

DOLORES ARCHAEOLOGICAL PROGRAM TECHNICAL REPORTS

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Identifying Food Processing Activities:  
The Ethnographic Resource Base

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Judith A. Southward

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Under the supervision of  
David A. Breternitz, Senior Principal Investigator

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TABLE OF CONTENTS

	Page Number
ACKNOWLEDGEMENTS. . . . .	ii
LIST OF FIGURES . . . . .	iii
LIST OF TABLES. . . . .	iv
INTRODUCTION. . . . .	1
THE CONCEPTUAL FRAMEWORK OF RESEARCH. . . . .	
Theoretical Development. . . . .	
Ethnographic Analogy . . . . .	
The Model of Inquiry . . . . .	
LIBRARY RESEARCH. . . . .	
THE ETHNOGRAPHIC LITERATURE PROFILE: GENERAL COMMENTS . . . . .	
SUMMARY OF THE ETHNOGRAPHIC AND ARCHAEOLOGICAL RESOURCE BASES USED TO IDENTIFY FOOD PROCESSING ACTIVITIES. . . . .	
COMPARISON OF THE RESOURCE BASES AND GUIDELINES FOR FUTURE RESEARCH. .	
CONCLUSIONS . . . . .	
REFERENCES SITED. . . . .	

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LIST OF FIGURES

Figure Number		Page Number
1	Planting Implements and Other Paraphernalia	31
2	Winnowing Beans	31
3	Sun-drying Corn, Peaches, Chile, and Peeled Cantaloupes	32
4	Sun-drying Peaches and Cantaloupes	32
5	Appliances for Gathering and Preparing Food	33
6	Cooking Appliances	34
7	Ancient Cooking Vessels of Zuni	34
8	Food Receptacles	34
9	Placing Wheat Flour in Basket Bowls	35
10	Kneading Wheat Bread	35
11	Grinding Grain	35
12	Musical Instruments used at "Crooning" Feasts	35
13	Section of a Large Corn-roasting Oven	36
14	Ovens of Ancient Times	36
15	A Shelter in a Cornfield	36
16	Cleaning an Oven Preparatory to Baking	37
17	Ovens	37
18	Varieties of Cooked Foods	38
19	Serving a Meal	38

LIST OF FIGURES

	Page Number
Figure 1. Planting implements and other paraphernalia. . . . .	
Figure 2. Winnowing beans. . . . .	
Figure 3. Sun-drying corn, peaches, chile, and peeled cantaloupes. .	
Figure 4. Sun-drying peaches and cantaloupes . . . . .	
Figure 5. Appliances for gathering and preparing food. . . . .	
Figure 6. Cooking appliances . . . . .	
Figure 7. Ancient cooking wessels of Zuni. . . . .	
Figure 8. Food Receptacles . . . . .	
Figure 9. Placing wheat flour in basket bowls. . . . .	
Figure 10. Kneading wheat bread. . . . .	
Figure 11. Grinding Grain. . . . .	
Figure 12. Musical instruments used at "Crooning" feasts . . . . .	
Figure 13. Section of a large corn-roasting oven . . . . .	
Figure 14. Ovens of ancient times. . . . .	
Figure 15. A shelter in a cornfield. . . . .	
Figure 16. Cleaning an oven preparatory to baking. . . . .	
Figure 17. Ovens . . . . .	
Figure 18. Varieties of cooked foods . . . . .	
Figure 19. Serving a meal. . . . .	

LIST OF TABLES

*see author's draft*

	Page Number
Table 1. A model of inquiry for the identification of food processing activities . . . . .	
Table 2. Food processing activities: the ethnographic resource base.	
Table 3. Food processing activities: the archaeological resource base. . . . .	

## INTRODUCTION

This report presents the results of research undertaken to identify food processing activities using ethnographic and ethnohistorical documents as a resource base. Specifically the proceedings of the study as they relate to the DAP conceptual framework of research will be discussed, as well as the data sets contained within the model of inquiry. In addition, some comments on the appropriateness of ethnographic analogy as it relates to this study will be discussed. A general profile of the ethnographic and ethnohistorical literature will also be presented. Finally, the identification of food processing activities using an ethnographic resource base will be compared to food processing activity areas identified by the DAP.

Before discussing the proceedings of the study in relation to the DAP conceptual framework for research, the historical background of the research proposal will be briefly documented. The original proposal on the identification of food processing activities was written and submitted to DAP for review in July 1979. The proposal was accepted and arrangements for the research were agreed upon in February 1980. In the interim period between submission and acceptance, the original proposal was modified. These modifications did not involve any restructuring of the basic intent to identify food processing activities, but rather involved redefining the data sets within the model of inquiry. The modified proposal was submitted to DAP for review, and personal communication with D.A. Breternitz, S.A. James, and R.A. Knudson (Spring and Summer 1980), indicated that research could proceed using the revised approach. Additional modifications of the proposal were implemented to conform to research guidelines set forth in

"The Dolores Project Cultural Resources Mitigation Design" (James et al: July 1980). Again these changes dealt with a restructuring of the method of inquiry, and not a restructuring of the basic intent of the proposal. Other changes were made as the library research progressed. These changes involved the behavioral data sets and are discussed below in the general ethnographic review section.

In addition to the above, it was agreed that where appropriate the research efforts of previous DAP proposal by W.J. Litzinger (1980) should be utilized as an additional resource base (D.A. Breternitz: 12 August 1980).

#### The Conceptual Framework of the Research

The conceptual framework of research set forth in "The Dolores Project Cultural Resources Mitigation Design" consists of "the set of logical rules designed to lead each researcher through an identical process of theoretical development, library reserach, hypothetical formulation and testing, progressive inference (extrapolation, interpolation, or patterning), and summarization: (James et al 1980:13). The following is a discussion of the manner in which the research relates to these rules.

