ARCHAEOLOGY AND THE METHODOLOGY OF SCIENCE pdf

1: Chapter 2: The Science of Archaeology

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Dating refers to the archaeological tool to date artefacts and sites, and to properly construct history. All methods can be classified into two basic categories: Based on a discipline of geology called stratigraphy, rock layers are used to decipher the sequence of historical geological events. Relative techniques can determine the sequence of events but not the precise date of an event, making these methods unreliable. These methods are based on calculating the date of artefacts in a more precise way using different attributes of materials. This method includes carbon dating and thermoluminescence. The first method was based on radioactive elements whose property of decay occurs at a constant rate, known as the half-life of the isotope. Today, many different radioactive elements have been used, but the most famous absolute dating method is radiocarbon dating, which uses the isotope 14C. This isotope, which can be found in organic materials and can be used only to date organic materials, has been incorrectly used by many to make dating assumptions for non-organic material such as stone buildings. The half-life of 14C is approximately years, which is too short for this method to be used to date material millions of years old. The isotope of Potassium, which has a half-life of 1. Another absolute dating method is thermoluminescence, which dates the last time an item was heated. It is the only method that can be used to date rocks, pottery and minerals for dates that are approximately between to 10, years old. This method is based on the fact that when a material is heated or exposed to sunlight, electrons are released and some of them are trapped inside the item. This process frees energy in the form of light, which can be measured. By making multiple measurements you need at least two for a date estimate we can find out how much radiation the item was exposed to over the years and can get dating estimates related to when the item was last heated. This method has the following restrictions: This method is usually used with carbon dating. All of the current dating methods are going through refinement. Archaeologists are seeking an accurate dating technique, but this method is yet to be found. Here we come to the question of how accurate the dates are that we currently have regarding the history of the human race and our planet. Even though more than one method of verification is used in most cases, the lack of an accurate method to date non-organic materials lends a certain degree of uncertainty to the accepted history of our planet. It is also important not to forget that throughout the history of humankind any discovery that shakes the status quo is always under attack until it becomes established, and we are in an era where many of the things that we once considered certain will become errors of our past.

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2: The science of Archaeology â€“ Intro to Archaeology

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Archaeology is undeniably multi-faceted. Scholars in this field employ laboratory-based physical, chemical, and biological analyses, alongside those derived from art-history, and other arts subjects. To some scholars, such as Lewis Binford, a leading American archaeologist, this discipline is certainly a science, despite the overlap with arts techniques. Yet another view is that archaeology is unclassifiable, a position taken in a recent New Scientist article by Sue Anderson. She suggests this is because of the wide range of techniques employed within it. This debate has raged long, and has been hard fought, in twentieth century archaeology. That it has continued for such a long time, with such vigour, seems to show that this is an important issue to archaeologists. The reasons for its importance are complex, but include questions of research direction, methodology, disciplinary identity, prestige and, of course, as Anderson points out, funding. Why does it matter whether archaeology is classified as an art, a science, or something different? A simple answer is that the procedure of archaeology, upon which its findings depend, is a product of its self-image. This is because what is considered admissible as evidence, method, and reasoning and the scope and purpose of archaeology that lead to specific questions being examined is a reflection of what archaeologists believe that they are doing. This derives from the emergence of a school of thought proposing that the subject can only proceed in an entirely subjective way, its interpretations untestable. This is in drastic contrast to the mainstream of modern archaeological thought, as it has developed since the s, stressing its scientific character. Consequently, not only is the character of this discipline an interesting philosophical question, but it is an important current issue in both the philosophy and practice of contemporary archaeology. This question is capable of being approached in two principal ways: The dividing line between arts and sciences in philosophical terms has been a matter of much debate. It is obviously inappropriate to reiterate or add to this here. A broad and, I hope, generally acceptable view of the contrast between arts and sciences is that sciences are those subjects in which the relative plausibility of rival hypotheses is capable of evaluation by some form of testing, and arts those in which subjective assessments are made. One might go further and claim that all science must be based upon mathematical principles, whereas in arts subjects this is not so. By such broad definitions, archaeology is, of necessity, a scientific discipline. Data are compared numerically, or in terms of numbers of shared traits, or patterns, all methods ultimately reducible to mathematical terms. Modern archaeological excavation itself constantly uses such methods to evaluate the date and meaning of both artifacts and structures. In this definition archaeology lies separate from literature, in that no mathematical evaluations are commonly used in the assessment of importance or meaning in this subject, except, perhaps, in poetical metrics and grammar. Using the comparative approach one may observe that archaeological practice, like that of all science, but not that of all arts subjects, involves the systematic collection of information in as objective or, at least, as comparable a way as possible. This is usually followed by analysis according to the logical frameworks outlined above. These data, and the results of analysis, are then, properly, disseminated for others to employ. The latter characteristic is shared with all academic disciplines; the former two principally belong to the sciences. Archaeological practice defined in this way thus indicates far greater correlation with the sciences especially perhaps with ecology and geology than with the arts. Even archaeological drawing is primarily conducted as part of systematic recording, seeking objectivity, or as part of the analysis of shared traits, or patterns, as mentioned above. Archaeology then, shares both a theoretical base, and much of its practice, with science but does contain arts elements within that practice. This is not unique among scientific disciplines: Archaeology is on these grounds a science, and even if its conclusions are often incapable of mathematical proof, then this is not unique among the sciences. How many of the conclusions of social psychology or ecology have been categorically proved in mathematical terms? If archaeology is a science, is it a social science? This is a harder question, not least because there seems some dissent over what in theory, rather than in practice, a social science is. That is, a science which has as its main goal the understanding of human

society; this would include, for example, politics and sociology. Archaeology would not by this definition be a social science, because, although much of archaeology does aim to understand past human society, there are many archaeologists, such as environmental archaeologists, specialists on ancient technology, and on survey techniques for example, geophysical survey , whose work is both in theory and practice not always primarily aimed at examining human society. That is not to say that specialists in these areas are uninterested in social questions, but that social issues do not form the central theme of all research in these fields. Again archaeology is in a similar position to ecology, which can include studies of society, but need not do so. Consequently, there would seem a strong case for the classification of archaeology as a science in the same sense as ecology. Although archaeology may include arts or social science aspects it is not unique in this among the sciences. Therefore, a scientific procedure seems not only more appropriate to research in this subject, but more concordant with how that research is in practice conducted.

