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Corn, Cucurbits and Cotton from Glen Canyon

By HUGH C. CUTLER

with an addendum

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by SUSAN R. CLARK

UNIVERSITY OF UTAH PRESS

SALT LAKE CITY

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Jesse D. Jennings, Editor

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Upper Colorado River Basin

Corn, Cucurbits and Cotton From Glen Canyon

as a part of the

Upper Colorado River Basin Salvage Program

in accordance with

Memorandum of Agreement

14-10-0333-1316

between

The National Park Service and the University of Utah

by

Hugh C. Cutler

University of Utah

PREFACE

During the Glen Canyon phase of the Upper Colorado River Archeological Salvage Project, all plant and animal remains were collected from archeological sites as routine procedure. Non-archeological plant and animal inventories were made and reported by the University of Utah Division of Biology. All Glen Canyon cultigens found in archeological context were identified by Hugh C. Cutler, Curator of Useful Plants, Missouri Botanical Garden; non-cultigens and animal remains were identified by personnel of the University of Utah Division of Biology and reported in each season's site reports, but there has been no combined summary of either the animals, or domesticated and wild plants of the Glen Canyon area.

This paper and addendum remedy this lack. Together, they provide a comprehensive summary of Glen Canyon plant and animal resources.

Jesse D. Jennings

ACKNOWLEDGMENTS

When the first announcements of archeological salvage work in Glen Canyon appeared, I* was enthusiastic about the possibilities of studying agriculture in this area outside the mainstream of Indian cultures. The little canyons with wind and water-sculptured rocks, the clear skies and springs and the magnificent loneliness and isolation that existed before the dam was built stimulate imagination. I knew, from many trips in the region, there were few areas for agriculture and the supplies of wild plants and game for food were limited. However, I hoped that in some hidden valley a fairly long sequence of cultivated plant materials could be found--a sequence not confused by many migrations and the activities of large numbers of people.

Although the large volume of cultivated plant materials recovered prove to have been deposited during a very short period of time and to be surprisingly uniform, they make a substantial contribution to our knowledge of the history of cultivated plants in the Southwest.

This work was aided in part by a grant from the National Science Foundation. I am grateful for the help of Marcia Eickmeier, William Eickmeier, and Michael Wynne, student assistants, who did a great deal of the sorting, measuring, and graphing of the large volume of collections.

* Hugh C. Cutler is Curator of Useful Plants, Missouri Botanical Garden, and Associate Professor, Washington University.

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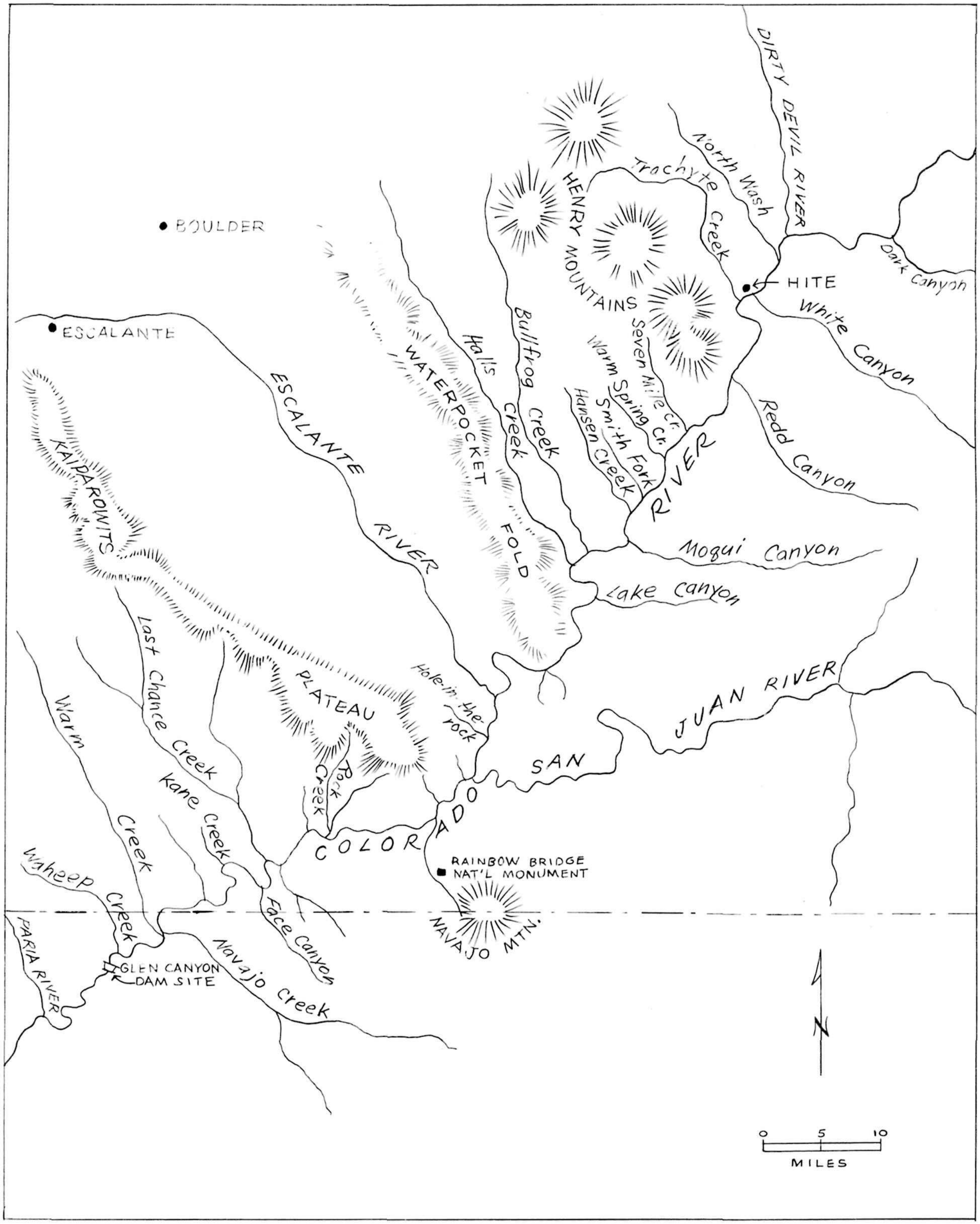

Glen Canyon Area.

INTRODUCTION

The remains of cultivated plants tell us a great deal about the people who grew them. Most cultivated plants are dependent upon man, and might be considered artifacts. Man usually brings seeds from some other region and then manipulates the nature of the plant by his seed selection. He also provides opportunities for the plants to cross with other cultigens and with wild and weedy plants in the new environment. It should be possible to determine where similar kinds of crops were grown and how much interchange of crops went on. This type of study is often done with pottery. It should also be possible, since there usually is an evolution of new forms as time goes on, to discover the extent and direction of change; thus elaborate a sequence useful for comparisons with other sites and for dating.

Most Indians in the Southwest grew several kinds of each food plant. Modern Indians recognize several kinds and usually keep the seed separate, grow it in separate plots, and select new seed according to a standard. The harvest is made several times; as the crop is ready, and sometimes for separate uses. At the end of the season any remaining immature fruits are gathered.

Often only the useable part of the plant is brought home. Thus, little or no refuse remains for the archeologist and only a few seeds, a forgotten or burned cache, or some pods or vines brought for a special purpose or by some accident, are present. Because mature corn cobs are sturdy and not used for food, we know more about corn in the Southwest than we do about any other cultivated plant. However, even cobs from a site do not give a true picture of the corn grown there as many things conspire to falsify the record of the corn harvests. All the corn is not brought to the site on the cob. Special kinds and seed corn are kept where they are more likely to be preserved for the archeologist to excavate. Usually the largest cobs are used for scrapers and fuel, while the most fragile ones are broken by trampling. If each sample were large and random enough to adequately represent the range of materials used, and if we knew the collections came from definite time periods, cultures, and areas, adequate comparisons could be made.

Because Indians usually grow several strains or cultivars of each crop plant, and because some of these cultivars may be lacking at some sites, it would be ideal to make comparisons of the same cultivar from various sites. Certain kinds of corn, sweet or pop corn, for example, are rigorously selected and grown in plots which are usually isolated from other corn growing plots. Sweet corn is very different from other kinds of corn grown in an Indian Pueblo of today, yet it is similar to sweet corn grown in other Pueblos.

A study of all Indian sweet corn shows a steady gradient from South America out to the plains. South American sweet corn ears are short and broad, with more than 24 rows of long, slender, reddish or yellowish kernels, whereas on the plains it has 10 or 12 rows of nearly crescent-shaped kernels, often colored the same red as the sweet corn of South America. Indian sweet corn found further east was usually 8 or 10 rowed and yellow like the native flints, but red and blue ears occasionally were seen. Most of these cultivars can be identified precisely only in exceptionally well preserved archeological material. Usually only comparisons of the collections as a whole can be made.

Plants spread out from their center of origin at varying rates. The amount of change through selection, hybridization and other means varied in different regions. Gradients of change might be established running out from the center to the periphery of the area in which the plant was grown. The changes in crop plants over the years have enabled us to establish rough sequences for corn and some other plants in a few areas (Martin, et al., 1952, 464-71). In order to complete such sequences and gradients and to make them really useful for the study of the history of agriculture, many collections from dated sites and more precise techniques for classifying minor variants in cultivated plants are needed.

Vegetal remains give little information on crop yields, harvest techniques, and the use of the plants, even when large samples are recovered. We can make fairly good estimates of yield for a single plant, but we rarely know how many seeds were planted in a hill, how many plants survived to maturity, or how the hills were spaced. Castetter and Bell (1942, 82) decided that soft corn grown by the Pima Indians seldom yielded more than 10 to 12 bu. per acre. The yield of the similar variety grown in Glen Canyon probably would be lower.

Agriculture came late to the Glen Canyon region; long after it had been practiced in central and southern Arizona and adjacent New Mexico. None of the crop plants were domesticated in the Glen Canyon region and no cultivars appear to have been restricted to the area.

The greatest diversity in corn, beans and squash is found in Mexico. The majority of the wild relatives of corn (species of Manisuris, Tripsacum, and Euchlaena [teosinte]), beans, and squash (the wild and weedy species of Cucurbita), and many wild species of cotton occur there. Archeological material of all the cultivated plants of Glen Canyon are found in older sites farther south and in Mexico.

The various kinds of cultivated plants spread into the United States in waves which apparently coincide with times of major cultural changes. Accidental crossing of the various cultivars and the wild relatives, environmental and human selection of seed often associated with religious or ceremonial practices, resulted in new forms and the preservation of old and tried ones. There are many records from modern Pueblo Indians on selection of seed corn according to definite standards, careful preservation of the seed, and its planting in separate plots. Cushing (1920, 167) wrote, "In each corn room or granary of Zuni are preserved carefully four objects: an ear of yellow corn full to the very tip of perfect kernels ... ". Whiting (1939, 12) noted, "The Hopi.... refuse to plant any kernels from an ear of corn which they consider to be a mixture... They are also keen to note differences in the quality, season, or other desirable characters, and seed corn is often selected with these factors in mind". White (1945, 566) said, "A perfect ear of corn, fully kerneled to the very tip, is known as kotona; it forms the basis of the most sacred fetish of the Keres -- the iariko". When I collected corn from most of the Pueblos during October of 1953, several cooperative Indians told me that the best ears were filled to the tip so no cob was visible, had straight rows, and no grains of other colors or textures. These "best" ears were not always the largest or heaviest. More information on crop plants, critical collections of corn and other plant material should be gathered from living Indians before this knowledge is lost. Collections could be made by someone skilled and patient enough to do the extracting of information on planting, preservation, and use.

Among the Glen Canyon corn collections the cobs and ears impaled on sticks or found in special caches were relatively uniform. Usually they had straight rows of grains running all the way to the tip, and more rows of grains than the average for cobs of a site. These specimens were interpreted as having been selected for seed corn or for special uses. Knotted yucca loops like those illustrated in Lipe, _et al._ (1960, 220), are used to suspend selected ears in ladder-like form for hanging on walls in Hopi villages. Some Pueblo Indians today save selected ears by tying or braiding husks together (Lipe, _et al._, 1960, 212-13, ill., 53).

Some cultivated plants were grown in very limited areas. The requirements of certain cultivars for specific temperature range, day length, and length of season limited the habitats these plants could occupy so they could not spread to new regions. Other adaptable and acceptable plants were carried to distant regions and grown successfully.

Evolution of cultivated plants is greatest when the cultivated forms have opportunities to hybridize with wild and weedy relatives (Hutchinson, 1965).

In Glen Canyon no wild forms existed which could cross with corn, cotton or gourds, or the wild squash relative, C. foetidissima. This plant was so rare and the barriers to crossing so great that it is likely there was no appreciable effect. In Glen Canyon we do not have the baffling diversity of interbreeding cultivated, weedy, and wild plants which one finds in Mexico.

None of the most ancient kinds of corn which are found in some sites in southern Arizona and New Mexico up to about A. D. 1000 or 1100 were found. Only a few cobs approach the modern descendants, Chapalote and Reventador (Wellhausen, et al., 1952; Cutler and Eickmeier, 1965, 48) of the popcorn races which are still grown occasionally in northern Mexico, and by the Papago Indians in Arizona.

The only squashes are cultivars of two species, Cucurbita pepo and C. mixta (Cutler and Whitaker, 1961; Whitaker and Cutler, 1965). The bottle gourd (Lagenaria siceraria) and cotton are found mainly in the larger sites, usually in protected places to the south and at lower altitudes.

The remains of cotton are not nearly as abundant as those of corn and cucurbits. All cotton fibers and fragments from Glen Canyon resemble those from cotton grown until recently by the Hopi, Gossypium hirsutum var. punctatum (G. hopi). All New World cultivated cottons are polyhybrid species with 26 pairs of chromosomes (genomes AD), twice as many as most wild species of the New and Old Worlds. Thirteen of these chromosome pairs (the D genome) are similar to those found in New World wild species. The other thirteen (the A genome) are similar to those known only from some African and Asian species, including the common Old World cultivated cottons and the wild weedy G. herbaceum var. africanum of southwestern Africa.

There is a striking parallel between the bottle gourd (Lagenaria siceraria) and cotton. Cultivated cotton (polyploid) of the same species as Glen Canyon cotton, G. hirsutum, but probably belonging to a distinct cultivar, has been found in a site near Tehuacan, State of Pueblo, Mexico, and dated at about 5800 B. C. (Smith, 1964, 675). Lagenaria is known from levels nearly as old in the same site (Cutler, Whitaker, and MacNeish, n. d.) and from older deposits in Tamaulipas (Whitaker, Cutler, and MacNeish, 1957). The earliest cotton and bottle gourd appeared in Mexico before agriculture was well developed and the plants may have been growing wild or as weeds in man-disturbed habitats.

The center for the genus Gossypium (Saunders, 1961, 52), and the greatest diversity in cultivated kinds and related wild species of the genus Lagenaria are found in Africa. Gossypium and Lagenaria have been collected from many of the same or similar localities in central and southern Africa.

Whitaker and Carter (1954, 700; 1961, 104) demonstrated that Lagenaria gourds could survive at least 347 days floating in sea water without appreciable decrease in the viability of seeds and that seeds in gourds stored under quite unfavorable conditions would still germinate six years after the experiment. This would allow ample time for movement from South Africa to the New World. Stephens (1958, 86) found that certain wild cotton seeds and bolls are capable of floating in sea water for at least several months and have remarkable tolerance to long immersion in sea water. The occurrence of wild forms of both genera in Africa, often in littoral habitats, the ability to float and survive salt water immersion, some tolerance of salty growing conditions, the favorable currents, and the distribution of the forms, suggest that trans-Atlantic transport could have been possible.

It is unlikely that all wild cotton species or even all cultivated forms have been discovered. Gentry, for example, published a new species from Mexico in 1956 from collections he made in 1952 along a highway in Michoacan. In 1958 Hutchinson and Lee described Gossypium longicalyx from a 1955 collection made in central Tanganyika. Relatively few specimens of cotton and cucurbits can be found in herbaria and it is likely that several undescribed relatives of the bottle gourd could be collected in Africa. Only a few collections of plant materials have been made from the coast and interior of northeastern Brazil; areas where seeds from Africa might land and grow.

CORN

The history of corn is incredibly complicated. Ancient wild grasses apparently gave rise to several species of Manisuris and Tripsacum, and to forms of maize. Later crossing of various kinds of Tripsacum with several kinds of maize produced a large number of different kinds of teosinte. Tripsacum and Manisuris still grow wild near cornfields from Bolivia to the United States and some hybridization still occurs. The greatest amount of recent hybridization involves the many kinds of teosinte which occur as weeds in and around cornfields in Guatemala and, especially, in Mexico. Teosinte and corn have the same number of chromosomes and corn is almost as receptive to teosinte pollen as it is to its own. Fortunately most of this confusion occurs south of the United States and the patterns of the limited number of cultivated plants which spread northward are less complicated.

Corn is a grass and has the basic grass pattern. The plant is composed of units called phytomers (Cutler and Cutler, 1948), each one consisting of a bud, a section of stem and a leaf. These units are modified in the various plant parts. Fragments of a tassel or an ear appear to be very different from a leaf with its sheath and associated stem section, yet these fragments and the leaf unit are homologous. Changes in a character in any part of the ear are usually accompanied by similar changes in the homologous parts of the tassel and by less obvious changes in the conservative vegetative parts, the leaves and stems. For example, pod corn (Fig. 2, f) has greatly elongated husk-like coverings, the glumes, which may completely enclose the kernel. The glumes of the tassels of a pod corn plant are also greatly elongated. Although I do not have figures, I would expect that pod corn plants would have somewhat longer leaf sheaths and leaves because these are the homologs of the glumes. Some of the less apparent homologies, such as that of tassel branching and ear shape, were described by Anderson (1944).

From the stalk fragments and larger tassel specimens found in Glen Canyon sites, supplemented by deductions supported by our studies of entire plants in modern Indian fields and in our experimental plantings, and by comparisons with materials from Mesa Verde sites, we can visualize corn plants grown in Glen Canyon. These were smaller and weaker than plants now grown by the Pueblo (including the Hopi) and Navajo Indians, and about the same size as those grown at Mesa Verde. The leaves were probably narrower than those of modern Pueblo or Pueblo III corn from Mesa Verde (Cutler and Meyer, 1965), and the plants, leaves and tassels more flexible.

One good ear was usually produced on a plant. If the plant were vigorous, a later maturing and smaller ear might be produced above and another below the first ear. The lowest ear frequently was borne so low that its base was partially buried by the soil or sand. Even a major ear was occasionally borne at soil level or in contact with soil heaped about the plant, indicated by stains on a few outer husks.

Seeds probably were not planted as deeply as the Hopi plant their seeds in non-irrigated land, but we would need to study many more stalk and root specimens before we could determine how deep the seeds were planted and how high the plants were hilled.

A few plants produced tillers which probably bore very small ears or none. Although secondary and tiller ears contributed a substantial proportion of the runty cobs found in archeological sites, runty ears could be produced on a plant perfectly capable of bearing large ears if the plant was grown under poor conditions or crowded by weeds or other corn plants in a hill.

Practically no entire tassels and relatively few tassel fragments were recovered. Less than half of this small sample still retained pollen. There was little reason to bring tassels into a dwelling or a storage area unless they were to be used for some ceremonial or decorative purpose. The utilitarian and uncomplicated nature of the Glen Canyon sites is suggested by the absence of tassels. Numbers of them were found in some nearby large sites, like Alkali Ridge Ruin, Aztec Ruin, and Step, Long, and Mug Houses in Mesa Verde (Cutler and Meyer, 1965), usually tied in bundles which were sometimes linked by yucca strips into long chains. Practically all of these tassels had been gathered shortly before the pollen was ready to be released, so that very few of the tassel fragments had shed any pollen. The Glen Canyon sites are slightly lower, and it is possible that plants matured slightly earlier, or the time at which the tassels were used was later. However, there is a good probability that the Glen Canyon tassel fragments were brought in for bedding or other purposes, or by accident. I have not found any descriptions for the use of tassel bundles in eye witness accounts of Indian customs to date.

CORN GRAINS

Corn is usually classified in commerce by the character of the kernel. This character is important in modern Indian classification because the character of food material stored in the grain determines the use to which corn can be put. Corn is usually catalogued in six main groups:

1. Pop corn has very little soft starch and most of the kernel is filled with hard starch (Fig. 2, a). No prehistoric pop corn was found in

The Glen Canyon sites, although it is likely some pop corn grew there. The 24 grains from 42Sa413 were a modern variety and could only have been introduced within the last 20 years.

2. Flint corn has a layer of hard and translucent starch surrounding the soft starch center (Fig. 2, b).

3. Flour corn grains are filled with loosely packed starch grains and have no "horny" or hard starch region (Fig. 2, c).

Most of the corn from Glen Canyon is medium-hard flint. Flint differs from flour corn mainly in a single gene, flint being dominant over flour, but there are many modifiers. Because the amount of hard starch varies considerably, it is possible to find a complete series of grains ranging from flour, through flints with very thin layers of hard starch, to grains which are almost completely filled and resemble pop corn. Occasional specimens are very hard and a few have only thin layers of hard material.

Most corn grown anywhere in prehistoric times was flint. The hard surface of the grains is more resistant to insect damage. Flint corn plants are slightly more vigorous than flour and considerably more vigorous than sweet corn plants. The leaves of flint strains of Mandan corn I have grown are darker green and the plants are more vigorous than flour strains from the same lines. They are also much darker, more vigorous and less attacked by insects than the sweet corn. Mandan corn is very much like Glen Canyon corn and some of the corn grown by the Pima and Papago. However, Mandan cobs are slightly larger and harder, and the number of grains slightly less. Whiting (1939, 70) wrote of Hopi flint corn: "Once a popular type of corn. With changing economic conditions it has now practically disappeared".

4. Dent corn has a band of hard starch around the sides of the grain but none at the cap. (Fig. 2, d) When the soft starch matures, dries, and shrinks, the cap sinks to form the dent. Dent corns differ from non-dent sorts by a considerable number of genes. They have been so mixed and modified by hybridization and the exchange of modifier genes, that there exists a complete series of gradations from non-dented to grotesquely dented and beaked grains. When dry, some slightly dented grains are similar to slightly immature grains. Usually true denting can be discerned by cutting the grains longitudinally as in Fig. 2. The grain in Fig. 2, j is a mixture of flint and dent, while that in Fig. 2, k is probably a mixture of flour corn and a dent. None of the kernels from Glen Canyon are extreme dents. They have the deep dent and beak found in a few of the grains from Yampa Canyon (Anderson, 1949, 92) and characteristic of such extremes

of the Mexican Pyramidal group of maize as the races Pepetillo, Conico, and Conico Norteno (Wellhausen, et al., 1952, 138, 81-6, 179).

5. Sweet corn grains are shriveled and translucent when dry. Because the sweet gene is recessive, it must receive the character from both parents. No sweet corn was found in Glen Canyon sites, but it may have been grown there. It has been grown in all the Pueblos since the early 1900's, and still may be grown by the Papago, Cocopah, and Maricopa Indians.

6. Pod corn has enlarged glumes which cover the entire grain. The grains may be any of the afore-mentioned five kinds. No pod corn was found in the Glen Canyon collections, but it is likely occasional ears appeared either as sports or introduced. The presence of pod corn in a Pueblo III site in Segi Canyon, about 30 mi. southeast of Glen Canyon, and the frequent occurrence of "hunch-backed flute-player" petroglyphs in which the "hump" was more deeply pecked, suggesting a carrying blanket, gave rise to the speculation (Cutler, 1944) that pod corn might have been carried to this region by traveling medicine men like the Callahuayo Indians of Bolivia. In historic times these Indians traveled over much of South America selling medicinal and magical materials in markets and fairs. One of the items they sold is pod corn. There is no indication that pod corn from the Segi Canyon site, or that found in several other sites in the Southwest, was any more important than any other kind of corn.

COLORS IN GRAINS

Color in corn kernels may be located in the outer-most layer (pericarp), beneath the pericarp in the thin outer layer (aleurone) of the storage tissue (endosperm) or in the endosperm itself. The upper part of the embryo (the scutellum) can also be colored, but this color is not usually visible when an intact corn ear is seen. The pericarp colors are the brightest and most lustrous. The pericarp may be colorless or orange, red, deep cherry-red, pink diffused, brown, variegated, blotched, or with a red spot at the point of attachment of the stigma. The colors may cover the entire grain or be restricted to the sides, leaving a colorless cap. The aleurone layer may be colorless, yellow, orange, brown, red, lilac, red-purple, deep purple or almost blue. The endosperm may be colorless (or white) or various shades of yellow to yellow-orange. Endosperm colors are usually most marked in the horny part of the endosperm and the starchy material in the center appears white, although even this is colored slightly in some cultivars with more compact endosperm. Most colors in these tissues are largely independent of each other. Therefore, a plant breeder can pick almost any combination of colors he desires, selecting one color for the pericarp, another for the aleurone, and still another for the storage tissue. This is usually referred to as the endosperm even though the aleurone layer is the outer layer of the endosperm. The aleurone layer contains practically no starch.

The pericarp and endosperm colors are the most resistant to changes caused by aging. Most of the browning evident in old corn grains is in the aleurone layer, with very little occurring in the pericarp or storage materials. A very few years after harvesting it is impossible to distinguish between ears which had their only color in the aleurone (usually a light yellow in recent Hopi, Zuni, and Papago corn which is similar to that recovered in Glen Canyon) and ears which were white, or lacked color in the aleurone and other tissues. It probably takes around 100 years for color to begin to fade in the hard parts of the endosperm and for a slight darkening to take place. In ears which are about a thousand years old some yellow often remains. The most persistent colors are certain reds which are not water-soluble. These are the reds found in variegated (sometimes called calico or squaw corn) ears or in very shiny bright red ears. After a thousand years these colors are almost as fresh as they were after a year of drying. The diffuse pinks and wine red of dye corn is very fugitive and some Navajo and Hopi cobs which were lying in the open for only a few years have lost most of their color. Some of the Glen Canyon cobs show traces of soluble red, but it is impossible to say what proportion of the ears had this color. Soluble red can vary in intensity and distribution from scarcely discernible traces, found in the vascular strands of the cob, to the dense, almost black coloration found in all parts of the Hopi dye corn, called "kokoma". I suspect that many Glen Canyon cobs had slight amounts of color but deeply colored cobs and grains were few. The color develops late and would not be apparent in corn gathered early for green corn. Red apparently is a primitive and ancient color for it is present in many primitive kinds of corn of South and Central America and Mexico, and is present in some sweet and pod corn.

Measuring thickness of the grains or the space they occupied on the cob, is one of the few measurements which can be made on the grain. It is most useful when grain width and length are also known, for the relations of these measurements sometimes are characteristic of definite kinds of corn. Dent corn grains are usually flat and long, while the typical light yellow, soft, floury, 12-rowed corn of the Pima-Papago corn race has kernels almost as thick and only slightly longer than they are wide. Because there was ample cob material from Glen Canyon sites, grain thickness was used only in preliminary work to check the reliability of diagrams of row number and cob size (as measured by cupule width).

Using corn grains, it is possible to calculate the number of rows of grains which were present on the ear from which they came. Since the grains on an ear represent segments of a complete ring covering 360°, angles made by the sides of the grain indicate what fraction of the ring that grain represents. Thus, when the sides of a grain fit an angle of 45°, we know it comes from an eight-rowed ear; if 36°, from a 10-rowed ear. Grains from the tips and butts of cobs, from ears which are distorted or only partially filled, and grains which have been carbonized after they were off the cob usually yield unreliable measurements. The calculation of row number from grains makes it possible to correlate quite accurately loose grains with cob types.

When more than scattered corn grains are found, it is likely that they are parts of a cache. It is impossible to tell, in many instances, whether grains were stored as shelled grain or whether they broke off cached ears. I suspect that in Glen Canyon most caches of shelled corn were for domestic use, and that corn saved for seed or ceremonial purposes was kept on the ear as most of it is among the Hopi. A large pot filled mainly with white flour kernels, but including some colored and flint kernels found near Ismay's Yellow Jacket Trading Post, has been on loan to the museum of Mesa Verde National Park. Such a mixture probably would not be used for seed corn. The uniformity of Glen Canyon cobs, with sticks inserted in their butts, suggests that entire ears were saved for seed.

ROWS OF GRAINS AND CUPULE WIDTH

Number of rows of grains is the easiest and most useful character to measure for the study of corn. Some caution must be used, however, for when corn is grown under adverse conditions, the plant is smaller and less vigorous and there will be fewer rows of grains on the ears (Emerson and Smith, 1950, 7). Throughout most of the United States the earliest corn had about 12 or 14 rows of grains. Over the years there was a gradual reduction in the proportion of 14-rowed ears and an increase in the number of eight-rowed ears (Table 8). Where dent corn appears, however, grain row number may increase. This is apparent in Fremont culture sites and in the Rio Grande Pueblo where dents arrived sometime after A. D. 1300.

