MATERIAL CULTURE OF THE

PIMA, PAPAGO, AND WESTERN APACHE

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U. S. Department of the Interior
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With suggestions for Museum Displays.

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FOREWORD

This paper is one of several prepared for the Field Division of Education of the National Park Service by a group of research workers employed during the CWA period of 1933-34. Its purpose was to provide an outline of ethnographic data suitable for use in the development of a museum layout and displays in connection with the development of a museum at Tumacacori National Monument.

The form and content of the paper are naturally conditioned by the purposes for which it was intended. It pretends neither to be an important piece of original research nor a complete statement of the ethnography of the tribes about Tumacacori, the Pima, Papago, and Apache. It is merely a compilation of the published data on their material culture. However, as a summary, the paper should be useful as an introduction to the subject. Its bibliography, although not complete, contains virtually all the significant scientific publications.

Although originally intended primarily for use in museum development by the Field Educational Headquarters of the National Park Service, several of the research papers prepared have aroused considerable interest. The demand for certain of them have been sufficient to warrant mimeographing some of the papers for wider distribution in the hope that their usefulness may be further extended.

In order to save time and expense in mimeographing, a few departures from the usual scholarly standards have been made. Footnotes are nearly all eliminated and references are enclosed in parentheses in the text.

The author has spent several years in field research for the University of California, National Research Council, and the Southwest Society of New York, and has published a number of papers and monographs on the ethnology of Northwestern Mexico. He has been a research associate of the University of California, instructor in Intersession, and at present is connected with the Field Division of Education of the National Park Service as a museum technician.

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INTRODUCTION

The Pima-Papago and the Apache are two rather strikingly different groups, both of which were intimately concerned with the founding and history of Tumacacori Mission and the other missions of Arizona and northern Sonora. The first group furnished the motive for the founding of the missions; the second was a principal cause of their ultimate decay. The two groups differ radically in speech, much in temperament, to a considerable degree in culture, and somewhat in racial composition.

The Pima, with which are probably to be classed the now extinct Sobaipuri, were and are an almost completely sedentary tribe, subsisting largely on the products of agriculture and the abundant mesquite bean, small game, and, strange as it may seem in this desert country, fish. This last item, fish, was probably of major importance only to the Gila Pima.

The Papago may be described as a sedentary tribe also, but with seasonal migrations. They relied to a larger extent upon wild products than the Pima. In the rainy season they made seasonal migrations from their permanent villages, by waterholes and springs along the base of the mountains, to sow and harvest crops planted in the lowlands which, except for the rainy season, were without water. Culturally the Papago may be described as Pima whose culture has been limited and somewhat altered by their more arid desert environment. Historically, perhaps, this characterization should be reversed and we should describe the Pima as Papago whose culture had been enriched by moving into a more favorable environment.

The Apache formerly consisted of a large number of groups or bands scattered over an enormous extent of territory. We are concerned only with the western Apache, whose major divisions will be indicated later. Before white contacts, these Apache were agricultural in a desultory fashion, but depended largely on game and wild vegetable products for their food. They were primarily nomadic in their habits, ranging over a more or less defined area, only settling down now and then in favorable spots to raise a crop of corn and other products. With the beginnings of white settlement they became increasingly nomadic and began to depend more and more on the results of raids on the cattle of their Mexican and Indian neighbors. Agriculture became correspondingly less important. In all probability the western Apache were more closely allied to the Navaho than they were to the eastern Apache. Apache traditions sometimes mention the vicinity of Flagstaff as their former home. This is now Navaho country.

The history of the two tribes is also quite different. Pima traditions are that they originated in the region they now occupy and there is nothing in their culture to indicate that they have not been in or near their present habitat for a very long time. It has been suggested that they are descendents of the builders of Casa Grande and similar type ruins, but for this there is no definite proof. Viewed conservatively, this opinion has many points against it. It is equally probable they were a people of lower culture co-existing with the builders of Casa Grande in the same general area. From the latter the ancestors of the Pima may have acquired a few cultural traits, occupying their lands after the collapse of the culture, and perhaps even absorbing the population remnants. There seems no definite proof for either of these theories.

The Apache, on the other hand, are unquestionably newcomers to the area. Their linguistic affiliations are far to the north and it is doubtful if they have been anywhere in the Southwest for much more than five hundred years. Certainly their contacts with the Pima and Papago are not that ancient. Most probably they reached their present westerly position not more than three or possibly four hundred years ago.

Pima and Papago culture was in part marginal to the Pueblo civilizations. Its major features, however, strongly resemble the culture of the sedentary Yuman tribes of the Gila and lower Colorado rivers. In a larger sense these lowland cultures in general appear to be partially derived from marginal contacts with cultural influences which came up the west coast of Mexico and the Sierra Madre to the Pueblos. The Pueblos modified and elaborated upon these influences, while the lowland peoples apparently simplified them. A good deal of similarity exists, moreover, between the lowland Arizona peoples and the lowland tribes of southern Sonora, the Yaqui and Mayo. (Spier, 1933,41; Ibid. 1928, comparative sections; Beals, 1932, distribution maps and discussion, Ibid. Yaqui-Mayo ms.)

Apache culture has evidently a different history. They appear to have come into the region as wandering nomadic hunters, learning the utilization of their new environment in large part from other peoples in the area, becoming minor agriculturists, and taking over a little of the social organization and ceremonialism of the Pueblos.

The following detailed discussion of the two groups is divided into two parts. One is a general discussion of each topic for which museum display is intended, including the data needed

for collecting and arranging materials, as well as some data which it would be pertinent for the custodians to have in mind. At the conclusion of each major topic, brief but specific suggestions for the museum displays are presented.

PHYSICAL CHARACTERISTICS

The Pima and Papago are closely related physically and are of unusually tall stature for American Indians. The Pima average 171.8 cms. and are probably the third tallest group of American Indians. They are markedly dolicocephalic or narrow headed as are the Papago. The Papago average 170.9 cms. in stature. (Hrdlicka, 1908, 132.) Both tend to a heavy build or corpulency and are notably dark in skin color in contrast to some of the surrounding tribes. The Pima and Papago resembles most closely the ancient peoples of southern Utah, a few of the Pueblo tribes, the Utes and Paiutes, and the peoples speaking related languages to the south of them in Mexico, particularly Tarahumare, Yaqui, Aztecs, and also the Tarascan speaking peoples. They show less resemblance to their near neighbors of Yuman speech and the Apache. (Hrdlicka, 1908, 10;13.)

The Apaches are of a radically different type, not resembling either their neighbors or the ancient inhabitants of the Southwestern area. The average male statures of the western group vary somewhat as follows: White Mountain, 171.1 cms., San Carlos, 169.6 cms. They are remarkably brachycephalic. An unusual degree of homogeneity exists among them, despite the earlier assumption that they had been much modified by the inclusion among them of Mexican captives and other peoples. They differ somewhat from their nearest linguistic relatives, the Navaho, the closest resemblance being with Lipan, Havasupai, and Walapai. (Hrdlicka, 1908, 8; 13; 132-3.) Many more detailed statistics are given by Hrdlicka (1908).

Museum Display

Face masks or busts of a man and a woman for the Pima or Papago and the Apache should be shown. These might be supplemented by pictures. (For Pima and Papago pictures see: Hrdlicka, 1906, plate 34; Lensmore, various plates; Russell, 1908, plates 2, 17, 30-38; 42-48; Hodge, 1910, 251; Dorsey, 1903, 181-3; 186; 188; 190. For the Apache see Bourke, 1891, 49; 240; 304; 416.) There exist numerous photographs and pictures of noted Apache such as Geronimo and the Bureau of Ethnology report for 1912 mentions the taking of Apache photographs. (Annual report 34:28)

Possibly a chart of comparative statures and head shapes might be presented for the region. If this seems desireable, the data may be found in Hrdlicka (1908).

LANGUAGE

Pima and Papago speak closely related dialects. Pima scarcely differs from Pima Bajo, spoken in central Sonora, and the separation of the two groups must have taken place in recent times. The linguistic affiliations are interesting. Pima is closely allied to Tepehuan, less close to a group which cuts across between Tepehuan and Pima including Yaqui-Mayo, Tarrahumare, Opata, and Concho, all of which are in turn related to Aztec or Nahuatl and form part of the larger grouping known as Uto-Aztecan, which includes the Shoshonean tribes of the Great Basin, southern California, Hopi, and Commanche. (Thomas and Swanton; unpublished data from A. L. Kroeber.)

The Apache are members of the great Na-Dene family from which they are separated by hundreds of miles. The various bands of Apache and the Navaho speak closely related languages, showing they came from the north in a group. Linguistic studies afford the principal evidence for their late arrival in the Southwest.

Museum Display

If anything at all is shown, the distribution of the two great linguistic stocks should be indicated. The base map illustrating Sapir's re-classification which is available in the Field Educational Headquarters, at Berkeley, should be used. More detailed data on interrelations within the stocks should be secured from Prof. A. L. Kroeber of the Department of Anthropology of the University of California at Berkeley and Prof. Edward Sapir at Yale University.

TRIBAL DIVISIONS, SETTLEMENTS, etc.

The Pima and Papago are clearly demarked, although friendly and allied peoples. An early group, the Sobaipuris, are sometimes classified as Papago (Hodge, 1895,231), but Bolton's classification of them as Pimas is more likely to be correct. (Bolton, 1919). The Sobaipuris have disappeared, merging at an early date with Pima and Papago under the joint impact of the missions and Apache raids. The present location of the Pima and Papago is much what it was at the time of the first missions, although vilages have shifted location somewhat.

The Pimas and Sobaipuris occupied originally the valley of the San Pedro from about the location of modern Tombstone to the Gila river, the valley of the Santa Cruz to Red Rock, and the Gila valley from Casa Grande to Gila Crossing. This appears as the situation about 1700. In 1775 the situation on the Gila was about the same, but the Sobaipuris are recorded by Hodge as leaving their homes in 1762. In 1850 the Pima lived on the Gila about Sacaton and on the Santa Cruz in the vicinity of Tucson and Red Rock with a division south or southeast of San Xavier mission which were called Dog Pima and spoke a slightly different dialect. The Papago seem to have always occupied more or less their modern locations with a division known as the Sand Papago living a non-agricultural (?) life in the northeastern corner of Sonora and in contact with the Cocopa.