#### Theoretical Development

The focus of the research proposal is the identification of food processing activities using ethnographic and ethnohistoric documents as a resource base. Food processing activities should be conceived as a system consisting of both behavioral and nonhuman (Schiffer 1976: 50) element sets. Behavioral elements include such cosiderations as who and how many individuals participate in the food processing activity. Nonhuman elements

include such considerations as the time, frequency, and duration of food processing, food items selected, kitchen utensils and features utilized, and the locus of the food processing activity. Most often research emphases have focused on the nonhuman elements of food processing without ever addressing the behavioral correlates that must implicitly accompany any archaeologically recovered materials. This is understandable when considering the differing focuses of the archaeological and ethnographic resource bases, and this study is not unique in the fact that it has failed to overcome these differences. Some attempt has been made to address this problem by offering a model of inquiry (table 1) where behavioral and nonhuman element sets could be approached along various archaeological ethnological; and experimental research paths. Yet the major identification of food processing activities offered in this report still focuses on nonhuman elements. Some of the conclusions resulting from this study may offer several guidelines useful for explicitly addressing behavioral elements.

#### Ethnographic Analogy

Analogy and inference form an integral portion of any study where statements of human behavior are ultimately to be related to recovered cultural materials. Precedents for the use of ethnographic analogy in archaeological inference making are well documented (cf. Anderson 1969, Binford 1967, Gould 1978, Kramer 1979, and Watson 1979). Two major approaches have been defined for the use of ethnographic analogy. These include the direct historical approach and the general comparative approach (Kramer 1979:2). The direct historical approach seeks analogs where there is an assumed continued lifeway pattern from past to present (Ascher 1961).

The general comparative approach seeks analogs in cultures that manipulate their environments in a similar manner. In this type of analogy the geographic area need not be the same, and there is no assumed or there is incomplete historical continuity between the social groups under study (Chang 1967, Gould 1978). Realizing that not all past behaviors have present day analogs (Kramer 1979: 2), this study focuses on the direct historical approach.

Kramer has defined two basic assumptions that are recognized as implicit in any study using ethnographic analogy:

1. "It is assumed that some behavioral elements of sociocultural systems have material correlates; if they are incorporated in the archaeological record, such residues may be used to develop inferences about the behaviors with which they were associated, and
2. "Observations of contemporary behavior can facilitate the development and refinement of insights into past behaviors, particularly when strong similarities can be shown to exist between the environments and technologies of the past and contemporary sociocultural systems being compared" (1979:1).

These assumptions have been used as the basic research guidelines for the study. In particular, emphasis has been placed on identifying the botanical, faunal, and material culture correlates of food processing.

Both Watson and Kramer have stressed that since the past and present are not isomorphic the use of ethnographic analogy always involves leaps of faith, and that there is a very important distinction between tested and untested leaps of faith (1979: 237). They have suggested that one method of approaching this dilemma is the formulation and testing of hypotheses. As specified in the format set forth in the conceptual framework for research (James et al 1980: 13), several guidelines are presented below for use in formulating hypotheses.

### The Model of Inquiry

The model of inquiry (table 1) was developed from the idea that food processing activities should be viewed as a system composed of both behavioral and nonhuman element sets. Certain specific ideas and terminology incorporated within the model are selected from Flannery and Winter (1976), and Stanislawski (1978). The diagrammatic stage of the model was greatly aided by both S.S. James and R.A. Knudson (Personal Communication: August 1980).

The format of the model is presented in two portions: an ethnographic side and an archaeological side. Each side is designed to match at the data set level. Ideally, these sides should be mirror images of each other. In reality, the desired correspondence is often lacking. This can ultimately and historically be traced to sampling biases inherent in both ethnographic and archaeological resource bases. These errors necessitate the use of inferences in connecting the ethnographic and archaeological sides of the model at the data set level.

The structure of each side of the model is hierarchial. The starting point is the answer desired from the research. The answer in this study is the identification of food processing activities. The next point along the model is presentation of the concept of what is meant by the phrase "food processing activity." This entails a listing of both the behavioral and the nonhuman element sets that were selected for this study as representing a food processing activity. The next step in the model is the definition of each element set as a measurable variable. Following this is a listing of the research resource base, either ethnographic or archaeological. Finally, the specific data sets assessed as appropriate indicators of the answer are presented. Each data set can be viewed as comprising a series

of value states. An individual value state is the smallest, single expression of an element set defined as a measurable variable. The element sets that were selected as comprising the concept of food processing activity are considered to be "expected " responses. The value states within each data set are considered "accepted" responses. It is assumed that the value states within and between each data set can be equated to and expected to respond as dependent variables, however, the degree of dependency cannot be assessed at this point in the research.

In addition to the above, the model assumes not only that the behavioral elements of each Puebloan society are equal, but that a general continuity exists between prehistoric and historic Puebloan societies. The latter assumption is an integral part of the model of inquiry and is discussed more fully in the section above dealing with ethnographic analogy. Variability in the model may be discussed in terms of the single and multiple paths that are possible in moving from the individual data set value states to the answer of what defines any single food processing activity. These single and multiple paths could be visualized as single and multiple hypotheses.

The model of inquiry was structured to focus the research in such a way as to address several of the methodological considerations presented in the "Implementation Design" section of "The Dolores Project Cultural Resources Mitigation Design" (James et al: 1980). These considerations include identification of the resource data base, the data sets, sample size, variability within the sample, adequacy in the amount of research, and the level of certainty required for making inferences (Ibid: 45-53). The following is an assessment of how the research relates to these methodological considerations.

Resource Data Base:

The resource data base includes both ethnographic and archaeological source materials. Specifically this includes two ethnographic works by Cushing (1920) and Nequatewa (1943), and a group of Activities Recording Forms used by DAP to identify recovered archaeological materials.

The Data Sets:

The data sets for this study have been defined above as the value states considered as acceptable answers to the elements defined as measurable variables which comprise any given food processing activity. A listing of each data set appears in table 1.

Sampling Size: Within the ethnographic resource base the sample has been limited to the geographic region which includes the Southwestern United States. Within this geographical region the societies chosen for study include those that are termed Puebloan. The concern with Puebloan groups has been to document food processing activities. Food processing activities should be viewed as a subset within larger socio-economic organizations. The ethnographic/ethnohistorical documents, the geographical area, Puebloan societies, and the topic of food processing were all selected to form a comprehensive body of data that would provide an appropriate resource base for making inferences based on analogy.

Minimum and maximum sample size limits were not set for the numbers of ethnographic documents to be utilized. Several sources were searched before it became clear that a complete literature review would not be possible within the time limits set for the proposal, or without the aid of a computer to help correlate the data. In light of these circumstances the following sources were selected for general review; Beaglehole 1937, Cushing, Fewkes, and Parsons 1922, Hough 1897, Parsons 1917, 1936, and

Stevenson 1904. Comments on these materials appear below in the Ethnographic Literature Profile: General Comments section. Cushing 1920, and Nequatewa 1943 were selected to form the basis of an intensive review which is presented in table 2, and discussed below in the Identification of Food Processing Activities section.

