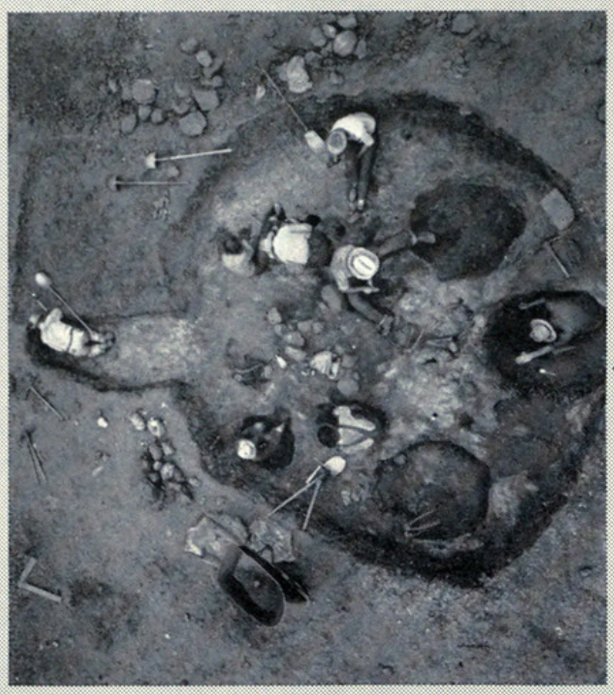
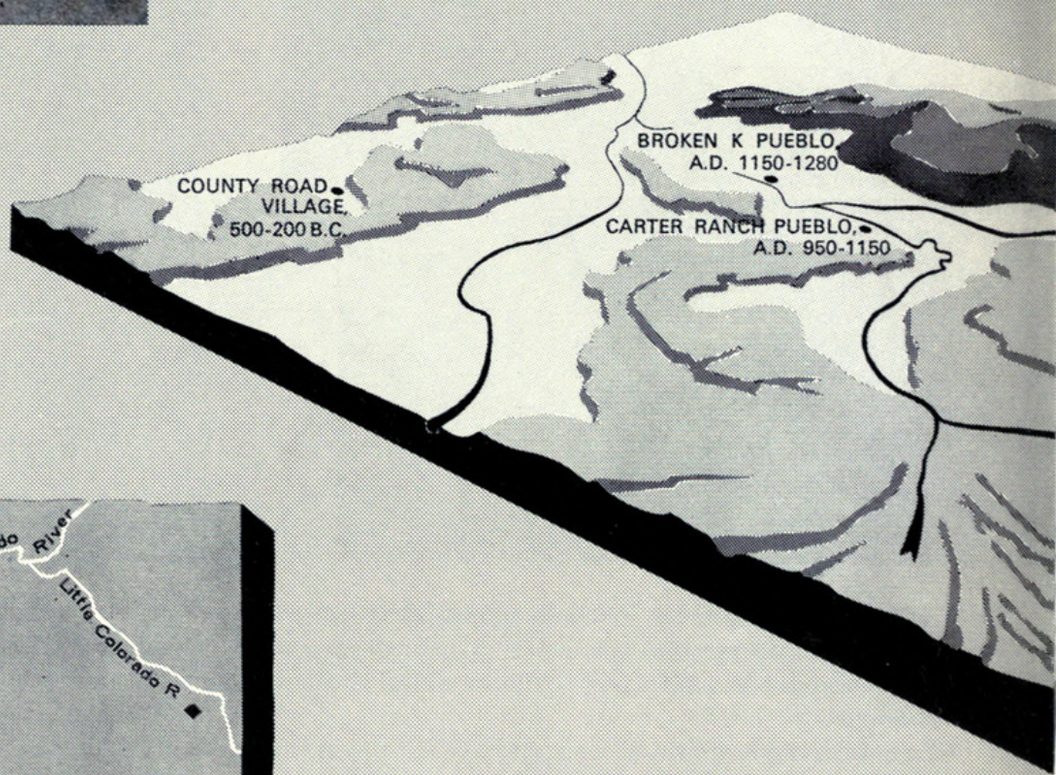
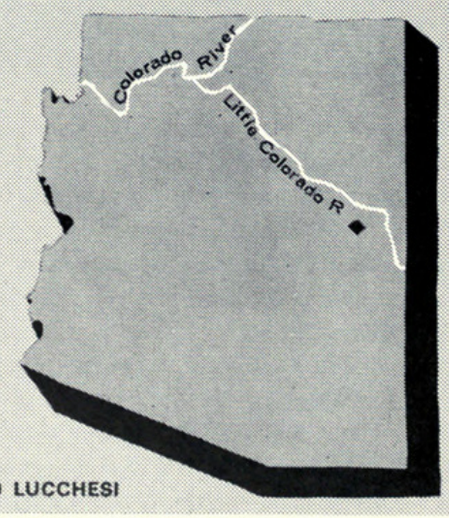
HAY HOLLO