Gross cob measurements, made on the entire cob after grains have been removed, are very inaccurate. The glumes are frequently broken or may be so soft that a definite measurement is difficult to make. Frequently only fragmentary cobs, with the glumes broken or entirely gone, are recovered from sites. It is best to make a measurement of a single unit of the main axis of the cob, the rachis. Such a measurement, cupule width, devised by Nickerson (1953) has often been used. A cupule is the pocket in the central axis of the cob in which a pair of spikelets, each usually producing a single grain, is borne. Width is measured across the cupule, from one margin to the other, at right angles to the longitudinal axis.

Cupule width is slightly influenced by the number of rows of grains and by numerous other factors. In general, it is smallest in the more ancient and primitive kinds of corn and larger in more recent kinds which have been selected for larger ears and greater vigor.

Cob size is a function of width of units of the cob (cupule width) and number or rows of these units. Since a pair of grains is borne in each cupule, the number of cupules visible in a cross-section is half the rows of grains.

The value of cob size in delimiting groups of corn types is demonstrated by the discontinuities in the distribution of points on diagrams of cupule width and row number (Figs. 4, 7, 11, 12). These discontinuities follow lines which are roughly equivalent to the distribution of points which indicate equal cob diameters. On several figures for Glen Canyon corn, lines have been drawn connecting points which indicate central cob (or rachis) diameters of 1.2 cm. and 1.7 cm. Such discontinuities follow the same pattern in diagrams of corn from other areas (Cutler, 1964a, 1965; Cutler and Eickmeier, 1965; Cutler and Meyer, 1965). These patterns are usually evident even when there is considerable overlap in kinds of corn or moderate amounts of hybridization.

CLASSIFICATION OF CORN

It is obvious that a classification of corn, based only on the character of the grains alone, would be as artificial as a system of classifying humans by hair color. There are advantages to an artificial classification. A natural one, however, based on evidence for the evolution of corn cultivars, should tell us more about the relationships of the specimens. A beginning on such a classification was made 24 years ago (Anderson and Cutler, 1942). Good descriptions of the major groups of corn of most Central and South American countries have been published by the National Academy of Sciences-National Research Council. The first, and still one of the best of these surveys, was Races of Maize in Mexico (Wellhausen, et al., 1952). In this, the concept of race is narrower than that of Anderson and Cutler (1942). At least five of the 1952 races were included in the 1942 "Mexican Pyramidal" race: Palomero Toluqueño, Conico, Zapolate Chico, Pepetillo, and Conico Norteño, all of them derived from Palomero Toluqueño. In 1942 most indigenous flour and flint corn grown by the Pima and Papago was included in the Pima-Papago corn race--a wide, variable, but closely related group which in 1952 was divided into Harinoso de Ocho, Mais Blando de Sonora, and Onaveño.

Only rough outlines of the progression of corn in the Southwest are known. The first corn was small, hard, usually 14-rowed and similar to the races Chapalote and Reventador described in the Races of Maize in Mexico (Wellhausen, *et al.*, 1952). Later came an eight-rowed flour corn and series of intermediates of this flour corn with the ancient, small-cobbed kinds. This progression may be diagramed:

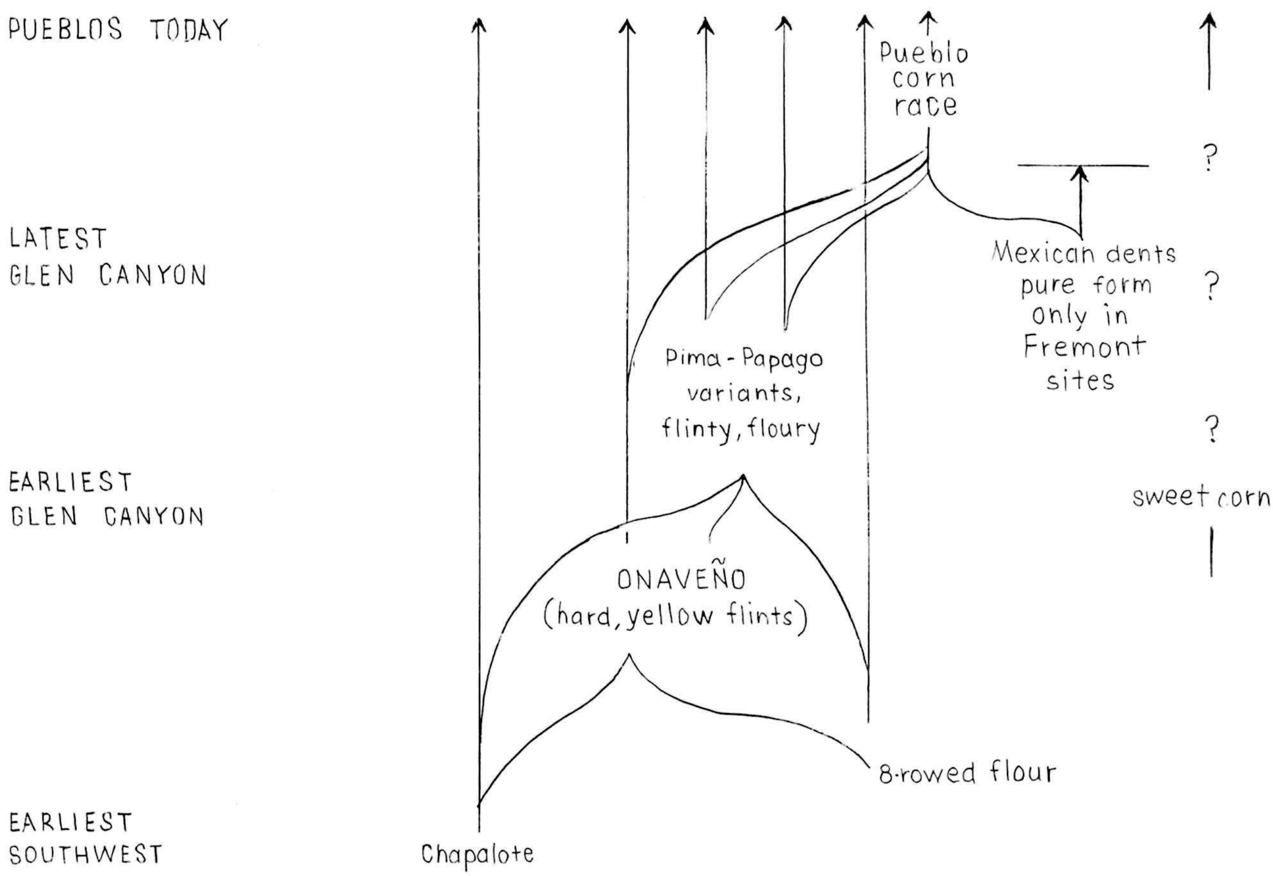

Fig. 1. Progression of corn in the Southwest.

Once the intermediate forms (hybrids) appeared, they had the advantage of hybrid vigor and the chance of improved combinations of characters, permitting them to be carried northward faster than their eight-rowed parent. Thus, the series probably reached the Southwest in the following order, which is also the order from hardest to softest, and from most-rowed to least-rowed:

1. Pre-Chapalote (Small Cob): small, hard grains on a small cob.

Although most specimens have 12 or 14 rows, they may have few rows, and it is likely the most ancient may have had eight or even four rows of grains. None of this early corn reached Glen Canyon, although some of it persisted in southern and central Arizona until about A. D. 1100 (Cutler, unpublished reports).

2. Chapalote: Slightly larger than its precursor, but with small, almost isodiametrical grains, usually brownish, on a small cob. It is unlikely that this was grown in the Canyon.

3. Reventador: Grains are slightly larger, wider, and flatter than in Chapalote and rarely smoky in color. A few cobs and yellow and red grains were found. It is likely the race was grown occasionally, but not as an important food crop.

4. Onaveño: This is the flinty section of the Pima-Papago corn race (Anderson and Cutler, 1942). Crossing of Eight-rowed Flour with Chapalote and Reventador resulted in a series of intermediates which have been separated into Onaveño, and the flour corn sometimes called Basketmaker corn or Mais Blando. Most Onaveño has 12 to 14 rows of hard, yellow flint kernels. The Glen Canyon cobs and grains are uniformly medium-large, suggesting a stable cultivar maintained by rigorous selection. Cobs are usually white; a few are rust-colored. Although grains are usually yellow, some white, red, blue, and variegated colors are present. The few cobs and grains of deep red dye corn belong to soft forms of Onaveño and to Mais Blando. It is impossible to distinguish the vast majority of cobs of Onaveño from Mais Blando. Generally the Onaveño cobs are slightly harder, have more rows, smaller cupules, and darker and firmer glumes. The major differences, and the basis for separation of these two, is in the character of the grains. Practically all of the cobs from Grand Canyon (Cutler, 1963) and nearly all from Glen Canyon and adjacent areas (Cutler, 1964b; Cutler and Bower, 1961; Cutler, n. d.) belong to these two races.

5. Mais Blando: This, (the "Mais Blando de Sonora" by [Wellhausen, et al., 1952, 196]) was second only to Onaveño in Glen Canyon. Most cobs were white with grains usually white or yellow, but often red, blue, or variegated. Yellow and white forms are still grown by the Hopi and much of the Hopi dye corn (kokoma) (Brown, Anderson and Tuchawena, 1952) would fall within this race. Farther east, in the Rio Grande Pueblos, dye corn is more variable and can also be flinty. It would then belong to Onaveño.

6. Eight-rowed Corn: This corn, called Harinoso de Ocho (Wellhausen, et al., 1952), had a great effect on agriculture in central New Mexico and Arizona about A. D. 500-700 (Martin, et al., 1952, 466-70) and somewhat later

in areas to the north. Galinat and Gunnerson (1963) made a study of this corn, but so much new material has been collected since their paper was written, the history of Eight-rowed must be studied anew. Flint forms of Eight-rowed were more common than flour forms and are the ones which were dominant in eastern United States in prehistoric times. This does not mean there is any evidence for Carter's suggestion that some corn came into the Southwest from the East (Carter, 1945). All botanical evidence indicates a steady movement northeastward from Mexico. Color range of Glen Canyon material is the same as that for Mais Blando. Dented forms of Mais Blando and Eight-rowed are found in Fremont Culture sites and are results of mixing with dent corn.

DENT CORN AND FREMONT CULTURE

Probably all dent corn, including that in the Southwest, is derived from the same ancient race; Palomero Toluqueño, or Toluca pop, illustrated in Anderson and Cutler (1942, Pl. 11, c) and in Wellhausen, et al. (1952, 47-54). A progression can be made from the most extremely tapered and small cobs, represented by dented forms of Toluca pop, running roughly: Conico, Conico Norteño, Pepetilla, Zapalate Chico, Chalqueño, Jala, and Cristalina de Chihuahua (see Wellhausen, et al., 1952 for descriptions and illustrations). The relationships are very complicated. Apparently a form of Conico Norteño spread northward, perhaps about A.D. 700 when cotton and some forms of squash first appeared in central Arizona. It had such a wide tolerance for varied day lengths, it could mature far north of the usual latitude. Anderson has suggested (1959) that the Mexican dent which moved to the Yampa River canyons was the varied-day-length-tolerant Zapalote Chico, but this could just as well have been Conico or some other variant of the many Mexican pyramidal dents. Most references to Fremont Culture corn call all of it "Mexican dent corn", while actually most of it was Onaveño and Mais Blando similar to that grown in Glen Canyon. Less than one-third was dent. References are made to Anderson's report (1948, Pl. 22) which pictures four extreme ears. These were obviously selected for seed because the two largest and two smallest are joined by sticks inserted in their butts. Anderson (1948, 92) wrote: "Whereas only two of the ears are exaggeratedly Mexican Pyramidal, the other ears bearing kernels are transitions to the same type and like them could be duplicated (aside from their discoloration) in modern Mexican fields."

Galinat and Gunnerson (1963) think that environmental selection on Pima-Papago race corn, which had hybridized with teosinte and Chapalote, resulted in the extremes found near Vernal, Utah. This is possible, but highly unlikely.

If there was severe environmental pressure, the number of eight-rowed ears would have increased. The contrary is true, for the proportion of eight-rowed cobs decreased in Fremont sites. Galinat and Gunnerson's (130) estimate of ten per cent eight-rowed cobs is not far from the figures we obtained for Fremont sites and greatly less than the usual 20 to 30% for Pueblo II and Pueblo III sites in northern Glen Canyon and the surrounding area. The ears Anderson showed in 1948 indicate that Fremont people had a definite idea regarding the kind of corn they wanted to grow--a kind distinct from others found at the site. Cobs and ears with sticks in their butts from Fremont sites 42Ga102, 103, and 288, pictured in Fig. 28 of Fowler (1963, 83) are not as extreme as those pictured by Anderson. However, they are distinct from such special lots as those pictured by Hurst and Anderson (1949, 164 from Cottonwood Cave) and those in this report (Fig. 5, 42Ka 172FS93, Fig. 10, 42Sa736, 16 cobs from a cache).

How did denting reach the Fremont Culture area, Glen Canyon sites or the eastern Pueblos? When the first Fremont extreme dents were seen, it appeared plausible that dents traveled up, perhaps through Glen Canyon, to the Yampa River area and then southeastward to the Rio Grande Pueblos. Collections made in the last 15 years show that this is very unlikely. Dents appeared quite late in sites in central Arizona and were very scarce in Glen Canyon until quite late. There are very few of the extreme dents which would be expected if a new race of corn was spreading northward. Apparently Glen Canyon could not be a pathway for the Fremont dents.

There is a good pathway farther west and there we have some quite early dents. From Antelope Cave, a Pueblo II site in the Arizona Strip about 50 mi. south of Zion National Park, we have two good collections which contain a considerable number of dent kernels. There are fewer eight-rowed and more 14-rowed cobs than are usually found in sites without dent influence in northern Arizona. Antelope Cave dent kernels are larger and flatter than most from northern Fremont sites and need more study.

From Zion National Park (ZNP-21) we have counts for 88 cobs made by Volney Jones (1955, 192). In his opinion, the corn is composed of the usual Glen Canyon kinds and has some Mexican dents, although none as extreme as Anderson's illustrations. The distribution of cobs by rows of grains is indicated in the following table:

Table 1. DISTRIBUTION OF COBS BY ROWS OF GRAINS

	Total No. Cobs	Rows of Grains 8	10	12	14	16
		Per Cent of Total Cobs				
Lower Escalante (Fig. 11, a)	23	9	13	65	13	
Upper Escalante (Fig. 11, b)	26	12	27	46	12	3
Sheet Gulch (Fig. 11, c)	32	13	9	41	31	6
42Sv5 (Snake Rock) (Fig. 11, d)	67	3	15	54	19	9
42Sv5 (Fig. 12, a) House D	37	3	11	62	13	11
42Un95 (Fig. 12, b) Feature 408	55	11	13	53	18	5
42Un95 (Fig. 12, c)	70	3	21	64	6	6
Zion National Park (Jones, 1955, 192)	88	7	23	56	12	2

In all of these sites we have been unable to separate the dent corn from other kinds, the Pima-Papago complex. The row number figures are not graphic. We find it difficult to see a gradient, as there is in pottery, from south to north, and from the lower Escalante collections to the upper Escalante and Sheet Gulch. The best indicator of the Fremont dent is shown in the diagrams, Figs. 11 and 12. There is a decided clustering of points at 12 rows and a marked number of cobs with cupule widths of more than 0.8 cm., outside the 1.7 cm. cob diameter mark which delimits most of the Pima-Papago complex. These 12-rowed cobs with cupule widths of more than 8 mm. represent vigorous intermediates of dents and the older corn of this region. The extreme dents would usually fall somewhere between 0.5 and 0.7 cm. in cupule width and perhaps have 14 rows of grains as often as 12. This observation has been checked on some collections from Mantle's Cave and other sites on the Yampa which were submitted by Herbert Dick many years ago. Until we saw the collections from the Glen Canyon Fremont sites, Snake Rock (42Sv5), and Caldwell Village (42Un95) we could not relate the Yampa corn to other collections and make useful comparisons. It now appears there is considerable similarity in Fremont corn. It probably extends into Arizona along a pathway considerably west of Glen Canyon.

Dilution of the effect of dents on the pattern of the entire corn from a site is shown by comparing the diagram of corn from House D of 42Sv5 with that of corn from all other parts of the site (Figs. 11, d, 12, a), or that from FS 408 of 42Un95 with most of the other corn from the site. In each case the sample from a restricted area shows a greater concentration of 12-rowed cobs.

We have relatively little material from areas west of these sites or from sites in western Arizona. Therefore, it has been impossible to trace Fremont dents back to the Mexican border.

It is unlikely that dents moved southeastward from the Fremont area. There is little evidence of dents until quite late in Mesa Verde and the middle San Juan. Our studies on the upper San Juan material collected by the Navajo Dam Project are still incomplete, but apparently dents came late there, as they did in the Kayenta, eastern Arizona, or western New Mexico sites we have studied. Therefore, dents probably did not move from a western Arizona pathway across northern Arizona to the Rio Grande. This is apparent even today in the corn of the Pueblos. Examples of the most dented corn, which represent the extreme of the Pueblo corn race (Anderson and Cutler, 1942), are to be found in the eastern Pueblos. From some observations I made while collecting corn in the Pueblos in 1953, the most extreme dents are in the Keresan Pueblos and Jemez. These may have been introduced in post-Spanish times, but I have seen very few of these extremes in the more conservative of the Spanish-American villages.

Eastern dents differ from those of the Fremont area in being more vigorous, with heavier cobs, larger kernels, and a tendency towards long ears and taller plants. They suggest western Mexico cultivars or races like Jala and Cristalina (descriptions in Wellhausen, et al., 1952). It is likely the Fremont dents came through western Arizona and Utah deserts and had little influence on the mainstream of agriculture. They perhaps contributed only a little hybrid vigor through occasional interchange of plant materials with neighboring peoples.

It is time that a complete review of Southwestern crop plants be made. Carter (1945) worked out a series of observations from materials available at that time, on succession of varieties and species of cultivated plants. He divided agriculture of the Southwest into "two distinct areal groups characterized by crops differing in species or varieties. These are the Gila-Colorado (Piman and Yuman) and the Plateau (Pueblo and neighboring peoples). This division goes far back in time." (Carter, 1945, 12). Much more reliably dated and identified plant material is available by people like Anderson, Bohrer, Cutler, Galinat, Heiser, Jones, Kaplan, Mangelsdorf, Nickerson, Smith, and Yarnell who have had experience with special groups and access to good collections. The areas Carter delimited are not as sharply marked and there are more exceptions than he thought, when only a few collections were available. His pioneering work did much to stimulate interest in plants from archeological sites in the Southwest.

SQUASHES AND PUMPKINS

Three species of *Cucurbita* are known from Glen Canyon. The wild squash, sometimes called wild gourd, calabacilla, or coyote melon (*Cucurbita foetidissima*) has been found in a few sites. However, no herbarium specimens have been collected from living plants in Glen Canyon. Floyd Sharrock collected a fruit from a plant north of Glen Canyon growing directly in front of a pueblo site (42Sa1602) located in upper Salt Creek in Canyonlands National Park. *C. foetidissima* has been collected near the Hopi Villages and along the upper San Juan River. It prefers disturbed soils and there are few places in the Canyon which offer an ideal habitat and at the same time would not be readily accessible to past and recent inhabitants. It is possible that continuous collecting by Indians exterminated it.

There are several reports which indicate use by modern Indians of the fruits, their seeds and many specimens of roots found in Tularosa Cave, New Mexico. Notes by Edmund Nequatwa, a Hopi Indian, on two herbarium sheets of C. foetidissima in the Museum of Northern Arizona state: "Used as food. Cornmeal cake dropped inside blossom and baked."

The terms squash and pumpkin are of no value in discussing cultivated cucurbits, although some attempts have been made to restrict these common names to certain species. As a rule pumpkins are coarse and strongly flavored cultivars used for forage, table vegetables or pies. Squashes are finer textured, milder flavored, used immature or when mature, baked, boiled, in pies, and less commonly used for forage. Within the three most common species of Cucurbita, C. pepo, C. moschata and C. maxima there are cultivars known as squash and others known as pumpkins. Most of the fruits of C. mixta are cushaws, although they may also be called squashes or pumpkins in some regions. Since we know little about the texture of fruits from Glen Canyon, we could make no useful distinction. Most of the fruits of C. pepo, however, including those eaten when young, would be similar to kinds commonly called pumpkins.

C. pepo is the oldest cultivated squash in the region and in the United States (Cutler and Whitaker, 1961; Whitaker and Cutler, 1965). There is relatively little diversity in the Glen Canyon material and apparently only two major kinds were grown. One of these was not greatly different from the common pumpkins still grown by the Pueblo Indians and variable in color from green to mottled green, and tan to orange. The other is a cultivar practically unknown outside of the Glen Canyon-lower Green River area. It has an exceptionally thick rind and apparently replaced the bottle gourd (Lagenaria siceraria) as a container in areas to the north where bottle gourds were difficult to grow. It is not known if C. pepo was used to store or carry water, but the size of the opening and its position fairly low down on the neck of the fruit suggests that pepo was mainly used for dry storage. It is possible to distinguish the rinds of bottle gourd from those of pepo by an examination of the cell structure. The thick and roughened rinds of pepo can be distinguished from the usually smooth and less thick rinds of C. mixta, but so far we have been unable to separate thin pepo rinds from rinds of C. mixta. Thus, Table 7 includes a listing of unidentified rind fragments. Mature fruit stems, or peduncles, of pepo usually have five rounded longitudinal ridges. Mixta fruit stems are usually swollen, corky and irregular in shape (Fig. 3).

Cucurbita mixta, the cushaw, is the latest of the squashes to appear in the Southwest. In Glen Canyon it approaches or reaches its farthest north limit. It was once thought (Cutler and Whitaker, 1961, 481) that mixta might be associated with Fremont Culture movements, but we have found no good evidence to support this. Good illustrations of pepo and mixta used for containers are to be found in Sharrock, et al., (1961, 264) and Fowler (1963, 86).

Some discussion of squashes is included later in this report under sites 42Sa374 and 42Sa619.

Martin and Sharrock (1964, 177) found squash pollen in five of 24 samples of human dung from Glen Canyon sites, mostly from 42Sa736 (Bernheimer Alcove [Sharrock, Day and Dibble, 1963]) in an area where considerable _C. mixta_ was present. The larger of the two distinguishable types of pollen was more abundant. They based their identifications on a paper written in India (Amasthi, 1962) which gave no clear description of the plants, no illustrations of the plants, and no means by which the identification could be checked. Since the majority of Asiatic squashes in our herbarium have been wrongly determined, and since the species most abundant is identified as _C. moschata_, which does not occur in Glen Canyon materials, I suggest that the most common species is _C. mixta_. This is later in time than _C. pepo_, and has a number of characters; fruit stem, neck cells of the fruit and frequently enlarged vine stems, which suggest that pollen may be similarly larger than that of _C. pepo_. The smaller pollen is likely to be _C. pepo_. It could also be the wild _C. foetidissima_ but the scarcity of this species makes this unlikely.

Mixta is frequently identified as _C. moschata_, although most specimens were identified as _moschata_ until _mixta_ was described in Russian, in 1930. Consequently, Carter used this name and has since been followed by others. Even as late as 1952, Whitaker and I were uncertain of the limits of some species and identified some seeds from Zion National Park as _C. moschata_, although these would now be identified as _mixta_ (Jones, 1955, 183, 185). As far as we know, _C. moschata_, although it may have been in the Southwest earlier than _mixta_, did not get farther north than Kayenta, Arizona.

THE BOTTLE GOURD, _Lagenaria siceraria_

Little more need be said about the bottle gourd. The only three sites which had more than a few specimens, still had so few they could have come from two or three fruits. Each of these sites (42Ka241, [Gunnerson, 1959] 42Ka274, and 42Ka276 [Lipe, 1960]) also had some cotton.

COTTON

It is difficult to determine whether cotton was being grown in Glen Canyon; cotton bolls might have been carried in trade (Kent, 1957, 467).

The fact that the Hopi were growing cotton makes it likely that it was grown this far north in Glen Canyon. Although a large number of sites had a few cotton fibers, the largest number of bolls were found in 42Sa364 (four bolls), 42Sa377 (three bolls) and 42Sa598 (many bolls, seeds with fibers) (Lipe, et al., 1960). A bag containing cotton seeds was found in 42Ka433 (Lipe, 1960).

GLEN CANYON AND RELATED SITES

Coombs Site, 42Ga34, A. D. 1075-1275
(Lister, 1959)
(Lister, Ambler and Lister, 1960)
(Lister and Lister, 1961)

Practically all of the material from this site was carbonized. In Fig. 4a, 20% has been added to cupule width measurements to compensate for the shrinkage estimated to have been caused by heating. Occupied from A. D. 1075-1275, the fullest development at this site occurred about A. D. 1100-1175, late PII to early PIII times. There are fewer eight-rowed cobs than usual for PIII sites and the number of 14-rowed cobs is small. This suggests that some of the corn dates from PII (see Table 7) and that Kayenta influences were dominant at this site. There may have been some Fremont influence here, but no dent kernels could be recognized in the carbonized remains. None of the cobs had as much taper as extremes of the Fremont culture strains of Mexican Pyramidal illustrated by Anderson (1948, Pl. 22). The sample is small but probably quite reliable since the specimens were taken from scattered areas and could not have come from a single cache. They tend to support the conclusions reached through studies of architecture and ceramics; the people were from the Kayenta area, had contacts with Mesa Verde and San Juan Basin people, but lesser contacts with the Fremont area (Lister, Ambler and Lister, 1960, 5, 29).

Sheep Horn Alcove, 42Ga102, Fremont culture, A. D. 1000-1050 and

Pantry Alcove, 42Ga103, Fremont culture, A. D. 1000-1050
(Fowler, 1963)

The most interesting material was a lot of 12 well-preserved ears, tabulated in Table 2. The sticks in the butts indicate that these ears were being saved, probably for seed. Most of the grains were discolored by age, which meant exact color could not always be distinguished. Many had a slight flush of pink in the pericarp and appeared to have been white-capped. Cupules, where they could be measured without seriously injuring the ear, were from 0.7 to 0.85 cm. wide.

Nine cobs which were lacking grains, from 42Ga103, had sticks inserted into the butts. They were very similar to the entire ears mentioned above and like them were probably saved for seed. Rows of grains ranged from 10 to 18 with six cobs having 12 rows for part or all of their length. Cupule widths ranged from 0.6 to 1.05 cm., the mode being 0.8 cm. Some of these ears approach the least dented of the pairs of ears impaled on sticks which were found in a Fremont site, Mantle's Cave, on the Yampa River (Anderson, 1948, Pl. 22). They are almost identical to ears shown in Galinat and Gunnerson (1963, Pl. 24). Similar cobs were found at another Fremont site (42Sv5) listed in Table 7.

The neck of a Green Striped Cushaw stuffed with grass, corn cobs and organic debris, were found in 42Ga102.

In Pantry Alcove two storage vessels and fragments of one or more others were found. A small pepo fruit (illustrated in Fowler, 1963, Fig. 32, c) with two sets of zig-zag lines scratched into the outer skin had been cleaned out through an opening in the side. A small sandstone slab closed this opening.

The circular opening cut in the side of a mixta fruit (illustrated in Fowler, 1963, Fig. 32, b) was also found with a small slab to close it. Fragments of mixta and three small sandstone slabs probably came from other Cucurbita vessels.

42Ga284, A. D. 1000-1250
(Fowler, 1963)

There is a wide range in cob types in this sample of only 22 specimens, ranging from small Pima-Papago race to large Pueblo race cobs. Cupule widths range widely, from 0.4 cm. to 0.9 cm., with a median at 0.78 cm.

Circle Terrace, 42Ga286, A.D. 1050-1250
(Fowler, 1963)

All 12 cobs are large, similar to Pueblo III types from other sites in this region.

Triangle Alcove, 42Ga288, A. D. 1000-1250
(Fowler, 1963)

A number of entire ears from this site may have been saved for seed. One of these (the 14-rowed ear in Table 3) had a stick inserted in the butt.

Table 2. SHEEP HORN ALCOVE 42Ga102 AND PANTRY ALCOVE 42Ga103

The most interesting material consisted of twelve well preserved ears tabulated below.