There exists no map of modern Pima and Papago settlements in accessible sources. The agencies or the Bureau of Indian Affairs should have such maps, however. Russell (1908, 20-23) gives lists of modern Pima towns but no map. Kissell gives a list of towns visited but this is admittedly not complete. Hodge (1910, 2;253) gives a list of Pima and Papago villages.

The Apache are said by some not to have been in southern Arizona in the 16th century. (Hodge, 1895, 230.) This argument is based largely on the failure of the accounts of the Coronado expedition to mention them. Later Spanish nomenclatures are confused and make different bands hard to identify. The Yavapai were sometimes classed as Apache as late as the end of the 19th century.

About 1850 there was clear identification of Chiricahua, San Carlos, White Mountain, and Tonto Apache, although some of these were made up of several independent bands. Spier indicates the location of White Mountain, San Carlos, and Tonto bands according to Maricopa informants for about that date. Other Apache were known to live to the south of them but were not identified.

The modern identifications of the Apache bands are as follows:

Chiricahua, headwaters of the Gila River. Four almost independent bands, each with a chief.

San Carlos, San Carlos River, Gila River near the mouth of the San Carlos, Arivaipa Creek, and the region west of Globe.

White Mountain or Coyotero, on the White River, a tributary of the Salt River.

Tonto, Tonto Basin at the head of Tonto Creek. All these divisions have had varied designations and the bands comprising them have also had different names applied to them. There were no permanent villages and only these general ranges may be indicated for them.

The modern location of the western Apache is on the White Mountain and San Carlos reservations. (1)

Museum Display

Recommended is a general regional tribal map to show early tribal locations and village sites. This may be fairly adequately compiled from Bolton, 1919b; Goddard, 1913; 14; and Spier, 1933, Fig. 1, page 5. Unless the Bureau of Indian Affairs can supply a map showing modern village sites, a map of the reservations will have to suffice. There is no point in showing village sites for the modern Apache as they had no permanent village sites aboriginally.

POPULATION

There are no reliable figures except possibly those in the 1910 or later census. The best estimate is probably that of

(1) The above data are based on the following sources:

Bartlett--village details rather accurately given.
Bolton, 1919a.
Ibid., 1919b--A map of Pimeria.
Ibid., 1930--Spanish documents, annotated.
Coues--Garces diary.
Goddard, 1913; 14 (map); 128-130.
Hodge, 1895; 230-231.
Ibid., 1910; 2:253.
Kissell, 127-128.
Lumholtz.
Mason, 1920, 14--list of villages visited in the Santa Rosa Valley.
Powell, 1891;99.
Russell, 1908, 17 et. seq.
Royce--Indian land cessions:
Pima: 820; 888; 894; 906; 914; 922.
Papago: 876; 908; 922.
Apache: 788; 822; 830; 838; 846; 854; 860; 864; 876; 878; 880; 882; 890; 922; 944.
Spier, 1933, 5;7-8; 27-40--An important discussion of native and documentary evidence for the region.

Dixon (1915) based on the 1910 census. Powell (1891;56) estimates the western Apache as 3,041. Gaillard (1894;293) estimates the Papago in the United States at between two and five thousand with an equal number in Sonora. He quotes the 1890 census as 5,113, but obviously does not think the figures reliable. Hodge, (1910, 1:66; 2:253) gives 2,058 at White Mountain reservation, 2,275 at San Carlos of mixed bands in 1903, and quotes Garces estimate of the Gila Pima at 2500. Hodge gives the Pimas in 1906 as 3,936 but this probably includes the Maricopa on the Gila reservation.

Museum Display

If reliable modern figures can be secured, they might possibly be appended to the map of tribal distributions. While not an important point, the question is apt to be asked by visitors.

ENVIRONMENT

The Pima anciently lived along water courses such as the San Pedro, Santa Cruze, Aravaipa, and Gila. The typical environment is the stream bottom with thick mesquite groves and flat, irrigable lands. The Papago lived in a more desert environment, depending upon more or less permanent springs and water holes for the location of their regular residences and upon the scanty rainfall for quick growing crops in favorable locations. Their habitat is generally more upland in character, marked by large cactus forests and the mescal producing mountains.

The Apache were roving in disposition. Their habitat is higher and more mountainous, ranging up into pine forests where they usually spent the winter, the abundant wood supply offsetting the colder climate. Their range is not desert in the sense of that of the Pima and particularly the Papago.

Museum Display

There need be little habitat or environmental display inside the museum unless it be pictures or an outside ethno-botanical garden. Tumacacori is in typical Pima environment with typical Papago country on either side of the valley. Visitors can hardly avoid seeing this environment, although its relation to human occupation may have to be pointed out to them. Apache environment may require more illustration. Pictures can be secured from the Bureau of American Ethnology and other sources. Several good Papago pictures are shown by Densmore (1929, Plates 2a, 2b, 3, and 5. See also Dorsey, 1903; Goddard, 1913. For good plates of

typical vegetation see Russell, 1908, plates 1, 7-12, 21, 41.) Most of the necessary pictures can no doubt be secured locally, however.

FOODS

The food exhibit offers the greatest opportunity to relate the tribes under consideration to their environment. The habitat of all these groups is notably inhospitable. The story to be told here is of the adjustment that has been made to find a livelihood in a region where it would appear impossible to the uninitiated.

AGRICULTURE

Among both Pima and Papago the men clear the ground, plant and irrigate the crop. The women harvest. (Russell, 1908, 89; Kissell, 128.) Corn or maize, beans, and squashes were the principal aboriginal crops. Modernly wheat has become the most important crop of the Pinas but is, of course, post-European. Corn or maizè (Zea mays) was the central agricultural plant formerly. The exact kind is not known, the varieties now grown being almost certainly post-European improvements. Corn is planted in April, harvested in June, planted again in July, and harvested in October. (Kissell, 129.)

The foregoing applies to the Papago also, except that the seasons are more irregular and slightly earlier in places. Papago fields, unlike Pima fields, are at a distance from the villages and are often quite scattered. The family migrates to the fields and lives there for the planting time and again when the crop is maturing remaining until the harvest. (Kissell, 128-9.)

At harvest the Pima bring the husked corn from the field to the house, placing it on a thin layer of brush. When all the corn is in, the brush is fired and the corn slightly roasted. It is then cut from the cob, dried, and stored. It is sometimes ground on the metate and baked in large cakes in the ashes. It is also boiled with ashes, dried (this procedure sounds unusual), the hulls washed off, dried again, ground, and made into gruel or pinole. Both the tortilla and the Pueblo wafer bread are lacking. Green corn is roasted. (Russell, 1908, 72-3; Pictures of processes: Hrdlicka, 1906, Plate 8, opp. page 42; Kissell, 192.)

There is little data on Apache agriculture. Women do all

the work in distinction to the Pima-Papago. Medicine men formerly buried eagle plumed sticks in the fields, scattered tule pollen, and sprinkled pollen on it again. (Reagan, 299; Bourke, 1892, 502.)

In harvesting the corn, Apache women break the ears off the stalk, tossing it over their heads into a carrying basket on their backs. The basket is emptied on a level spot and when the harvest is completed the corn is shucked, stacked to dry, shelled, and stored in baskets. The green ears encountered are roasted in the earth oven. (Reagan, 292-3; 295; 299-300.)

The corn is ground on the metate and cooked in cakes in or under the ashes, sometimes wrapped in green corn husks. At present the tortilla is the most common form of cooking but this is probably derived from the Mexicans. A soup of corn meal is made, stirred with two sticks. Green corn is eaten by boiling or roasting in the pit oven. In the latter case it is dried, shelled, and stored in baskets or jars. Sometimes it is cut from the cob, mashed on the metate, and boiled or made into a cake and baked. Corn is sometimes gathered before it is in the milk and eaten, cob and all, after boiling. (Reagan, preceeding citation.)

Russell indicates the Pima cultivated a variety of the red or kidney bean (Phaseolus vulgarus Linn.). While this is true of most agricultural American Indians, there is a possibility the aboriginal Pima bean was the tepary (Phaseolus acutifolius, var. latifolius), believed to be a native wild species in the Southwest. It appears established as the aboriginal bean cultivated by the Cocopa and specimens have been collected indicating it is still cultivated by the Papago. (Gifford, 1933, 265; Freeman.) Although the data are not yet conclusive, the probabilities are that the tepary was domesticated by the Pima-Papago or some of their near neighbors and this fact deserves exposition. There are no data on the harvesting, storing, and preparing of beans.

One and probably several varieties of Cucurbita were cultivated aboriginally. It is impossible to determine which were aboriginal. The ordinary pumpkin, Cucurbita pepo, Linn., may well have been one, to judge by the early descriptions. This includes a number of varieties of "squashes" (scallop, summer crook-neck, etc.) Cucurbita moschata Duschene is also grown in several varieties. Pumpkins and squash were originally preserved by cutting them in strips and drying them in the sun. They were soaked and boiled when eaten. Seeds were parched and eaten.

An aboriginal cotton (Gosypum sp.) was cultivated. It is said still to be planted by the Papago. Cotton and tobacco were planted when the mesquite leaves came out (about March). (Russell, 1908, 70-78; Cremony, 217; Browne, 109; Kissell, 128.)

Post-Spanish plants of the Pima include wheat, the garbanzo or chick-pea, watermelon, and muskmelon. (Russell, 1908, 70-78.)

