New Horizons in Archaeology

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THE ADVANCEMENT OF SCIENCE IN THE past century has clearly demonstrated the fact that the progress made in any one field is dependent upon that made in associated fields of study. In no instance is this more noticeable than in the field of archaeology. We all accept the fact that mathematics and geology are among the "ancients" in science, but we are apt to forget that archaeology is older than any of these. Man, with his interest in the past, has for thousands of years manifested an interest in the events and progress of those who preceded him. A close study of all of the "greats" in ancient science will reveal their interest in old remains and the lives of those who lived before them. Even among the savage tribes we find this same interest in the past. Thus, it is safe, I believe, to list anthropology among the first of the sciences to be studied.

Anthropology is a study which uses all of the sciences as tools. It is difficult to name any field of endeavor which has not been studied by the anthropologist in an attempt to reconstruct the history of mankind. Then, in turn, when the material has been evaluated, it is the chemist or metallurgist who takes the early history of his subject and uses it as a basis for later development.

The methods of the early worker in anthropology were, of necessity, crude. Unfortunately, in the case of archaeology the scientist is given but one chance. The story of man's past is written as though upon ancient parchment which crumples when exposed to the air. One careless excavation, loss of the description of a discovery, and the knowledge of that specific site is lost to the world forever. This unique position has for many years made archaeologists a clique of scientists who have not invited the eager diggings and examination of uneducated laymen. Year after year they have seen thousands of pages of history torn to bits for the price of a pretty piece of pottery or a shiny bracelet.

As the brother sciences advanced, so did the study of ancient man. The correlation of archaeology with the other sciences is now such that, to be an archaeologist, one must be, in the most general terminology, a scientist. In order to solve the mysteries of the ancient red man, for example, it has become necessary to turn to geology, botany, physics, mathematics, and numerous other disciplines. All the great archaeological advances made in America in the past century are due to the intelligent use of methods developed in other sciences.

A study of the food of the cultures of America has occupied many of the best men in that field. The association of food areas with migrations was determined and aided in the study of the problems of archaeology. The study of climates and early man by noted meteorologists has added much to our knowledge of ancient life. Studies of basketry, clothing, and ceramics have enlisted the aid of many persons not otherwise interested in archaeology and, in turn, have interested the archaeologist in subjects previously unknown to him. Art designs and early means of writing have led to very involved studies and attempts to decipher these early written languages. Remains of temples and other ruins have led the archaeologist to the architects in order that these might be reproduced intelligently and the mystery of their use solved. Early work in stone and manufacture of paints, glue, cement, maps, poisons, medicine, etc. have caused archaeologists to put down the spade and begin a study of the above subjects in order to understand their discoveries. The specific knowledge so vital to the archaeologist is that which will enable him safely to discover and remove for posterity these pages of unwritten history.

In this field more has been done in the past century than in all of the previous history of the world. Aerial photography has revealed to the student the location of numerous sites in regions before unmapped. In other regions it has revealed terrain features not noticeable from the ground. Once located, modern cameras and a professional knowledge of the subject have enabled accurate recording of the progress of the excavation with greater detail than sketching could ever afford. Application of tree-ring dating methods have been used to date numerous sites in the Southwest by study of the timbers used in ancient ruins. Mathematical and qualitative studies of pottery distribution have led to their use as a dating device. Geology has been applied to settle difficult problems of great age, possible only by knowledge of strata relations.

Following excavation of the site, by use either of the spade and brush or of more modern methods involving elaborate machinery for removal of fine sand or large quantities of dirt, much remains to be done. It is here that the numerous resources now available must be applied. Special devices for photographing the interior of pottery vessels have been placed in operation. Methods

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for the removal of layers of paint on walls of dwellings, used over a period of years, have been helpful in preserving what would have formerly been destroyed. In the laboratory, ancient seeds and fruits have been studied, chemicals and paints analyzed, and pottery mixtures reproduced.

