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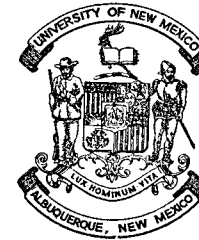
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The University of New Mexico
Bulletin

Ethnobiological Studies in the
American Southwest

*V. The Utilization of Mesquite and Screwbean
by the Aborigines in the American Southwest*



By
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University of New Mexico

and

EDWARD F. CASTETTER, Professor of Biology
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*Given to U. N. M. in memory of
Dr. E. F. Castetter Prince Pierce*

March 1987

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V. THE UTILIZATION OF MESQUITE AND SCREWBEAN BY THE ABORIGINES IN THE AMERICAN SOUTHWEST

DESCRIPTION OF PROSOPIS

Standley (132:350-53) lists four species of *Prosopis* inhabiting the American Southwest, two of which have played an important part in aboriginal economy.

Prosopis chilensis (Molina) Stuntz, is one of the best known plants of both Mexico and the arid regions of the United States, whereas its close relative *P. pubescens* Benth. is less widely distributed, being most abundant in the Colorado River and Rio Grande valleys. These appear in the literature under a variety of names. *P. chilensis*, in the United States and Mexico, is known under the names of *mesquite*, *mezquite* (from the Nahuatl *mezquitl*), *honey mesquite*, and *honey-pod mesquite*. In Mexico it is known by a variety of names, such as *mezquite blanco*, *mezquite amarillo*, *mezquite colorado*, *chachaca*, and *tahi*. Standley reports the following names as having been applied: *guisache* by the Indians of Michoacán and Guerrero, *chúcata* by the Tarascans of Michoacán, *tziritzequo* in Michoacán, *mezquite chino* in Tamaulipas, *quatrá* by the Cochimi of Baja California, and *ttáhi* by the *Otomí*. In Panama it has been called *manca-caballo*, in Nicaragua, *acacia de Catrina*, and in the Philippines, *aroma* (132:351, 352). In early Spanish accounts of the Southwest, and even today in South America, it is designated as *algaroba*. According to Martinez (92:286) the name mesquite in Mexico applies not only to species of *Prosopis*, but also to species of the genera *Cassia* and *Inga*. *P. pubescens* is frequently spoken of as *screwbean*, *screw-pod mesquite*, *mescrew*, or given its Spanish name, *tornillo*.

The heavy, compact, very durable wood of *P. chilensis*, which takes an excellent polish, as well as that of the screwbean, when large enough in size, has been used for furniture,



Map showing the conservative distribution of *Prosopis chilensis* (Molina) Stuntz. By conservative distribution is meant the territory in which the species constitutes a type.

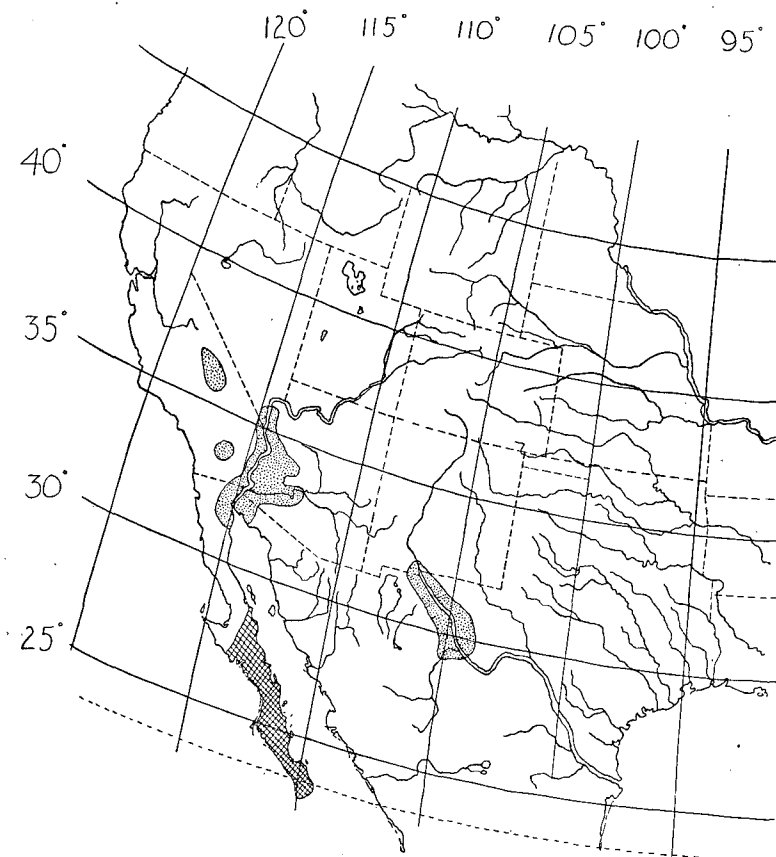
railroad ties, carts, fence posts, mine timbers, charcoal, fuel, etc., and in San Antonio and Brownsville, Texas, as paving blocks for their streets. Both the wood and bark have been employed in tanning, as the wood contains 6.21 per cent and the bark 3.54 per cent of tannin (132:351; 64:457; 48:17-8, 19; 92:288).

The shrubby form of *P. chilensis*, found towards the northern limits of the mesquite range, develops an enormous underground growth, known in Chihuahua as *cepa*. It is obtained at great expenditure of energy but makes excellent firewood, and in many places has been an important source of fuel (132:351; 48:17; 92:288).

The gum, which exudes from the tree, is produced mostly around knot holes and injuries of old trees with thick, cracked bark, although occasionally it may be found on young vigorous, smooth-barked trees. The secretion may be increased by incisions in the bark, and while the gum is of good quality it probably never will become an important article of trade as the yield is less than a pound a year per tree. It is called *mezquicopal* (from the Nahuatl *mizquicopalli*), *goma de mezquite*, and *goma del pais*. This translucent, amber-colored product is very similar to gum arabic, and often used as such in Mexico, where Delgado (40) has studied mesquite gum and concluded that it is possible to use it advantageously as a substitute for catechu. In this connection Hernandez (70:511), in 1790, referred incorrectly to the plant in Mexico as the true acacia of the ancients and from which gum arabic was produced. Chemically it differs from gum arabic in being unaffected by basic lead acetate, as in a solution of the latter it throws down a thick, white precipitate. In Mexico (92:288), some merchants have adulterated mesquite gum by mixing with it *huizache* gum which is of inferior quality. According to Martinez (92:288), mesquite gum is produced chiefly in May and is gathered before the rains. In the province of Sonora, the secretion is used as food by dissolving in sweetened water.

