layer by layer, typically using tools such as trowels, shovels, and brushes. The layers are carefully documented, and any artifacts, features, or changes in soil composition are recorded.

Recording and Analysis: As each layer is exposed, archaeologists meticulously record details about the artifacts found, the soil composition, any architectural features, and other relevant information. This documentation is crucial for understanding the context and relationships between different layers.

Interpretation: After excavation, archaeologists analyze the collected data, including the stratigraphy and the artifacts unearthed. They interpret the findings to reconstruct the site's history, chronology, human activities, and cultural changes over time.

Vertical excavation allows archaeologists to observe the vertical sequence of deposits, providing insights into the chronological order of human occupation or activity at the site. It helps in understanding the relative dating of different layers and in establishing connections between cultural periods or changes in the environment.

However, this method has its limitations, as it might not always reveal extensive horizontal information about the site. To complement vertical excavation, archaeologists often combine it with horizontal excavation techniques to gain a more comprehensive understanding of the spatial layout and relationships within the site.

Quadrant method

The quadrant method is a systematic approach used in archaeological excavations to organize and document the process of digging, mapping, and recording finds within a site. It involves dividing the excavation area into smaller, manageable units called quadrants, which helps maintain control and precision during the excavation process.Here's an overview of how the quadrant method is typically implemented:

- **Grid System:** The site is divided into a grid system, with each square of the grid representing a quadrant. The size of these quadrants can vary depending on the scale and nature of the site. Common sizes might range from 1x1 meter to larger dimensions.
- **Excavation Process:** Archaeologists excavate one quadrant at a time, working systematically from one quadrant to another within the grid. This ensures a methodical approach and allows for careful documentation of findings within each specific area.
- **Recording and Documentation:** As excavation progresses within each quadrant, detailed records are kept of the stratigraphy (layers of soil or sediment) and any artifacts or features discovered. Archaeologists document the depth at which artifacts are found, their spatial relationships within the quadrant, and other relevant information.
- **Mapping and Photography:** Mapping the site involves creating detailed plans or drawings that illustrate the layout of the excavation area and the positioning of significant finds within each quadrant. Photographs are also taken at various stages of excavation to visually document the process and findings.
- **Analysis and Interpretation:** After excavation, archaeologists analyze the collected data, including the stratigraphic sequence, artifacts, and spatial relationships. This analysis helps in interpreting the chronology, cultural context, and activities that occurred at the site over time.

The quadrant method allows for a systematic and controlled approach to excavating archaeological sites. It helps archaeologists maintain accuracy in documentation, preserve contextual information, and reconstruct the history of the site based on the stratigraphic layers and artifacts found within each

quadrant. Additionally, this method facilitates comparisons between different areas of the site and enhances the understanding of spatial relationships between features and artifacts.

Underwater archaeology is a specialized field that involves the study and exploration of submerged cultural remains, artifacts, and sites beneath rivers, lakes, seas, and oceans. It focuses on understanding human history, civilizations, and activities that occurred in underwater environments.

Key Aspects of Underwater Archaeology:

- **Diverse Sites:** This field encompasses various types of submerged sites, including shipwrecks, submerged cities, ports, harbors, and prehistoric settlements that were once above water.
- **Preservation Challenges:** Underwater sites face different preservation challenges compared to terrestrial sites due to the effects of water, currents, erosion, and marine life on artifacts and structures.
- **Technological Tools:** Underwater archaeologists use specialized equipment such as remote sensing technologies (side-scan sonar, magnetometers), submersibles, remotely operated vehicles (ROVs), and SCUBA diving to locate, survey, and excavate underwater sites.
- **Documentation and Conservation:** Detailed documentation of underwater finds is essential, often involving underwater photography, mapping, and careful retrieval techniques. Conservation methods for underwater artifacts differ due to the effects of water and salt on materials.
- **Interdisciplinary Approach:** Collaboration with experts from various fields like marine biology, geology, and oceanography is crucial for a comprehensive understanding of the underwater environment and its impact on archaeological sites.

Significance of Underwater Archaeology:

- **Maritime History:** It provides insights into ancient seafaring practices, trade routes, naval architecture, and maritime cultures, contributing to our understanding of global history and connectivity.
- **Cultural Heritage:** Many submerged sites hold significant cultural and historical value, preserving aspects of human civilizations that are otherwise lost to time.
- **Scientific Research:** Underwater archaeology contributes to scientific research, shedding light on environmental changes, sea-level fluctuations, and human adaptations to changing landscapes.

- **Public Interest and Education:** Discoveries from underwater archaeology often captivate public interest, fostering a greater appreciation for history and marine conservation efforts.

Underwater archaeology presents unique challenges and requires specialized skills, equipment, and methodologies due to the complexities of working in submerged environments. Yet, it continues to reveal fascinating insights into humanity's past and its relationship with water.

Stratigraphy

- **Archaeological Stratigraphy** is the study of the sequential layering of deposits, structures, and artifacts within an archaeological site. It focuses on analyzing the vertical and horizontal relationships of these layers to establish a chronological framework and understand the site's history.
- **Definition:** Archaeological stratigraphy involves examining the layers (or strata) of soil, sediment, or cultural remains within an archaeological context. It aims to reconstruct the temporal sequence of human activities, occupations, and changes at a site over time.