Although plans are being formulated for exploration of sea floors in search of lost cities and the use of diving apparatus has been demonstrated in Mexico, the new horizons of archaeology lie neither there nor in the unexplored countries from which we hear daily of the discovery of subhuman links. The new horizons of archaeology lie in the development of methods and practices fully applicable to all sciences. With but few exceptions the problems of archaeology are well known. We now know where the missing links should be located, the eras for which little has been found, the areas that are barren, and the material in the museums that now is of little value. As the era of large excavations for the purpose of stocking museums passes, the serious student of archaeology looks to the small sites and the ancient finds, where often little is found. It is his job to make the best utilization of the little he does find in order to rewrite as much of the story as possible.

One of the best examples of this type of material is the petroglyph or the numerous designs known as picture writing. Throughout the United States, as well as throughout the world, these designs are known. From Alaska to Mexico and from the Pacific to the Atlantic the walls of canyons are covered with the crude or elaborate pictures of the ancient American. Many of these are godlike figures towering 10 or 12 feet above the observer, while others are small designs carved on the surface of boulders in rivers in the hope of bringing added luck in fishing. Others in caves are painted in red, yellow, and blue and depict the scenes of tribal life. On numerous canyon walls as many as three or four different designs have been superimposed on others, the whole series covering a period of a thousand years. For many years, when archaeologists had great masses of material to excavate, these designs were ignored. For a while the early settlers of America thought that the designs were made by early explorers from Norway, eastern islands, or even Egypt. In some cases hundreds of books were written to describe these sites, and even duels were fought by those having different theories. As time passed and more sites were found where the only evidence of man's occupation was these strange "doodles," the archaeologists became more interested in making use of these designs as a key to the makers.

As art, pottery, and foods in different areas vary, so is there difference in designs. In some cases the simple designs, such as circles, squares, etc., were universal in their distribution. Others, however, like the quaint flute player of the Southwest, the water monster of Pennsylvania, or the masked dancers of Utah, formed a basis for constructive analysis. The material was so scattered and vast in amount that many workers became discouraged and left the task to others. With the general introduction of the method of qualitative analysis by A. L. Kroeber, of the University of California, the study of petroglyphs was approached by one of his fellow professors, Julian Steward, who in the 1930's began a qualitative analysis of the subject in an effort to make this vast amount of material available to archaeologists. By the use of some 50 typical designs ranging from simple lines to complex maps, Dr. Steward began to study the sites of California. As he had expected, the typical designs varied with geographical location, and in some cases his areas, as determined by the simple designs on canyon walls, agreed completely with those determined by the longer task of excavation and years of research. With the publication of his results the archaeologists of the United States began to dig from their files the old photographs and sketches of the petroglyphs of their respective states. Their work soon revealed, however, that in certain cases the material at hand must be handled by more definite means.

In the hope of testing a new method as well as continuing a study of petroglyphs, the author applied the statistical method in a formal manner to the same material first used by Dr. Steward. As was expected, the application of this subject proved that the correlation suspected and proved by Dr. Steward did exist and could be mathematically shown to exist. In addition, the results served to answer the questions raised by Dr. Steward's survey and revealed the usefulness of the application of statistics. In California and later in other states it has been possible to define the limit of cultural areas and in some cases to define the most important time relations—all by use of the simple designs so similar to the telephone "doodles" of today.

The application of statistics in this specific instance has been of value to the archaeologist in the study of material where such evaluation can be made. As many of the finds of the archaeologist are of this type—pottery, artifacts, and cultural traits—use of the method will lead to new and better comprehension of old data. In the museums and colleges of the United States numerous files of material are available for study in the light of new methods. When it is possible to make maximum use of all the data found at a site, from the smallest picture to the largest piece of pottery, we will be able to rewrite the story of the early American.

Although modern devices enable the archaeologist to make more comfortable expeditions and simplify the task of excavation, it is in the realm of analysis of material discovered that the new advancements will be made. Through proper use of statistical and qualitative methods all types of data, formerly discarded, may now be studied. The increased use of such methods has caused the scientist to look eagerly toward new horizons.