◂Field Museum archaeologists work in "wickiup" similar to pit houses found at Hay Hollow▸



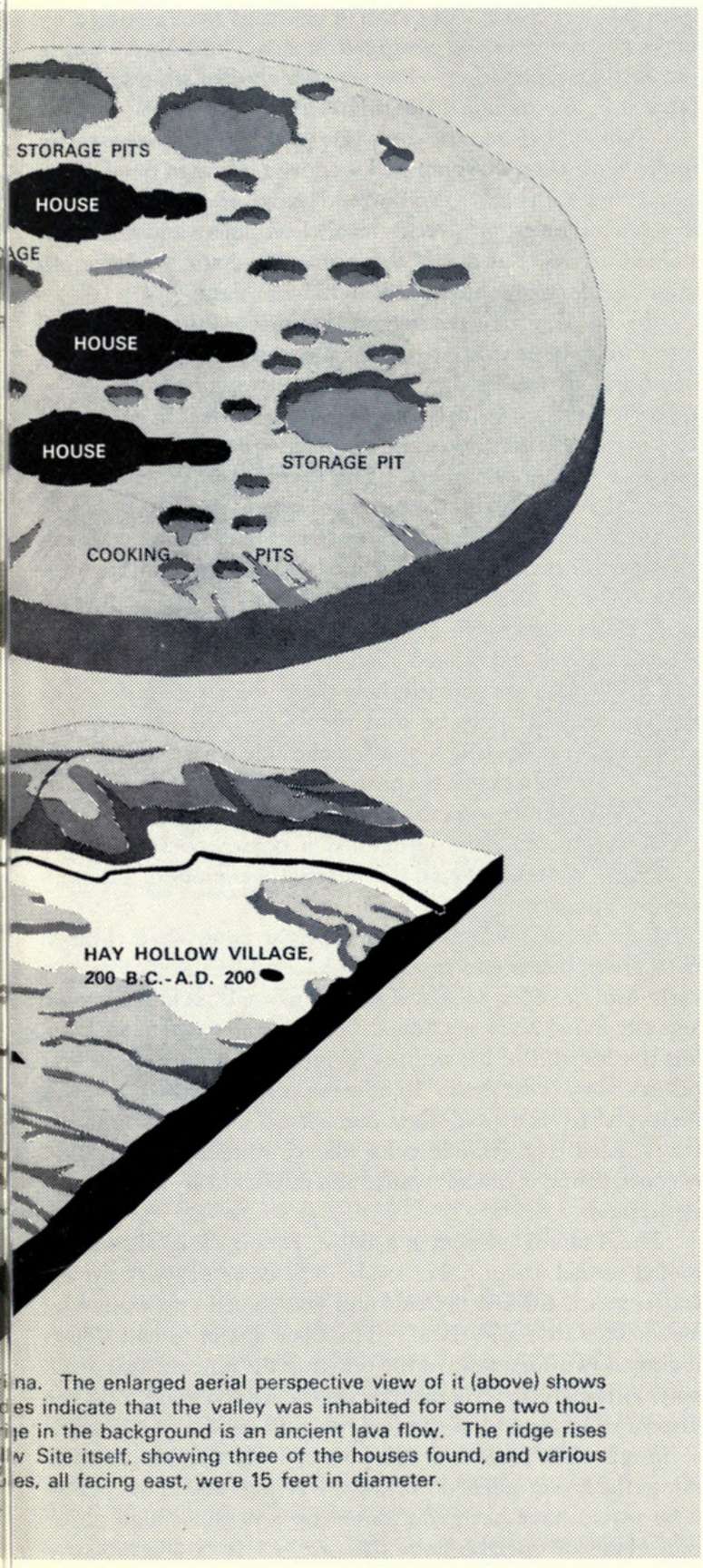


Map at left locates a 20 square mile section of Navajo Country, the location of Hay Hollow and other excavation sites. Carbon-1 sand years. The dry stream bed fills only after heavy rains. Th 500 feet above the valley floor. At top is a section of Hay H cooking and storage pits. Most pits were three feet deep. The

AERIAL PERSPECTIVE PROJECTIONS BY LIDO LUCCHESI

V SITE

by PAUL S. MARTIN, Chief Curator Emeritus, Anthropology



na. The enlarged aerial perspective view of it (above) shows es indicate that the valley was inhabited for some two thou- ge in the background is an ancient lava flow. The ridge rises v Site itself, showing three of the houses found, and various es, all facing east, were 15 feet in diameter.

ABOUT 2,000 YEARS AGO, in eastern Arizona, a small group of Indians was wresting a living from a formidable and arid area. Their living pattern was centuries old, for their forefathers had hunted big mammals—mastodons, horses, camels—and probably had eaten nuts, berries, seeds and roots. When the big game became extinct, they hunted smaller animals—deer, mountain sheep, rabbits—and continued to gather and eat wild plant foods. Sometime prior to A.D. 1, they had heard about planting seeds (corn) to produce food; and they had begun in a dilatory fashion to experiment with this novelty. Eventually, the use of this new plant profoundly modified the way of life of all later Indians.

This, in capsule form, was what we knew or thought we knew about Hay Hollow Valley, eastern Arizona, in 1963. Our suppositions were based on our knowledge of the cultural history of the area and on our comprehensive examination of the valley.