	42Ga102							42Ga103				
	2-1	2-2	3-1	3-2	4-1	4-2	5-3	157-2	104-4	123-1	137-4	137-5
Number of Rows of grains	12	14	12	16	14	12	16	10	14	16	12	14-12
Grain thickness	4.8	4.3	4.3	3.6	4.2	4	4.2			4.	4.	4.2
Grain width	10	8	10	8.5	9	9.5	9.			8.	8	8
Shank diameter	13x14	12x14	13x15	14x14	13x15	12x15	12x13			13x15	8x12	12x15
Endosperm	slight dent	medium dent	slight dent	slight dent	medium dent	flint	medium dent	slight dent	slight dent	medium dent	medium flint	medium flint
Color	white?	white	white?	white	cherry pale cap	cherry on yellow	white?			blue and white	yellow?	calico on yellow

Because most of these ears had been so discolored by age, exact colors could not always be distinguished. Many had a slight flush of pink or red in the pericarp and appeared to have been white-capped.

Table 3. CORN FROM TRIANGLE ALCOVE

Rows of grains	8	12	12	12	14
Grain thickness	4.6	3.8	3.8	3.5	5
Grain width	10.5	8.5	9	7.7	9.5
Cupule width	8	7	8	7.5	9
Shank diameter	7x9	12x15	14x15	11x14	12x4
Endosperm	medium flint	soft flint	slight dent	soft flint	medium flint
Color	white & blue	white or yellow	white ?	yellow ?	probably blue with pinkpericarp

Three other ears, one 12-rowed and two 14-rowed, resembled the second ear above. Many of the loose grains found at this site were true dents, with a slight thickening of the hard storage tissues at the sides of the grain and with none at the cap. Most dents were from 12-and 14-rowed ears. Some slightly dented grains from eight-rowed ears appeared to be slightly immature flour corn or are very weak dents with little hard storage material at the sides of the grains. A Green Striped Cushaw storage vessel, with an opening cut into the side and closed by a stone slab, was found in Triangle Alcove (illustrated in Fowler, 1963, Fig. 32, d).

42Ga290, date unknown
(Fowler, 1963)

Two medium flint ears, 12- and 16-rowed, with blue, purple and white grains were found at this site. They were similar to the entire ears found in 42Ga102 and 42Ga103, which are only a few miles away, but show little influence of dent corn.

42Ga291, date unknown
(Suhm, 1959)

One of the two 12-rowed cobs found in this Harris Wash site had a stick inserted in the butt.

Alvey site, 42Ka172, Unknown, to PII-PIII (Gunnerson, 1959)

Practically no change was found in the cultivated plant remains from the lowest level (Level I) to the upper (Level III), but the sample from Level I is too small for good comparisons. Only 31 of the 737 cobs recovered from the site came from the lowest level. Therefore, the absence of cucurbits and cotton from this level, although they are present in Levels II and III, is not surprising. It first appeared that the cobs in the lowest levels were smaller and had softer, narrower, and longer lower glumes than cobs in the middle and upper levels. Careful examination and measurements showed that this was not true. Row number, cob size, and characters of the cupules and glumes were remarkably constant throughout the site, although there is considerable diversity in the corn grown (Fig. 4, b). The number of 14-rowed cobs suggests some influence of Fremont Culture corn.

There appeared to be no dent grains from the lowest level and more from the upper than the middle level. Most of the mature loose grains from the site were yellow flint from 10- and 12-rowed ears. About half the loose grains were immature.

A considerable number of cobs with sticks in their butts was found. Nearly all of these cobs had 12 or 14 rows of grains, as do most stick-impaled cobs from Glen Canyon sites (Fig. 5). However, Feature 82, Level II yielded two 8-rowed, two 10-rowed, and six 12-rowed cobs with sticks in their butts.

A 6.0 cm. dia. small gourd rind probably is the yellow-flowered, cultivated, ornamental gourd, *Cucurbita pepo* var. *ovifera*, but may be the wild gourd, *C. foetidissima*.

Gates Roost, 42Ka178, Fremont? (Gunnerson, 1959)

The corn from this site varied greatly in size, shape, color of the cob, number of rows of grains and characters of the spikelets. A typical lot from Feature 18 is illustrated (Fig. 6). Some cobs impaled upon sticks are shown in Gunnerson (1959, Fig. 16). Several ears with grains and a few loose grains were slightly dented and were probably originally white. The number of 14-rowed cobs suggests that this corn is similar to that from two Fremont sites, Sheep Horn Alcove (42Ga102[Fowler, 1963]) and Pantry Alcove (42Ga103 [Fowler, 1963]). Many of the specimens from 42Ka178 were smaller and less well developed than cobs from the two Fremont sites, but this may be an accident of preservation. It has been suggested that Gates Roost was occupied seasonally. It is possible that all the corn was brought to the site and shelled; while at the other sites, late maturing secondary ears were shelled later in the field or some place away from the house sites.

Davis Kiva, 42Ka241, Pueblo II-III
(Gunnerson, 1959)

One of the four pieces of bottle gourd (Lagenaria siceraria) rind from this site apparently came from the stem end of a dipper gourd. Cotton fibers, string and cloth also were found at this site.

Talus Ruin, 42Ka274, MNA 5369, Pueblo III
(Lipe, 1960)

This site, about 59 mi. upstream from Lee's Ferry and a mile and a half below Benchmark Cave, probably was far enough south and low enough to grow some cotton and bottle gourds. Cotton seeds,fibers and 22 bottle gourd rinds were excavated. The proportion of very thick squash rinds appeared to be about the same as in sites farther north in Glen Canyon. A single seed of the Taos cultivar of Cucurbita mixta and 42 almost entire Green Striped Cushaw were found. Almost entire Green Striped Cushaw seeds and corn grains were present in fecal material from the site. The seeds apparently were completely dry when swallowed and no burns left by roasting were apparent.

The corn cobs were similar to those from most large sites along the river. (Fig. 4, c). Twenty-two of the corn grains were flour, three flint and two slightly dented.

Lizard Alcove, 42Ka276, Pueblo III
(Lipe, 1960)

Near Talus Ruin, and closely related to it, Lizard Alcove has similar corn. There are, however, slightly more eight-rowed cobs and the cobs are usually smaller (Fig. 4, d). Most of the many loose grains were yellow flint, from 8-, 10-, and 12-rowed ears. A few grains from eight-rowed and 10-rowed ears were somewhat broad and short, approaching the crescent shape of grains from eight-rowed flints of the eastern United States. A few dent grains were also present.

One of three pieces of bottle gourd from this site is from the neck of a dipper gourd.

Benchmark Cave, 42Ka433, Pueblo II-III
(Lipe, 1960)

The lower midden deposits (Stratum IV) are reported to have lacked cultivated plant deposits, with the exception of a single squash rind (Lipe, 1960, 218). Although the number of cobs recovered is small (Table 7), they suggest an initial trend toward eight-rowed ears, probably influenced by infiltration of the Harinoso de Ocho race and environmental selection. A later trend toward many-rowed dents, effected by hybridization with many-rowed dents and the selection of large ears for seed is suggested. There were not enough grains to support these observations and most of those found were yellow flints.

Fifty-nine cotton seeds from a pouch were quite uniform and may have been preserved for seed.

Hermitage site, 42Ka443, MNA 5369
(Lipe, 1960)

The corn from this site was almost identical with that from structure II of 42Ka433. It appeared to support the idea that there was a swing away from eight-rowed ears in the later years that Glen Canyon was occupied. The Hermitage site apparently had a short occupation and was abandoned shortly after A. D. 1150. This was before the proportion of eight-rowed corn decreased to 17% and 23% of the latest material from Benchmark Cave, or the average material from Talus Ruin. The Hermitage corn, like that from Lizard Alcove, had it's greatest activity before A. D. 1200.

Nine fragments of the bottle gourd ranged up to 0. 43 cm. in thickness--a mark of the favored growing season which apparently permitted the forms of Lagenaria with thicker rinds to mature.

The Watchtower (42Sa323) in Steer Pasture Canyon
(Sharrock, 1964)

The few cobs from this site had harder lower glumes than those of 42Sa324 (a Cedar Mesa site of unknown age which may go back as far as Basketmaker times).

42Sa324, Unknown (Basketmaker to Pueblo II?)
(Weller, 1959)

The high number of small and distorted eight-rowed cobs from this site suggests this is a distorted sample, perhaps due to a late season gathering of secondary and tiller ears (Fig. 4, e).

Loper Ruin, 42Sa364, MNA 3715-6, Pueblo III
(Lipe, 1960)

The corn from this Mesa Verde site was very much like that from the Kayenta site, Husted's Well (42Sa366), which is not far away. Cotton cordage, fibers, and seven fragments of bolls were found at the Loper Ruin.

Husteds Well, 42Sa366, Pueblo II-III
(Lipe, et al., 1960)

The corn from this site, like that from the Loper Ruin, showed a wide range in number of rows of grains, but less diversity in size of cob and glume characters than many other sites (Fig. 4, f). While there was a considerable number of eight-rowed cobs, and this number seems to have been increased both by introduction of Harinoso de Ocho and adverse environmental selection, the 12-rowed cobs were very similar to much older 12-rowed cobs from Basketmaker and Pueblo II sites farther south. However, there was considerable crowding of undeveloped spikelets at the tips of many cobs which is a later character, typical of dent corn. It has not been possible to discover if this came in with Fremont dents, presumably from the north and west, or from dents which produced the Pueblo race, which is most dented in the eastern Pueblos along the Rio Grande.

Oakleaf Alcove, 42Sa374
(Sharrock, et al., 1961)

The most remarkable plant remain from this west-facing alcove, was a complete fruit of the Green Striped Cushaw, C. mixta, which had been cleaned of all its flesh through a 9.0 cm. dia. hole in the side of the body. This fruit is shown in Fig. 7, b (Cutler and Whitaker, 1961) and in Fig. 93, a (Sharrock, et al., 1960).

The margins of this hole were rough, perhaps from the cuts of a dull metal knife or a stone tool.

Vegetal matter adhering to the body about the opening may be residue from a sealant used to seal the lid (a stone slab which still covered the hole), according to Floyd W. Sharrock (personal communication, May, 1961). The neck was bound with yucca strips which may have been part of a device for strengthening the container, to facilitate carrying, or part of an arrangement for using the fruit as a musical instrument. A crack in the base was tied with three small yucca leaf strips run through drilled holes.

The container was excavated by Sharrock from under six to 12 in. of sand, and he believed that it dated from the Pueblo period. It contained sterile sand and five seeds which Sharrock sent to a relative. Four of these supposedly germinated. While no fruits were recovered from the plants, a photograph of both surfaces of a single leaf from one of the plants resembles leaves of *Cucurbita mixta* cultivar Green Striped Cushaw.

I am reluctant to believe that these seeds date from Pueblo times, or even from before 1915, when some agriculture was carried on in Lake Canyon.

Although the container is like those of the Pueblo III period, with rough-cut side opening, yucca repairs, and a slab lid, similar kinds of squash were grown until recently by the Hopi and cleaned out in the same way. Recent Hopis mended bottle gourds with yucca strips and it is likely they would do the same with cushaw rinds. A Ute-Navajo group on the San Juan still used some pottery vessels and basketry bottles covered with pinyon resin in 1939, and grew squash and corn in recent years. I do not know what kinds were grown but the Green Striped Cushaw is widely grown among the Pueblos and Navajos, as well as by some residents of Blanding and Bluff.

It is unlikely that seeds would remain viable more than 20 or 30 years even in the protected condition of this site. Although I have not had experience with germination of old *C. mixta* seeds, 10-year-old seeds of *C. pepo*, *C. moschata* and *C. maxima*, which had been stored in packets in a closet, did not germinate. Thomas W. Whitaker, who has had considerable experience with cucurbits, wrote in a letter of August 30, 1965:

"We have no specific information about the longevity of *Cucurbita mixta* seed. I have grave doubts that it would be viable for more than 25 years under the best possible conditions. We keep our seed storage facility at about 40° F. and 40 degrees humidity. Under these conditions which are nearly ideal for our purposes *Cucumis melo* will remain viable 15-20 years."

Floyd Sharrock wrote (letter of May 26, 1961):

"There is no possible way a prank could have been played. The seeds were never touched in the field by anyone except myself. I excavated the gourd (6 to 12 in. from the surface), took out the seeds, packaged them and mailed them from the field. Thus, no one had the opportunity to substitute seeds since we were in Lake Canyon."

Fence Ruin, 42Sa377, Pueblo III
(Lipe, *et al.*, 1960)

Most corn grains from this site were 10- or 12-rowed yellow flints. A few fragments of cotton bolls were found.

42Sa389, Pueblo II-III
(Lipe, *et al.*, 1959 II)

In the Glen Canyon area very few eight-rowed ears were found in bundles or special cache's of some sort, or had sticks in their butts, which suggested they were being saved for seed. Two of five cobs from 42Sa389, wrapped in twigs and tied with yucca fibers, were eight-rowed, two were 10-rowed and one was 14-rowed.

Catfish Canyon site, 42Sa395, MNA 5983, unknown
(Lipe, 1960)

Most cobs from this site were rather large and well-developed, suggesting that this was either a selected lot, or conditions for farming here at the time of occupation were favorable. The relatively high number of eight-rowed cobs is unusual for this area and I suspect that the sample of 45 cobs may include the cache contents of an eight-rowed strain.

Forked Stick Alcove, 42Sa413, MNA 6153
(Lipe, *et al.*, 1960)

This site is near the Loper Ruin, 42Sa364. Like the Loper Ruin, it has strong Mesa Verde affiliation and has been disturbed by visitors.

Twenty-four grains of a modern commercial "Golden" popcorn were found in Feature 12. At least one of the outfits carrying tourists down the river carried popcorn.

Three slightly dented white or pale yellow grains, two yellow flint, and one calico flour grain were found at this site.

Shady Alcove, 42Sa576, Pueblo II-III (Lipe, *et al.*, 1960)

Many of the sites listed in Table 7 were not excavated and the plant materials represent surface collections made during the survey. These surface collections usually are quite reliable. A comparison of a surface collection made from Shady Alcove by the Museum of Northern Arizona (Fig. 7, a), and the corn from Feature 93 excavated by the University of Utah's Glen Canyon Project (Fig. 7, b) shows how they are similar in row number and cob size.

Echo Cave, 42Sa583, Pueblo III (Lipe, *et al.*, 1960)

There was considerable disturbance and mixing of deposits in this site, but where there was enough corn from a feature to give an adequate sample, it was apparent the mixing was far from complete. For example, corn from Feature 38 (Figs. 7, c, 8) had more mature, large cobs, many of them tapered, and softer glumes than corn from most other features. Feature 69 corn included many runty cobs with spikelets which did not bear grains. Feature 68 had some large cobs which approached some modern Pueblo corn in size and in the hard glumes. Many cobs bore remnants of the basal tips of grains, indicating that the grains had been removed when the corn was still moist and basal grain tissues weak. This lot of corn seems to have matured late and was gathered before it had completely matured and dried in the field. The presence of a cotton boll suggests that cotton may have been grown here, and the growing season was not exceptionally short.

Most grains found here, loose or on cobs, were medium hard yellow flints.

Table 4. CORN FROM 42Sa583: PERCENT OF COBS WITH EACH ROW NUMBER

Feature	Rows of Grains 8	10	12	14	16	Total Cobs
5		21%	65%	14%		14
16	21%	36%	34%	9%		33
18	37%	25%	38%			8
23	26%	26%	38%	10%		50
25	17%	11%	61%	5%	6%	18
22	20%	20%	56%	4%		25
51	10%	32%	54%	4%		28
60	46%	27%	27%			26
57	17%	33%	50%			12

Doll Ruin, 42Sa585, Pueblo III
(Lipe, *et al.*, 1960)

Many of the cobs from this site were only partially developed, probably from secondary ears, but there is considerable diversity in cob sizes, shapes, character of the glumes, and in cob colors. Although there are more undeveloped cobs here than in 42Sa583 (Lipe, *et al.*, 1960), the corn is very similar (Figs. 7, d, 9).

Cotton boll fragments and string were found in this site.

Echo Cave Group, 42Sa588, Pueblo II-III
(Lipe, *et al.*, 1960)

The only corn from this site, 49 cobs gathered during the survey, was very much like that from 42Sa583 and 42Sa585.

Crumbling Kiva, 42Sa597, MNA 6529, Pueblo II-III
(Lipe, 1960)

The corn from this site was very much like that from nearby sites of the same period. Cotton boll fragments and lint were present.

Defiance House, 42Sa598, Pueblo III
(Lipe, 1960)

About 80% of the pottery from this site showed ties with Mesa Verde, yet the corn was very much like that from Crumbling Kiva which had 80% Kayenta associated pottery. The following loose corn kernels were found:

52 yellow flint
7 white flint
7 pink on white or yellow flint
2 cherry flint
1 white or yellowish medium dent.

When the corn from the various features of this site (and some other sites) is studied, it becomes apparent that the lots have varying amounts of several different kinds of corn.

Features 49, 56, and 95 have very few eight-rowed cobs, but many 10-, 12-, and 14-rowed cobs. There are no caches of a single kind of corn, as far as I can determine. Although the proportions of kinds of corn found in the features varies considerably, the figures for total corn of a site are remarkably uniform. This is probably true because the various sites grow roughly the same kinds of corn and the same proportions of each kind. No connection could be detected here, or in any other site, between the occurrence of bottle gourds, squashes, cotton and particular kinds of corn. It is possible that pepo is more often associated with older kinds of corn, *mixta* and cotton than with more recent kinds.

Gourd House, 42Sa619, Pueblo III and recent(?)
(Sharrock, *et al.*, 1961)

About 17 almost whole and fragmentary shells of Cucurbita fruits were found on the surface of structure 1. The three I examined were slightly immature fruits of a form of *Cucurbita mixta* cultivar Green Striped Cushaw, which was grown in this region from the A. D. 1000's to the present time by various Indian and white inhabitants. It has been suggested that these fruits were grown in recent times by cowboy or Indian users of the site. The eight corn cobs from this site did not help much in determining the age of the cucurbits. Although similar cobs occur in other prehistoric sites in this region, the same kinds (though not the dominant variety) are still grown by recent Ute and Navajo.

Table 5. ROW NUMBER AND PERCENTAGE OF TOTAL COBS FROM DEFIANCE HOUSE (42Sa598)

Feature No.	No. Cobs	8	10	12	14	16+	C.SP.	PEPO		MIXTA
4	24	4	46	25	25		2			
8	44	18	18	50	11	2	8	1p		
9	30	37	40	10	13					
15	23	33	9	42	4	9		2p	1p	24r
47	53	18	26	45	14	2	7		4p	
49	23	4	43	35	17		20	1p?		
56	35	6	34	46	11	3	10			
62	23	26	17	39	17		5			
65	31	19	35	26	13	7	10		1p?	
69	79	16	42	28	10	4	44		2p?	
83	10	40	20	20	20		26	10s	4p	5s
95	29	3	31	45	21		2			
102	25	28	32	36	4		21			
108	31	19	26	48	3		9	3p	1p	
175	27	12	41	37	12	4	31	1p	1p	2s
178	27	41	16	37	12					

Mosquito Cave, 42Sa643, Pueblo II-III
(Lipe, *et al.*, 1959)

At this site where Kayenta pottery is dominant, slightly more 16-rowed cobs were found than in most sites. This probably is the result of chance preservation of a selected lot of 16-rowed corn rather than an indication of differences in the kinds of corn grown. Similar kinds of corn are found in nearby sites, including Mat House, 42Sa646 (Lipe, *et al.*, 1960).

Ax Groove Alcove, 42Sa693, Pueblo II-III, MNA 6890
(Sharrock, *et al.*, 1961)

A bell-shaped pit contained a *C. pepo* fruit with the upper part cut off and the flesh removed to make a 29.0 cm. dia. and 22.0 cm. tall storage container. The opening was about 10.0 cm. in dia., with rough and incurved edges. The incurving and the relatively thin walls (as compared to other pepo vessels in this region) indicate that the fruit was slightly immature when harvested. A design of a horizontal line with a zig-zag above it was scraped through the outer skin. This vessel is pictured in Sharrock, *et al.*, 1961, Fig. 93, b.

Most of the corn from this site came from surface collections and part of it from collections of the Museum of Arizona. The site had been disturbed by pot hunters. The corn agrees well with that from other sites of the same period in this region (Fig. 7, e).

Bernheimer Alcove, 42Sa736, Basketmaker-Pueblo III
(Sharrock, *et al.*, 1963)

Although a cache of corn cobs within a cedar bark covering probably was hidden as whole ears, the grains were removed by rodents. There were, however, no teeth marks apparent on the cobs or grains.

A bundle of cedar bark contained 16 quite uniform cobs, one of them with a few cherry-colored flint grains (Fig. 10). It is likely that the ears were entire when they were cached and rodents removed most of the grains. All of the ears probably had deep cherry-colored flint grains, purple cobs and resembled the purple dye corn called "koko'ma" by the Hopi (Whiting, 1939; Brown, Anderson and Tuchawena, 1952). Sharrock, Day and Dibble (1963) indicate that the bundle was similar to one described and pictured by Hurst and Anderson (1949) which had been taken from Cottonwood Cave, a Basketmaker site in Utah. Fourteen selected ears, complete with grains, and approximately one gallon of shelled corn were found in that bundle.

Table 6. COMPARISON OF CORN FROM COTTONWOOD CAVE AND BERNHEIMER ALCOVE

Site	Percent of Ears of Each Row Number			
	12 rows	14 rows	16 rows	18 rows
Cottonwood Cave	21%	43%	36%	
Bernheimer Alcove	38%	31%	25%	6%

The number of cobs in each bundle, the percent of each row number, and the shapes and sizes were remarkably similar. The only cob with some grains from Bernheimer Alcove had flint grains, as did all the cobs from Cottonwood Cave.

The major difference was in the color: Except for one red, the Cottonwood Cave ears were yellow, while it is likely that all the Bernheimer Alcove ears were deep red or purple. This similarity does not mean that the Bernheimer Alcove bundle must date from the same period, although this appears likely. Similar corn has been grown for a long time in the Southwest by many Indian groups. It is still grown today by most Pueblos, although the most similar found today is among the Hopi and Zuni. Most dye corn in the Rio Grande Pueblos has slightly larger cobs, harder glumes than dye corn of the Hopi, and frequently shows some signs of denting. Dye corn is widespread, from Chile to the Southwest. It is often one of the most conservative kinds of corn in the places it is grown.

Table 7. ROW NUMBER AND RACE CLASSIFICATION OF TOTAL COBS

FROM FREMONT AND PUEBLO SITES

Site	Culture or Period	No. of Cobs	Row Nos. 8	10	12	14	16+	C.SP.	Pepo r	Pepo s	Pepo p	Mixta r	Mixta s	Mixta p
			% of Total Cobs											
42Em4	Fremont	1				100								
42Em47	Fremont													
42Ga34	1075-1275	234	14	40	39	6	1						36	
42Ga102	Fremont	7			42	29	29							
42Ga103	Fremont	168	13	18	50	15	4							
42Ga276		5	40	20	40									
42Ga278		1			100				1					
42Ga280											1			
42Ga284		22	9	28	36	18	9				1			
42Ga286	P II-III	12	17	58	25			2r			1			
42Ga288	P II-III	142	16	30	41	10	3	12r			2			
42Ga289	P II-III	2			100									
42Ga290		2			50		50							
42Ga291		2			100			3r			2			
42Ga295		1			100									
42Ga298		61	16	21	48	15		3r			2			
42Ga302		2			100									
42Ga439	P II-III	2			50		50							
42Ga446		1	100											
42Ga448	P II-III	8	38	25	12	25								
42Ga450		33	3	12	46	33	6							
42Ga459		2					100							
42Ga470	P II-III	4	25		75									
42Ka172														
LI (lowest)		22	18	27	45	5	5							
LII (middle)	P II-III	112	19	31	38	11	1	53r						
LIII (top)	P II-III	18	22	28	39	11		24r	1			1		
42Ka174	P II-III	2	100							1				
42Ka178	Fremont ?	208	22	22	40	13	3	125r		3	7		13	3
42Ka179		3			100						1			
42Ka193		4	25	25	50									
42Ka199		1			100									
42Ka207	P II-III	2	50	50										
42Ka209	P II-III	1		100										
42Ka210	Fremont ?	5		20	60		20							
42Ka211		4			100									
42Ka212		7		14	72	14								
42Ka213		4		25	75									
42Ka216		1		100										
42Ka220		2				100								
42Ka225	Fremont ?	2			100									
42Ka231		5		60	40									
42Ka232		2			100									
42Ka235	P II-III	56	21	32	32	13	2	55r		2			26	7
42Ka236		2	50			50		66r		5	8	1	76	5
42Ka241	P II-III	32	16	28	56									
42Ka243		1				100								
42Ka248		2		100										
42Ka274	P III	507	23	35	36	5	1	146r		2	19	7	22	7
42Ka276	P III	157	31	35	29	4	1	42r			1		3	1
42Ka433														
Structure I (top)		23	17	35	39	9		23r			1			
Structure II		50	32	34	30	1	1	47r		2	10		2	
Structure III (lowest)		18	33	39	22	1		26r			1		1	
All	P II-III	91	28	35	31	5	1							

Site	Culture or Period	No. of Cobs	Row Nos. 8	10	12	14	16+	C.SP.	Pepo r	s	p	Mixta r	s	p
			% of Total Cobs											
42Ka443	P II-III	24	29	29	38	4		64r		2	2		2	6
42Ka770		7	29	14	43	14								
42Ka771	P II	18	22	33	39	6								
42Ka872	P II-III	5	40		40	20		1r						
42Ka877		3		67		33								
42Ka878	P II-III	18	28	39	33									
42Ka879	P II-III	26	23	35	38		4	4r						
42Ka883		7	29	29	42									
42Ka901	P II-III	8	25	25	50									
42Sa267		1		100										
42Sa303	P III	1			100									
42Sa305		7		29	57	14								
42Sa317		4	50		50									
42Sa321		3		100										
42Sa323	P III	14	14	29	43	7	7							
42Sa324		22	41	32	18	9								
42Sa350	P II-III	1				100								
42Sa356		4	25		75									
42Sa364	P III	73	23	34	36	4	3	16r	17	25				
42Sa366	P II-III	108	29	27	41	2	1	33r		2	3		18	
42Sa367	P II-III	3		33	67			1r						
42Sa368	P II-III													
42Sa370		1				100								
42Sa373	P II-III	2			100									
42Sa377	P III	48	15	58	25	2		12r		2				
42Sa378	P II-III	6	17	33	33	17								
42Sa380	P II-III	1	100											
42Sa389	P II-III	5	40	40		20								
42Sa395		42	45	29	19	7		4r			3			
42Sa413	P II-III	153	33	33	31	3		25r			8	3		
42Sa440	P II-III	8	12	25	63									
42Sa450	P II-III	10	10	10	60	20								
42Sa509	P III	2		50	50									
42Sa528	P I	1			100									
42Sa545		19		16	53	21	10							
42Sa555	P II-III	1			100									
42Sa566	P III	9	12	44	44			15r		47				1
42Sa576	P II-III	889	18	35	39	6	2	139r		35	23			
42Sa577	P III	5	20	20	40		20							
42Sa578	P II-III	7		43	29	14	14							
42Sa583	P III	897	17	30	44	7	2							
42Sa585	P III	101	17	25	49	6	3							
42Sa588	P II-III	49	20	28	40	12						10		
42Sa597	P II-III	62	23	27	42	6	2	26r						
42Sa598	P III	856	21	31	35	11	2	606		13	12		54	24
42Sa606	P III	2			100									
42Sa613		2			100									
42Sa616	P III	17		23	59	12	6							
42Sa619	P III	8	12	12	76							3		
42Sa624	P II-III ?	3	67		33									
42Sa633	P II-III ?	7	29	29	42									
42Sa639		3		67		33								
42Sa640	P III	3			100									
42Sa643	P II-III	71	16	24	39	10	11	8r			2			1
42Sa646	P III	81	22	28	45	5		4r						
42Sa658	P III	5		40	40	20								
42Sa662	P II-III ?	6	33	33	33									
42Sa663		2	50		50									
42Sa664	P II-III	5		40	60									

Site	Culture or Period	No. of Cobs	Row Nos. 8	10	12	14	16+	C. SP.	Pepo r	Pepo s	Pepo p	Mixta r	Mixta s	Mixta p
			% of Total Cobs											
42Sa665	P II-III	2		50			50							
42Sa669	P III	31	18	28	44	7	3	2r						
42Sa681	BM II + PIII	4		25	50	25								
42Sa685		4			100									
42Sa689	P II-III ?	1	100					1r						
42Sa693	P II-III	101	19	30	40	8	3					1		
42Sa702		1		100										
42Sa736	P III Cache	43			38	35	25	2r						
42Sv5	Fremont	37	3	13	62	11	11							
42Un79	Fremont	5			40	40	20							
42Un82	Fremont	1			100									
42Wn19	Fremont	1			100									
42Wn20	Fremont	1			100									
42Wn105	Fremont	3			67	33								

