EIILM UNIVERSITY

SIKKIM

ARCHAEOLOGY

CONTENTS

Chapter 1

Archaeology

Archaeology, or archeology,is the study of human activity in the past, primarily through the recovery and analysis of the material culture and environmental data that they have left behind, which includes artifacts, architecture, biofacts (also known as eco-facts) and cultural landscapes (the archaeological record). Because archaeology employs a wide range of different procedures, it can be considered to be both a science and a humanity, and in the United States it is thought of as a branch of anthropology,although in Europe it is viewed as a separate discipline.

Archaeology studies human prehistory and history from the development of the first stone tools in eastern Africa 4 million years ago up until recent decades.(Archaeology does not include the discipline of paleontology.) It is of most importance for learning about prehistoric societies, when there are no written records for historians to study, making up over 99% of total human history, from the Paleolithic until the advent of literacy in any given society. Archaeology has various goals, which range from studying human evolution to cultural evolution and understanding culture history.

The discipline involves surveying, excavation and eventually analysis of data collected to learn more about the past. In broad scope, archaeology relies on cross-disciplinary research. It draws upon anthropology, history, art history, classics, ethnology, geography, geology, linguistics, semiology, physics, information sciences, chemistry, statistics, paleoecology, paleontology, paleozoology, paleoethnobotany, and paleobotany.

Archaeology developed out of antiquarianism in Europe during the 19th century, and has since become a discipline practiced across the world. Since its early development, various specific sub-disciplines of archaeology have developed, including maritime archaeology, feminist archaeology and archaeoastronomy, and numerous different scientific techniques have been developed to aid archaeological investigation. Nonetheless, today, archaeologists face many problems, such as dealing with pseudoarchaeology, the looting of artifacts, a lack of public interest, and opposition to the excavation of human remains.

The science of archaeology grew out of the older multi-disciplinary study known as antiquarianism. Antiquarians studied history with particular attention to ancient artefacts and manuscripts, as well as historical sites. Antiquarianism focused on the empirical evidence that existed for the understanding of the past, encapsulated in the motto of the 18th-century antiquary, Sir Richard Colt Hoare, "We speak from facts not theory". Tentative steps towards the systematization of archaeology as a science took place during the Enlightenment era in Europe in the 17th and 18th centuries.

In Europe, interest in the remains of Greco-Roman civilisation and the rediscovery of classical culture began in the late Middle Age. Flavio Biondo an Italian Renaissance humanist historian created a systematic guide to the ruins and topography of ancient Rome in the early 15th century for which he has been called an early founder of archaeology. Antiquarians, including John Leland and William Camden, conducted surveys of the English countryside, drawing, describing and interpreting the monuments that they encountered.

First excavations

One of the first sites to undergo archeological excavation, was Stonehenge and other megalithic monuments in England. John Aubrey was a pioneer archaeologist who recorded numerous megalithic and other field monuments in southern England. He was also ahead of his time in the analysis of his findings. He attempted to chart the chronological stylistic evolution of handwriting, medieval architecture, costume, and shield-shapes.

Excavations were also carried out in the ancient towns of Pompeii and Herculaneum, both of which had been covered by ashes during the Eruption of Mount Vesuvius in AD 79. These excavations began in 1748 in Pompeii, while in Herculaneum they began in 1738. The discovery of entire towns, complete with utensils and even human shapes, as well the unearthing of ancient frescos, had a big impact throughout Europe.

However, prior to the development of modern techniques, excavations tended to be haphazard; the importance of concepts such as stratification and context were completely overlooked.

Development of archaeological method

The father of archaeological excavation was William Cunnington (1754–1810). He undertook excavations in Wiltshire from around 1798, funded by Sir Richard Colt Hoare. Cunnington made meticulous recordings of neolithic and Bronze Age barrows, and the terms he used to categorise and describe them are still used by archaeologists today.

One of the major achievements of 19th century archaeology was the development of stratigraphy. The idea of overlapping strata tracing back to successive periods was borrowed from the new geological and palaeontological work of scholars like William Smith, James Hutton and Charles Lyell. The application of stratigraphy to archaeology first took place with the excavations of prehistorical and Bronze Age sites. In the third and fourth decade of the 19th century, archaeologists like Jacques Boucher de Perthes and Christian Jürgensen Thomsen began to put the artifacts they had found in chronological order.

A major figure in the development of archaeology into a rigorous science was the army officer and ethnologist, Augustus Pitt Rivers, who began excavations on his land in England in the 1880s. His approach was highly methodical by the standards of the time, and he is widely regarded as the first scientific archaeologist. He arranged his artefacts typologically and (within types) chronologically.

This style of arrangement, designed to highlight the evolutionary trends in human artefacts, was of enormous significance for the accurate dating of the objects. His most important methodological innovation was his insistence that all artefacts, not just beautiful or unique ones, be collected and catalogued.

William Flinders Petrie is another man who may legitimately be called the Father of Archaeology. Petrie was the first to scientifically investigate the Great Pyramid in Egypt during the 1880s.His painstaking recording and study of artefacts, both in Egypt and later in Palestine, laid down many of the ideas behind modern archaeological recording; he remarked that "I believe the true line of research lies in the noting and comparison of the smallest details." Petrie developed the system of dating layers based on pottery and ceramic findings, which revolutionized the chronological basis of Egyptology. He was also responsible for mentoring and

training a whole generation of Egyptologists, including Howard Carter who went on to achieve fame with the discovery of the tomb of 14th-century BC pharaoh Tutankhamun.

The first stratigraphic excavation to reach wide popularity with public was that of Hissarlik, on the site of ancient Troy, carried out by Heinrich Schliemann, Frank Calvert, Wilhelm Dörpfeld and Carl Blegen in the 1870s. These scholars individuated nine different cities that had overlapped with one another, from prehistory to the Hellenistic period. Meanwhile, the work of Sir Arthur Evans at Knossos in Crete revealed the ancient existence of an advanced civilisation.

The next major figure in the development of archaeology was Sir Mortimer Wheeler, whose highly disciplined approach to excavation and systematic coverage in the 1920s and 1930s brought the science on swiftly. Wheeler developed the grid system of excavation, which was further improved by his student Kathleen Kenyon.

Archaeology became a professional activity in the first half of the 20th century, and it became possible to study archaeology as a subject in universities and even schools. By the end of the 20th century nearly all professional archaeologists, at least in developed countries, were graduates. Further adaptation and innovation in archaeology continued in this period, when maritime archaeology and urban archaeology became more prevalent and rescue archaeology was developed as a result of increasing commercial development.

Purpose

The purpose of archaeology is to learn more about past societies and the development of the human race. Over 99% of the history of humanity has occurred within prehistoric cultures, who did not make use of writing, thereby not leaving written records about themselves that we can study today. Without such written sources, the only way to learn about prehistoric societies is to use archaeology. Many important developments in human history occurred during prehistory, including the evolution of humanity during the Paleolithic period, when the hominins developed from the australopithecines through to the early members of the genus Homo in Africa and finally into modern Homo sapiens. Archaeology also sheds light on many of humanity's technological advances, for instance the ability to use fire, the development of stone tools, the discovery of metallurgy, the beginnings of religion and the creation of agriculture. Without

archaeology, we would know little or nothing about the use of material culture by humanity that pre-dates writing.

However, it is not only prehistoric, pre-literate cultures that can be studied using archaeology but historic, literate cultures as well, through the sub-discipline of historical archaeology.

For many literate cultures, such as Ancient Greece and Mesopotamia, their surviving records are often incomplete and biased to some extent. In many societies, literacy was restricted to the elite classes, such as the clergy or the bureaucracy of court or temple. The literacy even of aristocrats has sometimes been restricted to deeds and contracts. The interests and world-view of elites are often quite different from the lives and interests of the populace. Writings that were produced by people more representative of the general population were unlikely to find their way into libraries and be preserved there for posterity. Thus, written records tend to reflect the biases, assumptions, cultural values and possibly deceptions of a limited range of individuals, usually a small fraction of the larger population. Hence, written records cannot be trusted as a sole source.

The material record may be closer to a fair representation of society, though it is subject to its own biases, such as sampling bias and differential preservation.

Theory

There is no one singular approach to archaeological theory that has been adhered to by all archaeologists. When archaeology developed in the late 19th century, the first approach to archaeological theory to be practiced was that of cultural-history archaeology, which held the goal of explaining why cultures changed and adapted rather than just highlighting the fact that they did, therefore emphasizing historical particularism. In the early 20th century, many archaeologists who studied past societies with direct continuing links to existing ones (such as those of Native Americans, Siberians, Mesoamericans etc.) followed the direct historical approach, compared the continuity between the past and contemporary ethnic and cultural groups. In the 1960s, an archaeological movement largely led by American archaeologists like Lewis Binford and Kent Flannery arose that rebelled against the established cultural-history archaeology. They proposed a "New Archaeology", which would be more "scientific" and "anthropological", with hypothesis testing and the scientific method very important parts of what became known as processual archaeology.

In the 1980s, a new postmodern movement arose led by the British archaeologists Michael Shanks, Christopher Tilley,Daniel Miller,and Ian Hodder, which has become known as post-processual archaeology. It questioned processualism's appeals to scientific positivism and impartiality, and emphasized the importance of a more self-critical theoretical reflexivity.

However, this approach has been criticized by processualists as lacking scientific rigor, and the validity of both processualism and post-processualism is still under debate. Meanwhile, another theory, known as historical processualism has emerged seeking to incorporate a focus on process and post-processual archaeology's emphasis of reflexivity and history.

Archaeological theory now borrows from a wide range of influences, including neo-Darwinian evolutionary thought, phenomenology, postmodernism, agency theory, cognitive science, Structural functionalism, gender-based and Feminist archaeology, and Systems theory.

Methods

An archaeological investigation usually involves several distinct phases, each of which employs its own variety of methods. Before any practical work can begin, however, a clear objective as to what the archaeologists are looking to achieve must be agreed upon. This done, a site is surveyed to find out as much as possible about it and the surrounding area. Second, an excavation may take place to uncover any archaeological features buried under the ground. And, third, the data collected from the excavation is studied and evaluated in an attempt to achieve the original research objectives of the archaeologists. It is then considered good practice for the information to be published so that it is available to other archaeologists and historians, although this is sometimes neglected.

Remote sensing

Before actually starting to dig in a location, satellite imagery can be used to look where sites are located within a large area.

Field survey

The archaeological project then continues (or alternatively, begins) with a field survey. Regional survey is the attempt to systematically locate previously unknown sites in a region. Site survey is

the attempt to systematically locate features of interest, such as houses and middens, within a site. Each of these two goals may be accomplished with largely the same methods.

Survey was not widely practiced in the early days of archaeology. Cultural historians and prior researchers were usually content with discovering the locations of monumental sites from the local populace, and excavating only the plainly visible features there.

Gordon Willey pioneered the technique of regional settlement pattern survey in 1949 in the Viru Valley of coastal Peru and survey of all levels became prominent with the rise of processual archaeology some years later.

Survey work has many benefits if performed as a preliminary exercise to, or even in place of, excavation. It requires relatively little time and expense, because it does not require processing large volumes of soil to search out artifacts. (Nevertheless, surveying a large region or site can be expensive, so archaeologists often employ sampling methods.) As with other forms of non-destructive archaeology, survey avoids ethical issues (of particular concern to descendant peoples) associated with destroying a site through excavation. It is the only way to gather some forms of information, such as settlement patterns and settlement structure. Survey data are commonly assembled into maps, which may show surface features and/or artifact distribution.

The simplest survey technique is surface survey. It involves combing an area, usually on foot but sometimes with the use of mechanized transport, to search for features or artifacts visible on the surface. Surface survey cannot detect sites or features that are completely buried under earth, or overgrown with vegetation. Surface survey may also include mini-excavation techniques such as augers, corers, and shovel test pits. If no materials are found, the area surveyed is deemed sterile.

Aerial survey is conducted using cameras attached to airplanes, balloons, or even Kites. A bird's-eye view is useful for quick mapping of large or complex sites. Aerial photographs are used to document the status of the archaeological dig. Aerial imaging can also detect many things not visible from the surface. Plants growing above a buried man made structure, such as a stone wall, will develop more slowly, while those above other types of features (such as middens) may develop more rapidly. Photographs of ripening grain, which changes colour rapidly at maturation, have revealed buried structures with great precision. Aerial photographs taken at different times of day will help show the outlines of structures by changes in shadows. Aerial

survey also employs ultraviolet, infrared, ground-penetrating radar wavelengths, LiDAR and thermography.

Geophysical survey can be the most effective way to see beneath the ground. Magnetometers detect minute deviations in the Earth's magnetic field caused by iron artifacts, kilns, some types of stone structures, and even ditches and middens. Devices that measure the electrical resistivity of the soil are also widely used.

Archaeological features whose electrical resistivity contrasts with that of surrounding soils can be detected and mapped. Some archaeological features (such as those composed of stone or brick) have higher resistivity than typical soils, while others (such as organic deposits or unfired clay) tend to have lower resistivity.

Although some archaeologists consider the use of metal detectors to be tantamount to treasure hunting, others deem them an effective tool in archaeological surveying. Examples of formal archaeological use of metal detectors include musketball distribution analysis on English Civil War battlefields, metal distribution analysis prior to excavation of a 19th-century ship wreck, and service cable location during evaluation. Metal detectorists have also contributed to archaeology where they have made detailed records of their results and refrained from raising artifacts from their archaeological context. In the UK, metal detectorists have been solicited for involvement in the Portable Antiquities Scheme.

Regional survey in underwater archaeology uses geophysical or remote sensing devices such as marine magnetometer, side-scan sonar, or sub-bottom sonar.

Archaeological excavation existed even when the field was still the domain of amateurs, and it remains the source of the majority of data recovered in most field projects. It can reveal several types of information usually not accessible to survey, such as stratigraphy, three-dimensional structure, and verifiably primary context.

Modern excavation techniques require that the precise locations of objects and features, known as their provenance or provenience, be recorded. This always involves determining their horizontal locations, and sometimes vertical position as well (also see Primary Laws of Archaeology). Likewise, their association, or relationship with nearby objects and features, needs

to be recorded for later analysis. This allows the archaeologist to deduce which artifacts and features were likely used together and which may be from different phases of activity. For example, excavation of a site reveals its stratigraphy; if a site was occupied by a succession of distinct cultures, artifacts from more recent cultures will lie above those from more ancient cultures.

Excavation is the most expensive phase of archaeological research, in relative terms. Also, as a destructive process, it carries ethical concerns. As a result, very few sites are excavated in their entirety. Again the percentage of a site excavated depends greatly on the country and "method statement" issued. In places 90% excavation is common. Sampling is even more important in excavation than in survey.

It is common for large mechanical equipment, such as backhoes (JCBs), to be used in excavation, especially to remove the topsoil (overburden), though this method is increasingly used with great caution. Following this rather dramatic step, the exposed area is usually hand-cleaned with trowels or hoes to ensure that all features are apparent.

The next task is to form a site plan and then use it to help decide the method of excavation. Features dug into the natural subsoil are normally excavated in portions to produce a visible archaeological section for recording. A feature, for example a pit or a ditch, consists of two parts: the cut and the fill. The cut describes the edge of the feature, where the feature meets the natural soil. It is the feature's boundary. The fill is what the feature is filled with, and will often appear quite distinct from the natural soil. The cut and fill are given consecutive numbers for recording purposes. Scaled plans and sections of individual features are all drawn on site, black and white and colour photographs of them are taken, and recording sheets are filled in describing the context of each. All this information serves as a permanent record of the now-destroyed archaeology and is used in describing and interpreting the site.

Analysis

Once artifacts and structures have been excavated, or collected from surface surveys, it is necessary to properly study them, to gain as much data as possible. This process is known as post-excavation analysis, and is usually the most time-consuming part of the archaeological

investigation. It is not uncommon for the final excavation reports on major sites to take years to be published.

At its most basic, the artifacts found are cleaned, cataloged and compared to published collections, to classify them typologically and to identify other sites with similar artifact assemblages. However, a much more comprehensive range of analytical techniques are available through archaeological science, meaning that artifacts can be dated and their compositions examined. The bones, plants and pollen collected from a site can all be analyzed (using the techniques of zooarchaeology, paleoethnobotany, and palynology), while any texts can usually be deciphered.

These techniques frequently provide information that would not otherwise be known and therefore contribute greatly to the understanding of a site.

Virtual archaeology

Sometime around 1995 archaeologists started using computer graphics to build virtual 3D models of sites such as the throne room of an ancient Assyrian palace or ancient Rome.This is done by collecting normal photographs and using computer graphics to build the virtual 3D model. In more general terms, computers can be used to recreate the environment and conditions of the past, such as objects, buildings, landscapes and even ancient battles. Computer simulation can be used to simulate the living conditions of an ancient community and to see how it would have reacted to various scenarios (such as how much food to grow, how many animals to slaughter, etc.) Computer-built topographical models have been combined with astronomical calculations to verify whether or not certain structures (such as pillars) were aligned with astronomical events such as the sun's position at a solstice.

Academic sub-disciplines

As with most academic disciplines, there are a very large number of archaeological sub-disciplines characterised by a specific method or type of material (e.g., lithic analysis, music, archaeobotany), geographical or chronological focus (e.g. Near Eastern archaeology, Islamic archaeology, Medieval archaeology), other thematic concern (e.g. maritime archaeology,

landscape archaeology, battlefield archaeology), or a specific archaeological culture or civilisation (e.g. Egyptology, Indology, Sinology).

Historical archaeology

Historical archaeology is the study of cultures with some form of writing.

In England, archaeologists have uncovered the long-lost layouts of medieval villages abandoned after the crises of the 14th century and the equally lost layouts of 17th century parterre gardens swept away by a change in fashion.[citation needed] In downtown New York City archaeologists have exhumed the 18th century remains of the African burial ground.

Ethnoarchaeology

Ethnoarchaeology is the archaeological study of living people. The approach gained notoriety during the emphasis on middle range theory that was a feature of the processual movement of the 1960s. Early ethnoarchaeological research focused on hunting and gathering or foraging societies. Ethnoarchaeology continues to be a vibrant component of post-processual and other current archaeological approaches. Ethnoarchaeology is the use of ethnography to increase and improve analogs, which are then used as analogies to interpret the archaeological record. In short, ethnoarchaeology is the application of ethnography to archaeology.

Experimental archaeology

Experimental archaeology represents the application of the experimental method to develop more highly controlled observations of processes that create and impact the archaeological record. In the context of the logical positivism of processualism with its goals of improving the scientific rigor of archaeological epistemologies the experimental method gained importance. Experimental techniques remain a crucial component to improving the inferential frameworks for interpreting the archaeological record.

Archaeometry

Archaeometry is a field of study that aims to systematize archaeological measurement. It emphasizes the application of analytical techniques from physics, chemistry, and engineering. It is a field of research that frequently focuses on the definition of the chemical composition of

archaeological remains for source analysis. Archaeometry also investigates different spatial characteristics of features, employing methods such as space syntax techniques and geodesy as well as computer-based tools such as geographic information system technology. Rare earth elements patterns may also be used.A relatively nascent subfield is that of archaeological materials, designed to enhance understanding of prehistoric and non-industrial culture through scientific analysis of the structure and properties of materials associated with human activity.

Cultural resources management

While archaeology can be done as a pure science, it can also be an applied science, namely the study of archaeological sites that are threatened by development. In such cases, archaeology is a subsidiary activity within Cultural resources management (CRM), also called heritage management in the United Kingdom.[70] Today, CRM accounts for most of the archaeological research done in the United States and much of that in western Europe as well. In the US, CRM archaeology has been a growing concern since the passage of the National Historic Preservation Act (NHPA) of 1966, and most taxpayers, scholars, and politicians believe that CRM has helped preserve much of that nation's history and prehistory that would have otherwise been lost in the expansion of cities, dams, and highways.

Along with other statutes, the NHPA mandates that projects on federal land or involving federal funds or permits consider the effects of the project on each archaeological site.

The application of CRM in the United Kingdom is not limited to government-funded projects. Since 1990 PPG 16 has required planners to consider archaeology as a material consideration in determining applications for new development.

As a result, numerous archaeological organisations undertake mitigation work in advance of (or during) construction work in archaeologically sensitive areas, at the developer's expense.

Among the goals of CRM are the identification, preservation, and maintenance of cultural sites on public and private lands, and the removal of culturally valuable materials from areas where they would otherwise be destroyed by human activity, such as proposed construction. This study involves at least a cursory examination to determine whether or not any significant archaeological sites are present in the area affected by the proposed construction. If these do

exist, time and money must be allotted for their excavation. If initial survey and/or test excavation indicates the presence of an extraordinarily valuable site, the construction may be prohibited entirely. CRM is a thriving entity, especially in the United States and Europe where archaeologists from private companies and all levels of government engage in the practice of their discipline.

Cultural resources management has, however, been criticized. CRM is conducted by private companies that bid for projects by submitting proposals outlining the work to be done and an expected budget. It is not unheard-of for the agency responsible for the construction to simply choose the proposal that asks for the least funding. CRM archaeologists face considerable time pressure, often being forced to complete their work in a fraction of the time that might be allotted for a purely scholarly endeavor. Compounding the time pressure is the vetting process of site reports that are required (in the US) to be submitted by CRM firms to the appropriate State Historic Preservation Office (SHPO). From the SHPO's perspective there is to be no difference between a report submitted by a CRM firm operating under a deadline, and a multi-year academic project. The end result is that for a Cultural Resource Management archaeologist to be successful, they must be able to produce academic quality documents at a corporate world pace.

The annual ratio of open academic archaeology positions (inclusive of Post-Doc, temporary, and non tenure track appointments) to the annual number of archaeology MA/MSc and PhD students is grossly disproportionate.

This dearth of academic positions causes a predictable excess of well educated individuals who join the ranks of the following year's crop of non-academically employed archaeologists. Cultural Resource Management, once considered an intellectual backwater for individuals with "strong backs and weak minds"has reaped the benefit of this massive pool of well educated professionals.

This results in CRM offices increasingly staffed by advance degreed individuals with a track record of producing scholarly articles but who have the notches on their trowels to show they have been in the trenches as a shovelbum.

Popular views of archaeology

Early archaeology was largely an attempt to uncover spectacular artifacts and features, or to explore vast and mysterious abandoned cities. Early archaeology was mostly done by upper class, scholarly men. This generalization laid the foundation for the modern popular view of archaeology and archaeologists. This generalization had been with our culture for a long time, before silent movies in popular fiction novels. Another popular thought that dates back to this era is that archaeology is monetarily lucrative. A large majority of the general public is under the impression that excavations are undertaken for money and not historical data. It is easy for the general public to hold this notion for that is what is presented to them through general media, and has been for many decades.

The majority of the public view archaeology as being something only available to a narrow demographic. The job of archaeologist is depicted as a "romantic adventurist occupation". To generalize, the public views archaeology as a fantasized hobby more than a job in the scientific community. Perpetuating the stereotype in modern cinema does nothing to help the scientific community. The audience may not take away scientific methods from popular cinema but they do form a notion of "who archaeologists are, why they do what they do, and how relationships to the past are constituted." Major motion picture companies are more worried about the marketability of the film and the general dramatic interest of the public.

Almost all popular portrayals of archaeologists fall into a few categories. Mcgeough labels them as "British thinkers, American fighters, and repressed librarians." These labels mostly pertain to male archaeologists.

Female archaeologists fall into the categories of "privileged women" with a love of adventure who are overly sexualized and "junior scholars" who are like the repressed librarians but are sexualized when their glasses come off and their hair is let down.

The modern depiction is sensationalized so much that it has incorrectly formed the public's perception of what archaeology is. The public is often under the impression that all archaeology takes place in a distant and foreign land, only to collect monetarily or spiritually priceless artifacts. Many times these artifacts are pursued for power and/or wealth. Alfred Hitchcock referred to such items in his films as the "MacGuffin: an object of pursuit, protected, and rescue

by both hero and villain." We are led to believe that Indiana Jones is a hero for yelling, "It belongs in a Museum!" all while he wields a gun and destroys historical sites without the blink of an eye.

