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An Analysis of the Stone Artifacts from Gallinas Springs, New Mexico

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AN ANALYSIS
OF THE STONE ARTIFACTS
FROM GALLINAS SPRINGS, NEW MEXICO

by
Marvin G. Keller

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
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INTRODUCTION

The Project

The site of Gallinas Springs is a late Pueblo III - early Pueblo IV, five hundred room structure in west central New Mexico. It is situated in the Cibola National Forest in the foothills of the Gallinas Mountains approximately fifteen miles northwest of the town of Magdalena.

The excavation of Gallinas Springs was undertaken by a crew from Western Michigan University at the request of the National Forest Service in an effort to restore the site, which is being destroyed by an arroyo which courses through the middle of the site. The 1974 field season consisted of five separate operations: first, the test trenching of the midden area; second, wall trenching to determine the exact locations of rooms; third, salvage excavation of rooms being destroyed by the arroyo; fourth, random sampling of rooms still intact within the southern room block; and fifth, the restoration and stabilization of the excavated rooms.

To define the horizontal and vertical units the Operation (Op.)- Suboperation (Sub. Op.) system was used. Major operations were assigned alphabetical designations and suboperations numerical designations to separate horizontal space.
Thus the midden excavation was labeled "Op-A" and individual trenches in the midden were labeled "Ops-A1, A2, A3, etc.". Two room blocks eroded by the arroyo were designated "Ops-B and F". "Op-C" corresponded to work in the southern room block. Wall trenching operations were "C1, C2, C4, C6, C17, D1, E1, G1, and G2". The remaining "C" operations were random room excavations in the same area. Figure 1 (All Figures and Tables are found on pages 87-115.) is a partial map showing the locations of most of the operations.

Vertical units were assigned numerical designations. The units were excavated in arbitrary twenty centimeter levels unless a change in stratigraphy was apparent or a room floor was located, in which case excavations were transferred to natural or cultural levels. All room excavations were taken to at least floor level. In partially eroded rooms it was often reached within 40 centimeters of the surface. In rooms which were intact, the floor could be as deep as three meters below the surface. Wall trenches were excavated to average depths of 20 to 30 centimeters below the surface.

Geology of the Area

A summary of the nature of the lithic resources is necessary in order to understand the nature of the stone tool
industry. No geological surveys of the vicinity of Gallinas Springs have been completed, but surveys of the adjacent Puertocito quadrangle (Tonking 1957) and Dog Springs quadrangle (Givens 1957), within ten miles of the site, give sufficient information as to the nature of the stone material available.

Beds of sandstone, mudstone, shale, siltstone, and limestone in sequential order from the Permian, Triassic, and Cretaceous periods are the earliest deposits in the area. Outcrops of these early alluvial deposits are common in the area. The more prevalent outcrops are the volcanic deposits of tuffs, rhyolites, and basalts, which were laid down in the Tertiary period.

The stone tools recovered reflect the variety of mineral resources available.

Definition of Terms

Several basic conceptual units will be used to organize the data in this study. Category, class, and type are the commonly used and confused terms in the field of archeology and yet are essential to any attempt to order large masses of data. The intent is not to defend any particular definition of these terms, but merely to define the words as used in this report. A category is a grouping of artifacts or
other units of study by any defined set of characteristics. Category is therefore meant to be a broad term for a group of artifacts without referring to the criteria that formed the particular grouping. A class is a taxonomic category defined by observed, inherent characteristics shared by all members of that category. It is a means of providing "pigeon holes" for every artifact. Typical classes are "side-notched projectile points", "full-grooved axes", "laterally retouched flakes", etc. This definition closely corresponds to Rouse's use of "descriptive modes" (Rouse 1960:313). A type is a category which may correspond to a class, but which shows definite cultural, chronological, or distributional significance. For example, if a class of artifacts such as corner-notched projectile points were to appear only in burials, they would be referred to as burial or ceremonial objects. This would make them types as they now have cultural and distributional importance within the site or sites. This definition closely models Krieger, who states, "the type as a whole is also understood to occupy a definable historical position, that is its distribution is delimited in space, time, and association with other cultural material." (Krieger 1944:277-278).

The first step in any lithic study is to organize the data into workable groupings, which is best accomplished by
setting up classes as defined above. Once this is done, these classes can then be examined for correlations that may merit type distinctions and for formulating hypotheses of the cultural patterns. The classes which are used in the following pages are based on the categories of stone tools set up by Kidder (1932) and later modified by Woodbury (1954). The definitions of many of the classes are taken directly from these earlier studies, however at times I have elaborated on them to better fit the artifacts recovered from Gallinas Springs.

In describing the features of the artifacts, terms such as face, edge, and end are used. So there will be no confusion about what is being described, Figure 2 illustrates the specific points to which each of the terms refer.

In each category the mean, maximum, and minimum measurements were taken. Unless it is otherwise noted, these are measurements taken from whole artifacts. Fragment measurements are given if it is felt that they are significant or if the only artifacts recovered in the class are fragments.

Over four hundred stone artifacts and over six hundred fragments of waste chippage were recovered from Gallinas Springs. The following report is an effort to organize these data to aid in obtaining maximum information of the early inhabitants.
GROUND STONE

Metates

Metates are generally identified as large stone pieces which have been ground upon with another smaller stone (mano). They are normally associated with food preparation. Subclasses of metates are distinguished by the shape and wear on the grinding surface.

Slab metates (Fig. 3)

Number: 4 whole; 4 fragments

Size: Mean L- 37.5 cm. W- 25.7 cm. Th- 13.1 cm.

Min. L- 30.0 cm. W- 17.0 cm. Th- 6.5 cm.

Max. L- 41.0 cm. W- 30.0 cm. Th- 20.0 cm.

Material: All vesicular basalt.

Slab metates have a single large concave grinding surface which covers an entire face of the tool. These tools are pecked to shape, which varies in outline from rectangular to ellipse.

Trough metates (Fig. 4)

Number: 5 fragments

Size: Mean Th- 3.6 cm. (from fragments)
Min. Th- 3.0 cm.
Max. Th- 4.0 cm.

Material: 1 vesicular basalt; 4 sandstone.

Trough metates have a central grinding area on one face that usually extends the whole length of the metate. These differ from slab metates in that the whole surface is not ground and the edges are raised, leaving a depressed area in the middle or "trough". The ends of these metates can either be open or closed; unfortunately, the metates from Gallinas Springs are too fragmented to allow for this identification. The depth of the trough varies from five centimeters in the basalt fragment to less than one centimeter in each of the sandstone fragments.

Discussion

The shape of the grinding surfaces of metates have shown a series of changes through time. The earliest forms are small basin metates with a central grinding area; these are found in the Sulphur Spring stage of the Cochise culture (6,000-4,000 B.C.) (McGregor 1967:127). These persist until Basketmaker III (500 A.D. to 700 A.D.), where the trough metate, with its larger grinding surface, begins to replace them. During the Pueblo II period (900 A.D. to 1100 A.D.)
the slab metate appears and becomes the dominant form by Pueblo III (1100 A.D. to 1300 A.D.) (Woodbury 1954:58-59).
The high number of slab metates at Gallinas Springs cross dates the site well within the Pueblo III period, which is already determined through pottery sequences.

Missing from Gallinas Springs are mealing bins, which are stone lined pits in which slab metates are often found. Such bins are common in Pueblo sites of this time period. In a recent report from Prieta Vista, a small Pueblo site in north central New Mexico, it is suggested that the appearance of mealing bins is a possible indicator of the permanence of the settlement (Bice and Sundt 1972:44). If such a hypothesis is true, one would expect mealing bins in a site as large as Gallinas Springs.

An interesting feature of the metates is the relative frequency of the material from which they are made. At Gallinas Springs nine out of fifteen metates are made from vesicular basalt, while all of the slab metates are of this material. Although sandstone and basalt metates are common in Pueblo sites, the dominance of one material over the other is usually proportional to the availability of that material. At Gallinas Springs it does not appear to be simply a matter of availability but includes a degree of preference. Although
basalt is the most common material used for metates, sandstone is the dominant material in other classes, such as manos; even though both kinds of stone are available. The use of basalt for a grinding surface therefore is a conscious choice made by the individuals who used the tools. The porous surface of basalt gives an ideal coarse grinding surface and the hardness of the stone gives it an increased durability. The use of a sequence of surface textures from coarse to fine in grinding food is traced back to the inhabitants of Pueblo Bonito; the use of at least three different textures of grinding stones is still common (Judd 1954:133-134). In most reported cases basalt serves as the metate stone for the first coarse grinding of meal.

There is no special pattern of metate distribution in either shape or material at Gallinas Springs (See Table I). While the fill of room C-10 contains the largest number of metates, it is also twice the size of the other rooms at the site.

Manos

Wedge-shaped manos (Fig. 5a)

Number: 10 whole; 11 fragments

Size: Mean L- 25.3 cm. W- 11.3 cm. Th- 2.6 cm.
Min. L- 21.5 cm. W- 10.0 cm. Th- 2.0 cm.
Max. L- 28.5 cm. W- 13.0 cm. Th- 3.1 cm.

Material: All sandstone.

Wedge-shaped manos have two grinding surfaces on one face which meet at an angle. These surfaces are most probably the result of a back and forth grinding motion. Five manos are ground flat on the opposite face, giving evidence that these manos are not restricted to a single grinding pattern. All of these manos are pecked to a rectangular outline shape with ends and edges ground smooth.

**Triangular-shaped manos** (Fig. 5b)

Number: 4 whole; 9 fragments

Size: Mean L- 22.3 cm. W- 9.5 cm. Th- 2.0 cm.
Min. L- 20.5 cm. W- 8.0 cm. Th- 1.5 cm.
Max. L- 24.0 cm. W- 11.0 cm. Th- 2.5 cm.

Material: All sandstone.

Triangular manos have two adjoining grinding surfaces on a single face. The angle at which these two surfaces meet is more acute than on the wedge manos and the wear is more pronounced. Four of the triangular manos are ground flat on the opposite face. The outline shape of these manos varies from rectangular to ellipse with ends and edges often ground.
Convex-shaped manos (Fig. 6a, 6b)

Number: 6 whole; 12 fragments

Size: Mean L- 22.6 cm. W- 10.9 cm. Th- 3.7 cm.
      Min. L- 20.5 cm. W- 9.0 cm. Th- 2.3 cm.
      Max. L- 27.0 cm. W- 12.5 cm. Th- 4.1 cm.

Material: 9 sandstone; 9 vesicular basalt.

Convex manos are distinguished from wedge and triangular manos by the absence of two adjoining grinding surfaces on one face. Instead, there is a single convex grinding surface. These may have been used in a back and forth grinding motion, but do not show the angular wear of the other two subclasses. The grinding surface varies from convex to nearly flat. The outline shapes vary from rectangular to ellipse and all are pecked and ground to shape. Additional finger grooves are ground on the edges of five of the basalt manos. This is the only subclass of manos in which basalt is used; generally these basalt specimens tend to be thicker and the surfaces flatter than the sandstone ones.

Discussion

Manos are often the most numerous stone artifacts found
at Pueblo sites, yet little space is given to them in site reports. In Judd's analysis of the stone material from Pueblo Bonito only twelve manos were shipped to the lab for analysis while 424 were left in the field (Judd 1954:138). Kidder noted that he regretted not paying better attention to mano distribution in the field, since the sample saved was too small for adequate analysis (Kidder 1932:71). Woodbury's (1954) analysis of the stone material from the Jeddito district of northeast Arizona offers the only complete analysis from which patterns of shape and function could be generated.