Since 1963, we have been seeking new directions and values for our archaeological researches. One of our chief aims was to discover, trace and describe the evolution of the social and cultural development in a restricted area.

The catch-all phrase "social and cultural" means: man's adaptation to his total environment, social and physical; his ability to adjust to changes in the environment; his social institutions, such as rules of marriage, definition of kin-folks, connections—blood and social—between persons and families; rules of descent and inheritance; inventory of artifacts—tools of stone, bone and of fired clay (pottery); methods of making artifacts and their functions; houses; places o worship; ritual; clothing; foods and methods of preparing—and so on. In short, it includes everything man does, thinks, creates. One may say that this *is* culture and one might organize these categories into three segments, the economic, social, and religious subsystems. If any segment of this delicately balanced articulation of components is disturbed by change of climate, by warfare, by movements of people, by any demand or strain, the other subsystems or segments probably will also change accordingly.

To work out the social-cultural system in this little valley, we had first to examine the valley with care and to determine the chronological spread, the geographical boundaries, and the range of cultural diversity as represented by sites.

This we have done in part. We know the valley was first settled by 1000 B.C. or earlier, inhabited continuously until A.D. 1350, at which time it was abandoned. The valley is roughly 20 miles long and from 2 to 10 miles wide. The cultural variability ranges from hamlets occupied seasonally by hunters and gatherers through villages of pit-houses, through villages of a few surface contiguous rooms to very

large villages of contiguous rooms several stories in height.