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3: Archaeology - Wikipedia

Abstract The one book every graduate student in archaeology should read to understand how archaeology can be scientific - the one book collaboratively written by an experienced, intelligent archaeologist (Kelley) and a mature, respected philosopher of science (Hanen), both authors seasoned teachers who can distance themselves from the' fads and personalized controversies of their respective.

Thursday, February 11, Science, social science, and archaeology: Where do we stand? My views will target the archaeology of complex societies, both because that is my domain and I know it well, and because most of the anti-science rhetoric and practice seem to be in this domain. My reading of the literature of scientific methods and the philosophy of science, coupled with my experience in archaeology and transdisciplinary projects, lead me to the following definition of science: Science is a method to gather accurate knowledge about the natural and social world: It gives primacy to reason and observation. Science has a critical spirit: Constant testing of claims through observation and experiment; Findings are always tentative, incomplete, and open to challenge. It consists of an interconnected network of diverse evidence and theory; Its content and findings are judged by communities of scientists. I developed this definition after close consultation with these and other sources: For a similar succinct way of framing this kind definition, John Gerring There are differences of opinion over whether, or to what extent, science lives up to these high ideals. Even so, these are the ideals to which natural and social scientists generally aspire, and they help to define the enterprise in a general way and to demarcate it from other realms. Science and Psuedoscience in Archaeology Feder Please note that there is nothing in these definitions about experiments or laws. Hempel is nowhere to be seen. This definition does not coincide with the way the New Archaeologists viewed science Watson et al. I think their faulty views of science and explanation caused great harm to archaeology. Nor does my approach coincide well with the various traits that Matthew Johnson Please note also that this definition is about epistemology, not about methods narrowly defined. What is social science? For most of my career, before moving to ASU in , I had no idea that the social sciences had any relevance to archeology. Apart from the contentious issue of the relevance of cultural anthropology to archaeology my views on this issue are here: Smith b , the notion that sociology or political science or economics might be useful to me was foreign, not even on my radar. The notion that there might be a body of methodological and theoretical work that is extremely relevant to archaeology far more so than just about anything in cultural anthropology did not even cross my mind. After moving to ASU, I realized that ancient and modern cities could be compared and analyzed in common frames of reference; I discovered transdisciplinary research; and I discovered an epistemological literature in the social sciences that fit rather precisely with my own views of how to pursue scholarship. One way to highlight what is distinctive about the social sciences is to contrast them with the natural sciences on one hand, and the humanities on the other. The former are often said to focus on instrumental knowledge, and the latter on reflexive knowledge. As described by sociologist Michael Burawoy, this leaves the social sciences in the middle: Here is a chart, abstracted from a longer table from Jerone Kagan While this is obviously a greatly simplified scheme, it does indicate nicely the position of the social sciences between the natural sciences and the humanities. Half a century ago, C. Snow could describe scholarship as a choice between two cultures: But archaeologists have been slow to get the news. What are the major goals of social science research? As archaeologists, do we do these things? Identifying general patterns and relationships Testing and refining theories Interpreting culturally or historically significant phenomena Exploring diversity Giving voice Advancing new theories My work mostly concerns points 1, 2, 4, and 5, but there is an element of all of these goals in what I do. I would guess that this scheme could be used to organize the nature of social research by archaeologists. Ragin and Amoroso use this scheme to organize their textbook. Speaking of Christopher Tilley In its extreme formâ€”once quite common in social science but not unfashionableâ€”a whole civilization, society, or culture undergoes a life of its own. I think this list covers most of the terrain of archaeology. I can fit my views into this scheme, and it helps me make sense of why I find the work of some writers attractive and others less so. Social science epistemology Then Tilly Identification of individual or group dispositions

just before a point of action. I can find my personal logics of explanation here. But much of archaeology today cannot be incorporated into this scheme. Where would materiality, actor-network theory, or structuration be accommodated? These latter abstract, philosophical theoretical frameworks cannot be accommodated into the standard social science epistemologies because they pertain more to the humanities than to the social sciences. I use this as the organizing principle for my paper on arguments in archaeology Smith This question, which is basic to many domains of scholarship, derives from the second point of my definition of science at the top. Perspectives like materiality or practice theory or the social production of space cannot be disproven. They are so abstract that they cannot be tested and confirmed or rejected Smith a , They are more appropriately considered as part of the humanities than as part of the social sciences. This does not make them useless or bad; it just means that they have little role to play in developing causal models of past societies, or in understanding the hows or whys of specific social trajectories of past societies, or in relating archaeological findings to work in other disciplines on the major social problems of today. If this does not sound right to you, I suggest reading some social-science epistemology. This is pretty basic stuff although I must admit that I was ignorant of these ideas and sources until about eight years ago. I recommend a number of relevant sources in my two papers just cited. Or here are a few suggestions: So, why is it important to strive for a more scientific archaeology? See my next post, coming soon.

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4: Archaeological science - Wikipedia