Such pursuits continue to fascinate the public. Books, films, and video games, such as Indiana Jones, King Solomon's Mines, The City of Brass, Relic Hunter, The Mummy, Stargate, and Tomb Raider all testify to the public's interest in the discovery aspect of archaeology.

Much thorough and productive research has indeed been conducted in dramatic locales such as Copán and the Valley of the Kings, but the bulk of activities and finds of modern archaeology are not so sensational. Archaeological adventure stories tend to ignore the painstaking work involved in carrying out modern surveys, excavations, and data processing. Some archaeologists refer to such off-the-mark portrayals as "pseudoarchaeology".

Archaeology has been portrayed in the mainstream media in sensational ways. This has its advantages and disadvantages. Many practitioners point to the childhood excitement of Indiana Jones films as their inspiration to enter the field. Archaeologists are also very much reliant on public support, the question of exactly who they are doing their work for is often discussed.

Motivated by a desire to halt looting, curb pseudoarchaeology, and to help preserve archaeological sites through education and fostering public appreciation for the importance of archaeological heritage, archaeologists are mounting public-outreach campaigns.They seek to stop looting by combatting people who illegally take artifacts from protected sites, and by alerting people who live near archaeological sites of the threat of looting. Common methods of public outreach include press releases, and the encouragement of school field trips to sites under excavation by professional archaeologists.[citation needed] Public appreciation of the significance of archaeology and archaeological sites often leads to improved protection from encroaching development or other threats.

One audience for archaeologists' work is the public. They increasingly realize that their work can benefit non-academic and non-archaeological audiences, and that they have a responsibility to educate and inform the public about archaeology. Local heritage awareness is aimed at increasing civic and individual pride through projects such as community excavation projects, and better public presentations of archaeological sites and knowledge.[citation needed] The

U.S.Dept. of Agriculture, Forest Service(USFS) operates a volunteer archaeology and historic preservation program called the Passport in Time (PIT). Volunteers work with professional USFS archaeologists and historians on national forests throughout the U.S. Volunteers are involved in all aspects of professional archaeology under expert supervision.

In the UK, popular archaeology programs such as Time Team and Meet the Ancestors have resulted in a huge upsurge in public interest.[citation needed] Where possible, archaeologists now make more provisions for public involvement and outreach in larger projects than they once did, and many local archaeological organizations operate within the Community archaeology framework to expand public involvement in smaller-scale, more local projects. Archaeological excavation, however, is best undertaken by well-trained staff that can work quickly and accurately. Often this requires observing the necessary health and safety and indemnity insurance issues involved in working on a modern building site with tight deadlines. Certain charities and local government bodies sometimes offer places on research projects either as part of academic work or as a defined community project.[citation needed] There is also a flourishing industry selling places on commercial training excavations and archaeological holiday tours.

Archaeologists prize local knowledge and often liaise with local historical and archaeological societies, which is one reason why Community archaeology projects are starting to become more common. Often archaeologists are assisted by the public in the locating of archaeological sites, which professional archaeologists have neither the funding, nor the time to do.

The Archaeological Legacy Institute (ALI), self-described as "an independent, nonprofit, tax-exempt (501[c][3])", is a research and education corporation registered in Oregon in 1999. The ALI founded an online Archaeology Channel to support the organization's mission "to develop ways to make archaeology more effective both in gathering important information about past human lifeways and in delivering that information to the public and the profession."

Pseudoarchaeology

Pseudoarchaeology is an umbrella term for all activities that claim to be archaeological but in fact violate commonly accepted and scientific archaeological practices. It includes much fictional archaeological work (discussed above), as well as some actual activity. Many non-fiction authors

have ignored the scientific methods of processual archaeology, or the specific critiques of it contained in post-processualism.

An example of this type is the writing of Erich von Däniken. His 1968 book, Chariots of the Gods? together with many subsequent lesser-known works, expounds a theory of ancient contacts between human civilisation on Earth and more technologically advanced extraterrestrial civilisations. This theory, known as palaeocontact theory, or Ancient astronaut theory, is not exclusively Däniken's, nor did the idea originate with him. Works of this nature are usually marked by the renunciation of well-established theories on the basis of limited evidence and the interpretation of evidence with a preconceived theory in mind.

Looting

Looting of archaeological sites is an ancient problem. For instance, many of the tombs of the Egyptian pharaohs were looted during antiquity.[86] Archaeology stimulates interest in ancient objects, and people in search of artifacts or treasure cause damage to archaeological sites. The commercial and academic demand for artifacts unfortunately contributes directly to the illicit antiquities trade. Smuggling of antiquities abroad to private collectors has caused great cultural and economic damage in many countries whose governments lack the resources and or the will to deter it. Looters damage and destroy archaeological sites, denying future generations information about their ethnic and cultural heritage. Indigenous peoples especially lose access to and control over their 'cultural resources', ultimately denying them the opportunity to know their past.

Descendant peoples

In the United States, examples such as the case of Kennewick Man have illustrated the tensions between Native Americans and archaeologists, which can be summarized as a conflict between a need to remain respectful toward sacred burial sites and the academic benefit from studying them. For years, American archaeologists dug on Indian burial grounds and other places considered sacred, removing artifacts and human remains to storage facilities for further study. In some cases human remains were not even thoroughly studied but instead archived rather than reburied.

Furthermore, Western archaeologists' views of the past often differ from those of tribal peoples. The West views time as linear; for many natives, it is cyclic. From a Western perspective, the past is long-gone; from a native perspective, disturbing the past can have dire consequences in the present.

As a consequence of this, American Indians attempted to prevent archaeological excavation of sites inhabited by their ancestors, while American archaeologists believed that the advancement of scientific knowledge was a valid reason to continue their studies. This contradictory situation was addressed by the Native American Graves Protection and Repatriation Act (NAGPRA, 1990), which sought to reach a compromise by limiting the right of research institutions to possess human remains.

Due in part to the spirit of postprocessualism, some archaeologists have begun to actively enlist the assistance of indigenous peoples likely to be descended from those under study.

Archaeologists have also been obliged to re-examine what constitutes an archaeological site in view of what native peoples believe to constitute sacred space. To many native peoples, natural features such as lakes, mountains or even individual trees have cultural significance. Australian archaeologists especially have explored this issue and attempted to survey these sites to give them some protection from being developed. Such work requires close links and trust between archaeologists and the people they are trying to help and at the same time study.

While this cooperation presents a new set of challenges and hurdles to fieldwork, it has benefits for all parties involved. Tribal elders cooperating with archaeologists can prevent the excavation of areas of sites that they consider sacred, while the archaeologists gain the elders' aid in interpreting their finds. There have also been active efforts to recruit aboriginal peoples directly into the archaeological profession.

Chapter 2
History of Archaeology

Archaeology is the study of human activity in the past, primarily through the recovery and analysis of the material culture and environmental data that they have left behind, which includes artifacts, architecture, biofacts (also known as eco-facts) and cultural landscapes (the archaeological record).

The history of the development of the discipline can be traced back to the Antiquarians of the 16th and 17th century. It evolved into a systematic discipline in the late 19th century and became a widely used tool for historical and anthropological research in the 20th century.

The science of archaeology grew out of the older multi-disciplinary study known as antiquarianism. Antiquarians studied history with particular attention to ancient artefacts and manuscripts, as well as historical sites. Antiquarianism focused on the empirical evidence that existed for the understanding of the past, encapsulated in the motto of the 18th-century antiquary, Sir Richard Colt Hoare, "We speak from facts not theory". Tentative steps towards the systematization of archaeology as a science took place during the Enlightenment era in Europe in the 17th and 18th centuries.

During the Song Dynasty period (960–1279) in China, educated gentry became interested in the antiquarian pursuit of art collecting. Neo-Confucian scholar-officials were generally concerned with archaeological pursuits in order to revive the use of ancient relics in state rituals. This attitude was criticized by the polymath official Shen Kuo in his Dream Pool Essays of 1088. He endorsed the idea that materials, technologies, and objects of antiquity should be studied for their functionality and for the discovery of ancient manufacturing techniques, instead. Although a distinct minority, here were others who took the discipline as seriously as Shen did; the official, historian, poet, and essayist Ouyang Xiu (1007–1072) compiled an analytical catalogue of ancient rubbings on stone and bronze.

In Europe, interest in the remains of Greco-Roman civilisation and the rediscovery of classical culture began in the late Middle Age. Flavio Biondo an Italian Renaissance humanist historian

created a systematic guide to the ruins and topography of ancient Rome in the early 15th century for which he has been called an early founder of archaeology. The itinerant scholar Ciriaco de' Pizzicolli or Cyriacus of Ancona (1391—c.1455) also traveled throughout Greece to record his findings on ancient buildings and objects. Ciriaco traveled all around the Eastern Mediterranean, noting down his archaeological discoveries in his day-book, Commentaria, that eventually filled six volumes.

Antiquarians, including John Leland and William Camden, conducted surveys of the English countryside, drawing, describing and interpreting the monuments that they encountered. These individuals were frequently clergymen - many vicars recorded local landmarks within their parishes, details of the landscape and ancient monuments such as standing stones — even if they did not recognise the significance of what they were seeing.

First excavations

One of the first sites to undergo archeological excavation, was Stonehenge and other megalithic monuments in England. The first known excavations made at Stonehenge, were conducted by Dr William Harvey and Gilbert North in the early 17th century. Both Inigo Jones and the Duke of Buckingham also dug there shortly afterwards. John Aubrey was a pioneer archaeologist who recorded numerous megalithic and other field monuments in southern England. He also discovered and mapped the Avebury henge monument. He wrote Monumenta Britannica in the late 17th century, as a survey of early urban and military sites, including Roman towns, "camps" (hillforts), and castles and a review of archaeological remains, including sepulchral monuments, roads, coins and urns. He was also ahead of his time in the analysis of his findings. He attempted to chart the chronological stylistic evolution of handwriting, medieval architecture, costume, and shield-shapes.

William Stukeley was another antiquarian who contributed to the early development of archaeology in the early 18th century. He also investigated the prehistoric monuments of Stonehenge and Avebury; work for which he has been remembered as "probably... the most important of the early forerunners of the discipline of archaeology".He was one of the first to attempt to date the megaliths, and argued that they were a remnant of the pre-Roman druidic religion.

Excavations were carried out in the ancient towns of Pompeii and Herculaneum, both of which had been covered by ashes during the Eruption of Mount Vesuvius in AD 79. These excavations began in 1748 in Pompeii, while in Herculaneum they began in 1738 under the auspices of King Charles III of Naples. In Herculaneum, the Theatre, the Basilica and the Villa of the Papyri were discovered in 1768. The discovery of entire towns, complete with utensils and even human shapes, as well the unearthing of ancient frescos, had a big impact throughout Europe.

A very influential figure in the development of the theoretical and systematic study of the past through its physical remains, was "the prophet and founding hero of modern archaeology," Johann Joachim Winckelmann. Winckelmann was a founder of scientific archaeology by first applying empirical categories of style on a large, systematic basis to the classical (Greek and Roman) history of art and architecture. His original approach was based on detailed empirical examinations of artefacts from which reasoned conclusions could be drawn and theories developed about ancient societies.

In America, Thomas Jefferson, possibly inspired by his experiences in Europe, supervised the systematic excavation of a Native American burial mound on his land in Virginia in 1784. Although Jefferson's investigative methods were ahead of his time, they were primitive by today's standards.

Napoleon's army carried out excavations during its Egyptian campaign, in 1798-1801, which also was the first overseas archaeological expedition ever. The emperor took with him a force of 500 civilian scientists, specialists in fields such as biology, chemistry and languages, in order to carry out a full study of the ancient civilisation. The work of Jean-François Champollion in deciphering the Rosetta stone to discover the hidden meaning of hieroglyphics proved the key to the study of Egyptology.

However, prior to the development of modern techniques excavations tended to be haphazard; the importance of concepts such as stratification and context were completely overlooked. For instance, in 1803, there was widespread criticism of Thomas Bruce, 7th Earl of Elgin for removing the "Elgin Marbles" from their rightful place on the Parthenon in Athens. The marble sculptures themselves were valued by his critics only for their aesthetic qualities, not for the information they contained about Ancient Greek civilization.

In the first half of the 19th century many other archaeological expeditions were organized; Giovanni Battista Belzoni and Henry Salt collected Ancient Egyptian artifacts for the British Museum, Paul Émile Botta excavated the palace of Assyrian ruler Sargon II, Austen Henry Layard unearthed the ruins of Babylon and Nimrud and discovered the Library of Ashurbanipal and Robert Koldeway and Karl Richard Lepsius excavated sites in the Middle East. However, the methodology was still poor, and the digging was aimed at the discovery of artefacts and monuments.

Development of Archaeological Method

The father of archaeological excavation was William Cunnington (1754–1810). He undertook excavations in Wiltshire from around 1798, in collaboration with his regular excavators Stephen and John Parker of Heytesbury. Cunnington's work was funded by a number of patrons, the wealthiest of whom was Richard Colt Hoare, who had inherited the Stourhead estate from his grandfather in 1785. Hoare turned his attention to antiquarian pursuits and began funding Cunnington's excavations in 1804. The latter's site reports and descriptions were published by Hoare in a book entitled Ancient Historie of Wiltshire in 1810, a copy of which is kept at Stourhead.

Cunnington made meticulous recordings of mainly neolithic and Bronze Age barrows, and the terms he used to categorise and describe them are still used by archaeologists today. The first reference to the use of a trowel on an archaeological site was made in a letter from Cunnington to Hoare in 1808, which describes John Parker using one in the excavation of Bush Barrow.

One of the major achievements of 19th century archaeology was the development of stratigraphy. The idea of overlapping strata tracing back to successive periods was borrowed from the new geological and palaeontological work of scholars like William Smith, James Hutton and Charles Lyell. The application of stratigraphy to archaeology first took place with the excavations of prehistorical and Bronze Age sites. In the third and fourth decade of the 19th century, archaeologists like Jacques Boucher de Perthes and Christian Jürgensen Thomsen began to put the artifacts they had found in chronological order.

Professionalisation

As late as the mid-century, archaeology was still regarded as an amateur pastime by scholars. Britain's large colonial empire provided a great opportunity for such 'amateurs' to unearth and study the antiquities of many other cultures. A major figure in the development of archaeology into a rigorous science was the army officer and ethnologist, Augustus Pitt Rivers.

In 1880, he began excavations on lands that came to him in inheritance and which contained a wealth of archaeological material from the Roman and Saxon periods. He excavated these over seventeen seasons, beginning in the mid-1880s and ending with his death. His approach was highly methodical by the standards of the time, and he is widely regarded as the first scientific archaeologist. Influenced by the evolutionary writings of Charles Darwin and Herbert Spencer, he arranged the artefacts typologically and (within types) chronologically.

This style of arrangement, designed to highlight the evolutionary trends in human artefacts, was a revolutionary innovation in museum design, and was of enormous significance for the accurate dating of the objects. His most important methodological innovation was his insistence that all artefacts, not just beautiful or unique ones, be collected and catalogued. This focus on everyday objects as the key to understanding the past broke decisively with past archaeological practice, which had often verged on treasure hunting.

William Flinders Petrie is another man who may legitimately be called the Father of Archaeology. Petrie was the first to scientifically investigate the Great Pyramid in Egypt during the 1880s. Many theories as to how the pyramids had been constructed had been proposed (such as by Charles Piazzi Smyth),but Petrie's exemplary analysis of the architecture of Giza disproved these theories and still provides much of the basic data regarding the pyramid plateau to this day.

His painstaking recording and study of artefacts, both in Egypt and later in Palestine, laid down many of the ideas behind modern archaeological recording; he remarked that "I believe the true line of research lies in the noting and comparison of the smallest details." Petrie developed the system of dating layers based on pottery and ceramic findings, which revolutionized the chronological basis of Egyptology. He was also responsible for mentoring and training a whole generation of Egyptologists, including Howard Carter who went on to achieve fame with the discovery of the tomb of 14th-century BC pharaoh Tutankhamun.

The first stratigraphic excavation to reach wide popularity with public was that of Hissarlik, on the site of ancient Troy, carried out by Heinrich Schliemann, Frank Calvert, Wilhelm Dörpfeld and Carl Blegen in the 1870s. These scholars individuated nine different cities that had overlapped with one another, from prehistory to the Hellenistic period. Their work has been criticized as rough and damaging - Kenneth W. Harl wrote that Schliemann's excavations were carried out with such rough methods that he did to Troy what the Greeks couldn't do in their times, destroying and levelling down the entire city walls to the ground.

Meanwhile, the work of Sir Arthur Evans at Knossos in Crete revealed the ancient existence of an advanced civilisation. Many of the finds from this site were catalogued and brought to the Ashmolean Museum in Oxford, where they could be studied by classicists, while an attempt was made to reconstruct much of the original site. Although this was done in a manner that would be considered inappropriate today, it helped raise the profile of archaeology considerably.

Modern methodology

The next major figure in the development of archaeology was Mortimer Wheeler, whose highly disciplined approach to excavation and systematic coverage in the 1920s and 1930s brought the science on swiftly. Wheeler developed the grid system of excavation, which was further improved on by his student Kathleen Kenyon. The two constant themes in their attempts to improve archaeological excavation were, first, to maintain strict stratigraphic control while excavating (for this purpose, the baulks between trenches served to retain a record of the strata that had been dug through), and, second, to publish the excavation promptly and in a form that would tell the story of the site to the intelligent reader.

The bomb damage and subsequent rebuilding caused by the Second World War gave archaeologists the opportunity to meaningfully examine inhabited cities for the first time. Bomb damaged sites provided windows onto the development of European cities whose pasts had been buried beneath working buildings. Urban archaeology necessitated a new approach as centuries of human occupation had created deep layers of stratigraphy that could often only be seen through the keyholes of individual building plots. In Britain, post-war archaeologists such as W. F. Grimes and Martin Biddle took the initiative in studying this previously unexamined area and developed the archaeological methods now employed in much CRM and rescue archaeology.

Archaeology increasingly became a professional activity during the first half of the 20th century. Although the bulk of an excavation's workforce would still consist of volunteers, it would normally be led by a professional. It was now possible to study archaeology as a subject in universities and even schools, and by the end of the 20th century nearly all professional archaeologists, at least in developed countries, were graduates.

New technology

Undoubtedly the major technological development in 20th century archaeology was the introduction of radiocarbon dating, based on a theory first developed by American scientist Willard Libby in 1949. Despite its many limitations (compared to later methods it is inaccurate; it can only be used on organic matter; it is reliant on a dataset to corroborate it; and it only works with remains from the last 10,000 years), the technique brought about a revolution in archaeological understanding. For the first time, it was possible to put reasonably accurate dates on discoveries such as bones. This in some cases led to a complete reassessment of the significance of past finds. Classic cases included the Red Lady of Paviland.

It was not until 1989 that the Catholic Church allowed the technique to be used on the Turin Shroud, indicating that the linen fibres were of mediaeval origin.

Other developments, often spin-offs from wartime technology, led to other scientific advances. For field archaeologists, the most significant of these was the use of the geophysical survey, enabling an advance picture to be built up of what lies beneath the soil, before excavation even commences. The entire Roman town of Viroconium, modern day Wroxeter, has been surveyed by these methods, though only a small portion has actually been excavated. The application of physical sciences to archaeology, known as archaeometry or archaeological science, is now a major part of archaeology.

The discovery in 1991 in the Ötztaler Alpen of the prehistorical mummy of the so-called Man of Similaun introduced a new field of archaeological science. With the help of DNA Analysis the scholars could ascertain that Ötzi, how is called the mummy, doesn't belong to any known human population. Generally speaking, in the following years genetics have helped to understand the human migrations occurred during Prehistory.

Chapter 3

Purpose

The purpose of archaeology is to learn more about past societies and the development of the human race. Over 99% of the history of humanity has occurred within prehistoric cultures, who did not make use of writing, thereby not leaving written records about themselves that we can study today. Without such written sources, the only way to learn about prehistoric societies is to use archaeology. Many important developments in human history occurred during prehistory, including the evolution of humanity during the Paleolithic period, when the hominins developed from the australopithecines through to the early members of the genus Homo in Africa and finally into modern Homo sapiens. Archaeology also sheds light on many of humanity's technological advances, for instance the ability to use fire, the development of stone tools, the discovery of metallurgy, the beginnings of religion and the creation of agriculture. Without archaeology, we would know little or nothing about the use of material culture by humanity that pre-dates writing.

However, it is not only prehistoric, pre-literate cultures that can be studied using archaeology but historic, literate cultures as well, through the sub-discipline of historical archaeology. For many literate cultures, such as Ancient Greece and Mesopotamia, their surviving records are often incomplete and biased to some extent. In many societies, literacy was restricted to the elite classes, such as the clergy or the bureaucracy of court or temple. The literacy even of aristocrats has sometimes been restricted to deeds and contracts. The interests and world-view of elites are often quite different from the lives and interests of the populace. Writings that were produced by people more representative of the general population were unlikely to find their way into libraries and be preserved there for posterity. Thus, written records tend to reflect the biases, assumptions, cultural values and possibly deceptions of a limited range of individuals, usually a small fraction of the larger population. Hence, written records cannot be trusted as a sole source. The material record may be closer to a fair representation of society, though it is subject to its own biases, such as sampling bias and differential preservation.

Theory

There is no one singular approach to archaeological theory that has been adhered to by all archaeologists. When archaeology developed in the late 19th century, the first approach to archaeological theory to be practiced was that of cultural-history archaeology, which held the goal of explaining why cultures changed and adapted rather than just highlighting the fact that they did, therefore emphasizing historical particularism. In the early 20th century, many archaeologists who studied past societies with direct continuing links to existing ones (such as those of Native Americans, Siberians, Mesoamericans etc.) followed the direct historical approach, compared the continuity between the past and contemporary ethnic and cultural groups. In the 1960s, an archaeological movement largely led by American archaeologists like Lewis Binford and Kent Flannery arose that rebelled against the established cultural-history archaeology.They proposed a "New Archaeology", which would be more "scientific" and "anthropological", with hypothesis testing and the scientific method very important parts of what became known as processual archaeology.

In the 1980s, a new postmodern movement arose led by the British archaeologists Michael Shanks, Christopher Tilley,Daniel Miller, and Ian Hodder, which has become known as post-processual archaeology. It questioned processualism's appeals to scientific positivism and impartiality, and emphasized the importance of a more self-critical theoretical reflexivity.[citation needed] However, this approach has been criticized by processualists as lacking scientific rigor, and the validity of both processualism and post-processualism is still under debate. Meanwhile, another theory, known as historical processualism has emerged seeking to incorporate a focus on process and post-processual archaeology's emphasis of reflexivity and history.

Archaeological theory now borrows from a wide range of influences, including neo-Darwinian evolutionary thought, phenomenology, postmodernism, agency theory, cognitive science, Structural functionalism, gender-based and Feminist archaeology, and Systems theory.

Culture-historical archaeology

Culture-historical archaeology is an archaeological theory that emphasises defining historical societies into distinct ethnic and cultural groupings according to their material culture.

Originating in the late nineteenth century as cultural evolutionism began to fall out of favor with many antiquarians and archaeologists, it gradually began to become unpopular amongst the archaeological community, being superseded by new archaeological theories, namely processual archaeology, in the mid twentieth century. Cultural-historical archaeology had in many cases been influenced by a nationalist political agenda, being utilised to prove a direct cultural and/or ethnic link from prehistoric and ancient peoples to modern nation-states, something that has in many respects been disproved by later research and archaeological evidence.

First developing in Germany among those archaeologists surrounding Rudolf Virchow, culture-historical ideas would later be popularised by Gustaf Kossinna. Culture-historical thought would be introduced to British archaeology by V. Gordon Childe in the late 1920s. In the United Kingdom and United States, culture-history came to be supplanted as the dominant theoretical paradigm in archaeology during the 1960s, with the rise of processual archaeology. Nevertheless, elsewhere in the world, culture-historical ideas continue to dominate.

Webster remarked that the defining feature of culture-historical archaeology was its "statements which reveal common notions about the nature of ancient cultures; about their qualities; about how they related to the material record; and thus about how archaeologists might effectively study them."

Webster noted that the second defining feature of culture-historical thought was its emphasis on classification and typologies.