It is also used in preparing sweets; and an infusion of it is used for gargling and as a remedy for dysentery.

From reading the accounts of many of the early travelers in the Southwest one would be led to infer that the



Map showing the distribution of *Prosopis Palmeri* S. Wats. in Baja California, and the conservative distribution of *Prosopis pubescens* Benth. By conservative distribution is meant the territory in which the species constitutes a type

foliage of *P. chilensis* is extremely palatable. On the contrary, it has been the observation of the authors, as well as the contention of Havard (64:475), that while sheep, goats, cattle, and horses may browse it, mesquite foliage is incorporated in a subsistence or starvation diet at times

when more palatable food is lacking. It has been reported that, on the lower Rio Grande, when cows ate the young leaves in early spring their milk became bitter (64:457; 48:24-5).

The flowers are much frequented by bees and yield a good quality of light-colored honey, a source of revenue to bee keepers along the Salt and Gila rivers in Arizona (132:352; 48:24).

The pods, however, are the most important part of the plant. The pulp has a grape sugar content of 25 to 30 per cent, and the whole beans, when eaten by livestock, are comparable in nutritive value to the best types of forage. In San Antonio, Texas, before the advent of railroads, when grain was scarce, the pods were regularly brought to market and sold for a dollar a bushel. In the Hawaiian Islands, where the species was introduced by Catholic missionaries about the year 1830, and where the plant has become widely naturalized from sea-level to about three hundred meters, and is an article of some commercial importance due to its use as stock feed, the fruits also are gathered in large quantities and ground into meal for human food (132:352; 64:458-59; 48:19-24; 46:177). Some writers designate the *algaroba* of these islands as *P. dulcis*, but it is quite generally agreed that it should be called *P. chilensis*. In the early days of the Spanish occupation, when ships traded regularly between Acapulco and Manila, mesquite was introduced into the Philippines where it has become naturalized. Naves described it from that region as a new species, *P. vidaliana* (132:352).

Prosopis cinerascens A. Gray, found in southwestern Texas, Tamaulipas, and Nuevo León, is a pubescent shrub thirty cm. high, armed with long slender spines and having leaves bearing eight to twelve pairs of oblong leaflets, one and one-half to three mm. in length. The mature fruit measures from one and one-half to four cm. in length. It most closely resembles *P. pubescens* in that it has a twisted pod, but is easily distinguished from the latter by the capitate flower clusters (132:350).

It can be stated with almost complete certainty that *P. cinerascens* never attained any degree of importance as an article of diet among the aborigines of the Southwest, as it is limited in distribution to the margins of this area.

Prosopis Palmeri S. Wats., *palo de hierro*, inhabiting parts of Baja California and central Sinaloa, is a shrub or tree with spreading crown, sometimes as much as seven and one-half meters high, clothed with a rough bark which splits off in long strips. The leaflets are four to seven mm. long, the flowers bright yellow and fragrant, the fruit pubescent and almost terete at maturity (132:351).

Dr. Forrest Shreve, in correspondence with the senior author, writes that *P. Palmeri* is distributed over southern Baja California as far north as El Coyote and Coral de los Angeles, and in central Sinaloa as well. Dr. Ira L. Wiggins, by correspondence, states that it is confined to Baja California, where it ranges from the vicinity of Santa Rosalia south to the Cape region, being nowhere very abundant. Goldman (57:334), in his journey through Baja California, reported first finding it while crossing the rugged backbone of the peninsula near Guajademi on his way from Mulegé to La Purísima, being more abundant on his route from Matancita to La Paz, and occurring as the principal species on the more fertile soil of arroyos at altitudes between thirty and one hundred-fifty meters. He added that Brandegee recorded the species as abundant on the high, rocky mesas near La Purísima and Comondú.

Although *P. Palmeri* is a tree of sufficient size and productivity to warrant its inclusion in the diet of the Indians of Baja California and central Sinaloa, the species is not economically important within the limits of the Southwest as delimited by the authors in an earlier paper (28:2).

The two species of significance as food plants in the Southwest are, in order of importance, *P. chilensis* (Molina) Stuntz and *P. pubescens* Benth.

Prosopis chilensis is a shrub, or tree, with thorny branches and deciduous foliage consisting of bipinnate

leaves, borne singly or in clusters, composed of one, or, seldom, two, pairs of pinnae three to six inches long, with eight to fifteen pairs of leaflets one to two inches long and one and one-half to three lines wide, linear-oblong in shape, rigid, varying much in size, dependent on age and conditions of growth. The petiole of the leaf is two to four inches long, minutely stipulate and bears at its apex a cup-shaped gland and filiform appendage. The short-pedicel flowers are five-parted and a line or more in length, borne in axillary, short-peduncled, cylindrical spikes, one and one-half to four inches long. While greenish at first, the exerted stamens cause the older flowers to assume a conspicuously yellow color. The calyx, which is short and seldom equals half the length of the corolla, is smooth and bears at its summit short, acute teeth.

The greenish or yellowish-white petals are narrowly long, free, smooth on the outside, woolly within and at the apex. The ten straight, exerted and diverging stamens bear versatile anthers, and are at least twice as long as the corolla. The short stipitate ovary is crowned by a style fully as long as the stamens. Mature pods, four to eight inches long with ten to twenty seeds, are whitish yellow, mottled with red and borne in clusters of two to twelve on the same peduncle. A thick tough mesocarp divides the tough, ligneous outer wall of the quadrate pod from the inner papyraceous one. Seeds are obliquely arranged within the pod, inclosed in separate, flat casings, and, when mature, occupy almost its entire breadth. Each seed is suspended in the pod by a long coiled funiculus and consists of an embryo with ascending radicle and flat foliaceous cotyledons (64:452-53).