Agricultural implements were of the simplest kind aboriginally. The Pima irrigating canals were made with the digging stick and a wooden shovel. (It has been asserted the wooden shovel is post-Spanish but I believe there is fair evidence that it may be aboriginal in this region. Beals, Yaqui-Mayo ms.) These are illustrated by Russell (1908, Figs. 10, a, b, page 97.) The digging stick is of ironwood or Zizyphus lycioides, 1.140 m. long, 44 mm in diameter (typical specimen), with a chisel shaped end. It is used for planting, prying out bushes, a pick, and an impromptu weapon. The shovels were of misquite or cottonwood, .850 m. long, the blade .276 m. long and .167 wide. Earlier forms were possibly flat bladed rather than curved as shown by Russell, although the curve is merely the outer shape of the trees from which it is fashioned. A "hoe" was formerly in use consisting of a flat, sword-like piece of ironwood .680 m long, .083 m. wide, with a cutting edge 17 cm. long, used to cut weeds and cultivate plants. It was necessarily used in a kneeling position. Although found in the Casa Grande ruins, this peculiar implement, together with the shovel, has a limited distribution, being confined to the Pima-Papago and the costal region down to central Sinaloa. (Beals, 1932, 163.) Specimens no longer exist but could probably be reconstructed. Russell also shows surviving Spanish types of implements in the dibble, plow, and ox yoke. (Russell, 1908, 97-99.)

Apache agriculture was probably simpler and cruder than that of the Pima-Papago. It lacked irrigation but further data are unavailable.

Wild Plants Utilized

Even the Pima, most highly developed agriculturists of the three tribes considered, depend more on wild products than on their agricultural staples. Most important in the food supply was the bean of the mesquite. In times of crop failure, it became their principal reliance. The mesquite bean (Prosopis veluntina) was gathered in late summer and stored in the pod in cylindrical bins on the roofs of houses or sheds. Formerly these bins were probably on low platforms when the old style house was

used. The beans were prepared for use in two ways. They were ground or pounded in a mortar with a stone pestle (for larger quantities a wooden pestle was used), or the beans were separated from the pods and parched by tossing them in a pan with live coals, after which they were ground to a meal on the metate and made into pinole (i.e., the flour mixed with water.) The catkins or blossoms were stripped from the stem between the teeth and eaten raw. The gum of the mesquite was chewed.

The screw bean (Prosopis pubescens) was prepared somewhat differently, being roasted in an earth oven, dried, pounded in a mortar and made into pinole. (Russell, 1908, 74-75; Hrdlicka, 1906, plate 8, opp. page 42, illustrates the pounding of mesquite beans.)

The mesquite and screw bean were less used by the Papago and still less by the Apache, being scarcer in both habitats.

Other mainstays of Pima diet were the fruits of various opuntias, yuccas, chenopodiums, salvias, ironwood nuts, and various species of atriplex (salt bushes). The latter were extensively used, not only for their seeds, but were boiled with other foods because of the salty flavor. The viznaga cactus was also employed. A favorite food, which was used less than it would otherwise have been because of the long and somewhat dangerous mountain trips necessary to gather it, was the mescal (Agave americana, Linn., and probably other species). Its method of preparation differed little among the three tribes (see below under Apache). Saguaro (Cereus giganteus, Engelm.) fruit was highly prized, particularly for making an intoxicating beverage, especially as a prelude to a war expedition. Its harvest was so important that the Pima started their new year count with it. The fruit was eaten fresh and was also dried in balls some 15 cm. in diameter. The juice was extracted from both fresh and dried fruit by boiling all day. The residue is ground to a paste on the metate and eaten without further preparation. The juice makes a thick syrup which may be stored in jars sealed with clay. When diluted and allowed to ferment, it makes a sweetish intoxicating drink. For further details and a complete list of plants and their preparation see Russell (1908, 69-78, Plates 8, a, b, 9, c, d, Fig. 18, b, c, page 103. Also see Hrdlicka, 1908, 263-265.)

The success of the Pima in their inhospitable environment may be judged from a compilation given by Russell. He notes 22 plants of which the leaves, stems, or flowers were eaten, 4 furnishing bulbs or roots, 24 giving seeds or nuts, and 15 supplying fruits or berries. (Russell, 1908, 68.)

The Papago use much the same foods as the Pima but in different proportions. They utilized much more mescal and saguaro than the Pima. Densmore (1929, 151, Plate 19) gives a good description of the treatment of saguaro fruit and the making of saguaro wine. The saguaro is gathered by both peoples by a pole with a hook at the end. Among the Papago it is recorded that the shape is important. It is believed to resemble the Big Dipper, which is called the Cactus Hook. They also make use of an oak (Quercus oblongifolia); at least it is reported as an article of trade with the Pima. The latter remove the shells, parch the meats, and grind them. There is no leaching as is common in the great acorn using region of California, although ironwood nuts were sometimes prepared by a typical California leaching method, soaking the cracked nuts over night or pouring water over them in a depression in the sand. Some of the opuntia fruits, especially Opuntia arborescens, are picked with wooden tweezers, a split twig about 31 cms. long. (Densmore, 1929, 148-151; Russell, 1908, 70; 78; 103, Fig. 18; Hrdlicka, 1908, 263-265.)

The great dependence of the Apache aboriginally was the mescal. The hearts or roots or both are gathered and cooked in a pit oven. Probably a wooden chisel was formerly used but the only mescal knife recorded has a metal blade reminiscent of the shapes of the wooden implements of neighboring tribes. The pit oven is made by digging a large pit and filling it with dry wood on which are piled a quantity of stones. This is burned and when the fire is reduced to coals, the stones are covered with a foot or more of wet grass and twigs upon which the mescal is placed. These are covered with another layer of grass and twigs and the whole covered with earth to the depth of a foot. A fire is then built on top. After twenty four hours the mescal is removed. Sometimes the hearts are cooked for fifteen days and are then crushed, the liquid being used to make a fermented and intoxicating drink. (Cremony 217; Goddard, 1913, 138; Reagan, 3-4.)

Pima methods were similar but the hearts only seem to have been used. (Russell, 1908, 70.)

An intoxicating drink known as Tulupi is made in great quantity by the White River and San Carlos Apache from sprouted corn. It is of late introduction, being learned from the Chiricahua, who are said to have secured it from the south, probably the Tarahumare, where it appears to be aboriginal. A description of its manufacture and use is given by Hrdlicka (1904,190-191).

Other wild foods gathered by the Apache included the pods and bean of a locust resembling the eastern honey locust. These are gathered and dried when not quite mature, later being ground on

the metate and mixed with water. It is eaten both cooked and raw. Probably all the various cactus fruits were utilized but there is no specific information as to varieties. Pinon nuts are gathered extensively, the cone being burned off or dried until the nuts fall out. The nuts are placed in storage jars. When used, they are parched on a basketry tray with coals, ground into a flour, and made into soups or baked into a sort of bread. The pods (not the seeds) of one of the yuccas is roasted before the fire or in the ashes or is dried and boiled. An acorn (Quercus undulata, var.) is hulled, ground, and eaten raw or cooked with wheat flour. No even approximately complete list of Apache foods exists but Hrdlicka has some additional ones. (Reagan, 293-295; Hrdlicka, 1908, 257-259.)

Animal Foods

Fish were nearly as important as game for many of the Pima to judge by a comparison of Russell and Spier (Spier, 1933, 14 et. seq; Russell, 1908, 83). They were poor in quality. No data exist as to methods of catching or preparing. The Papago apparently had no access to fish, at least directly, while they were never eaten by the Apache, the latter sharing in the wide-spread tabu in the Southwest against fish. (Reagan, 295).

Large game was apparently of relatively little importance to the Pima. Most of the varieties were in the hills and during the period in which we know them, to go any distance from the village was to be in danger of Apache raiders. Also the task of hunting was considerable. Animals hunted included the peccary, badger, topknot quail (Lophortyx gambeli) which was tabued to women, an unidentified rat, beaver, horse, antelope, puma, white tailed deer (Odocoileus couesi), black tailed deer (Odocoileus hemichus (sub-species?)), cottontail rabbit, two varieties of the jack rabbit (Lepus texianus and Lepus alleni), mountain sheep, raccoon, gopher (Procyon cervinus), donkeys. Snakes and lizards were not eaten according to Russell. Hrdlicka mentions a species of lizard eaten but says snakes, dogs, cranes, fishhawks, eagles, buzzards, and crows are not eaten. He states clams were formerly abundant and much used in the Gila region. (Russell, 80-83; Hrdlicka, 1908, 24.)

There is no information on the Papago but presumably they made more use of deer, peccary, and other large animals, as they lived closer to the mountains in which they were most abundant. Densmore mentions that before hunting the Papago smoke Pihol flowers mixed with tobacco and sing songs. Pihol, according to

Russell, is the name of a Pima evil spirit living in the east. The Papago father of an unborn child must not see the death movements of a deer or cut certain portions. On the whole the Pima and Papago were singularly lacking in hunting rituals, which is perhaps a reflection of the lack of importance of this source of food. (Densmore, 1929, 210; Russell, 1908, 79.)

Modern Apache apparently do little hunting. Reagan scarcely mentions it other than to say an Apache will not kill a bear or eat bear meat. Hrdlicka adds that beaver were not eaten either. Pima, Apache and probably Papago used disguises in stalking deer and antelope. (Reagan, 295; Hrdlicka, 1908, 20.)

Cooking

None of the sources make apparent a distinction which should be observed in cooking methods. In general all methods of frying or cooking with fat or baking in ovens other than the pit oven are of white origin. The predominant native methods are to grind or pound vegetable foods and make them into cakes cooked in the ashes or into soups. Even here a distinction may be made. These tribes all make great use of the metate in preference to the mortar. Consequently it appears that many of the foods in the previous lists are parched, not from any necessity, but simply to make them dry enough to grind on the metate. Meats are usually broiled over the coals, less commonly boiled. Many vegetable products and some meats are cooked in the earth oven. (See various references above and in addition Kissell, 191-197, for parching and winnowing methods.)

Food Percentages

Sufficient field study has not been made to form more than a rough estimate of the importance of various food substances to the various tribes. I give here a guess at what they once were in descending order of importance.

Pima	Papago	Apache
Mesquite	Wild vegetable foods, mescal	Mescal
Corn, beans, squash	corn, beans, squash.	Large game, deer.
Wild seeds, cactus fruits, etc.	Small game, esp. rabbits.	Wild seeds, cactus fruits.
Small game, esp. rabbits.	Large game, deer, peccary, etc.	Small game, rabbits.
Fish, molluscs.		Corn, beans, squash.
Large game, deer, antelope.		