A bias may have been introduced into the sample by concentrating on those sections of the selected ethnographies dealing specifically with food processing. These sections provide good information on the food items selected for processing and the kitchen utensils used in the process, but provide very little direct information on the behavioral elements associated with food processing. Direct information on the behavioral elements might possibly be found in other sections of the ethnographic documents, however, the brief review completed so far suggests that these data will have to be inferred from general Puebloan societal patterns. If inferences of this nature do need to be made the model of inquiry should be adjusted to reflect the changes.

The archaeological resource base includes a group of food processing activity areas that are associated with Pueblo sites investigated by DAP. The group of activity areas examined was not selected as a statistical sample, but rather constituted the total number of food processing areas identified by DAP at the time when this study was undertaken.

#### Variability in the Sample

Variability within the ethnographic sample stems from differences between each Puebloan culture, and the differing research backgrounds and concerns of each ethnographer. Additional variability is probably introduced into the sample via biases that are inherent within the model of inquiry. Variability in the archaeological sample probably stems from

differences in the types of food processing which originally took place, differences in the methods of excavation and recovery of materials, and differences in the assignment of each area to a food processing category.

#### Adequacy in the Amount of Research

The amount of research completed in this study is adequate to the level of allowing hypotheses concerning food processing to be formulated. These hypotheses could specifically address the preliminary identification of the food items processed, the kitchen utensils utilized, and the locus of preparation. The amount of research completed does not address to any great extent any of the behavioral concerns, nor does it allow the researcher to repeatedly define any one food processing activity with certainty. In order to do this hypotheses should be tested in the field and the results combined with additional ethnographic research, as well as archaeological and experimental studies.

#### Levels of Certainty

One method which may be used to assess levels of certainty from an ethnographic resource base is a ranked system of certainty. In this system the ranking designation could be assigned according to the amount of inference required to make a meaningful statement about cultural behavior. Successively greater levels of inference input into the data system by the researcher would be assigned successively lower ranks of certainty. As mentioned above, the information available in ethnographic documents about foods selected for processing and the kitchen utensils used in the process is quite abundant. This is not true of information on the behavioral elements. More inferences need to be used to make this information meaningful. In this instance, statements made about cultural behavior using data interpreted with numerous inferences would be ranked with less

confidence. An absolute starting point for the levels of certainty is difficult to pinpoint and may be better assessed after the results of the study have been tested. Levels of certainty within the ranking system could possibly be expressed as statements of probable occurrence. It may also be useful to compare ethnographic data ranked in this manner with archaeological data ranked similarly.

## LIBRARY RESEARCH

As mentioned above, the library research focuses on ethnographic and ethnohistorical documentation of Puebloan societies in the Southwestern United States. The emphasis within these documents has been on food processing. The following sources were found useful for providing the general ethnographic literature profile below: Beaglehole 1937, Cushing 1920, Cushing, Fewkes, and Parsons 1922, Dozier 1966, Hough 1897, Nequatewa 1943, Parsons 1917, 1936, and Stevenson 1904. Cushing 1920 and Nequatewa 1943 were selected to form an intensive review which is presented in table 2, and discussed below in the Identification of Food Processing Activities section. In addition, Litzinger has provided a comprehensive bibliography of sources that provide comments on food processing (table 1, 1980).

THE ETHNOGRAPHIC LITERATURE PROFILE:  
GENERAL COMMENTS

Generally, it can be stated that the two major problems recognized to date in using ethnographic and ethnohistorical data as a resource base include the lack of consistency in the range of information documented about food processing activities, and a lack of detail concerning each sequential step. This is no doubt in large part due to the differing backgrounds and research interrests of each ethnographer, and of the differing research interests between archaeologist and ethnographers. For the archaeologist this means less direct information and a greater reliance on inference. The following is an assessment of the ethnographic and ethnohistorical literature as it relates to the element sets described earlier in this report (see also table 1) that combine to form a food processing activity. Figures 1-19 have been included as a supplement to this section to illustrate some of the comments.

As mentioned previously, the documentation of the behavioral elements is weak. the behavioral elements include who and how many individuals/groups perform the food processing activity. In a few cases there is a distinction made between individuals participating in daily food processing activities and those participating in special occasion activities (Cushing 1920, Dozier 1966). In many more cases, the best information available is that the women prepare and cook the food (Parsons 1936, fig. 2, 5, 9-11, 16, 17, 19); as assumption already well established in the archaeological literature. There is little direct mention of status (head of clan, mother, daughter, married daughter), or the number of individuals (minimum and maximum individuals or household groupings) participating in the processing activities.

Comments on time, frequency and duration are also not usually directly documented, so for the most part these items will have to be inferred. One source of information that is available for inferences on the time element is the seasonality of food items. Even in these instances, however, concerns of immediate processing for consumption versus storage for later processing will have to be dealt with. Information on frequency of food processing can sometimes be inferred from such comments as 'daily,' 'occasionally,' 'relished with evening meals,' or 'usually prepared for feasts' (Cushing 1920, Nequatewa 1943). Little information is provided on the duration of daily food processing activities; preparation of food for weddings or feasts may take all day or several days (Dozier 1966, Cushing 1920).

Unfortunately, little direct information is available for the locus of the food processing activity. In several instances it has been possible to determine an activity which takes place inside a structure as opposed to one which takes place outside a structure, or even away from the domicile area. In a few cases, there are references to activities taking place within a mealing room, kitchen, or adjacent to fires or ovens (Cushing 1920, Stevenson 1904). Many loci of processing will have to be inferred from contextual associations (fig. 3, 9-11, 13, 15-17).

The specific activity selected to process a food item is usually recorded. These processes include baking, boiling, grinding, parching, etc. The use of fire in food processing is readily documented, but the use of water or wind in food processing will have to be inferred. The finished food item is either mentioned directly or can be easily inferred. Information on surviving meals and mealtime etiquette is provided by both Cushing (1920: 516-586) and Beaglehole (1937: 60-61).