Scientific nomenclature for this plant is far from uniform. In Torrey and Gray's Flora it is given the name *Algarobia glandulosa*. This, however, is a synonym of *P. juliflora* (Swartz) DC., under which the plant is most frequently described in the literature. This latter, however,

is a synonym of *P. chilensis* (Molina) Stuntz based upon the earliest collection of the plant (132:1657).

P. chilensis is a variable species, but there appears to be no good basis for separation of the various forms. Some of the specimens from Mexico exactly match those from Jamaica, but many specimens show sufficient differences to warrant their designation as varieties. It may be mentioned, in this connection, that early writers state the mesquite of Jamaica is not a native plant, but was introduced in early days, very probably from Mexico (132:352).

One variety of *P. chilensis* is *P. chilensis velutina* (Wooton) Standl., also variously known as *P. odorata* Torr., *P. articulata* S. Wats., and *P. velutina* Wooton. This is distinguished from the typical *P. chilensis* by the small pubescent leaflets. Many specimens, especially those from Mexico, are so intermediate that it is not possible to recognize this form as other than a variety. If it were to be given rank as a species, Standley (132:353) is of the opinion the proper name for it would be *P. odorata* Torr. This name was based upon a flowering specimen of the present *P. chilensis velutina* and the fruit of *P. pubescens*, and for that reason has been discarded by most writers in favor of *P. velutina* Wooton. If the specific name *odorata* is to be used at all it seems reasonable to apply it to *P. chilensis velutina* rather than to the screwbean, since the term *odorata* applies to the fragrance of the former. *P. articulata*, another synonym, was based upon a form in which the pods are strongly constricted between the seeds. Specimens show great variation in this particular, the prominence of the constrictions being dependent, apparently, upon the amount of fleshy material developed in the valves (132:353). In correspondence with the senior author, Dr. Forrest Shreve, of the Desert Laboratory at Tucson, Arizona, writes: "I regard *P. velutina* as a distinct species, but there is not a general agreement in reference to this."

Another variety is *P. chilensis glandulosa* (Torr.) Standl., sometimes given specific rank as *P. glandulosa* Torr. If the material from the West Indies and the United States

were studied in comparison with that from Mexico, as has apparently been done by recent writers, *P. glandulosa* might well be considered a distinct species. The leaflets are usually glabrous, but often they are quite as pubescent as in *P. chilensis velutina*. Specimens from Peru and Argentina are so much like the plant of the United States that, if they were labeled as coming from the latter country, their determination as *P. glandulosa* would not be disputed (132:353). Most investigators are agreed that the algaroba of South America and the mesquite of the Southwest are one and the same.

The authors, in considering the use of mesquite of the Southwest, will follow the conservative classification of Standley (132:351-53, 1657-58) and Sudworth (133:165-66) and consider all forms of economic importance among the aborigines as variations of *P. chilensis* (Molina) Stuntz.

Prosopis pubescens Benth., designated by some authors as *P. odorata* Torr. and Frem., is a shrub or tree, attaining at times a height of ten meters, with a trunk often thirty cm. in diameter, armed with stout, whitish spines. The leaves are compound and deciduous, the pubescent leaflets one cm. long or less. Flowers are greenish, in spikes five to eight cm. long, ultimately developing a yellowish, spirally twisted, indehiscent fruit three to five cm. long. The wood of the plant is close-grained, very hard, brittle, and covered with a brownish bark (132:350).

Britton and Shafer (133:166f) have adopted, for this species, the name *Strombocarpa odorata* (Torr.) A. Gray, based either on *S. odorata* Torr. or on *P. odorata* Torr. The genus *Strombocarpa* A. Gray is commonly treated as a synonym of *Prosopis* Linn. (133:166f).

HABITAT AND DISTRIBUTION

P. chilensis has been quite extensively studied with reference to its environmental relationships. It is essentially a deep-rooted plant, able to tap ground-water where the water table is fifty to sixty feet below the surface. Also, it is excellently adapted for utilizing atmospheric precipita-

tion and is greatly resistant to drought. Because of these latter characteristics, mesquite, to some extent, spreads to the uplands where the ground water lies too far below the surface to be reached by its deeply penetrating tap roots. On the upland area, alkali flats, or stony bluffs its growth is generally that of a scattered, gnarled, stunted shrub, unless able to secure water abundantly from underground sources. Mesquite attains tree-like proportions as to height and size of trunk where the perennial supply of water or zone of saturation in the soil is near the surface, or even as much as fifty feet below the surface, provided the soil is of such nature as to be readily penetrated by the roots. Its size becomes progressively smaller as the depth to the water table is increased. Ranchers of southern Arizona regard mesquite as an indicator of water and at times follow its roots in the digging of wells. *P. chilensis* is found at its best on the flood plains bordering rivers. Its greatest expression of xerophytism is displayed on the uplands, being almost mesophytic in nature when growing under conditions of abundant moisture (3:22, 196; 22:17, 114-17; 23:41-2, 156; 24:80; 25:420-23, 505; 35:35, 47, 89; 64:454-57; 73:47; 74:47; 91; 100:183; 101:306-11; 99:42-54; 102:20; 118:15, 16, 40; 123:52, 144-49; 124:204-06; 127:9-12; 134:52, 56).

Screwbean (*P. pubescens*) is a close associate of mesquite, yet may be considered as a typical ground water plant, being confined to rich valley soils where the roots can reach water, while the latter frequently inhabits the uplands (99:54; 134:52, 56).