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Practitioners of archaeology find themselves allied oftenâ€¦ History of archaeology No doubt there have always been people who were interested in the material remains of the past, but archaeology as a discipline has its earliest origins in 15th- and 16th-century Europe , when the Renaissance Humanists looked back upon the glories of Greece and Rome. Popes, cardinals, and noblemen in Italy in the 16th century began to collect antiquities and to sponsor excavations to find more works of ancient art. These collectors were imitated by others in northern Europe who were similarly interested in antique culture. All this activity, however, was still not archaeology in the strict sense. It was more like what would be called art collecting today. The Mediterranean and the Middle East Archaeology proper began with an interest in the Greeks and Romans and first developed in 18th-century Italy with the excavations of the Roman cities of Pompeii and Herculaneum. Classical archaeology was established on a more scientific basis by the work of Heinrich Schliemann , who investigated the origins of Greek civilization at Troy and Mycenae in the s; of M. Conze was the first person to include photographs in the publication of his report. Schliemann had intended to dig in Crete but did not do so, and it was left to Arthur Evans to begin work at Knossos in and to discover the Minoan civilization , ancestor of classical Greece. He brought with him scholars who set to work recording the archaeological remains of the country. This decipherment, which enabled scholars to read the numerous writings left by the Egyptians, was the first great step forward in Egyptian archaeology. The demand for Egyptian antiquities led to organized tomb robbing by men such as Giovanni Battista Belzoni. A new era in systematic and controlled archaeological research began with the Frenchman Auguste Mariette , who also founded the Egyptian Museum at Cairo. The British archaeologist Flinders Petrie , who began work in Egypt in , made great discoveries there and in Palestine during his long lifetime. Petrie developed a systematic method of excavation, the principles of which he summarized in Methods and Aims in Archaeology It was left to Howard Carter and Lord Carnarvon to make the most spectacular discovery in Egyptian archaeology, that of the tomb of Tutankhamen in In Henry Creswicke Rawlinson became the first man to decipher the Mesopotamian cuneiform writing. Toward the end of the 19th century, systematic excavation revealed a previously unknown people, the Sumerians, who had lived in Mesopotamia before the Babylonians and Assyrians. First steps to archaeology The development of scientific archaeology in 19th-century Europe from the antiquarianism and treasure collecting of the previous three centuries was due to three things: Geology was revolutionized in the early 19th century with the discovery and demonstration of the principles of uniformitarian stratigraphy which determines the age of fossil remains by the stratum they occupy below the earth by men like William Smith , Georges Cuvier , and Charles Lyell. Lyell, in his Principles of Geology â€”33 , popularized this new system and paved the way for the acceptance of the great antiquity of man. Early stone tools had been identified in Europe since midth century. Thomsen classified the material in the Copenhagen Museum, opened to the public in , on the basis of three successive ages of Stone , Bronze , and Iron. His pupil and successor, J. Worsaae , showed the correctness of this museum arrangement by observed stratigraphy in the Danish peat bogs and barrows funerary mounds. Low lake levels in Switzerland in the mids permitted the excavation of the prehistoric Swiss lake dwellings, and here again the theory of a succession of technological stages was confirmed. In the last quarter of the 19th century remarkable Paleolithic discoveries were made in France and Spain ; these included the discovery and authentication of actual works of sculpture and cave paintings from the Upper later Paleolithic Period c. When Marcellino de Sautuola discovered the cave paintings at Altamira , Spain â€”80 , most experts refused to believe they were Paleolithic; but after similar discoveries at Les Eyzies in France around , they were accepted as such and were recognized as one of the most surprising and exciting archaeological discoveries. A succession of similar finds has continued in the 20th century. The most famous of these was at Lascaux , France, in During the last quarter of the 19th

century, Gen. Developments in the 20th century and beyond The 20th century saw the extension of archaeology outside the areas of the Near East , the Mediterranean, and Europe, to other parts of the world. The Stone Age has been described and studied throughout the world; among the most sensational discoveries are those of L. Leakey , who found stone tools and skeletal remains of early man dating back 2,, years in the Olduvai Gorge in Tanzania. Serious archaeological work began later in America than Europe, but as early as Thomas Jefferson had excavated mounds in Virginia and made careful stratigraphical observations. The 20th century saw a great increase in archaeological knowledge about prehistoric America: The enormous growth of archaeological work has meant the establishment of archaeology as an academic discipline; few important universities anywhere in the world are now without professors and departments of archaeology. There are now a very large number of scholarly journals in the field, as well as a considerable body of popularized books and journals that attempt to bridge the gap between professional and layman. Fieldwork Preliminary work Some archaeologists call everything they do out-of-doors fieldwork, but others distinguish between fieldwork, in a narrower sense, and excavation. Fieldwork, in the narrow sense, consists of the discovery and recording of archaeological sites and their examination by methods other than the use of the spade and the trowel. Sites hitherto unknown are discovered by walking or motoring over the countryside: In Europe, a study of old records and place-names may lead to the discovery of long-forgotten sites. The mapping of new and old sites is an essential part of archaeological survey. This process has been brought to a very high standard of perfection, both in the marking of archaeological sites on ordinary topographical maps and in the production of special period maps. The distribution map of artifacts, especially when studied against the background of the natural environment , is a key method of archaeological study. The formerly earthbound archaeologist has been greatly helped by the development of aerial photography. The application of aerial photography to archaeological investigation began in a small way during World War I , as a side effect of military reconnaissance, and was given further impetus by World War II ; the photographic intelligence departments of all the combatant nations were extensively staffed by archaeologists, who then carried their expertise and enthusiasm into the postwar years. The University of Cambridge now has its own department of air photography under J. The number of new sites discovered each year by aerial photography is very large. Some of these are surface sites, especially partly destroyed sites that show up well in special conditions of light , as in early morning or late evening. But many are sites that could not be found on the ground and that show up in aerial photographs as variations in soil colour or in the density of crop. Archaeological reconnaissance may be advanced from ordinary surface or aerial methods in a wide variety of ways. A very simple method is tapping the ground to sound for substructures and inequalities in the subsoil. Deep probes have made it possible to trace walls and ditches. The Lerici Foundation of Milan and Rome has had great success with this method since its development of the Nistri periscope, first used in in an Etruscan tomb in the cemetery of Monte Abbatone. The periscope is inserted into the burial chamber and can photograph the walls and contents of the whole tomb. Other modern techniques that have been applied to archaeological prospecting employ electricity and magnetic fields geophysical prospecting. A method of electrical prospecting had been developed in large-scale oil prospecting: Magnetic methods of prospecting detect buried features by locating the magnetic disturbances they cause: An American expedition discovered the site of Sybaris in Sicily by magnetic prospecting. Electromagnetic methods have been in use only since ; they employ developments of the concepts used in mine detectors. Instruments such as the pulsed-induction meter and the soil-conductivity meter detect magnetic soil anomalies , but only if the features are fairly shallow. Excavation Excavation is the surgical aspect of archaeology: Excavations can be classified, from the point of view of their purpose, as planned, rescue, or accidental. Most important excavations are the result of a prepared planâ€”that is to say, their purpose is to locate buried evidence about an archaeological site. Many are project oriented: But many excavations, particularly in the heavily populated areas of central and northern Europe, are done not from choice but from necessity. Gravel digging, clearing the ground for airports, quarrying, road widening and building, the construction of houses, factories, and public buildings frequently threaten the destruction of sites known to contain archaeological remains. Emergency excavations then have to be mounted to rescue whatever knowledge of the past can be obtained before these remains are obliterated forever. Partial destruction of cities