Scope of Archaeological Stratigraphy:

- **Chronological Sequence:** It helps establish a relative chronological sequence of events, occupations, and activities at a site, providing a timeline of human habitation or use.
- **Cultural Context:** Stratigraphy assists in understanding the spatial and cultural contexts of different periods of occupation or activity, allowing archaeologists to interpret societal changes and developments.
- **Artifact Analysis:** It enables the association of artifacts, features, and structures with specific layers or periods, aiding in dating and interpreting the significance of cultural materials.

Methodology of Archaeological Stratigraphy:

- **Excavation Strategies:** Controlled excavation methods are employed to carefully expose and record the layers, typically using trowels, brushes, and other precise tools.

Recording and Documentation

Recording and Documentation: Detailed documentation through drawings, photography, and written records is crucial to document the precise positions and relationships of artifacts, features, and strata.

Archaeological recording methods encompass various techniques and tools used to systematically document and analyze archaeological sites, artifacts, features, and contexts. These methods are crucial for accurate preservation, analysis, and interpretation of archaeological findings. Some key recording methods include:

- **Photography and Photogrammetry:** High-resolution photography is used to capture detailed images of artifacts, excavation trenches, and site features. Photogrammetry, a method using multiple overlapping photos, creates 3D models and maps of archaeological remains.
- **Drawings and Illustrations:** Archaeologists create detailed scaled drawings or illustrations of artifacts, architectural features, and site plans. These drawings often include measurements and annotations for clarity.
- **Mapping and Surveying:** Accurate mapping of archaeological sites involves using tools such as total stations, GPS devices, and drones to create detailed maps of excavation areas, site layouts, and landscape features.
- **Context Sheets and Matrix Recording:** Context sheets are forms used to record detailed information about individual contexts or excavation units. The Harris Matrix is a visual representation used to illustrate the stratigraphic relationships between different layers and features within a site.
- **Written Documentation:** Comprehensive written records including field notes, journals, and reports detail the excavation process, observations, interpretations, and context of discoveries. These records ensure transparency and aid in future research.
- **Database and Digital Recording:** Archaeologists use databases and digital recording systems to organize, manage, and analyze large volumes of archaeological data. This includes information about artifacts, contexts, stratigraphy, and associated metadata.
- **Conservation and Condition Reports:** Detailed records of artifact conditions, conservation treatments, and material analyses are maintained to monitor the state of preservation and inform future conservation efforts.
- **Specialized Techniques:** Various specialized techniques like remote sensing (e.g., ground-penetrating radar), geophysical surveys, and residue analysis are used for specific purposes, such as identifying buried features or analyzing ancient residues on artifacts. These recording methods ensure the accurate documentation and preservation of archaeological data. They also facilitate analysis, interpretation, and dissemination of findings, contributing to a comprehensive understanding of past human societies and cultures.

Three Dimensional Recording

For a long time the capturing of the third dimension, the depth or height was challenging. Traditionally, excavation plans and sections were documented in two dimensions. Objects were also recorded in two dimensions, often from different angles. Remote sensing images like aerial photographs were represented as flat surfaces. Although depth could be visualized with techniques such

as stereoscopes, analysis of relief was troublesome. Three-dimensional recording is the recording of artefacts and structures in time and space. The provenience of archaeological finds is recorded with reference to the site grid.

The need for recording archaeological finds by three-dimensional method has been emphasized by Sir Mortimer Wheeler in his renowned work, *Archaeology from the Earth*. Several methods for three-dimensional recording have been prescribed. For example, by intersecting measurements from two reference points and levelling with a bubble level attached to a surveying pole or similar straight edge. Wheeler advanced an Orthogonal System of measurement. It consisted of a line of datum pegs connected by string and not more than one meter distant from each other and of a strong wooden square long enough to cover the width of a normal excavation trench. Thus the string marks a reference line and measurements are taken at right angles to it, the square being held level. 1

Another method described later on is based on another principle in general usage in modern surveying. From a base point or station we measure a direction, the distance between base point and the feature to be recorded and finally the difference in level. To get the direction more conveniently the angle between true north and the line pointing to the feature (azimuth) should be determined as in surveying practice. Since the distances involved are very limited for the present purpose, any complicated and expensive instrument is not required. A simple angular division fixed upon the wooden peg marking the base point is needed. Other things required comprise a tape, a small spirit level, a plumb bob and a prismatic compass. This method is very economical and yields very reliable results. When the excavation work is conducted in a simple, straightforward way, Wheeler's Orthogonal System may be superior.

All this changed at the end of the last century with the introduction of computer based digitization technologies, 3D software, and digital near-surface sampling devices. 3D recording is conducted preferably with an electronic recording device, the total station or base point; or if no total station is available, with tapes, plumb bobs, and surveyor's levels. The new technology which usually involves off-site computer manipulation of the data, adds further accuracy to three-dimensional recording.

Drawing

After the conservation of an artefact, a drawing provides more relevant, detailed, easily edited, and potentially comparable information than is possible in a photograph. One of the most common jobs of an archaeological illustrator is drawing the finds and features from excavations and museums. The archaeological drawings are not just making a pretty picture of the item. The purpose is to provide most of the information in a form that the viewers can read. A good archaeological illustrator is well aware of the conventions governing how artefacts should be drawn. The knowledge of techniques of recording and drawing artefacts makes the work accurate and clear. The definition of a quality artefact

drawing is '…one which incorporates an understanding of the component parts of an artefact with an ability to make an accurate and aesthetic rendering of its character.