Museum Display

The museum can most advantageously concentrate on the display of vegetable foods. If an ethno-botanical garden is planted, many of the important sources of wild foods may be shown living. The grounds of Tumacacori have several important trees and shrubs already growing upon them. A good display of corn growing should suffice for the agricultural products as it is always the major crop, other plants being secondary. A wall chart showing the various planting times in relation to the flowering and harvesting time of various wild plants of importance might be of interest. Maize being the staple of all aboriginal agriculture in North America, a small map of the distribution of maize agriculture might accompany this exhibit. (Such a map may be copied from Wissler, 20, but should be modified in the mexican area according to Beals, 1932, map 4, page 159.) Agricultural implements may be made from pictures and dimensions given; pictures of fields may be shown, corn in the husk, shelled, and in various stages of preparation, grinding on the metate, cooking, etc. If a more elaborate exhibit is desired, models with figures would be feasible. The mesquite may be handled in the same way as a representative wild product, illustrating storage, gathering, pounding in the mortar, cooking, and the food products. (Mortar and metate described under heading of Houses and Furnishings.) A miniature cross-section of the earth oven might be used as a part of the display with indications of the economic importance of various points as: mountains, mescal, yuccas, deer, pinon nuts (Apache), acorns; foothills and mesas, saguaro, opuntias, etc., rabbits, antelope; lowlands, agriculture, mesquite, etc; rivers, fish and molluscs. This might be correlated with the map showing residence. A chart of the relative importance of various classes of food similar to that outlined above (page 22) should make clear their relative economic importance. A miniature hunting scene might be shown or, at any rate, hunting weapons (see weapons).

HOUSING

Pima and Papago houses are virtually identical except that the Papago house averages somewhat larger in size. The interior support of the house is four crotched posts which are set in a square 3 to 4m. apart. Heavy beams are laid across two opposite sides of the square, resting in the crotches. According to Bartlett (2:233) for larger dwellings three posts on a side were used or a total of nine, but modern writers express themselves as somewhat sceptical of this and believe he was attempting to

describe an extension sometimes made at the door of large houses. Lighter cross poles are laid across the two heavy beams, forming a grill. This part of the house is usually entirely of cottonwood. Light willow poles are set half a meter deep in the ground around the circle which is to be the base of the wall. Three to five circles of horizontal stays are lashed on to these willows with willow bark after the willows have been bent over and lashed to the central framework. The entire frame is then covered with brush, straw, or arrowweed. Earth is then heaped on the top to a depth of 15 or 20 cms. Sometimes it is also banked about the sides. Doors are always to the east and are usually low and narrow, 60 by 90 cms., and closed by blankets, or slats woven together with rawhide. There is no smokehole according to Russell, although Hrdlicka reports a small smokehole sometimes occuring. Testimony of early visitors indicates, however, that the smokehole originally was almost if not entirely lacking. The fireplace is in the middle. The materials of the Papago house are palo fierro (ironwood), mesquite, and cactus ribs.

The average dimensions of the Pima house as given by Russell are:

	Meters
Circumference	18.59
Interior diameter	5.48
Interior height	1.72
Distance between main supporting posts	2.28-2.43
Distance between posts and walls	.91-1.60
Diameter of rafters	.08
Distance between rafters	.30
Distance between horizontal ribs	.30
Distance between arched willow ribs	.20
Height of door	.81
Width of door	.61

The interior of the Pima house is loaded with soot from the smoke. Usually two or more families occupy each house. If there are two, their sleeping mats are placed on each side of the door with the head toward the east.

Houses are built by the men. They are used largely for sleeping and for protection from rare inclement weather. Some of the belongings are stored in the house, ollas, mats, dishes, gourds, ceremonial paraphenalia. They were formerly destroyed after a death occured in them. Adobe houses are a post-Spanish innovation. (Russell, 1908, 153-5; Hrdlicka, 1906, 41-2; Gaillard, 1894; 293. Among the Pimas, 58-9; for illustrations see Russell, 1908, fig. 76, page 154; plates 35, a, b, et. seq; Hrdlicka, 1906, plate 9,

opp. page 45; Ibid. 1908, plates 4, 5, 6; Dorsey, 1903; 200; Kissell, 142; 146; Densmore, 1929, plates 2, c, 6, a, b, and c.)

Formerly a low rectangular council house was built in each village as a meeting place for the men. Browne's (108) somewhat fanciful drawing gives the only suggestion of the nature of these but he should hardly be taken as a model. The rectangular shape is also uncertain. Rev. Whittemore (Among the Pimas) says they were elliptical. Such is certainly the case among the Maricopa. (Russell, 1908, 155; Among the Pimas, 58; Spier, 1933, 84; 91-92.)

The third type of building was a shade which consisted of a rectangular cottonwood framework supported by crotched posts and covered with arrowweed and earth, affording a protection from the sun. Much of the year it was the real living and working quarters of the family. Here women ground the food on the metate or pounded in the mortar while small children were placed in their hammock-like cradle, consisting of a blanket pinned across two parallel ropes. The roof was used for drying squash, melons, fruit. Occasionally one or more sides were enclosed in arrowweed as a protection against the wind.

A rectangular storehouse was built in much the same way as the shade except the walls were of ocatilla trunks or cactus ribs or of a large bush, Baccharis glutenosa. Storage bins are usually on the roof of this structure among the Pima. After a good harvest year the Pima storehouse was an interesting sight. On the walls hung basketry materials, martynia, willow bark, and willow splints. Standing in the corner were bear grass, cat-tail, and wheat straw. From beam to beam hang peppers, red and green, while on the ground are squashes, gourds, and great baskets full of grains, beans, and seeds. (Russell, 1908, 156; plate 25, e, f; Hrdlicka, 1906, 42; Kissell, 182.)

Many Pima houses have a separate kitchen enclosure, not a house but part of the house group. They are usually of arrowweed, circular, about 4-5 m. in diameter. Sand usually piles up against these. Inside are a half-dozen cooking pots, a fireplace of three stones, or a more modern equivelant. (Hrdlicka, 1906, 42; Russell, 1908, 69; 156-7.)

Pima and Papago villages are rambling affairs even now and were more so in the past owing to the custom of burning the house when a death occured and building another some distance away. Browne (108) gives a somewhat fantastic sketch of a Pima village.

Access to the storage bins of the Pima was by a ladder. The

oldest form apparently was the notched log. (Kissell, 1916, 176.)

Household Utensils

The Pima use two kinds of mortars, usually of cotton-wood or mesquite. One has the hole sunk in the end of the log and the opposite end either flat to stand on the ground or pointed and sunk in the ground. The other type is always portable, having the hole sunk in the side of the log. Dimensions of the latter type are: length, 40 cm. and up; height, 27 to 37 cms.; diameter, about 32 cms.; cavity about 17 cms. Stone mortars from ruins are occasionally used and some bed rock mortars occur on the Pima reservation and elsewhere as near Tucson in former Pima territory. The pestle is of stone or is a mesquite club with a rounded head. (Russell, 1908, 99-100; fig. 13, a, b, c; Kissell, 194-195.)

Bread trays of mesquite, rarely of cottonwood, are highly prized. One specimen collected is .615 m. long, .355 m. wide, .071 m. deep, and has three legs carved from the same piece of wood; 24 cms. in length. Smaller circular, elliptical, and rectangular trays are obtained from the Papago. Large wooden ladles are derived from the Papago and are probably of Mexican origin ultimately although this is far from certain. (Russell, 1908, 100-101; fig. 13, d; fig. 14, b, c.)

Hanging shelves are a part of most Pima-Papago houses. They are of rods twined with bark or more commonly, tied to cross pieces, forming a grill-like frame which is suspended from the roof beams. They are miscellaneous storage places. (Russell, 1908, 101-2; figs. 16, 17; Kissell, 141, et. seq.)

Bird cages are a common part of each household. They are squarish or vaulted in shape, usually made of arrowweed laid up in log cabin fashion or tied to transverse bars. Doves and eagles are the principal birds kept in them.

The fire drill was formerly used, but perhaps was made for each occasion it was needed as fire was ordinarily kept in a rotten tree somewhere about the village. The hearth was of saguaro or other soft wood about 3.15 m. long and 21 mm. wide. It was of the simplest form but no further data are given. The drill was presumably of hard wood. (Russell, 1908, 103.)

The cradle would be a part of nearly every household's equipment. It was a narrow bow of willow with five to ten cross pieces tied to it. A detachable hood of willow bark in checker weaving was used with it. (More complete description under basketry heading.) (Russell, 103-4, figs, 19, a, b.)

Paint brushes for painting the face were made of the tufted ends of arrowweed. (Russell, 1908,, 104.)

Rope twisters, spindles, balls of yarn, looms, etc., and various paraphernalia having to do with weaving and basketry, and with pottery-making would all be part of the household furnishings. (See appropriate headings for descriptions.) The same is true of weapons.

An important part of every household is the metate, a flat, legless, stone slab, slightly concave on its upper surface from end to end, flat from side to side (in distinction to Pueblo metates). They are made of coarse rock from the neighboring hills and vary in weight from twenty to two hundred pounds. The muller or manois of lava rock and has no shaping except as acquired through use. (Hrdlicka, 1906, plate 8, opp. page 42; Kissell, 192, fig. 41; Russell, 1908, 109-110; figs. 28-29.)

A stone pestle is often used with the wooden mortars, particularly with mesquite beans. They average 4½ pounds in weight, 253 mms. long and 70 mms. in diameter. They vary from the size of one's finger to specimens 20 pounds in weight. They are recovered from the ruins or slowly pecked into shape, often being used only partly shaped, the shaping continuing as time offers. (Russell, 110; figs. 28-29.)

Stone axes are still in use, largely for roughening the surface of metates. They are always recovered from the ruins about and single and double bitted and adze shapes are employed. Those hafted are tied with sinew to the limb of a tree of suitable size. (Russell, 1908, 110.)