We have excavated and reported on two of the larger, latest villages; we are now engaged in investigating the earlier end of the time scale. For the past two summers, we have concentrated on Hay Hollow Site, occupied between 200 B.C. and A.D. 200 by a hunting-gathering folk who were in the process of adopting and adapting to corn agriculture. The work has been done with the support of National Science Foundation and National Science Foundation Undergraduate Participation Program.

Although analyses are incomplete and conclusions tentative, I should like to give you a glimpse of what we found and what we think about it.

This ancient village is located on a gently sloping terrace or shelf that stands about 30 feet above the Valley floor. The Valley was once watered by a permanent stream, but now carries water to its parent stream, the Little Colorado River, only during and after heavy snow or rain.

The crude huts that once sheltered the hunters-gatherers were protected from the violent wintry winds by a pink, shaggy sandstone cliff some 60 feet in height. Scattered about at the bottom of this rocky outcropping are huge roundish boulders that look as if they had been tumbled there by giants.

The countryside was pleasing, and although arid, was not a barren, sandy wasteland. On the contrary, pinyon and juniper trees were common and although not more than twenty feet in height, presented a pleasing contrast to the pink and gray cliffs. Near the stream grew wild walnut trees and willows, the bark of which could have been used to make a brew with aspirin-like characteristics. The average annual rainfall was 13 inches.

The reddish soil produced a score or more of wild plants and grasses, most of which the Indians utilized for food, medicine, or dye. A few of the more common plants still present in the area are barberry, beargrass, goose-foot, groundcherry, Indian rice grass, mallow, mountain tea (*Ephedra*), plants of the mustard family, saltbush, sagebrush, squawbush, yucca.

In the Valley were several other contemporary villages similar to ours, hence social contacts were available.

This, then, was the scene of primitive human activities some 2,000 years ago—a valley where water was available, game present, with an abundance of vegetal foods waiting to be harvested, wood for constructing houses and for use in fires, and stones of all varieties from which tools and implements could be fashioned.

The village 2,000 years later, as we first saw it, was recognized as an "early" site only because of the well-trained, sharp eyes of the observers. The tell-tale signs were occasional slabs of sandstone reddened by fire, bits and pieces of chipped flint, chunks of tough igneous rocks that were battered, large boulders that had been transported to the site by man to be used as cores from which usable flakes could be struck, and portions of milling stones. No sign of a house or of pottery.

Now, two years and thousands of man-hours later, we know a great deal about the physical appearance of the site, and a little later we shall be able to make statements concerning the social life and order of the village.

A random sample of 60% of the entire site was examined and excavated and 90% of all features (houses, firepits, storage pits, charcoal stains) were completely excavated. All stone chips, stone tools, milling stones and fire-cracked rock were saved and taken to our field headquarters for weighing, measuring, classifying, description and tabulation. Samples of dirt from which fossil pollen might be extracted were taken from 200 key spots. All pieces of charcoal were salvaged by means of tweezers and wrapped in heavy aluminum foil to prevent contamination. Twenty-two chunks were sent to a laboratory for carbon 14 dating.

If you had visited the site while work was in progress, you might have been disappointed. Indeed, some of our visitors asked "where is it?" You would have seen piles of sifted dirt, stakes, holes, pits, rocks, leveled-off places and charcoal-stained areas. But out of this apparent chaos, we have obtained an amazing amount of significant data.

Preliminary analyses suggest that most of the features fall into three major clusters, each separated from the others by one hundred feet or so. Each cluster contains from one to three houses, one to three large pits (6 to 12 feet in diameter) and many smaller pits, some of which served as hearths and some as storage chambers. The firepits and general refuse areas all lie downwind from the houses.