in western Europe by bombing during World War II allowed rescue excavations to take place before rebuilding. An extension of the runways at London Airport led to the discovery of a pre-Roman Celtic temple there. Farmers have often unearthed archaeological finds while plowing their fields. The famous painted and engraved Upper Paleolithic cave of Lascaux in southern France was discovered by chance in when four French schoolboys decided to investigate a hole left by an uprooted tree. They widened a smaller shaft at the base of the hole and jumped through to find themselves in the middle of this remarkable pagan sanctuary. Similarly, the first cache of the Dead Sea Scrolls was discovered in by a Bedouin looking for a stray animal. These accidental finds often lead to important excavations. The French archaeologist P. University College Cork, Ireland All forms of archaeological excavation require great skill and careful preparation. Years of training in the field, first as an ordinary digger, then as a site supervisor, with spells of work as recorder, surveyor, and photographer, are required before anyone can organize and direct an excavation himself. Most museums, universities, and government archaeological departments organize training excavations. Actually, much of the work of excavation is careful work with trowel, penknife, and brush. It is often the recovery of features that are almost indistinguishable from nonarchaeological aspects of the buried landscape: Sometimes it is the recovery of features of which only ghost traces remain, like the burnt-out bodies from the buried city of Pompeii , or the strings of a harp that were found among the furnishings of Mesopotamian tombs at Ur. Because of the damage he may cause by inexperience and haste, the untrained amateur archaeologist often hinders the work of the professional. Amateur archaeology is forbidden in many countries by stringent antiquity laws. At the same time, it is certainly true that nonprofessionals have made important contributions in many areas of archaeology. Occasionally, an amateur does make an important discovery the further excavation of which can then be taken over by trained professionals. Such was the case at Sutton Hoo in Suffolk in , when work begun by a competent amateur was taken over by a team of experts who were able to uncover a great Anglo-Saxon burial boat and its treasure, without doubt the most remarkable archaeological find ever made in Britain. There are, of course, many different types of archaeological sites, and there is no one set of precepts and rules that will apply to excavation as a whole. Some sites, such as temples, forts, roads, villages, ancient cities, palaces, and industrial remains, are easily visible on the surface of the ground. They result from the accumulation of remains caused by centuries of human habitation on one spot. The sites of the ancient cities of Troy and Ur are examples. Another type consists of closed sites such as pyramids, chambered tombs, barrows burial mounds , sealed caves, and rock shelters. In other cases there are no surface traces, and the outline of suspected structures is revealed only by aerial or geophysical reconnaissance as described above. Finally, there are sites in cliffs and gravel beds, where many Paleolithic finds have been made. University College Cork, Ireland The wide range of techniques employed by the archaeologist vary in their application to different kinds of sites. The opening of the tomb chamber in an Egyptian pyramid is, for example, a very different operation from the excavation of a tell in Mesopotamia or a barrow grave in western Europe. Some sites are explored provisionally by sampling cuts known as sondages. Large sites are not usually dug out entirely, although a moderate-sized round barrow may be completely moved by excavation.

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5: Archaeology: Archaeological Science & Methodology - Routledge

The one book every graduate student in archaeology should read to understand how archaeology can be scientific - the one book collaboratively written by an experienced, intelligent archaeologist.

The Science of Archaeology Because archaeology is basically concerned with people, it forms an important subdivision of the social science of anthropology. Anthropology, the study of human culture, also includes three related specialtiesâ€”linguistics, the study of human speech and language; physical anthropology, the study of the origins and biological evolution of humans as well as the patterns of human physical variation; and cultural anthropology, the study of living peoples and the great variety of their customs, adaptations, and achievements. In practice, archaeologists utilize theories and methods of their colleagues in the other anthropological specialties and of experts in other fields of scientific study as well. Linguists, for example, can furnish useful checks on purely archaeological information. One of their techniques measures the change that has taken place between two related languages. Such change, say many linguists, is apparent when one compares lists of commonplace words, like "sky" or "mother," that nearly all peoples have in their vocabularies. By finding the degree of change in such word lists, the approximate time at which the two languages split from a common ancestral tongue may be indicated. Such data reinforce archaeological findings if they suggest a cultural divergence during the same span. Physical anthropologists provide special knowledge about biological variation among modern humans and their ancestors. This includes not only the study of ancient human fossil remains in Africa, Asia, and other parts of the Old World but also skeletal remains in the Americas, where no forms of humans earlier than modern Homo sapiens are known. The study of such remains provides information ranging from ancient diet and disease to indications of intermarriage or the replacement of one population by another. New breakthroughs in the realms of genetics, blood chemistry, and dentition continue to open more and more paths to our knowledge of the past. Cultural anthropology furnishes a wealth of knowledge on how living peoples use their environment, divide up labor, keep track of time, and organize themselves in households or social groups. If carefully applied, such information can provide useful analogies to help interpret the meanings of the material objects found in the ground. Like modern settlements, the remains of past settlementsâ€”that is, archaeological sitesâ€”are all around us. Archaeologists are interested in knowing precisely where these sites are so they can be preserved and protected for study and for the benefit of future generations. The geographical relationships among archaeological sites, regardless of whether they were occupied at the same time or at different times, can themselves provide clues to how their inhabitants obtained food and other resources of the area. Relationships among sites occupied at the same time can indicate social, religious, and political links or conflicts that may have characterized the region. One such regional investigation, by archaeologist Donna Roper, then of the University of Missouri at Columbia, concentrated on the Sangamon River Valley in central Illinois. Her thorough survey and sampling of the area brought two important periods of occupation to light: From her work in the Sangamon Valley, Donna Roper found that during the earlier period people tended to locate their settlements away from the river, at the base of bluffs at the valley edge. These bluff-base settlements were located near water sources and other frequently used resources. During this early period, however, additional temporary camps were set up in the valley bottomlands to exploit aquatic resources and in locations farther afield to hunt deer. Settlements of the later time span were built in the bottomlands. As Roper noted in her published report, these patterns were apparently the result of seasonal food procurement in the regionâ€”the reflection of a way of life similar to that of the Kickapoo Indians, who occupied the area in early historical times. According to eyewitness accounts in the historical documents, the Kickapoo shifted settlements with the seasons, practicing horticulture in one place during the summer, then moving into the bottomlands during the colder months to hunt. Archaeologists often focus their investigations on a specific siteâ€”any area of ground once used, and thus modified, by human beings. There is no typical archaeological site. One may be a 10,year-old campsite such as that found at Debert, Nova Scotia, virtually indistinguishable on the surface from surrounding meadows and forest. Others might hold the crumbling buildings and refuse mounds of a great city