Firestones are small convenient stones, three in number, for supporting pots. They are about 15 cms. in diameter. (Russell, 1908, 111.)

Headrings, nets used as saddle bags, and hair brushes would generally be found about the house as well. They are described elsewhere. Stone pipes, pouches of leather, and other leather objects would be present.

Apache houses are a modified form of the Pima-Papago house, differing largely in lacking the central supporting frame and in being much smaller. They are of poorer workmanship also. The diameter is 10 to 12 ft. the height, 9 to 10 ft. Poles, usually peeled green willow, are set in the ground 2 to 2½ feet apart,

the tops bent over and tied with anything handy. Usually a smoke hole is made at the top. Brush is thatched over the framework, which is customarily dome-shaped but is occasionally conical. An extension is often made by the door to serve as a windbreak. The door is always to the west. When the house is finished, the interior is excavated 12 to 18 inches and the dirt piled around the base to keep out water. The winter house is smaller.

For a small house, horizontal supports are tied around the upright ribs. For a larger house, overlapping arches are set in the ground all the way around except where the door is to be. Goddard says the thatch is usually bear grass rather than brush. The White Mountain Apache also have a double lean-to affair like a gable roof set on the ground which is thatched with grass or corn stalks. They also sometimes make a summer house in the form of a brush roofed (flat?) shade, often with the sides wattled with interwoven limbs of trees and brush. (Hrdlicka, 1905, 482-483; Dorsey, 1903, 182; Reagan, 290; Goddard, 1913; 133-134; Hrdlicka, 1908, plate 2, c; Ibid. 1905, plate 30, opp. page 482; Bourke, 1891, page 49, has an excellent display of the house and household equipment.)

The furniture of the Apache house is meager. Pots, a frying pan or two, dishpan, 5 gallon oil can, water jug, pounding or grinding slabs, usually recovered from a ruin, and sundry baskets. Summer houses, however, sometimes have a bed of poles as much as two or three feet above the ground with brush and dry grass placed upon it. (Reagan, 291.)

The firedrill of the Apache has a yucca base with a greasewood drill. The usual socket is made near the edge of the hearth with a groove leading to the edge. Decayed wood from a hollow tree is used as tinder. (Hough, 1901, 585-586; Dorsey, 1903, 183.)

An incised gourd ladle is reported as part of Apache house furnishings. (Hrdlicka, 1905, 484.)

Museum Display.

Model of an Apache house and a house group of the Pima-Papago, including house, shade, storehouse, and kitchen windbreak, showing as many as possible of the household utensils and furnishings in place and in use, is desireable. It should be entirely feasible to have a full-size Pima or Papago house constructed on the Monument grounds if desired as there are still Pima and Papago who know the techniques. Many of the artifacts suggested above are difficult to secure but models may be made easily for the most part or copies can be made by old Indians living in the vicinity.

Against this is the difficulty of keeping such a life-sized structure in presentable condition. The limited materials used for house building may be indicated.

BASKETRY

Basketry is one of the most alive of the old arts of the Pima-Papago and Apache. Certain modifications have crept in due to the nature of tourist demands and Apache basketry in particular has been largely adapted to this. A part of the distinction between the basketry of the three tribes is caused by the environmental influence of the materials available.

Environmental conditions have ruled out wicker and the common forms of twining for the Pima and Papago. The techniques used are plain and lattice wrapped weaving, lace coiling, crude, coarse, and fine foundation coiling, and plaiting.

Materials for wrapped weaving are the saguaro (Cereus giganteus), the ribs being used as rods and slats for foundation elements, arrow bush or arrowweed (Plucea borealis and Plucea servicea), used for foundations also. The simplest type is used to make doors and sieves. Hair brushes were made by the Papago of Agave fiber (Agave sp.), the Pima of tripled awn (Aristida Californica), Sacaton grass (Sporobolus wrightii), or other grass roots, yucca fiber, or Agave lecheguea. Stirrers are also made in this technique. Technique and articles are illustrated by Kissell (140; 142-143; 145; 147; fig. 1.)

Lattice wrapped weaving of a crude sort is more used. The warp element is saguaro and arrowweed, the binding elements thongs of rawhide or sinew from the back and legs of the deer. Cradles are made partially by this technique with a mesquite root bent for the frame, saguaro ribs for the cross pieces, and cats claw (Acacia gregii) and willow (in the hood?). The hood is twilled with willow and other splints in the warp and willow bark for the weft (or sinew or rawhide thongs) and cats claw for ornament. Fine green mesquite roots are sometimes used in the weft. (Kissell, 141; 146; 149; figs. 9, 10.)

Plaiting or twilling is always diagonal. It is used for sleeping mats, eating mats, (also used for drying food), headrings, backmats for the carrying basket, cylindrical baskets for trinkets, clothing, and food, and rectangular baskets for medicines and magical objects. The materials are: Papago, palmea (Dasylirion Wheelerii), the leaves being cut off with a stick, the thorns trimmed off, the leaves split down the middle and dried; Pima, cane

(Phragmetis communis), now no longer available since the streams have dried up due to excessive irrigation. The stems were cut, dried, and stored. When used, they were moistened, split lengthwise with the thumbnail, and flattened out. The rythms are usually three over three, i. e., each element is carried over three and then under three of the transverse elements but many variations occur. (Kissell, 150-172; for headband see, 158; 164; head ring, 158-163; baskets, 164-172.)

The above mentioned articles and techniques are rarely to be found offered for sale and are generally unornamented. They are entirely articles of common everyday use. Some of the coiled baskets are also purely useful but all the ornamented sale baskets are in coiling technique.

Crude coiling is done left to right (all other coiling being right to left.) It is used only for the large storage baskets found out-of-doors on roofs or platforms. It consists of a spiral foundation element of brushy twigs and is unique in that the twigs also serve as binder, the butts being worked into the previous spiral to hold it in place. Arrowweed (Plucea borealis) is the material.

Pima granaries are built without a base, the roof or platform on which it stands serving for this purpose. The average size is 40 to 50 cms. height, 1 m. diameter. They flare out somewhat at the top and are covered with a slightly conical lid made of arrowbrush and dirt arranged on top of old coiled grain basket, sloping slightly to overhang the edge of the basket.

The Papago granary is shaped like a hive or barrel with incurving top. It never stands on the house roof but is slightly raised from the ground by sticks or stones. The coiled base is of finer material, usually bear grass (Nolina erumpems), or willow, or cottonwood. It has no cover but a piece of old basket. It sometimes reaches the height of a man's shoulder. (Kissell, 172-179.)

Coarse coiling differs from the preceding in having a completely passive foundation and an independent active warp. It (and all other baskets of coiled technique) is worked from the right to left, but inasmuch as baskets are often made from the inside, the direction of work appears reversed to one standing outside. The binder or wrapping element punctures the top of the preceding spiral of the foundation and binds the new spiral firmly in place. There is no looping, interlacing, or twisting as in some other forms of coiling. A multiple foundation of a number of splints is used and the binder elements are widely spaced,

allowing the foundation to show. It is used for making storage baskets of a different type from the outdoor granaries, being placed in the house or storage shed. It holds finer materials than the crude coil type.

The largest storage bins of coarse coiling are globular in form among both tribes. The smaller Pima bins are bell-shaped with a flat base, the Papago, barrel-shaped with a more rounded wall and smaller base. They range in size from ½ to 1½ m. in height but sometimes reach dimensions of 2 by 2 meters.

For materials the Pima use wheat straw foundation and willow bark (Salix nigra), mesquite bark (Prosopis veluntina), Acacia constricta, and a few other barks as binder. The Papago foundation is bear grass (Nolina erumpems), the binder sotol (Yucca elata), and mesquite bark. Barks are gathered in small strips from the trees so as not to injure them. It is used green or else must be thoroughly soaked.

All basketry work except cradle making is done by the women. The tools used are a knife with a strong blade and an awl of hard wood, either Sarcobatus vermicularis or Acacia constricta. (Kissell, 179-190.)

Close coiling differs from coarse coiling only in the class of workmanship, the binder elements covering and concealing the foundation completely. Native forms are bowls and trays. The olla and wastebasket forms of the present day are designed for tourists and are not aboriginal. Pima bowl and tray shapes have narrow bottoms and ovoid rather than round contours. They are never water tight while Papago baskets are usually so. Papago bowls and trays are flat based with full, well-rounded curves. A tabulation of shapes is given by Kissell (190).

Papago materials are bear grass or Yucca baccata as a makeshift substitute for the foundation. The Pima foundation is of cat-tail (Typha angustifolio), or the poorer parts of old cottonwood twigs (Populus fremontii). Bear grass is gathered from the centers of the clusters and dried four or five days. It is worked without moistening. Pima and Papago use the same binding materials except that the Papago sometimes make baskets for sale of the inferior sotol (Yucca elata) which they would never use in their own baskets. The normal materials are willow bark (Salix nigra), cottonwood, and, for decoration, splints from the seedpods of Martynia probosidea. Willow is peeled and split while green and used after soaking. The size of the splints made determines the

size and fineness of the binder. Cottonwood is employed in the same way, the young spring twigs of both being used. Martynia supplies the black designs. Two short black splints are stripped from the front and back of each hook of the pod. The pods are gathered in the fall before frost (which injures the color) and stored. When desired they are soaked a day in a damp hole in the ground and the splints stripped off. For fine work the splints are pushed through with an awl, formerly of cactus thorn, bone, or mesquite wood. Now umbrella ribs are made into awls.

Designs of old type are variations of geometric, frequently fret, patterns, most of which started from a black center or base. Modern baskets, particularly of the Papago, generally lack the black base or center and the designs usually ray out toward the edges. They are simpler and often introduce realistic figures of plants, animals, or humans.

Many of these designs have names but it is extremely dubious if there are many of ancient usage. It is certain, despite the well-intentioned maunderings on the subject by amateur investigators, that there is no symbolism attached to the names. Both Russell and Kissell note that design names are often coined to satisfy the curiosity of visitors. (Russell, 1908, 139; Kissell, 190-225.)