Woodbury offers a general scheme for the development of mano styles in Arizona. Basketmaker III and Pueblo I period manos are all used on a single face with a convex to flat grinding surface. From Pueblo II to Pueblo IV times the number of manos with two or more grinding surfaces (wedge and triangular) increases, however, in these late periods single surface convex manos still persist. Woodbury offers three possible explanations for the persistence of these different mano styles: first, these manos represent separate modes of grinding; second, mano style is simply a matter of choice on the part of the user and is not related to grinding functions; or third, mano styles were preserved by different kin groups (Woodbury 1954:81).
The distribution of the different mano shapes at Gallinas Springs does not suggest any kin group or functional distributions; wedge, triangular, and convex manos are found distributed throughout the entire site and often are found together in the same rooms.

The relationship between mano shapes may also be considered to be a function of the degree of wear on a mano. Triangular shaped manos are generally smaller in size than either the convex or wedge shaped manos. Rinaldo has recognized this in eastern Arizona Pueblo sites and suggests the triangular shape represents an advanced stage of wear of the convex mano (Martin, Rinaldo, et. al. 1964:64). Both Kidder (1932:70-71) and Woodbury (1954:73) have observed these differences and conclude that triangular manos represent well-worn wedge shaped manos. The manos from Gallinas Springs offer support to Kidder and Woodbury. The fact that triangular shaped manos represent advanced stages of use is evident in their general shape as well as their reduced size. Three of the nearly complete triangular manos are worn to the degree that makes it difficult to grasp them for grinding, while all of the wedge shaped manos are sufficiently thick on at least one edge to merit further use. Two of the larger triangular manos recovered appear to be intermediate between
wedge and triangular forms. Although their general cross section is triangular, one edge is not worn as deeply as the other.

It has generally been accepted that mano shape conforms to the shape of the metate surface. The convexity of the mano grinding surface when viewed from an edge will be similar to the concavity of the metate surface. In this respect Woodbury sees convex manos correlated with trough metates and wedge and triangular manos with flat (slab) metates (Woodbury 1954:80-81). There is no direct association of mano shapes with metate shapes at Gallinas Springs to either support or deny the hypothesis. The amount of curvature from end to end may also be the result of wear, which is well illustrated in the wedge and triangular shaped manos. The wedge manos are flat when viewed edgewise (See Fig. 5a), while the triangular manos are convex (See Fig. 5b). The two triangular manos that are considered as intermediate between the two classes are also flat. While grinding, stone will wear away quickest at the focus of the applied force. In two-handed manos more force is applied at the ends where the hands rested, causing the ends to wear down sooner. As the wedge shaped manos were used not only would their cross sectional shape change, but also the convexity of the working surface.
This is not to say that manos do not conform to the surface of the metate, but that it is erroneous to assume that a flat grinding surface will produce a flat surfaced mano; other factors to be considered are the amount and direction of force applied to the manos. Other variables, such as, the nature of the stone used and the nature of the stone ground upon as well as the material being ground must be recognized before arriving at a judgement on the cause of mano shapes and sizes.

In examining the manos from Gallinas Springs it becomes apparent that the classes of mano shapes may not be as important in making cultural interpretations as is the nature of the stone used in manos. Sandstone and vesicular basalt were the two common materials used for manos and metates. Vesicular basalt was used for 64.3% of the total number of metates recovered, but was only used in 17.6% of the manos. Either basalt was not preferred for mano usage or these manos were used for specialized grinding functions.

There are three features on basalt manos that offer support to the hypothesis that these were specialized grinding tools. First, is the appearance of finger grips. In examining the frequency of these on certain classes of manos, Woodbury notes that manos of coarse grained sandstone had finger grips more often than those of fine grained sandstone.
The only possible explanation he gives is that these manos may have been used for the first grinding of meal, when finger grips would be more necessary than in later regrindings when less force was required (Woodbury 1954:81). In the manos from Gallinas Springs only six have finger grips, and five of these are of vesicular basalt. If we accept Woodbury's explanation for finger grips, then basalt manos may have been used for the initial grinding of meal.

A second important feature is the porous nature of the stone. As previously discussed, vesicular basalt is often used in metates for its ideal coarse grinding surface. It would be logical to assume that it would serve the same purpose in a mano.

The shape of vesicular basalt manos is restricted to flat or convex cross sections; no wedge or triangular shaped manos are of this stone. The wedge or triangular shape is considered the result of a strong back and forth grinding motion. If no basalt manos have these shapes, we can infer that a different grinding motion was used. This grinding motion may indicate a different grinding function.

Another significant point is the distribution of manos throughout the site. The nine basalt specimens were taken from five rooms which are in close proximity (See Table I and
Fig. 1). Although other mano shapes are found in these same
rooms, the restricted distribution of basalt manos is unusual.
The classes of sandstone manos are distributed more randomly
over the entire site.

Although the sample of floral remains is very small
(only 22.5 grams of charred corn cobs), charred corn cobs
are largely associated with basalt manos. Three of the five
rooms from which basalt manos were recovered contained 42.5%
of the total charred corn at the site. The association be­
tween corn and basalt manos is not conclusive, but hopefully
further work will demonstrate that basalt manos were used in
the initial stages of grinding meal from maize and that this
initial grinding was restricted to a particular area of the
site. When all points are considered, this seems to be the
most logical conclusion.

The relatively low frequency of basalt manos at the site
may be the result of their durability. No basalt manos are
less than three centimeters thick and none are worn beyond
further use. If basalt manos are more durable than sandstone,
they will not be replaced as often. Although basalt manos are
brittle and give durable grinding surfaces, it is apparent
that they break easily. Only two whole basalt manos were
recovered and one of these broke during shipping. These
manos were also used conservatively. Two halves of a single mano were recovered; one half shows additional use after it had been broken. One surface is much smoother than that of the adjoining fragment and the fractured edge shows additional grinding that obliterates part of the original fracture. The conservative use of a particular material usually indicates that it was not readily available, but geologic reports of adjacent areas indicate that basalt outcrops are common (Givens 1957; Tonking 1957). The reuse of the stone in this single example is difficult to interpret. One can only suggest that outcrops of vesicular basalt may have been in relatively inaccessible places and that the collection of this stone for use in manos and metates was an infrequent venture.

Manos are the chief grinding implements at any Pueblo site. Although they are commonly associated with food preparation, they were used for a variety of other grinding functions. Two manos, a wedge and a triangular mano, show traces of red and yellow ochre stains on their grinding surfaces, which indicates these tools were also used for grinding pigments. The variety of possible grinding purposes for manos and the large numbers commonly found at sites makes these utilitarian implements valuable tools in cultural inter-
pretation. More emphasis should be given to these artifacts than has been given in the past.

Small Grinding Stones

This category is made up of a variety of stones small enough to be held in one hand that show evidence of grinding on at least one face. They are normally associated with a variety of functions.

Disc-shaped stones (Fig. 7a, 7d)

Number: 8 whole; 1 fragment

Size: Mean L- 11.2 cm. W- 9.4 cm. Th- 4.7 cm.
      Min. L- 7.1 cm. W- 6.9 cm. Th- 3.4 cm.
      Max. L- 14.4 cm. W- 11.9 cm. Th- 6.4 cm.

Material: 6 sandstone; 3 basalt.

Disc-shaped stones are circular in outline with grinding occurring on at least on face; this face is generally ground flat. Two of the sandstone manos are ground flat on both faces. Modification of the edges varies, with all of the specimens showing evidence of pecking or grinding. The pecking may have been done in shaping the stone, but in three stones pecking is to such a degree on one edge as to indicate that these stones were used as hammerstones as well as grind-
ing stones. The edges of two sandstone specimens are beveled from additional grinding on the edges.

Irregular-shaped stones (Fig. 7b, 7c, 7e)

Number: 6 whole

Size: Mean L- 13.7 cm. W- 7.9 cm. Th- 5.4 cm.
Min. L- 9.9 cm. W- 4.8 cm. Th- 4.5 cm.
Max. L- 18.0 cm. W- 10.8 cm. Th- 7.0 cm.

Material: 1 vesicular basalt; 3 basalt; 1 granitic stone;
1 sandstone.

This subclass is a very broad category set up to collect the miscellaneous tools of whole and broken cobbles that show evidence of grinding on at least one face, but do not show any evidence of having been intentionally shaped. It is an awkward category to work with due to the variety of stones included, but at the same time it is necessary to employ it in order to avoid lengthy descriptions of each artifact. All of these stones are whole or broken cobbles that were picked up and used probably to fulfill an immediate grinding need. All are ground flat or convex on one face and three show evidence of use as hammerstones on at least one edge.
Discussion

These small grinding stones persisted through time at Pueblo sites with little change in shapes or numbers. In the pre-pueblo Cochise culture small oval and disc-shaped grinding stones are found as early as 6,000 B.C. (McGregor 1967:127).

The variety of shapes and sizes of small stones is almost matched by the variety of identified functions. Kidder puts the disc-shaped stones into the category of "rubbing stones", which he has specifically set aside for this shape of tool (Kidder 1932:72). Woodbury lumps these artifacts with other irregularly shaped ground stones, as done here, under Kidder's same heading (Woodbury 1954:90-91). Both agree that the disc-shaped stones may have served a variety of functions, but their well worn flat surfaces indicate they were rubbed on other hard stones and most likely served as one-handed manos.

More important is the context in which these nine disc-shaped manos occur. All were taken from the fill of three rooms; the same three rooms that seven of the nine basalt manos were found. (See Table I and Fig. 1). From this association and the location of the rooms two hypotheses are suggested. First, this may add further evidence that the rooms, as previously discussed, are specialized grinding areas. These
small stones, which also show some pecking on the edges, may have served as the tools, along with basalt manos, that were used in the initial grinding of meal. Small handstones would work well in breaking up seeds and corn for further grinding. The second hypothesis is that these stones either are tools from earlier inhabitants or from a different kin group. This is supported by the fact that the three rooms within which these tools are found are all located in a line on the inner row of rooms (See Fig. 1). The architecture and wall abutments indicate that this inner row was built first and the outer row of rooms was added on afterwards. The sample is small, but these associations are too unusual to be ignored. Hopefully both of these hypotheses will be tested when more information is available.

The many irregular pieces of ground stone have been the most problematical. Kidder admitted that it was guesswork, but he adopted the term "floor-polishers" for these smooth irregular stones (Kidder 1932:64-65). Presumably they were used to smooth an adobe floor after it dried. Unfortunately this term has remained and is popularly used in identifying most small ground stones. Ground stones from Prieta Vista have been called "floor and wall abraders" because "the wear contour indicates it was used against non-
rigid surfaces" (Bice and Sundt 1972:88). Although it is unclear what the wear contour is, I assume they are referring to the fact that the ground surface is rounded rather than flat. If this is the case, then it should be pointed out that the shape of the surface is dependent on many other factors besides the material being worked (See Pages 14-15). In any case the term "floor-polishers" has apparently been overused. Although the general category "irregular-shaped grinding stones" is broad, it is adequate and much less misleading.

Large Ground Cobbles

Number: 3 whole

Size: Fig. 8a L- 12.5 cm. W- 11.3 cm. Th- 6.8 cm.