like Chan Chan, Peru, or Baalbek, Lebanon. Whether cave or field, cliff dwelling or mound, or the stone foundations of a colonial house, each site is a unique and fragile remnant of the past. It holds not only artifacts but, more important, the sum total of existing clues on the relationship of these objects to one another. A site is a complicated package that, if carefully opened and meticulously recorded, can lead to interpretations of what happened at the place and provide information for determining when, how, and why it happened. The decision to excavate can be based on many factors. Usually a particular problemâ€”for example, when and why settled life began in an areaâ€”determines the choice. For the historical archaeologist, the reason for excavation may be to supplement or verify the written record, which is often plagued by omissions, biases, or vagueness. Excavations of settlements like Jamestown, Virginia, or the recovery of the cargo of a Civil War-period steamer provide glimpses of the past or, in the latter case, a past instant. And while historical records are of immense help in such cases, they may not address the specific archaeological problem involved. In other cases, reservoir flooding or disturbance of the ground by highway construction, home building, or agriculture may threaten sites with destruction. Such circumstances dictate a program of conservation archaeology designed to protect as many sites as possible and to recover information that would otherwise be lost forever from sites that cannot be saved. A good example of this is a site that once lay in an open pine grove at the tip of Rose Island in eastern Tennessee, near where the Tellico and Little Tennessee Rivers join. His preliminary exploration showed that there was far more to Rose Island than first met the eye. Telltale bands of dark soil indicating successive human occupation appeared about six feet below the surface. The kinds of stone tools and the absence of pottery in these deep layers suggested that the site was quite old, occupied perhaps by wandering bands of hunter-gatherers. Like all archaeologists, Jeff Chapman knew that in excavating he would necessarily destroy part of the site. Artifacts, of course, could easily be taken back to the laboratory for further study, but the all-important context of these remains could not be removed. Because the location of everything found would have to be recorded in detail, he and his crew of students carefully laid a reference grid of numbered wooden stakes through the pine grove before removing the overburden of surface soil. For three months they carefully troweled in selected grid squares, peeling away the ancient deposits. As they progressed, layer by layer, they were careful to leave all artifacts within a layerâ€”stone tools, chips, hearths, or whateverâ€”in place until all could be carefully inspected, drawn, and photographed. Then they removed the artifacts to numbered bags before proceeding to the layer below. Dirt from each layer, meanwhile, was carefully screened to recover any artifacts or fragments that may have been missed. In addition, samples of soil were washed in a process known as flotation to separate out any seeds or plant remains. As the pits deepened, the buried layers they had carefully removed could all be seen in cross section on the smooth walls of the pit. These were plotted to precise scale on graph paper. These, however, were far less important than the thorough records the excavators compiled, for the records could now serve as a substitute for the excavated part of the site, telling people precisely where each piece had been found. Back in the laboratory, analysis of the material began. Whereas it took Chapman only two summers to collect, record, and measure the archaeological data, it took years to accomplish the laboratory analysis, to formulate his conclusions, and to prepare the results for publication. By using computers and special software developed for the purpose, thousands of stone lance points, other tools, and fragments were sorted according to diagnostic characteristics, or attributes. With the resulting classification, Chapman and his team were able to compare their findings with those from other sites and to estimate the time when Rose Island was first occupied. The stone chips and their locations suggested not only how the tools were made but also where in the ancient camp the manufacturing went on. And burned acorns and hickory nuts gave valuable clues to the diet of the ancient Rose Islanders. In the course of his analysis Chapman received useful aid from colleagues in other sciences. For example, technicians in physics subjected his charred wood remains to radiocarbon tests. Their datesâ€”between and B. This was refined even more by other specialists who, by observing the lineup of magnetic molecules in the Rose Island hearths, could estimate fairly closely how much time had elapsed between the use of successive fireplaces. A geologist well acquainted with the mineralogy of the area showed that the people of Rose Island had found flint nearby for their toolsâ€”one reason, perhaps, for using the siteâ€”while a specialist in botany used wood charcoal to identify oak, hickory, and other vegetation, all crucial clues to the ancient environment.

Had the excavation yielded other kinds of remains, the aid of still more specialists might have been sought: Malacologists, who study ancient and modern snail and other mollusk shells, and palynologists, who identify pollen, can help detect environmental changes through time; ichthyologists and zoologists identify fish and animal remains. Equally important, following the recording and analysis, all the excavated artifacts, samples, field notes, maps, and other records were preserved so they will be available for future scientists to reanalyze with the greater knowledge and improved techniques and equipment of the future. Increasingly, archaeologists are turning not to sites but to the analysis of existing collections of artifacts or records of past surveys or excavations in order to gain information. With the growing recognition that it is often best to keep ancient sites intact for future generations, the study of collections, both institutional and private, is likely to become more common. During the late s, James Judge, then of the University of New Mexico, became interested in learning more about the life of the Paleo-indians, the earliest recognizable culture of the Americasâ€”the Ice Age hunter-gatherers who lived in North America before about B. His first step was a survey of the area, much like that done by Donna Roper in Illinois. After recording the locations of sites that could be detected by surface evidence, Judge turned to existing collections from the area. The use of such material ultimately saved him an immense amount of time and effort in his analysis. Using all these data, plus new information from sites he investigated himself, Judge sought the relationships between changes in Paleo-indian artifact forms, settlement location, and the environment over time. The analysis revealed that the then accepted view of Paleo-indian life in New Mexico as an unchanging span devoted to the hunting of big game was wrong. In its place emerged a picture of a long period in which patterns of animal watering places and human settlement, as well as the inventory of available animals, were in continuous change as the climate fluctuated and gradually became drier and as humans developed ways to organize themselves, to find and utilize resources, and to make a place for themselves in their world. However, far more than 99 percent of that enormous span lies totally out of reach of the earliest written records. When Columbus first set foot on what came to be called the Americas, people had inhabited those two vast continents for more than 13, years, yet virtually no decipherable written records were left. For any knowledge of our collective heritage, then, archaeology is the sole source of information. For those who choose it as a career, archaeology can be even more intriguing than its popular image, and its personal rewards can far outweigh what are often challenging working and thinking conditions. There are many reasons that professional archaeologists enjoy what they do. Perhaps the best is the excitement of discovering some knowledge about ourselves that would otherwise remain out of reach. Likewise, nonprofessional avocational archaeologists can experience much the same challenge and thrill in knowing that they too can contribute to our knowledge of the human past. Neither can deny that there is much yet to learn. Ancient Architects of the Mississippi: Eight hundred years ago, the lower Mississippi Delta was home to some of the most highly organized civilizations in the world. This feature tells you about life along the Mississippi at that time, builders of great mounds, and the activities of travelers and traders. Learn about the underwater projects of the Submerged Cultural Resources Unit, often in partnership with other organizations, including the U. Archeological Research in the Parks: Many national parks have active archeological programs. Learn about the exciting results of archeological projects in some of your favorite parks by clicking on the state of your choice. The human skeletal remains that have come to be referred to as the "Kennewick Man," or the "Ancient One," were found in July , in Kennewick, Washington. Almost immediately controversy developed regarding who was responsible for determining what would be done with the remains. Claims were made by Indian tribes, local officials, and some members of the scientific community. The documents here provide background information and detailed reports of aspects of the work being done on Kennewick Man by the Department of the Interior.