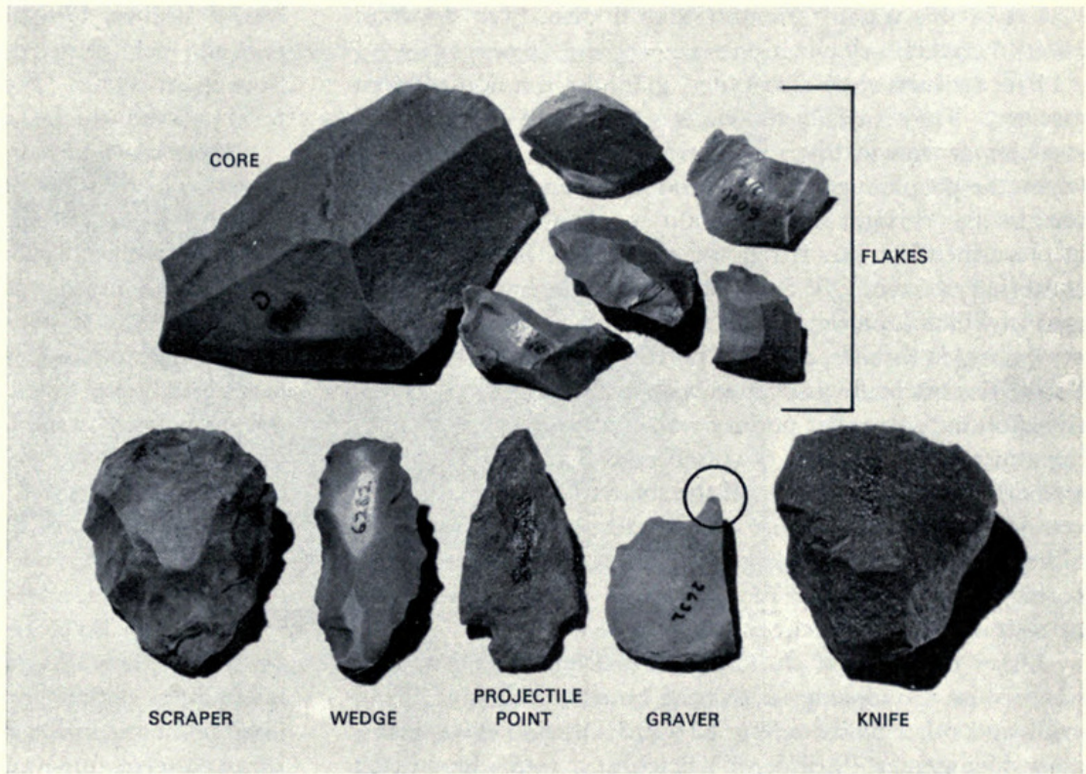
Each house was round, about 16 feet in diameter, and was provided with a saucer-like dirt floor, the center slightly lower than the rim. Around the rim or edge, juniper or pinyon-wood poles were set in holes. The poles were placed about 6 inches apart and leaned slightly toward the center of the house. We are not sure just how these poles were fastened at the top-side. It may be that they were tied together like those of a tepee, leaving a small smoke hole where all the poles met; or the poles may have been slightly arched and fastened to a superstructure so as to form a dome-like hut. In this case, the house would have resembled a contemporary Apache wickiup. We tend toward this latter interpretation, although we are guessing.

The interstices between the upright poles were chinked with grass, brush and mud, very much like the chinking in early American log cabins. Great hunks of this chinking were actually found on house floors. The chinking *was* mud, leaving the imprint of grass, fingerprints, brush and twigs, and preserved by great heat. In other words, when the house was destroyed by fire (and they had *all* burned), the chinking was roasted to brick-like color and consistency! This kind of construction is called "wattle and daub," or by the Spanish term, *jacal*.