Drawing artefacts reinforce an archaeologist's observational powers, and highlights features relevant to identification and interpretation. Drawings can depict both easily visible and fainter surface areas. All illustration should have a metric scale. What gives drawing its strength is the amount of information that can be expressed in a single image. By excluding the detail that renders a drawing realistic and applying a variety of conventions for various materials, archaeological drawings become interpretive diagrams rather than artistic or realistic portrayals of the artefact. The illustrator can furnish the drawing to his or her intended audience whether it is for publication, where a more technical drawing is common, or for museum display, where a more artistic portrayal is appropriate. This is also depends upon the available technology, and while 3D imaging is becoming increasingly possible, most illustrators continue to use the more cost-effective pen and ink method. When illustrating for publication, drawings make it convenient for researchers to examine and interpret the artefact to better understand its use in both a historical and archaeological context.

Orientation

It refers to the minimum to be included in a plan view of both sides and profile view, as required. If an object is bent it should be drawn as such, but the original shape can also be included. Conventions for orientation are based on types of artefact. For instance, pointed objects such as swords or pins are drawn with the tip facing down; however projectile points are aligned with the point upwards. The illustrator should provide as many views as necessary to convey the most amount of information.

Scale

It is important have the knowledge of the scale before drawing and how much the reduction or enlargement will affect the details of the artefact. A linear scale should also be included indicating which scale is being used on the actual drawing for future reference. A majority of the small finds can be drawn at a 1:1 scale, meaning 1cm in reality = 1cm on paper. Tiny artefacts, such as beads could also be enlarged to show more detail. For larger objects it may be necessary to scale down as necessary, which can include a scale of 1:2 or 1:4, etc. generally objects are drawn at a larger size, considering the reduction that will take place during the publication process.

Outline

There are different methods of outlining the object according to the available material. It can be traced directly, measured with an object such as a set-square, drawn using a grid system, scanned,

projected, or traced from a scaled photograph provided that the image in the photo was not distorted or taken from an undesirable angle, etc.

Absolute Dating

Absolute dating is a method in which involves precise dating of artefacts using various scientific techniques and in a few cases it is dated based on the hidden historical data available with historical documents such as inscriptions, copper plates, seals, coins, inscribed portrait sculptures and monuments

Radio Carbon Dating (C-14)

Radiocarbon dating (also known as carbon dating or C-14 dating) is a method for determining the age of an object containing organic material by using the properties of radiocarbon, a radioactive isotope of carbon. The radiocarbon dating is the oldest and perhaps the most widely used in archaeology. This method was developed in 1948 by Willard F. Libby as spin-off from atomic research during the Second World War. He received the Nobel Prize in Chemistry for this work in 1960.

It is based on the principle that radiocarbon C-14 is constantly been formed in the atmosphere by the interaction of cosmic rays with the nitrogen present in the atmosphere. The resulting C-14 combines with atmospheric

oxygen to form radioactive carbon dioxide which is absorbed by the plants by means of photosynthesis and by animals through eating. When the plant or animal ceases to be living it stops receiving fresh supply of C-14. The existing C-14 now undergoes a process of decay which is called radioactivity. C-14 is a radioactive isotope or element of C-12, and both are present in equal amounts. We may measure the decaying C-14 with reference to C-12, and find out the number of years that have elapsed since the decay began. The object which contains less C-14 proves to be older in age, and that which contains more C-14 turns out to be younger. This measurement is based on the fact that the half-life of C-14 is 5568 years. The half-life of a radioactive material is defined as the period during which one-half of the amount of the material decays out. Since most organic materials perish in due course, charcoal because of its high content of carbon is the commonest material utilized for radiocarbon dating.

The development of radiocarbon dating has had a profound impact on archaeology. Apart from allowing more accurate dating within archaeological sites than previous methods, it allows comparison of dates of events across great distances. Histories of archaeology often refer to its impact as the ‘radiocarbon revolution’. Radiocarbon dating has allowed key transitions in prehistory to be dated, such as the end of the last ice age, and the beginning of the Neolithic and Bronze Age in different regions.

It was believed that the dates produced by radiocarbon dating were precise until it was discovered that amounts of carbon in the atmosphere have varied over time. This had led to underestimating the age of prehistoric sites by up to 800 years. To overcome this problem, radiocarbon dates are calibrated. Radiocarbon dates are never exact. Even after calibration there is a scope of error that is calculated statistically. This generally means that there is a 68 per cent chance or 'level of confidence' (LOC) that the real date is within the range indicated and a 95 per cent LOC that it is within twice the range. C-14 is mostly used to date organic materials including bone, shell and plant remains. It does not work on cremated bone although it will work for charred bone. It is more precise with wood samples from twigs and nuts than from trees that may have lived for hundreds of years. Radiocarbon's practical use is for periods from 200 to about 10,000 years with less reliability to around 40,000 years. Until recently at least 10 grams of charcoal or 200 grams of bone were needed for results. However, the development of a process known as **Accelerator Mass Spectrometry** (AMS) has facilitated much smaller samples of material to be dated, down to the one grain of cereal. It is a technique that measures the amount of Carbon-14 in an organic object and provides a rough indication of its age. Samples need to be handled carefully to avoid contamination.