ARCHAEOLOGY AND THE METHODOLOGY OF SCIENCE pdf

6: Publishing Archaeology: Science, social science, and archaeology: Where do we stand?

"Archaeology and the Methodology of Science", by Jane E. Kelley and Marsha Hanen [Book Review].

Methods Survey The first step in an archaeological excavation is surveying the area. This can be done either with remote sensing or direct visual observation. Archaeologists conducting a survey Archaeologists also use non-invasive techniques to survey sites known as remote sensing. There are many methods including aerial photography which is simply taking pictures from an airplane, hot air balloon or even a remote controlled drone; ground penetrating radar which is used to locate artifacts hidden below ground, and LIDAR, which uses lasers to scan the surface from the air through vegetation. They start by setting up a grid and connecting the grid to a datum. A datum is a fixed reference point, often one placed by the U. Test pits are a small hole dug to determine the location, density and spread of artifacts. Archaeologists dig a shovel test pit as part of a site survey Then archaeologists excavate the site using trowels, shovels, and various other tools. They carefully remove dirt and note the precise location of any artifacts found. The context of the artifact is just as important as the artifact itself, so the artifacts are always carefully mapped and documented. Archaeologist using a trowel The dirt removed from the site is screened to search for any small artifacts that may have been missed during the initial excavation. Archaeologists with the National Park Service Screening Archaeologists also look for features while excavating a site. A feature is evidence of a human activity that is not movable, and usually has a vertical component. An aspect of a site that is only horizontal, such as a road, is not a feature. An example is a frequently used fire ring will leave evidence behind in the soil, but it cannot be moved with the occupants. Evidence of fires uncovered at an archaeological site-a feature After archaeologists have excavated the site completely, or to the extent the project planned, they fill the site back in and take the artifacts to be analyzed. They are analyzed and classified based on the research questions of the archaeologist. An artifact, pottery, that has been photographed for documentation-A scale is often included to show the size of the artifact. The artifacts are grouped with other artifacts of the same type. A type can be based on a variety of characteristics such as function or style. A group of artifacts that are all projectile point type Archaeologists also try to determine how old artifacts are. This can be done relative to other artifacts using stratigraphy-the idea that older artifacts are below newer ones. An excavation showing the layers used to date the artifacts relative to each other Artifacts can also be dated absolutely, or with an age or year they are from. This can be done using artifacts found in the site with known dates. These artifacts are known as diagnostic artifacts. They also can be used to determine the culture the artifacts are from. Artifacts can also be dated using dendrochronology, which uses the annual growth rings in trees to establish an age for artifacts. A tree with annual growth rings Artifacts can also be dated using radiocarbon dating. This uses the decay of carbon and the ratio of C to C to determine the age of the artifact. It is only effective up to 68, years. It is also not very accurate for more recent artifacts. Using all of the information about the artifacts, including context, typology, dating and more, archaeologists can piece together the events and culture of past society.

ARCHAEOLOGY AND THE METHODOLOGY OF SCIENCE pdf

7: Archaeology: Archaeology Textbooks: Archaeological Science and Methodology - Routledge

The National Science Foundation was established by an Act of Congress in to "promote the progress of science; to advance the national health, prosperity, and welfare; and to secure the national defense.".

News Feeds The science of Archaeology Being a natural science student, I have always thought of science as your chemistry, biology, and somewhat physics. However, I have recently figured that there is more to science than what one would think of it to be. Science is a process to ensure that we have the most accurate way to explain something, a process of understanding the world around us through the application of logical thought. Science is achieved through the scientific method, in which a question is brought up leading to a hypothesis, experimentation, and eventually a conclusion. Archaeology, as I see it now, is science. The discipline of archaeology is the scientific study of human society in which the question is about the human past and experimentation takes place through analysis and excavation, and examining cultural processes leading to the answer of why. Some recent work that best exemplifies this reasoning is seen through the collaboration of scientists looking in to the domestication of cats in China in the distant past. The year marked the year that cat bones were discovered in agricultural settings throughout China thus leading to the question of whether domestic cats brought to China over five thousand years ago around BC. The two hypotheses regarding this inquiry were: Yet, there was no way of figuring out an answer to this question without experimentation and analysis. In the absence of DNA of such ancient species the collaboration of scientists undertook geometric morphometric analysis in order to distinguish between the bones of such cats. The scientists analyzed the bones of several species of cat from the region during that time period and concluded that all the bones belonged to the species Prionailurus bengalensis, or in common terms the leopard cat, a species that happens to be still widespread in China to this day. Upon making this discovery, the scientists were able to make further conclusions based on the behavior of the present day leopard cat, which is well known to occupy areas with a strong human presence. Just as in other regions in the East, the leopard cat was most likely attracted to Chinese agricultural settlements due to the number of rodents taking advantage of grain stores in such areas. These conclusions reveal that in China it was the leopard cat and not the western wildcat that formed the first relationships with mankind, and that cat domestication was ties with the origins of agriculture. The process in entirety then, clearly shows that the work of the scientific researcher is very similar to that of an archaeologist. Though the area of inquiry, or rather the questions they set out to explain are different in nature, the methodology of getting to the answer is identical. This entry was posted in General. It does not seem like a typical science at first, until you really examined the field. As you showed with the domestic cat study, archaeology and science are closely related. Both have the same methods or approach e. Like with the study on domestic cats, evidence had to be found in order to support the hypotheses of when cats were domesticated, which was done by analyzing cat bones. I remember reading an article in the past that talked about lactose intolerance. Contrary to belief, lactose intolerance is actually not an uncommon condition. In fact, it is normal to be lactose-intolerant, but it is unusual to be lactose-tolerant. This can be attributed to thousands of years ago, for human ancestors were not able to consume dairy then. In the article, a study was performed to see from where the lactose-tolerance mutation originated. One of the most popular theories that showed how people went from being lactose-intolerant to be being lactose-tolerant is well-supported due to archaeological findings. The theory states that the introduction of farming about 10, years ago was what introduced the mutation. The best evidence for this theory is not only from DNA testing, but also from the fact that residual milk fat was found on pottery from that time period. In combination with genomic results, it is strongly believed that the transition to farming is what triggered the present-day tolerance to lactose-containing dairy products. Just as scientists and archaeologist share the same approach to answering questions, they also can be used together to answer the same questions.