Causes

Culture-historical archaeology arose during a somewhat tumultuous time in European intellectual thought. The Industrial Revolution had spread across many nations, leading to the creation of large urban centres, most of which were filled with poverty stricken proletariat workers. This new urban working class had begun to develop a political voice through socialism, threatening the established political orders of many European states. Whilst some intellectuals had championed the Industrial Revolution as a progressive step forward, there were many who had seen it as a negative turn of events, disrupting the established fabric of society. This latter view was taken up by the Romanticist movement, which was largely made up of artists and writers, who popularised the idea of an idyllic ancient agrarian society.

There was also a trend that was developing among the European intelligentsia that began to oppose the concept of cultural evolutionism (that culture and society gradually evolved and progressed through stages), instead taking the viewpoint that human beings were inherently resistant to change.

Geographic variability and the concept of "culture"

Historian of archaeology Bruce Trigger considered the development of culture-historical archaeology to be "a response to growing awareness of geographical variability in the archaeological record" at a time when the belief in cultural evolutionary archaeology was declining in western and central Europe.Throughout the 19th century, an increasing amount of archaeological material had been collected in Europe, in part as a result of land reclamation projects, increased agricultural production and construction, the foundation of museums and establishment of archaeological teaching positions at universities. As a result of this, archaeologists had come to increasingly realise that there was a great deal of variability in the artefacts uncovered across the continent. Many felt that this variability was not comfortably explained by preexisting evolutionary paradigms.

Culture-historical archaeology adopted the concept of "culture" from anthropology, where cultural evolutionary ideas had also begun to be criticised. In the late 19th century, anthropologists like Franz Boas and Friedrich Ratzel were promoting the idea that cultures represented geographically distinct entities, each with their own characteristics that had developed largely through the chance accumulation of different traits. Similar ideas were also coming from Germany's neighbour, Austria, at around this time, namely from two anthropologist Roman Catholic priests, Fritz Graebner and Wilhelm Schmidt, as well as by the archaeologist Oswald Menghin.

Nationalism and racialism

Bruce Trigger also argued that the development of culture-historical archaeology was in part due to the rising tide of nationalism and racism in Europe, which emphasised ethnicity as the main factor shaping history. Such nationalistic sentiment began to be adopted within academic disciplines by intellectuals who wished to emphasise solidarity within their own nations – in the face of social unrest caused by industrialization – by blaming neighbouring states.Under such a

nationalist worldview, people across Europe came to see different nationalities – such as the French, Germans and English – as being biologically different to one another, and it was argued that their behaviour was determined by these racial differences as opposed to social or economic factors.

Having been inspired and influenced by European nationalism, in turn, culture-historical archaeology would be utilised in support of nationalist political causes. In many cases, nationalists used culture-historical archaeological interpretations to highlight and celebrate the prehistoric and ancient past of their ancestors, and prove an ethnic and cultural link to them. As such, many members of various European nations placed an emphasis on archaeologically proving a connection with a particular historical ethnicity, for instance the French often maintained that they were the ethnic and cultural descendents of the ancient Gauls, whilst the English did the same with the Anglo-Saxons and the Welsh and Irish with the Celts, and archaeologists in these countries were encouraged to interpret the archaeological evidence to fit these conclusions.

One of the most notable examples of a nationalist movement utilising culture-historical archaeology was that of the Nazi Party, who obtained power in Germany in 1933 and established a totalitarian regime that emphasised the alleged racial supremacy of the German race and sought to unify all German speakers under a single political state. The Nazis were influenced by the culture-historical ideas of Kossinna, and used archaeology to support their claims regarding the behaviour of prehistoric Germans, in turn supporting their own policies.

History

Early development: 1869–1925

Culture-historical archaeology first developed in Germany in the late 19th-century.[11] In 1869, the German Society for Anthropology, Ethnology, and Prehistoric Archaeology (Urgeschichte) had been founded, an organisation that was dominated by the figure of Rudolf Virchow (1821–1902), a pathologist and leftist politician. He advocated the union of prehistoric archaeology with cultural anthropology and ethnology into a singular prehistoric anthropology which would identify prehistoric cultures from the material record and try to connect them to later ethnic groups who were recorded in the written, historical record.Although the archaeological work

undertaken by Virchow and his fellows was cultural-historical in basis, it did not initially gain a significant following in the coutnry's archaeological community, the majority of whom remained devoted to the dominant cultural evolutionary trend.

In 1895, a librarian who was fascinated by German prehistory, Gustaf Kossinna (1858–1931), presented a lecture in which he tried to connect the tribes who had been recorded as living between the Rhine and Vistula in 100 BCE with cultures living in that region during the Neolithic. Appointed Professor of Archaeology at the University of Berlin, in 1909 he founded the German Society for Prehistory (Vorgeschichte). He would proceed to further publicise his culture-historical approach in his subsequent books, Die Herkunft der Germanen (The Origin of the Germans), which was published in 1911, and the two-volume Ursprung und Verbreitung der Germanen (Origin and Expansion of the Germans), which was published between 1926 and 1927. A staunch nationalist and racist, Kossinna lambasted fellow German archaeologists for taking an interest in non-German societies, such as those of Egypt and the Classical World, and used his publications to support his views on German nationalism. Glorifying the German peoples of prehistory, he used an explicitly culture-historical approach in understanding them, and proclaimed that these German peoples were racially superior to their Slavic neighbours to the east.

Believing that an individual's ethnicity determined their behaviour, the core of Kossinna's approach was to divide Temperate Europe into three large cultural groupings: Germans, Celts and Slavs, based upon the modern linguistic groups. He then divided each of these cultural groupings into smaller "cultures", or tribes, for instance dividing the Germans up into Saxons, Vandals, Lombards and Burgundians. He believed that each of these groups had its own distinctive traditions which were present in their material culture, and that by mapping out the material culture in the archaeological record, he could trace the movement and migration of different ethnic groups, a process he called siedlungsarchäologie (settlement archaeology).Much of Kossinna's work was criticised by other German archaeologists, but nevertheless his basic culture-historical manner of interpreting the past still came to dominance in the country's archaeological community; Trigger noted that his work "marked the final replacement of an evolutionary approach to prehistory by a culture-historical one" and that for that, he must be viewed as an "innovator" whose work was "of very great importance".

As it became the dominant archaeological theory within the discipline, a number of prominent cultural-historical archaeologists rose to levels of influence. The Swedish archaeologist Oscar Montelius was one of the most notable, as he studied the entirety of the European archaeological prehistoric record, and divided it into a number of distinct temporal groups based upon grouping together various forms of artifacts.

Britain and the U.S.

Culture-historical archaeology was first introduced into British scholarship from continental Europe by an Australian prehistorian, V. Gordon Childe. A keen linguist, Childe was able to master a number of European languages, including German, and was well acqainted with the works on archaeological cultures written by Kossina. Having moved to the United Kingdom to escape political persecution in Australia, Childe took up a position as the Abercrombie Professor of Archaeology at the University of Edinburgh in 1927. This was followed by The Danube in Prehistory (1929), in which Childe examined the archaeology along the Danube river, recognising it as the natural boundary dividing the Near East from Europe, and subsequently he believed that it was via the Danube that various new technologies travelled westward in antiquity. In The Danube in Prehistory, Childe introduced the concept of an archaeological culture (which up until then had been largely restrained purely to German academics), to his British counterparts. This concept would revolutionise the way in which archaeologists understood the past, and would come to be widely accepted in future decades.

Concepts

Distinct historical cultures

The core point to culture-historical archaeology was its belief that the human species could be subdivided into various "cultures" that were in many cases distinct from one another. Usually, each of these cultures was seen as representing a different ethnicity. From an archaeological perspective, it was believed that each of these cultures could be distinguished because of its material culture, such as the style of pottery that it produced or the forms of burial that it practiced.

A number of culture-historical archaeologists subdivided and named separate cultures within their field of expertise: Heinrich Schliemann for instance, in examining the Bronze Age eastern Mediterranean, divided it up between such cultures as the Aegean, Mycenaean, Helladic and Cycladic.

Diffusion and migration

Within culture-historical archaeology, changes in the culture of a historical society were typically explained by the diffusion of ideas from one culture into another, or by the migration of members of one society into a new area, sometimes by invasion. This was at odds with the theories held by cultural evolutionary archaeologists, who whilst accepting diffusion and migration as reasons for cultural change, also accepted the concept that independent cultural development could occur within a society, which was something culture-historical archaeologists typically refused to accept.

A number of culture-historical archaeologists put forward the idea that all knowledge and technology in the ancient world had diffused from a single source in the Middle East, which had then been spread across much of the world by merchants. The Australian Grafton Elliot Smith for instance, in his works The Children of the Sun (1923) and The Growth of Civilisation (1924), put forward the idea that agriculture, architecture, religion and government had all developed in Ancient Egypt, where the conditions were perfect for the development of such things, and that these ideas were then diffused into other cultures. A similar theory was proposed by Lord Raglan in 1939, but he believed Mesopotamia to be the source rather than Egypt.

Inductive reasoning

Culture history uses inductive reasoning unlike its main rival, processual archaeology which stresses the importance of the hypothetico-deduction method. To work best it requires a historical record to support it. As much of early archaeology focused on the Classical World it naturally came to rely on and mirror the information provided by ancient historians who could already explain many of the events and motivations which would not necessarily survive in the archaeological record. The need to explain prehistoric societies, without this historical record, could initially be dealt with using the paradigms established for later periods but as more and

more material was excavated and studied, it became clear that culture history could not explain it all.

Manufacturing techniques and economic behaviour can be easily explained through cultures and culture history approaches but more complex events and explanations, involving less concrete examples in the material record are harder for it to explain. In order to interpret prehistoric religious beliefs for example, an approach based on cultures provides little to go on. Culture historians could catalogue items but in order to look beyond the material record, towards anthropology and the scientific method, they would have had to abandon their reliance on material, 'inhuman,' cultures. Such approaches were the intent of processual archaeology.

Culture history is by no means useless or surpassed by more effective methods of thinking. Indeed, diffusionist explanations are still valid in many cases and the importance of describing and classifying finds has not gone away. Post-processual archaeologists stress the importance of recurring patterns in material culture, echoing culture history's approach. In many cases it can be argued that any explanation is only one factor within a whole network of influences.

Criticism

Another criticism of this particular archaeological theory was that it often placed an emphasis on studying peoples from the Neolithic and later ages, somewhat ignoring the earliest human era, the Palaeolithic, where distinct cultural groups and differences are less noticeable in the archaeological record.

Chapter 4

Methods

An archaeological investigation usually involves several distinct phases, each of which employs its own variety of methods. Before any practical work can begin, however, a clear objective as to what the archaeologists are looking to achieve must be agreed upon. This done, a site is surveyed to find out as much as possible about it and the surrounding area. Second, an excavation may take place to uncover any archaeological features buried under the ground. And, third, the data collected from the excavation is studied and evaluated in an attempt to achieve the original research objectives of the archaeologists. It is then considered good practice for the information to be published so that it is available to other archaeologists and historians, although this is sometimes neglected.

Remote sensing

Before actually starting to dig in a location, satellite imagery can be used to look where sites are located within a large area.

Field survey

The archaeological project then continues (or alternatively, begins) with a field survey. Regional survey is the attempt to systematically locate previously unknown sites in a region. Site survey is the attempt to systematically locate features of interest, such as houses and middens, within a site. Each of these two goals may be accomplished with largely the same methods.

Survey was not widely practiced in the early days of archaeology. Cultural historians and prior researchers were usually content with discovering the locations of monumental sites from the local populace, and excavating only the plainly visible features there. Gordon Willey pioneered the technique of regional settlement pattern survey in 1949 in the Viru Valley of coastal Peru, and survey of all levels became prominent with the rise of processual archaeology some years later.

Survey work has many benefits if performed as a preliminary exercise to, or even in place of, excavation. It requires relatively little time and expense, because it does not require processing

large volumes of soil to search out artifacts. (Nevertheless, surveying a large region or site can be expensive, so archaeologists often employ sampling methods.) As with other forms of non-destructive archaeology, survey avoids ethical issues (of particular concern to descendant peoples) associated with destroying a site through excavation. It is the only way to gather some forms of information, such as settlement patterns and settlement structure. Survey data are commonly assembled into maps, which may show surface features and/or artifact distribution.

The simplest survey technique is surface survey. It involves combing an area, usually on foot but sometimes with the use of mechanized transport, to search for features or artifacts visible on the surface. Surface survey cannot detect sites or features that are completely buried under earth, or overgrown with vegetation. Surface survey may also include mini-excavation techniques such as augers, corers, and shovel test pits. If no materials are found, the area surveyed is deemed sterile.

Aerial survey is conducted using cameras attached to airplanes, balloons, or even Kites. A bird's-eye view is useful for quick mapping of large or complex sites. Aerial photographs are used to document the status of the archaeological dig. Aerial imaging can also detect many things not visible from the surface. Plants growing above a buried man made structure, such as a stone wall, will develop more slowly, while those above other types of features (such as middens) may develop more rapidly. Photographs of ripening grain, which changes colour rapidly at maturation, have revealed buried structures with great precision. Aerial photographs taken at different times of day will help show the outlines of structures by changes in shadows. Aerial survey also employs ultraviolet, infrared, ground-penetrating radar wavelengths, LiDAR and thermography.

Geophysical survey

Geophysical survey can be the most effective way to see beneath the ground. Magnetometers detect minute deviations in the Earth's magnetic field caused by iron artifacts, kilns, some types of stone structures, and even ditches and middens. Devices that measure the electrical resistivity of the soil are also widely used. Archaeological features whose electrical resistivity contrasts with that of surrounding soils can be detected and mapped. Some archaeological features (such as those composed of stone or brick) have higher resistivity than typical soils, while others (such as organic deposits or unfired clay) tend to have lower resistivity.

Although some archaeologists consider the use of metal detectors to be tantamount to treasure hunting, others deem them an effective tool in archaeological surveying. Examples of formal archaeological use of metal detectors include musketball distribution analysis on English Civil War battlefields, metal distribution analysis prior to excavation of a 19th-century ship wreck, and service cable location during evaluation.

Metal detectorists have also contributed to archaeology where they have made detailed records of their results and refrained from raising artifacts from their archaeological context. In the UK, metal detectorists have been solicited for involvement in the Portable Antiquities Scheme.

Regional survey in underwater archaeology uses geophysical or remote sensing devices such as marine magnetometer, side-scan sonar, or sub-bottom sonar.

Excavation

Archaeological excavation existed even when the field was still the domain of amateurs, and it remains the source of the majority of data recovered in most field projects. It can reveal several types of information usually not accessible to survey, such as stratigraphy, three-dimensional structure, and verifiably primary context.

Modern excavation techniques require that the precise locations of objects and features, known as their provenance or provenience, be recorded. This always involves determining their horizontal locations, and sometimes vertical position as well (also see Primary Laws of Archaeology). Likewise, their association, or relationship with nearby objects and features, needs to be recorded for later analysis. This allows the archaeologist to deduce which artifacts and features were likely used together and which may be from different phases of activity. For example, excavation of a site reveals its stratigraphy; if a site was occupied by a succession of distinct cultures, artifacts from more recent cultures will lie above those from more ancient cultures.

Excavation is the most expensive phase of archaeological research, in relative terms. Also, as a destructive process, it carries ethical concerns. As a result, very few sites are excavated in their entirety. Again the percentage of a site excavated depends greatly on the country and "method statement" issued. In places 90% excavation is common. Sampling is even more important in

excavation than in survey. It is common for large mechanical equipment, such as backhoes (JCBs), to be used in excavation, especially to remove the topsoil (overburden), though this method is increasingly used with great caution. Following this rather dramatic step, the exposed area is usually hand-cleaned with trowels or hoes to ensure that all features are apparent.

The next task is to form a site plan and then use it to help decide the method of excavation. Features dug into the natural subsoil are normally excavated in portions to produce a visible archaeological section for recording. A feature, for example a pit or a ditch, consists of two parts: the cut and the fill.

The cut describes the edge of the feature, where the feature meets the natural soil. It is the feature's boundary. The fill is what the feature is filled with, and will often appear quite distinct from the natural soil. The cut and fill are given consecutive numbers for recording purposes. Scaled plans and sections of individual features are all drawn on site, black and white and colour photographs of them are taken, and recording sheets are filled in describing the context of each. All this information serves as a permanent record of the now-destroyed archaeology and is used in describing and interpreting the site.

Analysis

Once artifacts and structures have been excavated, or collected from surface surveys, it is necessary to properly study them, to gain as much data as possible. This process is known as post-excavation analysis, and is usually the most time-consuming part of the archaeological investigation. It is not uncommon for the final excavation reports on major sites to take years to be published.

At its most basic, the artifacts found are cleaned, cataloged and compared to published collections, to classify them typologically and to identify other sites with similar artifact assemblages. However, a much more comprehensive range of analytical techniques are available through archaeological science, meaning that artifacts can be dated and their compositions examined. The bones, plants and pollen collected from a site can all be analyzed (using the techniques of zooarchaeology, paleoethnobotany, and palynology), while any texts can usually be deciphered.

These techniques frequently provide information that would not otherwise be known and therefore contribute greatly to the understanding of a site.

Virtual archaeology

Some time around 1995 archaeologists started using computer graphics to build virtual 3D models of sites such as the throne room of an ancient Assyrian palace or ancient Rome. This is done by collecting normal photographs and using computer graphics to build the virtual 3D model. In more general terms, computers can be used to recreate the environment and conditions of the past, such as objects, buildings, landscapes and even ancient battles.Computer simulation can be used to simulate the living conditions of an ancient community and to see how it would have reacted to various scenarios (such as how much food to grow, how many animals to slaughter, etc.)Computer-built topographical models have been combined with astronomical calculations to verify whether or not certain structures (such as pillars) were aligned with astronomical events such as the sun's position at a solstice.

Chapter 5

Academic Sub-Disciplines

As with most academic disciplines, there are a very large number of archaeological sub-disciplines characterised by a specific method or type of material (e.g., lithic analysis, music, archaeobotany), geographical or chronological focus (e.g. Near Eastern archaeology, Islamic archaeology, Medieval archaeology), other thematic concern (e.g. maritime archaeology, landscape archaeology, battlefield archaeology), or a specific archaeological culture or civilisation (e.g. Egyptology, Indology, Sinology).

Historical archaeology

Historical archaeology is the study of cultures with some form of writing.

In England, archaeologists have uncovered the long-lost layouts of medieval villages abandoned after the crises of the 14th century and the equally lost layouts of 17th century parterre gardens swept away by a change in fashion.[citation needed] In downtown New York City archaeologists have exhumed the 18th century remains of the African burial ground.

Ethnoarchaeology

Ethnoarchaeology is the ethnographic study of peoples for archaeological reasons, usually through the study of the material remains of a society (see David & Kramer 2001). Ethnoarchaeology aids archaeologists in reconstructing ancient lifeways by studying the material and non-material traditions of modern societies. Archaeologists can then infer that ancient societies used the same techniques as their modern counterparts given a similar set of environmental circumstances.

Ethnography can provide insights of value to archaeologists into how people in the past may have lived, especially with regard to their social structures, religious beliefs and other aspects of their culture. However, it is still unclear how to relate most of the insights generated by this anthropological research to archaeological investigations. This is due to the lack of emphasis by anthropologists on the material remains created and discarded by societies and on how these material remains vary with differences in how a society is organised.

This general problem has led archaeologists (for example, London 2000) to argue that anthropological work is not adequate for answering archaeological problems, and that archaeologists should therefore undertake ethnoarchaeological work to answer these problems. These studies have focused far more on the manufacture, use and discard of tools and other artifacts and have sought to answer such questions as what kinds of objects used in a living settlement are deposited in middens or other places where they may be preserved, and how likely an object is to be discarded near to the place where it was used.

One good example of ethnoarchaeology is that of Brian Hayden (1987), whose team examined the manufacture of Mesoamerican quern-stones, providing valuable insights into the manufacture of prehistoric quern-stones. Many other studies have focused on the manufacture and use of ceramics, architecture, food, and other types of material culture. In the best cases, these studies have involved long term ethnographic fieldwork (for example, Herbich 1987, Kramer 1997, Deal 1998, Dietler & Herbich 1998, Longacre & Skibo 2000, Kohn 2010).

Experimental archaeology

Experimental archaeology (also called experiment archaeology and experiential archaeology) is a field of study which attempts to generate and test archaeological hypotheses, usually by replicating or approximating the feasibility of ancient cultures performing various tasks or feats. It employs a number of different methods, techniques, analyses, and approaches in order to do so, based upon archaeological source material such as ancient structures or artifacts.

It is distinct from uses of primitive technology without any concern for archaeological or historical study. Living history and historical reenactment, which are generally undertaken as a hobby, are the lay person's version of this academic discipline.

One of the main forms of experimental archaeology is the creation of copies of historical structures using only historically accurate technologies. This is sometimes known as reconstruction archaeology or reconstructional archaeology; however, reconstruction implies an exact replica of the past, when it is in fact just a construction of one person's idea of the past; the more archaeologically correct term is a working construction of the past. In recent years, experimental archaeology has been featured in several television productions, such as BBC's "Building the Impossible" and the PBS's Secrets of Lost Empires. Most notable were the

attempts to create several of Leonardo da Vinci's designs from his sketchbooks, such as the 16th century tank.

A good example is Butser Ancient Farm in the English county of Hampshire which is a working replica of an Iron Age farmstead where long-term experiments in prehistoric agriculture, animal husbandry, and manufacturing are held to test ideas posited by archaeologists. In Denmark, the Lejre Experimental Centre carries out even more ambitious work on such diverse topics as artificial Bronze Age and Iron Age burials, prehistoric science and stone tool manufacture in the absence of flint.

Other examples include:

The Kon-Tiki (1947), a balsa raft built by Thor Heyerdahl and sailed from Peru to Polynesia to demonstrate the possibility of cultural exchange between South America and the Polynesian islands.

Attempts to transport large stones like those used in Stonehenge over short distances using only technology that would have been available at the time. The original stones were probably moved from Pembrokeshire to the site on Salisbury Plain.

Since the 1970s the re-construction of timber framed buildings has informed understanding of early Anglo Saxon buildings at West Stow, Suffolk, England. This extensive program of research through experiment and experience continues today.The reconstruction of part of Hadrian's Wall at Vindolanda, carried out in limited time by local volunteers.

Greek triremes have been reconstructed by skilled sailors from plans and archaeological remains and have been successfully tried out at sea.

Attempts to manufacture steel that matches all the characteristics of Damascus steel, whose original manufacturing techniques have been lost for centuries, including computational fluid dynamics reconstructions by the University of Exeter of the Sri Lanka furnaces at Samanalawewa, thought to be the most likely sources for Damascus steel.

Marcus Junkelmann constructed Roman devices and gear for various museums. He also tested and analyzed them in various reenactments, among them a group of legionaries in full authentic gear crossing the Alps from Augsburg to Verona.

Variations

Other types of experimental archaeology may involve burying modern replica artifacts and ecofacts for varying lengths of time to analyse the post-depositional effects on them. Other archaeologists have built modern earthworks and measured the effects of silting in the ditches and weathering and subsidence on the banks to understand better how ancient monuments would have looked. The work of flintknappers is also a kind of experimental archaeology as much has been learnt about the many different types of flint tools through the hands-on approach of actually making them. Experimental archaeologists have equipped modern professional butchers, archers and lumberjacks with replica flint tools to judge how effective they would have been for certain tasks. Use wear traces on the modern flint tools are compared to similar traces on archaeological artifacts, making probability hypotheses on the possible kind of use feasible. Hand axes have been shown to be particularly effective at cutting animal meat from the bone and jointing it.

Archaeometry

Archaeological science, also known as archaeometry, consists of the application of scientific techniques to the analysis of archaeological materials. Archaeometry is now considered its own scientific field. The UK's Natural and Environmental Research Council provides funding for archaeometry separate from the funding provided for archaeology.Archaeological science involves dating and studying ancient materials. It is related to methodologies of archaeology.