Dendrochronology

Dating of wooden objects on the basis of tree rings or growth rings of a tree is called dendrochronology. It is derived from the Greek word Dendron meaning 'tree limb' chronos mean 'time' and logy meaning 'study'. It is a dating method that uses the number, thickness and density of annual growth rings of ancient trees. This method was first developed by the American scientist A.E. Douglas at the beginning of the twentieth century.

This is the most accurate chronometric dating method. It is based on the principle that every year many species of trees produce growth rings of new wood under their bark during annual growing seasons. The width of the ring (i.e., the amount of growth) for each year is determined by various internal and external factors, but it tends to vary mainly in proportion to either the amount of available precipitation or the prevailing temperatures. The rings are wider in good conditions than in poor ones. Samples are obtained by using an increment borer, a simple metal tube of small diameter that can be driven into a tree to get a core extending from bark to centre. This core is split in the laboratory, the rings are counted and measured, and the sequence of rings is correlated with sequences from other cores.5 Trees located in the same area will have similar ring pattern which means wood from different periods can be matched in overlapping sequences. These are tied to historical dates by modern trees anchors the tree-ring chronology in time.

Dendrochronology mostly uses softwood species that are sensitive to changes in growth conditions, while hardwoods exhibit rather little variation in ring width. This method provides precise dating,

sometimes to the nearest year. It is especially used to develop calibration curves used to correct data obtained from radiocarbon dating, a technique that remains imprecise due to fluctuations in the concentration of C-14 in the atmosphere over the centuries.

The bristlecone pines of California, which live for 4,000 years, were used to construct sequences over 7,000 years in the USA. However, this method has limitations. Not all areas have sufficiently varied seasons or sufficient surviving timber to make it possible to construct sequences. To effectively date wood around fifty years of tree rings are needed. Since this represents quite a thick piece of wood, the technique is better for dating building timbers than artefacts. Its direct use is from the Neolithic onwards when buildings were used and it has been widely used on medieval ships and buildings. Where wood has been reused, as often occurred with structural timbers in the past, this method can overestimate the age of a structure. However, dendrochronology is also the key method for calibrating radiocarbon dates

and therefore is indirectly used in dating a wide range of organic materials for up to 11,500 years.

Thermoluminescence

Thermoluminescence (TL) dating is a method that is based on the analysis of light release when heating crystalline material. It is used in mineralogy and geology, but is also increasingly being applied for dating of anthropological and archaeological samples. Thermoluminescence uses the phenomenon of ionizing radiations that exist naturally in the atmosphere. This dating method is mainly applicable for material with mineral or crystalline structure or with spurious crystalline contents. It is only functional for insulating material not for metallic artefacts. This technique is based on a unique physicochemical property of certain minerals (especially quartz and feldspar) that have an imperfect structure and therefore retain radioactive elements in the natural environment. Radioactive decay in the quartz crystals found in clay leads to a build-up of electric charge at a known rate. The electrical charge is released as light when the crystals are heated. When pottery is heated the energy in the flash of light is measured and used to calculate the time since it was fired.

Thermoluminescence is a technique which involves complex manipulation. To obtain a date for a single pottery sample, it is necessary to perform a laboratory fractionation of the clay mineral used in the manufacture of the pottery and prepare around 75 sub-samples; some of these are heated to release the level of thermoluminescence, while others receive a radiation dose to measure their sensitivity to radiation. Thermoluminescence can replace radiocarbon dating to date events that occurred more than 50,000 years ago; it is used mainly for dating stone fireplaces, ceramics and fire remains.6

Thermoluminescence dating is used for material where radiocarbon dating is not available, like sediments. Its use is now common in the authentication of old ceramic wares, for which it gives the

fairly accurate date of the last firing. This technique has been used with reasonable success to date heat altered stone tools, burned hearths, and pottery. It is not as accurate as C-14 dating and can give incorrect readings due to radiation from the soil or if the initial heating was at low temperature. However, it is useful for older periods and cases where there are no organic remains such as dating Upper Palaeolithic figurines.

These methods are used in archaeology and geology for dating and analyzing materials, particularly for determining the age of archaeological artifacts or geological formations. Here's a brief overview of each method:

- **Potassium-Argon Dating** This method is used to date rocks and geological materials that contain potassium minerals. Potassium naturally contains a radioactive isotope, potassium-40 (40K), which decays into argon-40 (40Ar) over time. By measuring the ratio of potassium to argon, scientists can calculate the age of the sample. This method is particularly useful for dating volcanic rocks and early human fossils.
- **Uranium Series Dating:** This dating method is based on the radioactive decay of uranium isotopes within materials like calcium carbonate, bones, or teeth. Uranium-238 decays into thorium-230, which further decays through several steps, eventually ending with a stable lead isotope. By measuring the ratios of uranium, thorium, and lead isotopes, scientists can determine the age of the sample. It's commonly used for dating cave deposits, speleothems (e.g., stalactites, stalagmites), and fossils.
- **Fission Track Dating:** Fission track dating is based on the natural tracks or trails of damage left in certain minerals by the spontaneous fission of uranium-238 atoms. These tracks accumulate over time, and by counting them, scientists can estimate the age of the mineral. This method is often applied to dating the formation of volcanic glasses, certain types of minerals, and the thermal history of rocks.
- **Electron Spin Resonance :** ESR dating measures trapped electrons in crystal lattices of certain materials like tooth enamel, quartz, or calcite. When these materials are exposed to natural radiation, electrons become trapped in defects in the crystal structure. By measuring the accumulated radiation dose and the number of trapped electrons, scientists can estimate the age of the sample. ESR is commonly used in dating fossil teeth, shells, and other materials with a crystalline structure.