Fig. 8b L- 18.8 cm. W- 13.0 cm. Th- 8.4 cm.

Fig. 8c L- 15.6 cm. W- 11.9 cm. Th- 7.5 cm.

Material: granitic stone.

The three cobbles in this class are distinguished from the other grinding stones by three features: all three are similar in their large size; all are ground to similar shape which varies from ellipse to roughly circular; all show grinding over the entire surface on faces, ends, and edges. These artifacts are large enough to serve as table stones and yet small enough to be hand-held grinders. The total
working of the entire surface suggests they were probably used as both. Only one (Fig. 8c) shows characteristics of having been pecked and ground, one face is ground flat while the center is pitted from pecking.

There is little associated material to offer an explanation of use. All were found in room fill, however two were found within the same room (C-10), which also contained a large number of disc-shaped grinding stones.

Cobbles similar to these three have not been reported elsewhere, but it is likely that other authors have grouped these with other grinding stones.

Flat Ground Stone
(Figs. 9, 10)

Number: 69 fragments
Size: Mean Th- 2.1 cm. (from fragments)
Min. Th- .7 cm.
Max. Th- 3.3 cm.
Material: 8 rhyolitic tuff; 61 sandstone.
This is a broad category consisting of a variety of flat stone fragments. All pieces of stone show grinding on at least one face and are generally very thin. It is difficult to assign any functions to these pieces, since many are small (less than 10 cm. in length) and were found scattered
throughout the fill of various rooms. All fragments, with one exception, are shaped by pecking along the margins. The exception is a thin fragment recovered near the surface of room C-13 (Fig. 9d). This piece is cut through halfway and then broken to a roughly circular shape (Fig. 10). This is the only piece of stone recovered from Gallinas Springs that was worked in this manner; similar stones have not been reported elsewhere in the Southwest.

Worked flat stones are common at most Pueblo sites and they are normally given a number of functional names; griddle stone, hatchway stone, hearth stone, and floor stone are only a few. However, without any special associations with floors, fire hearths, or doorways, such distinctions could not be made.

Three small sandstone fragments are charred on one surface indicating use with fire, and they may be called griddle stones. Five stones have red ochre stains on a face indicating they were used in grinding pigments. Other than these cases, no specific functional groupings could be made.

The further sorting of these pieces into separate categories is not felt necessary. The quantity of small fragments recovered indicates that sandstone was used commonly as a grinding base. It is unusual that only one fragment was found in the midden. Even though these pieces are small, they
evidently were not immediately discarded after breaking.

Hammerstones
(Fig. 11)

Number: 52 whole

Size: Mean L- 8.3 cm. W- 5.8 cm. Th- 4.5 cm.

Min. L- 3.7 cm. W- 2.9 cm. Th- 1.8 cm.

Max. L- 12.0 cm. W- 10.9 cm. Th- 7.9 cm.

Material: 16 basalt; 20 granitic; 16 tuff.

Hammerstones are roughly shaped stone that come in a variety of shapes and sizes. They generally are battered on at least one end; specimens that have been well used are battered over the entire surface and are often spherical in shape.

Hammerstones are usually the most numerous artifacts found at Pueblo sites. They are used for a number of purposes, from use in the various stages of tool manufacture to food processing. The use of three different kinds of stone for hammerstones may have been a conscious selection on the part of the users. Basalt and granite are considerably harder substances than tuff and may have been used for different purposes. However, the random distribution of these kinds of hammerstones throughout the site (Table I) and the lack of correlation with specific kinds of flakes or other
manufactured tools suggests these stones were used for a broad range of functions. If the hammerstones were randomly selected for use in an immediate task, then their distribution should represent the availability of the different stone resources. If this statement is true, then we can conclude that basalt, tuff, and granitic materials were all available in equal abundance, since there is nearly an equal proportion of each in the hammerstones (30.8% basalt, 30.8% granite, 38.4% tuff). The geologic reports of adjacent areas by Givens (1957) and Tonking (1957) would support this.

There is a near random distribution of hammerstones over the site with the exception of room C-10. This large room contained 31.4% of the total hammerstones recovered (See Table II). It also contained a higher number of manos and other grinding stones (See Table II).

Eight hammerstones are beveled along at least one edge. Similar beveling is noted by Woodbury on discoidal hammerstones from northeast Arizona. He concludes that the beveling is the result of holding the stones in the same angle while in use, which caused them to wear evenly (Woodbury 1954:90). This beveling was noted above on disc-shaped grinding stones (See page 20). Since the beveled edges of these grinding stones are too smooth to be the result of hammering, one would
conclude that grinding the edges of these stones at a constant angle would cause the same beveling as noted on the hammer-stones.

Polishing Stones
(Fig. 12)

Number: 14 whole; 5 fragments

Size: Mean L- 4.5 cm. W- 3.4 cm. Th- 2.2 cm.
     Min. L- 2.8 cm. W- 2.0 cm. Th- 1.2 cm.
     Max. L- 6.1 cm. W- 4.3 cm. Th- 2.9 cm.

Material: granite pebbles

These are generally small stones that show a high degree of smoothing on the surfaces. Such pebbles are commonly identified as polishing stones for use in smoothing and polishing pottery.

When examined under a twenty power stereoscope, only four of the identified polishing stones showed minute parallel striations on the surface. These are also the only four to show a relatively high degree of polish. These stones are the most fine grained of all the specimens recovered, so it is likely that the degree of polish on the pebbles is not only dependent on the amount of use, but also on the grain size of the pebbles. Woodbury has noticed similar pebbles which lack a high degree of polish. He simply refers to them
as unused pebbles that were probably picked up for their beauty (Woodbury 1954:97).

In addition to these nineteen pebbles, two pebbles were found which are polished and battered on one or both ends (Fig. 11g, 11h). These are placed in the hammerstone class, but it is recognized that they probably served dual functions.

The distribution of these pebbles throughout the room fill of the site is random with the exception of room C-10, which contained six pebbles (31.6% or the total). The clustering of these artifacts along with the other classes of artifacts, distinguishes this room as a work area that served a variety of functions.

**Grooved Abraders**

This class is composed of stones which were probably used for a variety of purposes, but have the common denominator of possessing one or more grooves on their faces.

**Single-grooved stones** (Fig. 13)

Number: 3 whole; 3 fragments

Size: Fig. 13a  L- 9.7 cm. W- 7.2 cm. Th- 4.0 cm.  
Fig. 13b  L- 9.9 cm. W- 6.7 cm. Th- 3.2 cm.  
Fig. 13c  L- 10.1 cm. W- 9.0 cm. Th- 4.9 cm.
Material: 3 sandstone; 3 basalt

All the artifacts in this subclass have a single large groove on one surface. The width of this groove is not less than one centimeter in any object, however, the depth of the groove varies from nearly a centimeter to only a few millimeters. All specimens are ground smooth on both faces.

**Disc-shaped multiple grooved stone** (Fig. 14b)

Number: 1 whole

Size: L- 11.5 cm. W- 11.2 cm. Th- 3.4 cm.

Material: sandstone

One face of this stone shows a series of small grooves along the margins. The opposite face has a single large groove through the center. The edges are ground to give the stone a circular shape.

**Grooved and polished stone** (Fig. 14a)

Number: 1 whole

Size: L- 8.4 cm. W- 5.1 cm. Th- 2.0 cm.

Material: basalt

One face of this stone contains two narrow parallel grooves, while the other face is polished. It is triangular in cross section.
Small pieces of ochre (Fig. 14c, 14d)

Number: 2 fragments

Size:  
Fig. 14c  L- 1.7 cm.  W- 1.4 cm.  Th- 1.5 cm.
Fig. 14d  L- 2.0 cm.  W- 1.4 cm.  Th- 1.6 cm.

Material: red ochre

These two small fragments have thin grooves along one face. One piece (Fig. 14c) has two deep intersecting grooves, while the other (Fig. 14d) has four parallel grooves on one face.

Discussion

The grooved abrader is another category of artifacts whose functions are diversified. Most commonly these artifacts are referred to as "arrow-shaft straighteners" or "arrow-shaft smoothers". Woodbury (1954:110) identifies such tools as having grooves that are rounded in cross section and large enough to accommodate a slender wooden shaft. The six large-grooved implements from Gallinas Springs would fit this definition. However, one object (Fig. 13a) has a red ochre stain within the groove marking it as a possible pigment grinding tool.

The remaining grooved objects have much smaller grooves and may be identified with a variety of possible functions;
such as, sharpening awls, shaping beads, grinding edges of chipped tools, and other bone and woodworking functions. The pieces of ochre are not hard enough to serve as abrading tools; the grooves cut into their surfaces are likely the result of their being used as pigment sources.

The distribution of the grooved stones offer little data to further explain their functions. All were scattered throughout the fill of various rooms. It is room C-10 that contained the most abraders; the disc-shaped and two large abraders were found in its fill.

Grooved and Notched Implements

Tools of this class are distinguished by having grooves or notches on one or more surfaces to facilitate hafting. The subclasses are divided by shapes, which are suggestive of their functions.

Mauls (Fig. 15)

Number: 2 whole

Size: Fig. 15a L- 15.6 cm. W- 9.4 cm. Th- 8.0 cm.

Fig. 15b L- 11.3 cm. W- 9.7 cm. Th- 8.0 cm.

Material: vesicular basalt

These are large heavy stones blunted on both ends and
were probably used for heavy hammering. Both specimens are fully grooved. One object (Fig. 15a) is flat on both ends, rectangular in shape with all surfaces ground flat. The other (Fig. 15b) is rounded on both ends and is spherical in shape.

**Axes (Fig. 16b-d)**

Number: 3 whole

Size:  
- Fig. 16b L- 8.7 cm. W- 5.3 cm. Th- 2.8 cm.  
- Fig. 16c L- 11.8 cm. W- 7.2 cm. Th- 3.4 cm.  
- Fig. 16d L- 8.2 cm. W- 5.3 cm. Th- 3.0 cm.

Material: basalt

These tools are all ground to a beveled tip. Two of the specimens (Fig. 16b, 16c) are crudely chipped to shape with only the beveled end showing grinding; both are notched for hafting. The third specimen (Fig. 16d) is a finely ground tool and is fully grooved. The sharpened end shows tiny flake scars from use; the blunted end shows a minor degree of battering.

**Hammers (Fig. 16a, 16e)**

Number: 1 whole, 1 fragment

Size:  
- Fig. 16a L- 10.3 cm. W- 6.4 cm. Th- 3.6 cm.
Fig. 16e  L— W— 4.1 cm.  Th— 2.9 cm.

Material: basalt

The difference between hammers and mauls is basically size; hammers are much smaller and not as heavy as mauls. One hammer (Fig. 16a) is slightly grooved on one face with a tapered body; the tapered end is ground off flat. The other specimen (Fig. 16e) is a fine grained basalt with all surfaces ground smooth; only one face is grooved. The broken end of this specimen shows a few small flake scars along the broken edge indicating it was used after breaking.

Hoes  (Fig. 17b)

Number: 1 whole

Size: L— 22.2 cm. W— 9.1 cm. Th— 4.2 cm.