The ethnographic information available on the resources selected for processing and the kitchen utensils used in the process is more extensive. Generally, the information provided consists of an enumeration of the items that would likely be associated with each portion of the food processing activity. Unfortunately, there is little detail documented about contextual associations of the kitchen utensils, wastage of food items, or discard practices.

The food resources selected for processing can basically be divided into the following categories: nuts and seeds, greens, berries, fruits, roots and tubers, meats, fats, sugars, and beverages. Much of the literature is concerned with the processing of corn. The format of presentation usually involves some documentation of the gathering of the food item, preliminary preparation usually by toasting, boiling, or grinding, and then a listing of the final preparation of ground meals into breads, cakes, pudding, etc. Occasionally by-processes are recorded. These include additions to the basic food item of dyes, sugars, fats, or saliva. Several of these by-processes can be associated with special occasion food preparation (Cushing 1920, Stevenson 1904). Rarely is there mention of food items being spilled, spoiled, or discarded. Occasionally there is direct mention of immediate consumption or storage of the food item, and sometimes this can be easily inferred.

There is reasonably good information provided on the kitchen utensils involved in a food processing activity. The format of presentation usually involves describing the preparation activity and the kitchen utensils are either directly mentioned or can be readily inferred. Unfortunately, it appears as if many of the ethnographers were most concerned with recording a compendium of known recipes for particular food items. Where available

the enumeration of kitchen utensils and their use in the preparation activity should often be viewed as accessory information to a recipe, and not as the primary reason for the account. It is perhaps this bias that is most responsible for the disappointing lack of attention paid to details such as: minimum and maximum numbers of kitchen utensils, volume of containers, contextual placement of utensils, motor habits in the use of utensils, resharpening practices, and re-use patterns. As an example, it is often difficult to judge whether a container mentioned at the beginning of a food processing activity is the same container mentioned later in the description, or whether a new container has been introduced.

SUMMARY OF THE ETHNOGRAPHIC AND ARCHAEOLOGICAL RESOURCE  
BASES USED TO IDENTIFY FOOD PROCESSING ACTIVITIES

As mentioned previously, Cushing (1920) and Nequatewa (1943) were used to provide an ethnographic basis for the identification of food processing activities. This was then compared to food processing activities identified by DAP. Initially, information from the two ethnographic sources was recorded following the format of table 1. Later, because of the lack of information in certain of the data sets (especially behavioral), the format was changed to include documentation of the food items processed, description of the process of preparation, the kitchen utensils and appliances utilized, and the preparation area (see table 2). The documentation of food items was restricted to vegetal products.

A similar table (see table 3) was prepared from information found on the Activities Recording Forms and accompanying maps used by DAP to identify activity areas. Information collected for this table includes the

site number, the provenience of the activity on the site, the preparation area (Coding Designation phrases were obtained from the form: CODING FOR ACTIVITY LOCI, DAP, May 1980), and a description of the artifacts, features, and botanical remains associated with the activity.

On both tables information which was not provided directly from the source materials but which was inferred, is enclosed within parentheses. Often kitchen utensils and preparation areas were mentioned several times within one food processing sequence. Whenever these items were felt to be the same they were connected with a bracket. The following is a summary of the information contained in the tables.

Approximately 119 ethnographic entries documenting food processing activities can be found in table 2. Many of these activities (or portions of) probably took place inside structures, although there is little direct mention of this (Cushing 1920). The preparation areas have been grouped as follows:

- (78%) Fire Areas (total), including:
  - (54%) Fire Features (a fire area which was not specially defined in the literature)
  - (18%) Kitchen Fireplaces
  - ( 5%) Ovens
  - (.8%) Fire-boxes
  - (.8%) Roasting pits
- (58%) Food Processing: Not Further Specified (NFS)
- (35%) Mealing Areas
- (22%) Limited Activity Loci
- (21%) Domestic: Meals
- ( 6%) Storage: Food

Even though there is a lack of information on the duration of most sequences of processing any one food item, the review of the literature suggests that the majority of food processing activities involve multiple features and/or areas. Fire Areas (again primarily Fire Features) are associated with Mealing Areas in 34 percent of the references. Within these, the literature review suggests that 9 percent of the Fire and Mealing Areas can be assumed to be directly associated at a given point in

time. Fire, Mealing, and Food Processing: NFS Areas are associated in 21 percent of the reference entries. Limited Activity Loci (22 percent) are areas located away from the domicile site and most frequently represent areas of procurement of plant resources, or ovens (see table 2, Cushing 1920: 204-8, 235-6, 256-7 for oven references). A Fire Feature is the most likely associated feature for a Limited Activity Loci area. Storage: Food areas occur in a few instances after work at a Limited Activity Loci procurement area has been completed at a domicile structure. The percentage of references to food storage areas is thought to be low. Domestic: Meal areas have been included where they were mentioned because some of the food preparation areas and utensils may also double as meal serving utensils (Fig. 6-9, 18, 19).

A little more than half (52 percent) of the entries deal with the gathering and preparation of wild plant foods. The remaining entries deal solely with the preparation of corn. By far the most detailed accounts of food preparation are those for the processing of corn. Most references to the processing of both wild plant foods and corn involve preliminary steps usually of parching, toasting, grinding, and boiling; secondary steps which usually include further testing and/or grinding; and final steps of baking or boiling of the food item into various breads, mushes, dumplings, or stews (Cushing 1920). The duration of an entire sequence is not well documented by either Cushing (1920) or Nequatewa (1943).

Material culture items were divided into two categories: vessels and utensils. Vessels were defined as objects that hold food items, serve as mixing bowls, boiling pots, baking pans, etc. In the ethnographic literature they were referred to most often as being made of clay or basketry materials (Figs. 6-11, 18). Utensils were defined as those

objects usually involved in an action motion, and most frequently included grinding stones, pounders, utensils to stir, and utensils to toast. The first two types of utensils are undoubtedly of stone; the latter of vegetal materials (figs. 5-6). Other utensils include boiling stones. In addition, one type of utensil was designated as 'surface,' either portable or non-portable. These include such items as flat baking stones (comals, he'we stones), or areas where kneading, pounding, slicing, or dough raising may have taken place (portable mats or non-portable prepared surfaces). The kitchen utensils associated with each step of a food processing activity have been recorded. Since kitchen utensils were often not directly mentioned there may have been some duplication of items. If, however, a food processing sequence included toasting, grinding, and boiling or baking, then at least 3-5 vessels/utensils may be inferred to have been associated with the activity. The number of vessels/utensils for any particular food processing activity was found to range between 2-11 objects.