Table 8. PERCENT OF COBS OF EACH ROW NUMBER FOUND IN SELECTED SITES AND LEVELS

	Total Cobs	Rows of grains 8	10	12	14	16
Basketmaker II and III						
MNA 7523B, near Navajo Mountain, Arizona-Utah	697	11%	14	47	18	10
Mummy Cave, Canyon de Chelly	222	1	23	47	21	8
Step House, Pit struc. I, Level IV	322	9	22	46	18	5
MNA 2520, Turkey Cave, Segi Canyon, Test I, Level II	159	21	21	47	9	2
Pueblo I and II						
Mesa Verde sites 1676	27	7	11	30	37	15
Antelope Cave, northern Arizona	1,022	12	34	37	14	3
MNA 2520, Turkey Cave, Test I and 2, Levels 4-7	74	22	31	39	5	3
Kiet Siel	133	30	36	32	2	0
Pueblo I to early Pueblo III						
MNA 2520, Turkey Cave, Test 1 and 2, Levels 1-3	126	24	38	32	5	1
Pueblo III						
Mesa Verde, Step House	5,932	30	34	28	1	0
Mesa Verde, Long House	2,171	42	35	21	1	0
Mesa Verde, Mug House	3,621	46	37	15	2	0
Betatakin	83	28	38	30	4	0
Kiet Siel	349	38	39	20	3	0
From West Central New Mexico						
O-Block Cave, New Mexico, Reserve Phase, A.D. 1000-1100	59	46	27	17	8	2
O-Block Cave, Three Circle Phase, A.D. 900-1000	136	52	29	12	6	1
Tularosa Cave, New Mexico San Francisco Phase A.D. 700-900	250	73	21	4	1	1
Tularosa Cave Georgetown Phase A.D. 500-700	119	35	19	29	13	5

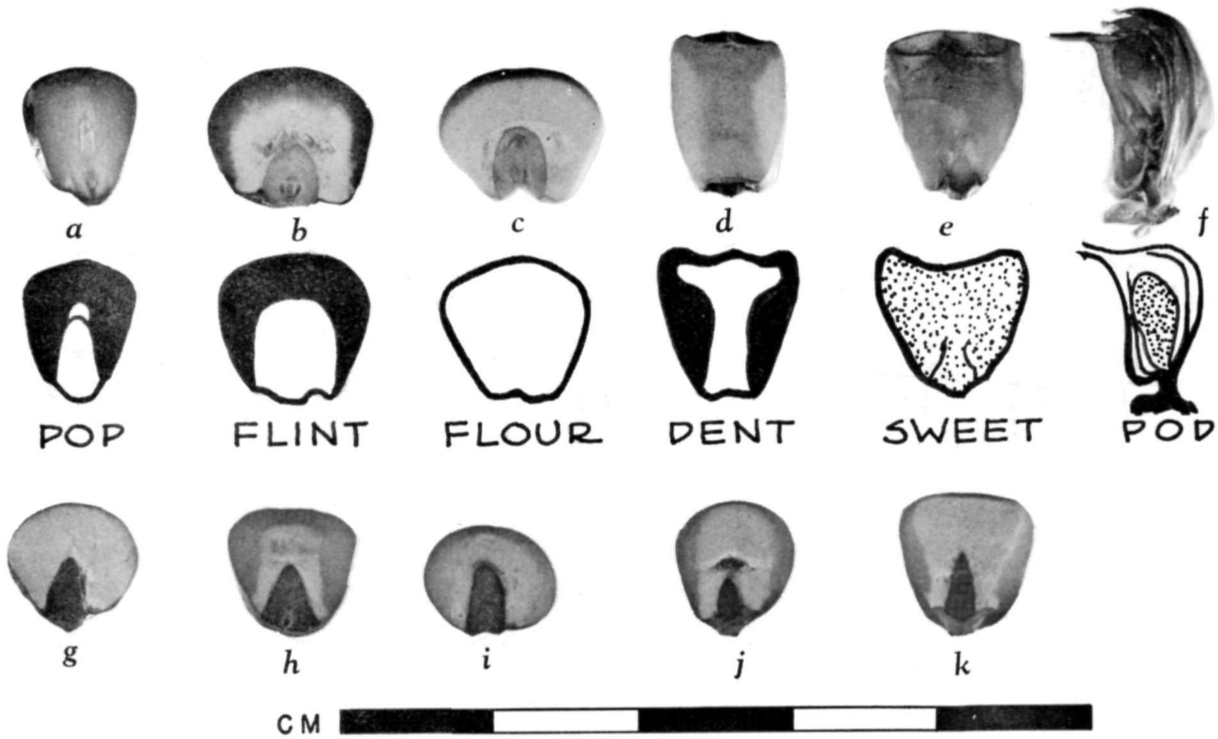

Fig. 2 Corn grains. a-f, kinds of corn grains; g-k, grains from 42Ka276; g, flour; h, flint; i, flint; j. flint-dent; k, dent.

Fig. 3 Squash fruit stems. Left two are Cucurbita pepo, right two are Cucurbita mixta.

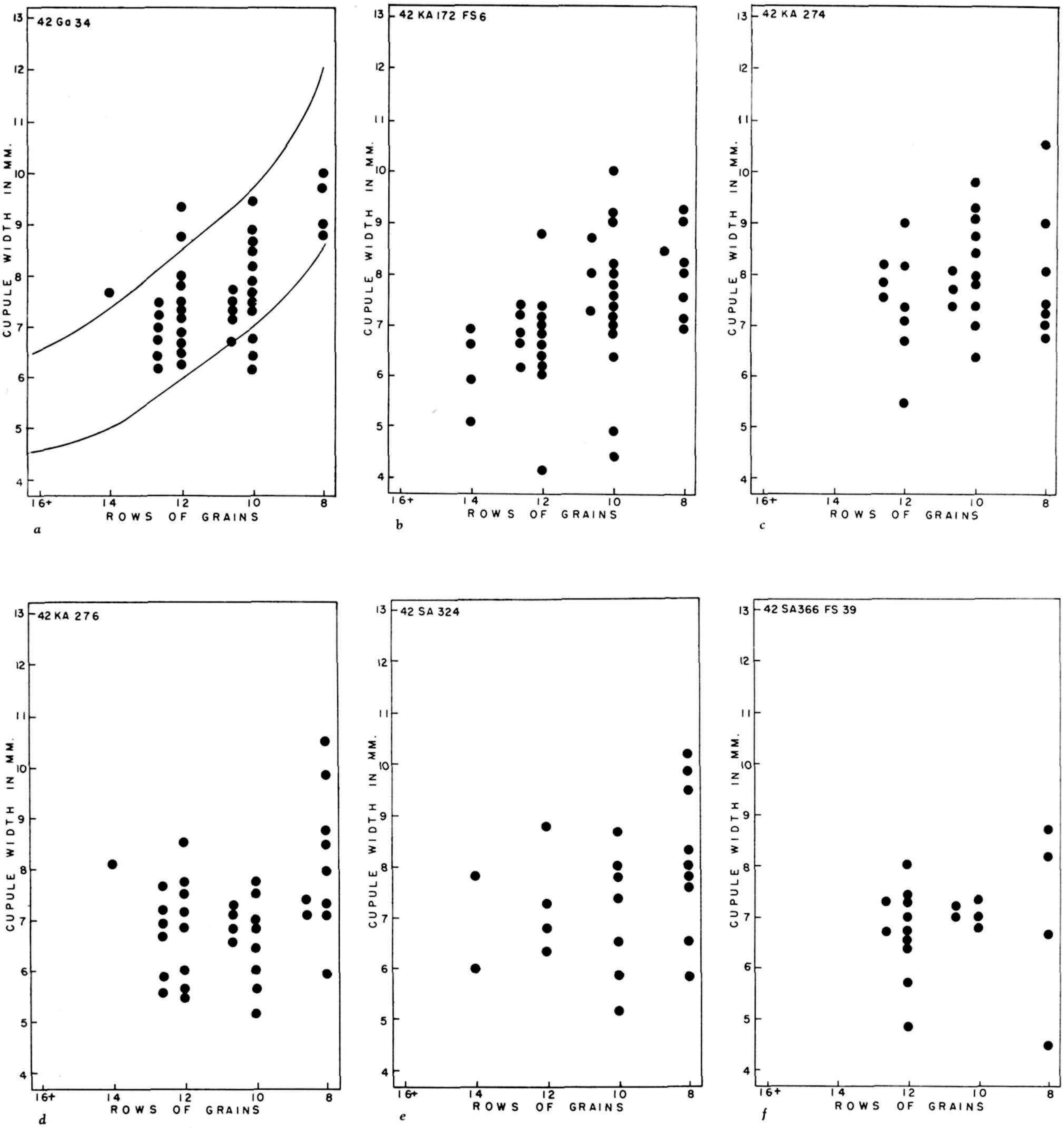

Fig. 4a Diagram of cupule width and rows of grains (42Ga34)
Fig. 4b Diagram of cupule width and rows of grains (42Ka172, FS6)
Fig. 4c Diagram of cupule width and rows of grains (42Ka274)
Fig. 4d Diagram of cupule width and rows of grains (42Sa276)
Fig. 4e Diagram of cupule width and rows of grains (42Sa324)
Fig. 4f Diagram of cupule width and rows of grains (42Sa366, FS39)

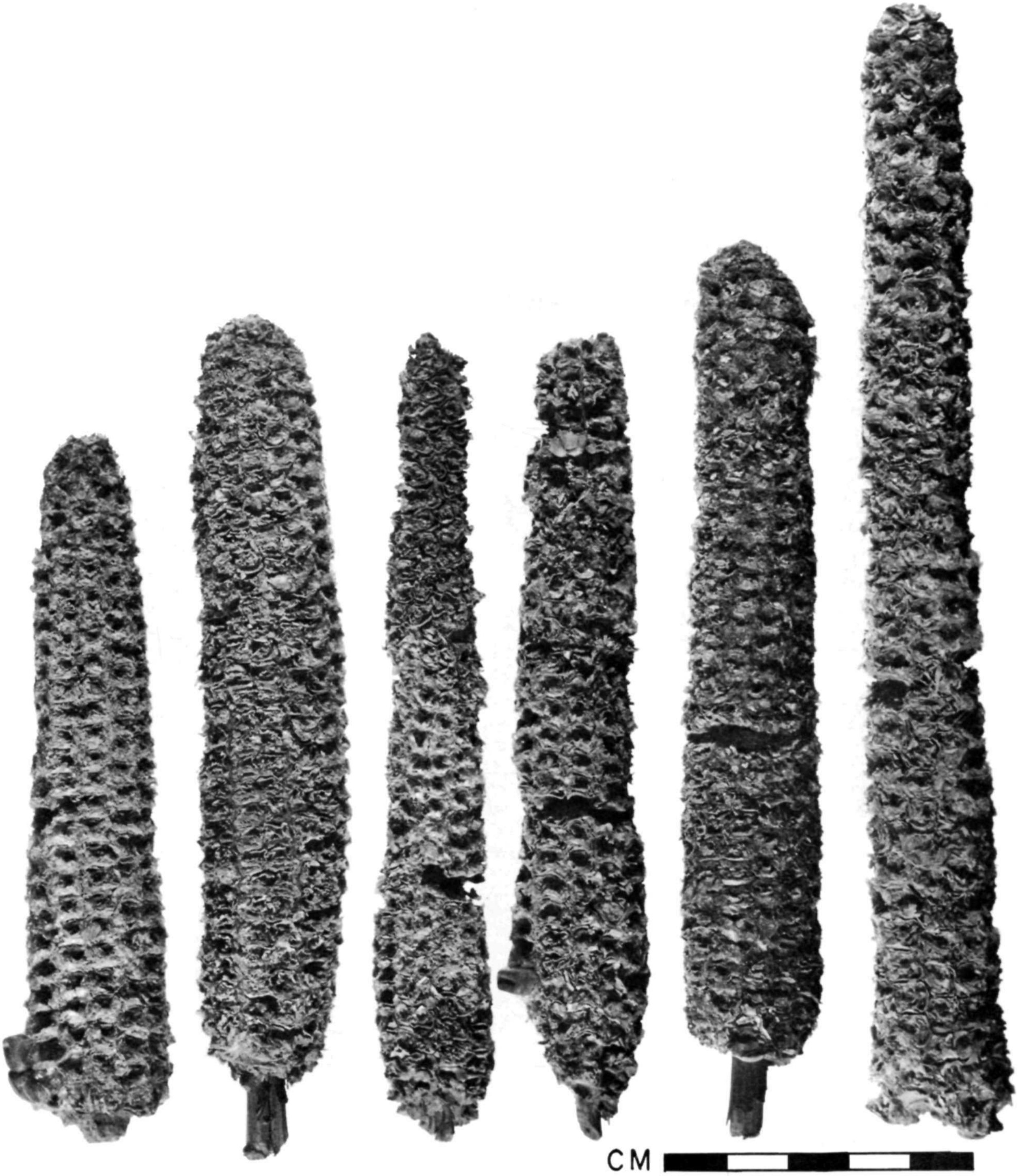

Fig. 5 Six cobs on sticks from 42Ka172, Feature 93

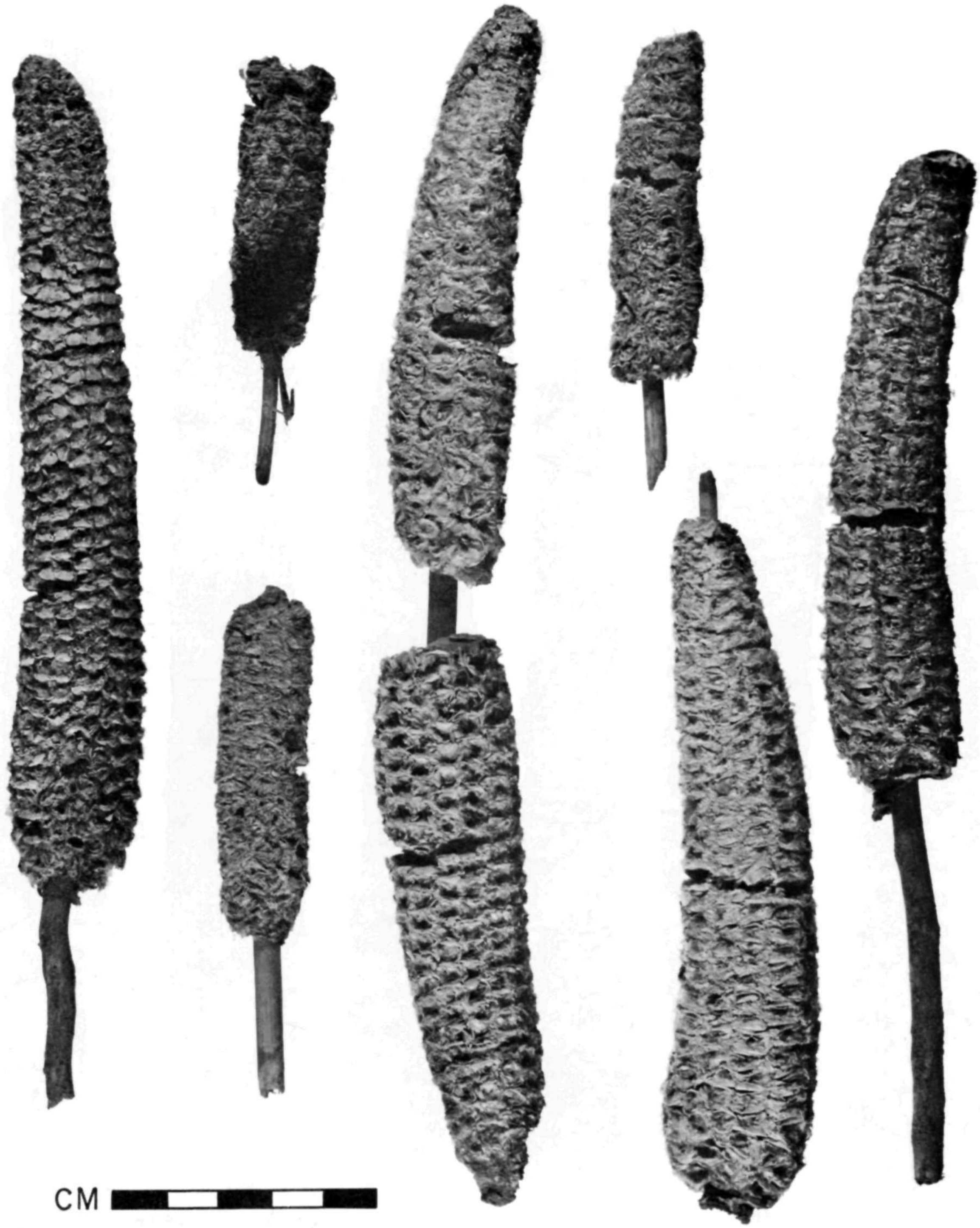

Fig. 6 Cobs on sticks from 42Ka178 FS 18. The taper, many rows, and the soft glumes suggest that these were Fremont culture flour-dent corn.

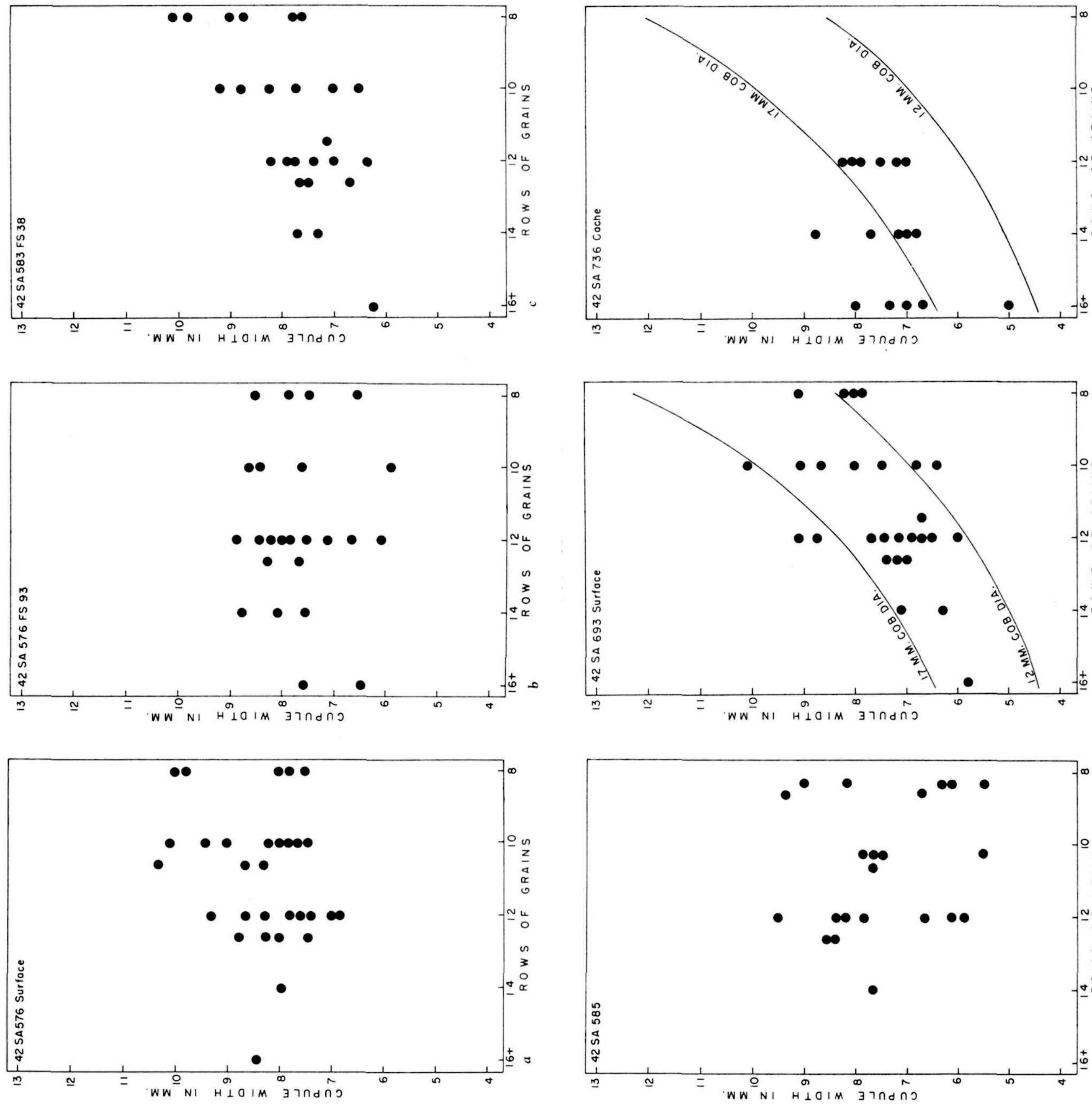

Fig. 7 a Diagram of cupule width and rows of grains (42Sa576, surface)
Fig. 7 b Diagram of cupule width and rows of grains (42Sa576, FS93)
Fig. 7c Diagram of cupule width and rows of grains (42Sa583, FS38)
Fig. 7d Diagram of cupule width and rows of grains 42Sa585, FS90-91)
Fig. 7e Diagram of cupule width and rows of grains (42Sa693, surface)
Fig. 7f Diagram of cupule width and rows of grains (42Sa736, cache)

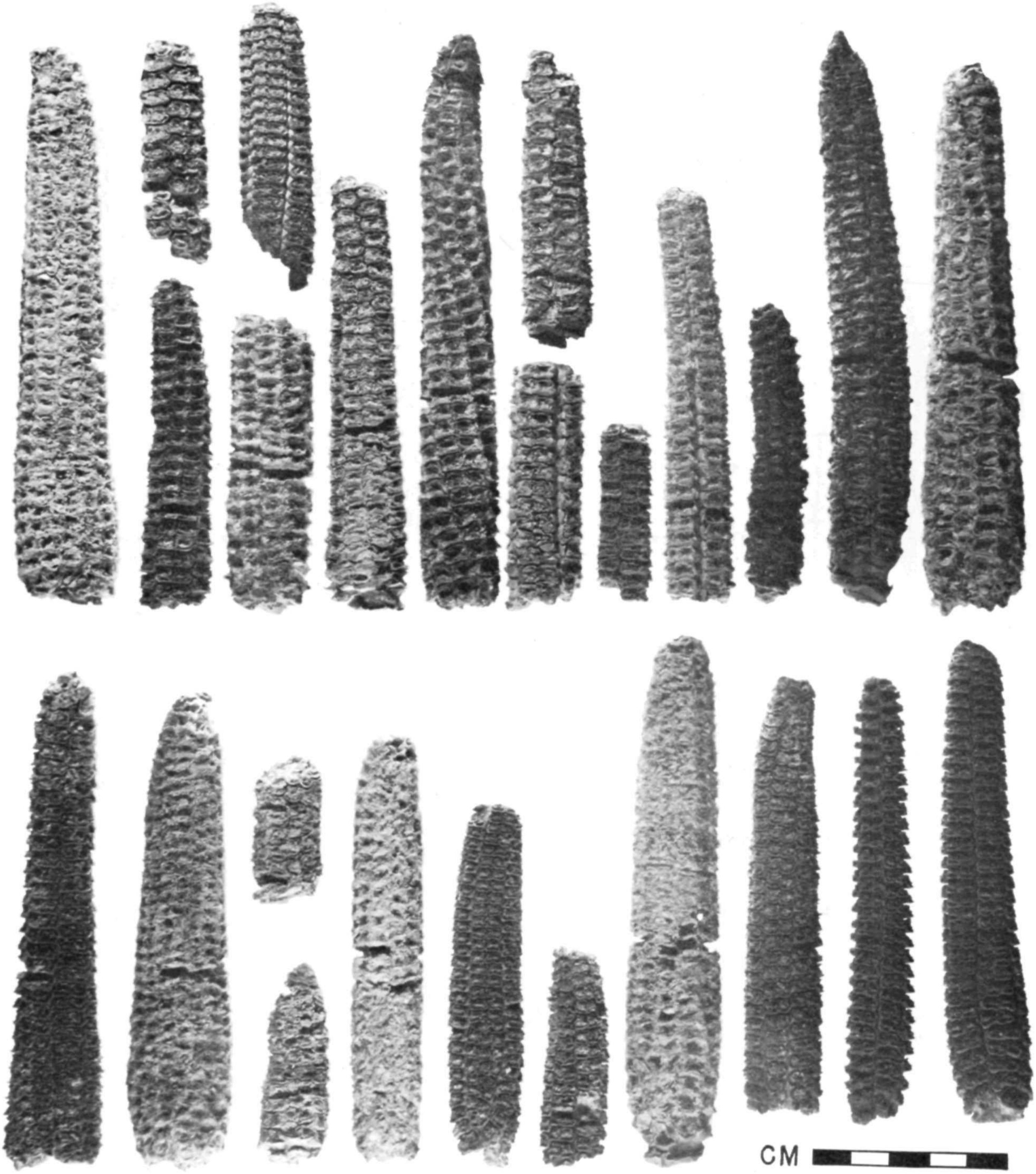

Fig. 8. A varied lot of good mature corn from 42Sa583. Feature 38

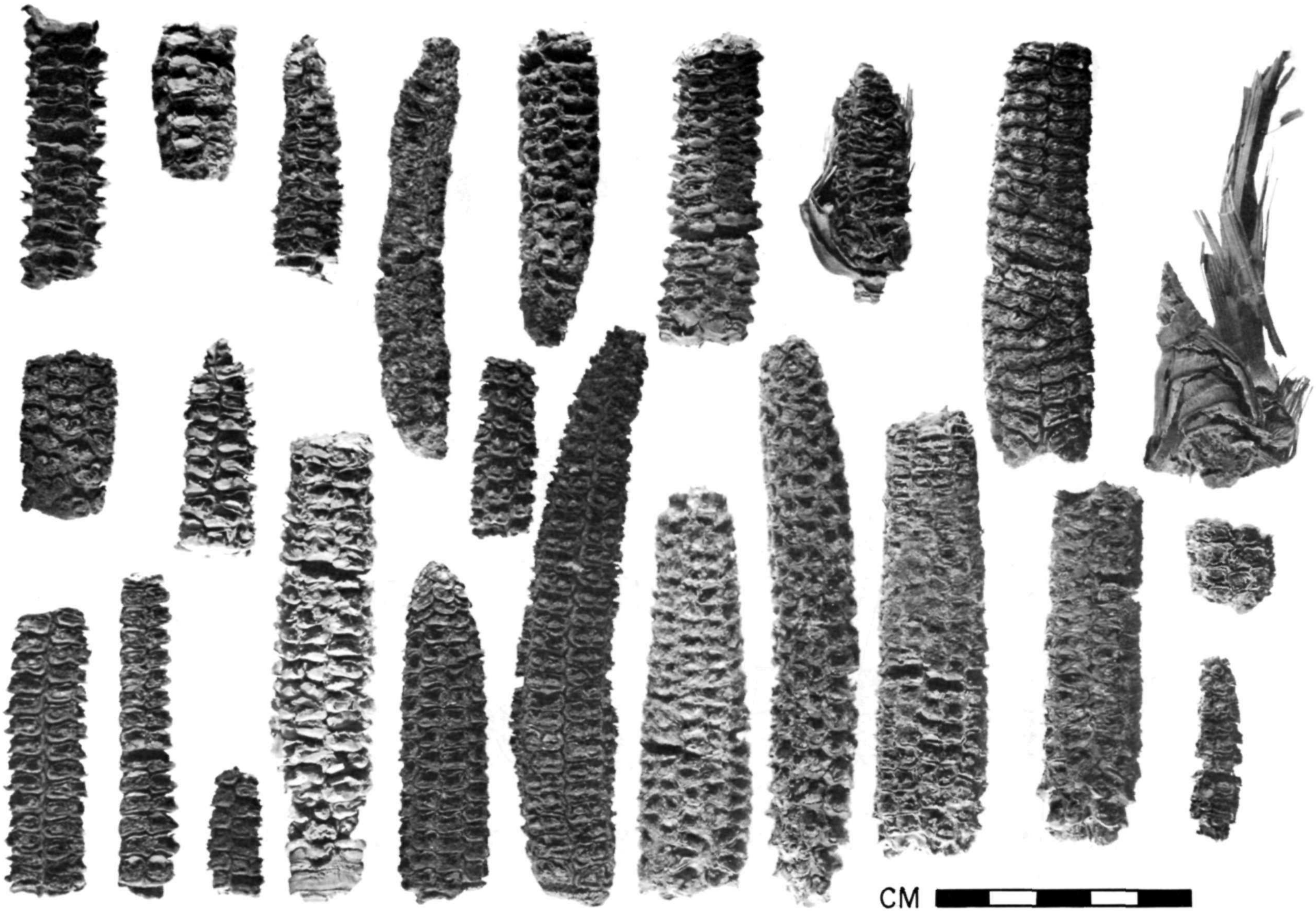

Fig. 9. A mixed lot of good and runty ears, mature to slightly immature, from 42Sa585, Feature 90-91