Material: tuff

This single specimen is roughly flaked to shape. It has a ground notch on one edge and is beveled at both ends. There are a series of hinge fractures along one end, the faces of which show wear through intentional grinding or use polish. It is similar in shape to those objects inferred to be hoes by Kidder. (1932:58-59).
Discussion

Although all of the grooved implements were ground to shape, the amount of work expended in making these tools varied. Two axes (Fig. 16b, 16c) are ground only on the cutting edge; except for minor grooving, the rest of the surface is in a rough state. Only one axe (Fig. 16d) is finely ground over the entire surface and it is the only one that is fully grooved. It was originally believed that the cruder axes represented an early stage of manufacture, but closer examination revealed that the beveled edges showed minor fracturing, which was probably the result of use.

The two hammers differ in size, shape, and working. One (Fig. 16a) is ground to a roughly triangular shape, but not finely smoothed. The other (Fig. 16e) is finely smoothed over all surfaces with ends and edges neatly squared off. It would appear that much more time was expended in producing this implement. The fact that it shows evidence of continued use after breaking indicates its user wanted to extend the life of an implement that he had spent extra time in making.

The two mauls are the largest of the grooved implements. The grooves running around the perimeter are very large, nearly a centimeter deep, indicating these objects may have been hafted to fairly large handles. Neither maul is heavily...
battered; either they were not greatly used or else they were not used in working hard material. Kidder (1932:55) concludes that this lack of battering indicates mauls were not used on stone and were probably used in driving stakes or wedges.

All of these objects were scattered throughout the room fill. There is no specific distribution to suggest further functions.

Large Pounding Stone
(Fig. 17a)

Number: 1 whole

Size: L- 14.9 cm. W- 10.4 cm. Th- 7.8 cm.

Material: basalt

This is a heavy stone which is pecked to shape. It is tapered at one end which is heavily fractured. The size of this object and the battering at one end suggest that it was used as a pounding stone of some sort.

Beads and Pendants

The distinction between beads and pendants is arbitrarily defined by the location of the perforation. Beads are perforated centrally and pendants are perforated near one edge.
**Turquoise beads** (Fig. 18a, 18f, 18g)

Number: 2 whole; 1 fragment

Size: Fig. 18a L- 1.7 cm. W- .7 cm. Th- .3 cm.
Fig. 18g L- .8 cm. W- .8 cm. Th- .4 cm.

Material: turquoise

All three are finely ground, polished, and perforated by alternate drilling from each face. The largest is ground to a rectangular shape, while the remaining two are circular.

**Turquoise pendants** (Fig. 18b, 18d, 18e)

Number: 2 whole; 1 fragment

Size: Fig. 18b L- .9 cm. W- .7 cm. Th- .2 cm.
Fig. 18e L- 1.4 cm. W- 1.2 cm. Th- .2 cm.

Material: turquoise

These three pendants are all roughly triangular in shape. They are ground, polished, and perforated by alternate drilling from each face.

**Siltstone pendant** (Fig. 18h)

Number: 1 whole

Size: L- 4.1 cm. W- 3.2 cm. Th- .4 cm.

Material: siltstone

This large pendant is ground on both faces and polished.
on all edges. One face has two intersecting lines engraved on it.

**Serrated pendant** (Fig. 18c)

Number: 1 whole

Size: L- 1.9 cm. W- 1.2 cm. Th-.2 cm.

Material: unidentified white chert-like material

The pendant is ground on both faces with ground serrated edges.

**Discussion**

Turquoise is commonly used in ornamental objects throughout the Southwest. The prevalent use of turquoise at Gallinas Springs is not unusual, since turquoise is still available in nearby mountains. In addition to the worked objects, five fragments of raw turquoise were also found, indicating that work on the turquoise was done at the site.

The largest pendant, made of red siltstone, is similar to material used at Pueblo Bonito which Judd (1954:101) has identified as claystone or red shale. The pendant recovered from Gallinas Springs is unusual in that the edges are highly polished and the surfaces show smoothing only by grinding.

The small serrated pendant is the most unusual item.
Stone pendants of this design are uncommon at most Pueblo sites in as much as intricate carving of this design is usually restricted to shell ornaments. Although there were a few shell beads and pendants found at Gallinas Springs, none are designed in this manner.

With the exception of the serrated pendant, all of the beads and pendants are manufactured in a similar way. Each is ground to its particular shape and then polished. All perforations are done by alternate drilling from both faces.

Three of the turquoise pendants were found in the midden and two beads were surface finds; the rest were scattered in room fill. There is no clustering of these objects to suggest they were manufactured by a single individual or a specific group of people. The similarity in workmanship is most likely the result of general manufacturing techniques shared by all craftsmen at Gallinas Springs.

Small Sandstone Tablets
(Fig. 19)

Number: 1 whole; 2 fragments
Size: L- 7.4 cm. W- 4.8 cm. Th- .7 cm.
Material: sandstone

A few striking similarities are shared by these three sandstone pieces: all have been ground to shape; the edges
are beveled and ground much finer than the surface; all have traces of ochre on at least one face. In addition, two of the specimens (Fig. 19a, 19b) are roughly trapezoidal in shape; the right hand edge on each has been minutely serrated; and a red ochre stain occurs on one surface of each. The third fragment (Fig. 19c) is similar to the second trapezoid fragment (Fig. 19b) in that they both have yellow ochre stains on one face and red ochre stains on the other. No doubt, all three served as small grinding stones for pigments. The serrated edges of two of the specimens may have served as cutting edges.

Similar objects have not been reported from other sites. Small sandstone fragments are common, but they lack the serrated and beveled edges found on these artifacts.

Stone Balls
(Fig. 20)

**Sandstone concretions** (Fig. 20a, 20c)

Number: 2 whole

Size: Fig. 20a L- 2.4 cm. W- 2.3 cm. Th- 2.3 cm.

Fig. 20c L- 2.4 cm. W- 2.4 cm. Th- 2.3 cm.

Material: sandstone

These are naturally occurring sandstone concretions;
they show no working.

**Magnetite ball** (Fig. 20b)

Number: 1 whole

Size: L- 3.8 cm. W- 3.4 cm. Th- 3.2 cm.

Material: magnetite

This artifact has been intentionally ground to the shape of a ball.

**Discussion**

Stone balls are not uncommon at Pueblo sites; Woodbury (1954:188-189) has identified a number of concretions at sites in Arizona. He types them as ceremonial or ritual objects, since many were found in Kivas or associated with burials. The magnetite ball is a puzzling object. Other spheres at the site are battered hammerstones of tuff and basalt, but the magnetite ball is the only one that is intentionally ground to shape; its shape is the result of manufacture rather than use.

It is certainly worth noting that all three of these balls were found in the same general area. Unfortunately the field notes do not give the exact locations of these stones, but all were uncovered in the C-6 wall trenching...
operation (See Fig. 1) approximately twenty centimeters below the surface. Further excavation in this area may offer more information on these artifacts.

Rectangular Stones
(Fig. 21)

Number: 3 whole

Size:  
Fig. 21a L- 10.3 cm. W- 2.6 cm. Th- 2.1 cm.  
Fig. 21b L- 9.0 cm. W- 3.1 cm. Th- 2.0 cm.  
Fig. 21c L- 6.9 cm. W- 1.8 cm. Th- 1.5 cm.

Material: 2 basalt; 1 siltstone

These three stones are grouped together only because they have been ground to a similar shape. Features on the stones suggest dissimilar functions. The largest specimen (Fig. 21a) has been finely ground on all surfaces and three of the surfaces are highly polished. All corners are squared off and both ends are ground flat. One end is ground to a chisel-like tip. Along this tip the grinding is interrupted by tiny flake scars, the only area on the tool to show any flake removal. This flaking along the tip suggests the tool served as a chisel of some sort. The second object (Fig. 21b) is not well worked and appears to be in an early stage of manufacture; little about its use could be inferred. The third artifact (Fig. 21c) is made from siltstone and has been
slightly tapered to one end. All surfaces have been ground smooth and the tapered end has been rounded. It is unlikely that this object served the same function as the first one (Fig. 21a), since this material is too soft to be heavily used.

Similar rectangular shaped stones are rare at other Pueblo sites. Often cylindrical stones are found, called "medicine cylinders", which are believed to have served a religious function (Kidder 1932:92; Judd 1954:287; Woodbury 1954:183). In the Cebolleta Mesa region Dittert (1959:317) found similar rectangular objects which he refers to as "medicine sticks", but these are much smaller than those from Gallinas Springs.

Unfortunately the location of these objects offers little help in explaining their use. Only the larger chisel-like artifact was found near the floor level of a room (C-8), but little other material was found with it. The others were found near the surface of separate rooms.

Foot Effigy
(Fig. 22)

Number: 1 whole

Size: L- 8.0 cm. W- 3.5 cm. Th- .7 cm.

Material: basalt.
The working on this stone is minimal. At the broad end are four ground-in notches, which form five separate ridges or "toes". Along the edges and opposite end there is evidence of fine grinding and even a polish in spots. Both faces are smooth, but do not appear to be intentionally ground. It appears that the natural shape of the stone has not been greatly altered, only modified by adding notches and rounding off the edges.

Effigies are commonly found at Pueblo sites. At Pecos, Kidder (1932:112) recovered 263 human effigies and 228 animal effigies, most of these are clay, only seven are stone. Less common are foot effigies which are complete artifacts and not fragments from larger figurines. Rinaldo (Martin, Rinaldo, et al. 1964:82) identified a foot effigy in the material recovered from an eastern Arizona Pueblo site. It is made from an unidentified material and has eight grooves cut into one surface. Bluhm (1957:64) has also recovered a foot effigy from the Sawmill Site in New Mexico, but it is made from clay, not stone. The effigies most similar to the one at Gallinas Springs are those from Tularosa Cave (Martin, Rinaldo, Bluhm, et al. 1952:146-147); they are made from an unidentified stone, ground to shape, and described as bear paw effigies rather than human foot effigies.
Although numerous effigies have been described, there has been a failure on the part of most archeologists to assign a function to these objects. The word "effigy" simply means a representation of a person or object, but it often takes on a religious connotation. Many of the full figurine effigies have been found in kivas and therefore are identified as ceremonial objects. One wonders about effigies that are not found in kivas. Do they merit being typed as ceremonial objects simply on the basis of similar style and workmanship? Perhaps archeologists have too readily let artifacts without obvious utilitarian functions fall into Binford's (1972:95-96) "sociotechnic" and "ideotechnic" realms without thoroughly examining the associated data.

The effigy from Gallinas Springs was recovered from the fill of a large room (C-10), approximately one and a half meters below the surface and one meter above the room floor. Within the same and in adjacent levels, several sherds, which were reassembled into a large jar, were found. There are a number of correlations between effigy shape and vessel design that suggest the former is actually a multipurpose pottery-making tool.

The large vessel has two five-row bands of indented coils on its shoulder and neck. The notched end of the "foot"
fits into these indentations (See Fig. 23). To better demonstrate this point, an experiment was conducted in an effort to duplicate the indentations found on the jar. Coiled sherds of fresh clay were indented using the notched end of the "foot" in a rolling motion. The similarity in design of the original potsherds (Fig. 24a) and the experimental one (Fig. 24b) is striking. Exact replication was difficult due to the number of variables, such as, the moisture of the clay when impressed, the size and kind of temper used, the amount of smoothing done after indenting the coils, and the moisture of the clay when smoothed. The best results were obtained when both the tool and the clay were moistened before being impressed and then allowed to dry a few hours before smoothing. It is important to note that only five rows of coils are indented on the jar, which is the maximum that could be indented at any one time with the tool.