Types of archaeological science

Archaeological science can be divided into the following areas:

Physical and chemical dating methods which provide archaeologists with absolute and relative chronologies

Artifact studies

Environmental approaches which provide information on past landscapes, climates, flora, and fauna; as well as the diet, nutrition, health, and pathology of people

Mathematical methods for data treatment (also encompassing the role of computers in handling, analyzing, and modeling the vast sources of data)

Remote-sensing and geophysical-survey applications comprising a battery of non-destructive techniques for the location and characterization of buried features at the regional, micro-regional, and intra-site levels

Conservation sciences, involving the study of decay processes and the development of new methods of conservation

Techniques such as lithic analysis, archaeometallurgy, paleoethnobotany, palynology and zooarchaeology also form sub-disciplines of archaeological science.

Influence of archaeometry

Archaeometry has greatly influenced modern archaeology. Archaeologists can obtain significant additional data and information using these techniques, and archaeometry has the potential to alter the understanding of the past. The so-called "Second radiocarbon revolution" provides a good example of such alteration: it significantly re-dated European prehistory in the 1960s (the first radiocarbon revolution involved the original introduction of the method to archaeology from 1949). Some scholars are pressing all graduate programs in archaeology to include a survey course in archaeometry.

Dating techniques

Archaeological science has particular value when it can provide absolute dates for archaeological strata and artifacts. Some of the most important dating techniques include:

Radiocarbon dating — especially for dating organic materials

Dendrochronology — for dating trees; also very important for calibrating radiocarbon dates

Thermoluminescence dating — for dating inorganic material (including ceramics)

Optically stimulated luminescence (OSL)/optical dating — for absolutely dating and relatively profiling buried land-surfaces in vertical and horizontal stratigraphic sections, most often by measuring photons discharged from grains of quartz within sedimentary bodies (although this technique can also measure feldspars, complications caused by internally induced dose-rates often favor the use of quartz-based analyzes in archaeological applications)

Electron spin resonance, as used (for example) in dating teeth

Potassium-argon dating — for dating (for example) fossilized hominid remains by association with volcanic sediments (the fossils themselves are not directly dated)

Artifact studies

Another important subdiscipline of archaeometry is the study of artifacts. Archaeometrists have used a variety of methods to analyze artifacts, either to determine more about their composition, or to determine their provenance. These techniques include:

X-ray fluorescence (XRF)

Inductively coupled plasma mass spectrometry (ICP-MS)

Neutron activation analysis (NAA)

Scanning electron microscopy (SEM)

Laser-induced breakdown spectroscopy (LIBS)

Lead, strontium and oxygen isotope analysis can also test human remains to estimate the diets and even the birthplaces of a study's subjects.

Provenance analysis has the potential to determine the original source of the materials used, for example, to make a particular artifact. This can show how far the artifact has traveled and can indicate the existence of systems of exchange.

Locating Archaeological Sites

Archaeometry is also very helpful in finding potential dig sites. The use of remote sensing has enabled archaeologists to identify many more archaeological sites than they could have

otherwise. The use of aerial photography remains the most widespread remote-sensing technique, but archaeologists have supplemented it with the use of satellite imagery, especially with the declassification of images from military satellites. Ground-based geophysical surveys often help to identify and map archaeological features within identified sites.

Chapter 6

Cultural Resources Management

In the broadest sense, Cultural Resources Management (CRM) is the vocation and practice of managing cultural resources, such as the arts and heritage. It incorporates Cultural Heritage Management which is concerned with traditional and historic culture. It also delves into the material culture of archaeology. Cultural resources management encompasses current culture, including progressive and innovative culture, such as urban culture, rather than simply preserving and presenting traditional forms of culture.

However, the broad usage of the term is relatively recent and as a result it is most often used as synonymous with heritage management. In the United States, cultural resources management is not usually divorced from the heritage context. The term is, "used mostly by archaeologists and much more occasionally by architectural historians and historical architects, to refer to managing historic places of archaeological, architectural, and historical interests and considering such places in compliance with environmental and historic preservation laws."

Cultural resources include both physical assets such as archaeology, architecture, paintings and sculptures and also intangible culture such as folklore and interpretative arts, such as storytelling and drama.Cultural resource managers are typically in charge of museums, galleries, theatres etc., especially those that emphasize culture specific to the local region or ethnic group. Cultural tourism is a significant sector of the tourism industry.

At a national and international level, cultural resource management may be concerned with larger themes, such as languages in danger of extinction, public education, the ethos or operation of multiculturalism, and promoting access to cultural resources. The Masterpieces of the Oral and Intangible Heritage of Humanity is an attempt by the United Nations to identify exemplars of intangible culture.

Cultural resource management can trace its beginning to the environment/conservational movement in the 1960s and 1970s. During this time, there was growth in legislation concerning the protection of cultural resources. The Archaeological and Historic Preservation Act of 1974, commonly known as the Moss-Bennett Act, helped to fuel the creation of CRM, while creating

"growth in archaeological jobs in the federal government, academia, and private sector." Federal legislation had passed earlier in 1906 under the Antiquities Act, but it was not until the 1970s when the term "cultural resources" was coined by the National Park Services. This term came into more popular usage after two meetings in 1974: the Cultural Resource Management conference and the Airlie House conference. Following these conferences, the National Park Service (NPS) defined cultural resources in the Cultural Resource Management Guidelines as being:

"Those tangible and intangible aspects of cultural systems, both living and dead, that are valued by or representative of a given culture or that contain information about a culture.They include but are not limited to sites, structures, districts, objects, and historic documents associated with or representative of peoples, cultures, and human activities and events, either in the present or in the past. Cultural resources also can include primary written and verbal data for interpretation and understanding of those tangible resources."

Cultural resources management applied to heritage management

Cultural Heritage Management

Cultural resources management in the heritage context is mainly concerned with the investigation of sites with archaeological potential, the preservation and interpretation of historic sites and artifacts, and the culture of indigenous people. The subject developed from initiatives in rescue archaeology, sensitivities to the treatment of indigenous people, and subsequent legislation to protect cultural heritage.

In the 1970s, archaeologists created the term "cultural resource management" as a parallel to natural resource management to address the following resources:

Historic properties (as listed or eligible for the National Register of Historic Places)

Older properties that may have cultural value, but may or may not be eligible for the National Register

Historic properties that have cultural value beyond their historicity

Native American graves and cultural items

Shipwrecks

Museum collections

Historical documents

Religious sites

Religious practices

Cultural use of natural resources

Folklife, tradition, and other social institutions

Theater groups, orchestras, and other community cultural amenities

A significant proportion of the archaeological investigation in countries that have heritage management legislation including the USA and UK is conducted on sites under threat of development. In the US, such investigations are now done by private companies on a consulting basis, and a national organization exists to support the practice of CRM. Museums, besides being popular tourist attractions, often play roles in conservation of, and research on, threatened sites, including as repositories for collections from sites slated for destruction.

National Register eligibility

In the United States, a common Cultural Resource Management task is the implementation of a Section 106 review: CRM archaeologists determine whether federally funded projects are likely to damage or destroy archaeological sites that may be eligible for the National Register of Historic Places. This process commonly entails one or more archaeological field surveys.

The National Register of Historic Places (NRHP) is the United States federal government's official list of districts, sites, buildings, structures, and objects deemed worthy of preservation. A property listed in the National Register, or located within a National Register Historic District, may qualify for tax incentives derived from the total value of expenses incurred preserving the property.

The passage of the National Historic Preservation Act (NHPA) in 1966 established the National Register and the process for adding properties to it. Of the more than one million properties on the National Register, 80,000 are listed individually. The remainder are contributing resources within historic districts. Each year approximately 30,000 properties are added to the National Register as part of districts or by individual listings.

For most of its history the National Register has been administered by the National Park Service (NPS), an agency within the United States Department of the Interior. Its goals are to help property owners and interest groups, such as the National Trust for Historic Preservation, coordinate, identify, and protect historic sites in the United States. While National Register listings are mostly symbolic, their recognition of significance provides some financial incentive to owners of listed properties. Protection of the property is not guaranteed. During the nomination process, the property is evaluated in terms of the four criteria for inclusion on the National Register of Historic Places. The application of those criteria has been the subject of criticism by academics of history and preservation, as well as the public and politicians.

Occasionally historic sites outside the country proper, but associated with the United States (such as the American Embassy in Tangiers) are also listed. Properties can be nominated in a variety of forms, including individual properties, historic districts, and multiple property submissions (MPS). The Register categorizes general listings into one of five types of properties: district, site, structure, building, or object. National Register Historic Districts are defined geographical areas consisting of contributing and non-contributing properties. Some properties are added automatically to the National Register when they become administered by the National Park Service. These include National Historic Landmarks (NHL), National Historic Sites (NHS), National Historical Parks, National Military Parks/Battlefields, National Memorials, and some National Monuments. (Federal properties can be proclaimed National Monuments under the Antiquities Act because of either their historical or natural significance. They are managed by multiple agencies. Only monuments that are historic in character and managed by the National Park Service are listed administratively in the National Register.)

Some examples are Fallingwater, Robie House, Martin Luther King Jr's Grave, and Old Slater Mill.

History of the National Register of Historic Places

On October 15, 1966 the Historic Preservation Act created the National Register of Historic Places and the corresponding State Historic Preservation Offices (SHPO). Initially, the National Register consisted of the National Historic Landmarks designated before the Register's creation, as well as any other historic sites in the National Park system.Approval of the act, which was amended in 1980 and 1992, represented the first time the United States had a broad-based historic preservation policy. The 1966 act required those agencies to work in conjunction with the SHPO and an independent federal agency, the Advisory Council on Historic Preservation (ACHP), to confront adverse effects of federal activities on historic preservation.

To administer the newly created National Register of Historic Places, the National Park Service of the U.S. Department of Interior, with director George B. Hartzog, Jr., established an administrative division named the Office of Archeology and Historic Preservation (OAHP). Hartzog charged OAHP with creating the National Register program mandated by the 1966 law. Ernest Connally was the Office's first director. Within OAHP new divisions were created to deal with the National Register.The division administered several existing programs, including the Historic Sites Survey and the Historic American Buildings Survey, as well as the new National Register and Historic Preservation Fund.

The first official Keeper of the Register was William J. Murtagh, an architectural historian. During the Register's earliest years in the late 1960s and early 1970s, organization was lax and SHPOs were small, understaffed, and underfunded. However, funds were still being supplied for the Historic Preservation Fund to provide matching grants-in-aid to listed property owners, first for house museums and institutional buildings, but later for commercial structures as well.

A few years later in 1979, the NPS history programs affiliated with both the U.S. National Parks system and the National Register were categorized formally into two "Assistant Directorates." Established were the Assistant Directorate for Archeology and Historic Preservation and the Assistant Directorate for Park Historic Preservation. From 1978 until 1981, the main agency for the National Register was the Heritage Conservation and Recreation Service (HCRS) of the United States Department of Interior.

In February 1983, the two assistant directorates were merged to promote efficiency and recognize the interdependency of their programs. Jerry L. Rogers was selected to direct this newly merged associate directorate. He was described as a skilled administrator, who was sensitive to the need for the NPS to work with SHPOs, academia, and local governments.

Although not described in detail in the 1966 act, SHPOs eventually became integral to the process of listing properties on the National Register. The 1980 amendments of the 1966 law further defined the responsibilities of SHPOs concerning the National Register. Several 1992 amendments of the NHPA added a category to the National Register, known as Traditional Cultural Properties: those properties associated with Native American or Hawaiian groups.

The National Register of Historic Places has grown considerably from its legislative origins in 1966. In 1986 citizens and groups nominated 3,623 separate properties, sites, and districts for inclusion on the National Register, a total of 75,000 separate properties. Of the more than one million properties on the National Register, 80,000 are listed individually. Others are listed as contributing members within historic districts.

Property owner incentives

The Sixteenth Street Baptist Church in Birmingham, Alabama received a Save America's Treasures Grant in 2006.

Properties are not protected in any strict sense by the Federal listing. States and local zoning bodies may or may not choose to protect listed historic places. Indirect protection is possible, by state and local regulations on development of National Register properties, and by tax incentives.

Until 1976, federal tax incentives were virtually non-existent for buildings on the National Register. Before 1976 the federal tax code favored new construction rather than the reuse of existing, sometimes historical, structures. In 1976, the tax code was altered to provide tax incentives that promote preservation of income-producing historic properties. The National Park Service was given the responsibility to ensure that only rehabilitations that preserved the historic character of a building would qualify for federal tax incentives. A qualifying rehabilitation is one that the NPS deems consistent with the Secretary of the Interior's Standards for Rehabilitation. Properties and sites listed in the Register, as well as those located in and contributing to the

period of significance of National Register Historic Districts, became eligible for the federal tax benefits.

Owners of income-producing properties listed individually in the National Register of Historic Places or of properties that are contributing resources within a National Register Historic District may be eligible for a 20% investment tax credit for the rehabilitation of the historic structure. The rehabilitation may be of a commercial, industrial, or residential property, for rentals. The tax incentives program is operated by the Federal Historic Preservation Tax Incentives program, which is managed jointly by the National Park Service, individual State Historic Preservation Offices, and the Internal Revenue Service. Aside from the 20% tax credit, the tax incentive program offers a 10% tax credit for rehabilitation to owners of non-historic, non-residential buildings constructed before 1936.

Some property owners may qualify for grants as well, for instance the Save America's Treasures grants, which apply specifically to properties entered in the Register with national significance or designated as National Historic Landmarks. The Save America's Treasures office has closed. The United States Congress has not renewed the funding for the program for fiscal years 2011 and 2012, and does not plan to re-establish funding.

The NHPA did not distinguish between properties listed in the National Register of Historic Places and those designated as National Historic Landmarks concerning qualification for tax incentives or grants. This was deliberate, as the authors of the act had learned from experience that distinguishing between categories of significance for such incentives caused the lowest category to become expendable. Essentially, this made the Landmarks a kind of "honor roll" of the most significant properties of the National Register of Historic Places.

Nomination process

Any individual can prepare a National Register nomination, although historians and historic preservation consultants often are employed for this work. The nomination consists of a standard nomination form and contains basic information about a property's physical appearance and the type of significance embodied in the building, structure, object, site, or district. The State Historic Preservation Office receives National Register nominations and provides feedback to the nominating individual or group. After preliminary review, the SHPO sends each nomination

to the state's historic review commission, which then recommends whether the State Historic Preservation Officer should send the nomination to the Keeper of the National Register. For any non-Federally owned property, only the State Historic Preservation Officer may officially nominate a property for inclusion in the National Register. After the nomination is recommended for listing in the National Register by the SHPO, the nomination is sent to the National Park Service, which approves or denies the nomination. If approved, the property is entered officially by the Keeper of the National Register into the National Register of Historic Places. Property owners are notified of the nomination during the review by the SHPO and state's historic review commission. If an owner objects to a nomination of private property, or in the case of a historic district, a majority of owners, then the property cannot be listed in the National Register of Historic Places.

Criteria

For a property to be eligible for the National Register, it must meet at least one of the four National Register main criteria. Information about architectural styles, association with various aspects of social history and commerce, and ownership are all integral parts of the nomination. Each nomination contains a narrative section that provides a detailed physical description of the property and justifies why it is significant historically with regard either to local, state, or national history. The four National Register of Historic Places criteria are the following.

Criterion A, "Event," the property must make a contribution to the major pattern of American history.

Criterion B, "Person," is associated with significant people of the American past.

Criterion C, "Design/Construction," concerns the distinctive characteristics of the building by its architecture and construction, including having great artistic value or being the work of a master.

Criterion D, "Information potential," is satisfied if the property has yielded or may be likely to yield information important to prehistory or history.

The criteria are applied differently for different types of properties; for instance, maritime properties have application guidelines different from those of buildings.

Exclusions

There are specific instances where properties usually do not merit listing in the National Register. As a general rule, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, moved structures, reconstructed historic buildings, commemorative properties, and properties that have achieved significance during the last fifty years are not qualified for listing on the Register.[20] There are, however, exceptions to all the preceding; mitigating circumstances allow properties classified in one of those groups to be included.

A listing on the National Register of Historic Places is governmental acknowledgment of a historic district, site, building, or property. However, the Register is mostly "an honorary status with some federal financial incentives." The National Register of Historic Places automatically includes all National Historic Landmarks as well as all historic areas administered by the National Park Service. Landmarks such as these include: National Historic Sites (NHS), National Historical Parks, National Military Parks/Battlefields, National Memorials, and some National Monuments. Occasionally historic sites outside the country's borders, but associated with the United States, such as the American Embassy in Tangiers, also are listed.

Listing in the National Register does not restrict private property owners from the use of their property. Some states and municipalities, however, may have laws that become effective when a property is listed in the National Register. If federal money or a federal permitting process is involved, Section 106 of the National Historic Preservation Act of 1966 is invoked. Section 106 requires the federal agency involved to assess the effect of its actions on historic resources.

Statutorily, the Advisory Council on Historic Preservation (ACHP) has the most significant role by Section 106 of the National Historic Preservation Act. The section requires that the director of any federal agency with direct or indirect jurisdiction of a project that may affect a property listed or determined eligible for listing in the National Register of Historic Places, must first report to the Advisory Council. The director of said agency is required to "take into account the effect of the undertaking" on the National Register property, as well as to afford the ACHP a reasonable opportunity to comment.

While Section 106 does not mandate explicitly that any federal agency director accept the advice of the ACHP, their advice has practical influence, especially given the statutory obligations of the NHPA that require federal agencies to "take into account the effect of the undertaking."

In cases where the ACHP determines federal action will have an "adverse effect" on historic properties, mitigation is sought. Typically, a Memorandum of Agreement (MOA) is created by which the involved parties agree to a particular plan. Many states have laws similar to Section 106. In contrast to conditions relating to a federally designated historic district, municipal ordinances governing local historic districts often restrict certain kinds of changes to properties. Thus they may protect the property more than a National Register listing does.

The Department of Transportation Act, passed on October 15, 1966, the same day as the National Historic Preservation Act, included provisions that addressed historic preservation. The DOT Act is much more general than Section 106 NHPA in that it refers to properties other than those listed in the Register.

The more general language has allowed more properties and parklands to enjoy status as protected areas by this legislation, a policy developed early in its history. The United States Supreme Court ruled in the 1971 case Citizens to Preserve Overton Park v. Volpe that parklands could have the same protected status as "historic sites."

Multiple Property Submission

A multiple property submission (MPS) is a thematic group listing of the National Register of Historic Places that consists of related properties that share a common theme and can be submitted as a group. Multiple property submissions must satisfy certain basic criteria for the group of properties to be included in the National Register.

The lodge and cabins at White Pines State Park, in Illinois, are part of a multiple property submission.

The process begins with the Multiple Property Documentation Form, which acts as a cover document rather than the nomination to the National Register of Historic Places. The purpose of the documentation form is to establish the basis of eligibility for related properties. The information of the Multiple Property Documentation Form can be used to nominate and register

related historic properties simultaneously, or to establish criteria for properties that may be nominated in the future. Thus, additions to an MPS can occur over time.

The nomination of individual properties in an MPS is accomplished in the same manner as other nominations. The name of the "thematic group" denotes the historical theme of the properties. It is considered the "multiple property listing." Once an individual property or a group of properties is nominated and listed in the National Register, the Multiple Property Documentation Form, combined with the individual National Register of Historic Places Nomination Forms, constitute a Multiple Property Submission.

Examples of MPS include the Lee County Multiple Property Submission, the Warehouses in Omaha, the Boundary Markers of the Original District of Columbia, and the Illinois Carnegie Libraries. Before the term "Multiple Property Submission" was introduced in 1984, such listings were known as "Thematic Resources" or "Multiple Resource Areas."

Types of properties

Listed properties are generally in one of five broad categories, although there are special considerations for other types of properties that in any one, or into more specialized subcategories. The five general categories for National Register properties are: building, structure, site, district, and object. In addition, historic districts consist of contributing and non-contributing properties.

Buildings, as defined by the National Register, are distinguished in the traditional sense. Examples include a house, barn, hotel, church, or similar construction. They are created primarily to shelter human activity. The term building, as in outbuilding, can be used to refer to historically and functionally related units, such as a courthouse and a jail or a barn and a house.

Structures differ from buildings in that they are functional constructions meant to be used for purposes other than sheltering human activity. Examples include an aircraft, a grain elevator, a gazebo, and a bridge.

Objects are usually artistic in nature, or small in scale compared to structures and buildings. Although objects may be movable, they are generally associated with a specific setting or environment. Examples of objects include monuments, sculptures, and fountains.

Sites are the locations of significant events, which can be prehistoric or historic in nature and represent activities or buildings (standing, ruined, or vanished). When sites are listed, it is the locations themselves that are of historical interest. They possesses cultural or archaeological value regardless of the value of any structures that currently exist at the locations. Examples of types of sites include shipwrecks, battlefields, campsites, natural features, and rock shelters.

Historic districts possess a concentration, association, or continuity of the other four types of properties. Objects, structures, buildings, and sites in a historic district are united historically or aesthetically, either by choice or by the nature of their development.

There are several other different types of historic preservation associated with the properties of the National Register of Historic Places that cannot be classified as either simple buildings and historic districts. Through the National Park Service, the National Register of Historic Places publishes a series of bulletins designed to aid in evaluating and applying the criteria for evaluation of different types of properties.Although the criteria are always the same, the manner they are applied may differ slightly, depending upon the type of property involved. The National Register bulletins describe application of the criteria for aids to navigation, historic battlefields, archaeological sites, aviation properties, cemeteries, and burial places, historic designed landscapes, mining sites, post offices, properties associated with significant persons, properties achieving significance within the last fifty years, rural historic landscapes, traditional cultural properties, and vessels and shipwrecks.

Recent past

In American historic preservation, the fifty-year rule is the generally held belief that a property cannot be listed in the National Register of Historic Places unless it is at least fifty years old. Actually, this rule is not a hard rule at all; it is an exception to the National Register's criteria for evaluation. As stated by John H. Sprinkle, Jr., Deputy Director of the Federal Preservation Institute, "this 'rule' is only an exception to the criteria that shape listings within the National Register of Historic Places. Of the eight "exceptions" , Consideration G, for properties that have achieved significance within the past fifty years, is probably best-known, yet also misunderstood preservation principal in America."

With each passing year a new group of resources crosses the fifty-year threshold, that were before considered "too recent" for listing on the National Register of Historic Places (unless they were exceptionally significant). The preservation of these "underage" resources, has gained increasing attention in recent years.

Careers in CRM

Cultural resource management features people from a wide array of disciplines. The general education of most involved in CRM includes, but is not limited to, sociology, archaeology, architectural history, cultural anthropology, social and cultural geography, and other fields in the social sciences.

In the field of cultural resource management there are many career choices. One could obtain a career with an action agency that works directly with the NEPA or even more specifically, Native American resources. There are also careers that can be found in review agencies like the Advisory Council on Historic Preservation(ACHP), or the State Historic Preservation Office(SHPO) Beyond these choices, one could also obtain a career as part of the local government and work with planning agencies, housing agencies, social service agencies, local museums, libraries, or educational institutions. Jobs at private cultural resource management companies can range from field technicians (see shovelbum) to principal investigators, project archaeologists, historic preservationists, and laboratory work. One could also become a part of an advocacy organization, such as the National Trust for Historic Preservation.

Debates

It is commonly debated in cultural resource management how to determine whether cultural or archaeological sites should be considered significant or not. The criteria that is stated by the National Register of Historic Places is said to be able to be, "interpreted in different ways so that the significance… may be subjectively argued for many cultural resources." [12] Another issue that arises among scholars is that, "protection does not necessarily mean preservation." [13] Any public projects occurring near the cultural resource can have adverse effects. Development plans for a proposed project may not be able to be changed to limit impact and to avoid damage to the resource.

Management of cultural organizations

The vocation of management in cultural and creative sectors is the subject of research and improvement initiatives, by organizations such as Arts and Business which take a partnership approach to involving professional business people in running and mentoring arts organizations. Some universities now offer vocational degrees.

The management of cultural heritage is underpinned by academic research in archaeology, ethnography and history. The broader subject is also underpinned by research in sociology and culture studies.

Cultural anthropology

Understanding the traditional cultures of all peoples (Indigenous or not) is essential in mitigating the adverse impact of development and ensuring that intervention by more developed nations is not prejudicial to the interests of local people or results in the extinction of cultural resources.

Cultural resources policies

Cultural resources policies have developed over time with the recognition of the economic and social importance of heritage and other cultural assets.