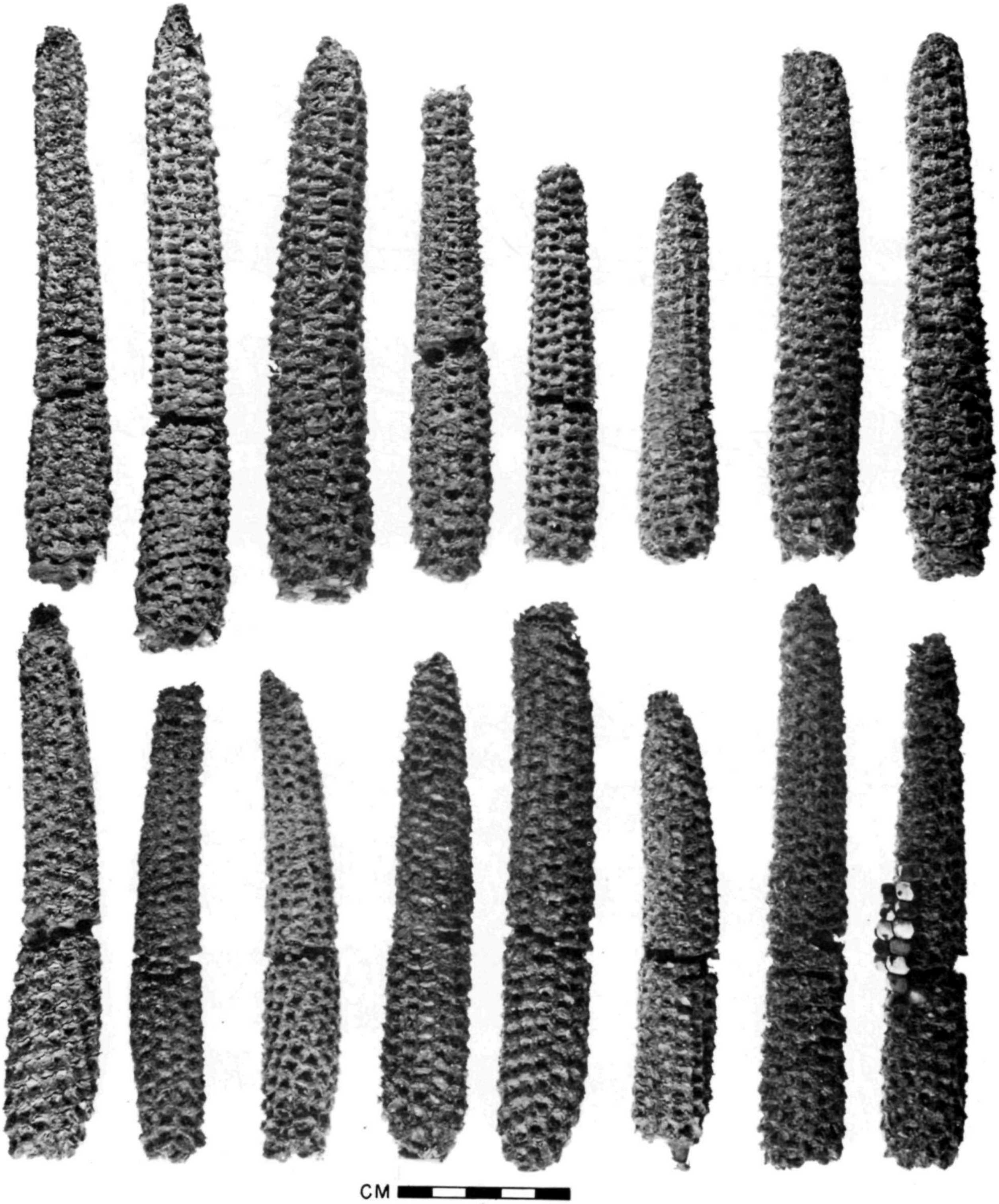

Fig. 10. A cache of 16 uniform ears probably saved for seed or special use, from 42Sa736

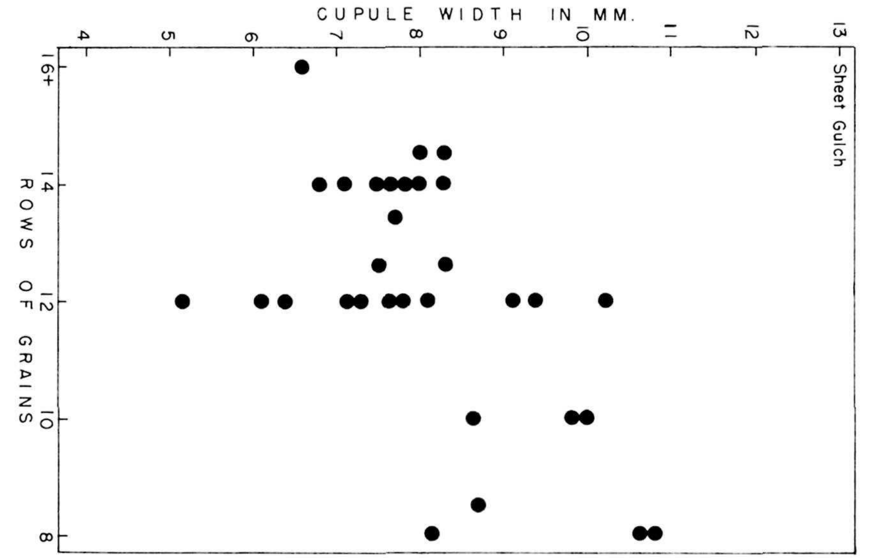

Fig. 11 a. Diagram of cupule width and rows of grains (Sheet Gulch)

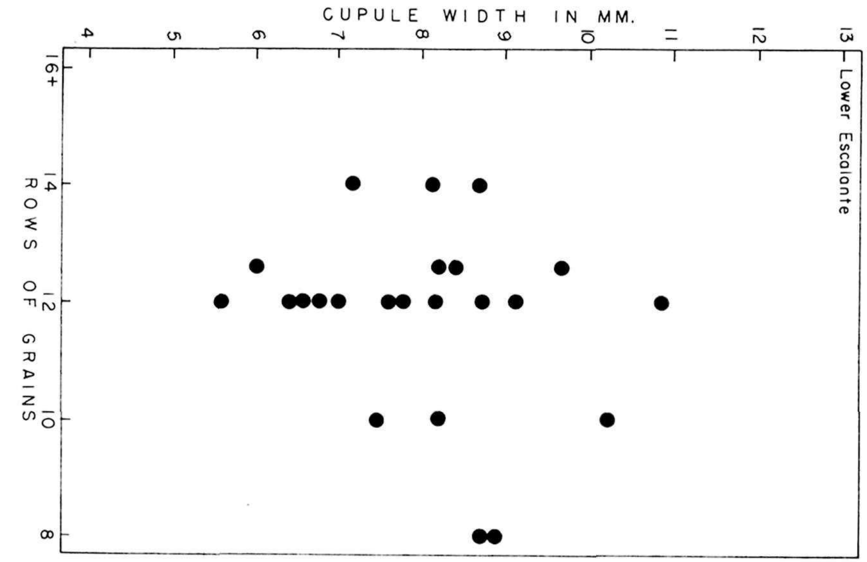

Fig. 11 b. Diagram of cupule width and rows of grains (lower Escalante)

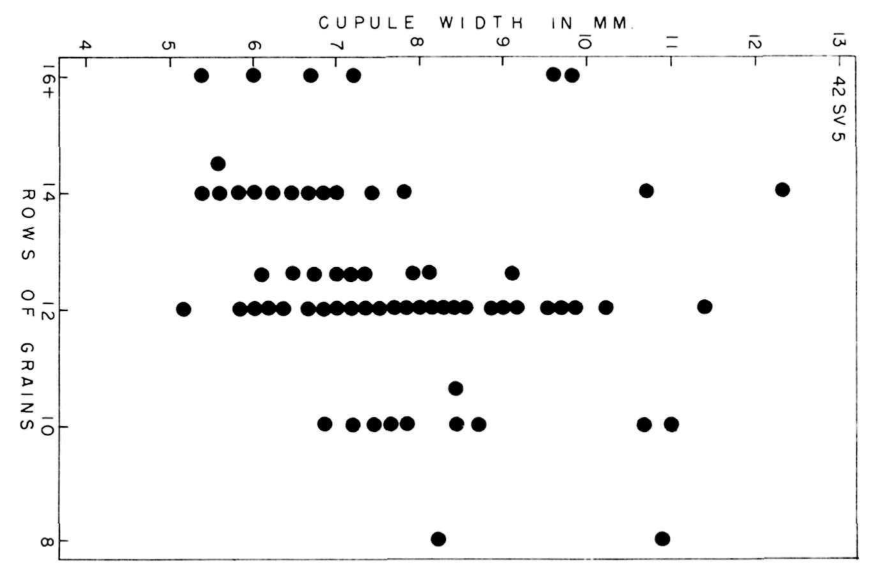

Fig. 11 c. Diagram of cupule width and rows of grains (42Sv5)

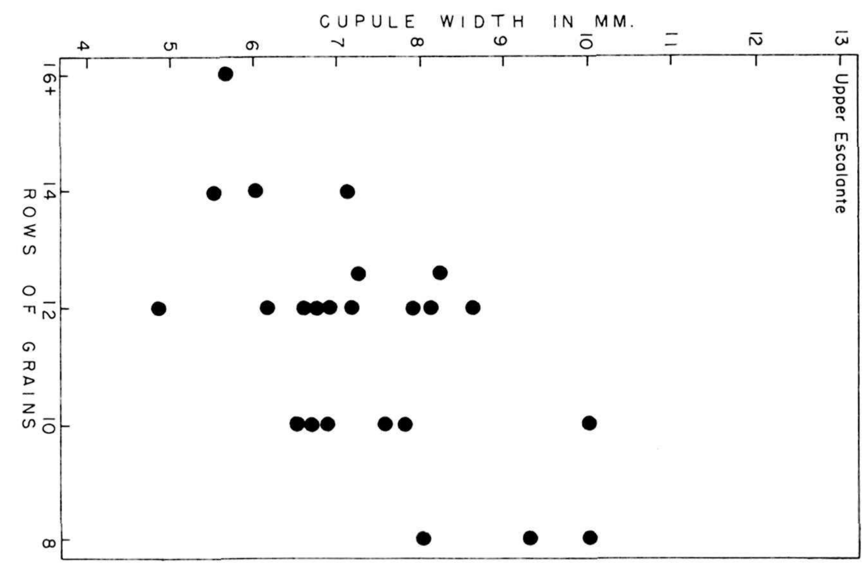

Fig. 11 d. Diagram of cupule width and rows of grains (upper Escalante)

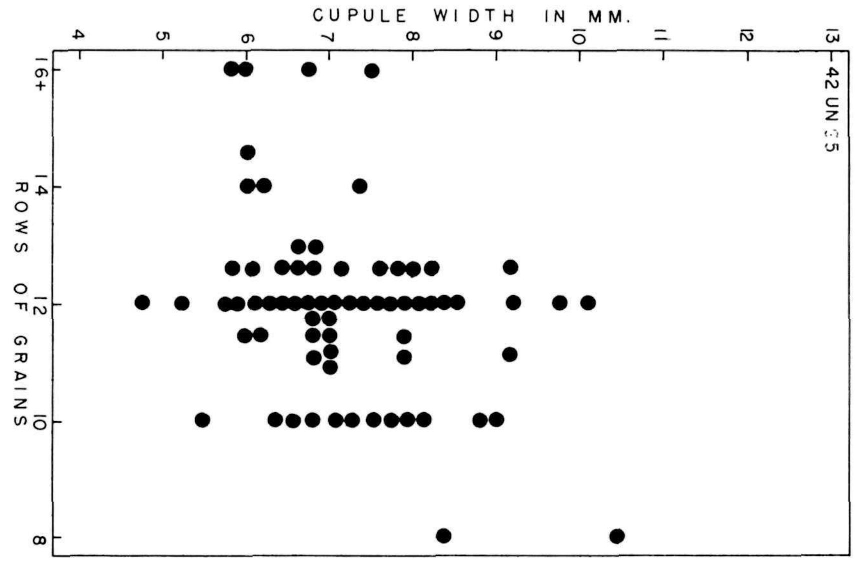

Fig. 12 a. Diagram of cupule width and rows of grains (42Un95)

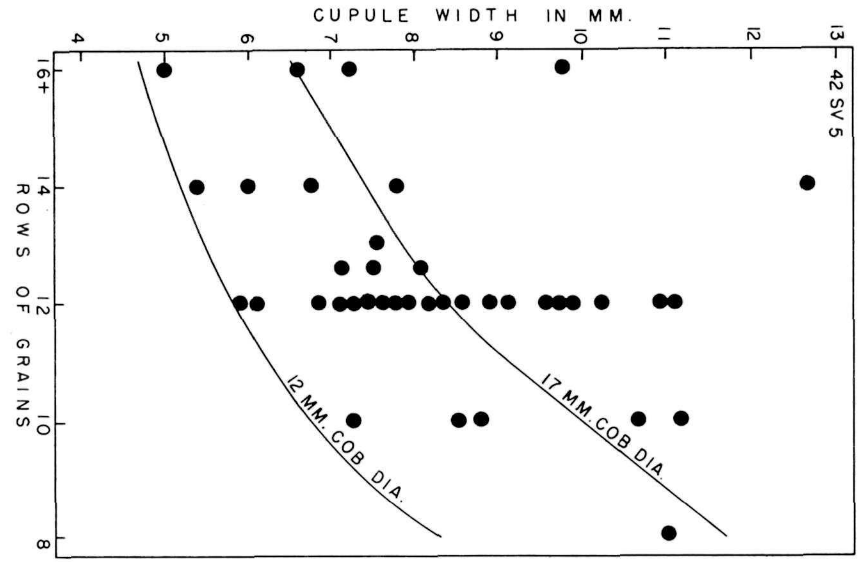

Fig. 12 b. Diagram of cupule width and rows of grains (42Sv5)

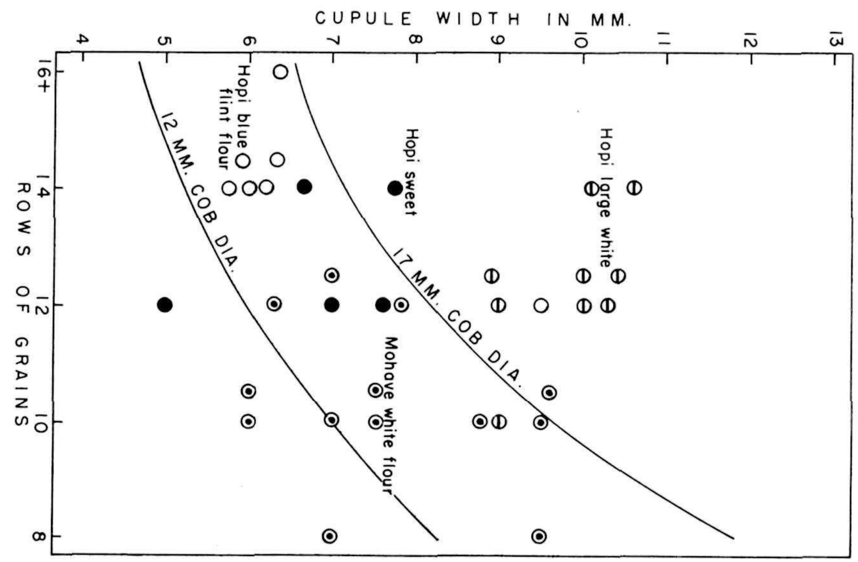

Fig. 12 c. Diagram of cupule width and rows of grains (Moenkopi Pueblo).

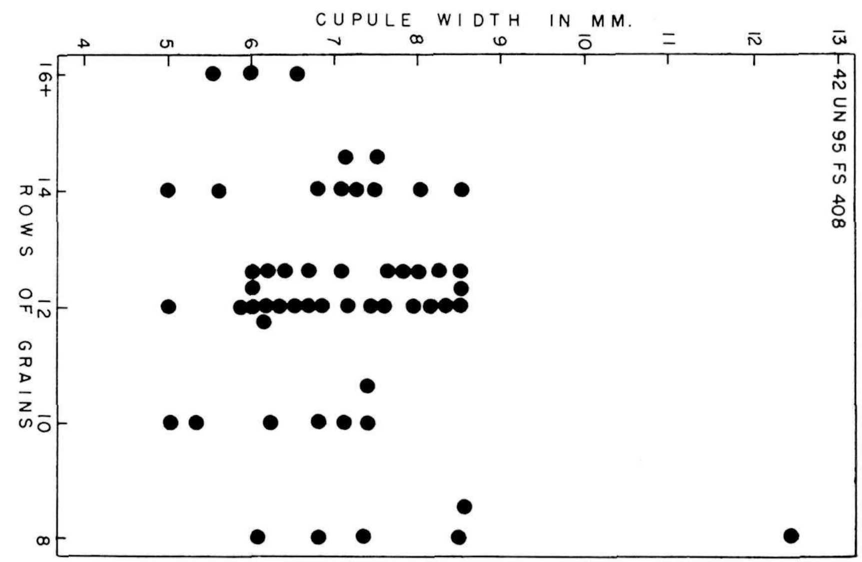

Fig. 12 d. Diagram of cupule width and rows of grains (42Un95, FS408).

DISCUSSION OF FIGURES

Overlaps in most characters used to define cultivated forms are a result of the ease with which corn crosses--the many different kinds grown by Indians, the mixture of primary, secondary, and tiller ears gathered at different states of maturity, the harvest of ears from good and poor fields, and other factors. Although diagrams using many characters can be constructed, a simple graph of central cob diameter, measured by cupule width, and rows of grains is the most useful device I have found for demonstrating basic similarities and differences in cobs.

Clusters of points on diagrams of cob size, and rows of grains coincide with clusters formed by related or identical corn cultivars; those still in existence or verified by substantial archeological collections of ears with grains found in caches.

In the diagrams most cobs with central cob diameter less than 1.7 cm. and more than 1.2 cm. belong to the Pima-Papago corn race segregates, Onaveño, Mais Blando, and Eight-rowed. Cobs with 12 to 16 rows of grains and small cupules have large amounts of Reventador and Chapalote germplasm. Pure forms of these last two races were not found in Glen Canyon.

Most cobs above the 1.7 cm. cob diameter line approach the race called Pueblo (Anderson and Cutler, 1942) and probably have some vigor introduced by crossing with dent corn. This is especially true of cobs with 12 or more rows of grains. The large white corn from Moencopi, a Hopi Pueblo, plotted in the upper left of Fig. 11, d, is a slightly dented form of an ancient flour corn still grown by the Hopi and by the Mohave (see the scattered squares in Fig. 12, d). Large cobs with 8 or 10 rows of grains are likely to be vigorous examples of Eight-rowed corn, because denting usually is linked with more than 12 rows of grains.

No consistent differences have been seen in the corn of Mesa Verde, Kayenta, or Virgin branch sites. Slight differences in sampling or age could distort the samples. Mesa Verde sites may have a few more eight-rowed cobs, but such an increase would occur if the Mesa Verde sites were slightly later in date or occupied less favorable locations.

To make figures comparable, 20% has been added to cupule width for carbonized cobs from 42Ga34, 42Sv5, and 42Un95. This figure is an estimate of the shrinkage during carbonization.

Fig. 4, a. No Fremont influence is apparent. This site, 42Ga34, had fewer 8- and 14-rowed cobs than most early Pueblo III sites.

Fig. 4, b. 42Ka172 had some dent kernels in the upper levels, but no Fremont culture influence could be detected in the corn.

Fig. 4, c. Cobs from 42Ka274 resembled those from 42Ka172. They may be a bit later because there are slightly fewer rows of grains.

Fig. 4, d. These cobs from 42Ka276 showed a further shift to fewer rows of grains when compared to Figs. 4, b and 4, c.

Fig. 4, e. Runty cobs and many small eight-rowed cobs suggest marginal conditions or a late harvest of secondary and tiller ears. Cupule size was relatively normal and suggests that under better conditions, or as major ears, the same seed could have produced good ears. If runty, eight-rowed ears are excluded, this sample resembled most others from late BMIII to early PIII sites in this region.

Fig. 4, f. There was less diversity in this lot of corn from 42Sa366 than is usually found in this region; few cobs were large and few eight-rowed.

Fig. 5. Most cobs, which apparently were saved for seed or other special use, had more rows of grains than the average for Glen Canyon. Apparently man selected for more rows of grains while adverse conditions favored fewer rows. Other lots of corn from this site showed the usual distribution of corn types (see Table 7).

Fig. 6. All of these selected cobs, from a seasonably occupied Virgin branch site, probably were slightly dented. The central pair probably was the most dented and approached some of the extreme Fremont culture dents.

Fig. 7, a. This surface collection of cobs from 42Sa576 was like the following lot, but had a few more large cobs. This probably results from drifting of larger objects to the surface when the surface is disturbed.

Fig. 7, b. Cobs excavated from Feature 93 of 42Sa576.

Fig. 7, c. This lot of cobs from 42Sa583 Feature 38 was larger and more mature than the average for the site, but still falls within the general pattern (Fig. 7). The averages for the 897 cobs from this site (Table 7), which had 75% Kayenta pottery and 25% Mesa Verde pottery, were very much like the averages for 900 cobs from 42Sa576, which had 61% Kayenta pottery and 32% Mesa Verde pottery.

Fig. 7, d. This lot, from 42Sa585, Features 90-1, was a mixture of secondary and tiller cobs with those from main ears. There were fewer 10-rowed cobs than usual (Fig. 9).

Fig. 7, e. Cobs from 42Sa693. Note the similarity in distribution of points on the diagrams for general collections from Glen Canyon. Such coincidence could occur only if frequent interchange of seeds and similar standards or ideals for the selection of seed existed.

Fig. 7, f. These are 16 cobs from a cache, Feature 75 of 42Sa736 (Fig. 10).

Fig. 8. This is a varied lot of good mature cobs (Fig. 7). Some, like the cob in the lower right, had broken glumes and fragments of grain tips left after removal of the grains when still moist. The ears shown on the left and right of the top row were shelled when completely mature and dry. They show soft, entire glumes and no traces of grain tips.

Fig. 9. This is a lot from Features 90-1 (Fig. 7, d).

Fig. 10. These 16 uniform cobs were slightly tapered and probably all had slightly flinty, deep-red kernels. The cobs, now faded, once were deep-red.

Figs. 11 and 12 were discussed earlier in the text.

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ADDENDUM

A TABULAR SUMMARY OF PLANT AND ANIMAL RESOURCES OF THE GLEN CANYON AREA

Part 1

Ethnohistorically Reported Uses of Plants in the Glen Canyon Area

Part 2

Botanical Species of the Glen Canyon Area

Part 3

Species Other Than Floral Reported From Glen Canyon and Represented in Archeological Collections

by

Susan R. Clark

NOTE

It should be noted that the species shown in the following tabulation do not necessarily represent a complete inventory of the Glen Canyon biota. It is merely a composite list derived from the published material in the sources cited on pages 113 to 116.

Part 1. Ethnohistorically Reported Uses of Plants in the Glen Canyon Area, Arranged Alphabetically by Common Name

Plants Reported to Have Been Used for Food, Medicine, and/or Magic

Acanthochiton (1)*
Almond (1)
Apple (1)
Apricot (1)
Aster (5)
Ball Cactus (1)
Beebalm (1)
Biscuit Root (1)
Blazing Star (1)
Bladderpod (1)
Bluebell (1)
Brickellbush (1)
Buckwheat (3)
Bull Nettle (1)
Cancer Root (1)
Cane Cactus (2)
Cardinal Flower (1)
Carrot (1)
Cattail (1)
Chamaesaracha (1)
Chamaesyce (1)
Cherry (1)
Chili Pepper (1)
Clammy Weed (1)
Clematis (1)
Cloakfern (1)
Cockerell (1)
Cocklebur (1)
Colorado Rubber Plant (1)
Coneflower (1)
Coriander (1)
Corn Smut (1)
Crownbeard (1)
Cryptanthe (2)
Cucumber (1)
Cymopteris (1)
Dandelion (1)
Deer's Ears (1)
Dicoria (1)
Dock (1)
Dogwood (1)
Douglas Spruce (1)
Dove Weed (1)
Earth Star (1)
Evening Primrose (4)
Fennel (1)
Flax (2)
Fleabane (1)
Gaillardia (1)
Gaura (1)
Gilia (3)
Globe Mallow (2)
Golden Aster (1)
Golden Rod (3)
Goosefoot (4)
Ground Cherry (3)
Hedgehog Cactus (1)
Hoffmanseggia (1)
Hop (1)
Horsebush (1)
Hymenopappus (2)
Indian Rice Grass (1)
Jerusalem Artichoke (1)
Jimson Weed (1)
Joint-fir (4)
?Kallstroemia (1)
Knotweed (1)
Larkspur (1)
Lettuce (1)
Leucelene (1)
Lily (1)
Lithospermum (1)
Locoweed (3)
Lupine (1)
Lycium (1)
Machaeranthera (1)
Mesquite (1)
Mint (2)
Mule Ears (1)
Mullen (1)
Muskmelon (1)
Nuttallia (1)
Onion (3)
Onosmodium (1)
Oxytenia (1)
Parosela (2)
Peanut (1)
Pear (1)
Phorandendron (2)
Plantain (1)
Praire Clover (1)
Prickley Pear Cactus (4)
Prince's Plume (2)
Puffball (1)
Purslane (2)
Radish (1)
Reverchonia (1)
Rock Pine (1)
Rorripa (1)
Rush Pink (1)
Safflower (1)
Sand Verbena (1)
Sandwort (1)
Scurf-pea (1)
Seepweed (1)

*The number following the common name refers to the number of species of that genus reported to have been used.

Sericotheca (1)
Sorghum (1)
Spiderwort (1)
Spleenwort (1)
Spurge (4)
Stickleaf (2)
Strawberry (1)
Thistle (6)
Thoroughwort (1)
Tobacco (2)
Tomato (1)
Townsendia (1)
Umbrella Wort (1)
Watermelon (1)
Water Parsnip (1)
Western Wallflower (1)
Wild Potato and Tomato (1)
Willow-weed (1)
Winter Fat (1)
Wire Lettuce (3)
Yarrow (1)
Zinnia (1)

Plants Reported To Have Been Used as Food, Medicine, Magic, Tools and/or Utensils

Agave (1)
Apache Plume (1)
Barberry (1)
Bean (5)
Beargrass (1)
Beardtongue (2)
Bee-flower (2)
Box Elder (3)
Bulrush (2)
Chokecherry (1)
Cliff Rose (1)
Coreopsis (1)
Corn (1)
Cotton (2)
Cottonwood, Aspen (5)
Creeping Buttercup (1)
Cucurbit (4)
Currant, Wild (1)
Dropseed (4)
Fetid-Marigold (2)
Four o'clock (4)
Galleta Grass (1)
Giant Reed (1)
Groundsel (2)
Hackberry (1)
Hairgrass (2)
Holly Grape (1)
Horsetail (2)
Indian Paintbrush (1)
Juniper (3)
Milkweed (3)
Mahogany (1)
Navajo Tea (3)
Oak (2)
Parryella (1)
Peach (1)
Pigweed (4)
Pinyon Pine (1)
Ponderosa Pine (1)
Psilostrophe (1)
Rabbitbrush (4)
Ragweed (1)
Reed Cane (3)
Rhubarb, Wild (1)
Rose, Wild (2)
Rush (2)
Sagebrush (7)
Saltbush (6)
Sandgrass (1)
Serviceberry (2)
Snakeweed (4)
Squawbush, Sumac (3)
Sunflower (4)
Tansy Mustard (3)
Thelypodium (1)
Unicorn Plant (2)
White Fir (1)
Willow (3)
Winged Pigweed (1)
Wislizenia (1)
Yucca (4)

Plants Reported to Have Been Used Only as Tools, Utensils, Fuel, etc.

Alder (1)
Beardgrass (1)
Boerhaavia (1)
Clubflower (1)
Dogbane (1)
Grama Grass (3)
Greasewood (1)
Ironwood (1)
Locust (1)
Osage Orange (1)
Panic Grass (1)
Waterbirch (1)
Wedelia (1)

Part 2. Botanical Species of the Glen Canyon Area Arranged Alphabetically by Genera

FERNS

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
Adiantum capillus-veneris* Maidenhair fern	No	No	
Adiantum pedatum* Maidenhair fern	No	No	
Asplenium trichomanes Spleenwort	No	Yes	Paint for prayer-sticks
Dryopteris filix-mas Shield fern	No	Yes	None
Filix fragilis Brittle fern	No	Yes	None
Notholaena fendleri Cloak fern	No	Yes	Medicine
Pellea limitanea* Cliff brake	No	No	

FUNGI

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
Geaster sp. Earth star	No	Yes	Medicine
Lycoperdon sp. Puffball	No	Yes	Food
Ustilago zeae Corn smut	No	Yes	Medicine

Fungi, in general, was reported to have been used for food, body paint, and medicine.