A total of 64 activity areas identified by DAP as relating to food processing were examined. These areas were distributed across nine different sites, and the majority (70 percent) were located in non-structural use areas. The coding designation of these activity areas is as follows:

- (44%) Food Processing: Not Further Specified
- (42%) Unassigned
- ( 9%) Mealing Areas
- ( 4%) Cooking Areas

The following features (103 total) are associated with the above activity areas:

- (75%) Fire Areas (total) including:
  - (39%) Hearths
  - (27%) Heating pits
  - ( 6%) Fireplaces
  - ( 1%) Firepits
  - ( 1%) Cooking pits
  - ( 9%) Pits
  - ( 7%) Warming pits

- ( 3%) Unspecified pits
- ( 2%) Cists
- ( 1%) Storage cists
- ( 1%) Ash pits
- ( 1%) Collecting basins
- ( 1%) Indeterminate cultural features
- ( 1%) Noncultural features

The number of features associated with each activity area is as follows:

- (38%) Single feature, no assoc. botanical or artifact
- (39%) Multiple features, no assoc. botanical or artifact
- ( 8%) Single feature, with assoc. botanical or artifact
- ( 6%) Multiple features, with assoc. botanical or artifact

(The above breakdown does not include Mealing Areas).

Activity areas classified as Food Processing: NFS and Unassigned are identified by either single or multiple combinations of hearths or heating pits. The outstanding indicator of a Mealing Area is the presence of at least one metate, with or without rests. Four of the Mealing Areas also have associated artifacts; one area an associated cist. None of the Mealing Areas are associated with vegetal remains. All of the Mealing Areas are located within pitstructures. The Cooking Areas are all located in surface structures. One Cooking Area is identified by three associated Fireplaces, another by a single Fireplace, and the third by an associated Fireplace and Hearth.

Botanical remains are noted in five of the activity areas. These include three Food Processing: NFS, and two Unassigned areas. With the exception of one slab-lined pit, all of the botanical remains are associated with Hearths. The botanical remains reported are as follows: corn kernals and Chenopodium seeds; Opuntia, Atripox, and Purlane seeds, corn; bean; macrobotanical remains; and burned beans and corn.

Nonhuman bone is recorded at one Mealing Area and two Unassigned activity areas. All three of these areas have associated artifacts, but no associated botanical remains.

Artifacts (FL, NFL, CER; metates at Mealing Areas have not been included) are recorded at four Mealing Areas and six Unassigned areas. The artifacts are located both within and around features at these activity areas. The total number of artifacts recorded is 67 and includes: 34 FL, 22 CER, and 11 NFL. The greatest number of artifacts recorded at an area is 26 (Unassigned); the lowest is 1 (Mealing Area). The remaining areas have artifact counts ranging from 2-12.

COMPARISONS OF THE RESOURCE BASES AND  
GUIDELINES FOR FUTURE RESEARCH

This section deals with a comparison of the ethnographic resource and the DAP archaeological resource base used to identify food processing activities. Some guidelines for future research will also be presented.

The designation of food processing activity areas by the DAP is apparently based on combinations of empirical observations by the excavator, previously accepted archaeological inferences, and ethnographic analogy. It also appears that several people (usually one person, however, per site) are involved in the identification process. The degree of input from any one of the above sources of information for identifying a food processing activity is unknown. An occasional notation on the Activities Recording Forms suggests the use of ethnographic analogy. In any comparison such as the one following where two approaches may have used overlapping source materials, circularity can arise. Since this report focuses on select resource bases, and since the DAP identifications were apparently not made by the same person, the degree of circularity may be minimal. In addition to the above problem, any study of food processing activities will be hindered not only by changes in subsistence patterns through time, but also by the lack of preservation of remains on archaeological sites. Cushing (1920) offers comments on changes through time of foodstuffs (table 2: 243-6, 257, 290) boiling methods (table 2: 254), kitchens (table 2: 295), Kitchen Fireplaces (table 2: 262-3, 296-7), Ovens (table 2: 262-3), Mealing Areas (table 2: 262-3), and Kitchen utensils (table 2: 262-3, 295-6).

The majority of the food processing activity areas identified by DAP are located in nonstructural use areas. As mentioned above, the location of food preparation areas was not usually indicated directly in the ethnographic literature, although descriptions of associated features (especially Kitchen Fireplaces) suggest that many of the food preparation activities did take place inside structures. The number of nonstructural use areas identified by DAP is probably correct and these outside areas should continue to be searched for evidences of food processing. The number of food processing activity areas defined by DAP as located within structures is probably also correct. What may need to be changed is the areal extent of the food preparation areas, especially for those activities located within structures. This is discussed more fully below.

The majority of food processing activities designated by DAP are either Food Processing: NFS (44 percent), or Unassigned (42 percent). These areas are all characterized by either single (38 percent) or multiple (39 percent) Fire Areas. The ethnographic literature suggests that Fire Areas, either singly or in combinations, should constitute a focal point of a food preparation area. In addition, the long standing tradition of a metate being the focal point of a Mealing Area should still be regarded as correct. However, most references to a food processing sequence suggest that there are food preparation areas involved which are neither a Fire Feature or a Mealing Area. These areas often involve mixing, kneading, rolling, slicing, raising dough, etc., and appear by the descriptions to be located adjacent to a Fire or Mealing Area. These areas (coded as Food Processing: NFS in the ethnographic literature review, see table 2) are combined with Fire Areas in 49 percent of the references, and with Mealing Areas in 39 percent of the references. Food Processing: NFS, Fire, and

Mealing Areas were associated in 21 percent of the entries. This suggests that perhaps the areal extent of food processing activities may be too small and could be expanded to include more than one focal point and the adjacent areas.

It is suggested that the Coding Designation of Unassigned should be dropped from usage and be replaced by the phrase Food Processing. This designation could be used to indicate an entire preparation area or sequence, including single and multiple features. The ethnographic literature suggests that the coding designation of Cooking Area could apply to several different types of fire features. Since Kitchen Fireplaces are apparently located in dwelling rooms (Cushing 1920: Table 2: 262-263, 296-297), more specific designations than Cooking Area might be more useful. These special designations could be subsumed under the phrase Food Processing (ie: Food Processing: Kitchen Fireplace). Mealing Area should be retained as a coding designation, either also subsumed under the phrase Food Processing, or used singly. There are numerous references to the use of coarse and fine grinding stones in food preparation sequences. Often the use of grinding stones appear to be separated by periods of time, so that the grinding stones may actually be at differing loci. One way to check this would be to plot the locations of mealing stones with differing granularities. The ethnographic literature suggests that the various types of features associated with the DAP food processing activities is probably correct.