The exploitation of cultural resources can be controversial, particularly where the finite cultural heritage resources of developing countries are exported to satisfy the demand for antiquities market in the developed world. The exploitation of the potential intellectual property of traditional remedies in identifying candidates for new drugs has also been controversial. On the other hand, traditional crafts can be important elements of income from tourism, performance of traditional dances, and music that is popular with tourists and traditional designs can be exploited in the fashion industry. Popular culture can also be an important economic asset.

Chapter 7

Popular Views of Archaeology

Early archaeology was largely an attempt to uncover spectacular artifacts and features, or to explore vast and mysterious abandoned cities. Early archaeology was mostly done by upper class, scholarly men. This generalization laid the foundation for the modern popular view of archaeology and archaeologists. This generalization had been with our culture for a long time, before silent movies in popular fiction novels. Another popular thought that dates back to this era is that archaeology is monetarily lucrative. A large majority of the general public is under the impression that excavations are undertaken for money and not historical data. It is easy for the general public to hold this notion for that is what is presented to them through general media, and has been for many decades.

The majority of the public view archaeology as being something only available to a narrow demographic. The job of archaeologist is depicted as a "romantic adventurist occupation".To generalize, the public views archaeology as a fantasized hobby more than a job in the scientific community. Perpetuating the stereotype in modern cinema does nothing to help the scientific community. The audience may not take away scientific methods from popular cinema but they do form a notion of "who archaeologists are, why they do what they do, and how relationships to the past are constituted." Major motion picture companies are more worried about the marketability of the film and the general dramatic interest of the public.

Almost all popular portrayals of archaeologists fall into a few categories. Mcgeough labels them as "British thinkers, American fighters, and repressed librarians." These labels mostly pertain to male archaeologists. Female archaeologists fall into the categories of "privileged women" with a love of adventure who are overly sexualized and "junior scholars" who are like the repressed librarians but are sexualized when their glasses come off and their hair is let down. The modern depiction is sensationalized so much that it has incorrectly formed the public's perception of what archaeology is. The public is often under the impression that all archaeology takes place in a distant and foreign land, only to collect monetarily or spiritually priceless artifacts. Many times these artifacts are pursued for power and/or wealth. Alfred Hitchcock referred to such items in his films as the "MacGuffin: an object of pursuit, protected, and rescue by both hero and villain."

We are led to believe that Indiana Jones is a hero for yelling, "It belongs in a Museum!" all while he wields a gun and destroys historical sites without the blink of an eye.

Such pursuits continue to fascinate the public. Books, films, and video games, such as Indiana Jones, King Solomon's Mines, The City of Brass, Relic Hunter, The Mummy, Stargate, and Tomb Raider all testify to the public's interest in the discovery aspect of archaeology.

Much thorough and productive research has indeed been conducted in dramatic locales such as Copán and the Valley of the Kings, but the bulk of activities and finds of modern archaeology are not so sensational. Archaeological adventure stories tend to ignore the painstaking work involved in carrying out modern surveys, excavations, and data processing. Some archaeologists refer to such off-the-mark portrayals as "pseudoarchaeology".

Pseudoarchaeology — also known as alternative archaeology, fringe archaeology, fantastic archaeology, or cult archaeology — refers to interpretations of the past from outside of the academic archaeological community, which typically also reject the accepted scientific and analytical methods of the discipline. These pseudoscientific interpretations involve the use of archaeological data to construct theories about the past that differ radically from those of mainstream academic archaeology in order to supplement new historic claims with evidence. Claims like these exaggerate evidence, draw dramatic, romanticized conclusions, and more.

There is no one singular pseudoarchaeological theory, but many different interpretations of the past that are at odds from those developed by academics. Some of these revolve around the idea that prehistoric and ancient human societies were aided in their development by intelligent extraterrestrial life, an idea propagated by authors such as Swiss author Erich von Däniken in books such as Chariots of the Gods? (1968) and Italian author Peter Kolosimo. Others instead hold that there were human societies in the ancient period that were significantly technologically advanced, such as Atlantis, and this idea has been propagated by figures like Graham Hancock in his Fingerprints of the Gods (1995).

Many alternative archaeologies have been adopted by religious groups. Fringe archaeological ideas such as Archaeocryptography and Pyramidology have been embraced by religions ranging

from the British Israelites to the Theosophists. Other alternative archaeologies include those that have been adopted by members of New Age and contemporary Pagan belief systems. These include the Great Goddess hypothesis, propagated by Marija Gimbutas, according to which prehistoric Europeans worshipped a single female monotheistic deity—and various theories associated with the Earth mysteries movement, such as the concept of ley lines.

Academic archaeologists have heavily criticised pseudoarchaeology, with one of the most vocal critics, John R. Cole, characterising it as relying on "sensationalism, misuse of logic and evidence, misunderstanding of scientific method, and internal contradictions in their arguments."

 The relationship between alternative and academic archaeologies has been compared to the relationship between intelligent design theories and evolutionary biology by some archaeologists.

Etymology

Various different terms have been employed to refer to these non-academic interpretations of archaeology. During the 1980s, the term "cult archaeology" was used by figures like John R. Cole (1980) and William H. Stiebing Jr (1987). In the 2000s, the term "alternative archaeology" began to be instead applied by academics like Tim Sebastion (2001),Robert J. Wallis (2003), Cornelius Holtorf (2006), and Gabriel Moshenka (2008). Garrett F. Fagan and Kenneth L. Feder (2006) however claimed this term was only chosen because it "imparts a warmer, fuzzier feel" that "appeals to our higher ideals and progressive inclinations." They argued that the term "pseudoarchaeology" was far more appropriate, a term also used by other prominent academic and professional archaeologists such as Colin Renfrew (2006).

Other academic archaeologists have chosen to use other terms to refer to these interpretations. Glyn Daniel, the editor of Antiquity, used the derogative "bullshit archaeology", and similarly the academic William H. Stiebing Jr. noted that there were certain terms used for pseudoarchaeology that were heard "in the privacy of professional archaeologists' homes and offices but which cannot be mentioned in polite society."

Characteristics

William H. Stiebing Jr. argued that despite their many differences, there were a set of core characteristics that almost all pseudoarchaeological interpretations shared. He believed that because of this, pseudoarchaeology could be categorised as a "single phenomenon." He went on to identify three core commonalities of pseudeoarchaeological theories: 1) the unscientific nature of its method and evidence, 2) its tendency to "provide simple, compact answers to complex, difficult issues," and 3) its tendency to present itself as being persecuted by the archaeological establishment, accompanied by an ambivalent attitude towards the scientific ethos of the Enlightenment. This idea that there are core characteristics of pseudoarchaeologies is shared by other academics.

Lack of scientific method

Academic critics have pointed out that pseudoarchaeologists typically neglect to use the scientific method. Instead of testing the evidence to see what hypotheses it fits, pseudoarchaeologists "press-gang" the archaeological data to fit a "favored conclusion" that is often arrived at through hunches, intuition, or religious or nationalist dogma. Different pseudoarchaeological groups hold a variety of basic assumptions which are typically unscientific: the Nazi pseudoarchaeologists for instance took the cultural superiority of the ancient Aryan race as a basic assumption, whilst Judeo-Christian Fundamentalist pseudoarchaeologists conceive of the Earth as only being 10,000 years old and Hindu Fundamentalist pseudoarchaeologists believe that the Homo sapiens species is much older than the 200,000 years old it has been shown to be by archaeologists. Despite this, many of pseudoarchaeology's proponents claim that they reached their conclusions using scientific techniques and methods, even when it is demonstrable that they have not.

Academic archaeologist John R. Cole believed that most pseudoarchaeologists do not understand how scientific investigation works, and that they instead believe it to be a "simple, catastrophic right versus wrong battle" between contesting theories. It was because of this failure to understand the scientific method, he argued, that the entire pseudoarchaeological approach to their arguments was faulty. He went on to argue that most pseudoarchaeologists do not consider alternate explanations to that which they want to propagate, and that their "theories" were typically just "notions", not having sufficient supporting evidence to allow them to be considered "theories" in the scientific, academic meaning of the word.

Commonly lacking scientific evidence, pseudoarchaeologists typically use other forms of evidence to support their arguments. For instance, they often make use of "generalized cultural comparisons," taking various artefacts and monuments from one society, and highlighting similarities with those of another to support a conclusion that both had a common source— typically an ancient lost civilisation like Atlantis, Mu, or an extraterrestrial influence. This takes the different artefacts or monuments entirely out of their original contexts, something which is anathema to academic archaeologists, for whom context is of the utmost importance.

Another form of evidence used by a number of pseudoarchaeologists is the interpretation of various myths as reflecting historical events, but in doing so these myths are often taken out of their cultural contexts. For instance, pseudoarchaeologist Immanuel Velikovsky claimed that the myths of migrations and war gods in the Central American Aztec civilisation represented a cosmic catastrophe that occurred in the 7th and 8th centuries BCE. This was criticised by academic archaeologist William H. Stiebing Jr., who noted that such myths only developed in the 12th to the 14th centuries CE, over a millennium after Velikovsky claimed that the events had occurred, and that the Aztec society itself had not even developed by the 7th century BCE.

Opposition to the archaeological establishment

[Academics] have formed a massive and global network through universities, museums, institutes, societies and foundations. And this immense powerhouse and clearing-house of knowledge has presented their dogma of history to the general public totally unhindered and unchallenged from the outside... On a more sinister note: now this "church of science" has formed a network of watchdog organisations such as CSICOP and The Skeptical Society [sic] (to name but a few) in order to act as the gatekeepers of the truth (as they see it), ready to come down like the proverbial ton of bricks on all those whom they perceive as "frauds," "charlatans," and "pseudo-scientists" - in short, heretics.

Pseudoarchaeologists typically present themselves as being underdogs facing the much larger archaeological establishment.They often use language which disparages academics and dismisses them as being unadventurous, spending all their time in dusty libraries and refusing to challenge the orthodoxies of the establishment lest they lose their jobs. In some more extreme examples, pseudoarchaeologists have accused academic archaeologists of being members of a widespread

conspiracy to hide the truth about history from the public. When academics challenge pseudoarchaeologists and criticise their theories, many pseudoarchaeologists see it as further evidence that their own ideas are right, and that they are simply being suppressed by members of this academic conspiracy.

The prominent English archaeologist Colin Renfrew admitted that the archaeological establishment was often "set in its ways and resistant to radical new ideas" but that this was not the reason why pseudoarchaeological theories were outright rejected by academics. Garrett G. Fagan expanded on this, noting how in the academic archaeological community, "New evidence or arguments have to be thoroughly scrutinised to secure their validity... and longstanding, well-entrenched positions will take considerable effort and particularly compelling data to overturn." Fagan noted that pseudoarchaeological theories simply do not have sufficient evidence to back them up and allow them to be accepted by professional archaeologists.

Conversely, many pseudoarchaeologists, whilst criticising the academic archaeological establishment, also attempt to get support from people with academic credentials and affiliations.

At times, they quote historical, and in most cases dead academics to back up their arguments; for instance prominent pseudoarchaeologist Graham Hancock, in his seminal Fingerprints of the Gods (1995), repeatedly notes that the eminent physicist Albert Einstein once commented positively on the Pole shift hypothesis, a theory that has been abandoned by the academic community but which Hancock supports. As Fagan noted however, the fact that Einstein was a physicist and not a geologist is not even mentioned by Hancock, nor is the fact that the understanding of Plate tectonics (which came to disprove Earth Crustal Displacement), only came to light following Einstein's death.

Nationalist motivations

Pseudoarchaeology is frequently motivated by nationalism (cf. Nazi archaeology, using cultural superiority of the ancient Aryan race as a basic assumption) or a desire to prove a particular religious (cf. Intelligent design), pseudohistorical, political, or anthropological theory. In many cases, an a priori conclusion is established, and fieldwork is undertaken explicitly to corroborate the theory in detail.

Archaeologists distinguish their research from pseudoarchaeology by pointing to differences in research methodology, including recursive methods, falsifiable theories, peer review, and a generally systematic approach to collecting data. Though there is overwhelming evidence of cultural connections informing folk traditions about the past, objective analysis of folk archaeology—in anthropological terms of their cultural contexts and the cultural needs they respond to—have been comparatively few. However, in this vein, Robert Silverberg located the Mormon's use of Mound Builder culture within a larger cultural nexus and the voyage of Madoc and "Welsh Indians" was set in its changing and evolving sociohistorical contexts by Gwyn Williams.

Religious motivations

Many pseudoarchaeological theories are designed to back up the beliefs of particular religious groups.

Judeo-Christian pseudoarchaeologists argue that the Earth is 4,000-10,000 years old, depending on the source. On the other hand, Hindu pseudoarchaeologists believe that the Homo sapiens species is much older than the 100,000 years of age they are generally believed to have existed from. Archaeologist John R. Cole refers to such beliefs as "cult archaeology" and believes them to be pseudoarchaeological. He went onto say that this "pseudoarchaeology" had "many of the attributes, causes, and effects of religion."

While proponents of these theories hold that they use scientific techniques and methods, skeptics argue that they don't.

One example is Ron Wyatt, who claimed to have discovered Noah's ark, the graves of Noah and his wife, the location of Sodom and Gomorrah, the Tower of Babel, and numerous other important sites. However, he lacks evidence for the majority of his findings, and so was dismissed by most Bible scholars, scientists, and historians. A similar response was given by Answers in Genesis, a young-Earth creationist organization, which states that there "is already a huge amount of archaeological and other evidence consistent with the truth of the Bible." They further state that true Christians "are always glad to assess and publicize actual evidence of genuine finds (there have been many over the years) supporting the historicity of the Bible."

Description

Pseudoarchaeology can be practised intentionally or unintentionally. Archaeological frauds and hoaxes are considered intentional pseudoarchaeology. Genuine archaeological finds may be unintentionally converted to pseudoarchaeology through unscientific interpretation. (cf. Confirmation bias)

Especially in the past, but also in the present, pseudoarchaeology has been motivated by racism, especially when the basic intent was to discount or deny the abilities of non-white peoples to make significant accomplishments in astronomy, architecture, sophisticated technology, ancient writing, seafaring, and other accomplishments generally identified as evidence of "civilization". Racism can be implied by attempts to attribute ancient sites and artifacts to Lost Tribes, Pre-Columbian trans-oceanic contact, or even extraterrestrial intelligence rather than to the intelligence and ingenuity of indigenous peoples.

Practitioners of pseudoarchaeology often rail against academic archaeologists and established scientific methods, claiming that conventional science has overlooked critical evidence. Conspiracy theories may be invoked, in which "the Establishment" colludes in suppressing evidence.

Countering the misleading "discoveries" of pseudoarchaeology binds academic archaeologists in a quandary, described by Cornelius Holtorf as whether to strive to disprove alternative approaches in a "crusading" approach or to concentrate on better public understanding of the sciences involved; Holtorf suggested a third, relativist and contextualised approach, in identifying the social and cultural needs that both scientific and alternative archaeologies address and in identifying the engagement with the material remains of the past in the present in terms of critical understanding and dialogue with "multiple pasts", such as Barbara Bender explored for Stonehenge. In presenting the quest for truths as process rather than results, Holtorf quoted Gotthold Lessing (Eine Duplik, 1778):

"If God were to hold in his right hand all the truth and in his left the unique ever-active spur for truth, although with the corollary to err forever, asking me to choose, I would humbly take his left and say 'Father, give; for the pure truth is for you alone!'"

"Archaeological readings of the landscape enrich the experience of inhabiting or visiting a place," Holtorf asserted. "Those readings may well be based on science but even non-scientific research contributes to enriching our landscapes." The question for opponents of folk archaeology is whether such enrichment is delusional.

Participatory "public" or "community" archaeology offers guided engagement.

Archaeology has been portrayed in the mainstream media in sensational ways. This has its advantages and disadvantages. Many practitioners point to the childhood excitement of Indiana Jones films as their inspiration to enter the field. Archaeologists are also very much reliant on public support, the question of exactly who they are doing their work for is often discussed.

Chapter 8

Remote Sensing

Satellite imagery consists of images of Earth or other planets collected by artificial satellites.

History

The first images from space were taken on sub-orbital flights. The U.S-launched V-2 flight on October 24, 1946 took one image every 1.5 seconds. With an apogee of 65 miles (105 km), these photos were from five times higher than the previous record, the 13.7 miles (22 km) by the Explorer II balloon mission in 1935. The first satellite (orbital) photographs of Earth were made on August 14, 1959 by the U.S. Explorer 6. The first satellite photographs of the Moon might have been made on October 6, 1959 by the Soviet satellite Luna 3, on a mission to photograph the far side of the Moon. The Blue Marble photograph was taken from space in 1972, and has become very popular in the media and among the public. Also in 1972 the United States started the Landsat program, the largest program for acquisition of imagery of Earth from space. Landsat Data Continuity Mission, the most recent Landsat satellite, was launched on 11 February 2013. In 1977, the first real time satellite imagery was acquired by the USA's KH-11 satellite system.

All satellite images produced by NASA are published by Earth Observatory and are freely available to the public. Several other countries have satellite imaging programs, and a collaborative European effort launched the ERS and Envisat satellites carrying various sensors. There are also private companies that provide commercial satellite imagery. In the early 21st century satellite imagery became widely available when affordable, easy to use software with access to satellite imagery databases was offered by several companies and organizations.

Uses

Satellite images have many applications in meteorology, agriculture, geology, forestry, landscape, biodiversity conservation, regional planning, education, intelligence and warfare. Images can be in visible colours and in other spectra. There are also elevation maps, usually made by radar images. Interpretation and analysis of satellite imagery is conducted using specialized remote sensing applications. Some of the first image enhancement of satellite photos

was conducted by the U.S. Government and its contractors. For example ESL Incorporated developed some of the earliest two dimensional Fourier transforms applied to digital image processing to address NASA photos as well as national security applications. Satellite imagery is also used in seismology and oceanography in deducing changes to land formation, water depth and sea bed, by color caused by earthquakes, volcanoes, and tsunamis.

Resolution and data

There are four types of resolution when discussing satellite imagery in remote sensing: spatial, spectral, temporal, and radiometric. Campbell (2002) defines these as follows: - spatial resolution is defined as the pixel size of an image representing the size of the surface area (i.e. m2) being measured on the ground, determined by the sensors' instantaneous field of view (IFOV); - spectral resolution is defined by the wavelength interval size (discreet segment of the Electromagnetic Spectrum) and number intervals that the sensor is measuring; temporal resolution is defined by the amount of time (e.g. days) that passes between imagery collection periods for a given surface location; and radiometric resolution is defined as the ability of an imaging system to record many levels of brightness (contrast for example). - Radiometric resolution refers to the effective bit-depth of the sensor (number of grayscale levels) and is typically expressed as 8-bit (0-255), 11-bit (0-2047), 12-bit (0-4095) or 16-bit (0-65,535). - Geometric resolution refers to the satellite sensor's ability to effectively image a portion of the Earth's surface in a single pixel and is typically expressed in terms of Ground Sample Distance, or GSD. GSD is a term containing the overall optical and systemic noise sources and is useful for comparing how well one sensor can "see" an object on the ground within a single pixel. For example, the GSD of Landsat is ~30m, which means the smallest unit that maps to a single pixel within an image is ~30m x 30m. The latest commercial satellite (GeoEye 1) has a GSD of 0.41 m (effectively 0.5 m due to United States Government restrictions on civilian imaging). This compares to a 0.3 m resolution obtained by some early military film based Spy satellite such as Corona.

The resolution of satellite images varies depending on the instrument used and the altitude of the satellite's orbit. For example, the Landsat archive offers repeated imagery at 30 meter resolution for the planet, but most of it has not been processed from the raw data. Landsat 7 has an average

return period of 16 days. For many smaller areas, images with resolution as high as 41 cm can be available.

Satellite imagery is sometimes supplemented with aerial photography, which has higher resolution, but is more expensive per square meter. Satellite imagery can be combined with vector or raster data in a GIS provided that the imagery has been spatially rectified so that it will properly align with other data sets.

Applications of remote sensing data

Conventional radar is mostly associated with aerial traffic control, early warning, and certain large scale meteorological data. Doppler radar is used by local law enforcements' monitoring of speed limits and in enhanced meteorological collection such as wind speed and direction within weather systems.

Other types of active collection includes plasmas in the ionosphere. Interferometric synthetic aperture radar is used to produce precise digital elevation models of large scale terrain (See RADARSAT, Terra SAR-X, Magellan).

Laser and radar altimeters on satellites have provided a wide range of data. By measuring the bulges of water caused by gravity, they map features on the seafloor to a resolution of a mile or so. By measuring the height and wavelength of ocean waves, the altimeters measure wind speeds and direction, and surface ocean currents and directions.

Light detection and ranging (LIDAR) is well known in examples of weapon ranging, laser illuminated homing of projectiles. LIDAR is used to detect and measure the concentration of various chemicals in the atmosphere, while airborne LIDAR can be used to measure heights of objects and features on the ground more accurately than with radar technology. Vegetation remote sensing is a principal application of LIDAR.

Radiometers and photometers are the most common instrument in use, collecting reflected and emitted radiation in a wide range of frequencies. The most common are visible and infrared sensors, followed by microwave, gamma ray and rarely, ultraviolet. They may also be used to detect the emission spectra of various chemicals, providing data on chemical concentrations in the atmosphere.

Stereographic pairs of aerial photographs have often been used to make topographic maps by imagery and terrain analysts in traffic ability and highway departments for potential routes.

Simultaneous multi-spectral platforms such as Land sat have been in use since the 70's. These thematic mappers take images in multiple wavelengths of electro-magnetic radiation (multi-spectral) and are usually found on Earth observation satellites, including (for example) the Land sat program or the IKONOS satellite. Maps of land cover and land use from thematic mapping can be used to prospect for minerals, detect or monitor land usage, deforestation, and examine the health of indigenous plants and crops, including entire farming regions or forests.

Hyper spectral imaging produces an image where each pixel has full spectral information with imaging narrow spectral bands over a contiguous spectral range. Hyper spectral imagers are used in various applications including mineralogy, biology, defence, and environmental measurements.

Within the scope of the combat against desertification, remote sensing allows to follow-up and monitor risk areas in the long term, to determine desertification factors, to support decision-makers in defining relevant measures of environmental management, and to assess their impacts.

Geo Eye

GeoEye's GeoEye-1 satellite was launched September 6, 2008. The GeoEye-1 satellite has the highest resolution of any commercial imaging system and is able to collect images with a ground resolution of 0.41 meters (16 inches) in the panchromatic or black and white mode. It collects multispectral or color imagery at 1.65-meter resolution or about 64 inches, a factor of two better than existing commercial satellites with four-band multistage imaging capabilities. While the satellite is able to collect imagery at 0.41 meters, GeoEye's operating license from the U.S. Government requires re-sampling the imagery to 0.5 meters for all customers not explicitly granted a waiver by the U.S. Government.

DigitalGlobe

DigitalGlobe's WorldView-2 satellite provides high resolution commercial satellite imagery with 0.46 m spatial resolution(panchromatic only). The 0.46 meters resolution of WorldView-2's panchromatic images allows the satellite to distinguish between objects on the ground that are at least 46 cm apart. Similarly DigitalGlobe's QuickBird satellite provides 0.6 meter resolution (at NADIR) panchromatic images.

Spot Image

The 3 SPOT satellites in orbit (Spot 2, 4 and 5) provide images with a large choice of resolutions – from 2.5 m to 1 km. Spot Image also distributes multiresolution data from other optical satellites, in particular from Formosat-2 (Taiwan) and Kompsat-2 (South Korea) and from radar satellites (TerraSar-X, ERS, Envisat, Radarsat). Spot Image will also be the exclusive distributor of data from the forthcoming very-high resolution Pleiades satellites with a resolution of 0.50 meter or about 20 inches. The first launch is planned for the end of 2011. The company also offers infrastructures for receiving and processing, as well as added value options.

Rapid Eye

RapidEye's constellation of five satellites, launched in August 2008,[10] contain identical multispectral sensors which are equally calibrated. Therefore, an image from one satellite will be equivalent to an image from any of the other four, allowing for a large amount of imagery to be collected (4 million km² per day), and daily revisit to an area.