GRASSES

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
Agropyron sp.* Wheatgrass	Yes	Yes	
Agropyron cristatum* Crested wheatgrass	No	No	
Agropyron smithii* Colorado bluestem	No	Yes	None
Agropyron spicatum* Bunch wheatgrass	Yes	No	
Agropyron trachycaulum* Slender wheatgrass	Yes	No	
Agrostis alba* Bentgrass, Red top	No	No	
Agrostis palustris* Creeping bent	No	No	
Agrostis semiverticillata* Water bentgrass	No	No	
Agrostis verticillata* Water bentgrass	No	No	
Alopecurus aristulatus Rush grass	No	Yes	None
Andropogon sp.* Bluestem	Yes	Yes	
Andropogon barbinodis* Bluestem	No	No	
Andropogon gerardi* Big bluestem	No	No	
Andropogon hallii* Sand bluestem	No	No	

* An asterisk following an entry signifies that that genus and species has been reported from Glen Canyon proper. See bibliography attached.

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
GRASSES (cont.)			
Andropogon scoparius* Beard grass, Little bluestem, Sage grass	No	Yes	Brooms
Aristida fendleriana* Fendler three-awn grass	No	Yes	None
Aristida longiseta* Three-awn grass	No	Yes	None
Arundo donax* Giant reed	No	Yes	General construction, musical instruments, magic, symbolic name of clans, myth, ceremonially associated with bow and arrow
Blepharoneuron tricholepsis	No	No	
Bouteloua barbata* Six-weeks grama	No	No	
Bouteloua curtipendula* Side-oats grama grass, Mesquite grass	No	Yes	Brooms and brushes
Bouteloua eriopoda* Black grama	No	Yes	Hair brushes
Bouteloua gracilis* Blue grama	No	Yes	Important forage grass, basketry, brooms, and hair brushes
Bromus ciliatus Grama grass	No	No	
Bromus marginatus* Mountain brome	No	No	
Bromus rubens* (Mesa also)** Brome grass, Red brome, Foxtail chess	No	No	
Bromus tectorum* (Mesa also) Cheat grass	No	No	
Calamagrostis inexpansa Reed grass	No	No	
Calamovilfa gigantea Sand grass	No	Yes	Ceremonial decorations, prayer-sticks, construction of mats and carrying cases, construction of kivas
Cenchrus carolinianus Sand bur	No	Yes	None
Cenchrus pauciflorus* Sand bur	No	No	
Chaetochloa viridis* Green foxtail	No	No	
Chloris virgata* Feather fingergrass	No	No	
Distichlis stricta* (Mesa also) Desert saltgrass	Yes	No	
Echinochloa crusgalli* Barnyard grass	No	No	
Elymus canadensis* Wild rye	No	Yes	None
Elymus glaucus* Wild rye	No	No	
Festuca octoflora*(Mesa also) Six-weeks fescue grass	No	No	
Hilaria jamesii* Galleta grass	No	Yes	Basketry, ceremonial implements, prayer-sticks

**As reported by Ambler, et al., (see bibliography)

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
GRASSES (cont.)			
Imperata brevifolia Satintail	No	No	
Lycurus pheoides* Wolftail, Texan timothy	No	Yes	None
Muhlenbergia aspirifolia* Scratch grass	Yes	No	
Muhlenbergia pungens* Muhlenbergia, Purple hair grass	No	Yes	Brushes and brooms
Muhlenbergia rigens Hairgrass	No	Yes	Plume offering, magic
Muhlenbergia trifida Hair grass	No	No	
Munroa squarrosa* False buffalo grass	No	No	
Oryzopsis hymenoides*(Mesa also) Indian rice grass	Yes	Yes	Food (esp. in famine), name of clan
Panicum spp.* Panic-grass	No	Yes	
Panicum barbipulvinatum Panic grass	No	Yes	Brooms
Panicum obtusum* Panic grass, Vine-mesquite	No	Yes	None
Panicum tennesseense Panic grass	No	No	
Panicum virgatum* Switchgrass	No	No	
Phalaris arundinacea Reed canary grass	Yes	No	
Phragmites communis* Reed cane	Yes	Yes	General construction, tubular pipes, pipe stems, weaving rods, musical instruments, prayer-sticks, name of clan, myth, ceremonially assoc. with bow and arrow
Phragmites phragmites Reed cane	No	Yes	Arrows, game sticks
Poa spp.* Muttongrass	No	No	
Poa bigelovii* Bigelow bluegrass	No	No	
Poa fendleriana* (Mesa also) Muttongrass	No	No	
Poa longiligula* Long-tongued muttongrass	No	No	
Poa nevadensis* Nevada bluegrass	No	No	
Poa secunda* Sandberg bluegrass	No	No	
Polypogon lapathifolium* Rabbitfoot	No	No	
Polypogon monspeliensis* Annual beardgrass	No	No	
Puccinellia airoides* Nuttall alkaligrass	No	No	
Sagittaria latifolia* Arrowgrass	No	No	
Sitanion hystrix* Squirrel tail	No	Yes	None
Sorghum vulgare Sorghum	No	Yes	Food

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
GRASSES (cont.)			
Sorghastrum nutans	No	No	
Spartina gracilis* Cordgrass	No	No	
Sphenopholis obtusata* Prairie wedgegrass	No	No	
Sporobolus airoides* Dropseed, Alkali sacaton	Yes	Yes	Food (esp. in famine)
Sporobolus asperifolia* Dropseed grass	No	No	
Sporobolus contractus* Spike dropseed	No	Yes	None
Sporobolus cryptandrus* Spike dropseed	No	No	
Sporobolus flexuosus* Mesa dropseed	No	Yes	Food (esp. in famine)
Sporobolus giganteus Giant dropseed	No	Yes	Food, prayer-sticks
Sporobolus pulvinatus* Dropseed	No	No	
Sporobolus strictus Dropseed	No	Yes	Basketry
Stipa comata* Needlegrass	No	Yes	None
Stipa lettermani Needlegrass	No	No	
Stipa neomexicana* Needlegrass	Yes	No	
Triglochin maritima* Arrowgrass	No	No	
Tridens pulchellus* Fluffgrass	No	No	
Trisetum spicatum*	No	No	
Zea mays Corn	Yes	Yes	Food, ceremony and ritual, clan name, symbol of directions, smoking, ritual offerings, gifts, forage, prayer-sticks, ceremonial ornaments, fire-lighters, handles, holders, darts, balls (corn kick-ball), trade, voting tallies, medicine, magic, ceremonial adornment, game implement (shuttlecock), dye and paint (purple variety only), husk containers or packets, possible** scraper (cob), husk cordage
HERBS			
Abronia elliptica* Sand verbena	No	Yes	Possible magic
Abronia glabrata* Sand verbena	No	No	
Abronia salsa* Sand puffs	No	No	
Acanthochiton spp.	Yes	Yes	Possible food
Acanthochiton wrightii	No	Yes	Food, magic
Achillea lanulosa Yarrow, Sneezeweed	No	Yes	Medicine
Actinea acaulis arizonica Sunflower	No	Yes	Beverage (intoxicant), medicine

** The entry "possible" refers to disagreement among informants or uncertainty as to use of archeologically recovered object.

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Agave sp. Century plant, Mescal	Yes	Yes	Beverage, hunting and war lance shafts, preparation of ceremonial equipment, tinder, name of clan, trade
Agave kaibabensis Mescal	No	No	
Agave utahensis* Utah yant, Century plant	Yes	No	Food
Agoseris glauca* Mountain dandelion	No	No	
Allionia coccinea Umbrella-wort	No	Yes	Possible medicine
Allionia incarnata* Allionia	No	No	
Allionia linearis* Allionia	No	Yes	None
Allium sp.	Yes	Yes	
Allium cernuum Onion	No	Yes	Food seasoning
Allium geyeri Onion	No	Yes	Food seasoning
Allium macropetalum*(Mesa also) Wild onion	No	No	
Allium nevadensis* Nevada wild onion	No	No	
Allium recurvatum Wild onion	No	Yes	Food
Amaranthus spp. Amaranth	Yes	Yes	Possible food
Amaranthus albus* Tumbleweed	No	No	
Amaranthus blitoides* Pigweed, Tumbleweed	No	Yes	Food
Amaranthus cruentus Coxcombs	No	Yes	Food coloring
Amaranthus graecizans* Amaranth	No	No	
Amaranthus hybrides pariculates Purple amaranth	No	Yes	Rouge, ceremonial decoration
Amaranthus retroflexus Pigweed	No	Yes	Food
Ambrosia aptera Ragweed	No	No	
Amsonia eastwoodiae* Dogbane	No	No	
Androstephium breviflorum* Funnel lily	No	No	
Aplopappus sp. * Aplopappus	No	Yes	
Aplopappus armenoides Sunflower	No	Yes	None
Aplopappus drummondii* Sunflower	No	No	
Aplopappus gracilis* Aplopappus	No	No	
Aplopappus heterophyllis Sunflower	No	Yes	None
Aplopappus nuttallii Sunflower	No	Yes	None
Aplopappus scopulorum* Aplopappus	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Apocynum sp.	Yes	No	Cordage, basketry
Apocynum cannabinum* Dogbane, Indian hemp	Yes	No	Basketry
Apocynum sibericum Dogbane	No	No	
Aquilegia micrantha* Columbine	No	No	
Arabis sp.* Rock cress	No	No	
Arabis lignifera (Mesa only) Rock cress	No	No	
Arabis pendulina (Mesa only) Rock cress	No	No	
Arabis perennans Rock cress	No	No	
Arabis pulchra (Mesa only) Rock cress	No	No	
Arachis hypogaca Peanut	No	Yes	Rarely cultivated (food)
Arenaria confusa Sandwort	No	No	
Arenaria eastwoodia Sandwort	No	Yes	Medicine
Arenaria fendleri* Sandwort	No	No	
Argemone intermedia* Prickly poppy	No	No	
Argemone platyceras* Prickly poppy	No	No	
Artemisia arbuscula* Sage	No	No	
Artemisia forwoodii Green sage	No	Yes	Medicine
Artemisia ludoviciana* Sagebrush	No	No	
Artemisia wrightii Wormwood	No	Yes	Medicine, food
Asclepias spp. Milkweed	Yes	Yes	Food, medicine
Asclepias capricornu*(Mesa also) Spider milkweed, Antelope horns	No	No	
Asclepias cryptoceras* Milkweed	No	No	
Asclepias funastrum Climbing milkweed	Yes	No	
Asclepias galioides Milkweed	No	Yes	Food, weaving, prayer-sticks, medicine
Asclepias involucrata* Milkweed	No	Yes	Gum (chewing)
Asclepias latifolia* Milkweed	No	No	
Asclepias speciosa* Milkweed	No	Yes	Food
Aster abatus* Mohave aster	No	No	
Aster arenosus (Mesa only) Aster	No	No	
Aster arvinsis* Aster	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Aster brachyactis* Aster	No	No	
Aster cichoriaceus*(Mesa also) Aster	No	Yes	Medicine, Beverage (stimulant)
Aster commutatus* Aster	No	No	
Aster frondosus* Aster	No	No	
Aster glaucodes* Aster	No	No	
Aster hesperius Aster	No	Yes	Medicine
Aster incanopilosus Aster	No	Yes	Medicine-magic
Aster leucelene* Aster	No	Yes	Medicine
Aster spinosus* Aster	No	No	
Aster tanacetifolius* Tansy-led aster	No	Yes	Medicine, beverage (stimulant)
Astragalus spp.* Locoweed	Yes	Yes	Ceremonial emetic ingredient
Astragalus amphioxys Milk vetch	No	No	
Astragalus arctus* Locoweed	No	No	
Astragalus calycosus Locoweed	No	No	
Astragalus ceramicus imperfectus Locoweed	No	Yes	Occasional food
Astragalus cophorus Locoweed	No	No	
Astragalus desperatus*	No	No	
Astragalus diphysus* Locoweed	No	Yes	Food
Astragalus gilensis*	No	No	
Astragalus humillimus	No	No	
Astragalus kentrophyta*	No	No	
Astragalus lentiginosus* Locoweed	No	No	
Astragalus nuttallianus*	No	No	
Astragalus praelongus	No	Yes	Occasional food
Astragalus preussii* Locoweed	No	No	
Astragalus sabulonum*	No	No	
Astragalus seculorum	No	No	
Astragalus sesquiflorus	No	No	
Astragalus sophoroides	No	No	
Astragalus subcinereus* Locoweed	No	No	
Astragalus tephrodes*(Mesa only) Milk vetch	No	No	
Astragalus thompsonae* Locoweed	No	No	
Astragalus zionis*	No	No	
Aulospermum sp. Indian parsnip	Yes	No	
Bahia woodhousei Thistle	No	Yes	Medicine
Berula erecta Water parsnip	No	Yes	Medicine

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Boerhaavia erecta	No	Yes	To whip flies, to catch flies on stickly leaves and stems
Brickellia arguta* Brickellbush, small flowered	No	No	
Brickellia californicus (Mesa also) Brickellbush	No	Yes	None
Brickellia grandiflora Brickellbush	No	Yes	None
Brickellia longifolia*(Mesa also) Brickellbush	No	No	
Brickellia oblongifolius linifolius Brickellbush	No	Yes	Medicine
Brickellia scaber* Brickellbush	No	Yes	None
Brickellia watsonii* Brickellbush	No	No	
Bromus ciliatus Fringed brome	No	Yes	None
Calochortus sp. * (Mesa also) Sego lily	Yes	Yes	
Calochortus aureus Mariposa lily	No	Yes	Food, ceremonially assoc. with northwest direction, clan name, ceremonial symbol
Calochortus flexuosus* Mariposa lily	No	No	
Calochortus nuttallii* Sego lily	No	No	
Calycoseris parryi*	No	No	
Campanula parryi* Bluebell	No	Yes	Medicine
Campanula petiolata Bluebell	No	Yes	None
Capsicum annuum Chili pepper	No	Yes	Food, food coloring
Carduus ochrocentrus Thistle	No	Yes	Medicine
Carex spp. * Sedge	Yes	Yes	None
Carex kelloggii* Kellogg sedge	No	No	
Carex lanuginosa* Sedge	No	No	
Carex vulpinoides* Sedge	No	No	
Carthamus tinctorius Safflower, false saffron	No	Yes	Food coloring
Castilleja chromosa*(Mesa also) Indian paintbrush	No	No	
Castilleja linariaefolia* Indian paintbrush	No	Yes	Medicine, ceremonial paint, dye, associated with southeast direction, personal adornment (flower), clan name, flower is prominent in art (decoration).
Centaurea picris Star-thistle, knapweed	No	No	
Chaenactis douglasii* Chaenactus	No	No	
Chaenactis macrantha* False yarrow	No	No	
Chaenactis stevioides* Chaenactis	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Chamaesaracha coronopus	No	Yes	Food
Chamaesyce chaetocalyx Euphorbia	No	Yes	Medicine
Chenopodium spp. * Goosefoot	Yes	Yes	Food, food preparation
Chenopodium album* Lambs-quarters	Yes	Yes	Food, food preparation
Chenopodium cornutum Goosefoot	No	Yes	Medicine
Chenopodium fremontii* Fremont goosefoot	No	No	
Chenopodium incanum Goosefoot	No	Yes	Food
Chenopodium incisum* Goosefoot	No	No	
Chenopodium leptophyllum* Narrow-leaved goosefoot	No	Yes	Food
Cheirinia sp. Blistercress	No	Yes	None
Chrysopsis hirsutissima Golden aster	No	Yes	None
Chrysopsis hymenoides*	No	No	
Chrysopsis villosus*(Mesa also) Golden aster	No	Yes	Possible medicine
Chicorium sp. Chickory	No	Yes	None
Cicuta occidentalis Water hemlock	No	Yes	None
Cirsium nidulum* Thistle	No	No	
Cirsium pulchellum* Thistle	No	Yes	Medicine, clan name
Cirsium rydbergii* Thistle	No	No	
Cirsium undulatum* Bull thistle	No	No	
Claytonia perfoliata* Miner's lettuce	No	No	
Clematis ligusticifolia* Clematis	No	Yes	Possible hair tonic
Cleome spp. Bee-flower	Yes	Yes	Food, medicine
Cleome lutea* Yellow bee-flower	No	Yes	Food, medicine
Cleome serrulata* Rocky mountain bee-weed	No	Yes	Food, prayer-sticks, preparation of pottery paint, pottery decoration, decoration of plume offerings
Clevia hyalina*	No	No	
Coldenia hispidissima* Coldenia	No	No	
Comandra pallida* False toadflax, Bastard toadflax	No	No	
Convolvulus arvensis* Bindweed	No	No	
Cordylanthus parviflorus* Club flower	No	No	
Cordylanthus wrightii* Club flower	No	Yes	Skin bleach
Coreopsis cardaminefolia Coreopsis	No	Yes	Food, dye, magic

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Coriandrum sativum Coriander	No	Yes	Food, food flavoring
Corispermum hysopifolium* Bugseed	No	No	
Corispermum marginale* Bugseed	No	No	
Corispermum nitidum* Tickseed, Bugseed	No	No	
Corydalis aurea*	No	No	
Crassina grandiflora Zinnia	No	Yes	Medicine
Cressa truxillensis* Alkali weed	No	No	
Croton texensis* Croton, Dove weed	No	Yes	Medicine
Cryptanthe spp.* Cryptanthe	No	Yes	
Cryptanthe crassisepala* Cryptanthe	No	Yes	Medicine
Cryptanthe fendleri* Cryptanthe	No	No	
Cryptanthe flava*(Mesa also) Cryptanthe	No	No	
Cryptanthe jamesii Cryptanthe	No	Yes	Medicine
Cryptanthe micrantha*	No	No	
Cryptanthe nevadensis*	No	No	
Cryptanthe pterocarya*(Mesa also) Cryptanthe	No	No	
Cryptanthe recurvata*	No	No	
Cuscuta sp.	No	Yes	None
Cycloloma atriplicifolium* Winged pigweed	No	Yes	Medicine, dye, food, magic
Cymopteris sp. Indian parsnip	Yes	Yes	
Cymopteris fendleri* (Mesa also) Cymopteris	No	No	
Cymopteris globosus* Cymopteris	No	No	
Cymopteris newberryi* Cymopteris	No	Yes	Food
Cyperus sp.* Sedge	No	No	
Cyperus erythrorhizos* Flatsedge	No	No	
Datura meteloides* Sacred datura, Jimson weed	Yes	Yes	Chewed to induce visions, drug, medicine, magic
Daucus carota* Carrot	No	Yes	Food
Delphinium scaposum* Larkspur	No	Yes	Medicine, ceremony, clan name, assoc. with southwest direction
Descurainia sp. Tansy mustard	Yes	Yes	Paint, trade, food
Descurainia halictorum Tansy mustard	No	Yes	Clan name
Descurainia obtusa* Tansy mustard	No	No	
Descurainia pinnata* Tansy mustard	No	Yes	Pottery paint, food, clan name
Dithyrea wislizeni Spectacle pod	No	Yes	Medicine, beverage (intoxicant)

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Dicoria spp.	No	Yes	Possible food
Dondia fruticosa Seepweed	No	Yes	Ritual bathing
Draba cuneifolia Whitlowgrass	No	No	
Dryopetalon sp.	Yes	No	
Dyssodia acerosus* Dyssodia	No	No	
Dyssodia pentachaeta* Dyssodia	No	No	
Dyssodia thurberi* False dog fennel	No	No	
Eleocharis acicularis* Spike-rush	No	No	
Eleocharis macrostachya* Spike-rush	No	No	
Eleocharis montevidensis* Spike-rush	No	No	
Eleocharis palustris* Spike-rush	No	No	
Eleocharis parishii* Spike-rush	No	No	
Eleocharis rostellata* Spike-rush	No	No	
Elymus canadensis* Canadian wild-rye	No	No	
Encelia frutescens* Encelia	No	No	
Epilobium adenocaulon* Willow-weed	No	Yes	Medicine
Epipactis gigantea* Stream orchid, Giant helleborine	No	No	
Equisetum arvense* Souring rush, Horsetail	No	Yes	Forage
Equisetum hyemale* Western horsetail	No	No	
Equisetum kansanum* Kansas horsetail	Yes	No	
Equisetum laevigatum* Horsetail	No	Yes	Possible sacred bread
Equisetum praealtum* Tall horsetail	Yes	No	
Eragrostis diffusa Lovegrass	No	Yes	None
Eremocrinum albomarginatum* Glen Canyon lily	No	No	
Erysimum sp. Western wallflower	No	Yes	Medicine, ceremonical magic
Erigeron arenarius* Fleabane	No	No	
Erigeron argentatus* Fleabane	No	No	
Erigeron bell idiastrum* Fleabane	No	No	
Erigeron canadensis* Fleabane	No	Yes	Medicine
Erigeron divergens* Fleabane	No	No	
Erigeron endelmanni* Fleabane	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
<u>Erigeron strigosus</u>* Fleabane	No	No	
<u>Eriogonum</u> spp.* Buckwheat	Yes	Yes	Medicine
<u>Eriogonum alatum</u>* Wild buckwheat	No	Yes	Medicine
<u>Eriogonum annuum</u> Eriogonum	No	Yes	None
<u>Eriogonum aurem</u>* Eriogonum	No	No	
<u>Eriogonum cernuum</u>* Buckwheat	No	Yes	None
<u>Eriogonum cognatum</u>	No	No	
<u>Eriogonum corymbosum</u>* Buckwheat	No	No	
<u>Eriogonum deflexum</u>* Buckwheat	No	No	
<u>Eriogonum divergens</u> Buckwheat	No	Yes	None
<u>Eriogonum fasciculatum</u> Buckwheat	No	Yes	Medicine
<u>Eriogonum inflatum</u>* Buckwheat, Bottlestopper	No	No	
<u>Eriogonum jamesii</u>* Buckwheat	No	Yes	Medicine, ceremonial food, magic
<u>Eriogonum jonesii</u>* Buckwheat	No	No	
<u>Eriogonum leptocladum</u> Buckwheat	No	No	
<u>Eriogonum shocklevi</u>* Eriogonum	No	No	
<u>Eriogonum simpsoni</u>* (Mesa also) Buckwheat	No	No	
<u>Eriogonum subreniforme</u>* Buckwheat	No	No	
<u>Eriogonum umbellatum</u> Buckwheat	No	No	
<u>Eriogonum wetherillii</u>* Eriogonum	No	No	
<u>Erodium cicutarium</u>* Cicarta, Filaree, Alfilaria, Heron-bill	No	No	
<u>Erysimum</u> sp. Western wallflower	No	Yes	Medicine, ceremonial magic
<u>Erysimum capitatum</u> Western wallflower	No	No	
<u>Eucrypta micrantha</u>*	No	No	
<u>Eupatorium occidentale arizonicum</u> Thoroughwort	No	Yes	Medicine
<u>Euphorbia</u> spp.* Spurge	No	Yes	Medicine
<u>Euphorbia fendleri</u>* Fendler spurge	No	Yes	Medicine
<u>Euphorbia flagelliformis</u>* Spurge	No	Yes	Medicine
<u>Euphorbia parryi</u>* Parry spurge, Slender spurge	No	No	
<u>Euphorbia polycarpa</u> Spurge	No	Yes	Medicine
<u>Euphorbia serpyllifolia</u> Spurge	No	Yes	Medicine, food
<u>Euploca convolvulacea</u>* Euploca	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Foeniculum officinale Fennel	No	Yes	Substitute for tobacco
Fossumbromia foveolata*	No	No	
Frageria ovalis Strawberry	No	Yes	Possible food
Franseria sp.* Sand bur	Yes	Yes	Forage, medicine
Franseria acanthicarpa* Bur sage, Ragweed	Yes	Yes	Forage, medicine
Frasera sp.* Deer's ears	No	Yes	Medicine
Frasera utahensis* Frasera	No	No	
Funastrum cyanchoides* Climbing milkweed	No	No	
Funastrum heterophyllum* Climbing milkweed	No	No	
Gaillardia pinnatifida* Gaillardia	No	Yes	Medicine
Galium sp. Bedstraw	No	Yes	None (makes gums smart if chewed)
Galium aparine* Bedstraw, Cleavers, Goosegrass	No	No	
Galium stellatum* Stellate bedstraw	No	No	
Galium triflorum* Bedstraw	No	Yes	None
Gaura coccinea	No	Yes	None
Gaura parviflora	No	Yes	Medicine
Geranium atropurpureum Geranium	No	Yes	None
Geum strictum Avens	No	Yes	None
Gilia spp.* Gilia	No	Yes	Medicine
Gilia aggregata* Scarlet gilia, Skyrocket	No	Yes	Magic (hunter's petition)
Gilia congesta* Gilia	No	No	
Gilia greeneana Red gilia	No	Yes	None
Gilia gracilis Gilia	No	No	
Gilia gunnisoni* Gunnison gilia	No	No	
Gilia leptomeria* Gilia	No	No	
Gilia longiflora Gilia	No	Yes	Medicine, clan name
Gilia multiflora Gilia	No	Yes	Medicine
Gilia polycladon*	No	No	
Gilia setosissima*	No	No	
Gilia shottii* Gilia	No	No	
Gilia sinuata* (Mesa also) Gilia	No	No	
Gilia subnuda Gilia	No	No	
Glycyrrhiza lepidota* Licorice	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Gnaphalium palustre* Cudweed	No	No	
Grindelia aphanactis* Gum weed	No	No	
Grindelia fastigiata* Gum weed	No	No	
Gutierrezia spp. Snakeweed	No	Yes	Prayer-sticks
Gutierrezia filifolia Snakeweed	No	Yes	Medicine, food, ceremonial adornment (denotes officership).
Gutierrezia longifolia Snakeweed	No	Yes	Prayer-sticks, medicine, forage
Gutierrezia lucida* Snakeweed	No	Yes	Prayer-sticks, medicine
Gutierrezia microcephala* Matchweed, Snakeweed	No	No	
Gutierrezia sarothrae* (Mesa also) Matchweed, Snakeweed	No	Yes	Prayer-sticks, medicine
Helianthus sp. Hopi sunflower	No	Yes	General construction, dye, preparation of ceremonial body paint, food.
Helianthus annuus* Common sunflower	No	Yes	Bird seed, ceremonial face powder, medicine, magic, adornment of flute priests, cigarette "match".
Helianthus anomalus* Sunflower	No	Yes	Bird seed, ceremonial face powder, medicine, magic, adornment of flute priests, cigarette "match".
Helianthus petiolaris* Sunflower	No	Yes	Bird seed, ceremonial face powder, medicine, magic, adornment of flute priests, cigarette "match".
Helianthus tuberosus Jerusalem artichoke	No	Yes	Food
Heliotropium convolvulaceum* Heliotrope	No	No	
Heliotropium xerophilum Cockerell	No	Yes	None
Hoffmanseggia jamesii	No	Yes	Medicine
Hordeum jubatum* Foxtail barley	No	No	
Hordeum stebbinsii* Barley	No	No	
Humulus americanus Wild hop	No	Yes	Food
Hymenopappus acaulis* Hymenopappus	No	No	
Hymenopappus cinereus* Hymenopappus	No	No	
Hymenopappus eriopodus* Hymenopappus	No	No	
Hymenopappus filifolius Hymenopappus	No	Yes	Medicine
Hymenopappus lugens* Hymenopappus	No	Yes	Medicine, decoration of warrior's bandolier
Hymenopappus pauciflorus	No	No	
Hymenoxyz spp. *	No	Yes	
Hymenoxyz acaulis* Hymenoxyz	No	No	
Hymenoxyz bigelovii	No	No	
Hymenoxyz floribunda Colorado rubber plant	No	Yes	Food (chewed as gum)
Hymenoxyz leptoclada* Hymenoxyz	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Hypopitys latisquama Pinesap	No	Yes	None
Insularis eastwoodiae Plantago	Yes	No	
Ionoxalis violacea Violet wood-sorrel	No	Yes	None
Iva xanthifolia Marsh elder	No	Yes	None
Juncus spp.* Rush	Yes	Yes	
Juncus balticus* Baltic rush, Wire grass	Yes	Yes	Ceremonial association with water
Juncus longistylus* Rush	No	No	
Juncus mertensianus* Rush	No	No	
Juncus mexicanus* Rush	No	No	
Juncus saximontanus* Rush	No	No	
Juncus torreyi Rush	No	Yes	Ceremonially associated with water
?Kallstroemia brachystylis	No	Yes	Medicine
Kochia scoparia* Molly	No	No	
Laciniaria punctata Blazing star	No	Yes	Food
Lactuca sativa Lettuce	No	Yes	Rarely cultivated (food)
Lactuca serriola* Wild lettuce	No	No	
Lappula floribunda Stick seed	No	Yes	None
Lappula redovoskii* Stick-seed	No	No	
Lepidium spp.* Peppergrass	No	No	
Lepidium apetalum* Peppergrass	No	No	
Lepidium densiflorum* Peppergrass	No	No	
Lepidium eastwoodiae* Peppergrass	No	No	
Lepidium fremontii* Peppergrass	No	No	
Lepidium jonesii* Peppergrass	No	No	
Lepidium lasiocarpum*	No	No	
Lepidium montanum* Montana peppergrass	No	No	
Leptasea austromontana	No	Yes	None
Lesquerella cinera* Bladder pod	No	No	
Lesquerella intermedia (Mesa only) Bladder pod	No	Yes	Medicine
Lesquerella ludoviciana Bladder pod	No	No	
Lesquerella rectipes* Bladder pod	No	No	
Leucelene eriocoides	No	Yes	Medicine, ceremonially symbolic of cloud