These dating methods play a crucial role in archaeology and geology by providing scientists with tools to estimate the ages of various materials, artifacts, or geological formations, allowing for a better understanding of past environments, human evolution, and the chronology of Earth's history.

Other Relative Dating Methods

Relative dating is fundamental to chronology. As you learnt in the previous unit, it refers to the categorizing of events in the absence of any written record or evidence. Relative chronology is important in reconstructing prehistoric archaeology. In relative dating the duration of the event is not known, so also the elapsed time between events is very difficult to determine.

Fluorine Test

Fluorine test dating is another method of relative dating. It is based on the fact that amount of fluorine deposited in bones is proportional to their age. Most of the ground waters contain small amount of fluorine. The fluorine ions combine with hydroxyapatite crystals of the bone to form fluropatite. A bone buried for a longer time will absorb more fluropatite and vice-versa. The date of the bone is determined on the basis of the amount of fluropatite present in the bone. This test is useful in dating bones that cannot be attributed with certainty to any particular stratum and cannot be dated according to the stratigraphic method. A limitation of this method is the fact that the rate of fluorine formation is not constant, but varies from region to region. The quantity of fluorine can be determined either through chemical analysis or with the X- ray crystallographic method. In 1953, this test was used to easily identify that the 'Piltdown Man' was forged, almost fifty years after it was originally 'unearthed'. Like fluorine, uranium or nitrogen content of the bones also can be measured.

Nitrogen Test

Nitrogen provides another measurement of relative age. Nitrogen dating is a form of relative dating which relies on the reliable breakdown and release of amino acids from bone samples to estimate the age of the object. Bones are composed of calcium phosphate, fat and bone protein or collagen. In contrast to fluorine, nitrogen in the bone decreases with the length of time it has been buried. On death, the collagen decays at a uniform rate and turns into nitrogen. Like fluorine method, the amount of presence of nitrogen is measured and dated accordingly. The rate of decay depends on physical and chemical composition of the soil. Therefore, it is not universal. However, one can differentiate the date of the bones collected from a single deposit or from a single burial. In some situations, like thin porous bones might more rapidly change the dating created by multiple methods.

Pollen Test

Relative dating can also be done on the evidence of floral remains. A common method of dating through floral remains is known as palynology. All flowering plants produce the almost non-destructible grains called pollen. The outer skin (exine) of these grains is resistant to decay and is hence preserved in lake sediments that have allowed the pollen experts to reconstruct detailed sequences of past vegetation and climate. The botanical samples are collected

by means of a technique called *flotation technique*. Several screening methods are being used in the recovery of micro or macro botanical remains. The Flotation technique developed by Anthony J. Legge remains the best method and is being adopted throughout the world as it yields the best recovery rates. The pollen is extracted and then concentrated and stained before being examined under a microscope. Pollen grains can be recognized by their shape, and the percentages of different species present in each sample are recorded on a pollen diagram. A comparison of the pollen diagrams for different levels within a deposit allows the identification of changes in the percentages of a species and thus changes in the environment.

The most well-known chronologically placed pollen sequences are those developed for the Holocene times of northern Europe. By examining the pollen samples from a particular site, one can safely place them in particular time-ranged pollen zones. The type of pollen found in any geological stratum depends on the kind of vegetation that existed at the time such stratum was deposited. A site or locality can therefore be dated by determining what kind of pollen was found associated with it.

Self Assessment Question

1. Elaborate the Surface of Exploration?

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2. Explain the various threats of Archaeological sites in India

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3. Evaluate the methods and techniques used in archaeological exploration.

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4. Explain the Excavation staffs and their function.

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5. Explain the process and methods of exploration in archaeology, detailing manual and scientific excavation techniques.

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6. Elaborate on excavation methods such as Vertical, Horizontal, and Quadrant Methods.

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7. Discuss the significance and methodology of Underwater Archaeology.

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8. Explain in detail various dating methods used in archaeology, distinguishing between Absolute (Radio Carbon, Thermo luminescence, etc.) and Relative Dating (Flouring Method, Nitrogen Method, etc.).