Each travel on the same orbital plane at 630 km, and deliver images in 5 meter pixel size. RapidEye satellite imagery is especially suited for agricultural, environmental, cartographic and disaster management applications. The company not only offers their imagery, but consults with their customers to create services and solutions based on analysis of this imagery .

ImageSat International

Earth Resource Observation Satellites, better known as "EROS" satellites, are lightweight, low earth orbiting, high-resolution satellites designed for fast maneuvering between imaging targets. In the commercial high-resolution satellite market, EROS is the smallest very high resolution

satellite; it is very agile and thus enables very high performances. The satellites are deployed in a circular sun-synchronous near polar orbit at an altitude of 510 km (+/- 40 km). EROS satellites imagery applications are primarily for intelligence, homeland security and national development purposes but also employed in a wide range of civilian applications, including: mapping, border control, infrastructure planning, agricultural monitoring, environmental monitoring, disaster response, training and simulations, etc.

Meteosat

Model of a first generation Meteosat geostationary satellite.

The Meteosat-2 geostationary weather satellite began operationally to supply imager data on 16 August 1981. Eumetsat has operated the Meteosats since 1987.

The Meteosat visible and infrared imager (MVIRI), three-channel imager: visible, infrared and water vapour; It operates on the first generation Meteosat, Meteosat-7 being still active.

The 12-channel Spinning Enhanced Visible and Infrared Imager (SEVIRI) includes similar channels to those used by MVIRI, providing continuity in climate data over three decades; Meteosat Second Generation (MSG).

The Flexible Combined Imager (FCI) on Meteosat Third Generation (MTG) will also include similar channels, meaning that all three generations will have provided over 60 years of climate data.

Disadvantages

Because the total area of the land on Earth is so large and because resolution is relatively high, satellite databases are huge and image processing (creating useful images from the raw data) is time-consuming. Depending on the sensor used, weather conditions can affect image quality: for example, it is difficult to obtain images for areas of frequent cloud cover such as mountain-tops.

Commercial satellite companies do not place their imagery into the public domain and do not sell their imagery; instead, one must be licensed to use their imagery. Thus, the ability to legally make derivative products from commercial satellite imagery is minimized.

Privacy concerns have been brought up by some who wish not to have their property shown from above. Google Maps responds to such concerns in their FAQ with the following statement: "We understand your privacy concerns... The images that Google Maps displays are no different from what can be seen by anyone who flies over or drives by a specific geographic location."

Moving images

In 2005 the Australian company Astrovision (ASX: HZG) announced plans to launch the first commercial geostationary satellite in the Asia-Pacific.[citation needed] It is intended to provide true color, real-time live satellite feeds, with down to 250 metres resolution over the entire Asia-Pacific region, from India to Hawaii and Japan to Australia. They were going to provide this content to users of 3G mobile phones, over Pay TV as a weather channel, and to corporate and government users.

Unfortunately, the market response to the AstroVision concept fell into the classic chicken-egg problem: potential customers were excited by the possibilities offered, but they were unwilling (or, in government cases, generally unable) to sign contracts for a service that would not be delivered for 3–4 years (the length of time required to build and launch the satellite). AstroVision ran low on funds and was forced to shut down the program in 2006.

Chapter 9

Archaeological Field Survey

Archaeological field survey is a type of field research by which archaeologists (often landscape archaeologists) search for archaeological sites and collect information about the location, distribution and organization of past human cultures across a large area (e.g. typically in excess of one hectare, and often in excess of many km^2). Archaeologists conduct surveys to search for particular archaeological sites or kinds of sites, to detect patterns in the distribution of material culture over regions, to make generalizations or test hypotheses about past cultures, and to assess the risks that development projects will have adverse impacts on archaeological heritage.The surveys may be: (a) intrusive or non-intrusive, depending on the needs of the survey team (and the risk of destroying archaeological evidence if intrusive methods are used) and; (b) extensive or intensive, depending on the types of research questions being asked of the landscape in question. Surveys can be a practical way to decide whether or not to carry out an excavation (as a way of recording the basic details of a possible site), but may also be ends in themselves, as they produce important information about past human activities in a regional context.

A common role of field survey is in assessment of potential archaeological significance of places where development is proposed. This is usually connected to construction work and road building. The assessment determines whether the area of development impact is likely to contain significant archaeological resources and makes recommendations as to whether the archaeological remains can be avoided or an excavation is necessary before development work can commence.

Archaeologists use a variety of tools in survey, including GIS, GPS, remote sensing, geophysical survey and aerial photography.

Research and planning

Survey work may be undertaken in response to a specific threat (such as proposed or pending development project) to an area of known or unknown archaeological interest or as part of a program addressing specific research topics. In either case actual fieldwork is most likely to be preceded by a phase of desktop research (reviewing existing data in the form of maps, formal

and informal written records, photographs and drawings) or in the modern age internet research using search engines, ancestry and birth or property records online. Consideration should be given to the nature of the landscape (vegetation coverage, existing settlement or industry, soil depth, climate) before a range of techniques is selected to be applied within an appropriate overarching method.

Rationale

An area may be considered worthy of surveying based on the following:

Artifacts found: Locals have picked up physical artifacts, sometimes held by the local museum but more often collected in private homes or old buildings such as churches and synagogues, and it is unclear where they are coming from.

Literary sources: Old literary sources have provided archaeologists with clues about settlement locations that have not been archaeologically documented. Sometimes the texts may be quite recent; for instance, a book on local history may mention an interesting area.

Oral sources: In many locations, local stories contain some hint of a greater past, and often they have a basis in history. For instance, someone may remember that a grandfather who used to walk the hills as a shepherd used to talk about columns from an old temple, although the descendant never saw the ruins.

Local knowledge: In many cases, locals know where to find something of interest to archaeologists. They may not have reported it because of taking it as part of their world, or because of fearing intrusions on their land or community.

Previous surveys: In some places, a past survey may have been recorded in an academic journal. The use of more recent technologies and finds from other sites may provide reason to re-examine the site.

Previous excavations: Excavations carried out before the middle of the 20th century are notoriously poorly documented. They were often carried out by methods that left behind much of the evidence the modern-day archaeologist is looking for. Early excavators were often interested only in fine pottery, jewelry and statues and referred to as rescue archaeologists.

Lack of knowledge: Many areas of the world have developed limited knowledge about the nature and organization of past human activity at the regional level. (Although one or more sites may be known from an area, often little is known about the wider distribution of contemporary settlements, and how settlement patterns may change over time.) An archaeological field survey is the primary tool for discovering information about previously uninvestigated areas.

Archaeological hypotheses: Some kinds of archaeological theories — about changes in agricultural strategies or population density for example — are investigated or tested through the use of archaeological surveys of areas that should or should not contain particular kinds of archaeological materials if the theory is true.

Aerial photography

Aerial photography is a good tool for planning a survey. Remains of older buildings often show in fields as cropmarks; just below the topsoil, the remains may affect the growth of crops or grass. There should preferably be photographs of the same area at different times of the year, allowing the analyst to find the best time to see crop marks.

Previous work in the region

If the indicator that started the process was not a record of previous work, the archaeologists will need to check if any work has been done prior to commencement of the pending project. As many older surveys and excavations were published in papers that are not widely available, this may be a difficult task. A common way to handle this is through a visit to the area, to check with local museums, historians and older people who might remember something about the former activities in a particular locale.

Permissions

It is usually a simple matter to gain permission to perform a cultural field survey, especially a non-intrusive one. If the area is privately owned, the local laws may or may not require the landowners' co-operation. Permission for an intrusive form of survey may be more difficult to

acquire, due to the fear of destroying evidence or property values and the threat of lawsuit for said damages from the property owner.

Intrusive vs. non-intrusive surveys

In a non-intrusive survey, nothing is touched, just recorded. An accurate survey of the earthworks and other features can enable them to be interpreted without the need for excavation.

An intrusive survey can mean different things. In some cases, all artifacts of archaeological value are collected. This is often the case if it is a rescue survey, but less common in a regular survey.

Another form of intrusive research is bore holes. Small holes are drilled into the ground, most often with hand-powered bores. The contents are examined to determine the depths at which one might find cultural layers, and where one might expect to strike virgin soil. This can be valuable in determining the cost of an excavation - if there is a build-up of several meters of soil above the layers the archaeologist is interested in, the price will obviously be much higher than if artifacts are found only centimeters below ground.

Extensive vs. intensive survey

One way to classify archaeological field surveys is to divide them into two types: intensive survey and extensive survey. The former is characterised by the complete or near-complete coverage of the survey area at a high-resolution, most often by having teams of survey archaeologists walk in a systematic way (e.g. in parallel transects) over parcels of the landscape in question, documenting archaeological data such as lithics, ceramics and/or building remains. However, variations in artifact visibility related to topography, vegetation, and soil character, not to mention the imperfect detection abilities of human observers, bring into question the very concept of complete coverage. The Extensive survey, on the other hand, is characterised by a low-resolution approach over targets within a study area (sometimes including hundreds of km²). Sometimes this involves a random sampling or some other kind of probability sample to gain a repsentative sample of the study area. Extensive surveys may be designed to target the identification of archaeological sites across a large area, whereas intensive surveys are designed to provide a more comprehensive picture of the location of sites and the nature of off-site data (e.g. field systems, isolated finds, etc.). Intensive survey is the more costly, timely, and

ultimately informative of the two approaches, although extensive survey can provide important information about previously unknown areas.

Purposive vs. sampling survey

Archaeological field surveys can also be characterized as either purposive or sampling surveys. The former, sometimes also called "archaeological prospection," involves cases where archaeologists are searching for a particular site or a particular kind of archaeological material. For example, they might be searching for a particular shipwreck or an historic fort whose exact location is no longer certain. However, they may also be searching for archaeological materials in particular locations to test hypotheses about past use of those spaces. Sampling surveys, on the other hand, have the goal of obtaining a representative sample of some population of sites or artifacts in order to make generalizations about that population. This involves some probability sampling of spatial units, such as random or stratified random sampling of geometrical (often square) or irregular spatial units.

Fieldwalking (transects)

Conventionally, fieldwalking in grids or along lines called transects has formed the backbone of archaeological survey fieldwork, at least where visibility is fairly good. A single researcher or team will walk slowly through the target area looking for artifacts or other archaeological indicators on the surface, often recording aspects of the environment at the time. The method works best on either ploughed ground or surfaces with little vegetation. On ploughed surfaces, as the soil is turned regularly artifacts will move to the top. Erosion and soil loss on uncultivated and lightly vegetated soil (e.g., in semi-arid environments) may cause artifacts to also 'rise' to the surface.

Even with optimal surface conditions the efficacy of fieldwalking varies according longterm land use, topography, weather conditions, the skill and experience of the fieldwalkers, and other factors. Intensive arable agriculture on hilltops will first expose and then pulverize artifacts such as pottery and even chipped stone (typically flint, chert or obsidian) flakes. Conversely, the plateau and upper scarp or valley side soils will move down slope, forming a deep seal over low-lying archaeological deposits, rendering them inaccessible to surface survey. Even artifacts on the surface and with relatively high visibility (i.e., little obscuring vegetation), however, are not

consistently detected by surveyors. Consequently, it is unrealistic to expect 100% recovery of artifacts or even sites. We can evaluate surveyors effectiveness at detecting artifacts with "Sweep width," which is the theoretical width of a transect in which the number of artifacts detected outside the sweep is identical to the number missed within the sweep. The poorer the visibility, the poorer the contrast between the artifact "targets" and their surroundings, or the poorer the surveyor's skill or attention, the narrower the sweep width will be.

Modern technology such as GPS has made survey recording much easier, as positions of artifacts or artifact clusters ("sites") can be taken well within the limits of accuracy and precision necessary for survey work. Recording the position and attributes of archaeological features has been expedited by customizable portable computing interfaces or mobile Geographical Information Systems (GIS).

Databases containing existing regional archaeological data as well as other landscape GIS layers such as soils, vegetation, modern features, and development plans can be loaded on a mobile GIS for referencing, for sampling purposes, and for groundtruth updating directly in the field, resulting a more informed archaeological survey process.

Visible above-ground structures

Fieldwalking picks up artefact scatters in ploughed fields. In heavily wooded areas such as Scandinavia, fieldwalking is not a central surveying method. Here artefacts and structures are hidden by humus and fallen leaves, and are therefore virtually invisible even at short distances. Instead archaeological surveyors concentrate on the region's abundant above-ground structures such as burial cairns, collapsed field walls and rock art panels, looking for unnatural changes in the vegetation and landscape to decide what may be hidden under the vegetation, or more rarely surveying by subsurface testing (SST). SSTs can consist of a series of shovel-test pits dug down below this humus layer or, where substantial later sediments may cover archaeological materials, series of auger or core holes. Because SSTs are much more costly than fieldwalking, surveys by SST usually have very low intensity. The various Scandinavian sites and monuments registers mainly list above-ground monuments, not ploughed-out pottery scatters.

Narrowing it down

Because of the high costs involved in some kinds of surveys, it is often helpful to use "predictive modelling" to narrow down the search for archaeological materials. This is particularly important for purposive surveys, but can also be used to guide sampling surveys by eliminating the need to survey areas where, for geological or other reasons, we can reasonably expect all ancient traces to be destroyed (e.g., by erosion) or far too deeply buried (e.g., by alluvium) to be detectable. Modern predictive models in archaeology employ Geographic Information Systems (GIS).

Geophysical survey

Geophysical survey is used for subsurface mapping of archaeological sites. In recent years, there have been great advances in this field, and it is becoming an increasingly useful and cost-effective tool in archaeology. Geophysical instruments can detect buried archaeological features when their electrical or magnetic properties contrast measurably with their surroundings. In some cases, individual artifacts, especially metal, may be detected as well. Readings taken in a systematic pattern become a dataset that can be rendered as image maps for interpretation. Survey results can be used to guide excavation and to give archaeologists insight into the patterning of non-excavated parts of the site.

Unlike other archaeological methods, geophysical survey is not invasive or destructive. For this reason, it is often used where preservation (rather than excavation) is the goal for project preservation and compliance with applicable laws.

The geophysical methods most commonly applied to archaeology are magnetometers, electrical resistance meters, ground-penetrating radar (GPR) and electromagnetic (EM) conductivity. These methods provide excellent resolution of many types of archaeological features, and are capable of high sample density surveys of very large areas and of operating under a wide range of conditions. While common metal detectors are geophysical sensors, they are not capable of generating high-resolution imagery. Other established and emerging technologies are also finding use in archaeological applications.

Although geophysical survey has been used in the past with intermittent success, good results are very likely when it is applied appropriately. It is most useful when it is used in a well-integrated

research design where interpretations can be tested and refined.[7][8] Interpretation requires a knowledge both of the archaeological record, and of the way it is expressed geophysically. Appropriate instrumentation, field survey design, and data processing are essential for success, and must be adapted to the unique geology and archaeological record of each site. In the field, control of data quality and spatial accuracy are critical to a successful mission completion.

Analysis

The most important part of the survey is the analysis. The types of questions typically asked of survey data include: what is the evidence for first occupation of an area; when was this area occupied; how are sites distributed; where are sites located; what evidence is there for a settlement hierarchy; what sites are contemporary with each other; how has the modern landscape interfered with the visibility of archaeological remains; what sorts of activities can be recognized (e.g. dwellings, tombs, field systems); how many people lived in this area (at any given time); why did people choose to live in this area; how has the landscape changed over time; what changes in settlement patterns have there been?

At times, one part of the survey may not have yielded the evidence one wanted to find. For instance, very little may have been found during a field walk, but there are strong indications from geophysical survey and local stories that there is a building underneath a field. In such a case, the only way to decide if an excavation is worth the cost is to carefully analyze the evidence to determine which part to trust.

On the one hand, the geophysics might just show an old and forgotten water-pipe, but it might also show the wall of just the building the archaeologists were looking for.

The analysis therefore includes careful examination of all the evidence collected. A method often used to determine its value is to compare it to sites of the same period. As the number of well-documented surveys grow, this becomes a slightly easier task, as it is sometimes easier to compare two survey results than to compare a survey result with an excavated site.

Chapter 10

Art Repatriation

The repatriation and reburial of human remains is a current debate in archaeology. Various indigenous peoples around the world, such as Native Americans and Indigenous Australians have requested that human remains from their respective communities be repatriated for reburial. A famous case is that of the Kennewick Man in the United States. Similarly, contemporary Druids have requested the reburial of ancient human remains in the British Isles.

Repatriation in general seems to be concerned with objects, in the broadest sense of the word, ranging from human remains to art Art repatriation. But it actually is about people in the present and their perception of the past in the present. Repatriation claims are linked to politics, ethnic identity, and other debates or problems in contemporary society that have or claim to have a historical link to the object.

Art repatriation is the return of art or cultural objects, usually referring to ancient or looted art, to their country of origin or former owners (or their heirs). The disputed cultural property items are physical artifacts of a group or society that were taken from another group usually in an act of looting, whether in the context of imperialism, colonialism or war. The contested objects range widely from sculptures and paintings to monuments and human remains.

Ancient world

War and the subsequent looting of defeated peoples has been common practice since ancient times. The stele of King Naram-Sin of Akkad, which is now displayed in the Louvre Museum in Paris, is one of the earliest works of art known to have been looted in war. The stele commemorating Naram-Sin's victory in a battle against the Lullubi people in 2250 BCE was taken as war plunder about a thousand years later by the Elamites who relocated it to their capital in Susa, Iran. There, it was uncovered in 1898 by French archaeologists.

The Palladion was the earliest and perhaps the most important stolen statue in western literature. The small carved wooden statue of an armed Athena served as Troy's protective talisman, which is said to have been stolen by two Greeks who secretly smuggled the statue out of the Temple of

Athena. It was widely believed in antiquity that the conquest of Troy was only possible because the city had lost its protective talisman. This myth illustrates the significance of statuary in Ancient Greece as divine manifestations of the gods that symbolized power and were often believed to possess supernatural abilities.

The sacred nature of the statues is further illustrated in the supposed suffering of the victorious Greeks afterward, including Odysseus, who was the mastermind behind the robbery. According to Roman myth, Rome was founded by Romulus, the first victor to dedicate spoils taken from an enemy ruler to the Temple of Jupiter Feretrius. In Rome's many subsequent wars, blood-stained armor and weaponry were gathered and placed in temples as a symbol of respect toward the enemies' deities and as a way to win their patronage. As Roman power spread throughout Italy where Greek cities once reigned, Greek art was looted and ostentatiously displayed in Rome as a triumphal symbol of foreign territories brought under Roman rule. However, the triumphal procession of Marcus Claudius Marcellus after the fall of Syracuse in 211 is believed to have set a standard of reverence to conquered sanctuaries as it engendered disapproval by critics and a negative social reaction.

Modern era

One of the most infamous cases of esurient art plundering in wartime was the Nazi appropriation of art from both public and private holdings throughout Europe and Russia. The looting began before World War II with illegal seizures as part of a systematic persecution of Jews, which was included as a part of Nazi crimes during the Nuremberg Trials. During World War II, Germany plundered 427 museums in the Soviet Union and ravaged or destroyed 1,670 Russian Orthodox churches, 237 Catholic churches and 532 synagogues.

A well-known recent case of wartime looting was the plundering of ancient artifacts from the National Museum of Iraq in Baghdad at the outbreak of the war in 2003. Although this was not a case in which the victors plundered art from their defeated enemy, it was result of the unstable conditions of war that allowed looting to happen and which some would argue was the fault of the invading US forces.

Archaeologists and scholars criticized the US military for not taking the measures to secure the museum, a repository for a myriad of valuable ancient artifacts from the ancient Mesopotamian

civilization. In the several months leading up to the war, scholars, art directors, and collector met with the Pentagon to ensure that the US government would protect Iraq's important archaeological heritage, with the National Museum in Baghdad being at the top of the list of concerns. Between April 8, when the museum was vacated and April 12, when some of the staff returned, an estimated 15,000 items and an additional 5,000 cylinder seals were stolen. Moreover, the National Library was plundered of thousands of cuneiform tablets and the building was set on fire with half a million books inside; fortunately, many of the manuscripts and books were preserved.

A US task force was able to retrieve about half of the stolen artifacts by organizing and dispatching an inventory of missing objects and by declaring that there would be no punishment for anyone returning an item. In addition to the vulnerability of art and historical institutions during the Iraq war, Iraq's rich archaeological sites and areas of excavated land (Iraq is presumed to possess vast undiscovered treasures) have fallen victim to widespread looting.Hordes of looters disinterred enormous craters around Iraq's archaeological sites, sometimes using bulldozers. It is estimated that between 10,000 and 15,000 archaeological sites in Iraq have been despoiled.

Modern imperialism and looting

The scale of plundering that took place under Napoleon's French Empire was unprecedented in modern history with the only comparable looting expeditions taking place in ancient Roman history. In fact, the French revolutionaries justified the large-scale and systematic looting of Italy in 1796 by viewing themselves as the political successors of Rome, in the same way that ancient Romans saw themselves as the heirs of Greek civilization.They also supported their actions with the opinion that their sophisticated artistic taste would allow them to appreciate the plundered art. Napoleon's soldiers crudely dismantled the art by tearing paintings out of their frames hung in churches and sometimes causing damage during the shipping process. Napoleon's soldiers appropriated private collections and even the papal collection. Of the most famous artworks plundered included the Bronze Horses of Saint Mark in Venice and the Laocoön and His Sons in Rome (both since returned), with the later being considered the most impressive sculpture from antiquity at the time.

The Laocoön had a particular meaning for the French because it was associated with a myth in connection to the founding of Rome. When the art was brought into Paris, the pieces arrived in the fashion of a triumphal procession modeled after the common practice of ancient Romans.

Napoleon's extensive plunder of Italy was criticized by such French artists as Antoine-Chrysostôme Quatremère de Quincy (1755–1849), who circulated a petition that gathered the signatures of fifty other artists. With the founding of the Louvre Museum in Paris in 1793, Napoleon's aim was to establish an encyclopedic exhibition of art history, which later both Joseph Stalin and Adolf Hitler would attempt to emulate in their respective countries.

Napoleon continued his art conquests in 1798 when he invaded Egypt in an attempt to safeguard French trade interests and to undermine Britain's access to India via Egypt.

His expedition in Egypt is noted for the 167 "savants" he took with him including scientists and other specialists equipped with tools for recording, surveying and documenting ancient and modern Egypt and its natural history. Among other things, the expedition discoveries included the Rosetta Stone and the Valley of the Kings near Thebes. The French military campaign was short-lived and unsuccessful and the majority of the collected artifacts (including the Rosetta Stone) were seized by British troops, ending up in the British Museum. Nonetheless, the information gathered by the French expedition was soon after published in the several volumes of Description de l'Égypte, which included 837 copperplate engravings and over 3,000 drawings. In contrast to the disapproving public reaction to the looting of Italian works of art, the appropriation of Egyptian art saw widespread interest and fascination throughout Europe, inciting a phenomenon which came to be called "Egyptomania".

Demands for restitution

A precedent for art repatriation was set in Roman antiquity when Cicero prosecuted Verres, a senate member and illegal appropriator of art. Cicero's speech influenced Enlightenment European thought and had an indirect impact on the modern debate about art repatriation. Cicero's argument uses military episodes of plunder as "case law" and expresses certain standards when it comes to appropriating cultural property of another people. Cicero makes a distinction between public and private uses of art and what is appropriate for each and he also asserts that the primary purpose of art is religious expression and veneration. He also sets

standards for the responsibilities of imperial administration abroad to the code of ethics surrounding the collection of art from defeated Greece and Rome in wartime. Later, both Napoleon and Lord Elgin would be likened to Verres in condemnations of their plundering of art.

Art was repatriated for the first time in modern history when Arthur Wellesley, 1st Duke of Wellington overturned art plundered by Napoleon to Italy after he and Marshal Bulchers armies defeated the French at the Battle of Waterloo in 1815. This decision contrasted sharply to a long-held tradition to the effect that "to the victors go the spoils." This is remarkable considering that in the battle of Waterloo alone, the financial and human costs were colossal; the decision to not only refrain from plundering France but to repatriate France's prior seizures from the Netherlands, Italy, Prussia, and Spain, was extraordinary. Moreover, the British paid for the restitution of the papal collection to Rome because the Pope could not finance the shipping himself. When British troops began packing up looted art from the Louvre, there was a public outcry in France. Crowds reportedly tried to prevent the taking of the Horses of Saint Mark and there were throngs of weeping ladies outside the Louvre Museum.