P. chilensis finds a congenial home throughout the Lower Austral Zone in Mexico, and extends to Chile and Brazil. It flourishes in Texas, New Mexico, and Arizona, being by far the most common tree or shrub of the immense desert tracts drained by the middle Rio Grande, the Gila, and the lower Colorado. Northward from the mouth of the Rio Grande it disappears from the coast and recedes inland twenty or thirty miles, remaining at about the same distance from the sea all the way to Victoria and Columbus, Texas. From there the line of its eastern limit runs directly

north, passing approximately through Dallas, Texas. Bending slightly westward, this eastern limit crosses the Red River and enters Oklahoma, passes north of Fort Sill, Oklahoma, crosses the Canadian River and strikes the 37th parallel, where the 100th meridian intersects it. Its approximate northern limit is the 37th parallel, i. e., the southern boundary of Colorado and Utah, although it does occur in the southern portion of the latter state. It occupies the southern point of Nevada, and, at its extremity, bends southward towards Fort Tyon. The western limit is the rather uncertain line made by the western margin of the Mohave and Colorado deserts. It extends into the Colorado Delta region and from there spreads over nearly the entire Baja Californian Peninsula (2:354; 3; 8:3, 241, 245, 404, 413, 415, 428, 432, 477, 486, 522; 19; 23; 35; 48:16; 57:334; 64:451-52; 69:I, 344; IV, 141, 142, 144, 162, 303; 73:46-8; 74:47; 77:63; 83:154-55, 174, 211, 213, 215, 218, 219; 92:289; 89; 97; 98:15-7; 116:I, 15-31; 124; 127; 132:351; 134; 136:287; 139:330; 46:177). Dr. Ira L. Wiggins, in correspondence with the senior author, states that this species extends from southern Utah and Nevada to Chile, with breaks in the moist tropics. He writes that in Baja California it is common in all the desert regions from the International Boundary to the tip of the peninsula, except in the Upper Sonoran Zone of the Sierra San Pedro Mártir and the Sierra de La Laguna. *P. chilensis* has been reported also from near Shreveport, Louisiana.¹

Dr. Forrest Shreve has most kindly supplied a more conservative map of the distribution of *P. chilensis*, as well as maps showing the distribution of *P. Palmeri* and *P. pubescens*, which are reproduced in this article. He adds that, if *P. velutina* Wootton is given rank as a species, it would completely replace *P. chilensis* (Molina) Stuntz in most of Arizona and Sonora.

1. Dr. Ivan M. Johnston, Research Associate of the Arnold Arboretum, informed the authors, by correspondence, under date of Nov. 25, 1937, that this species is probably native in some of the West Indies, for example Cuba. Also that it is clearly introduced into Hawaii and Asia, probably by way of the Acapulco-Manila route. He is not certain as to its nativity in Chile, but suspects that it is introduced, and that it may be native in Peru.

Dr. Wiggins writes that *P. pubescens* is found along the Colorado River delta and along the eastern slopes of the Sierra Juarez, just south of Mexicali. In 1929, he collected it along the banks of a small desert stream at the foot of the grade dropping down from the village of Alaska in Baja California. This, so far as he knows, is the southernmost limit for the species on the peninsula, being about thirty or forty miles south and a trifle west of Mexicali. On the Sonoran side he observed it growing on the mesa just back from the Colorado River, about the margins of grassy playas, where he collected it in 1937 at a point about twenty or thirty miles south of the Arizona-Sonora line just below Yuma and Gadsden. He adds that it is also common on the Bill Williams Fork north of Bouse, Arizona, near the old mining town of Planet, and occurs sparingly along the western edge of the Colorado Desert. Coulter (34:95) and Havard (65:455, 468, 499) list it in Texas as abundant along the Rio Grande, and many of its tributaries from El Paso to Devil's River. The authors have observed it abundantly in the Rio Grande Valley as far as a little north of Bernalillo, New Mexico. In the latter state it has also been reported along the Pecos River.

ARCHAEOLOGY AND EARLY HISTORY

In tracing backward the aboriginal usage of any given plant, archaeological data are of utmost significance, yet in this study they are not stressed, for certain obvious reasons. The archaeological finds of mesquite may be the beans or pods within a storage container, where they have escaped the ravages of fire and rodents, the meal adhering to some food bowl, the mortar in which the actual grinding was done, or the wood preserved as some implement, building material, etc.

The archaeological work in the Southwest has been most extensive in those sections where mesquite was not extensively used or not used at all. Fewkes (47:92, 150) reports the finding of mesquite beans during excavation of

one of the rooms at Casa Grande, Arizona, while Harrington (62:59) in the excavation of Mesa House, in southern Nevada, found several screwbean pods and encountered both screwbean and mesquite pods during the excavation of Gypsum Cave, Nevada (63:26, 82, 194). Bandelier (8:488) referred to a funeral jar found at Casa Blanca which was sealed with mesquite gum and clay.

Rock mortars have been found at Casa Grande (47:128), and bedrock mortars are reported quite generally throughout the range of mesquite and screwbean, yet it can only be surmised that their use was formerly the same as at present, and for that reason a detailed account of such finds is omitted. Likewise the archaeological record of other uses to which mesquite was put is too fragmentary and speculative to be of service in this study.

There remains, however, another avenue which has proved especially fruitful in pointing to the use of mesquite as having remained unchanged from the aboriginal to the historic period. It is fortunate indeed that the earliest explorers and missionaries have, in some cases, left rather extensive descriptions of the uses made of mesquite and screwbean by the inhabitants of the Southwest at the time of these early European intrusions.

Cabeza de Vaca, in the narrative of his journey from coast to coast, between 1528 and 1536, related having encountered Indians, probably in the Colorado Valley, who gave his party a great quantity of flour of *mezquiquez*. He described the fresh fruit as quite bitter, but rather sweet and wholesome when eaten with earth. The fruit was prepared by mashing the pods with a large club in a hole in the ground. Soil was mixed with the pods during the beating process, then the mixture thrown into a basket-like jar, covered with water, and additional earth stirred into it until sweet. Each Indian then took out a handful, sucked the juice, and threw the coarser portions upon a skin, whence they were collected and again placed in water. This was repeated several times and their stomachs became greatly

distended by the earth, meal, and water which were swallowed (107:89).

Several years later, Castañeda (138:515-16), chronicler of the Coronado expedition of 1540-42, writing of the region of Petatlan in Mexico (along the present Rio Sinaloa, and evidently the Cahita Indians), said "The nature of the country changes here very greatly, because from this point on there are no trees except the pine, nor are there any fruits except a few tunas, mesquites, and pitahayas." He also observed: "They made bread of the mesquite, like cheese, which keeps good for a whole year." Similarly, Alarcon (60:XIV, 392), who left Acapulco, Mexico, to join Coronado, and who ascended the Colorado River in 1540, wrote of the Indians in that region: "And that I might knowe what maner of foode they had, I made a sign unto them, that wee would gladly eate, and they brought mee certaine cakes of Maiz, and a loafe of Mizquiqui . . ."