Lace coiling is a technique confined to the carrying frame or kiaha. It is essentially coiling without foundation, or point-lace. Papago materials are the fiber of Agave heteracantha and Yucca elata. The Pima (who no longer make them) used Dasylirioni Wheeleri. The leaves are roasted at night in a crude pit oven, the pulp and skin scraped from the fibers with a deer scapula, and the fibers washed and dried. They are spun into two strand cord by rolling on the leg (formerly the thigh). Some sort of a needle appears to be almost obligatory, although the old form is not known. However, the fingers or a sharpened stick will serve after a fashion. The early Pima type has gone out of use and only Papago types of kiaha are now seen. The early Pima type was cone shaped, taller, more tapering, and the four poles did not extend below the basket and only a short distance above. (Kissell, 225-244.) (2)

Apache basketry is simpler and more easily presented. Like much Pima-Papago basketry, modern designs and shapes are frequently for sale purposes.

Tools consist simply of a knife and an awl, formerly of stone and bone respectively, and brushes and strainers made of bunches of stiff yucca fiber.

Materials for twining water jars are a variety of sumac (probably Rhus trilobata) or, more often, shoots of the squawberry (Vaccineum stamineum). Sumac is gathered in about one meter lengths and cleared of twigs, but the bark is left on. Squawberry yields slightly shorter osiers. If used for the warp, they are left as gathered, merely being moistened while working. If they are used for weft, they are split in three pieces and the pith scraped out. The bark side of the splints is always turned inwards. For twining burden baskets, sumac, cottonwood, and willow or mulberry (Morus sp.) are used in the same way. Mulberry was formerly used almost exclusively for weft purposes but has been largely supplanted, except in the finer work, by cottonwood and willow.

For coiled ware sumac is used rarely. More commonly cottonwood (Populus fremontii) and willow (Salix lasiandra or Salix nigra) are employed. For foundations, shoots of as uniform diameter as possible are selected and peeled, when they are about 2 mm. thick and a meter or so long. For storage they are bunched together in bundles of thirty or so and wound spirally from end to end with a piece of grass. If they are to be used as sewing splints, the end nearest the tree is divided in three parts with a knife and the osier torn in three, holding one piece in the teeth, the other two being held in the two hands. The sap wood is removed by scraping, the inner surface smoothed, and the splints wound in coils for storing. For decoration Martynia louisiana or proboscidea is highly prized and the pods are stored in bunches. Yucca root (Yucca elata or baccata) is used to give a red note in some modern baskets. Pitch of the pinon (Pinus edulis) is used to waterproof twined jars. Juniper is mentioned but there is no account of its use.

(2) For further notes see the following:

Kissell (complete study of basketry).
Russell, 1908, 131-148; plates 22-34 (see explanations in text to distinguish old and new types.)
Breazeale, (plenty of illustrations and some sense mixed up with much nonsense about symbolism and the origins of Indian inspiration. No effort to discriminate between old and new styles of design.)
Holmes, 1888, 220. (Two coiled basketry illustrations.)
Hrdlicka, 1906, 43.
Densmore, 1929, plates 7, 10.
Dorsey, 1903, 201-3.
Goddard, 1913, 148-151.

Two varieties of twined weaving are used, plain, in which a rigid warp element is used with two pliable weft elements, one passing before and one behind each warp and twisting about each other between each warp, and twilled twine. This resembles the first except that a second rigid warp element runs at right angles to the first and is caught in by the weft elements each time it crosses an upright warp. Various modifications of this latter technique are used, the most common being a diagonal twilled twine. Three ply twining also occurs.

Burden baskets are made in twilled twine. All are more or less conical in shape with rounded or reflexed bases. Notable are reinforcing ribs, which run from the bottom to the top, and a reinforcing pin at the edge. Water jars are more coarsely made in plain twine in bottle shape. They are coated with pitch. Handles for introducing a carrying strap are set in with sewing fibers or leather.

Baby carrier hoods are sometimes made in wicker technique but more commonly are twined.

Close coiling is used to make all bowls and flat dishes, elaborate jars, and eccentric shapes. Practically all coiling is in anti-clockwise direction, although sometimes apparently reversed because of the position in which the basket is made. Coiled work differs from that of the Pima-Papago in having three definite foundation splints instead of a vague multiple splint of grass. The sewing passes under or through the upper of the three rods.

Old style basket shapes were sharp pointed at the base or were small enough at the base to be unstable. Bases and walls merged almost imperceptibly and there was usually a sharp outflare at the rim. Modern shapes have better bases, a gentle curve from base to side-wall, and a slight bulge or incurve before rim is reached.

The ornamentation of coiled and twined ware is quite different. Paints and dyes are employed only on twined work, while the application of rawhide, beads, and silver buttons is almost entirely confined to this same technique. Ornamentation of twined baskets is limited to horizontal bands with few exceptions, there being from one to four on the average burden basket. There is a much wider use of design in coiled work, involving various elements as horizontal bands, radiating effects, either vertical or diagonal, and whorls (in lightning designs). Realistic designs of men, animals, birds, and flowers appear formerly to have

been rarely if ever used, but are now increasing common because of the demands of tourists.

In general Apache basketry appears to have had three historic periods. The first is little known but is marked by chaste geometric designs. The middle period, indicated by collections made about 1890, was marked by florid and completely typical designs. The modern period characterized by a return towards the earlier designs but with the introduction of new elements and shapes.

The baby carrier is an elliptical willow frame within which were fastened transverse ribs of soft wood and with a hood of reeds, sometimes woven in wicker technique, but more commonly bound with sinew. (3)

Weaving

Pima-Papago weaving has long since been discarded. Native cotton was grown. Seeds were spearated from the fiber by spreading the cotton on the ground and beating it with a switch. The spindle was a piece of arrowweed about 730 mm. in length, diameter 7 mm., with a cross bar of cactus rib 175 mm. by 31 mm. Formerly a block of wood was placed on the shaft, at least part of the time. Women spun, sitting on the ground, the left leg under them with the sole turned upward (a very typical Indian posture). One end of the spindle was held between the toes or rested in a wooden cup held between the toes. The spindle was twisted with the right hand, the left feeding in loose cotton held on the arm.

Blankets and belts were woven. Men did the weaving on a primitive horizontal loom. This appears identical with that used by the Opata, Maricopa, and the Yaqui-Mayo of Sonora. A heald or heddle and a spreader were used. There is some doubt about the heald being aboriginal but it appears in early descriptions of

(3) The above is based largely on Roberts, 1929, which see for further details. Also see (particularly for illustrations):

Hrdlicka, 1905, 484-6.
Dodge, 1900, 193-4.
Holmes, 1888, 198; 213; 223.
Roberts, 1916, 602.
Bourke, 1891, 49.
Dorsey, 1903, 182.
Goddard, 1913, 144-149.

the Opata. A detail description of the loom would take too much space here. (For further details see Russell, 1908, 148-153; Spier, 1933, 110-122 (an excellent account of the Maricopa loom with drawings and photographs). There are notes also in Bartlett, 2:225; 229; Emory, 85.)

There is no evidence the Apache ever wove.

Other Textiles

Russell describes a net of two-ply maguey fiber thread. There is no description of the technique.

Ropes of maguey fiber are made by the Papago and traded to the Pima. The technique is European. (Russell, 1908, 113-115.)

Museum Display

The rather limited basketry materials used by Pima-Papago and Apache can be shown and the steps in preparation illustrated. Pictures will show processes where necessary. It should not be difficult to secure baskets in various stages of manufacture. The number of baskets in this part of the display should be limited to the definite purpose of illustrating techniques, shapes and perhaps typical patterns. Here or elsewhere in the exhibit the contrast between the old and new in shapes and designs might be brought out profitably and should assist tourists who usually buy baskets when in this region. It would not only be educational but would stimulate the preservation of the better class of basketry techniques and styles among the Indians.

Weaving may be included here owing to its relationship to basketry techniques. A model loom may be constructed and materials, preparation, and techniques illustrated compactly and simply. The weaving products are so simple as to require very few examples (if they can be secured.)

POTTERY

Pima-Papago pottery is rather crude, far inferior to Pueblo wares. It is nevertheless pleasing in appearance. The Apache make none at all, although they are said to have done so up to about 1885.

The Pima obtain clay from several sources. Common ware which will be subjected to heat is made from clay obtained from the hills which lie on the southern border of the Gila reservation.

It is a dry granular clay with much stone which must be winnowed out by hand. It requires no temper. A whitish clay is obtained from the northeastern base of Sacaton hills and from pits near the Casa Blanca ruins as well as the river bottom near the village of Rsotuk. These clays all require a temper of sand or ground pot-sherds. Red ocher is applied as a slip to all pottery except water coolers. Black gum, obtained by boiling chips of mesquite on which the gum has dried, is applied and becomes a deep black color after burning.

The implements used are: A wooden paddle about .268 m. long by .112 m. wide (Russell, 1908, 101, illustration), an "anvil" consisting of a smooth stone about 100 cm. in diameter, and various smooth stones about the size and shape of a finger for smoothing and polishing the surface. Various digging implements and baskets are adapted from other purposes to dig and prepare the clay.

The clay is thoroughly dried by spreading on blankets in the sun, then sifted to remove larger particles of stone. It is then mixed with water, kneeded into lumps the size of the fist, and set aside to ripen over night. The base of the vessel is made by spreading clay over the bottom of an old pot of suitable size and patting it smooth with the paddle. This is allowed to dry about an hour. After removing from the "form", the edges are moistened and coils are added. The coils are made by taking a lump of moist clay and rolling it rapidly between the hands to make a cylinder about 20 cms. long. This is pinched onto the base and into rough shape. If necessary other coils are added to complete the circumference. These are then worked into final shape by patting the outside with the paddle, the inside being supported by the anvil. Each coil is allowed to dry a little in the sun before the next coil is added. Consequently two or three vessels are usually worked at a time. The vessel is held in the potter's lap while the coils are placed and patted into shape, the handle of the paddle always being downward. When the vessel is large enough, it is placed on the ground with a little sand or earth heaped up as a support and turned with the hand as needed. The outside is smoothed with the small smoothing stones dipped in water with a motion from the base upward. When the shape is completed a red slip is applied, made from a dark red shale ground in water to make a thick paste. It is applied with the hands and the surface rubbed down with a smoothing stone afterwards. The vessel is dried over night and burned the following day. Burning is in a shallow pit which has a fire built in it long enough to thoroughly dry out the soil. A little mesquite

wood or decayed willow wood is spread over the depression, the vessel placed on this and surrounded with wood laid up "log-cabin" fashion. The burning takes about twenty minutes. When cooled sufficiently, the decoration is applied, the mesquite gum being placed with a sharpened stick made from Baccharis glutenosa and the vessel is again subjected to heat for a few minutes until the deep black color appears.