Another correlation links the shape of the tool in the area of the "ball of the foot" and the rim shape of the vessel. The artifact fits almost perfectly within the outflared rim of the vessel (Fig. 25). Thus the "foot" serves not only as a decorating tool, but also as a tool for shaping and smoothing the rim.

A third important feature of the artifact is the fine

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wear and polish that occurs on the edges. It is likely that this wear is the result of using the edges to smooth or scrape the coils of the vessel. The slight convexity of the outer edge of the tool matched the concave inner surface of the jar.

After identifying these correlations, an effort was made to locate other sherds within the site that might also have been designed by the tool. No other sherds found show the same pattern, however, within the other levels of the same room, sherds were found decorated with "thumbnail impressed" coils. Although no illustration is shown, it is apparent that the "heel" of the effigy works equally well in producing these indentations. While these correlations do not prove that all foot effigies are pottery tools, they do show that viable utilitarian functions of unusual items can be demonstrated if the proper data is present. It is probably time to re-evaluate other foot effigies and effigies in general.

Ground Siltstone  
(Fig. 26a-c)

Number: 3 fragments

Size:  
Fig. 26a  L- 5.0 cm.  W- 3.4 cm.  Th- 3.1 cm.  
Fig. 26b  L- 5.4 cm.  W- 4.0 cm.  Th- 3.5 cm.  
Fig. 26c  L- 4.5 cm.  W- 3.7 cm.  Th- 3.4 cm.
Material: siltstone

These small stones have been ground on all surfaces. The first two objects (Fig. 26a, 26b) are tapered at one end. The fragments are too small and the grinding on the surfaces is too general to assign any function to these artifacts. Woodbury (1954:99) has noted similar stones from the Jeddito district in Arizona and simply refers to them as "irregular flat abraders".

The distribution of the three objects does not offer any clues to their use; all were found near the surface of three separate rooms.

Ground Galena Cube
(Fig. 26d)

Number: 1 whole
Size: L- 2.7 cm. W- 2.7 cm. Th- 1.8 cm.
Material: galena

This cube has been ground on all surfaces. It is likely that it served some "sociotechnic" or religious function as it was associated with a burial (Burial 5) in room C-13 (See discussion of burials on page 79).

Galena is rare at other Pueblo sites. Judd (1954:102) refers to the occurrence of galena at Pueblo Bonito, but he does not mention how much was found or whether it has been
Crystals

Quartz crystals (Fig. 27)

Number: 8 fragments

Size: Mean L- 2.5 cm. W- 1.3 cm. Th- 1.0 cm.
Min. L- 1.2 cm. W- .6 cm. Th- .5 cm.
Max. L- 4.4 cm. W- 2.3 cm. Th- 1.6 cm.

Material: quartz

Only one crystal shows evidence of having been worked (Fig. 27h). It has been ground and battered on all surfaces and on both ends. The other smaller crystals show no working except for minor fracturing of the tip.

Calcite crystal (Fig. 28b)

Number: 1 large conglomeration

Size: L- 10.0 cm. W- 7.0 cm. Th- 5.0 cm.

Material: calcite

This large crystal formation is battered on both ends.

Discussion

Quartz crystals are assumed to have served religious or ceremonial functions among prehistoric Pueblo peoples. At
Pecos, Kidder (1932:106-110) found fourteen quartz crystals and fragments associated with five separate burials. From Pueblo Bonito, Judd (1954:289) discusses a single ground quartz crystal in a room associated with other "altar paraphernalia". In addition, Woodbury (1954:191-192) cites the ethnographic accounts of the Hopi use of crystals in a variety of religious functions. However, only one of the eight crystals, the largest well-ground crystal (Fig. 27h), found at Gallinas Springs was associated with a burial, Burial 5, which also contained the ground galena cube. Of the remaining crystals, three were found in the midden and four were in the fill of separate rooms. The data from Gallinas Springs suggests that only well-ground crystals were regarded as special ceremonial objects. The other unworked crystals may have served a religious purpose, but their distribution does not indicate such a function.

Close examination of the small unworked crystals offers evidence that they may have served a utilitarian function. Under a twenty power microscope it was found that the tips of each were broken and some showed minute flake scars. Since quartz crystals are hard stones, it seems probable that they were selected for use as drilling or engraving tools. Since they are already pointed, no further modification is
needed to make them into usable tools. Rinaldo arrived at the same conclusion when he noted similar wear on the tips of the crystals from Higgins Flat Pueblo in western New Mexico (Martin, Rinaldo, et al. 1956:123). However it should be pointed out that the tips of crystals are the most fragile portions and minor fracturing could occur while extracting the crystals or through constant handling.

The calcite crystal formation was found in room C-10 associated with the other fossils in Figure 28. Its function is uncertain, but the association with the other nonutilitarian items suggests a special religious use.

Fossils

**Septarian formation** (Fig. 28a)

Number: 1 whole

Size: L- 12.5 cm. W- 10.5 cm. Th- 7.0 cm.

Material: sandstone and limestone.

This unusual object is a naturally occurring formation (identified by Dr. Thomas Straw, Dept. of Geology, Western Michigan University). Many of the projecting sandstone ridges show minor grinding.

**Bivalve shells** (Fig. 28c, 28d)
Number: 1 whole shell; 1 half shell

Size:  Fig. 28c L- 3.8 cm. W- 3.6 cm. Th- 1.7 cm.
      Fig. 28d L- 4.1 cm. W- 3.4 cm. Th- 2.7 cm.

Material: limestone

Both pieces have been ground and show striations on all surfaces. The first artifact (Fig. 28c) is also highly polished.

Discussion

Although fossils are commonly found at Pueblo sites, little is known of their use. Kidder (1932:110) identified a number of marine fossils from Pecos and concluded that they were collected from "idle curiosity" rather than for any special religious purposes. He based this conclusion on the fact that they were all found in rubbish heaps. Woodbury (1954:190) also notes the appearance of fossils in rubbish heaps, but still hints at the possibility of a ceremonial function. But in both cases the fossils recovered are unmodified and do not show the grinding that appears on the fossils from Gallinas Springs. The only worked fossils are those identified by Judd (1954:291-292) from Pueblo Bonito. They were found in room fill and in kivas, which leads him to believe that they must have served a ceremonial function.
The distribution of fossils at Gallinas Springs is interesting. The fossils and the other two items in Figure 28 were recovered from a single room (C-10), and all were located within forty centimeters of the room's floor. Complete excavation of the floor was not accomplished in the first season's work, but the large size of the room, the appearance of these artifacts, the location of at least three human burials (unexcavated) on the floor, and the location of a wind deflector on the floor distinguish this room from the other excavated rooms. Since the fossils are similar to those found in kivas by Judd, it is probable that this room may have served some ceremonial purpose. Hopefully a complete excavation of the room floor will better explain its use.

Miscellaneous Stone Pieces

Number: 23 mostly fragments
Size: (measurements not taken)
Material: 9 basalt; 14 tuff

Unfortunately no classification is complete without this category. Into it fall all the stone material that could not be adequately identified. The basalt stones are large pieces that show battering on some edges. In most cases the battering
is minor; no doubt, they were used to fulfill an immediate need and were then discarded. The tuff fragments, angular, battered, and broken, are probably wall stones. All were found in room fill with no special associations with other material to suggest possible uses.
CHIPPEP STONE

Projectile Points

Projectile points are small pointed artifacts which were presumably attached to wooden shafts. The subclasses are distinguished by the size and shape of the implements.

Triangular concave-base points (Fig. 29a-f; Fig. 30a)

Number: 11 whole; 19 fragments

Size: Mean L- 1.9 cm. W- 1.1 cm. Th- .3 cm.
Min. L- 1.5 cm. W- .8 cm. Th- .2 cm.
Max. L- 2.4 cm. W- 1.8 cm. Th-.4 cm.

Material: 22 obsidian; 8 chert

These small points are randomly flaked and show no characteristic notching. All points in this category have concave bases.

Corner-notched points (Fig. 29i-k; Fig. 30f)

Number: 4 whole; 7 fragments

Size: Mean L- 3.3 cm. W- 1.8 cm. Th-.5 cm.
Min. L- 2.5 cm. W- 1.5 cm. Th-.4 cm.
Max. L- 4.2 cm. W- 2.2 cm. Th-.6 cm.

Material: 6 obsidian; 5 chert
These points tend to be larger than the triangular points. The diagnostic feature is the notching that occurs near the base.

**Barbed points** (Fig. 29m; Fig. 30c)

Number: 1 whole; 1 fragment

Size: Fig. 29m L- 3.1 cm. W- 1.3 cm. Th- .3 cm.

Material: 1 obsidian; 1 chert

On barbed points the notches run diagonally to the mid-line of the point. On the two examples from Gallinas Springs the notches are located near the base.

**Triangular side-notched points** (Fig. 29n; Fig. 30d)

Number: 2 fragments

Size: Fig. 29n L- 1.2 cm. W- 1.2 cm. Th- .3 cm.

Material: 1 obsidian; 1 chert

On these points the notching occurs much higher on the body of the projectile point than on the corner notched ones. The notching is also much smaller and finer.

**Serrated points** (Fig. 29l; Fig. 30d)

Number: 1 whole; 1 fragment

Size: Fig. 29l L- 3.2 cm. W- 2.0 cm. Th- .4 cm.
Material: chert

The diagnostic features are the serrated edges on the body of the projectile point. The complete specimen (Fig. 30d) is also notched in the same manner as Figure 29m.

**Triangular pointed-base point** (Fig. 29g; Fig. 30b)

Number: 1 whole

Size: Fig. 29g L- 2.6 cm. W- 1.1 cm. Th- .5 cm.

Material: chert

The base of this point appears to have been pointed by the removal of a single flake from each edge. This was accomplished on each side by a blow diagonally to the midline of the projectile point. The edges of the pointed base are flat and have not been retouched.

**Concave-body, concave-base point** (Fig. 29h; Fig. 30g)

Number: 1 whole

Size: Fig. 29h L- 2.7 cm. W- 1.7 cm. Th- .5 cm.

Material: obsidian

Most diagnostic of this point are the concave sides, which form a narrow body. The general shape is similar to that of a drill, but the tip does not show the blunting found on most drills (See page 61).
**Triangular convex-base point** (Fig. 29o; Fig. 30h)

Number: 1 whole

Size: Fig. 29o L- 1.2 cm. W- 1.0 cm. Th- .3 cm.

Material: obsidian

This is the smallest point recovered from the site. Its body form differs from the other triangular points in having a convex base instead of a concave base.

**Undiagnostic fragments**

Number: 7 fragments

Size: (no measurements taken)

Material: 2 obsidian; 5 chert

The fragments are mostly tips and midsections of bifacially worked tools which are assumed to be projectile points. There are no diagnostic features on these fragments to place them into subclasses.

**Discussion**

Fifty-eight projectile points and point fragments were recovered from Gallinas Springs. It is obvious from the number of points and the high number of animal bones that hunting played a major role in the subsistence activities at Gallinas Springs. The large number of small mammals,
such as, rabbits and other small rodents, as well as the large number of deer and antelope remains, indicate they were exploiting a wide variety of faunal resources. The distribution of the points throughout the site does not give any further information on the specific use or manufacture of each point style; nearly half of the total points were found in the midden, while the remaining were scattered in room fill (See Tables III, V).