Despite the unprecedented nature of this repatriation effort, there are recent estimations that only about 55 percent of what was taken was actually repatriated: the Louvre Director at the time, Vivant Denon, had sent out many important works to other parts of France before the British could take them. Wellington viewed himself as representing all of Europe's nations and he believed that the moral decision would be to restore the art in its apparently proper context.

The great public interest in art repatriation helped fuel the expansion of public museums in Europe and launched museum-funded archaeological explorations. The concept of art and cultural repatriation gained momentum through the latter decades of the twentieth century and began to show fruition by the end of the century when key works were ceded back to claimants.

Legal issues

National government laws

In 1863 US President Abraham Lincoln summoned Francis Lieber, a German-American jurist and political philosopher, to write a legal code to regulate Union soldiers' behavior toward Confederation prisoners, noncombatants, spies and property. The resulting General Orders

No.100 or the Lieber Code, legally recognized cultural property as a protected category in war. The Lieber Code had far-reaching results as it became the basis for the Hague Convention of 1907 and 1954 and has led to Standing Rules of Engagement (ROE) for US troops today. A portion of the ROE clauses instruct US troops not to attack "schools, museums, national monuments, and any other historical or cultural sites unless they are being used for a military purpose and pose a threat".

In 2004 the US passed the Bill HR1047 for the Emergency Protection for Iraq Cultural Antiquities Act, which allows the President authority to impose emergency import restrictions by Section 204 of the Convention on Cultural Property Implementation Act (CCIPA). In 2003, Britain and Switzerland put into effect statutory prohibitions against illegally exported Iraqi artifacts. In the UK, the Dealing in Cultural Objects Bill was established in 2003 that prohibited the handling of illegal cultural objects.

International conventions

The Hague Convention of 1907 aimed to forbid pillaging and sought to make wartime plunder the subject of legal proceedings, although in practice the defeated countries did not gain any leverage in their demands for repatriation.

The Hague Convention of 1954 for the Protection of Cultural Property in the Event of Armed Conflict took place in the wake of widespread destruction of cultural heritage in World War II is the first international treaty of a worldwide vocation focusing exclusively on the protection of cultural heritage in the event of armed conflict.

The UNIDROIT (International Institute for the Unification of Private Law) Convention on Stolen or Illicitly Exported Cultural Objects of 1995 called for the return of illegally exported cultural objects.

Unesco

The 1970 UNESCO Convention against Illicit Export under the Act to implement the Convention (the Cultural Property Implementation Act) allowed for stolen objects to be seized if there were documentation of it in a museum or institution of a state party and the following agreement in 1972 promoted world cultural and natural heritage.

The 1978 UNESCO Convention strengthened existing provisions; the Intergovernmental Committee for Promoting the Return of Cultural Property to its Countries of Origin or its Restitution in case of illicit Appropriation was established. It consists of 22 members elected by the General Conference of UNESCO to facilitate bilateral negotiations for the restitution of "any cultural property which has a fundamental significance from the point of view of the spiritual values and cultural heritage of the people of a Member State or Associate Member of UNESCO and which has been lost as a result of colonial or foreign occupation or as a result of illicit appropriation".It was also created to "encourage the necessary research and studies for the establishment of coherent programmes for the constitution of representative collections in countries whose cultural heritage has been dispersed".

In response to the Iraqi National Museum looting, UNESCO Director-General, Kōichirō Matsuura convened a meeting in Paris on April 17, 2003 in order to assess the situation and coordinate international networks in order to recover the cultural heritage of Iraq. On July 8, 2003, Interpol and UNESCO signed an amendment to their 1999 Cooperation Agreement in the effort to recover looted Iraqi artifacts.

Political issues

Colonialism and identity

From early on, the field of archaeology was deeply involved in political endeavors and in the construction of national identities. This early relationship can be seen during the Renaissance and the proto-Italian reactions against the High Gothic movement, but the relationship became stronger during 19th century Europe when archaeology became institutionalized as a field of study furnished by artifacts acquired during the rise of European colonialism led by the British and French. Colonialism and the field of archaeology mutually supported one another as the need to acquire knowledge of ancient artifacts justified further colonial dominance.

As further justification for colonial rule, the archaeological discoveries also shaped the way European colonialists identified with the artifacts and the ancient people who made them. In the case of Egypt, colonial Europe's mission to bring the glory and magnificence of ancient Egypt closer to Europe and incorporate it into knowledge of world history, or better yet, European history placed ancient Egypt in a new spotlight. With the archaeological discoveries, ancient

Egypt was adopted into the Western historical narrative and came to take on a significance that had up until that time been reserved for ancient Greek and Roman civilization. The French revolutionaries justified the large-scale and systematic looting of Italy in 1796 by viewing themselves as the political successors of Rome, in the same way that ancient Romans saw themselves as the heirs of Greek civilization;by the same token, the appropriation of ancient Egyptian history as European history further legitimated Western colonial rule over Egypt. But while ancient Egypt became patrimony of the West, modern Egypt remained a part of the Muslim world. The writings of European archaeologists and tourists illustrate the impression that modern Egyptians were uncivilized, savage, and the antithesis of the splendor of ancient Egypt.

Museums furnished by colonial looting have largely shaped the way a nation imagines its dominion, the nature of the human beings under its power, the geography of the land, and the legitimacy of its ancestors, working to suggest a process of political inheriting. It is necessary to understand the paradoxical way in which the objects on display at museums are tangible reminders of the power held by those who gaze at them. Eliot Colla describes the structure of the Egyptian sculpture room in the British Museum as an assemblage that "form[s] an abstract image of the globe with London at the center".

The British Museum, as Colla describes, presents a lesson of human development and progress: "the forward march of human civilization from its classical origins in Greece and Rome, through Renaissance Italy, to modern-day London".

The restoration of monuments was often made in colonial states to make natives feel as if in their current state, they were no longer capable of greatness. Furthermore, sometimes colonial rulers argued that the ancestors of the colonized people did not make the artifacts. Some scholars also argue that European colonialists used monumental archaeology and tourism to appear as the guardian of the colonized, reinforcing unconscious and undetectable ownership. Colonial rulers used peoples, religions, languages, artifacts, and monuments as source for reinforcing European nationalism, which was adopted and easily inherited from the colonial states.

Nationalism and identity

As a direct reaction and resistance to colonial oppression, archaeology was also used for the purpose of legitimating the existence of an independent nation-state.[44] For example, Egyptian

Nationalists utilized its ancient history to invent the political and expressive culture of "Pharaonism" as a response to Europe.

Some argue that in colonized states, nationalist archaeology was used to resist colonialism and racism under the guise of evolution. While it is true that both colonialist and nationalist discourse use the artifact to form mechanisms to sustain their contending political agendas, there is a danger in viewing them interchangeably since the latter was a reaction and form of resistance to the former. On the other hand, it is important to realize that in the process of emulating the mechanisms of colonial discourse, the nationalist discourse produced new forms of power. In the case of the Egyptian nationalist movement, the new form of power and meaning that surrounded the artifact furthered the Egyptian independence cause but continued to oppress the rural Egyptian population.

Some scholars argue that archaeology can be a positive source of pride in cultural traditions, but can also be abused to justify cultural or racial superiority as the Nazis argued that Germanic people of Northern Europe was a distinct race and cradle of Western civilization that was superior to Jewish race. In some conflicts that involve land ownership, archaeology is used to encourage confrontation by means of constructing of national myth as seen with the ancient fortress of Masada in Israel. In other cases, archaeology allows rulers to justify the domination of neighboring peoples as Saddam Hussein used Mesopotamia's magnificent past to justify his invasion of Kuwait in 1990.

Some scholars employ the idea that identity is fluid and constructed, especially national identity of modern nation-states, to argue that the post-colonial countries have no real claims to the artifacts plundered from their borders since their cultural connections to the artifacts are indirect and equivocal. This argument asserts that artifacts should be viewed as universal cultural property and should not be divided among artificially created nation-states. Moreover, that encyclopedic museums are a testament to diversity, tolerance and the appreciation of many cultures. Other scholars would argue that this reasoning is a continuation of colonialist discourse attempting to appropriate the ancient art of colonized states and incorporate it into the narrative of Western history. The controversy comes from the fact that some believe that it is disrespectful to the dead and to their contemporary descendants for their remains to be displayed in a museum or in other ways stored. A lot of the human remains are from archaeological excavations or old

physical anthropological collections. They are mainly stored for scientific purposes in museums, medical collections and research facilities. Most of the research on human remains is done "In the name of science". This expression has had magical and biblical power in the past, but less and less in the modern era. It is very difficult or even impossible to explain the use of archaeology for society. When discussing stakeholders and values in a repatriation case this has serious implications for the outcome of the claim. Comparing archaeological research with medical research one clearly sees a profound difference. Human life is held so precious that for this reason certain sacrifices are made, such as the use of human remains to save future human life. The most extreme case of violation is validated due to the results that can be attained in saving human life. Archaeological benefit must be sought in the generation of 'knowledge' itself and the understanding of human kind. The only question remains when does someone's perception of ancestor desecration end, this can differ from person to person and from culture to culture.

The trauma of history

The first and foremost undercurrent of repatriation is the ill treatment of people in the past, the repatriation of human remains is to a degree part of a healing process bandaging the traumas of history. In essence it is important that this ill treatment is addressed but with the repatriation and reburial of remains they are essentially lost to the world as a reminder of that part of the object's history or biography. Repatriation also presents an opportunity for people to lay claim to their own past and actively decide what is and what is not a part of their cultural heritage. The basis beneath the open wounds of history is the difference in treatment of remains that were seen as sufficiently other and could therefore be studied without any ethical considerations.

The contesting of ownership of human remains in museums and other institutions, and demands of return to cultural groups is largely fuelled by the difference in the handling of 'white' and indigenous remains. Where the former were reburied the latter were subjects of study and eventually ending up in museums. In a sense one cultural group assumed the right to carry out scientific research upon another cultural group. This disrespectful unequal treatment stems from a time when race and cultural differences had huge social implications. These are changing but the aftermath of centuries of inequality cannot be corrected so easily. This frustration is what partly fuels the repatriation and ownership claims that seem to have increased in the last 30

years.The "traumas of history" can be addressed by reconciliation, repatriation and formal governmental apologies disapproving of conducts in the past by the institutions they now represent. A good example of a repatriation case is described by Thorton where a large group of massacred Indians is returned to their tribe, showing the healing power of the repatriation gesture. But the repatriation of Kennewick man goes far beyond the colonial and Indian confrontations that are the real trauma.

Druids and human remains

The contemporary Druidic movement is a modern religion with its origins in the 18th century, however based upon the ideas about the original western European druids of the Iron Age. A key principle found amongst many, though not all Druids, is ancestor veneration, and because of this many believe that they have a responsibility to care for the ancient dead. In 2006 Paul Davies requested that the Alexander Keiller Museum in Avebury, Wiltshire rebury their Neolithic human remains, and that storing and displaying them was "immoral and disrespectful". The National Trust refused to allow reburial, but did allow for Druids to perform a healing ritual in the museum.

Criticism has come of this view from the archaeological community, whose members have made statements like "no single modern ethnic group or cult should be allowed to appropriate our ancestors for their own agendas. It is for the international scientific community to curate such remains." A different argument proposed by archaeologists was that "Druids are not the only people who have feelings about human remains... We don't know much about the religious beliefs of these Prehistoric people, but know that they wanted to be remembered, their stories, mounds and monuments show this. Their families have long gone, taking all memory with them, and we archaeologists, by bringing them back into the world, are perhaps the nearest they have to kin. We care about them, spending our lives trying to turn their bones back into people... The more we know the better we can remember them. Reburying human remains destroys people and casts them into oblivion: this is at best, misguided, and at worse cruel."

Chapter 11

Post-processual archaeology

Post-processual archaeology, which is sometimes alternately referred to as the interpretative archaeologies by its adherents, is a movement in archaeological theory that emphasizes the subjectivity of archaeological interpretations. Despite having a vague series of similarities, post-processualism consists of "very diverse strands of thought coalesced into a loose cluster of traditions".Within the post-processualist movement, a wide variety of theoretical viewpoints have been embraced, including structuralism and Neo-Marxism, as have a variety of different archaeological techniques, such as phenomenology.

The post-processual movement originated in the United Kingdom during the late 1970s and early 1980s, pioneered by archaeologists such as Ian Hodder, Daniel Miller, Christopher Tilley and Peter Ucko, who were influenced by French Marxist anthropology, postmodernism and similar trends in sociocultural anthropology. Parallel developments soon followed in the United States. Initially post-processualism was primarily a reaction to and critique of processual archaeology, a paradigm developed in the 1960s by 'New Archaeologists' such as Lewis Binford, and which had become dominant in Anglophone archaeology by the 1970s. Post-processualism was heavily critical of a key tenet of processualism, namely its assertion that archaeological interpretations could, if the scientific method was applied, come to completely objective conclusions. Post-processualists also criticized previous archaeological work for overemphasizing materialist interpretations of the past and being ethically and politically irresponsible.

In the United States, archaeologists widely see post-processualism as an accompaniment to the processual movement, while in the United Kingdom, they remain largely thought of as separate and opposing theoretical movements. In other parts of the world, post-processualism has made less of an impact on archaeological thought. Various archaeologists have criticized post-processual archaeology, for a variety of reasons.

Approach to archaeology

Subjectivism

The post-processualists took an approach to archaeology that was diametrically opposed to that of the processualists. The processualists were positivists, and as such had believed that the scientific method should and could be applied to archaeological investigation, therefore allowing archaeologists to present objective statements about past societies based upon the evidence.

Post-processual archaeology however believed that this was incorrect, and instead emphasized that archaeology was subjective rather than objective, and that what truth could be ascertained from the archaeological record was often relative to the viewpoint of the archaeologist responsible for unearthing and presenting the data.As the archaeologist Matthew Johnson noted, "Postprocessualists suggest that we can never confront theory and data; instead, we see data through a cloud of theory."

Interpretation

Due to the fact that they believe archaeology to be inherently subjective, post-processualists argue that "all archaeologists... whether they overtly admit it or not", always impose their own views and bias into their interpretations of the archaeological data. In many cases, they hold that this bias is political in nature. Post-processualist Daniel Miller believed that the positivist approach of the processualists, in holding that only that which could be sensed, tested and predicted was valid, only sought to produce technical knowledge that facilitated the oppression of ordinary people by elites. In a similar criticism, Miller and Chris Tilley believed that by putting forward the concept that human societies were irresistibly shaped by external influences and pressures, archaeologists were tacitly accepting social injustice. Many processualists took this further and criticised the fact that archaeologists from wealthy, western countries were studying and writing the histories of poorer nations in the second and third worlds. Ian Hodder stated that archaeologists had no right to interpret the prehistories of other ethnic or cultural groups, and that instead they should simply provide individuals from these groups with the ability to construct their own views of the past. While Hodder's viewpoint was not universally accepted amongst post-processualists, there was enough support for opposing racism, colonialism and professional elitism within the discipline that in 1986 the World Archaeological Congress was established.

A number of post-processualists, such as Michael Shanks, Christopher Tilley and Peter Ucko, undermined "archaeology's claims to be an authoritative source of knowledge about the past", thereby "encouraging people to question and resist all forms of authority… This position was hailed by its supporters as democratizing archaeology and purging it… of elitist pretensions".

Understanding past societies

Materialism and idealism

Whereas the processualists had been firm materialists, and the culture-historical archaeologists had been idealists, the post-processualists argued that past societies should be interpreted through both materialist and idealist ideas. As Johnson noted, "Many post processualists claim that we should reject the whole opposition between material and ideal in the first place." Whilst recognising that past societies would have interpreted the world around them in a partially materialistic way, the post-processualists argue that many historic societies have also placed a great emphasis on ideology (which included religion) in both interpreting their world and influencing their behaviour. Examples of this can be seen in the work of B. Knapp, who examined how the social elite manipulated ideology to maintain their political and economic control, and of Mike Parker Pearson, who asserted that tools were just as much a product of ideology as were a crown or a law code.

Using an example to explain this belief in materialist-idealist unity, the archaeologist Matthew Johnson looked at the idea of landscape amongst past societies. He argued that:

On the one hand, a materialist view of landscape tends to stress how it may be seen in terms of a set of resources, for example for hunter-gatherers or early farming groups. This leads one to turn, for example, to optimal foraging theory and other economic models for an understanding of how people exploited the landscape 'rationally'. Postprocessualists like to argue that landscapes are always viewed in different ways by different peoples. They reject the 'rational' view of 'landscape-as-a-set-of-resources' as that of our own society and one that is ideologically loaded in its own way, loaded towards ideas of commodity and exploitation found in our own society. They suggest that ancient peoples would have had different views of what was 'real' in that landscape. On the other hand, an exclusively idealist view of landscape does not work either. Postprocessualists like to stress that such an understanding of landscape was not formed in the

abstract - that the way people moved around and used that landscape affected their understanding of it.

Structuralism

Many, although not all post-processualists have adhered to the theory of structuralism in understanding historical societies. Structuralism itself was a theory developed by the French anthropologist Claude Lévi-Strauss (1908–2009), and held to the idea that "cultural patterns need not be caused by anything outside themselves… and that underlying every culture was a deep structure, or essence, governed by its own laws, that people were unaware of but which ensured regularities in the cultural productions that emanate from it." At the centre of his structuralist theory, Lévi-Strauss held that "all human thought was governed by conceptual dichotomies, or bilateral oppositions, such as culture/nature, male/female, day/night, and life/death. He believed that the principle of oppositions was a universal characteristic inherent in the human brain, but that each culture was based on a unique selection of oppositions". This structuralist approach was first taken from anthropology and applied into forms of archaeology by the French archaeologist André Leroi-Gourhan (1911–1986), who used it to interpret prehistoric symbols in his 1964 work, Les Religions de Préhistoire.

Within the post-processual movement, Ian Hodder became "the leading exponent of a structuralist approach".In a 1984 article, he looked at the similarities between the houses and the tombs of Neolithic Europe, and used a structuralist approach as a basis for his ideas on their symbolism. He then went on, in his seminal book The Domestication of Europe (1990), to use structuralist ideas to come up with his theory that within Neolithic Europe, there was a dichotomy between field (agrios) and house (domus), with this duality being mediated by a boundary (foris).

Human agency

Sociologists Karl Marx and Anthony Giddens were influential figures in the development of post-processual ideas about human agency.

Post-processualists have also adopted beliefs regarding human agency, arguing that in other theoretical approaches to archaeology such as cultural-historical and processual, "the individual

is lost", and humans are therefore portrayed as "passive dupes who blindly follow social rules."Post-processualists instead argue that humans are free agents who in many cases act in their own interests rather than simply following societal rules, and by accepting these ideas, post-processualists argue that society is conflict-driven.

Influenced by the sociologist Anthony Giddens (1938-) and his structuration theory, many post-processualists accepted that most human beings, whilst knowing and understanding the rules of their society, choose to manipulate them rather than following them obediently. In turn, by bending the societal rules, these rules eventually change.

Other post-processualists have instead taken the view of sociologist Karl Marx (1818–1883) that class conflict was the force for this social change.In this manner they share similarities with Marxist archaeologists. A minority of post-processualists, such as Julian Thomas have however argued that human agency is not a useful aspect for looking at past societies, thereby accepting a culturally determinist position.

Marginalised archaeologies

Post-processualism places great emphasis on encouraging marginalised groups to interact with archaeology.

Gender archaeology

In the 1960s and 1970s, feminist archaeology emerged as adherents of the second wave feminist movement began to argue that women in the archaeological record had been ignored by archaeologists up until that time. According to archaeologist Sam Lucy, "The agendas of feminist archaeology and post-processualism highlighted the importance of social and political factors on supposedly 'objective' investigation".

Indigenous archaeology

Precedents

Although it would not be actually termed "post-processual archaeology" until 1985 (by one of its most prominent proponents, Ian Hodder), an archaeological alternative to processual archaeology had begun to develop during the 1970s. Some had already anticipated the theory's emergence,

with the social anthropologist Edmund Leach informing the assembled archaeologists at a 1971 discussion on the topic of "The Explanation of Culture Change" held at the University of Sheffield that cultural structuralism, which was then popular amongst social anthropologists, would soon make its way into the archaeological community.

Bruce Trigger, a Canadian archaeologist who produced a seminal study of archaeological theory, identified there as being three main influences upon post-processualism. The first of these was "the Marxist-inspired social anthropology that had developed in France during the 1960s and already had influenced British social anthropology." This, Trigger noted, "had its roots not in orthodox Marxism but in efforts to combine Marxism and structuralism by anthropologists such as Maurice Godelier, Emmanuel Terray, and Pierre-Phillipe Rey".The second main influence was postmodernism, which "emphasized the subjective nature of knowledge and embraced extreme relativism and idealism". Having originated amongst the disciplines of comparative literature, literary criticism and culture studies, postmodernist thinking had begun to develop within archaeology. The third influence identified by Trigger was the New cultural anthropology movement within the cultural anthropological discipline, which had arisen after the collapse of Boasian anthropology. The new cultural anthropologists "denounced studies of cultural evolution as being ethnocentric and intellectually and morally untenable in a multicultural, postcolonial environment."

Origins in Britain

Post-processual archaeology began in Britain during the late 1970s, spearheaded by a number of British archaeologists who had become interested in aspects of French Marxist anthropology. Most prominent among these was Ian Hodder (1948-), a former processualist who had made a name for himself for his economic analysis of spatial patterns and early development of simulation studies, particularly relating to trade, markets and urbanization in Iron Age and Roman Britain. Having been influenced by the "New Geography" and the work of the processualist David Clarke, as his research progressed, he became increasingly sceptical that such models and simulations actually tested or proved anything, coming to the conclusion that a particular pattern in the archaeological record could be produced by a number of different simulated processes, and that there was no way to accurately test which of these alternatives was correct. In effect, he came to believe that even using the processual approach to understanding

archaeological data, there were still many different ways that that data could be interpreted, and that therefore radically different conclusions could be put forward by different archaeologists, despite processualism's claim that using the scientific method it could gain objective fact from the archaeological record. As a result of this, Hodder grew increasingly critical of the processualist approach, developing an interest in how culture shaped human behaviour. He was supported in this new endeavour by many of his students, including Michael Spriggs.

In 1980 these early post-processualists held a conference at Cambridge University, from which a book was produced, entitled Symbolic and Structural Archaeology (1982), which was edited by Hodder himself and published by Cambridge University Press. In his introduction to the book, Hodder noted that:

During the early period of exploration and development of ideas, premature conference presentations and individual seminars were given by various members of the Cambridge group in other archaeological departments in England and abroad. Individual scholars who were invited to talk to us in Cambridge in that period often felt, understandably, obliged to maintain a distinct opposition. While it is certainly the case that these presentations had occurred before our views had even begun to settle down, and that they were excessively aggressive, they played an important role in the process of enquiry and reformulation. In particular, the contrasts which were set up by us and by outside scholars allowed the views of the seminar group, and the differences of viewpoint within the group, to be clarified. The opposition highlighted our own opinion but also threw the spotlight on the blind alleys down which there was a danger of straying. Our aggression resulted from the conviction that we were doing something new. This, too, was important. In the initial period there was a clear idea of what was wrong with existing approaches and there was a faith that something else could be done.

Bruce Trigger considered this book to be "a postprocessual showcase and counterpart to New Perspectives in Archaeology", the 1968 book written by American archaeologist Lewis Binford (1931-2011) that helped to launch the processual movement.