In the narrative of the Espejo expedition of 1582-83, mesquite is referred to as one of the three mainstays of the diet of Conchos tribes dwelling along the Conchos River in Chihuahua, Mexico; also mention is made of the fact that, below El Paso, a group of Indians belonging to the Tanpachos nation, and evidently nomadic, brought to the explorers a large quantity of mesquite. Moreover, at, and in the vicinity of, the pueblo of San Bernaldino (which seem to be Pataragueyes Indians), north of the junction of the Conchos and Rio Grande rivers, the natives brought the party screwbeans for food (90:50, 69, 126). Similarly, Obregon (108:274, 276), in his history of sixteenth century exploration in western America, observed that everywhere along the Conchos River the tribes came out to receive the explorers in a friendly manner, with presents of mesquite, tamales, prickly pears, and deerskins, and that the Conchos and Rayados supported themselves on mesquite, prickly pear, etc. Also the Cabris presented the discoverers with ground mesquite pods and mesquite bread. On his expedition, Oñate sent a party up the Colorado River to visit

the Mohave Indians, and found that these people obtained considerable food from mesquite and the seeds of grass, which were gathered in large quantities.¹ Additional data on mesquite in Mexico were supplied by Ximenez (141), in 1615. A third of a century later Perez de Ribas (111:6-9, 284, 671) observed the use of mesquite by the Yaqui of Sonora, the Indians of the coast of Sinaloa, and the Lagunero Indians; also that Sinaloa and Lagunero Indians made an intoxicating drink from the pods. Icazbalceta (80:II, 303) also reported the use of mesquite as food by the Sinaloa Indians.

Padre Velarde was perhaps referring to mesquite beans when he wrote, in 1716, that the principal harvest of the Pababotas (Pimas who eat beans), was the bean called *papavi* (140:128), while Captain Anza (12:II, 51, 172, 261, 263, 280) later wrote of the use of mesquite bark among the Yuma to make fabrics, and that the women wore skirts made of the inner bark of willow, cottonwood, and mesquite. He received from them gifts of *frijoles*, calabashes, and screw-beans. In describing the migratory life of the Papago he mentioned their reliance upon mesquite, as well as how the Cajuenche (Serrano) lived on these beans, together with mescal, from the mountains, and rabbits, which they hunted. Similarly, Font, who accompanied Anza on his second expedition, mentioned the use of mesquite timbers at Casa Grande (12:IV, 37). Of the Pima he wrote (12:IV, 44), "... and perhaps because they eat much péchita, which is the mesquite pod ground and made into atole, the tornillo, grass seeds, and other coarse things, when they are assembled together one perceives in them a very evil odor." In another place he speaks of the use of péchita and tornillo among the Gileños. According to his account the Yuma had good crops, although tornillo and péchita were gathered for variety (12:IV, 99); he added that they were offensive because of their bean, mesquite, and tornillo diet (12:IV,

1. "Juan de Oñate and the Founding of New Mexico." New Mex. Hist. Soc. Publications in History, v. 2, p. 166, ed. by G. P. Hammond, 1927.

103). In speaking of the Quémeya (Kamia), he probably was including a number of the Yuma tribes between San Diego and the Colorado River. They regularly lived on the beans of mesquite and the tule. Like Anza, he noted the cakes of mesquite and tornillo meal made by the Cajuenche (Serrano) (12:IV, 131, 482). Garcés, who was likewise a companion of Anza, recounts that the Indians living about three and one-half leagues south of Santa Olaya, relied upon mesquite and "... on another bean which has the shape of a screw" (12:II, 330).

In 1780, Clavigero (30:I, 66), writing of Mexico, observed that mizquitl, or mesquite, as the Spaniards called it, was a kind of true Acacia and the gum was true gum Arabic, as Hernández and other learned naturalists had already testified. He described the plant and noted that the sweet edible fruits contain seed which formerly the Chichimequi made into a paste which served as bread. Later, writing of Baja California, this same author (31:10) recorded that its wood was used for the curved parts of boats, and that the twigs were mashed and applied to the eyes to relieve soreness. He found the tree in abundance on the plains between the mountains and the Gulf of California. The Cochimi Indians called it *quatrá*, the Mexicans, *mizquitl*; and the Spaniards, *mezquite*. Clavigero's information was evidently, in part at least, based upon the work of Hernández. The latter (70:II, 511) described the habit of the plant, its edibility and pleasant flavor, and mentioned the preparation of cakes from the fruits, these being used by the Indians as a kind of bread. He observed that there were several kinds of mesquite. The secretion from the bark mixed with water relieved eye troubles, while a decoction of the bark checked menstrual flow.

A few years later, Pfefferkorn (112:I, 121-24; II, 142-43) wrote that the petschita, the fruit of the mesquite tree, was a food material of the Sonorans. "The fruit which the mesquite tree frequently bears is highly prized by the Indians. It is called petschita among them, in the form and

size of a bean pod, only that it is flattened and filled with little kernels somewhat the size of a lentil. As long as the tree stands, it retains its green color, also till complete maturity. First, if they (fruit) are taken from the tree and dried they become dark brown. The Indians like them uncommonly because of their sweetness, and often eat so immoderately of them that they become ill; for the fruit is very hot (heating) and constipates if they are not taken with discretion. Someone called me once to an Indian who was thrown to the ground by a sudden attack so that he lay there without speech, without moving, and almost without sign of life. But his feeble pulse assured me that he was still alive. It was June, when the petschita is ripe everywhere. This fell to my good fortune. I suspected the condition to be caused by an immoderate appetite, especially since I saw that his belly was expanded like a drum. Therefore, I took a little feather and tickled in the throat until the movement made him vomit. He did it honestly and threw up such a quantity of undigested petschita that I could not conceive how his stomach could have held such an amazing heap. The patient immediately came to himself, and when he noticed me together with several Indians he was so ashamed that he took flight immediately without saying a word . . . " Besides eating the fruit fresh, the Indians also collected the pods, dried them in the sun and stored a supply for the household. They either roasted the pods, ground them between stones, and mixed this meal with water, which they drank (no wine could be more agreeable to the taste), or they pulverized the unroasted pods in a wooden mortar, poured water on it, and cooked a very sweet mash out of it, which they regarded as quite delicious. Said Pfefferkorn, "I have tried it myself, but it was not so attractively healthy, that I should have wanted to eat more. Perhaps I might have become accustomed to it in time." The pinole and atole which these Indians made were more agreeable than those from maize, because of their natural sweetness.