The Indians entered the house by crawling through a roofed tunnel about 6 feet long. The covered entryway always opened toward the east and was roofed and walled by means of wattle and daub. The floor of the tunnel sloped slightly downward toward the center of the house. It is probable, although the evidence for this is not too good, that the eastern or outer end of the tunnel could be closed by means of upright slab-doors or a skin portiere. As the crawling visitor to the house reached the house—or west end of the tunnel—he would have been confronted by a two-foot-high partition made of upright slabs that curved in a gentle spiral

The drawing at right shows how a prehistoric "wickiup" might have looked. Pit houses were constructed with a series of posts in a circle. The posts were pulled together into a dome shape and covered. The covering material used at Hay Hollow was most probably mud daub. All of the houses found at Hay Hollow had been destroyed by fire.

Examples of Southwest Indian stone tools, all taken from Hay Hollow Site. Large stone at top is a typical core, from which flakes are struck (right). These flakes are then shaped into various tools. Lower row, left to right, a scraper, used on wood, bone and skins; a wedge, for splitting bone or wood; a projectile point, for hunting; a graver, for carving designs and personal marks on stone, wood and bone; and a knife, used for cutting meat and leather. The tools shown came from different cores, some flint, others quartzite. Relative frequencies of tools in a specific area of the site may give clues to the function of that area; thus, presence of cores, flakes, and debris may indicate that the area was a tool manufacturing area; presence of both knives and scrapers might indicate a food and skin processing area.



toward the rear, leaving a space just wide enough to accommodate a thin person. This partition was placed there as a kind of deflector to keep cold draughts from striking and scattering the embers of the fire or from chilling the occupants.

The interior furnishings of the house were simplicity itself: a small fire hearth, a few covered food storage pits, a milling stone or two, a few stone knives and perhaps several skins that served as cushions or blankets.

It may be of interest to note that all houses of this type as well as all later pit houses in the Southwest were provided with east-facing tunnel entrances and with deflectors. In fact, the ventilator tunnel and shaft found in almost all southwestern kivas (religious structures) of later times evolved from the earlier entry-tunnel and likewise opened toward the east or southeast. Further, almost all kivas were supplied with deflectors—some of which were painted.

Near the east or outer opening of the house tunnel were two firepits. These may have been used for household cooking since the interior hearth was used exclusively for heat or light.

Each cluster of houses was adjacent to several large pits and many smaller ones. The large ones may have been furnished with pine boughs and furry skins and in these some of the family may have slept as do the contemporary Apache Indians. Conversely, they might have served as barbecue pits or for food storage.

The numerous smaller pits were undoubtedly used in connection with cookery of some kind. Some may have been utilized for "cooking" flint rock or to put it more elegantly, for thermal treatment of flint cores.

Don Crabtree, of Idaho State Museum, Pocatello, Idaho has demonstrated that untreated flint (chert) is fractious and difficult to flake. Long, slow thermal treatment (48 hours or more) and slow cooling of raw, unworked flint nodules makes

them glassy in appearance and as easily worked or chipped as glass or obsidian (volcanic glass). Natural glass is the easiest of all rocks from which chipped or flaked implements (arrow-points and the like) may be made. An expert can detect a thermal-treated flint tool at a glance.

By means of tedious counting, classifying and even weighing of over 50,000 worked or chipped pieces of flint, of over thousands of fire-cracked sandstone slabs, of tough igneous-rock hammers, of milling stones, of pottery fragments, so that the distribution of the frequencies of each tooltype could be plotted on site maps, we have an excellent idea of the village's "activity-structure." By this, I mean the *kinds* of work programs that were carried on and *where* the work was actually accomplished and *who* did it. This type of information is essential if we wish to make statements about how the village was organized for doing certain jobs and who was involved in this organization. This, in turn, gives us clues about the social organization.

The artifacts were distributed spatially in a non-random manner. That is to say the various tools were not scattered in a haphazard way but, rather, were left more or less exactly where the people used the tools and left them. We are fairly certain that certain tasks were almost always accomplished in prescribed places. It follows, then, that when we find a clustering of a tool type in a specific area, we have found the area in which a particular job was done.