ARCHAEOLOGY AND THE METHODOLOGY OF SCIENCE pdf

8: Formats and Editions of Archaeology and the methodology of science [www.enganchecubano.com]

Archaeological science, also known as archaeometry, consists of the application of scientific techniques to the analysis of archaeological materials, to assist in dating the materials. It is related to methodologies of archaeology.

Antiquarians studied history with particular attention to ancient artifacts 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. 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 of the 16th century, including John Leland and William Camden , conducted surveys of the English countryside, drawing, describing and interpreting the monuments that they encountered. First excavations[edit] An early photograph of Stonehenge taken July One of the first sites to undergo archaeological excavation was Stonehenge and other megalithic monuments in England. John Aubrey â€" 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. These excavations began in in Pompeii, while in Herculaneum they began in The discovery of entire towns, complete with utensils and even human shapes, as well the unearthing of 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 overlooked. The father of archaeological excavation was William Cunnington â€" Cunnington made meticulous recordings of Neolithic and Bronze Age barrows , and the terms he used to categorize and describe them are still used by archaeologists today. The idea of overlapping strata tracing back to successive periods was borrowed from the new geological and paleontological 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. A major figure in the development of archaeology into a rigorous science was the army officer and ethnologist , Augustus Pitt Rivers , [14] who began excavations on his land in England in the s. His approach was highly methodical by the standards of the time, and he is widely regarded as the first scientific archaeologist. He arranged his artifacts by type or " typologically , and within types by date or "chronologically". This style of arrangement, designed to highlight the evolutionary trends in human artifacts, was of enormous significance for the accurate dating of the objects. His most important methodological innovation was his insistence that all artifacts, not just beautiful or unique ones, be collected and catalogued. His painstaking recording and study of artifacts, 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 was the first to scientifically investigate the Great Pyramid in Egypt during the s. Mortimer Wheeler pioneered systematic excavation in the early 20th century. Pictured, are his excavations at Maiden Castle, Dorset , in October These scholars individuated nine different cities that had overlapped with one another, from prehistory to the Hellenistic period. 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. The Child was an infant of the Australopithecus africanus species, an early form of hominin The purpose of archaeology is to learn more about past societies and the development of the human race. Without such written sources, the only way to understand prehistoric societies is through archaeology. Because archaeology is the study of past human

activity, it stretches back to about 2. Many important developments in human history occurred during prehistory, such as the evolution of humanity during the Paleolithic period, when the hominins developed from the australopithecines in Africa and eventually into modern Homo sapiens. Without archaeology, we would know little or nothing about the use of material culture by humanity that pre-dates writing. 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. Across the millennia many thousands of cultures and societies and billions of people have come and gone of which there is little or no written record or existing records are misrepresentative or incomplete. Writing as it is known today did not exist in human civilization until the 4th millennium BC, in a relatively small number of technologically advanced civilizations. In contrast, Homo sapiens has existed for at least , years, and other species of Homo for millions of years see Human evolution. These civilizations are, not coincidentally, the best-known; they are open to the inquiry of historians for centuries, while the study of pre-historic cultures has arisen only recently. Even within a literate civilization many events and important human practices are not officially recorded. Any knowledge of the early years of human civilization â€” the development of agriculture, cult practices of folk religion, the rise of the first cities â€” must come from archaeology. In addition to their scientific importance, archaeological remains sometimes have political or cultural significance to descendants of the people who produced them, monetary value to collectors, or simply strong aesthetic appeal. Many people identify archaeology with the recovery of such aesthetic, religious, political, or economic treasures rather than with the reconstruction of past societies. When such unrealistic subjects are treated more seriously, accusations of pseudoscience are invariably levelled at their proponents see Pseudoarchaeology. However, these endeavours, real and fictional, are not representative of modern archaeology.

ARCHAEOLOGY AND THE METHODOLOGY OF SCIENCE pdf

9: Journal of Archaeological Science - Elsevier

Science is a method to gather accurate knowledge about the natural and social world: It gives primacy to reason and observation.

Resources Introduction The methods used by archaeologists to gather data can be applied to any time period, including the very recent past. One archaeologist in the U. Over the past years archaeologists have developed many effective methods and techniques for studying the past. Archaeologists also rely upon methods from other fields such as history, botany, geology, and soil science. In this section of Methods of Gathering Data you will learn how archaeologists gather and analyze information by utilizing historical research techniques, field methods for data recovery, and laboratory analyses. Back to top Historical Research Techniques Every archaeology project begins with a research design â€"a plan that describes why the archaeology is being done, what research questions it hopes to answer, and the methods and techniques that will be used to gather and analyze the artifacts and other archaeological materials. It will also outline where artifacts recovered from the project will be stored, and how the research will be reported and shared with the public. Archival research Archival research is often the first step in archaeology. This research uncovers the written records associated with the study area. If the area was inhabited during historical times in the past several hundred years in North America the archaeologist will look for primary historical documents associated with the study area. Primary historical documents that archaeologists may consult before beginning their field research include: Open this History Toolkit to learn more about investigating the past with primary sources. In addition to primary historical documents, archaeologists will look for site reports that have been prepared by other archaeologists who have studied this area. These reports will describe what was found in this area during any previous archaeological investigations and will help guide the new research. Documentation files for all of the recorded prehistoric and historic sites in each state are maintained in the State Historic Preservation Office, along with archaeological research reports pertaining to sites in the state. Oral History Oral history is another research method that archaeologists and historians may use to gather information. It includes any kind of information passed down by word of mouth, like stories you have been told about your family history, as well as traditions that your family observes. Archaeologists today collaborate with descendants of Native American peoples, and with African American communities who are only a few generations removed from the lives of their enslaved or free ancestors, to better understand the cultural traditions of their pasts. Archaeologists working on the 19th century Levi Jordan Plantation in Texas have interviewed descendants of both the plantation owners and the enslaved plantation workers as part of their research. They have created the Levi Jordan web site to share this information with the public and to allow the public to communicate with the archaeologists. At Castle Rock Pueblo in southwestern Colorado archaeologists have learned about the past culture of the Anasazi peoples through both the objects left behind, and the oral traditions of modern Puebloan people. Now get ready to take an electronic field trip back in time to Castle Rock Pueblo in AD and solve a mystery while you are there. In the Field While historians and archaeologists both use written documents to learn about the past, only archaeologists are trained to find and interpret archaeological sites. Here you will learn about some of the field methods archaeologists use to find sites and, when necessary, to excavate them. A trowel is used to carefully remove thin layers of soil from test units. Of course, many other tools are used by archaeologists in the field and lab to dig, sift, measure, and analyze artifacts. View some of these computer animations of tools and equipment that archaeologists use. Others, like tape measurers, toothbrushes, brooms and dustpans, are household objects! You can also view photographs of archaeologists using some of these tools on sites. How Do You Find Sites? Archaeologists use a number of different methods to find sitesâ€"and sometimes they are found just by accident! The prehistoric burials at Low Hauxley on the coast of England were discovered by an observant beach walker who noticed a stone box sticking out of a sand dune after a storm. A burial ground with remains of more than 17th and 18th century Africans was discovered during building construction in New York City. An archaeological predictive model is a tool that indicates the probability that an archaeological site will occur in a certain area. It helps determine where you look for sites based on factors