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Unit-V

- Interpretation of Excavated Materials - Classification of Artifacts - Contextual and Site Catchment Analysis; Pottery and Antiquities: Description and Analysis - Scientific Analysis of Organic Materials. Archaeological excavations in Tamil Nadu – Arikamedu – Adichanallur – Korkai – Keezhadi – Mayiladumparai – Sivagalai – other sites

Objectives

- Understand the history of excavations, chronology, stratigraphy, locations of arte facts and structures of Arikamedu
- Describe the excavations conducted in two phases in Adichanallur

Archaeological excavations in Tamil Nadu

Arikamedu

The site of Arikamedu is situated on the Coromandel Coast of India, 4 km south of Pondicherry, within the Union Territory of Pondicherry. The French astronomer Guillaume Le Gentil, who visited Pondicherry, makes the earliest mention of Arikamedu. He considered the ruins to be the remains of an ancient town or large village which, according to the local residents was known as Virampattinam. The historical importance of Arikamedu and its connection with the Roman Empire was first recognized by Jouveau-Dubreuil, who had started collecting artefacts from the surface of the mound and the river bank as early as 1937. His identification of the Arikamedu site with Poduke emporium mentioned in the Periplus of Erythrean Sea is accepted by historians; thus, the name Poduke, perhaps deriving from Tamil Puducheri, meaning new hamlet (the origin of the name Pondicherry), must have been in vogue at the time of the Periplus. Since the meaning of the Tamil word puducheri means a new settlement or, at least a change, it has been suggested that the name Puducheri was perhaps given when the settlement was transformed from a small village into a centre of commerce.

Many French and Indian scholars also visited the site of Arikamedu. Between 1941 and 1944, excavations were conducted by French scholars on a small-scale under the direction of L. Faucheux and R. Sarleau. They plotted two grids, oriented north-south which are regarded as the most significant areas for excavations. Parts of the site were also declared protected by the French Government. These excavations were published later on.

However, the most outstanding excavations were carried out by Mortimer Wheeler, the Director General of Archaeological Survey of India, in 1945. His excavations at Arikamedu were the most widely known partly because of the methodology adopted by him, and partly because of the publicity given to the excavations by Wheeler himself in his numerous publications. Wheeler's important contribution at Arikamedu was the preparation of a contour map of the site and the surrounding area.

J.M. Casal continued excavations here in 1947 and obtained extremely important data but unfortunately his work largely went unnoticed. After a comprehensive review of archaeological work at Arikamedu, Vimala Begley started fresh excavations between 1989 and 1992 which revealed many new types of artefacts and structures. All these discoveries proved that the site was first occupied during the second century BC. An underwater survey was also conducted by a team of archaeologists from the ASI in 2002.

This survey found that impact of erosion on the site and the original extent of the site was beyond the present limits. Excavations at Arikamedu have brought to light the existence of small and large industries during the Pre- Roman period. Large number of shells, beads and pottery clearly indicated the existence of indigenous craft traditions before the arrival of Romans. Megalithic sites in the Gingee, Vaigai-Tamrapami and Kaveri valleys support the economic activity at Arikamedu.

Wheeler dated Arikamedu with the help of imported pottery viz., Arretine Ware and amphora from the Mediterranean. The use of amphora indicates that the Indians had developed a taste for foreign wine. He found that nearly all the excavated structures were constructed in the post of the Arretine ware period which showed that the site came to be occupied during the first two centuries AD. The presence of Celadon Ware and Chola coins of eleventh century AD indicated that the site was occupied for a long time. Excavations conducted later on brought to light evidence of trade with the Mediterranean between third to seventh century AD, as well as occupation during the Chola period and contact with Southeast Asia through trade. The evidence of Celadon Ware evidently supports the assumption that ships from India were engaged in trade with China. It is most likely that the site lost its importance due to the formation of sand bar at the mouth of Ariyankuppam River in the fourteenth century, which resulted in blockage of the entry of ships to the river, and this important port was abandoned.

The entire site of Arikamedu was divided in two parts by Wheeler—the northern sector and southern sector. The nature and date of the structures discovered in these two sectors also showed variation. The structures discovered at Arikamedu were made of bricks. The northern sector had a warehouse which was built in 50 AD on the foreshore of the estuary on which apparently timber buildings had already stood. The debris of port penetrated into it. The brickwork with mud mortar had tough plaster outside to keep out water on this low-lying site which must have been vulnerable to flooding and was abandoned at an early date. The warehouse was used for working precious and semi-precious stones and exporting it to Rome.

The southern sector was occupied for about a century. The site continued to be occupied till 200 AD. Prominent structures built in the southern sector were two walled courtyards, with carefully built dyeing vat tanks supplied and drained by a series of brick culverts. Widespread use of drain, considerable pavements of large bricks and the absence of domestic features suggest its use for

industrial purposes. Excavators speculated that these tanks and courtyards were used in the preparation of the muslin cloth. In addition to this, excavations carried out by French scholars and Wheeler revealed numerous other small and fragmentary structures. Some of these
fragmentary structures were drains constructed by means of corbelled walls, floored and roofed with horizontal bricks, a number of fragmentary walls, patches of brick floor, a fragmentary square or oblong structure of uncertain purpose, blocks of brickworks and pavements, ring-well or soak-pit built of pottery rings

Stratigraphy in the southern and northern sectors also differs. Due to haphazard digging and extensive damage caused to it, the stratigraphic sequence is not clear. In the southern sector natural soil was found at 3m. above the sea level. It was out of reach of flood. Habitation started here later but continued after the abandonment of northern sector. The cultural deposits were divided into three main phases- Early Middle and Late which were further divided in sub-periods.