The dominant point style at Gallinas Springs is the small unnotched triangular point, making up 60% of the total identifiable points. These projectile points are common throughout the area during the Pueblo III and IV periods, but the proportions of the triangular points to other point styles vary among the different sites. In northern Arizona Woodbury (1954:122-130) notes that small triangular points appear after the Pueblo II period, but are never as frequent as the other notched classes. From Prieta Vista, a small Pueblo III site north of Albuquerque, only one unnotched point was recovered, which is believed to be unfinished (Bice and Sundt 1972:82-83). Eighty miles southwest of Prieta Vista, in the Cebolleta Mesa area, small unnotched triangular points are most common during the Pueblo III period (Dittert 1959:555). The point styles from Gallinas Springs are most similar
to those from the Cebolleta Mesa which lies fifty miles north of Gallinas Springs. The possible relationship between these sites will be discussed later (See pages 76-77).

Another important feature of the projectile point collection is the relative frequencies of the lithic material from which the points are made. Obsidian accounts for 73.4% of the small triangular points and for 60.8% of the total points recovered, while chert is used in nearly 58% of all the larger notched points. The importance of obsidian will be discussed later (See pages 73-78), but it is apparent that obsidian was the preferred material for the projectile points at Gallinas Springs.

Crescent-shaped Object
(Fig. 30d; Fig. 31d)

Number: 1 fragment

Size: Fig 30d L- - W- 1.0 cm. Th-.4 cm.

Material: obsidian

This fragment is bifacially flaked. Kidder (1932:34-35) has reported similar objects at Pecos. He calls them ceremonial objects because they are too small, and their edges too blunt to be effective tools; in at least one case such objects have been associated with other "ceremonial paraphernalia". The artifact from Gallinas Springs had no particular
"paraphernalia" associated with it; it was found in the fill of a room (C-5).

Perforating Tools

Perforating tools come in a variety of shapes. The diagnostic feature is an intentionally pointed tip that has been dulled or flattened through use.

Bifacial drills  (Fig. 31g, 31h; Fig. 32d, 32e)

Number: 3 fragments

Size:  Fig. 31g L- 2.3 cm.  W- .6 cm.  Th- .4 cm.

Fig. 31h L- 3.0 cm.  W- 1.0 cm.  Th- .5 cm.

Fig. 32e L- 2.7 cm.  W- .9 cm.  Th- .5 cm.

Material: chert

All of these fragments are from drills that appear to have been broken in midsection. They are all bifacially worked. The tips of two are flattened, while the third is rounded.

Unshaped drill  (Fig. 31i; Fig. 32c)

Number: 1 whole

Size:  Fig. 31i L- 3.7 cm.  W- 1.4 cm.  Th- .6 cm.

Material: chert
This specimen differs from the other drill fragments in that its body has not been bifacially flaked; only the base shows a series of flake scars which serve to round it off. The tip is pointed by the removal of two long flakes from each edge.

**Thick pointed flakes** (Fig. 31a-c; Fig. 32a, 32b)

- **Number**: 4 whole
- **Size**: Mean L- 3.3 cm. W- 2.2 cm. Th- 1.0 cm.
  - Min. L- 2.7 cm. W- 1.7 cm. Th- .9 cm.
  - Max. L- 4.0 cm. W- 3.0 cm. Th- 1.2 cm.
- **Material**: 1 obsidian; 3 chert

These are large thick flakes that generally show retouching along one edge and are flaked to a point. The tips of three of the flakes are flattened.

**Thin pointed flakes** (Fig. 31e, 31f; Fig. 32f, 32g)

- **Number**: 1 whole; 1 fragment
- **Size**: Fig. 32f L- 1.8 cm. W- 1.1 cm. Th- .4 cm.
  - Fig. 32g L- -- W- 1.3 cm. Th- .4 cm.
- **Material**: 1 obsidian; 1 chert

These small flakes have been bifacially flaked along both edges to form sharp points. They resemble small pro-
jectile points—except that they lack any shaping of the base.

Discussion

In this study an arbitrary distinction has been made between drills and pointed flakes by restricting the term drill to those flaked implements that have a long, narrow, intentionally shaped body. The other two categories of pointed flakes show evidence of use as perforators by their distinctive blunting on the tips, but they have not been finely worked to a narrow body. It is obvious that the kinds of material perforated by these artifacts cannot be determined by their shape alone, but it is probable that the slender bifacial drills worked better in working hard objects, such as, stone or pottery. Their shafts appear to be much more durable, since they are nearly as thick as they are wide at the tips. The other flake tools may have served better in perforating softer objects, such as, bone, wood, and leather. Unfortunately the distribution of these tools throughout the site does not show any specific functional associations; most of the artifacts were found in the midden or wall trenches (See Table III).
Scraping and/or Cutting Tools

The separation of the following three categories is based solely on the location of retouch on the preform.

**Side scrapers** (Fig. 33a-c)

Number: 7 whole

Size: Mean L- 4.4 cm. W- 2.6 cm. Th- .7 cm.

Min. L- 3.2 cm. W- 1.9 cm. Th- .5 cm.

Max. L- 6.5 cm. W- 3.7 cm. Th- 1.0 cm.

Material: 2 obsidian; 5 chert

These artifacts are retouched along one lateral edge; four are bifacially retouched and three are unifacial. The curvature of the edge varies from straight to convex.

**Converging scrapers** (Fig. 33e-g)

Number: 4 whole

Size: Mean L- 4.0 cm. W- 3.0 cm. Th- .8 cm.

Min. L- 3.4 cm. W- 2.7 cm. Th- .7 cm.

Max. L- 4.8 cm. W- 3.4 cm. Th- .9 cm.

Material: 2 obsidian; 2 chert

These are all bifacially retouched flakes that are retouched on both edges and converge to a point. On one obsidian flake (Fig. 33g) the edges are ground flat, probably
through use. A single chert flake in this category shows minute flaking along the edges and is brought to a narrow rounded end rather than pointed.

**Rectangular scraper** (Fig. 33d)

Number: 1 whole

Size: Fig. 33d L- 3.5 cm. W- 2.0 cm. Th- .8 cm.

Material: chert

Both edges of this tool have been bifacially flaked. The tip is squared off and bifacially retouched, leaving three working edges on the flake.

**End scrapers** (Fig. 34a-c)

Number: 3 whole

Size: Fig. 34a L- 5.0 cm. W- 4.7 cm. Th- 1.0 cm.

Fig. 34b L- 4.4 cm. W- 3.8 cm. Th- .9 cm.

Fig. 34c L- 7.5 cm. W- 6.1 cm. Th- 1.5 cm.

Material: chert

These are large broad flakes that have a bifacially retouched edge on the opposite end of the bulb of force. Two of the flakes (Fig. 34a, 34c) have steep retouch along a lateral edge, which probably served to dull the edge in order that it could be safely hand held.
Notched flakes (Fig. 34d-f)

Number: 4 whole

Size: Mean L- 3.3 cm. W- 2.4 cm. Th- .9 cm.
Min. L- 2.5 cm. W- 1.8 cm. Th- .7 cm.
Max. L- 4.2 cm. W- 3.3 cm. Th- 1.3 cm.

Material: 1 obsidian; 3 chert

These flakes are retouched along a single edge. The notching is the result of unifacial retouch. Two of the chert specimens (Fig. 34d, 34e) are double notched, while the other two show a single notch.

Discussion

The term "scraper" is used here only as an arbitrary label to identify retouched flakes. It is not meant to refer necessarily to any specific function of these artifacts. A distinction between implements used for scraping and those used for cutting was not considered useful in this study, since all artifacts in the above categories would have worked equally well for both purposes. Semenov has been able to separate scraping and cutting tools by detecting microscopic wear patterns in the form of striations on the cutting edges of the tools (Semenov 1964:83-94, 101-113). The scrapers
from Gallinas Springs were studied under a stereoscope at seventy-five and at one hundred and fifty powers. Since no wear patterns were detected, no functional separation is made.

Notched flakes are often identified as "spokeshaves" and are commonly believed to have been used in shaping wooden shafts (Bice and Sundt 1972:71). The notched flakes from Gallinas Springs would fit this description, but one should hasten to point out that they may have worked equally well in shaping and cutting bone for awls, beads, or other implements.

It is interesting that obsidian is used in only 26.3% of the scrapers, whereas it is used in 60% of the projectile points. Although obsidian is easily worked and offers a very sharp edge, it is extremely brittle and fractures easily, which does not make it a practical cutting or scraping implement. If they were importing the obsidian over long distances, it is probable that they chose to use it most economically. Since other data indicates that they were not bringing in large pieces of obsidian (See pages 74-75), they may have been forced to restrict its use to smaller implements.
Preforms
(Fig. 35)

Number: 3 whole; 3 fragments

Size:
- Fig. 35a L- 3.8 cm. W- 3.0 cm. Th- 1.0 cm.
- Fig. 35b L- 3.2 cm. W- 2.4 cm. Th- .7 cm.
- Fig. 35c L- 4.5 cm. W- 2.5 cm. Th- .9 cm.

Material: obsidian

Preforms are stone pieces that show a number of large primary flake scars, but no evidence of secondary retouch. They probably represent the initial stage of shaping projectile points. Only one preform (Fig. 35c) is rectangular in shape; all others are triangular.

Retouched Flake Fragments

Number: 42 fragments

Size: (measurements not taken)

Material: 19 Obsidian; 23 chert

Into this category fall the numerous fragments that show evidence of edge modification, mostly retouch, but are too small to be adequately placed in another category.

Waste Chippage

This class represents the by-products of a flake tool.
industry, namely, all of the material that is discarded during the process of knapping stone tools. Although this category is often forgotten or ignored, it yields important data on manufacturing processes. The following subclasses of waste flakes represent sequential stages in the manufacturing process.

**Primary decortication flakes**

Number: 23 flakes

Size: (measurements not taken)

Material: 15 obsidian; 8 chert

These flakes represent the first stage in stone tool manufacture. They are the first flakes removed from a whole cobble in order to expose the clean inner surface. One surface of the flake is entirely rough cortex, while the other is a smooth originally interior surface possessing a bulb of force.

**Secondary decortication flakes**

Number: 170 flakes

Size: (measurements not taken)

Material: 95 obsidian; 75 chert

These flakes may be grouped with the other primary
flakes, since they both represent the initial decortication of a cobble. The secondary flakes still have cortex on one surface, but the same surface possesses one or more flake scars, indicating other flakes have been removed. The opposite surface possesses a bulb of force.

**Initial trimming flakes**

Number: 101 flakes  
Size: (measurements not taken)  
Material: 35 obsidian; 66 chert  
The surfaces of these flakes have no cortex material. They represent further trimming of the artifact or core after all cortex has been removed. Normally these flakes represent a stage of shaping the artifact.

**Thinning flakes**

Number: 5 flakes  
Size: (measurements not taken)  
Material: 4 obsidian; 1 chert  
As defined by Crabtree (1972:94), thinning flakes are those flakes removed from a preform to thin the artifact. They have a ground edge in the bulbar area and a small lip around the bulb. Generally these flakes are very small and
represent a final step in flake tool manufacture. Unfortunately this subclass is not as fruitful as hoped. There are very few flakes that can be identified as thinning flakes. Either the flakes were too small to be recovered, or they were broken before recovery making identification impossible, or this analyst is not experienced enough to adequately identify these flakes. Most likely all factors come into play.