like distance from water, ground steepness, soil type, and other factors that influence where people settle or perform certain tasks. The methods used to find sites will depend upon the kind of research questions that the archaeologist is trying to answer. If highway or housing construction is planned, archaeologists may need to know of any archaeological sites on the property. First they will check if any previous surveys have been done in the area and, if so, what was found. If no previous sites have been recorded, the archaeologist will conduct an archaeological survey to determine if the area contains any sites. If sites are found, the archaeologist will want to know how many, their location, and how the sites relate to each other. Usually, to save time and money, only a sample of the area is tested. Surface Surveys A surface survey is a systematic examination of the land. A team of archaeologists will walk in straight lines back and forth across the study area looking for evidence of past human activity, including stone walls or foundations; artifacts made of stone, ceramics, or metal; color changes in the soil that may indicate features such as hearths, middens garbage pits , or storage pits They will use a compass and long tape measure to make sure they walk in a straight line and will record the exact location of all evidence they find. Artifacts are collected and put in bags with a label of their exact location. Features, which cannot be removed, are photographed and drawn. This technique is useful in plowed fields. Usually test pits are done where the ground has not been farmed or plowed and it contains a lot of surface vegetation. The soil may be screened sifted to recover small artifacts and often profiles pictures of the test pits are drawn to record what the soil looks like in each unit. Geophysical Surveys There are a number of non-invasive techniques archaeologists can use to find sites without having to dig. Examples of geophysical surveys that do not involve disturbing the soil include are magnetometry , resistivity and ground penetrating radar or GPR. Evaluating Site Significance After conducting a survey an archaeologist will have enough information to determine if any significant archaeological resources are located in the study area. The archaeologist will write and file a site report in the State Historic Preservation Office, which describes their research. If significant sites were found, an excavation may be planned. In the next section we will discuss how important data is recovered from archaeological sites through excavation. Back to top Data Recovery Believe it or not archaeologists do not often excavate dig entire sites! Archaeology is a destructive scienceâ€”meaning that once a site is excavated it is gone forever. The artifacts and information gathered remain, but the site itself can never be recreated. Excavating sites is also costly and time consuming. Once the dig is done, archaeologists have a professional responsibility to analyze all of the artifacts and information obtained, to report on their research in scholarly journals and to the public, and to curate the collections. For all of these reasons, archaeologists generally excavate sites only when they are threatened by destruction from construction or development or when they may reveal important information about past cultures. And they usually excavate only a small portion of any site. Although archaeologists work on all kinds of sites and in all parts of the world, the same basic process is followed everywhere when an excavation is planned. Research Design Before an excavation begins, archaeologists write a research design. This important document is reviewed before archaeologists are granted permission to excavate a site. If an American archaeologist wants to work in a foreign country, permission must be granted by the appropriate agency in that government. Tribal Indian lands in the U. Once a research design is approved and permits area granted, a team is put together and the necessary tools and materials are gathered. Gridding the Site Once a site has been excavated, it is gone forever. Because of this, archaeologists must record exactly where all of the artifacts and features on a site are located. Before any soil or artifacts are removed from a site, a site grid is created. A datum point, or fixed reference point from which all measurements are taken, is established and a rectangular grid is superimposed over the whole site. Each square in the grid is precisely measured and assigned a number. These squares are often referred to as units. This system allows the archaeologist to create a precise map of the site and to record the exact location of all the features and artifacts on the site. Excavating a Unit Archaeologists use a statistical sampling method to select which squares or units they will excavate. To begin they will collect surface artifacts, then remove any ground cover using a shovel and trowel. All soil removed from a unit is screened sifted to recover small artifacts and ecofacts whose exact location, both horizontally and vertically, is recorded. Artifacts from each unit are stored in plastic bags that are labeled with the site and excavation unit numbers and level. The unit may be dug in arbitrary levels such as every 10 cm or by following the natural

stratigraphy layers of the unit. These short video clips show how to prepare a test unit for excavation. Stratigraphy Over time both natural processes like the decay of organic matter, and cultural caused by humans processes, create soil layers. In cross section these soil layers resemble a layer cake, with the oldest layers on the bottom and the most recent layers on the top. This is called the Law of Superposition and is one of the most important principles in archaeology. Stratigraphy is the study of geological or soil layers that is used to determine the relative age of each layer. There are many factors that can disturb the stratigraphy on a site and make it hard to determine the relative ages of the layers. Look at how 4, years of natural and cultural processes can combine to create and disturb the stratigraphy on an archaeological site. Stratigraphy is one clue used by archaeologists to determine the relative age of an artifact or site. In the next section we will look t other ways of determining how old something is. Back to top In the Lab Archaeologists spend much more of their time in the laboratory analyzing artifacts and data than they do in the field. In this section, you will learn how archaeologists analyze artifacts, features, and other information recovered in the field to help answer their research questions. During the investigative process, they also seek to learn when site was occupied, the purpose of the objects recovered, what the people ate, the kinds of structures they lived and worked in, with whom they traded, and much more. They may also look at how the site they are analyzing relates to other sites that are nearby or quite distant. The analysis will depend upon what research question the archaeologist began the project with. Stratigraphy can determine the relative age of soil layers and artifacts and can help us understand the order in which events occurred. However if an artifact of known age such as a coin with a mint date is found in a soil layer it can tell us when something occurred. Tree-ring dating, or dendrochronology is one of the oldest dating methods used by archaeologists. It is based on the principle that trees produce growth rings each year and the size of the rings will vary depending upon rainfall received each year. Archaeologists have built up long sequences of rings from tree trunks that extend back centuries. In the American Southwest tree ring dating goes back to 59 BC.

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