The sparse botanical remains associated with the DAP food preparation areas to date may be good indicators of the remains that are most likely to be found. Many of the ethnographic food preparation references deal with the grinding of corn and wild nuts/seeds into meals and fine flours.

Rarely would these meals or flours preserve in large quantities, except perhaps in storage areas. Traces of these foodstuffs on the floors of structures could certainly help to identify food preparation areas. The ethnobotanical and pollen sampling programs in use by DAP should prove quite effective in defining food preparation activities, especially if structures which are sampled and the results are combined with other project analyses.

Nonhuman bone used either as a food source or as a kitchen utensil is not mentioned in the sections of the ethnographic sources reviewed. Since bone is often quite numerous on archaeological sites, the lack of documentation may either be a result of the focus of this study on vegetal foodstuffs, or a bias on the part of the ethnographers. Whatever the reason for the lack of documentation, studies of nonhuman bone should be reviewed before any assessment of food processing activities is completed. Almost all of the ethnographic entries make reference to kitchen utensils either directly, or in a manner where they can be readily assumed. Most of the food processing sequences (grinding, mixing, cooking) apparently involve the use of 3-5 kitchen vessels/utensils. These kitchen vessels/utensils include pottery and basketry vessels, mats, stirring sticks, grinding stones, baking stones, and boiling stones (figs. 5-12). Unfortunately many of these utensils are perishable. Only a few of the DAP activity areas are associated with artifacts, and these are mainly flaked lithics. With the exception of one reference to slicing (Chushin 1920: table 2: 234-5), there is little mention made of utensils that could be inferred to be of flaked stone. Since flaked lithic tools are frequently recovered both technological and functional studies should be used to determine their role in food processing activities. Ceramics are the next most frequent

artifacts recovered from the DAP activity areas. Cushing mentions that vessels used for cooking were made of a red clay and tempered with more grit. Water-jars, eating-bowls, and other receptacles were made of carbonaceous shale or marl, smoothed, coated with a thin wash, and highly polished (1920: table 2: 310-15). Although the resource materials probably differ between the Zuni and Dolores River areas, the differences noted in the manufacturing of special purpose vessels could be analogous and useful or identifying food preparation areas. Locating pottery vessels which are blackened from use could also be diagnostic. As mentioned above, differing granularities of grinding stones may indicate differing loci of food preparation. In addition, use wear patterns of archaeological grinding stones could be compared with grinding stones used experimentally to help isolate patterns specifically related to food processing (cf. Zier 1981).

## CONCLUSIONS

This report has focused on the use of an ethnographic resource base for the identification of food processing activities. Food processing activities identified in this manner were then compared to activities identified by the DAP. Guidelines for future research and identification of food processing activities have been discussed.

The ethnographic literature indicates that food preparation takes place both within and outside of household residences. The number of activity areas identified by DAP as located in both nonstructural and structural use areas is probably correct. The spatial extent of these activity areas may be too restricted. Information from the ethnographic sources suggests that a food processing sequence usually consists of gathering a food item; preliminary preparation by toasting or parching, and grinding; secondary preparation of mixing, kneading, dough raising; and final preparation by boiling or baking into breads, cakes, mushes, stews. Such a sequence involves repeated usage of at least two main focal points: a fire area and a mealing area. Kitchen vessels/utensils for such a sequence probably include at least three to five items. It is suggested that the real extent of food processing areas identified by DAP could be extended to include not only a fire and mealing area, but also the areas adjacent and between these features. This may be especially true for activity areas identified within structures; the areal extent may include as much as one-quarter of a pitstructure. In addition, rafters above fire and mealing areas may be part of a food processing area. Roofs of structures should also be considered as likely food processing areas

(fig. 16). An entire food preparation activity, with two or more focal points as described above, may be best coded simply as food processing.

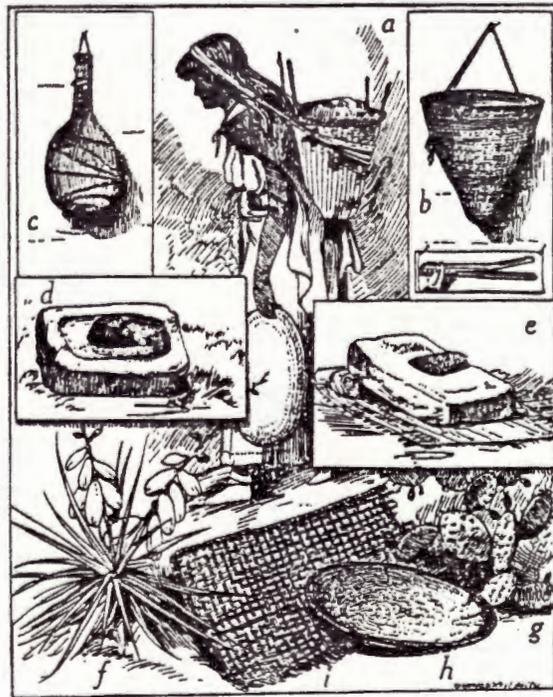
The ethnobotanical, pollen, and faunal studies being completed by DAP appear to be quite comprehensive and will probably prove sufficient for use in identifying food processing activities. The strengths of these studies may be improved by focusing on structures which have been catastrophically abandoned.

Both technological and functional studies of artifacts should be used in identifying food processing activities. At present there is a lack of a focus towards a functional interpretation of recovered artifacts from DAP. Although this is due to the descriptive focus of the preliminary analysis program that must be completed, final identifications of food processing activities should be partially based on the results of functional analyses.

The importance of detailed distributional maps and photographs of artifacts, features, and structures can hardly be stressed enough.

As mentioned above the behavioral elements of who and how many individuals/groups participate in food processing activities could not be comprehensively documented within the time limits of this study. These elements are an important part of food preparation activities and can probably be inferred from general societal patterns recorded in ethnographic sources.