At the end of the first quarter of the nineteenth century, Pattie (135:94), Indian trader and trapper, noted that the Indians of New Mexico and Arizona pounded mesquite pods in a mortar and made the pulp into bread, while Hardy saw the plant about the same time in Baja California on both sides of the Colorado River, and observed that the Indians in the latter region allowed mesquite pods to ferment in water in an earthen bowl. They chewed these pods to remove the fermenting liquid, then spat them back into the bowl. He recorded that the Indians of Tiburon Island engaged in this same practice (61:330-37, 434, 446). On an expedition down the Colorado River a quarter century later, Sitgreaves' men took from the Yampai (Tonto) Indians, bread made from mesquite flour. Sitgreaves also mentioned the use of mesquite and screwbean by the Yuma; and Woodhouse, naturalist of the expedition, explained how the Indians ground mesquite seeds and made bread from the flour (125:10, 19, 40, 59). At about the same time Möllhausen observed that, among the Indians of the Colorado Valley, mesquite was a valuable asset in years of poor agricultural harvests, their granaries containing an abundance of both mesquite and screwbean pods. The natives ground the beans and made them into cakes, or mixed them with either maize or wheat flour (104:II, 249, 262, 276).

NAMES AND MYTHS

Words for mesquite and screwbean are to be found in the language of the Papago, who referred to them according to the seasonal appearance of the tree (44:25, 26;38:II, 120a). Also names for both plants appear in the languages of the Pima (38:II, 120a), Western Yavapai (56:258), Walapai (87:53, 54), Mohave (38:II, 125a; 85:742), Kamia (85:742; 53:23), and Maricopa (85:743; 129:22), while mesquite was found in the native tongue of the Yuma (85:742), Kohuana (85:743), and Coyotero Apache (110:169). The Havasupai had a word for mesquite pods (128:107), while among the Maricopa the mesquite tree and its

beans were designated separately. This was not true for the screwbean (129:50). They had a designation for the cakes of mesquite meal (129:51), and the translation of the word for "burden basket" was "mesquite basket" (129:123). The Kaveltcadom had place names referring to mesquite (129:24).

Both the Mohave and the Maricopa had gentile names associated with mesquite (38:II, 113a, 116a), and it was a clan name among the Mohave, Yuma, and Apache-Mohave (13:181). The bean has totemic significance as a clan name for women among the Yuma, Mohave, Kohuana, and Maricopa, while the Mohave and Kamia have clan names based upon the screwbean (52:158, 159, 160, 162, 165). A sib totem of the Maricopa was mesquite (129:196), and names of girls were sometimes taken for different parts of the tree (129:196, 197, 204).

In the origin myth of the Walapai, mesquite and its beans were grown for the Mohave, and Coyote suggested making the tree high, and with thorns, so that gathering would be less easy. The Mohave ground the beans in a mortar, sifted the flour, and prepared it in cakes. The Creator also made the screwbean tree, its beans to be eaten and prepared in the same way (87:13). The Apache recount how the Sun and Moon consulted together, then formed a mesquite tree and hung bunches of beans upon its branches (14:211). The "Death of the Coyote" myth of the Pima tells of mesquite surviving the great flood, and of how Coyote ate so many beans that they swelled up in his stomach and caused his death (120:245). Bourke's Mohave informant related how Matavela, one of the sons of Earth and Sky, before his death, told his son to provide food for man. Mustam-ho, therefore, created corn, tobacco, and mesquite for his children (13:179).

The "Creation" myth of the Maricopa states that the Maricopa, Pima, and Yavapai, after the death of their Maker, scattered over the country and gathered wild berries, mesquite beans, and killed various game (129:352).

In the "Coyote" myth a deer was created out of the wood (129:354). The "Flute Lure" tale tells of the preparation of the bean meal by grinding, and mentions storage of the beans by packrats in their nests, and relates how a lizard stored mesquite beans, and pounded and sifted them for meal (129:369-70, 382). In another myth Blackbird and Tanager tied up a door with mesquite bark, and the "Brother-Slayer" tale relates how the mother gathered and used the bark and mud on her hair (129:409, 411).

The preceding incomplete account of the occurrence of names for mesquite and screwbean in the languages of various tribes, their totemic significance, and their occurrence in Indian mythology is, perhaps, indicative of the prolonged importance of these plants among these Indians.

USES AS FOOD

In the opinion of the authors mesquite was one of the most important wild plant staples of the Southwest, and along parts of the Gila and Colorado rivers the screwbean was of equal or sometimes greater importance in the aboriginal diet. Both Havard (66:121; 67:37) and Palmer (109:410) support this contention. The latter ranked mesquite as among the palatable staples of the Apache, Pima, Maricopa, Yuma, Yavapai, Mohave, Walapai, Cocopa, and Hopi, besides other tribes in New Mexico, Utah, Nevada, and southern California. He adds that screwbean was considered a superb article of diet by the Indians of the Colorado River and by certain Utah Indians, ". . . who collect with assiduity all they can and store for winter use." Murdock (105:328) states that mesquite was one of the plants with which the Hopi supplemented their agricultural products, especially in lean years, and Harrington (63:82) records its use by the Southern Paiute. The pods were sometimes employed by Southwestern Indians in making an intoxicating beverage (121:388).