Pottery shapes are the olla or water cooler, often angular in profile, a varied number of cooking vessels, including parching pans and baking dishes or flattened plates, (neither of these forms are decorated), and canteens or water carriers. Spoons or ladles do not appear to be aboriginal. Plates and cups probably are also modern. The decorations usually are crude copies of old pottery from the ruins.

Much of the best pottery in Russell's time came from the Kwahadk village. Gaillard notes that the Papago made good dark red ware with black designs but none of the cream colored ware he found common among Pimas and Maricopas. If this is true, the latter peoples have copied their modern pottery from the Papago. Most of the pottery now ascribed to the Pima and Papago is modern trade ware but there has been some effort among the better class of curio dealers in Phoenix to ascertain and sponsor the old styles.

(Most of the above description is summarized from Russell, 1908, 124-130. See also his plates 16 to 20 for steps in manufacture and shapes. Of minor importance are: Gaillard, 1894,294; Goddard, 1913, 144-145.)

The Apache are said to have abandoned pottery making about 1885. They made undecorated cylindrical cooking jars of medium size with convex to nearly conical bases. (Hrdlicka, 1905, 487.)

MISCELLANEOUS ETHNOGRAPHIC ITEMS

Weapons

Pima-Papago war bows are made of mulberry wood obtained in the Pinal and Superstition mountain, often reinforced with bands of sinew wrapped about the weak points. The curve was usually gracefully compound. The string was two-strand sinew. The arrow release was primary. (Russell, 1908, 95; plates 7, b, 13, a.)

Arrows are ordinarily made from the straight stem of the arrowweed. They are supposed to be cut the length from the tip of the forefinger to the nipple of the breast of the maker. War

arrows have three feathers. All arrows and bows are sometimes stained with the blood of a jackrabbit and war arrows may be dyed with cochineal insects taken from the opuntia cacti. Only war arrows have stone heads, fastened on with sinew which is carried about 2 cms. down the shaft. Most of the arrow heads are found in the ruins but a few are made. They are quite small, from 1½ to 2 cms. in length, usually without tangs. The quiver is of wildcat skin. (Russell, 1908, 96; 110; plates 13, c, d.)

An important old weapon was the war club of "potato masher" style, the handle end having a sharp point, the head being an inverted truncated cone, flat across the end. Pima use is not described but it may have been brought down with a smashing blow or rammed upward into the face of the enemy (Maricopa and Mohave methods). In battle a portion of the men fought with this club and a shield alone. Another weapon was a short sharpened stick serving as a lance, but this is considered to be a recent borrowing from the Yuma. (Russell, 1908, 96; Spier, 1933, 135-6; 171.)

Round rawhide shields were carried by those who fought with clubs. They are about 49 cms. in diameter (only one old specimen is known) with a cottonwood handle in the center and a loop of rawhide by which they could be slung around the neck. The front was painted in various designs. (Russell, 1908, 120-122.)

The Pimas apparently did most of their fighting with the Apache, although they occasionally aided the neighboring Maricopa against their Yuma, Mohave, and Yavapai enemies. The Apache constantly harrassed the Pima villages, necessitating an almost continual guard. In the most dangerous seasons sentinels were posted day and night. At the height of the Apache wars with the Pima in the middle and early 19th century, small parties would prowl around the villages every three or four days, stealing livestock and killing stragglers, while once a month or oftener a larger party would attack the villages. As a general thing part of the Pima war party was armed only with shield and club. Those with bows and arrows fought on horseback after the Pimas acquired sufficient animals. Various magical recitatives were performed in advance and during a planned war party or raid into Apache territory.

Warriors killed on such raids were usually burned rather than given the customary burial and in any case the bow and arrows of the warrior were broken and left where he had been killed.

On their return to the village, anyone who had killed an enemy went into seclusion for 16 days, observing various tabus, after which purification rites were performed. A victory dance was celebrated. The scalp was also purified and eventually made into

a sort of fetish, wrapped in eagle down, tied with cotton string, and placed in a long medicine basket. The Papago also placed in the basket, a mud effigy, made by an old medicine man. The scalps were believed to warn off enemies, cause rain, etc.

The Pima and Papago both appeared to fight only the Apache on their own initiative. As stated, the Pima helped their Maricopa neighbors, but the Maricopa were the ones attacked or who took the initiative. The Pima played an important part in the last attack on the Maricopa by the Yuma and Mohave in 1857 in which only one Yuma survived. (Russell, 1908, 200-206; Densmore, 1929, 193-195; Parsons, 461.)

Hunting weapons differ. Bows are of osage orange or even willow. Hunting arrows are two feathered instead of three and do not have stone points. (Russell, 1908, 95-96.)

Slings were used by young men and boys as a weapon. They were of leather, a leather piece for holding the stone, and two leather strings. (Russell, 1908, 120.)

Apache war weapons were the bow and arrow, spear, and war club. There appears no distinction between war and hunting arrows, except war arrows were poisoned by being thrust into a decomposed deer liver which had been bitten by a rattlesnake and mixed with crushed tarantulas and scorpions. The effectiveness was probably magical, although tetanus may have resulted from wounds by such arrows. Bows were from four to five feet in length, backed with sinew to produce the so-called Turkish bow. The arrows were a reed-like shaft with a hardwood fore-shaft to which was attached a point of flint, obsidian, or chalcedony, using sinew and mesquite gum. The arrow point was usually notched to receive the sinew wrapping. (Hoffman, 1896, 284, method of attachment.) The making of Apache arrowpoints was unusual in that two men worked together, one holding the point and the awl or punch, the other striking the blow by which the flake was detached.

The club of the Apache was quite different from that of the Pima-Papago, being an oval stone encased in rawhide with a handle attached. The spear was a long wooden shaft to which was attached an iron point with skin of a cow tail (this of course is post-Spanish.) (Dorsey, 1903, 186; Hoffman, 1896, 284; Fowke, 1896, 140.)

The Apache had a variety of ceremonies connected with war which have not been described in detail. On his first four war parties a Chiricahua young man must not scratch himself except with a special stick and must drink water only through a tube.

(Bourke, 1892, 490; 494.)

The Apache, particularly after the introduction of horses, became parasitical nomadic raiders who lived largely by warfare. They raided far into Mexico, and also attacked Pima, Papago, Hopi, Zuni, and Navaho, the latter dating raids back in the early 18th century (Mindeleff, 1891, 35; 86.) That Hopi tradition goes back no further suggests again a late date for the Apaches in Arizona.

Museum Display

Part of a case should be devoted to a display of weapons, although little interest can attach to them without pictures of use. The contrast between hunting and war arrows can be shown in the Pima-Papago collections. The contrast between Apache bows and clubs and Pima-Papago bows and clubs is of interest. Unhafted arrow points and hafted arrows side by side will indicate technique. Possibly a small map showing the alignment of tribes in southern and western Arizona may be of interest in connection with weapons and warfare. The Pima, Papago, Maricopa (and their absorbed tribes, Halchidoma, Kveltchadom), Cocopa, and Kohuana were universally friendly and equally hostile toward the Yuma, Mohave, Yavapai, and western Apache. So far as I know there are no pictures of war scenes in this region. Spier, 1933, gives some vivid verbal descriptions of pitched battles between Yuma and Maricopa which might be used to reconstruct a scene.

Clothing and Ornament

Pima-Papago men wore a breechclout and, in cold weather, a cotton blanket or a deerskin shirt (no details known). When abroad on the trails the men wore red dyed moccasins of deerskin. The rabbit skin blanket is reported, apparently made as elsewhere. The cotton blanket was worn to come down to the knees, and might be converted by the men into what appeared to be a baggy pair of trousers by running a cord between the legs attached to a girdle about the waist. The women wore a sort of kilt banging to below the knee and made of the shredded inner bark of the willow. It is attached to the girdle cord. Women also wrapped the cotton blanket around the waist, tucking in the end or wearing a belt or cord to support it. About the house both sexes wore sandals of raw hide fastened in an unusual manner. A thong passed between the first and second and the fourth and fifth toes, passing through a hole in the sole. The other direction the ends crossed over the instep and passed through holes in the heel plate at the side of the heel, thence doubling behind the heel two or three times. The heel plate was a strip of rawhide passing under the sole of the

sandal and coming up through slits on each side of the heel. (Russell, 1908, 122, 157-8; plates 37, a, b, 36, 38, b.)

Methods of adornment were concerned with the hair, tatooing, painting, feathers and beads. Men wore the hair long. At twenty they began to braid it into skeins cut off square at the bottom. They were normally wound about the head and confined with a woven band or cord. The front hair was cut off squarely across the forehead. The ear locks were sometimes braided with ornaments of shell, bone, and, later, tin and scarlet cloth. Eyelashes and eyebrows were not touched but the scanty beard was plucked with tweezers.

Children's hair was "cut" with a coal whenever it reached the shoulders, the portion cut off being mixed with clay and plastered on the head a few hours to stimulate growth. Children must never touch their own hair after it was cut off.

Women banged their hair as did the men, over the forehead, but left the rest grow long and hang free, carefully combing it twice a day and bathing it about once a week, first plastering it the night before with mud and mesquite gum (which dyed it black).

Finger nails were bitten off when invonveniently long.