In spite of numerous excavations over the past many years there are no satisfactory answers to a number of questions regarding origin, development and extension of this town, chronology, ancient port, trade mechanism, etc. How and why Arikamedu became an important centre of commerce on the Coromandal Coast needs to be explained. The excavations were carried out in limited area with limited aims. Barring two structures, the other structures discovered were fragmentary in nature. Some of the areas excavated by Wheeler and Casal have suffered a great deal of damage. Additional, how Arikamedu was related to inland interior settlements and what type of political or economic organization may have governed the location of the port needs to be explained.

Artifacts discovered from Arikamedu can be found in various museums and private collections across the world. Perhaps, no other site can claim the distinction of having its artefacts spread among a large number of individuals and institutions. Some of Jouveau-Dubreuil's collection are kept in the Government Museum at Egmore, Chennai. A few of the early finds by the French have been kept in the State Government museums in Bangalore and Hyderabad in South India and some were sent to the French Museum at Hanoi and Louvre Museum in Paris. Some of the materials from these excavations have been lost. A major chunk of the material from Wheeler's excavation is in the collection of the ASI at Purana Qila in New Delhi while others are in the collection of Institute of Archaeology, London and British Museum, London. The materials discovered during the excavations conducted V. Begley's team is with ASI, Chennai. A small collection of Arikamedu objects is in the Aurobindo Ashram Library at Pondicherry.

The history of Arikamedu can be reconstructed by gathering information from archaeological and literary sources. The discovery of stone axes with pointed butts suggested a Neolithic settlement at the site. The use of such stone hand-axes was prevalent during later periods was also known in many other

South Indian sites. Archaeological evidence suggests that the site was first occupied on a regular basis around the late third century or early second century BC. This period belongs to the Late Iron Age or Megalithic Age in South India. The earliest occupancy was in the Southern sector and not in the Northern sector. Fishing and bead-making were important occupations of this community.

Probably, trade with Mediterranean started around the second century BC. But trade was at its height from the mid-first century BC to mid- first century AD. During this period, the site may have been a part of the Sangam Chola Kingdom with its capital at Uraiyur. A square copper coin of this dynasty has been found during the excavations at Arikamedu. Alternatively, Arikamedu would have been a part of the territory of the Malaiyaman chieftain who controlled the regions close to Arikamedu with their capital at Tirukoilur. Or else, the Velir chieftains ruled the region. Perhaps, each of these dynasties controlled Arikamedu, one after the other.

During that period, both the Northern and Southern sectors were inhabited, probably by different ethnic communities. There was continuous interaction between the occupants of the two sectors. Gradually the site evolved into an urban industrial centre where different types of pottery, beads, ivory artefacts and textiles were manufactured. The industrial area extended over both the sectors. The Southern sector was also the main market place. However, the port was located in the northernmost part of the Northern sector. The settlement of Roman and other foreign traders and merchants was located in this sector.

The quantity of Mediterranean artefacts is much larger in northern than in the southern sector. Trade declined towards the end of the first century AD probably as a result of changes in the pattern of trade and trade routes. However, the settlement continued and new buildings were erected between the third and sixth centuries AD. Gradually, the power of the Sangam Cholas and Malaiyamans declined and Arikamedu would have been under the control of the Pallava dynasty that ruled this region with its capital at Kanchipuram. During the fourteenth and fifteenth centuries, Arikamedu was a part of the Chola Empire. From the Cholas, it may have passed on to the Vijayanagar Empire which emerged as a major power in South India from 1336 to 1565 AD. Chola coins, pottery and mud lamps have been frequently found at Arikamedu.

The site appears to have again emerged as an international trade centre during this period. The Chinese ceramics and coins discovered at the site indicate that the site had brisk trade with China. Arikamedu port has also been mentioned in a Medieval Chinese text. The occurrence of Persian blue glazed pottery in Arikmedu testifies its contact with Persia.

Perhaps, the site was deserted sometime in the sixteenth -seventeenth centuries. There are references to brick-robbing at the site. At the close of the 18th century, after the French conquest of the area, Arikamedu was reoccupied for a short period of time. Between 1771 and 1773, a seminary and

residence was constructed for the Jesuit missionaries. The seminary, however, was abandoned in 1783. The locals mention the ruined seminary as the 'Mission House'. Many other buildings were constructed during this period.

The history of Arikamedu appears vaguer during the nineteenth and early twentieth century. Large portions of the site came to be used for agricultural purposes during this period. Coconut, Mango and Tapioca were cultivated. Cultivation never stopped even after the archaeological importance of the site was recognized and some portions of the site were declared as protected area. French rule in Pondicherry ended in 1954. The entire Pondicherry region including Arikamedu now joined the Republic of India. From that time onwards, Arikamedu has been a protected site of the Archaeological Survey of India.

Adichanallur

Adichanallur is an archaeological site located in the Thoothukudi district in southern Tamil Nadu and is 15 km away from Korkai, the capital of the early Pandyan Kingdom. The town is locally known as Aathichanallur, and has been the site of numerous significant archaeological finds. It has been an active playground of archaeologists and anthropologists for more than 150 years. The urn-burial site was brought to light when a German explorer, Andreas Fedor Jagor, conducted a random excavation at the place in 1876. At that point of time, he unearthed number of bones, iron artefacts, burial urns, and copper objects. An Englishman called Alexander Rea, who was the Superintending Archaeologist, excavated the urn-burial site between 1889 and 1905. In his article titled 'Prehistoric antiquities in Tinnevelly', published in the Archaeological Survey of India's annual report in 1902-03, Rea called the Adichanallur site 'the most extensive prehistoric site as yet discovered in southern if not in the whole of India.' A Frenchman called Louis Lapique had also conducted an excavation in 1904.