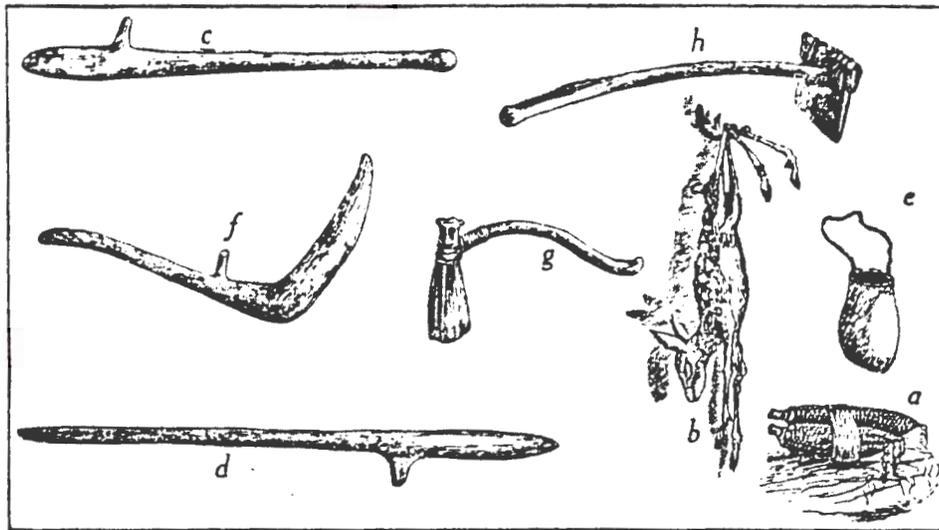
Food processing activities now being defined by DAP are identified by a combination of empirical observations by the excavators, previously accepted archaeological inferences, and ethnographic analogy. All of these methods represent valid ways of identifying food processing activities and none should be dispensed with.



APPLIANCES FOR GATHERING AND PREPARING FOOD

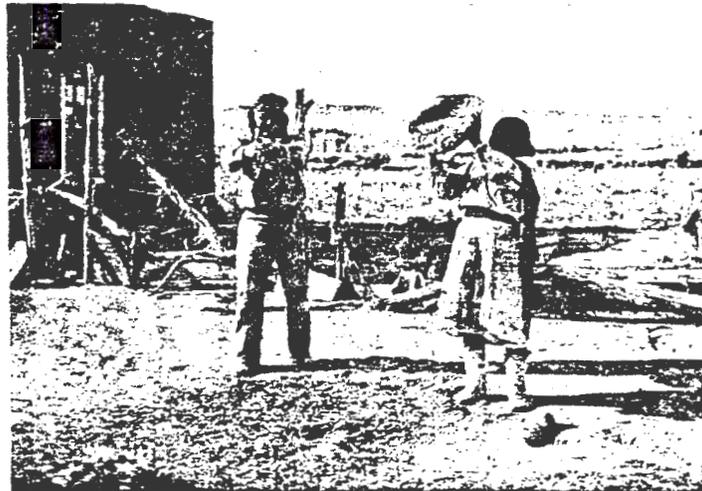
Fig. 5

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 Cushing, Frank H.  
 1920 Zuni breadstuffs. Museum of the American Indian,  
Heve Foundation, Indian Notes and Monographs,  
 Vol. VIII. New York.



PLANTING IMPLEMENTS AND OTHER PARAPHERNALIA

Fig. 1



WINNOWING BEANS

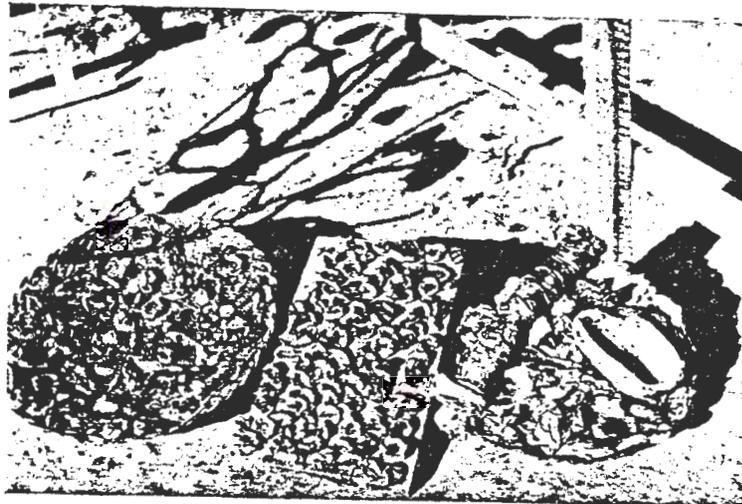
Fig. 2

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 1920 Zuni breadstuffs. Museum of the American Indian,  
Heye Foundation, Indian Notes and Monographs,  
Vol. VIII. New York.



SUN-DRYING CORN, PEACHES, CHILE, AND PEELED CANTALOUPE

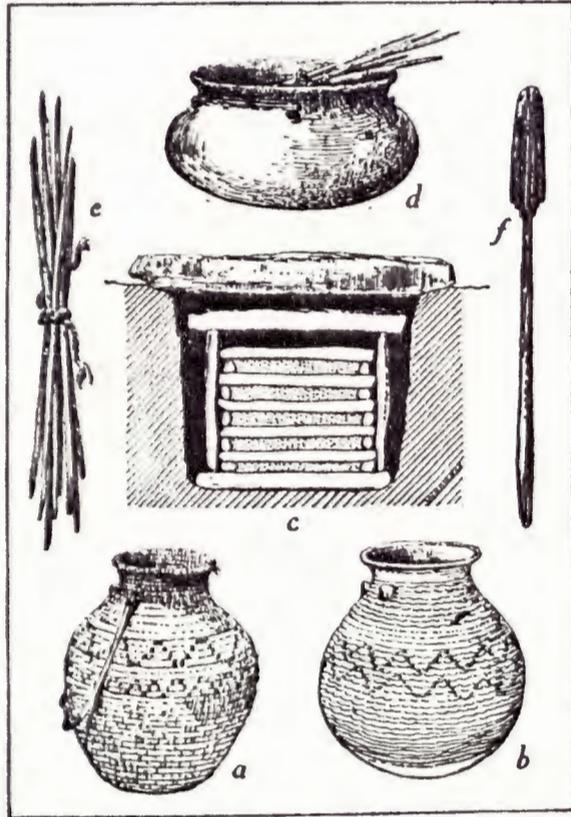
Fig. 3



SUN-DRYING PEACHES AND CANTALOUPE

Fig. 4

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1920 Zuni breadstuffs. Museum of the American Indian,  
Heye Foundation, Indian Notes and Monographs,  
Vol. VIII. New York.