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Linum aristatum Flax	No	No	
Linum australe Yellow flax	No	Yes	Possible beverage, possible medicine
Linum puberulum Yellow flax	No	Yes	Medicine
Lithospermum linearifolium	No	Yes	Medicine, magic
Lobelia cardinalis* Cardinal flower	No	No	
Lobelia splendens Cardinal flower	No	Yes	Medicine
Lomatium macdougalii Biscuitroot, Indianroot	No	No	Food, medicine
Lupinus sp. Lupine	Yes	Yes	
Lupinus aduncus Lupine	No	Yes	None
Lupinus caudatus* Lupine	No	No	
Lupinus kingii* Dwarf lupine	No	Yes	Possible medicine
Lupinus pusillus* (Mesa also) Lupine	No	No	
Lupinus rubens*	No	No	
Lupinus sparsiflorus* Lupine	No	No	
Lygodesmia grandiflora* Rush pink	No	Yes	Food preparation, medicine
Machaeranthera glabella	No	Yes	Medicine
Malacothrix californica* Desert dandelion	No	No	
Malacothrix fendleri* Desert dandelion	No	No	
Malacothrix glabrata* Malacothrix	No	No	
Malacothrix sonchoides*	No	No	
Malacothrix torreni*	No	No	
Mannia fragrans*	No	No	
Marchantia polymorpha*	No	No	
Martynia sp. Unicorn plant	No	Yes	Artificial flowers for headdresses
Martynia louisiana Unicorn plant, Devil's claw	No	Yes	Ceremonial implements, awls (?) magic
Melilotus sp.* Sweetclover	No	No	
Melilotus alba* White sweetclover	No	No	
Mentha canadensis Mint	No	Yes	Food
Mentzelia albicaulis* (Mesa also) Blazing star, Stickleaf	No	No	
Mentzelia laevicaulis* Blazing star	No	No	
Mentzelia multiflora* Blazing star	No	Yes	Medicine, possible food, substitute for tobacco
Mentzelia pumila* Stickleaf	No	Yes	Medicine, possible food, substitute for tobacco, magic
Mentzelia veatchiana* Stickleaf	No	No	
Mimilus eastwoodiae* Red monkey flower	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Mirabilis multiforma Wild four o'clock	No	Yes	Magic
Mirabilis oxybaphoides Four o'clock	No	Yes	Possible magic
Monarda mentaefolia Beebalm	No	Yes	Pot herbs, occasionally cultivated (food), food flavoring, medicine, magic
Myriophyllum sp. Water milfoil	Yes	No	
Navarretia setosissima* Navarretia	No	No	
Nama demissum	No	No	
Nama hispida	No	Yes	? (data inconsistent)
Nicotiana attenuata Wild tobacco	No	Yes	Ceremonially smoked, smoked daily, clan name, gifts, medicine
Nicotiana trigonophylla* Wild tobacco	No	Yes	Ceremonially smoked
Nolina sp. Beargrass	No	Yes	Valuable fiber plant, possible food
Nuttallia multiflora	No	Yes	Magic
Odostemon fremontii Holly grape	No	Yes	Tools, medicine, arrows, spindle shafts, battens, associated with southeast direction
Odostemon repens Oregon grape	No	Yes	None
Oenothera sp. Evening primrose	Yes	Yes	Ceremonial implements, magic, medicine
Oenothera albicaulis* Evening primrose	No	Yes	Ceremonial implements, magic
Oenothera caespitosa*(Mesa also) Tufted evening primrose	No	No	
Oenothera cavernae* Evening primrose	No	No	
Oenothera decoritans* Evening primrose	No	No	
Oenothera hookeri* Yellow evening primrose	No	No	
Oenothera longissima* Evening primrose	No	No	
Oenothera multijuga* Evening primrose	No	No	
Oenothera pallida* White evening primrose	No	Yes	Ceremonially associated with northeast direction
Oenothera runcinata* Evening primrose	No	Yes	Ceremonially associated with northeast direction
Oenothera scapoidea* Evening primrose	No	No	
Oenothera strigosa* Evening primrose	No	No	
Oenothera triloba Evening primrose	No	Yes	Medicine
Onosmodium thurberi	No	Yes	Mixed with tobacco, magic, smoked medicinally
Oreocarya multicaulis	No	Yes	None
Orobanche fasciculata* Clustered broomrape	No	No	
Orobanche multiflora* Broomrape	No	No	
Osmorhiza obtusa Sweetroot	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Oxytenia spp.	Yes	Yes	Possible food
Oxytenia acerosa*	No	No	
Composite			
Oxytropis lambertii sericea	No	Yes	None
Locoweed			
Oxytropis oreophila*	No	No	
Locoweed			
Panicularia nervata	No	Yes	None
Manna grass			
Parosela lasianthera	No	Yes	Food
Parosela terminalis	No	Yes	Possible food
Pectis angustifolia	No	Yes	Food, food coloring, dye
Fetid-marigold			
Pectis papposa	No	Yes	Medicine, food, perfume
Fetid-marigold			
Pectocarya recurvata*	No	No	
Penstemon spp.*	No	Yes	
Beardtongue			
Penstemon ambiguus*	No	Yes	Personal adornment, its appearance marks the end of watermelon planting time
Beardtongue			
Penstemon barbatus	No	Yes	None
Scarlet bugler			
Penstemon bridgesii (Mesa only)	No	No	
Beardtongue			
Penstemon caudatus	No	Yes	None
Beardtongue			
Penstemon crandallii*	No	No	
Beardtongue			
Penstemon eatoni*	No	No	
Firecracker			
Penstemon pachyphyllus*	No	No	
Beardtongue			
Penstamon palmeri*	No	No	
Beardtongue			
Penstamon torreyi	No	Yes	Magic, medicine
Beardtongue			
Penstamon utahensis* (Mesa also)	No	No	
Beardtongue			
Petalostemon candidum*	No	No	
Prairie clover			
Petalostemon flavescens*	No	No	
Prairie clover			
Petalostemon oligophyllum*	No	Yes	Medicine
Prairie clover			
Phacelia corrugata	No	No	
Phacelia			
Phacelia crenulata*	No	No	
Phacelia			
Phacelia demissa*	No	No	
Phacelia			
Phacelia integrifolia	No	Yes	None
Phacelia			
Phacelia ivesiana*	No	No	
Phacelia			
Phacelia linearis*	No	No	
Phacelia			
Phacelia pulchella*	No	No	
Phaseolus acutifolius latifolius	No	Yes	Food
Tepary			

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Phaseolus lunatus Lima bean	No	Yes	Important in Powamu Ceremony
Phaseolus multiflorus Scarlet runner bean	No	Yes	Occasionally raised (food)
Phaseolus vulgaris** Stringbean	Yes	Yes	Food, ceremonial symbol
Phaseolus vulgaris** Kidney bean	Yes	Yes	Dye, medicine, food
Phlox austromontana (Mesa only) Phlox	No	No	
Phlox hoodii Phlox	No	No	
Phlox woodhousei (Mesa only) Phlox	No	No	
Phragmites communis* Common reed, Reed cane	Yes	Yes	Arrow mainshafts, basketry
Physalis fendleri (Mesa only) Ground cherry	No	Yes	Food
Physalis longifolia Ground cherry	No	Yes	Food
Physalis neomexicana Ground tomato, ground cherry	No	Yes	Medicine
Physaria didymocarpa* Bladder pod	No	No	
Plantago argyraea Plantain	No	No	
Plantago major* English plantain	No	No	
Plantago purshii* Plantain	Yes	Yes	Possible medicine
Polanisia trachysperma Clammy weed	No	Yes	Ceremonially whipping
Polemonium delicatum Jacobs ladder, Skunkleaf	No	No	
Poliominthe incana* Mint	No	Yes	Food, food flavoring
Polygala acanthoclada* Polygala	No	No	
Polygonum aquaticum* Water smartweed	No	No	
Polygonum lapathifolium* Knotweed, Smartweed	No	Yes	Medicine
Polypogon lutosus Beardgrass	No	Yes	None
Polypogonum aviculare Knotweed	No	Yes	None
Portulaca oleracea Purslane	No	Yes	Food
Portulaca retusa	No	Yes	Food
Primula incana* Primrose	No	No	
Primula specuicola* Primrose	No	No	
Psilostrophe sparsiflora	No	No	
Psilostrophe tagetinae	No	Yes	Dye, paint for ceremonial masks, body paint
Psoralea juncea* Scurf-pea	No	No	

**Note: scientific nomenclature does not recognize the distinction between string beans and kidney beans.

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Psoralea lanceolata* Scurf-pea	No	No	
Psoralea tenuiflora* Scurf-pea	No	Yes	Medicine
Ptiloria spp.* Ptiloria	No	Yes	
Ptiloria exigua* Wire lettuce	No	Yes	Medicine
Ptiloria pauciflora* Wire lettuce	No	Yes	Medicine
Ptiloria tenuifolia* Wire lettuce, Flowering straw	No	Yes	Medicine
Puccinellia airoides* Nuttall alkali grass	No	No	
Quamoclidion multiflorum Four o'clock	No	Yes	Anchor for string of bird traps, medicine to induce visions
Ranunculus cymbalaria* Trailing or creeping buttercup	Yes	Yes	Medicine, bird snares
Ranunculus sceleratus* Cursed crowfoot	No	No	
Raphanus sativus Radish	No	Yes	Rarely cultivated (food)
Ratibida columnaris Coneflower	No	Yes	Medicine
Reboulia hemisphaeria*	No	No	
Reverchonia avenaria	No	Yes	Food preparation, medicine
Ribes inebrians Wild currant	No	Yes	Food, arrows
Rorippa nasturtium-aquaticum* Watercress	No	No	
Rorippa sinuata	No	Yes	Medicine
Rudbeckia flava Black-eyed susan	No	Yes	None
Rumex hymens cephalus* Wild rhubarb	No	Yes	Dye (imp. source), medicine
Rumex mexicanus Dock	No	Yes	Medicine, magic
Rumex venosus* Dock	No	No	
Salsola kali* Russian thistle	No	No	
Scirpus sp.* Bulrush	Yes	Yes	
Scirpus acutus* Tule, Bulrush	No	No	
Scirpus americanus American rush	Yes	No	
Scirpus lacustris Bulrush	Yes	Yes	Ceremonially associated with water
Scirpus paludosus* Bulrush	No	No	
Scirpus validus Mat bulrush	Yes	No	Basketry
Senecio spp.* Senecio	No	Yes	
Senecio longilobus Groundsel	No	Yes	Medicine
Senecio macdougalii	No	Yes	None
Senecio multicapitatus Groundsel	No	Yes	Medicine, brushes

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Senecio spartiodes Groundsel	No	No	
Sidalcea neomexicana* Prairie mallow	No	No	
Silene antirrhina* Sleepy catchfly	No	No	
Sisymbrium altissimum* Tumble mustard	No	No	
Sisymbrium linifolium* Lava cress	No	No	
Smilacina racemosa* False solomon seal	No	No	
Smilacina stellata* False solomon seal	No	No	
Solanum elaeagnifolium Bull nettle	No	Yes	Medicine, food
Solanum fendleri Native potato	No	Yes	Food
Solanum jamesii Wild potato	No	Yes	Food
Solanum rostratum	No	Yes	Medicine
Solanum triflorum Wild tomato	No	Yes	Medicine
Solanum tuberosum Irish potato	No	Yes	Occasionally cultivated (food)
Solidago altissima* Golden rod	No	No	
Solidago canadensis Golden rod	No	Yes	Medicine
Solidago missouriensis Golden rod	No	Yes	Possible food (not indigenous)
Solidago petradoria* Golden rod	No	Yes	Prayer-sticks, medicine, charm remedy, preparation of corn food
Solidago sparsiflora Golden rod	No	Yes	None
Sonchus asper* Sowthistle	No	No	
Sonchus oleraceus Sowthistle	No	No	
Sophora stenophylla* Scurf-pea	No	No	
Sphaeralcea spp. Globe mallow	Yes	Yes	Medicine
Sphaeralcea coccinea* Globe mallow	No	No	
Sphaeralcea grossulariaefolia* Globe mallow	No	No	
Sphaeralcea leptophylla* Narrow-leaf globe mallow	No	No	
Sphaeralcea lobata Globe mallow, Niggerweed	No	Yes	Medicine, face paint, ceremonial beverage, magic
Sphaeralcea parvifolia* Globe mallow	No	No	
Sphaeralcea rusbyi*	No	No	
Sphaerostigma decorticans* Evening primrose	No	No	
Stanleya albescans	No	Yes	Food
Stanleya pinnata* Prince's plume	No	Yes	Food, medicine
Streptanthella longirostris	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Streptanthus cordatus*	No	No	
Streptanthus longirostris* Streptanthus	No	No	
Swertia utahensis* Elkweed	No	No	
Taraxacum taraxacum Common dandelion	No	Yes	Food, dressing for fractures, medicine
Targionia hypophylla*	No	No	
Tetraneuris scaposa Thistle	No	Yes	Medicine
Thalesia fasciculata Cancer root	No	Yes	Medicine, ceremonial beverage
Thalictrum fendleri Meadow rue	No	Yes	None
Thelesperma gracile	No	Yes	Beverage, basketry, dye for textiles
Thelesperma subnudum Navajo tea	No	Yes	Beverage, basketry, textile dye
Thelesperma trifidum	No	Yes	Beverage
Thelypodium integrifolium* Thelypodium	No	No	
Thelypodium wrightii	No	Yes	Pottery paint, food, magic
Thermopsis sp.	Yes	No	
Tidestromia lanuginosa Amaranth	No	No	
Tissa sparsiflora* Sandsperry	No	No	
Townsendia arizonica	No	Yes	Possible medicine
Townsendia eximia	No	Yes	None
Townsendia incana* Townsendia	No	No	
Tradescantia sp. Spider wort	No	Yes	Possible food
Tradescantia occidentalis* Spider wort	No	No	
Tribulus terrestris Caltrop	No	Yes	None
Tripterocalyx micranthus* Sand verbena	No	No	
Tripterocalyx pedunculatus* Sand four o'clock	No	No	
Tripterocalyx wootonii* Four o'clock	No	Yes	Medicine
Typha spp. Cattail	Yes	Yes	
Typha angustifolia* Narrowleaf cattail	No	Yes	Chewed as gum, ceremonially associated with water
Typha domingensis* Narrowleaf cattail	Yes	No	
Typha latifolia* Wideleaf cattail	No	Yes	None
Urtica sp.* Nettle	No	No	
Verbascum thapsus* Common mullen	No	Yes	Medicinally smoked
Verbesina encelioides Crownbeard	No	Yes	Medicine
Veronica americana* Speedwell	No	No	
Vicia sp.* Vetch	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
HERBS (cont.)			
Villanova dissecta Thistle	No	Yes	Medicine
Viola canadensis Violet	No	Yes	None
Viola nephrophylla Violet	No	No	
Wedelia glabra Cockerell	No	Yes	Medicine
Wedelia incarnata	No	Yes	To whip flies, to catch flies with sticky leaves and stems
Wislizenia melilotoides	No	Yes	Food, prayer-sticks, preparation of pottery paint
Wyethia scabra* Mule ears	No	Yes	Medicine
Xanthium commune Cocklebur	No	Yes	Medicine, food
Xanthium pennsylvanicum Cocklebur	No	No	
Xanthium saccharatum* Cocklebur	Yes	Yes	None
Zygadenas elegans* Death camus	No	No	

LICHENS

Lichens, in general, are reported to have been applied to teeth and gums to cure toothaches.

Acarospora arenacea*	No	No
Acarospora chrysops*	No	No
Acarospora strigata*	No	No
Biatorella simplex*	No	No
Caloplaca elegans*	No	No
Candelariella vitellina*	No	No
Collema furvum* Black jelly furvum	No	No
Collema granosum*	No	No
Dermon spp.*	No	No
Endocarpon wilmsoides*	No	No
Grimmia orbicularis* Black rock moss	No	No
Lecanora frustulosa*	No	No
Lecanora lentigera*	No	No
Lecanora melanapsis*	No	No
Lecanora muralis*	No	No
Lecanora utahensis*	No	No
Lecidea amylacea*	No	No
Lecidea auriculata*	No	No
Lecidea cyanea*	No	No
Lecidea lithophila*	No	No
Lecidea paupercula*	No	No
Lecidea vulgata*	No	No
Parmelia consersa*	No	No
Parmelia sorediata*	No	No
Psora crenata*	No	No
Psora decipiens*	No	No
Psora luridella*	No	No
Toninia caeruleonigricans*	No	No

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
MOSSES			

Mosses, in general, are reported to have been ground and applied to the lips as a remedy for cold sores and to tooth cavities to stop the pain.

Amblystegium americanum*	No	No	
Amblystegium compactum*	No	No	
Amblystegium varium*	No	No	
Barbula bescherellei*	No	No	
Barbula cruegeri*	No	No	
Barbula fallax*	No	No	
Barbula vinealis*	No	No	
Barleula*	No	No	
Bryum spp.*	No	No	
Bryum capillare*	No	No	
Bryum gemmiparum*	No	No	
Bryum pendulum*	No	No	
Bryum pseudotriquetrum*	No	No	
Bryum turbinatum*	No	No	
Campylium chrysophylla*	No	No	
Clevia hyalina* Liverwort	No	No	
Cratineuron filicinum*	No	No	
Crossidium aberrans*	No	No	
Crossidium desertorum*	No	No	
Crossidium griseum*	No	No	
Desmatodon convolutus*	No	No	
Desmatodon obtusifolius*	No	No	
Didymodon tophaceus*	No	No	
Didymodon trifarius*	No	No	
Encalypta vulgaris*	No	No	
Eucladium verticillatum*	No	No	
Fissidens grandifrons* Liverwort	No	No	
Fissidens obtusifolius* Liverwort	No	No	
Fossombronia fovelata*	No	No	
Funaria hygrometrica*	No	No	
Funaria microstoma*	No	No	
Funaria muhlenbergii*	No	No	
Grimmia anodon*	No	No	
Grimmia orbicularis*	No	No	
Grimmia plagiopodia*	No	No	
Grimmia pulvinata*	No	No	
Grimmia rani*	No	No	
Grimmia rani austen*	No	No	
Gymnostomum aeruginosum*	No	No	
Gymnostomum recurvirostrum*	No	No	
Husnotiella sp.*	No	No	
Hygroamblystegium irriguum*	No	No	
Hygroamblystegium marianopoitana*	No	No	
Hygrohypnum luridum	No	No	
Hygrohypnum palustre*	No	No	
Hymenostylium recurvirostrum	No	No	
Leskea tactorum*	No	No	
Mannia frangrans* Liverwort	No	No	
Marchantia polymorpha* Common liverwort	No	No	
Philonotis marchica*	No	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
MOSSES (cont.)			
Platyhypnidium riparioides*	No	No	
Pottia heimii*	No	No	
Reboulia hemisphaerica*	No	No	
Liverwort			
Riccia frostii*	No	No	
Liverwort			
Targionia hypophylla*	No	No	
Liverwort			
Tortula brevipes*	No	No	
Tortula inermis*	No	No	
Tortula mucronifolia*	No	No	
Tortula ruralis*	No	No	
Weisia ligulaefolia*	No	No	
Weisia perligulata*	No	No	
SHRUBS			
Acamtopappus sphaerocephalus*	No	No	
Golden head			
Acer glabrum*	No	No	
Mountain maple			
Amelanchier alnifolia	Yes	No	
Service berry			
Amelanchier pallida	No	Yes	Bows and arrows, possible food
Shadblow			
Amelanchier utahensis*(Mesa also)	Yes	Yes	Shovel handle
Utah service berry			
Aplopappus scopularum*	No	No	
Arctostaphylos pungens (Mesa only)	No	No	
Manzita			
Artemisia spp.*	Yes	Yes	Food, medicine
Artemisia bigelovii (Mesa only)	No	No	
Sagebrush			
Artemisia dracunculoides*	No	Yes	Food
False tarragon, Wormwood, Aromatic sage			
Artemisia filifolia*	No	Yes	Medicine, associated with south-east direction
Sand sagebrush, Silversage			
Artemisia frigida*	No	Yes	Ceremonial decoration, magic, prayer-stick, medicine
Mountain sagebrush			
Artemisia ludoviciana*(Mesa also)	No	No	
Sagebrush, Western mugwort			
Artemisia spinescens*	No	No	
Bud-sage			
Artemisia tridentata*(Mesa also)	Yes	Yes	Fire fuel, medicine, cordage
Big sagebrush, Rocky Mnt. sage			
Atriplex spp.	Yes	Yes	Possible food, snare sticks
Atriplex argentea	No	Yes	Preparation of corn dishes, kiva fuel, prayer-sticks
Saltbush			
Atriplex canescens*	Yes	Yes	Preparation of corn dishes, kiva fuel, prayer-sticks, medicine, possible comb, snares
Four-winged saltbush			
Atriplex confertifolia*	Yes	Yes	Preparation of corn dishes, kiva fuel, prayer-stick, medicine
Shadscale			
Atriplex cuneata*	No	No	
Cuneate saltbush			
Atriplex garrettii*	No	No	
Garrett saltbush			
Atriplex hastata*	No	No	
Hastate saltbush			
Atriplex jonesii	No	No	
Saltbush			

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
SHRUBS (cont.)			
Atriplex lentiformis* Quail brush	No	No	
Atriplex obovata Saltbush	No	Yes	Preparation of corn dishes, kiva fuel, prayer-sticks
Atriplex powellii Saltbush	No	Yes	Preparation of corn dishes, kiva fuel, prayer-sticks
Atriplex saccaria* Saltbush	No	Yes	Preparation of corn dishes, kiva fuel, prayer-sticks
Baccharis emoryi* Baccharis	Yes	No	
Baccharis glutinosa* Baccharis, Water-wally, Waterwillow	No	No	
Berberis fremontii* Fremont barberry	Yes	Yes	Clan name, skin coloring
Cercocarpus sp.* Desert mahogany	Yes	Yes	
Cercocarpus montanus (Mesa only) Mountain mahogany	Yes	Yes	Leather dye, batons and combs used in weaving, rabbit sticks, medicine
Chrysothamnus spp.* Rabbitbrush	Yes	Yes	Kiva fuel, windbreaks, arrows, wicker plaques, dye, ceremonial implements, weaving, name of clan, associated with northwest and north-east directions
Chrysothamnus bigelovii Rabbitbrush	No	Yes	Dye, basketry, windbreaks, shelters, door to estufa, magic
Chrysothamnus depressus* Rabbitbrush	No	Yes	Prayer-sticks, medicine
Chrysothamnus greenei Rabbitbrush	No	Yes	Prayer-sticks, medicine
Chrysothamnus nauseosus* Big rabbitbrush	Yes	No	
Chrysothamnus stenophyllis Rabbitbrush	No	Yes	Prayer-sticks, medicine
Chrysothamnus viscidiflorus* Varnish-leaved rabbitbrush	Yes	No	
Chrysothamnus viscidiflorus var. fortifolius* Twisted-leaf rabbitbrush	No	No	
Coleogyne ramosissimum*(Mesa also) Blackbrush	Yes	No	
Cowania mexicana (Mesa only) Cliff rose	No	No	
Cowania stansburiana* Cliff rose	Yes	Yes	Arrows, cradleboard padding, medicine, associated with southeast direction, possible weaving
Dalea fremontii* Fremont indigo bush, Pea bush	No	No	
Dalea polyadenia* Indigo-bush	No	No	
Dalea thompsoni Thompson indigo bush	No	No	
Dalea whitingii Indigo bush, Pea bush	No	No	
Echinocereus spp.* Hedgehog cactus	Yes	Yes	Food
Echinocereus aggregatus* Hedgehog cactus	No	No	
Echinocereus engelmanni* Hedgehog cactus	No	No	
Echinocereus fendleri Fendler hedgehog cactus	No	Yes	Food

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
SHRUBS (cont.)			
Edwinia americana Wax flower	No	Yes	None
Ephedra sp. * Mormon tea	Yes	Yes	
Ephedra antisyphilitica Joint-fir	No	Yes	Medicine
Ephedra nevadensis* Teamster's tea, Nevada joint-fir	No	Yes	Medicine, food
Ephedra torreyana* Torrey joint-fir, Mormon tea	Yes	Yes	Medicine
Ephedra viridis* (Mesa also) Green joint-fir, Mormon tea	Yes	Yes	Medicine
Eurotia lanata* Winter fat	No	Yes	Medicine
Fallugia paradoxa* Apache plume	Yes	Yes	Arrows, possible hair tonic, ceremonial equipment, brooms, magic
Forestiera neomexicana* Adelia, Ironwood	No	Yes	Digging sticks
Gossypium spp. Cotton	Yes	Yes	Cordage, weaving, wrapping, clothing, tying
Gossypium hopi Hopi cotton	Yes	Yes	Woven articles for ritual, ceremony, and every-day; medicine-magic, warp, prayer feathers, shinny-ball stuffing
Gossypium hirsutum Cotton	No	Yes	Weaving, magic
Graya spinosa*(Mesa also) Hop sage	No	No	
Laphamia palmerii* Laphamia	No	No	
Laphamia stansburri* Laphamia	No	No	
Lycium andersoni* Water jacket, Wolf berry	No	No	
Lycium pallidum (Mesa only) Pale lycium	No	Yes	Food, entire shrub used in Niman Kachina dance, magic
Lycium torreyi* Squawthorn, Wolf berry, Desert thorn	No	No	
Lycopersicum esculentum vulgare Tomato	No	Yes	Occasional cultivation (food)
Maclura aurantiaca (Not indigenous) Osage orange, Bois d'arc	No	Yes	Bows
Mamillaira spp. * Ball cactus, Fishhook cactus	No	Yes	Food
Opuntia sp. * (Mesa also) Prickly pear	Yes	Yes	Food
Opuntia arborescens Cane cactus	No	Yes	Ceremonial whipping, food
Opuntia camanchica Prickly pear	No	Yes	Food
Opuntia compressa (Mesa only) Prickly pear	No	Yes	Medicine
Opuntia hystricina* Cactus, Yellow prickly pear	No	Yes	Food
Opuntia polyacantha*	No	Yes	Food
Opuntia rhodantha* Prickly pear	Yes	No	
Opuntia whipplei Cane cactus, Cholla cactus	No	Yes	Food, medicine, name of clan
Pachistima myrsinites Boxleaf	No	Yes	None

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
SHRUBS (cont.)			
Parryella filifoilia*	No	Yes	Basketry, pack hooks, food coloring, snow brooms, woven kachina masks, medicine, weaving
Pediocactus simpsoni*	No	No	
Peraphyllum ramosissimum*	Yes	No	
Squaw apple			
Petrophytum caespitosum*	No	No	
Rock mat, cactus			
Phorandendron sp. (Mesa only)	No	Yes	Beverage, medicine
Phorandendron juniperum (Mesa only)	No	Yes	Medicine
Mistletoe, One-seed juniper			
Pluchea sericea*	Yes	No	
Arrowweed, Marsh fleabane			
Prosopsis glandulosa (Not indigenous)	No	Yes	Medicine
Mesquite			
Ptelea crenulata	No	Yes	None
Hoptree			
Ptelea tomentosa	No	Yes	None
Hop trefoil			
Purshia tridentata*	No	No	
Antelope brush, bitterbrush			
Rhamnus betulaefolia*	No	No	
Birchleaf buckthorn			
Rhus sp.	Yes	Yes	Snare sticks, corn cob skewer, basketry
Squawbush			
Rhus cismontana	No	Yes	Smoking
Sumac			
Rhus glabra	No	No	
Sumac			
Rhus mexicanus	No	Yes	Ceremonial powder
Dock			
Rhus radicans*	No	No	
Poison ivy			
Rhus toxicodendron*	No	No	
Poison sumac, Poison ivy			
Rhus trilobata*	Yes	Yes	Plume offerings, food, bows, arrows, beverage, preparation of dyes and paints, basketry, construction of cradles, medicine, perfume, kiva fuel, ceremonial equipment, prayer-sticks, weaving implements, knife handle, possible awl or arrow tip
Tri-lobed squawbush, Skunkbush sumac			
Rhus utahensis*	No	No	
Squawbush			
Ribes sp.	Yes	Yes	None
Gooseberry			
Ribes cereum	Yes	No	
Wax current			
Robinia neomexicana	No	Yes	Bows
Locust			
Rosa sp.	No	Yes	Perfume, medicine
Wild rose, Garden rose			
Rosa arizonica*	No	Yes	Occasional food
Wild rose			
Rosa nutkana*	No	No	
Wild rose			
Salsola kali*	No	No	
Russian thistle			