After a gap of 100 years T. Satyamurthy, the Director of Chennai Circle of the ASI, started the excavation of Adichanallur in February 2004. It was an extraordinarily large urn-burial site spread over 114 acres on a low, rocky hillock on the bank of River Tamiraparani. The first phase of excavation in 2004 was conducted between February 4 and July 5. In the six trenches that were dug then, the ASI ran into a range of spectacular finds. Each trench was a square, 10 metres by 10 metres.

Keezhdi

Keezhdi also known as Keeladi, is a small village near Silaiman on the border between Madurai and Sivaganga districts in Tamil Nadu. This is the biggest ancient excavation site in South India. It is considered as the parallel of Mohenjo-Daro. For several years, experts had guessed that the archaeological site at Keezhdi in Sivaganga district of Tamil Nadu dates back to the Sangam Age. In 2013-14, the ASI conducted explorations in 293 sites along river Vaigai in the districts of Theni,

Dindigul, Madurai, Sivaganga and Ramanathapuram. Keezhdi in Sivaganga district was selected for digging and artefacts were discovered by the ASI in the second phase of the excavation. Carbon dating of charcoal found at the site has confirmed that the settlement there belonged to 200 BC. These excavations thus proved that urban civilization had existed in Tamil Nadu in the Sangam Age.

The diggings at Keezhdi were conducted at two localities. Both the places have yielded different things and one can guess that they represent a social hierarchy. The bigger of the two places with more number of trenches has been identified as the settlement of the educated rich people, as many precious objects like jewellery, semi-precious stones, fine game stones and 74 Tamil-Brahmi inscriptions have been discovered. Occurrence of beads of agate, quartz and Carnelian testifies that they had trade contacts with Rome and other countries. The Tamil-Brahmi letters were inscribed on the pottery which suggests that the common man was literate because inscriptions commissioned by kings are found in stones and walls of temples. There were poetic Tamil names such as Iyanan, Uthiran, Vendhan, Santhanavathi and Saathan, on those inscriptions, some of which can be found in the Sangam literature.

The other locality has more of graffiti on pottery, bone tools and iron weapons, the fish symbol which was both an art and as a sign representing a clan, was also found. Red-and-Black pottery, groove tiles used for laying roofs and typical flat brick measuring 38 cm are the other signs that the city discovered belongs to the Sangam Age.5

More than 5600 antiquities and artefacts have been unearthed in Keezhdi in the diggings conducted by the State Archaeology Department of Tamil Nadu. Hitherto, 102 trenches have been excavated at the site. The

terracotta beads, carnelian beads, shell bangles and iron pieces.6 One of the potsherds is inscribed with an image of a fish which was once the symbol of the great Pandya rulers. One of the names on another sherd has been traced back to Sri Lanka, indicating a trade link or perhaps a long-ago immigrant. Many unearthed potsherds have a roulette design, similar to the kind used in ancient Rome. This point to the possibility of foreign trade at that time.

Other artefacts include stone celts for sharpening tools, circular and square coins from the Chola and Pandya period, chess games made of ivory, arrowheads made of bones and iron, gold beads, iron implements like knives and daggers.

The use of fired brick, the size of the building complex, an array of pots placed in such a way that it must have been used either as a lamp or for painting, and other finds suggest that the settlement is of a more civilized population than was previously suspected during the Sangam period.

Keezhdi excavation is significant in the way that it has given archaeological evidence for the existence of a secular civilization belonging to the Sangam era. If more excavations are conducted

there, we will find more evidence that will definitely show the trace of a strong secular culture once existed in ancient Tamil Nadu known as Thamizhagam.

Self Assessment Question

1. Explore the interpretation of excavated materials, focusing on artifact classification, contextual and site catchment analysis.

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2. Evaluate key archaeological excavations in Tamil Nadu, including Arikamedu, Adichanallur, Korkai, Keezhadi, Mayiladumparai, Sivagalai, and other notable sites, highlighting their significance and findings.

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Recommended Books

1. K. Rajan**,** *Archaeology: Principles and Methods***,** ManooPathippakam,Thanjavur, 2002
2. K. Rajan, *Understanding Archaeology: Field Methods, Theories and Practices,*ManooPathippakam,Thanjavur, 2016
3. K.V. Raman, *Principles and Methods of Archaeology*, Parthajan Publications, Madras, 1986 **.**
4. B.D. Dillon, ed., *Practical Archaeology: Field and Laboratory Techniques and Archaeological Logistics*, Institute of Archaeology, University of California, Los Angeles, 1989
5. Stuart Fleming, *Dating in Archaeology: A Guide to Scientific Techniques*, J.M. Dent, London 1978 .
6. Robert F.Heizer, (ed.), *The Archaeologist at Work: A Source Book in Archaeological Method and Interpretation*, Harper & Row, New York, 1969 .
7. C. Renfrew & Paul Bahn, *Archaeology: Theories, Methods and Practice*, Thames &Hudson, London, 2012.
8. Surendranath Roy, *The Story of Indian Archaeology 1784-1947*, Archaeological Survey of India, New Delhi, 2011.