Development in the United States

Post-processual archaeology developed largely independently amongst the archaeological community in the United States. As such its primary influence was critical theory, as opposed to

the French Marxist anthropology which had been the primary influence upon their British counterparts. Many American archaeologists had begun to recognise issues of bias within the scientific community, and within the processual movement itself which attempted to be scientific. They also began to notice elements of ethnic prejudice within archaeology, particularly in regards to Native American peoples, who had commonly not had a chance to participate in their own heritage management up until the 1990s. Many American archaeologists also began to take note of a gender bias in the archaeological interpretation and in the discipline as a whole, as women had been largely marginalised. The 1980s saw archaeological studies finally being published that dealt with this issue, namely through Joan Gero's paper on "Gender bias in archaeology: a cross-cultural perspective" (1983) and Margaret Conkey and Janet Spector's paper on "Archaeology and the Study of Gender" (1984). Amongst the post-processualists, less emphasis was put on correcting class biases in the American archaeological record than had been put into studying gender and ethnic differences. Instead, it was mostly amongst historical archaeologists (those who study the archaeology of the historic, or literate period of the past), that such investigation into marginalised classes such as workers and slaves took place.

Criticism

As the archaeologists Colin Renfrew and Paul Bahn noted, "For its most severe critics, , while making a number of valid criticisms, simply developed some of the ideas and theoretical problems introduced by processualism. To these critics it brought in a variety of approaches from other disciplines, so that the term "postprocessual," while rather neatly echoing the epithet "postmodern" in literary studies, was a shade arrogant in presuming to supersede what it might quite properly claim to complement."

In their article "Processual Archaeology and the Radical Critique" (1987), Timothy K. Earle and Robert W. Preucel examined the post-processual movement's "radical critique" of processualism, and whilst accepting that it had some merit and highlighted some important points, they came to the conclusion that on the whole, the post-processual approach was flawed because it failed to produce an explicit methodology.

Descendant people

In the United States, examples such as the case of Kennewick Man have illustrated the tensions between Native Americans and archaeologists, which can be summarized as a conflict between a need to remain respectful toward sacred burial sites and the academic benefit from studying them. For years, American archaeologists dug on Indian burial grounds and other places considered sacred, removing artifacts and human remains to storage facilities for further study. In some cases human remains were not even thoroughly studied but instead archived rather than reburied. Furthermore, Western archaeologists' views of the past often differ from those of tribal peoples. The West views time as linear; for many natives, it is cyclic. From a Western perspective, the past is long-gone; from a native perspective, disturbing the past can have dire consequences in the present.

As a consequence of this, American Indians attempted to prevent archaeological excavation of sites inhabited by their ancestors, while American archaeologists believed that the advancement of scientific knowledge was a valid reason to continue their studies. This contradictory situation was addressed by the Native American Graves Protection and Repatriation Act (NAGPRA, 1990), which sought to reach a compromise by limiting the right of research institutions to possess human remains. Due in parts to the spirit of postprocessualism, some archaeologists have begun to actively enlist the assistance of indigenous peoples likely to be descended from those under study.

Archaeologists have also been obliged to re-examine what constitutes an archaeological site in view of what native peoples believe to constitute sacred space. To many native peoples, natural features such as lakes, mountains or even individual trees have cultural significance. Australian archaeologists especially have explored this issue and attempted to survey these sites to give them some protection from being developed. Such work requires close links and trust between archaeologists and the people they are trying to help and at the same time study.

While this cooperation presents a new set of challenges and hurdles to fieldwork, it has benefits for all parties involved. Tribal elders cooperating with archaeologists can prevent the excavation of areas of sites that they consider sacred, while the archaeologists gain the elders' aid in

interpreting their finds. There have also been active efforts to recruit aboriginal peoples directly into the archaeological profession.

Chapter 12

Underwater Archaeology

Underwater archaeology is archaeology practiced underwater. As with all other branches of archaeology it evolved from its roots in pre-history and in the classical era to include sites from the historical and industrial eras. Its acceptance has been a relatively late development due to the difficulties of accessing and working underwater sites, and because the application of archaeology to underwater sites initially emerged from the skills and tools developed by shipwreck salvagers. As a result underwater archaeology initially struggled to establish itself as bona fide archaeological research. The situation changed when universities began teaching the subject and when a theoretical and practical base for the sub-discipline was firmly established. Underwater Archaeology now has a number of branches including, after it became broadly accepted in the late 1980s maritime archaeology: the scientifically based study of past human life, behaviours and cultures and their activities in, on, around and (lately) under the sea, estuaries and rivers. This is most often effected using the physical remains found in, around or under salt or fresh water or buried beneath water-logged sediment. In recent years the study of submerged WWII sites and of submerged aircraft in the form of underwater aviation archaeology have also emerged as bona fide activity.

Though often mistaken as such, underwater archaeology is not restricted to the study of shipwrecks. Changes in sea-level, because of local seismic events, such as the earthquakes that devastated Port Royal and Alexandria, or more widespread climatic or changes on a continental scale mean that some sites of human occupation that were once on dry land are now submerged. At the end of the last ice age the North Sea was a great plain, and anthropological material, as well as the remains of animals such as mammoths are sometimes recovered by trawlers. Also, because human societies have always made use of water, sometimes the remains of structures that these societies built underwater still exist (such as the foundations of crannogs, bridges and harbours) when traces on dry land have been lost. As a result, underwater archaeological sites can include a vast range including: submerged indigenous sites and places where people once lived or visited, that have been subsequently covered by water due to rising sea levels; wells, cenotes, wrecks (shipwrecks; aircraft); the remains of structures created in water (such as

crannogs, bridges or harbours); other port-related structures; refuse or debris sites where people disposed of their waste, garbage and other items such as ships, aircraft, munitions and machinery, by dumping into the water.

Underwater archaeology is often complementary to archaeological research on terrestrial sites because often the two are linked by many and various elements including geographic, social, political, economic and other considerations. As a result a study of an archaeological landscape can involve a multidisciplinary approach requiring the inclusion of many specialists from a variety of disciplines including prehistory, historical archaeology, maritime archaeology, anthropology. There are many examples. One is the wreck of the VOC ship Zuytdorp lost in 1711 on the coast of Western Australia and where there remains considerable speculation that some of the crew survived and after establishing themselves on shore intermixed with Indigenous tribes from the area.The archaeological signature at this site also now extends into the interaction between indigenous people and the European pastoralists who entered the area in the mid 19th century.

Research Potential

There are many reasons why underwater archaeology can make a significant contribution to our knowledge of the past. In the shipwreck field alone individual shipwrecks can be of significant historical importance either because of the magnitude of loss of life (such as the Titanic), or circumstances of loss (Housatonic was the first vessel in history sunk by an enemy submarine).[11][12] Shipwrecks, such as Mary Rose, can also be important for archaeology because they can form a kind of accidental time capsule, preserving an assemblage of human artifacts at the moment in time when the ship was lost.[13][14]

Sometimes it is not the wrecking of the ship that is important, but the fact that we have access to the remains of it, especially where the vessel was of major importance and significance in the history of science and engineering (or warfare), due to being the first of its type of vessel. The development of submarines, for example, can be traced via underwater archaeological research, via the Hunley which was the first submarine to sink an enemy ship (Hunley also had unique construction details not found in previous vessels and was one of the only historic warships ever

raised intact),[12] the Resurgam II, the first powered submarine,and Holland 5, which provides insight into the development of submarines in the British Navy.

UNESCO Convention

All traces of human existence underwater which are one hundred years old or more are protected by the UNESCO Convention on the Protection of the Underwater Cultural Heritage. This convention aims at preventing the destruction or loss of historic and cultural information and looting. It helps states parties to protect their underwater cultural heritage with an international legal framework.

Challenges

Underwater sites are inevitably difficult to access, and more hazardous, compared with working on dry land. In order to access the site directly, diving equipment and diving skills are necessary. The depths that can be accessed by divers, and the length of time available at depths, are limited. For deep sites beyond the reach of divers, submarines or remote sensing equipment are needed.

For a marine site, while some form of working platform (typically a boat or ship) is often needed, shore-based activities are common. Notwithstanding, underwater archaeology is a field plagued by logistics problems. A working platform for underwater archeology needs to be equipped to provide for the delivery of air for example, recompression and medical facilities, or specialist remote sensing equipment, analysis of archaeological results, support for activities being undertaken in the water, storage of supplies, facilities for conservation for any items recovered from the water, as well as accommodation for workers. Equipment used for archaeological investigation, including water dredge and air lifts create additional hazards and logistics issues. Moreover, marine sites may be subject to strong tidal flows or poor weather which mean that the site is only accessible for a limited amount of time. Some marine creatures also pose a threat to diver safety.

Underwater sites are often dynamic, that is they are subject to movement by currents, surf, storm damage or tidal flows. Structures may be unexpectedly uncovered, or buried beneath sediments. Over time, exposed structures will be eroded, broken up and scattered. The dynamic nature of the environment may make in-situ conservation infeasible, especially as exposed organics, such as

the wood of a shipwreck, are likely to be consumed by marine organisms such as piddocks. In addition, underwater sites can be chemically active, with the result that iron can be leached from metal structures to form concretions. The original metal will then be left in a fragile state. Artifacts recovered from underwater sites need special care.

Visibility may be poor, because of sediments or algae in the water and lack of light penetration. This means that survey techniques that work well on land (such as triangulation), generally cannot be used effectively under water.

In addition it can be difficult to allow access to the results of the archaeological research as underwater sites do not provide good outreach possibilities or access for the general public. Work has been done to bridge this difficulty with the advent of the WWW and direct streaming of projects. Another example is the excavation of the Queen Anne's Revenge.

Techniques

Although specialised techniques and tools have been developed to address the challenges of working under water, the archaeological goals and process are essentially the same as in any other context. Investigating an underwater site however, is likely to take longer and be more costly than an equivalent terrestrial one.

An important aspect of project design is likely to be managing the logistics of operating from a boat and of managing diving operations. The depth of water over the site, and whether access is constrained by tides, currents and adverse weather conditions will create substantial constraints on the techniques that can feasibly be used and the amount of investigation that can be carried out for a given cost or in a set timescale. Many of the most carefully investigated sites, including the Mary Rose have relied substantially on avocational archaeologists working over a considerable period of time.

As with archaeology on land, some techniques are essentially manual, using simple equipment (generally relying on the efforts of one or more scuba divers), while others use advanced technology and more complex logistics (for example requiring a large support vessel, with equipment handling cranes, underwater communication and computer visualisation).

Position fixing

Knowing the location of an archaeological site is fundamental to being able to study it. In the open sea there are no landmarks, so position fixing is generally achieved using GPS. Historically, sites within sight of the shore would have been located using transects. A site may also be located by visually surveying some form of marker (such as a buoy) from two known (mapped) points on land. The depth of water at a site can be determined from charts or by using the depth sounding sonar equipment that is standard equipment on ships. Such sonar can often be used to locate an upstanding structure, such as a shipwreck, once GPS has placed the research vessel in approximately the right location.

Site survey

The type of survey required depends on the information that is needed to resolve archaeological questions, but most sites will need at least some form of topographical survey and a site plan showing the locations of artifacts and other archaeological material, where samples were taken and where different types of archaeological investigation were carried out.

Environmental assessment of archaeological sites will also require that environmental conditions (water chemistry, dynamic properties) as well as the natural organisms present on the site are recorded. For shipwrecks, particularly post-industrial age shipwrecks, pollution threats from wreck material may need to be investigated and recorded.

The simplest approach to survey is to carry out three dimensional surveying by divers using depth gauges and tape measurements.Research shows that such measurements are typically less accurate than similar surveys on land. Where it is not practical or safe for divers to physically visit a site, Remotely Operated Vehicles (ROVs) enable observation and intervention with control by personnel located at the surface.

The low technology approach of measuring using tape measures and depth gauges can be replaced with a more accurate and quicker high technology approach using acoustic positioning.

Remote sensing or Marine Geophysics is generally carried out using equipment towed from a vessel on the surface and therefore does not require any one, or any equipment to actually penetrate to the full depth of the site. Sensitive sonar, especially side-scan sonar or multi-beam sonar may be used to image an underwater site. Magnetometry can be used to locate metal

remains such as metal shipwrecks, anchors and cannon. Sub-bottom profiling utilizes sonar to detect structures buried beneath sediment.

Recording

LAMP archaeologist recording a scaled drawing of the ship's bell discovered on the late 18th century "Storm Wreck" off St. Augustine, Florida

A variety of techniques are available to divers to record findings underwater. Scale drawing is the basic tool of archaeology and can be undertaken underwater. Pencils will write underwater on permatrace, plastic dive slates, or matt laminated paper.

Photography is the mainstay of recording, and with the advent of digital cameras is cheap and convenient. For underwater use, cameras, including video cameras can be provided with special housings that enables them to be used underwater. Low visibility underwater and distortion of image due to refraction mean that perspective photographs can be difficult to obtain. However, it is possible to take a series of photographs at adjacent points and then combined into a single photomontage or photomosaic image of the whole site.

Excavation

Where intrusive underwater excavation is appropriate, silts and sediments can be removed from an area of investigation using a water dredge or airlift. When used correctly, these devices have an additional benefit in tending to improve the visibility in the immediate vicinity of the investigation. It is also important to note that for very deep sea excavation submarines are sometimes used to view sites. Underwater photography can also be conducted from these submarines which assists the recording process.

Archaeological science

A variety of archaeological sciences are used in underwater archaeology. Dendrochronology is an important technique especially for dating the timbers of wooden ships. It may also provide additional information, including the area where the timber was harvested (i.e. likely to be where the ship was built) and whether or not there are later repairs or reuse of salvaged materials. Because plant and animal material can be preserved underwater, archaeobotany and

archaeozoology have roles in underwater archaeology. For example, for submerged terrestrial sites or inland water, identification of pollen samples from sedimentary or silt layers can provide information on the plants growing on surrounding land and hence on the nature of the landscape. Information about metal artifacts can be obtained through X-ray of concretions. Geology can provide insight into how the site evolved, including changes in sea-level, erosion by rivers and deposition by rivers or in the sea.

Artifact recovery and conservation

Artifacts recovered from underwater sites need stabilization to manage the process of removal of water and conservation. The artifact either needs to be dried carefully, or the water replaced with some inert medium (as in the case of The Mary Rose). Artifacts recovered from salt water, particularly metals and glass need be stabilized following absorption of salt or leaching of metals. In-situ conservation of underwater structures is possible, but consideration needs to be given to the dynamic nature of the site. Changes to the site during intrusive investigation or removal of artifacts may result in scouring which exposes the site to further deterioration.

Interpretation and presentation of underwater archaeology

Diver trails also called wreck trails can be used to allow scuba-divers to visit and understand archaeological sites that are suitable for scuba-diving [31] Otherwise presentation will typically rely on publication (book or journal articles, web-sites and electronic media such as CD-ROM). Television programmes can attempt to provide an understanding of underwater archaeology to a broad audience.

Publications

Publication is an essential part of the archaeological process and is particularly crucial for underwater archaeology, where sites are generally not accessible and it is often the case that sites are not preserved in-situ.

The specialist journals on maritime archaeology, which include the long established International Journal of Nautical Archaeology, The Bulletin of The Australasian Institute for Maritime Archaeology (AIMA) and the recently launched Journal of Maritime Archaeology publish articles about maritime archaeological research and under water archaeology. However, research

on underwater sites can also be published in mainstream archaeological journals, or thematic archaeological journals. Some institutions also make their unpublished reports, often called 'Grey Literature', accessible thereby allowing access to far more detail and a wider range of archaeological data than is otherwise the case with books and journals. An example is the works of the Department of Maritime Archaeology at the Western Australian Museum.

The public interest market is covered by a number of diving, shipwreck and underwater archaeology books, beginning with the works of Jacques Cousteau.

The techniques of underwater archaeology are also documented in published works, including a number of handbooks, and Muckelroy's classic work on Maritime Archaeology.

Bibliography

1. ^ Society for American Archaeology, retrieved 2011-01-15
2. ^ Jump up to: a b Renfrew and Bahn (2004 [1991]:13)
3. Jump up ^ Haviland et al. 2010, p. 7,14
4. Jump up ^ McPherron, S. P., Z. Alemseged, C. W. Marean, J. G. Wynn, D. Reed, D. Geraads, R. Bobe, and H. A. Bearat. 2010. Evidence for stone-tool-assisted consumption of animal tissues before 3.39 million years ago at Dikika, Ethiopia. Nature 466:857-860
5. Jump up ^ Wylie, Alison (2002), Thinking from things: essays in the philosophy of archaeology, Berkeley: University of California Press, p. 31, ISBN 0-520-22361-6
6. Jump up ^ Aldenderfer and Maschner (1996)
7. Jump up ^ Gladfelter (1977)
8. Jump up ^ Watters (1992)
9. Jump up ^ Watters (2000)
10. Jump up ^ The History of the Science of Archaeology
11. Jump up ^ Hunter, Michael (1975). John Aubrey and the Realm of Learning. London: Duckworth. pp. pp.156–7, 162–6, 181. ISBN 0-7156-0818-5.
12. Jump up ^ Dorothy King, The Elgin Marbles (Hutchinson, January 2006)
13. Jump up ^ Everill, P. 2010. The Parkers of Heytesbury: Archaeological pioneers. Antiquaries Journal 90: 441-53
14. Jump up ^ Everill, P. 2009. Invisible Pioneers. British Archaeology 108: 40-43

15. Jump up ^ Bowden, Mark (1984) General Pitt Rivers: The father of scientific archaeology. Salisbury and South Wiltshire Museum. ISBN 0-947535-00-4.

16. Jump up ^ Hicks, Dan (2013). "Characterizing the World Archaeology Collections of the Pitt Rivers Museum". In Hicks, Dan; Stevenson, Alice. World Archaeology at the Pitt Rivers Museum: a characterization (Oxford: Archaeopress).

17. Jump up ^ "Sir William Flinders Petrie". Palestine Exploration Fund. 2000. Retrieved 2007-11-19.

18. Jump up ^ Kenneth W. Harl. "Great Ancient Civilizations of Asia Minor". Retrieved November 23, 2012.

19. Jump up ^ MacGillivray, Joseph Alexander (2000). Minotaur: Sir Arthur Evans and the Archaeology of the Minoan Myth. New York: Hill and Wang (Farrar, Straus and Giroux).

20. Jump up ^ Renfrew and Bahn (2004 [1991]:33-35)

21. Jump up ^ "Kevin Greene - "Archaeology: an Introduction"". Staff.ncl.ac.uk. Retrieved 2010-08-12.

22. Jump up ^ Schiffer, M. B. 1972. Archaeological Context and Systemic Context. American Antiquity 37: 156-165

23. ^ Jump up to: a b c Trigger (1989)

24. Jump up ^ Binford (1962)

25. Jump up ^ Flannery (1967)

26. Jump up ^ Shanks and Tilley (1987)

27. Jump up ^ Shanks and Tilley (1988)

28. Jump up ^ Shanks (1991)

29. Jump up ^ Shanks (1993)

30. Jump up ^ Tilley (1993)

31. Jump up ^ Miller and Tilley1984

32. Jump up ^ Miller et al. (1989)

33. Jump up ^ Hodder (1982)

34. Jump up ^ Hodder (1985)

35. Jump up ^ Hodder (1987)

36. Jump up ^ Hodder (1990)

37. Jump up ^ Hodder (1991)

38. Jump up ^ Hodder (1992)

39. Jump up ^ Pauketat, Timothy R. (2001)

40. Jump up ^ Renfrew and Bahn (2004 [1991]:75)

41. Jump up ^ Remote sensing for archaeology

42. Jump up ^ Willey (1953)

43. Jump up ^ Willey (1968)

44. Jump up ^ Billman and Feinman (1999)

45. Jump up ^ Redman (1974)

46. Jump up ^ "Kite Aerial Photography". Retrieved 2012-12-02.

47. Jump up ^ Reeves, D. (1936). Aerial photography and archaeology. American Antiquity, 2(2), 102-107. Retrieved from: http://www.jstor.org/stable/275881

48. Jump up ^ Hall, E. T. (1970). Survey techniques in underwater archaeology. Philosophical Transactions of the Royal Society of London. Series A, Mathematical and Physical Sciences, 269(1193), 121-124. Retrieved from http://www.jstor.org/stable/73925

49. ^ Jump up to: a b c d e Michael Bawaya, "Virtual Archaeologists Recreate Parts of Ancient Worlds", Science, 8 January 2010, vol. 327, p. 140.

50. Jump up ^ Gould (1971a)

51. Jump up ^ Gould (1971b)

52. Jump up ^ Yellen (1972)

53. Jump up ^ Yellen (1977)

54. Jump up ^ Gould and Yellen 1987

55. Jump up ^ Yellen (1991)

56. Jump up ^ Sillet et al. (2006)

57. Jump up ^ Schott and Sillitoe (2005)

58. Jump up ^ Ogundele (2005)

59. Jump up ^ Kuznar (2001)

60. Jump up ^ Ashcer (1961) as cited in Wylie (1985)

61. Jump up ^ Ascher (1961)

62. Jump up ^ Saraydar and Shimada (1971)

63. Jump up ^ Saraydar and Shimada (1973)

64. Jump up ^ Gifford-Gonzalez (1985)

65. Jump up ^ Frison (1989)

66. Jump up ^ Glascock et al. 1994

67. Jump up ^ Hacıgüzeller, Piraye (2012), "GIS, critique, representation and beyond", Journal of Social Archaeology 12 (2): 245–263, doi:10.1177/1469605312439139

68. Jump up ^ Saiano, F. and Scalenghe, R. (2009), "An anthropic soil transformation fingerprinted by REY patterns", Journal of Archaeological Science 36 (11): 2502–2506, doi:10.1016/j.jas.2009.06.025

69. Jump up ^ MIT Archaeological Materials and CMRAE Mission Statement[dead link]

70. Jump up ^ The University of Exeter - SoGAER - Department of Archaeology, Sogaer.ex.ac.uk, 2008-10-28, retrieved 2009-05-05

71. Jump up ^ "Planning Policy Guidance 16: Archaeology and planning - Planning, building and the environment - Communities and Local Government". Web.archive.org. Archived from the original on 2008-02-12. Retrieved 2009-07-25.

72. Jump up ^ Department for Culture Media and Sport (2009-04-28), Department for Culture Media and Sport - historic environment, Culture.gov.uk, archived from the original on 21 May 2009, retrieved 2009-05-05

73. Jump up ^ English Heritage - Stonehenge & the History of England: English Heritage, English Heritage, archived from the original on 30 April 2009, retrieved 2009-05-05

74. Jump up ^ Historic Scotland, Historic Scotland, archived from the original on 26 April 2009, retrieved 2009-05-05

75. Jump up ^ Cadw, Cadw.wales.gov.uk, archived from the original on 29 April 2009, retrieved 2009-05-05

76. Jump up ^ Built Environment, Ehsni.gov.uk, archived from the original on 2007-12-25, retrieved 2009-05-05

77. Jump up ^ Flannery (1982)

78. ^ Jump up to: a b c McGeough, Kevin (2006), "Heroes, Mummies, and Treasure: Near Eastern Archaeology in the Movies", Near Eastern Archaeology 69: 174–185

79. Jump up ^ "Romancing the Past-Archaeology". Denison University. Retrieved 2011-01-11.

80. Jump up ^ "Indiana Jones Inspires Fans". ABC News. Retrieved 2011-01-11.

81. Jump up ^ Strong, Meghan (2007-04-19), The Indiana Jones Effect, Lycoming College, p. 40

82. Jump up ^ "Denning 2004, Internet Archaeology 15". Intarch.ac.uk. 2004-01-28. Retrieved 2010-08-12.

83. Jump up ^ Anthropological Studies Center (ASC), Sonoma.edu, archived from the original on 28 March 2009, retrieved 2009-05-05

84. Jump up ^ "^ "Rapid City Journal" Published Online: 14 Nov 2008". Rapidcityjournal.com. 2008-11-14. Retrieved 2010-08-12.

85. Jump up ^ The Archaeological Legacy Institute (ALI). "The Archaeology Channel and About Us: Archaeological Legacy Institute". ArchaeologyChannel.org. Retrieved 29 December 2011.

86. Jump up ^ Time Life Lost Civilizations series: Ramses II: Magnificence on the Nile (1993)

87. Jump up ^ Sheets (1973)

88. Jump up ^ Hodge (1937)

89. Jump up ^ Munson et al. (1995)

90. Jump up ^ Canadian Geographic Online

EIILM UNIVERSITY

SIKKIM

Jorethang, District Namchi, Sikkim- 737121, India
www.eiilmuniversity.ac.in