Mesquite beans formed one of the most important, if not the most important, article of diet for the Pima of primi-

tive times (120:66, 74; 88:123; 137:54; 59:419; 38:II, 109; 71:II, 252; 94:525; 132:352). They are still an important element in the diet, although the supply is often curtailed through the activities of livestock feeding upon them and use of the wood for fuel (32:296). Grossman (59:419) states that the tree grew in abundance and that millions of pounds of beans were gathered annually. In years when their crops failed, the fruits of sahuaro (*Carnegiea gigantea*) and mesquite were the most abundant and accessible resources. When these failed in their country the Pima were forced to make long journeys into the Apache country, bordering their own land, to secure food (120:66). In exchange for articles bought them by the Maricopa and Papago, the Pima traded corn, beans, mesquite beans and meal (120:94). The harvest of mesquite occurred somewhat later than that of sahuaro (120:74), and was a tribal event, large parties constituting the expeditions, with the women the principal gatherers (130:9; 71:II, 252). The pods were collected in cylindrical granary baskets and these stored on the roofs of the houses or sheds or on platforms, where they would be safe from rodents (94:525; 10; 120:74; 89:340). The beans were prepared by pounding with a stone pestle in a mortar, or, for large quantities, with a large wooden one. Frequently the pods were ground with the seeds, or the seeds might be separated and parched by tossing them up in a basket of live coals, then reducing them to meal by grinding, after which they were prepared and eaten as *pinole* (120:75). Another method of preparation was to crush the pods or seeds in a mortar and sift them. The women then lined baskets with clean cloths on which were placed successive layers of the sifted bean, and each layer sprinkled with a little water. When filled, a piece of cloth was tied over the top of each basket and the moistened meal allowed to stand overnight. The mass caked together and could be kept for an indefinite period without spoiling or becoming wormy. It was eaten without further preparation and considered a great delicacy (88:123; 79:261). When stored in the form

of whole or dry pods, partially pulverized, they soon became a living mass, since an insect, a species of *Bruchus*, was present in almost every seed. To the Pima or any other tribe of Indians, this made little difference. The insects were not removed but accepted as an agreeable ingredient of the flour, subsequently made from the beans. If reduced to a fine flour soon after gathering, the larvae still remained within the beans and became a part of the meal, forming a homogeneous mass of animal and vegetable matter. The flour, being very sweet, formed an agreeable drink when mixed with water, and was very palatable when made into gruel (109:410). The Pima made a dough out of the freshly pounded beans, which was cooked in the form of round cakes (79:261). Another popular article of diet was prepared by roasting and grinding corn and mixing this meal with the sweet juice obtained by placing mesquite beans in cold water and bringing the whole to the steeping point (79:261). Sometimes the dry beans, after being pounded in a wooden mortar, were boiled with water until they became soft. After the water was squeezed out, the pulpy substance remaining was molded into cakes and these baked in hot ashes. The bread thus prepared had a sweetish taste and was very nourishing (59:419). Russell (120:68) states that the Pima confined their treatment of mesquite, corn, and later, wheat, and other flour to baking as *tortillas*, as loaves in the ashes, frying in suet, or mush, or with other foods in the shape of dumplings. Wafer bread was unknown.

Among the Papago, the beans, formerly an important crop, were gathered in August near the summer villages (20:39; 95:371; 76:636; 32:299; 71:II, 200; 38:II, 32, 111a; 51:293; 116:I, 22). The seeds were either ground as flour, or the seeds and pods pounded in a mortar, since they were too sticky for the metate. When gathered near home they were dried in the pods, in which case they were spread on the house-top, turned from time to time until dried and then stored in jars. If considered desirable to reduce the

bulk, the sun-dried pods were flailed to beat out the seeds, the whole then winnowed in a basket and the seeds parched and stored (26:25). Within historic times the Papago, near the white settlements, have depended less on mesquite than those farther removed from such settlements (79:23-4). They sometimes received mesquite beans and meal in trade with the Pima (23:26).

In the diet of the Apache, mesquite formerly was, and in some localities still is, a most important article (38:I, 18; 15:186; 58:62; 73:59; 45:185; 7:185; 131:458; 73:59; 45:185). Among the Mescalero and Chiricahua, the beans were gathered, boiled, pounded on a hide or ground in a metate, the mixture placed in a pan and worked with the hands until it attained a thick consistency. Formerly, the raw beans were ground into flour on a metate, but at present a meat grinder is used for this purpose. After being ground the seeds were winnowed and the flour made into bread or a sort of pancake which was regarded as a great delicacy. Frequently the whole seeds were cooked with meat and the seed coats spat out as the combination was eaten (27:41). The mesquite pod was sometimes ground for flour with which they made their favorite pinole. Occasionally the pods containing the seeds were boiled in water until the mixture turned red, the pods removed, then mashed by hand and returned to the container and the mixture "boiled down" until the result was a sort of pudding (27:41). Among the San Carlos Apache, mesquite beans ranked next to cactus fruits as a staple. They were gathered in large quantities and stored, and the fact that they might become wormy later was of no more consequence than among other tribes. They were prepared by being pounded into a pulp in a cavity made in some convenient rock. The pulp was soaked in cold water, squeezed out by hand through a basket, the remainder thrown away, and the sweet liquid drunk. Another method of preparation was to let the pods dry, pick out and discard the seeds, pound the pods thoroughly, and mix with warm or cold water. This dish was eaten as mush, without boiling

(79:258). The Tonto Apache say they lived on deer, rabbits, rats, mescal, mesquite beans, cactus fruits, and a variety of nuts gathered in the mountains (126:417). The White Mountain Apache gathered the mesquite pods when quite mature and dried them, after which they were crushed to a fine powder on the metate. The meal or pulp was mixed with water and either cooked or eaten raw (113:145). The Apache in general made cakes of the meal similar to those of the Pima (32:231; 15:131; 110:169). At times they parched and ground the seeds of the sunflower and mixed them with cornmeal or mesquite beans to form a rich cake (15:131). Holes in the rocks, which the Apache used as mortars for grinding the pods, are now commonly found in the mountains near where mesquite plants are plentiful (132:352).

September was the month of mesquite harvest for the Havasupai, and they knew but one way to prepare the beans as food. They were gathered when dry and pounded on the grinding slab. The excessively hard seeds were winnowed from the ground pod and the meal of the latter soaked in water for several hours, stirred, and the liquor drunk. The sweet, dry pods were chewed at odd times (128:107).