**Unidentifiable debris**

Number: 176 flakes and fragments  
Size: (measurements not taken)  
Material: 53 obsidian; 123 chert  

Into this category fall all the small flakes and tabular fragments which could not be identified. Many of the pieces are not thin flakes, but pieces of broken material too small to be worked.

**Modified flakes**

Number: 120 flakes  
Size: (measurements not taken)  
Material: 34 obsidian; 86 chert  

The flakes in this category are the total of all the
flakes in the previously discussed categories which show evidence of edge modification. They represent 24.4% of all flakes recovered. Often these flakes are referred to as "utilized flakes", which means they were flakes that were used without retouching, which resulted in minute fracturing of the edge. However, the more general term "modified flakes" is considered preferable, since there does not exist a set of guidelines to determine the difference between those flakes that have been utilized and those that have had their edges modified as the result of natural or fortuitous disturbances. The edge of a flake is the most fragile area which can be easily chipped. There are too many circumstances that can cause edge modification to warrant the designation "utilized" which carries undesirable, potentially misleading, connotations.

Cores (Fig. 36)

Number: 12

Size: (measurements not taken)

Material: chert

These are tabular pieces of chert which show a series of flake scars over the surfaces. They are unintentionally shaped pieces showing random flake removal.
Blades

Number: 12

Size: (measurements not taken)

Material: 1 obsidian; 11 chert

A blade is a specialized flake with parallel lateral ridges whose length is more than twice the width (Crabtree 1972:42). This category is set up in order to determine if there is a sufficient number of elongated flakes occurring at Gallinas Springs to suggest blade manufacture. Since only 2.5% of the flakes recovered could be considered blades and there are no blade cores represented; it is evident that no blade manufacturing techniques were used.

Discussion

Obsidian and chert are the most common materials in the flake tool industry at Gallinas Springs. Because of the great variety of textures and colors of chert, no separation into categories of this nature was attempted. Such separations would have resulted in many categories with only a few flakes in each. The variety of cherts suggests a number of sources, small outcrops or random cobbles.

In addition to chert and obsidian a number of flakes of rhyolitic tuff were also recovered in the fill of various
rooms. These are not considered to be part of the flake tool industry, since no tools are found made of this material. Tuff was used as wall stones and it is likely that these flakes are from shaping wall stones.

The waste chippage offers valuable information on the nature of lithic resources and the utilization of those resources. In comparing the total quantities of flake debris it is found that there is almost an equal proportion of obsidian to chert; 48.9% of all debris is obsidian and 51.1% is chert. However, the proportions of the separate categories of waste chippage between these two materials differs significantly: 54.5% of all obsidian debris shows some amount of cortex material on one face, while only 30.4% of all chert debris has cortex; only 17.3% of the total obsidian debris are initial trimming flakes compared to 25% of the chert; and the proportion of tabular waste is higher still, 26.2% are of obsidian and 45% are of chert (See Table VI).

These proportions support two important inferences about the nature of the obsidian used at Gallinas Springs. First, few, if any, finished artifacts or preforms were imported. Rather, whole nodules were imported and manufacturing was done at the site. This is evident from the high number of
cortex flakes found at the site. Second, the original cobbles coming in were evidently very small. The high proportion of cortex flakes relative to the proportion of initial trimming flakes supports this. If the cobbles were large, one would expect a greater number of initial trimming flakes. Once cortex is removed from a small cobble very little trimming to further shape the artifact is possible. One extreme example of a minimally sized cobble is a nodule of obsidian (Fig. 35b) which shows flake removal on both faces and still has cortex on all surfaces; it measures only 5.0 cm. X 1.9 cm. X 1.4 cm. Since obsidian is largely restricted to use in smaller projectile points, it is likely that the size of the finished artifact was restricted by the size of the original cobble.

The proportions of flakes and tools also indicate that obsidian was worked more economically than chert. There are fewer unmodified tabular waste pieces of obsidian than chert (Table VI). In addition, cortex remnants occur on 32.4% of all finished obsidian artifacts, compared to 16.2% of the chert artifacts. Clearly, a greater attempt was made to salvage cortex and trimming flakes of obsidian than of chert.

This use of obsidian is indicative of the fact that it was material highly desired, but not readily available.
Since surveys of the nearby areas did not reveal any obsidian outcrops (Tonking 1957; Givens 1957), it appears that the obsidian had to be imported to Gallinas Springs over a great distance. The nearest known obsidian sources are near Mount Taylor and the Jemez Mountains, both of which lie over a hundred miles to the north; or the Mimbres area which lies over a hundred miles to the south. Any or all of these areas may have served as the source of obsidian for Gallinas Springs, but the typological correlations of point styles suggest that Mount Taylor is the most likely source. The Cebolleta Mesa lies just south of Mount Taylor; surveys of this area show a high number of small unnotched projectile points during the Pueblo III period, similar to those appearing at Gallinas Springs (See pages 60-61). If the Jemez area was the source of obsidian, one might expect point styles present at Prieta Vista, which lies just south of the Jemez Mountains, to appear at Gallinas Springs. However, at that site only one unnotched projectile point is recorded (See page 60). In the Mimbres area there are small cobbles of obsidian similar in size to those at Gallinas Springs, but in this area notched projectile points are the dominant form (Cosgrove 1932:47-48). Although small triangular points are found in all sites in the Pueblo III period, only in the Cebolleta Mesa region
and regions due west in eastern Arizona is this unnotched triangular point dominant over the other notched classes. It is important to note that at Gallinas Springs these small triangular points are largely restricted to obsidian (22 out of 30 identifiable fragments). If obsidian was being imported, it is likely that the method for working this material, as reflected in the point styles, was imported also. The issue may be more complex than presented here, and it can be argued that point styles in the Southwest are too general for such specific inter-site correlations. But the explanation outlined above seems to be the best for the information that is available.

Although there is evidence to support the nature of the obsidian imported and the source from which it came, there is little data to explain how it was imported. Obsidian artifacts or waste material did not cluster in any rooms (See Tables IV and V). If obsidian was imported by an individual or a specific group of individuals, it was quickly dispersed throughout the site. The random scattering of obsidian is most likely indicative of the lack of any structured trade system at Gallinas Springs. When obsidian was brought in, it was shared by all members. There were no specific areas where obsidian was worked and then dispersed; the nodules themselves were

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distributed to be worked later. There is only one instance of a clustering of specific waste chippage. In room C-8, of the 37 fragments of chippage, 22 are white chalcedony. Only two other fragments of this same material were found elsewhere in the site. This clustering probably indicates a single cobble was brought in by an individual and worked in the room.
SPECIAL ASSOCIATIONS

Burials

The burials of fifteen individuals from Gallinas Springs have been analyzed. Of these fifteen only one, Burial 5, has a quantity of artifacts found in direct association. Burial 5 is a young adult male located on the floor level of room C-13. Found with this individual were the remains of six plain black bowls and five olivella shells which may have been from a bracelet. The lithic artifacts consist of an obsidian side scraper and an obsidian converging scraper which were found directly over the pelvic girdle, also a ground quartz crystal (Fig. 27h) and a ground galena cube (Fig. 33g) which were located near the lower limbs. Since these two ground objects were the only ones of their kind recovered from the site, it is likely that they served a special ceremonial function. The use of crystals in a ceremonial context has been noted at other sites (See page 50). The individual buried in room C-13 must have had a good deal of status, since he was the only one buried with a quantity of grave goods.

Three other burials at Gallinas Springs each have single
stone objects associated. Burial 8, found deep below the floor of room C-13, had a single side-notched obsidian projectile point near it. Since the individual has been identified as a young adult female, it is unlikely that the point is a grave good. Its location near the body may well be fortuitous. Three individuals were found at the floor level of room C-8. Of these three one had a sandstone mano fragment near its head. Another burial in room C-9 had a similar fragment in association. It is unlikely that these objects served as grave goods since they were found amidst the rubble of broken wall stones and no other cultural material was found in association. Adding to this is the fact that both individuals were adult males and since the grinding of food is a female activity one would not expect to find such female oriented objects with male individuals.

Special Rooms.

Of all the rooms excavated room C-10 stands out not only for its large size, but also for the quantity of artifacts contained within its walls (17.6% of manos, 19% of metates, 31.4% of hammerstones, and 31.6% of polishing stones). It also contained the only fossils recovered from the site. This room has already been noted as a possible food prepara-
tion area (See pages 16, 17, 21) and as a possible ceremonial areas (See pages 52, 53). It seems unlikely that room C-10 could have served these two distinct purposes simultaneously. Fortunately, the stratigraphy shows that the artifacts recovered were from two distinct upper and lower rooms. One and a half meters below the surface several charred beams were excavated that probably served as ceiling beams for the lower room. All of the manos, metates, hammerstones, and polishing stones were found above or directly adjacent to this level, indicating that these were from the work area of the upper room. Below the level of the charred beams only two manos were found along with the fossils and calcite formation. Although this lower room floor was not completely excavated a possible bird burial was found along with at least three human burials. This lower room was most likely restricted as a special ceremonial area. This was the only room to show a distinct stratigraphic separation between upper and lower floors and a similar separation in artifact groupings.
SUMMARY

The sample of stone artifacts from Gallinas Springs is relatively small; the data recovered is further biased considering that eleven of the twenty rooms excavated were partially destroyed by an arroyo. As much as fifty to seventy per cent of these rooms were eroded away. The relatively high concentrations of material in the "C" area compared to other areas of the site must be evaluated cautiously, since so much material from the "B" and "F" areas had been washed away. However, even with these biases, a number of hypotheses may be drawn; some support conclusions previously drawn in other reports and some are new.

1. Basalt was the preferred material for use in metates. (See pages 8-9). Even though sandstone is abundant in the area, it is not found as often in metates as basalt. Basalt makes up 64% of all metates recovered from Gallinas Springs. This hard, porous material was probably preferred because it lasted longer and offered an ideal coarse grinding surface for the initial grinding of meal.

2. Triangular shaped manos represent a well-worn stage of wedge shaped manos (See pages 13-14). All of the wedge and triangular manos are restricted to sandstone. Generally,
the triangular forms are smaller than the wedge forms and the edges are worn to the point that further use would have been difficult. Two manos were found that are intermediate between the two shapes; they are triangular in cross section yet similar shape and size to the wedge shaped manos. Both mano classes are distributed evenly throughout the site.

(3) Basalt manos are specialized tools used in the initial stage of grinding corn into meal (See pages 15-17). Although basalt was used in a higher percentage of metates, it was only used in 17.6% of the manos. Basalt manos are restricted to convex cross sections, indicating a different mode of grinding may have been used than in the sandstone specimens. The appearance of finger grips on five of these manos may indicate the need for better control of the tool in coarse grinding. The porous surface offers a good coarse grinding surface in manos as well as metates. Basalt manos were found in only five rooms; these rooms may be associated with food preparation, since they contained over 42% of the total charred corn remains from the site.

(4) Disc shaped grinding stones are specialized grinding stones used in the initial stages of grinding meal (See pages 21-22). The disc shaped manos were found in only three rooms; the same rooms in which seven of the nine basalt manos were
recovered. The edges of these stones are also battered. If basalt manos represent an initial stage of grinding, then the association of disc shaped stones in the same rooms may indicate a similar use.

An alternate explanation for the distribution of disc shaped grinding stones is that they were used by different kin groups or earlier inhabitants (See page 22). The three rooms in which the disc shaped stones were found are all located within an inner row of rooms; the architecture and wall abutments indicate the inner row was built prior to the exterior row of rooms. This may have been done by earlier inhabitants of Gallinas Springs or a separate kin group.