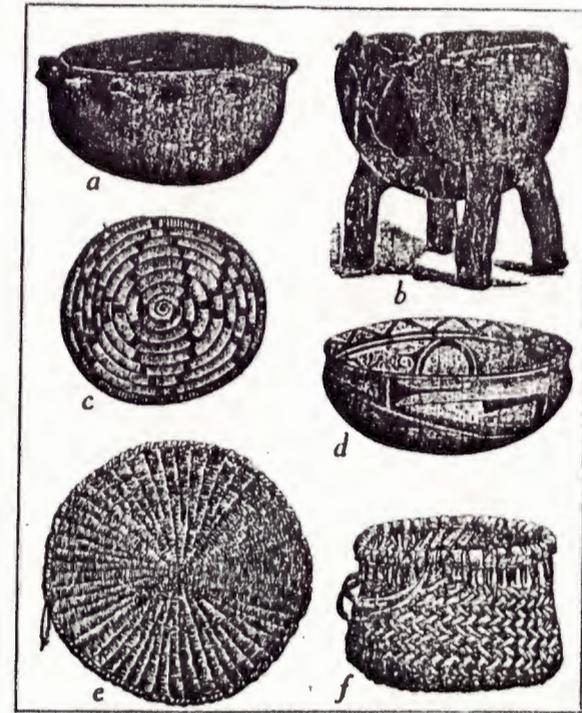
COOKING APPLIANCES

Fig. 6



FIG. 7.—Ancient cooking vessels of Zuñi

Fig. 7



FOOD RECEPTACLES

Fig. 8

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Cushing, Frank H.

1920 Zuni breadstuffs. Museum of the American Indian,  
Heye Foundation, Indian Notes and Monographs,  
Vol. VIII. New York FIG. 1:192.

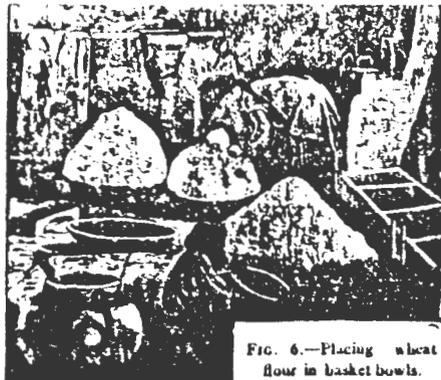


FIG. 6.—Placing wheat flour in basket bowls.

Fig. 9



FIG. 7—Kneading wheat bread

Fig. 10

CUSHING—ZUNI BREADSTUFF

PL. XXII



GRINDING GRAIN

fig. 11



FIG. 8—Musical instruments used at the "crooning" feasts

Fig. 12

Reprinted from:  
 Cushing, Frank H.  
 1920 Zuni breadstuffs.  
Museum of the American Indian, Heye Foundation,  
Indian Notes and Monographs, Vol. VIII.  
 New York. FIG. 6:372,  
 FIG. 7:374.

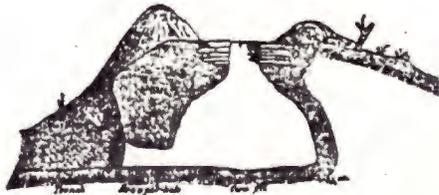


FIG 2.—Section of a large corn-roasting oven

Fig. 13

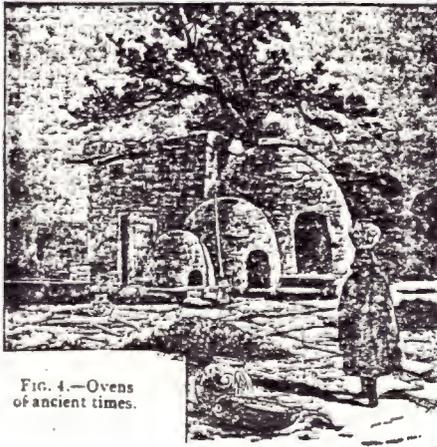


FIG. 4.—Ovens of ancient times.

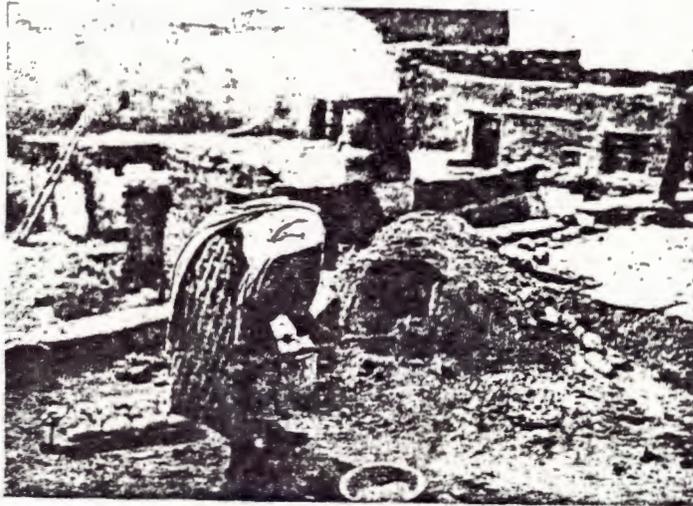
Fig. 14



A SHELTER IN A CORNFIELD

rig. 15

Reprinted from:  
 Cushing, Frank H.  
 1920 Zuni breadstuffs. Museum of the American Indian,  
Heve Foundation, Indian Notes and Monographs,  
 Vol. VIII. New York. FIG. 2:205, FIG. 4:263.



CLEANING AN OVEN PREPARATORY TO BAKING  
The unbaked loaves are seen near the woman's feet

Fig. 16 4

Fig. 17



OVENS

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1920 Zuni breadstuffs. Museum of the American Indian,  
Heye Foundation, Indian Notes and Monographs,  
Vol. VIII. New York.



VARIETIES OF COOKED FOODS

Fig. 18

Fig. 19



SERVING A MEAL

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Heye Foundation, Indian Notes and Monographs,