Potsherds (broken pieces of pottery) are a good example. Potsherds are chiefly associated with hearth areas. This distribution indicates that pottery was used primarily for cooking and not for storage. Two more facts about the pottery strengthen this hypothesis: all the sherds are sooty, and the vessels are of so small a size as to almost preclude the possibility of their use as storage containers. Incidentally, this pottery may be among the earliest in the Southwest, because it was surely present at 400 B.C. or earlier.

Other examples of clusterings of tool types are 1) milling stones were found only in or near houses. Since reducing seeds and other foods to flour or paste is the job of women in most documented "primitive" societies, it seems likely that milling was done by women in or near houses; 2) tools employed for cutting, sawing, hacking, and scraping occurred in large numbers in the vicinity of smaller roasting pits. This correlation indicates, at the minimum, that butchering and cutting of carcasses and scraping of skins for clothing were carried on near hearths; 3) an aggregation of the bases or stem-ends of projectile points and quantities of stone flakes suggested the area in which the men of the group manufactured projectile points. After a hunt, spear or arrow shafts were brought home for re-use. If the tip of the projectile point had broken off when striking and wounding the game, the basal portion would remain in the shaft and could be replaced by a new point.

The location of the work areas is thus spotted by plotting the frequency distributions of each tool type and this is made possible by having "control" of the find-spot of each chip, artifact and sherd.

Now, from these data what can we say about the social units that performed tasks necessary for the day-to-day survival of the group? At the moment, only a few suggestive hypotheses can be made. Our analyses must proceed further before we can say more.

Each house probably housed a single family—father, mother, and 2 or 3 children. The residence pattern was probably neo-local. This term implies that upon marriage, the newlyweds built a new house. This is in contrast to the husband taking up residence with his wife's family (matrilocal) or the wife, with her husband's family (patrilocal). Cooking was mostly done outside by means of stone-boiling, by roasting, or by barbecuing. We don't know if the families living in each cluster were related by blood, or brought together by similar work tasks.

Up to this point, I have merely described the site, our findings, and our tentative hypotheses. I have dealt exclusively with events, details and particulars. As a basis for further studies, these particulars are important; but we must take the next steps, the first one of which is to generalize from these details. We are eager to go on to discuss the cultural process, which is one of the goals of anthropology.

When our analyses are complete, we will possess a set or a network of functionally related culture elements, like building blocks all put together, articulated in working order to produce a whole–a *system*. The structural units of our system comprise some of the things I have mentioned: type and size of house and its relation in space to other houses; cooking and storage pits; kinds of tools and pottery; foods and methods of preparing; specific areas where certain tasks were carried on; division of labor; probable composition of work groups and of social organization; and forces that intergrated the people into a functioning society.

This is a *system* as seen at a *single point in time*, and must be formulated before we can make comparisons or deal with culture processes and regularities or "laws"—our ultimate goal.

A process involves change with continuity; a process is the study of how a "system" at 2,000 years ago is transformed into a different "system" at A.D. 500 or A. D. 1,000 or at any later point in time. Process, then, represents views of cultural patterns undergoing change. It is like a movie with one frame (a system at a single point in time) succeeding another. The viewing of this movie is basic to our task. But it is not all.

Our final goal is to seek trends and *causes* of human behaviour. Culture exhibits certain lawfulness—it is not irregular or capricious. If we study events (systems, culture processes) with the view of discovering their regularities, we shall perceive that cultures behave in accordance with fixed and universal laws. By "law," I mean a statement of a constant relationship between two or more classes of phenomena under stated conditions. For example, the more adapted and and specialized a culture, the less adaptable it becomes. Hence, its downfall is a probable outcome of its successes, as in dynastic Egypt.

It will be some years before we can formulate the laws from our Hay Hollow Valley data. They will be the product of many students working together and pooling their efforts. All we can claim now is that we have made a strong beginning.