(5) The foot effigy recovered from Gallinas Springs is probably a multi-purpose pottery tool (See pages 43-47). The evidence for this is fairly conclusive. The indentations made on fresh clay with the effigy match those on a large jar found in the same room. Indented bands on the jar are restricted to five rows, which is the maximum number that could be indented at any one time with the effigy. The out-flared rim of the jar matches the shape of the effigy. The polish on the edges of the effigy are similar to the polish found on polishing stones.

(6) Ground galena and ground quartz crystals are cere-
monial objects (See pages 48-50, 79). Only one example of each was found and these were associated with a single burial.

(7) Unmodified quartz crystals served as perforating tools (See pages 50-51). Every quartz crystal recovered showed minor fracturing of the tip. The natural shapes of the crystals make them serviceable gravers or perforators. It is unlikely that they served as ceremonial objects at Gallinas Springs, since none were found with special associations and many were recovered from the midden.

(8) Obsidian was imported as whole cobbles from the region of Mount Taylor (See pages 73-78). Similarity in point styles between the Cebolleta Mesa region and Gallinas Springs mark the Mount Taylor area as the most likely source of obsidian. The relatively low percentage of initial trimming flakes, the recovery of few tabular waste pieces, and the restricted use of obsidian in small projectile points suggest that the cobbles coming in were small.

Comparisons of lithic types indicate that the site fits well within the Pueblo III and Pueblo IV time periods, which has also been established by a preliminary ceramic study. The projectile point classes fit into the general classes identified in the western New Mexico and eastern Arizona areas. Unfortunately, site to site comparisons of Gallinas Springs
to other Southwestern sites is difficult due to the lack of attention given to lithic material. Compared to the fine ceramic data available in the Southwest, lithics have been given second priority. In many ways the stone material is not as sensitive to the changes in time and space as ceramic styles. Where projectile point temporal changes can only be treated in general terms, ceramic styles often vary within fifty year periods. However, the fact that most lithic artifacts are utilitarian implements makes them an important data resource. As environments change and new methods of exploiting the environments are developed, it is these utilitarian implements that often show greater variations.

The purpose of this report is to organize and describe the stone material from Gallinas Springs in as complete and accurate a manner as the data permits, and to use this data to arrive at patterns of distribution and to derive an understanding of the past lifeways. In many ways this is only a preliminary report; the sample is small and much of the data is fragmentary. But it is hoped that it will provide a framework from which to proceed in testing the inferences made here and those to be drawn in the future as more data becomes available.
### TABLE I

Distribution of Metates, Manos, Small Grinding Stones, Hammerstones, and Polishing Stones

<table>
<thead>
<tr>
<th>Class</th>
<th>Wall Trenches</th>
<th>C Rooms</th>
<th>D Rooms</th>
<th>E Rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>7 8 9 10 11 13</td>
<td>14 15 16 1 2 3 4 5 6 7 8 1 2 3</td>
<td></td>
</tr>
<tr>
<td>Metates:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slab</td>
<td>1</td>
<td>2 2 1</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Trough</td>
<td>2</td>
<td>1 1</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Manos:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wedge</td>
<td>3</td>
<td>1 1 4 2</td>
<td>1 2 1</td>
<td>2 1 1</td>
</tr>
<tr>
<td>Triang.</td>
<td>1</td>
<td>2 3 2</td>
<td>2 3</td>
<td>2 1 1</td>
</tr>
<tr>
<td>Convex-S*</td>
<td>2</td>
<td>1 1 1 1</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Convex-B*</td>
<td>2</td>
<td>4 1 1</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>Grinding Stones:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc</td>
<td></td>
<td>1 3 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1 2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Hammerstones</td>
<td>10</td>
<td>2 2 4</td>
<td>16 1 1</td>
<td>5 3 1</td>
</tr>
<tr>
<td>Polishing stones</td>
<td></td>
<td>1 1 3 6</td>
<td>1 2</td>
<td>1 1</td>
</tr>
<tr>
<td>S* Sandstone</td>
<td></td>
<td>Note: Three polishing stones found in midden are not recorded.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B* Basalt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class</td>
<td>Wall Trench</td>
<td>C Rooms</td>
<td>F Rooms</td>
<td>B Rooms</td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 8 9 10 11 13 14 15 16 1 2 3 4 5 6 7 8 1 2 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manos:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>7.8 9.8 7.8 9.8 17.6 5.8 7.8 1.9 5.8 7.8 3.9 5.8 1.9 1.9 3.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Sandstone</td>
<td>9.7 7.1 9.7 19.0 7.1 9.7 7.1 9.7 4.7 7.1 2.4 4.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Basalt</td>
<td>22.2 44.4 11.0 11.0 11.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td>17.6 3.9 1.9 7.8 31.4 1.9 1.9 9.8 5.9 1.9 1.9 3.9 5.9 1.9 1.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% of Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polishing Stones</td>
<td>5.3 5.3 15.8 31.6 5.3 10.5 5.3 5.3 5.3 5.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TABLE III

Distribution of Chipped Stone Tools

<table>
<thead>
<tr>
<th>Class</th>
<th>Midden</th>
<th>Wall Trench</th>
<th>C Rooms</th>
<th>F Rooms</th>
<th>B Rooms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proj. Pt.</td>
<td></td>
<td></td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Triang.</td>
<td>20</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
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<tr>
<td>Other</td>
<td>8</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Frag.</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td></td>
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<tr>
<td>Perforators:</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drills</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thick Flakes</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thin Flakes</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Notched Flakes</td>
<td>2</td>
<td></td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Scrapers:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
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<td>Side</td>
<td>2</td>
<td></td>
<td>1</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Converg.</td>
<td>1</td>
<td></td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Preforms</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Misc. Frag.</td>
<td>15</td>
<td>2</td>
<td>6</td>
<td>2</td>
<td>10</td>
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### TABLE IV

**Distribution of Waste Chippage**

<table>
<thead>
<tr>
<th>Class</th>
<th>Midden</th>
<th>Wall Trenches</th>
<th>B Rooms</th>
<th>F Rooms</th>
<th>C Rooms</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Decort. Flakes:</td>
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<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Obsidian</td>
<td>7</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Chert</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Secondary Decort. Flakes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obsidian</td>
<td>59</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>3</td>
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<tr>
<td>Chert</td>
<td>30</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Initial Trimming Flakes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obsidian</td>
<td>16</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Chert</td>
<td>35</td>
<td>5</td>
<td>7</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Bifacial Trimming Flakes:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>Obsidian</td>
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<td></td>
<td></td>
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<tr>
<td>Chert</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debris:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obsidian</td>
<td>11</td>
<td>3</td>
<td>11</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Chert</td>
<td>69</td>
<td>6</td>
<td>11</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Class</td>
<td>Midden</td>
<td>Wall Trench</td>
<td>B Rooms</td>
<td>F Rooms</td>
<td>C Rooms</td>
</tr>
<tr>
<td>---------------</td>
<td>--------</td>
<td>-------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>% of Total Waste</td>
<td>49.2</td>
<td>1.1</td>
<td>7.6</td>
<td>9.5</td>
<td>8.6</td>
</tr>
<tr>
<td>% of Obsid. Waste</td>
<td>46.5</td>
<td>3.5</td>
<td>1.0</td>
<td>10.9</td>
<td>10.4</td>
</tr>
<tr>
<td>% of Chert Waste</td>
<td>51.3</td>
<td>4.4</td>
<td>1.1</td>
<td>5.1</td>
<td>8.9</td>
</tr>
<tr>
<td>% of Total Flake Tools</td>
<td>45.1</td>
<td>4.5</td>
<td>3.8</td>
<td>6.8</td>
<td>6.8</td>
</tr>
<tr>
<td>% of Obsid. Tools</td>
<td>49.2</td>
<td>4.6</td>
<td>3.1</td>
<td>4.6</td>
<td>6.2</td>
</tr>
<tr>
<td>% of Chert Tools</td>
<td>41.2</td>
<td>2.9</td>
<td>4.4</td>
<td>5.9</td>
<td>5.9</td>
</tr>
</tbody>
</table>
### TABLE VI

Percentage of Waste Chippage

<table>
<thead>
<tr>
<th>Material</th>
<th>Primary and Secondary Decortication flakes</th>
<th>Initial Trimming Flakes</th>
<th>Tabular Waste</th>
<th>Total Chippage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obsidian</td>
<td>54.5 %</td>
<td>17.3 %</td>
<td>26.2 %</td>
<td>48.9 %</td>
</tr>
<tr>
<td>Chert</td>
<td>30.4 %</td>
<td>5.0 %</td>
<td>45.0 %</td>
<td>51.1 %</td>
</tr>
</tbody>
</table>
FIGURE 2

Descriptive Terms

Face

Edge

Edge

End

End

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FIGURE 3
Slab Metate

FIGURE 4
Trough Metate
FIGURE 5
Manos: a, Wedge; b, Triangular

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Convex Manos
a, sandstone; b, basalt

FIGURE 6

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FIGURE 7
Small Grinding Stones
a, d, Disc; b, c, e, Irregular

FIGURE 8
Large Ground Cobbles

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FIGURE 9
Flat Ground Stone

FIGURE 10
Close-up of Cut Edge of 9d
FIGURE 11
Hammerstones

FIGURE 12
Polishing Stones

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FIGURE 13

Single-grooved Abraders

FIGURE 14

Multiple Grooved Abraders
a, Grooved and Polished Stone; b, Disc-shaped Abrader
c, d, Grooved Ochre

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FIGURE 15
Mauls

FIGURE 16
a, e, Hammers; b, c, d, Axes
**FIGURE 17**

a. Large Pounding Stone; b, Hoe

**FIGURE 18**

a, f, g, Turquoise Beads; b, d, e, Turquoise Pendants; c, Serrated Pendant; h, Siltstone Pendant
FIGURE 19
Small Sandstone Tablets

FIGURE 20
Stone Balls
a, c, Concretions; b, Ground Magnetite
FIGURE 21

Rectangular Stone

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FIGURE 22

Foot Effigy

FIGURE 23

Demonstrated use of Effigy in Pottery Decoration
FIGURE 24

a, Original Sherd; b, Experimental Sherd

FIGURE 25

Effigy and Vessel Rim.
FIGURE 26

a, b, c, Ground Siltstone; d, Ground Galena

FIGURE 27

a, b, c, d, e, f, g, Quartz Crystals; h, Ground Quartz Crystal

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FIGURE 28

a, Septarian Formation; b, Calcite Crystals; c, d, Fossil Shell
FIGURE 29

Projectile Points
a-f, Triangular Concave Base; g, Triangular Pointed Base; h, Concave Body Concave Base; i-k, Corner Notched; l, Serrated; m, Barbed; n, Side Notched; o, Triangular Convex Base.
FIGURE 30

Projectile Points

a  b  c

d  e  f

g  h  i

1 cm.

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FIGURE 31

a, b, c, Thick Flake Perforators; d, Crescent; e, f, Thin Flake Perforators; g, h, Bifacial Drills; i, Unshaped Drill
FIGURE 33

a, b, c, Side Scrapers; d, Rectangular Scrapers; e, f, g, Converging Scrapers

FIGURE 34

a, b, c, End Scrapers; d, e, f, Notched Flakes
FIGURE 35

Preforms

FIGURE 36

Cores

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