Hairbrushes were made of the roots of Sacaton grass, or, modernly, fibers of Agave lechuguea or Yucca baccata, a bundle being bent over in the middle and bound with cord for some distance.

The face and often the body was painted. Ochers and other minerals were kept in bags of deerskin or cloth and mixed with grease before applying. Russell (1908) illustrates some of the face designs.

Tattooing was done with a needle made by wrapping two to four thorns from the prickly pear together with native cotton and sinew. Charcoal, powdered in water, was the coloring matter, burned from either willow or mesquite. Both men and women did the work, but women operators were thought more successful. The needles were dipped in the charcoal mixture and the face washed with it. Men were tattoed along the margin of the lower eyelid and in a horizontal line across the temples. Across the forehead passed a band made of wavy transverse lines or short vertical zig-zags. Occasionally a band was placed about the wrist.

Women had the line on the lower eyelid and two vertical lines on each side of the chin from the lip to the lower edge of the

jaw, united at the top with a band across the lower lip which included the outer third of the muccus membrane.

Both sexes, but especially men, wore strands of beads suspended from ear lobes and necks. Beads and gorgets were disks cut from sea shells, stone, bone, (carved and decorated), small deer bones, and turquoise. Similar ornaments were worn by women on both wrists, and by men on the right wrist, the left having a protector against the bow string made of soft coyote skin or rawhide. Persons of bravery pierced the nasal septum and wore a skewer of polished bone through it or suspended a turquoise or shell from it.

Men wore the soft breast feathers of the eagle, turkey, or other large birds in their hair. A special war headdress was made of eagle, hawk, or owl feathers and one is noted which contained the hair of a slain Apache as well. Contestants in the relay races wore a special hooked skewer in their hair. Women twined into their hair coronets of sunflowers or cornhusks. (Russell, 1908, 116-117; 118; 158-163: Culin, 1907, 673 (two poor photographs) 674 (two sketches).

Apache men's dress formerly consisted of a loin cloth and buckskin moccasins with a hard sole and upcurving toe. The best type have long soft uppers reaching to the thighs. They are sparingly decorated with painted designs and bead work. Elaborate beaded moccasins were made entirely for trade in modern times. Women wore the same moccasins as men. Men also wore a buckskin passing over one shoulder and tied under the opposite arm.

Women wore a ceremonial dress of a short buckskin shirt, open at the sides and reaching to the hips, with V-shaped openings at the neck. Beaded designs on this were usually in red, white, and black about the yoke. Below this was one or two rows of tin pendants. Buckskin shirts worn were very heavy with a long fringe about the upper portion and the bottom.

Men and women wore necklaces of many-colored beads, some in simple multiple designs, other worked into a band with designs. Women wore earrings with pendant strings of beads and both sexes wore bead bracelets.

Men wore the hair loose or in two double-over rolls at the back of the head. Women let it hang loose, cut to the length of the shoulders and banged over the forehead, unless they were unmarried. Then it was worn in an hour-glass shaped roll in a double loop at the back of the head, fastening over it a peculiar figure eight shaped piece of leather ornamented with brass buttons.

This was removed and usually destroyed at marriage. Two or more eagle feathers were attached by buckskin thongs to the hair of the men. (Dorsey, 1903, 183-185; Reagan, 289-290; Hrdlicka, 1905, 489-490; Mallery, 1893, 755; Goddard, 1913, 140.)

Minor Manufactures

The Pima-Papago make leather tobacco pouches of buckskin ornamented with vividly colored symbols of the sun and provided with rattles, usually of tin cylinders, attached to buckskin strings passing through holes in the edge of the pouch. A buckskin cord is attached to the top for suspension.

Tobacco smoking formerly was largely ritualistic in its significance. Cane cigarettes were originally made as offerings at various shrines. There was no tabu on boys smoking at an early age but it was discouraged. The usual reply to a boy's request for tabacco was, "I will give you tobacco when you kill a coyote." Apache tobacco pouches are very similar. (Russell, 1908, 118-119.)

Stone pipes were occasionally used, although apparently always taken from the ruins, never made. They are of the tubular type and are employed by doctors in sucking or blowing the bodies of the sick to expel disease and for other ceremonial usage. (Russell, 1908, 112.)

Games

The Pima-Papago had a large number of games, most of them being widely distributed among neighboring tribes. Best known is perhaps the kicking ball races which were frequently intertribal, covering courses many miles in length. A variant of this was like our modern relay race. Many gambling games were played, the most common being that widely known in the Southwest under the name of Quince (Spanish name). (Russell, 1908, 171-181; Culin, 1907, Dice game, 146-152; hand game, 295-296; hidden ball, 336; 353-356; arrow game, 389; hoop and pole, 489; ring and pin, 551-552; shinny, 631; ball race, 670-675; double ball, 659-660; shuttle cock, 717; quoits, 724; Spanish games, 794; running races, 806; pictures on pp. 671; 673; 674.) The Apache games recorded are less numerous, probably because the descriptive material is poorer. Hoop and pole games were most important, and like many Indian games, had a ceremonial significance. Women were not permitted to see them. (Goddard, 1913, 164-5; Culin, 1907, dice, 86-91; archery, 385; hoop and pole, 429; 449-457; cat's cradle, 762, fig. 1034; pictures, 86, 89; Dorsey, 1903, 187.)

Musical Instruments

These were extremely simple. The Pima-Papago used flageolets of cane, basket drums made by turning any basket upside down and pounding with the hands or striking with a stick, notched sticks placed on a basket as a resonator, and various rattles. Except for the gourd rattle, the disk, belt, cocoon, and other rattles seem to be of recent Yaqui origin. Rattles of the dew claws of the deer were formerly used. (Russell, 1908, 166-170; Densmore, 1929, 3, various plates; Bartlett, 2:223 shows deer hoof rattle.)

The Apache use a flageolet, a one string violin (not a musical bow) of European origin, and a water drum, made in Bourke's time of an iron kettle partially filled with water and with a piece of well-soaped cloth drawn tightly over the opening. Formerly a pot of clay and a deer skin were undoubtedly used. The stick is a withe bent into a circle at one end and struck against the drum head with a side to side motion. (Bourke, 1892, 462; Hrdlicka, 1905, 488; Dorsey, 1903, 190.)

Ceremonial and Religious Regalia

Certain objects of ceremonial and religious usage may be referred to here as they afford possible museum materials. For the Pima these include eagle feather aspergers (two feathers tied to a stick and used to sprinkle water or exercise sickness), effigy figures of leather, wood, or feathers, prayer sticks (arrowweed sticks with feathers attached), ceremonial wands, and wooden masks (these are probably of Yaqui manufacture). The Papago make objects in certain ceremonies which are miniatures of all objects they desire in abundance and which depend on water for their existence. They use a bull-roarer made of two pieces of saguaro wood tied with a connecting string, the smaller piece of wood serving as a handle, gourd ceremonial masks, and canvas clown masks. (Russell, 1908, 187; 107, 123; 116; 106-107; 108; Densmore, 1929, 139; Mason, 1920, 16-18.)

Pima ceremonialism is not well described, Russell doing little more than list the objects employed. Papago material is somewhat better. (For sources see Densmore, 1929, 82 et. seq; 137 et. seq; Brown, 1906; Gaillard, 1894, 295 et. seq; Mason, 1920; Davis; Parsons, 1928; Yarrow, 1881, 98-99; Grossman; Kissell, 169-172.) These references include religious concepts, curing and magic, and all types of ceremonies. Curtis should have some material but has not been consulted in the preparation of this paper.

The Apache use the bull-roarer also, decorated with anthropo-

morphic or kachina-like figures. They make considerable use of color symbolism and have rather more clearly defined deities than the Pima-Papago. Of prime importance are medicine bundles, medicine hats, and medicine cords. Tule pollen is used much as the Pueblos use corn meal and sand altars are reported but not described. (The principal sources on the Apache are Bourke, 1892, 1891a; Reagan, 301 et. seq; Hrdlicka, 1905, 489; 193.)

Museum Display

With the exception of weapons (dealt with above), little can be done in the way of vivifying this material without inordinate effort. Clothing will be well taken care of by models made for other displays, unless it is desired to have a special set of models for this purpose alone. Face paint designs and the use of various ornamental objects, may be shown. In the main the ceremonial paraphernalia is not spectacular in itself and unless it can be shown in use in a model of some phase of the ceremonies, it cannot be livened up to any extent. With some research it might be possible to reconstruct a curing scene or puberty dance. However, much of the ceremonial material is not illustrated or is inadequately illustrated, so many difficulties would intervene.

POLITICAL AND SOCIAL ORGANIZATION

As there is little suitable for simple museum display, I merely append the sources. (Pima, Russell, 1908, 182-200; Parsons, 1928. Apache, Reagan, 301; 309-315; Bourke, 1892, 1890; Hodge, 1910, 63 et. seq.)

DISEASE AND CURING

This might properly come under the discussion of religion and ceremonialism. References to paraphernalia and concepts will be found in the references given above. A list of plants is, however, known for the Pima. (Russell, 1908, 79-80.) It is undoubtedly incomplete.

Museum Display

Specimens of plants and their uses may be shown along with the food plant exhibit or may form a small separate case.

INTELLECTUAL CULTURE

A large body of myths and poetical prayers and songs are used by all three peoples. These are in a large measure inaccessible in adequate translations. Russell's Pima translations

warp the form of the original text almost beyond recognition and give no real flavor of the original. (Russell, 1908, 206 et. seq; Densmore, 1929; Walton and Waterman; Goddard, 1918; 1919a; 1919b; 1920; Lloyd.)

Historical annals were kept by the Pima by means of mnemonic stocks. These had a mark for each year and sometimes a symbol. They were meaningless, however, to anyone but the owner. (Russell, 1908, 34-36.)

Museum Display

A sketch of one of the mnemonic sticks and a portion of the annals with their symbols as given by Russell should be interesting. Emphasis should be laid on the different concept of what is historically important. Such a chart could be placed almost anywhere convenient in the museum room.

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The following abbreviations are used in the bibliography:

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