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
SHRUBS (cont.)			
Salsola pestifer Russian thistle, Tumbleweed	No	Yes	None
Salvia carnosa Sage	No	Yes	Medicine (in form of beverage, tobacco and smoke)
Sambucus racemosa Elder	No	No	
Sarcobatus vermiculatus* Greasewood	Yes	Yes	Rabbit sticks, planting sticks, stirring rods, musical rasps, lease rods, clothes hooks in houses, arrows, general construction, chief kiva fuel, name of clan
Sclerocactus parviflorus* Cactus	No	No	
Sclerocactus whipplei* Cactus	No	No	
Sericotheca dumosa	No	Yes	Food
Shepherdia rotundifolia*(Mesa also) Buffalo berry	Yes	No	
Streptanthus cordatus (Mesa only) Twist flower	No	No	
Suaeda depressa Seepweed	No	No	
Suaeda occidentalis* Seepweed	No	No	
Suaeda intermedia* Tall inkweed	No	No	
Symphoricarpos sp. Snowberry	Yes	No	
Symphoricarpos longiflorus* Snowberry	No	No	
Tetradymia canescens inermis Horsebush	No	Yes	Medicine
Yucca sp. (Mesa also) Yucca	Yes	Yes	Cordage, basketry, woven mats, sandals, thread, possible food,netting
Yucca angustissima*(Mesa also) Narrow-leaved yucca	Yes	Yes	Soap, ceremonial purification, medicine, basketry, varnish, paint brushes, ceremonial whips, medicine, cordage, food, sandals
Yucca baccata Yucca, Spanish bayonet	Yes	Yes	Ceremonial adornment, food, weaving, basketry, ceremonial whips, plume offerings, soap, ritual washing, ritual emetic, fishing net, paint brushes, preparation of paint, bow strings, sandals, tying material
Yucca glauca Soapweed	No	Yes	Soap, food, paint brushes, tying material, bandoleers and neckties worn by clowns, whips used in initiation, weaving
Yucca harrimaniae* Harriman yucca	Yes	Yes	Basketry, weaving
Yucca navajoa* Yucca	No	No	
TREES			
Abies concolor White fir, Balsam fir	Yes	Yes	Ritually smoked, pipestems, medicine, clan name, magic
Acer sp. Boxelder, Maple	Yes	No	Possible food

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
TREES (cont.)			
Acer glabrum Boxelder	No	No	
Acer grandidentatum (Mesa only) Big-toothed maple	No	No	
Acer interius* Boxelder	Yes	No	
Acer negundo* Western boxelder	Yes	No	Ball (wooden)
Alnus sp. Alder	Yes	Yes	
Alnus tenuifolia Alder	No	Yes	Dye
Betula fontinalis Waterbirch, Streamside birch	Yes	Yes	Handle (knife)
Cedrus sp. Cedar	Yes	No	
Celtis sp.* Oak	Yes	Yes	
Celtis douglasii* Hackberry	No	No	
Celtis reticulata* Hackberry	Yes	Yes	Handles for axes and hoes, food
Cercis canadensis* Red bud	Yes	No	
Cercis occidentalis* Red bud	No	No	
Cornus stolonifera riparia Dogwood	No	Yes	Clan name, myth, plume offering
Fraxinus anomala*(Mesa also) Single-leaf ash	Yes	No	
Fraxinus coriacea Ash	Yes	No	
Juniperus spp. Juniper	Yes	Yes	Firewood, purifying and protective agent, general construction, rakes, agricultural implements, tinder, medicine, paint, preparation of corn dishes, food, personal adornment, ceremonial implements, clan and phratry names, cordage, weaving, basketry, chinking material, bed matting
Juniperus monosperma*(Mesa also) Juniper	No	Yes	Firewood, tinder, torches, chinks for houses, bows, ceremonial bows, medicine-magic, medicine, food, ceremonial implements and costumes
Juniperus osteosperma* Little Utah juniper	Yes	Yes	Mats, pads (i.e., baby carrier padding)
Juniperus utahensis	Yes	No	Basketry, cordage, sandals, twining
Juniperus scopulorum* Red juniper	Yes	Yes	None
Malus sylvestris Apple	No	Yes	Food (cultivated)
Negundo interius Box elder	No	Yes	Pipestems
Picea sp. Spruce	Yes	No	
Picea engelmanni Engelmann spruce	No	Yes	None
Pinus sp.	Yes	Yes	Food
Pinus brachyptera Rock pine, Western yellow pine	No	Yes	Attached to prayer feathers

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
TREES (cont.)			
Pinus edulis*(Mesa also) Pinyon pine	Yes	Yes	Food, decoration, repairing pottery and waterproofing (gum), medicine, protective and purifying agent, symbol of phratry, prep. of dyes, magic
Pinus flexilis White pine	No	Yes	None
Pinus ponderosa Ponderosa pine	Yes	Yes	General construction, ceremonial implements, prayer-sticks
Populus spp.* (Mesa also) Cottonwood	Yes	Yes	Construction of houses, kachina dolls, gaming cups, boxes for storage of ceremonial equipment, tinder, drums, chewing gum (berries), prayer-sticks, ceremonial implements, food, weaving implements, fire-making apparati, fire wood
Populus acuminata Rydberg's cottonwood	No	Yes	None
Populus angustifolia Narrow-leaf cottonwood, Mountain cottonwood	No	Yes	Preparation of offerings
Populus arizonica* Arizona poplar	No	No	
Populus aurea Rocky Mountain aspen	No	Yes	Ritually smoked, associated with northeast direction
Populus fremontii* Fremont cottonwood	Yes	Yes	Possible cist roof construction, tablets, gaming pieces, possible lap board, knife handle, shovel blade
Populus tremuloides Aspen	No	Yes	Medicine, clan name
Populus wislizeni Valley cottonwood	No	Yes	Many artifacts esp. cottonwood drum, prayer-sticks, clan name
Prunus sp. Cherry	No	Yes	Food (occasionally cultivated)
Prunus amygdalus Almond	No	Yes	Food, (occasionally cultivated)
Prunus armeniaca Apricot	No	Yes	Cultivated food
Prunus melanocarpa* Black chokeberry	No	Yes	Bows, food
Prunus persica Peach	Yes	Yes	Cultivated food, weaving batons
Pseudotsuga sp. Douglas fir	Yes	Yes	
Pseudotsuga douglasii Douglas fir	Yes	Yes	Ceremonial subject important in rain ritual
Pseudotsuga mucronata Douglas spruce	No	Yes	Branches used in all Tewa dances and most Hano dances, trade, myth (origin)
Pyrus communis Pear	No	Yes	Cultivated food
Quercus spp.* Oak	Yes (acorns)	Yes	Rabbit sticks, arrows, bows, digging sticks, weft battons, axe handles, utensils, name of clan, associated with northwest direction, food
Quercus gambelii*(Mesa also) Gambel oak	Yes	Yes	
Quercus turbinella* Live oak	Yes	No	

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
TREES (cont.)			
Quercus turbinella X Quercus gambelii* Hybrid oak	No	No	
Quercus undulata Evergreen oak, Utah oak, Wavy-leaved oak	Yes	Yes	Food, digging sticks, bows, war clubs, rabbit sticks, embroidery stretchers, utensils, clan name
Quercus utahensis*	Yes	No	
Salix spp.* Willow	Yes	Yes	Rabbit sticks, arrows, bows, digging sticks, clubs, weft battons, axe handles, utensils, name of clan, ceremonial implements, roofing, prayer-sticks, possible cist roof construction, corn cob skewers, basketry, general construction
Salix argophylla Willow	No	Yes	None
Salix cordata Willow	No	Yes	None
Salix exigua* Sandbar willow	Yes	Yes	Basketry
Salix gooddingii* Goodding willow, Western black willow	Yes	Yes	Possible bow, knife handle
Salix irrorata Willow	No	Yes	Body paint, food, basketry, clan name, possible bowls or cups
Salix laevigata* Willow	No	No	
Salix lutea* White willow	No	No	
Tamarix gallica French tamarix	No	Yes	None
Tamarix pentandra* Tamarix, Salt cedar	No	No	
VINES			
Citrullus vulgaris Watermelon	No	Yes	Food, oil
Clematis liqusticifolia* Western virgin-bower	No	Yes	None
Cucumis melo Muskmelon, Cantaloupe, Melon	No	Yes	Food, ceremonial body paint
Cucumis sativus Cucumber	No	Yes	Occasionally raised (food)
Cucurbita spp.	Yes	Yes	Food, storage vessels, scrapers, burial (seeds)
Cucurbita foetidissima (Mesa also) Wild gourd, Wild squash, Coyote melon	Yes	Yes	Utensils, medicine, possible food
Cucurbita maxima Turban squash	No	Yes	Food
Cucurbita mixta Cushaw	Yes	No	Storage vessel
Cucurbita moschata Squash, pumpkin	No	Yes	Cultivated ceremonial food, food, sounding board for musical rasps, carried container, oil
Cucurbita pepo Squash	Yes	Yes	Medicine, food, rattles, ceremonial dress, containers for precious articles
Humulus lupilus neomexicanus Hop	No	Yes	None

Genera and Species	Archeologically Recovered	Ethnohistorically Reported	Use
VINES (cont.)			
Lagenaria siceraria* Bottle gourd	Yes	No	
Parthenocissus inserta* Woodbine, Ticket creeper	No	No	
Parthenocissus vitacea* Thicket creeper	No	No	
Vitis sp. Grapes	No	Yes	Frequent cultivation (food)

Part 3. Species Other Than Floral Reported From Glen Canyon and Represented in Archeological Collections, Arranged Alphabetically by Genera

Name	Archeologically Recovered	Material Recovered
Accipiter cooperii Cooper's hawk	Yes	Feathers
Accipiter gentilis Goshawk	No	
Accipiter striatus Sharp-shinned hawk	No	
Actitus macularia Spotted sandpiper	No	
Aechmophorus occidentalis Western grebe	No	
Aegolius acadicus Saw-whet owl	No	
Aeronautes saxatalis White-throated swift	No	
Agelaius phoeniceus Redwinged blackbird	Yes	Two skins tied together inside dog-skin bag (Magic)
Alectoris graeca Chukar	No	
Amblystoma tigrinum Tiger salamander	No	
Amphispiza belli Sage sparrow	No	
Amphispiza bilineata Black-throated sparrow	No	
Anas acuta Pintail	No	
Anas carolinensis Green-winged teal	Yes	Feathers
Anas cyanoptera Cinnamon teal	No	
Anas discors Blue-winged teal	No	
Anas platyrhynchus Mallard	No	
Anas strepera Gadwall	No	
Anthus spinoletta Water pipit	No	
Antilocarpa sp. Antelope	Yes	Ornament (toe bone), possible* moccasin sole (worked hide)
Antilocarpa americana** Antelope	Yes	Bone
Aphelocoma coerulescens Scrub jay	No	
Aquila chrysaetos Golden eagle	Yes	Hollow bone tube (worked), possible bone
Archilochus alexandri Black-chinned humming-bird	No	
Ardea herodias Great blue heron	No	
Asio otus Long-eared owl	No	

* The entry "possible" refers to the possibility of the remains being of that species.
** The entry of an asterisk following a species signifies that that species has been reported from the mesas only.

Name	Archeologically Recovered	Materials Recovered
Aythya affinus Lesser scaup	No	
Aythya americana Redhead	No	
Aythya valisineria Canvas back	No	
Bassariscus astutus Ringtail	Yes	Bone
Bison bison Bison	Yes	Possible bone
Bison taylori* Bison	Yes	Possible bone
Bombycilla cedrorum Cedar waxwing	No	
Botaurus lentiginosus American bittern	No	
Branta canadensis Canada goose	No	
Bubo virginiatus Great horned owl	Yes	Feathers, bone
Bucephala albeola Bufflehead	No	
Bucephala clangula Common golden-eye	No	
Bufo punctatus Red spotted toad, Desert toad	No	
Bufo woodhousei Rocky Mountain toad	No	
Buteo jamaicensis Red-tailed hawk	Yes	Feathers
Buteo regalis Ferruginous hawk	No	
Buteo swainsoni Swainson's hawk	No	
Calypte costae Costa's hummingbird	No	
Canis sp. * Gray wolf	Yes	Bone
Canis familiaris* Dog	Yes	Bone, possible fecal matter, possible skin bag, possible hair cordage
Canis latrans Coyote	Yes	Possible fecal matter, bone
Capella gallinago Common snipe	No	
Carpodacus cassinii Cassin's finch	No	
Carpodacus mexicanus House finch	No	
Castor sp. * Beaver	Yes	Bones; punch, rubbing, flaking, or weaving tool
Castor canadensis Beaver	Yes	Bone
Cathartes aura Turkey vulture	Yes	Feather
Catherpes mexicanus Canon wren	No	
Catoptrophorus semipalmatus Willet	No	
Certhia familiaris Brown creeper	No	

Name	Archeologically Recovered	Material Recovered
Charadrius vociferus Killdeer	No	
Chen hyperborea Snow goose	No	
Chlidonias niger Black tern	No	
Chlorura chlorura Green-tailed towhee	No	
Chondestes grammacus Lark sparrow	No	
Chordeiles minor Common nighthawk	No	
Chrysemys picta Western painted turtle	No	
Cinclus mexicanus Dipper	No	
Circus cyaneus Marsh hawk	No	
Citellus sp.* Rock squirrel, Ground squirrel	Yes	Bone,possible pet (burial)
Citellus lateralis* Golden-mantled ground squirrel	Yes	Bone
Citellus leucurus White-tailed antelope squirrel	Yes	Bone, dessicated in burial
Citellus splosma* Ground squirrel	Yes	Bone
Citellus variegatus Rock squirrel	Yes	Pouch containing hide dauber and red ocher, bone
Cnemidophorus sp. Lizard	Yes	Possible bones
Cnemidophorus sacki Plateau whiptail	No	
Cnemidophorus tigris Northern whiptail	No	
Coccyzus americanus Yellow-billed cuckoo	No	
Colaptes cafer* Red-shafted flicker	Yes	Wrapped and tied bundle of feathers
Contopus sordidulus Western woodpeewee	No	
Corvus brachyrhynchos Common crow	No	
Corvus corax Common raven	No	
Crotalus viridis Western rattlesnake	No	
Crotaphytus collaris Collared lizard	No	
Crotaphytus wislizeni Long-nosed leopard lizard	No	
Cynomys sp. Prairie dog	Yes	Bone, skin bag, possible engraver (smoothed mandible)
Dendrocopos pubescens Downy woodpecker	No	
Dendroica auduboni Audubon's warbler	No	
Dendroica nigrescens Black-throated gray warbler	No	
Dendroica petechia Yellow warbler	No	

Name	Archeologically Recovered	Material Recovered
Dendroica townsendi Townsend's warbler	No	
Dipodomys sp.* Kangaroo rat	Yes	Bone
Dipodomys ordii Ord's kangaroo rat	Yes	In burial with feather through joint of ankle
Dolichonyx oryzivorus Bobolink	No	
Dumetella carolinensis Catbird	No	
Empidonax difficilis Western flycatcher	No	
Empidonax oberholseri Dusky flycatcher	No	
Empidonax trailli Traill's flycatcher	No	
Empidonax wrightii Gray flycatcher	No	
Eremophila alpestris Horned lark	No	
Erethizon sp.* Porcupine	Yes	Possible fecal matter, bone
Erethizon dorsatum Porcupine	No	
Ereunetes mauri Western sandpiper	No	
Erolia minutilla Least sandpiper	No	
Euphagus cyanocephalus Brewer's blackbird	No	
Eutamias sp.* Chipmunk	Yes	Complete skin
Eutamias quadrivittatus Colorado chipmunk	No	
Falco columbarius Pigeon hawk	No	
Falco mexicanus Prairie falcon	No	
Falco peregrinus Peregrine falcon	No	
Falco sparverius Sparrow hawk	Yes	Feathers
Fulica americana American coot	No	
Gavia immer Common loon	Yes	Bone
Geococcyx californianus Roadrunner	No	
Geothlypsis trichas Yellowthroat	No	
Guiraca caerulea Blue grosbeak	No	
Gymnorhinus cyanocephala Pinyon jay	Yes	Feathers
Haliaeetus leucocephalus Bald eagle	No	
Hirundo rustica Barn swallow	No	
Holbrookia maculata Speckled earless lizard	Yes	Possible bone

Name	Archeologically Recovered	Material Recovered
Hyla arenicolor Canyon tree frog	No	
Hylocichla guttata Hermit thrush	No	
Hylocichla ustulata Swainson's thrush	No	
Hypsiglena torquata Mesa Verde night snake	No	
Icteria virens Yellow-breasted chat	No	
Icterus bullockii Bullock's oriole	No	
Icterus parisorum Scott's oriole	No	
Iridoprocne bicolor Tree swallow	No	
Junco caniceps Gray-headed junco	No	
Junco hyemalis Slate-colored junco	No	
Junco oreganus Oregon junco	No	
Lampropeltis getulus California king snake	No	
Lanius excubitor Northern shrike	No	
Lanius ludovicianus Loggerhead shrike	No	
Larus californicus California gull	No	
Larus delawarensis Ring-billed gull	No	
Larus philadelphia Bonaparte's gull	No	
Larus pipixan Franklin's gull	No	
Lepus californicus Black-tailed jack rabbit	Yes	Bone
Leucophoyx thula Snowy egret	No	
Limnodromus scolopaceus Long-billed dowitcher	No	
Lophortyx gambelii Gambel's quail	Yes	Bone
Lutra canadensis River otter	No	
Lynx sp.* Bobcat	Yes	Bones, fecal matter, awl, smoothed scapulae
Lynx rufus Bobcat	Yes	Bone, awl
Mareca americana American widgeon	No	
Marmota flaviventer* Marmot	Yes	Bones
Masticophis taeniatus Desert striped whipsnake	No	
Megaceryle alcyon Belted kingfisher	No	
Meleagris gallopavo* Turkey	Yes	Bone, arrow shaft feather, feather pahos

Name	Archeologically Recovered	Material Recovered
Melospiza lincolnii Lincoln's sparrow	No	
Melospiza melodia Song sparrow	No	
Mergus merganser Common merganser	No	
Mergus serrator Red-breasted merganser	No	
Mimus polyglottos Mockingbird	No	
Molothrus ater Brown-headed cowbird	No	
Mustela frenata Long-tailed weasel	No	
Mustela nigripes Black-footed ferret	Yes	Possible bone
Myadestes townsendi Townsend's solitaire	No	
Myiarchus cinerascens Ash throated flycatcher	No	
Myotis subulatus Small-footed myotis	No	
Myotis yumanensis Yuma myotis	No	
Neotoma sp.* Wood rat, Pack rat	Yes	Bones, fecal matter
Neotoma albigula White-throated wood rat	No	
Neotoma cinerea Bushy-tailed wood rat	No	
Neotoma lepida Desert wood rat	No	
Neotoma mexicana Mexican wood rat	No	
Neotoma stephensi Stephen's wood rat	No	
Numenius americanus Long-billed curlew	No	
Nuttalornis borealis Olive-sided flycatcher	No	
Nycticorax nycticorax Black-crowned night heron	No	
Odocoileus sp. Deer	Yes	Possible awl, possible pendant, bone, skin, hide, possible moccasins, hair, possible gaming piece or die, possible punch, possible hide children's wrapper, possible hide pouch, hide dauber, possible tie string, possible thongs, possible fringe, possible fecal matter, gouge or chisel (antler), possible cordage (twisted hide), possible skin bag; possible tool for stripping yucca fibers, skin scraping, bark shredding or grass cutting (scapula), possible scraper, possible flaker, needle; punch, rubbing, weaving or flaking tool; possible rubbing or punching tool (tooth), scraping implement, chipping implement (antler), notched antler (undet. purpose), venison offering in burial, flesher, antler drilled lengthwise, deer hoof rattle, possible sinew ties.

Name	Archeologically Recovered	Material Recovered
Odocoileus hemionus Mule deer	Yes	Bone
Olor columbianus Whistling swan	No	
Ondatra sp.* Muskrat	Yes	Bone
Onychomys leucogaster Northern grasshopper mouse	No	
Oporornis tolmiei MacGillivray's warbler	No	
Oreoscoptes montanus Sage thrasher	No	
Otus asio Screech owl	No	
Ovis sp. Sheep	Yes	Bone pendant, possible gaming piece or die, punch (hoof), bone, possible hide pouch, possible moccasin sole, large bag (pelt), painted unworked bone.
Ovis canadensis Mountain sheep, Big horn sheep	Yes	Skin, hide, possible moccasins, fur, bone, possible children's wrappers, possible awl, awl, piercing or punching tools, horn sickle, horn digging stick tip, horn tabular blades, horn ornament or gaming piece, fecal matter, fleshers, possible pendant, possible yucca fiber stripper, possible skin scraper, possible bark shredder, possible grass cutter, horn seed beater, possible horn scraper, possible flaker, possible punch, possible rubbing or punching tool, painted horn, gaming piece (horn), fiber scraper blunt-ended tool, bone with cordage attached, grooved bone, split bone, conical horn object, possible sinew ties, notched scapula.
Ovis domesticus Domestic sheep	Yes	Bone
Oxyura jamaicensis Ruddy duck	No	
Parus atricapillus Black-capped chickadee	No	
Parus gambeli Mountain chickadee	No	
Parus inornatus Plain titmouse	No	
Paserculus sandwichensis Savannah sparrow	No	
Passer domesticus House sparrow	No	
Passerella iliaca Fow sparrow	No	
Passerina amoena Lazuli bunting	No	
Pelecanus erythrorhynchos White pelican	No	
Perognathus apache Apache pocket mouse	No	
Perognathus flavus Silky pocket mouse	No	
Perognathus formosus Long-tailed mouse	No	

Name	Archeologically Recovered	Material Recovered
Perognathus intermedius Rock pocket mouse	No	
Perognathus longimembris Little pocket mouse	No	
Perognathus parvus Great Basin pocket mouse	No	
Peromyscus sp.* Mouse	Yes	Bone
Peromyscus boylii Brush mouse	No	
Peromyscus crinitus Canyon mouse	No	
Peromyscus maniculatus Deer mouse	Yes	Bone
Peromyscus nasutus Rock mouse	No	
Peromyscus truei Pinyon mouse	No	
Petrochelidon pyrrhonota Cliff swallow	No	
Phainopepla nitens Phainopepla	No	
Phalacrocorax auritus Double-crested cormorant	No	
Phalaenoptilus nuttalli Poor-will	Yes	Feathers (wrapped and tied in bundle)
Pheucticus melanocephalus Black-headed grosbeak	No	
Phrynosoma douglassi Mountain short-horned lizard	No	
Phrynosoma platyrhinos Southern desert horned lizard	No	
Pica pica* Magpie	Yes	Wing (base wrapped with yucca leaf)
Pipilo erythropthalmus Rufous-sided towhee	No	
Pipistrellus hesperus Western pipistrelle	No	
Piranga ludoviciana Western tanager	No	
Pituophis catenifer Great Basin gopher snake, Bull snake	No	
Plegadis chihi White-faced ibis	No	
Podiceps caspicus Eared grebe	No	
Podilymbus podiceps Pied-billed grebe	No	
Polioptila caerulea Blue-gray gnatcatcher	No	
Pooecetes gramineus Vesper sparrow	No	
Porzana carolina Sora	No	
Procyon lotor Raccoon	No	
Psaltriparus minimus Common bush-tit	No	
Rallus limicola Virginia rail	No	

Name	Archeologically Recovered	Material Recovered
Rana pipens Western leopard frog	No	
Recurvirostra americana American avocet	No	
Regulus calendula Ruby-crowned kinglet	No	
Regulus satrapa Golden-crowned kinglet	No	
Reithrodontomys megalotis Western harvest mouse	No	
Riparia riparia Bank swallow	No	
Salpinctes obsoletus Rock wren	No	
Salvadora hexalepis Mohave patch-nosed snake	No	
Sauromalus obesus Western chuckwalla	No	
Sayornis nigricans Black phoebe	No	
Sayornis saya Say's phoebe	No	
Scaphiopus hammondi Western spadefoot (toad)	No	
Sceloporus graciosus Great Basin sagebrush lizard	No	
Sceloporus magister Utah spiny lizard	No	
Sceloporus undulatus Northern plateau lizard	No	
Seiurus noveboracensis Northern waterthrush	No	
Selasphorus platycercus Broad-tailed hummingbird	No	
Selasphorus rufus Rufous hummingbird	No	
Sialia currucoides Mountain bluebird	Yes	Feather
Sialia mexicana Western bluebird	No	
Sitta canadensis Red-breasted nuthatch	No	
Sitta carolinensis White-breasted nuthatch	No	
Spatula clypeata Shoveler	No	
Speotyto cunicularia Burrowing owl	No	
Sphyrapicus thyroideus Williamson's sapsucker	No	
Sphyrapicus varius Yellow-bellied sapsucker	No	
Spilogale gracilis Western spotted skunk	Yes	Bone
Spinus pinus Pine siskin	No	
Spinus psaltria Lesser goldfinch	No	
Spinus tristis American goldfinch	No	

Name	Archeologically Recovered	Material Recovered
Spizella arborea Tree sparrow	No	
Spizella breweri Brewer's sparrow	No	
Spizella passerina Chipping sparrow	No	
Steganopus tricolor Wilson's phalarope	No	
Stelgidopteryx ruficollis Rough-winged swallow	No	
Stellula calliope Calliope hummingbird	No	
Strix occidentalis Spotted owl	No	
Sturnella neglecta Western meadowlark	No	
Sturnus vulgaris Starling	No	
Sylvilagus sp.* Cottontail rabbit	Yes	Bone, awl
Sylvilagus audobonii Desert cottontail	No	
Tachycineta thalassina Violet-green swallow	No	
Taxidea sp. Badger	Yes	Bones
Taxidea taxus Badger	No	
Telmatodytes palustris Long-billed marsh wren	No	
Thamnophis cyrtopsis Western black-necked garter snake	No	
Thamnophis elegans Wandering garter snake	No	
Thomomys bottae* Pocket gopher	Yes	Bone, fur cordage
Thryomanes bewickii Bewick's wren	No	
Totanus flavipes Lesser yellowlegs	No	
Totanus melanoleucus Greater yellowlegs	No	
Toxostoma bendirei Bendire's trasher	No	
Tringa solitaria Solitary sandpiper	No	
Troglodytes aedon House wren	No	
Turdus migratorius Robin	No	
Tyrannus verticalis Western kingbird	No	
Tyrannus vociferans Cassin's kingbird	No	
Tyto alba Barn owl	Yes	Feathers
Urocyon cinereoargenteus Grey fox	Yes	Bones
Ursus sp.* Bear	Yes	Unworked hide and hair

Name	Archeologically Recovered	Material Recovered
Uta ornata Northern cliff lizard	No	
Uta stansburiana Northern side-blotched lizard	No	
Vermivora celata Orange-crowned warbler	No	
Vermivora luciae Lucy's warbler	No	
Vermivora ruficapilla Nashville warbler	No	
Vermivora virginia Virginia's warbler	No	
Vireo gilvus Warbling vireo	No	
Vireo solitarius Solitary vireo	No	
Vireo vicinior Gray vireo	No	
Vulpes fulva Red fox	Yes	Bones
Vulpes macrotis Kit fox	Yes	Bones
Wilsonia pusilla Wilson's warbler	No	
Xanthocephalus xanthocephalus Yellow-headed blackbird	No	
Xantusia vigilis Utah night lizard	No	
Zenaidura macroura Mourning dove	Yes	Feathers
Zonotrichia leucophrys White-crowned sparrow	No	
Zonotrichia querula Harris' sparrow	No	
Bird	Yes	Bones, awl, possible tubular beads, fecal matter, feather necklace, feather cordage, feather decoration on cord of yucca used probably for weaving robes
Cow	Yes	Possible bone
Gopher	Yes	Bone
Lion	Yes	Fecal matter
Owl	Yes	Regurgitated mass
Rabbit	Yes	Bone, skin, hide, fur string, skin blanket, skin umbilical pads, unworked hair, fur blanket, skin robe, fur cordage
Rodent	Yes	Possible tubular beads
Squirrel	Yes	Bone
Toad	Yes	Bone
Turtle, tortoise	Yes	Bone, shell (unworked but polished)

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70. *The San Juan Canyon Historical Sites*, by C. Gregory Crampton (1964), 92 pp., 8 maps, 25 figs., bibliography. $1.75. (Glen Canyon Series, No. 22)

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