The Walapai used mesquite very extensively (79:260). The harvest occurred in August, at which time the beans were first tasted to see if they were ripe. Camp was then moved to a point near the scene of the gathering activity and four or five baskets of the fruit gathered for each family. If the ripe pods had dropped from the tree they were gathered from the ground, if not, they were picked from the tree and dried (87:53). After crushing on the metate, or grinding in a mortar of wood or stone, the pods were mixed with water and a little salt, and the mixture drunk or eaten. Occasionally, the seeds were crushed and eaten as mush (79:260; 87:53), or the flour made into loaves and wrapped in rabbit skins to facilitate transportation. These cakes were broken, soaked in water, and the mixture drunk (87:53). To reduce the bulk the beans were often pounded before storage. Mesquite beans, or meal in the form of

cakes, were sometimes secured from the Mohave (87:209-10, 222).

In the diet of the Yavapai mesquite was a staple (55:178, 180, 205; 56:250, 255). The ripe pods were collected in burden baskets in late July and pulverized in a bedrock mortar with a stone pestle (55:211; 56:257). It was not necessary to manufacture them as natural mortars and pestles were to be found at low altitudes near the source of the mesquite supply. Wooden mortars from cottonwood or mesquite were prepared and sometimes used, although stone mortars were considered preferable (56:280). The pestle was always of stone (56:259). Mesquite and screwbean were the only foods thus prepared (56:280). Pulverized beans were moistened in a water-tight basket, the juice expressed with the hands into another container and drunk, or the wet meal might be placed in the mouth, the juice sucked from it and the residue spat out (56:259; 55:211). For transporting, the meal was made into a cake (56:257). Mesquite beans, sunflower seeds, etc., often were stored in pottery ollas covered with stone lids, grass, and earth for winter use (55:203).

Although the Mohave are considered to have been an agricultural tribe, yet mesquite beans were a prime staple (38:II, 50, 112; 79:21, 24; 115:I, 594; 114:III (1), 115-16). Allen (1:616) states that it was their principal food in winter. The bottom lands in which they lived were a jumble of arrowweed (*Pluchea sericea*) and mesquite, with small groves of cottonwood (13:177). Mesquite trees often were owned individually and in some cases a bunch of arrowweed was hung on the tree to indicate that its yield was claimed (85:737). The women did the gathering and the pods were stored in large willow baskets and set upon platforms or atop the houses (1:616; 94:351; 13:177). Not far from the entrance of each habitation was a mortar made of the stump of a mesquite tree, the pestle for which was a large piece of lava, eighteen inches long (13:177). The pods were crushed with this pestle, or, more rarely, a wooden one, the

hard seeds remaining whole. Sometimes the meal was eaten raw, the seeds being shaken out in the hand, but more often it was mixed with water and the sweet liquid drunk. The remaining dough was carried to the mouth in handfuls, sucked out and replaced, to be soaked in water a second time before being discarded. Sometimes the fresh dough was made into a huge jar-shaped cake, covered with wet sand, and baked, and was so hard after baking that it had to be cracked with a stone. In eating the seeds were spat out or swallowed whole (85:736-37; 79:24; 87:222). The Mohave sometimes gave mesquite to the Walapai.

As one approached the dwellings of the Cocopa, the most conspicuous feature was the raised platform about six feet in height, upon which, in great baskets of willow and tule, secure from floods, storms, and rodents, were stored their most important vegetable foods—mesquite beans, corn, and beans. The mesquite tree flourished on the borders of all the lagoons and upon the overflow lands yielding a supply of beans adequate, in itself for their subsistence. For bending down the branches, a short crosspiece was lashed at an acute angle to a pole by means of mesquite bark fiber. Large quantities were gathered and reduced to meal in cottonwood mortars with a long mesquite wood pestle. The meal, after being soaked in water, was sucked for its saccharine content, after which the residue was spat out (29:203; 9:53; 82:52; 54:267, 270). Barrows records the fruit as the "staple of life" (9:56).

A Cocopa baby's first drink consisted of a few drops of water, and for four days after birth, it received no other nourishment than the boiled decoction of mesquite inner bark, administered by a woman who dipped her fingers in the concoction and allowed them to be sucked by the baby (54:289).

To the Yuma, mesquite and screwbean were very important articles of the food supply and insured them against starvation in years of irregular flood (9:56; 38:II, 66, 115a; 49:116). The trees were not exclusively owned, except

when they grew near a habitation, but families were in the habit of gathering beans from the same district each year and erecting permanent storage bins for them. The pods were stored both on or near their habitations and near the base of the mesa close to the source of supply. Large granaries were erected on platforms of cottonwood poles, and, to permit closer packing, the beans were often broken before being stored. When filled, the bin was covered with arrowweed brush and damp mud, which, in the sun, soon caked hard. The current supply was taken from the stores near the houses (49:116). A wooden mortar of cottonwood and a pestle of mesquite were used for pounding the beans (49:116; 38:II, 68). Large quantities of meal were prepared at a time, dampened, and worked into large cakes and allowed to dry. These cakes were stored about the home for long periods (49:116).

There once prevailed among the Yuma a custom of sealing the marriage contract by having the couple eat a bowl of gruel made of mesquite beans (38:II, 68).

Among the Seri, mesquite was probably the second most important article of the vegetable diet (96:207; 76:639; 50:93). The beans were gathered in a random fashion whenever a well loaded tree was found. The pods and seeds were pulverized roughly by pounding on any convenient stone, or if stones suitable for this were not at hand the beans were carried in improvised bags to a nearby place where the pounding might be done. The partially pounded beans were winnowed by tossing in a basket, and the pounding continued until a fairly uniform meal was obtained (96:207; 86:19). McGee observed this to be eaten raw, either dry in small pinches, or more often, stirred in water to form a thin atole. It probably also was prepared by boiling with water (96:207).

Mesquite was the most important wild food of the Kamia (53:23). The fruit was gathered in July, and as the low trees were too branchy and thorny to be climbed, they were either shaken, or forked sticks used to bend the

branches (53:23). The pods were stored in granary baskets closely resembling those of the Mohave and Cahuilla (53:40). Pounding was done in a cottonwood mortar with mesquite wood or stone pestle (53:41). A decoction made of the meal was drunk sweet, never fermented (53:28).

The Maricopa and Halchidhoma, likewise, placed great reliance upon mesquite (129:48, 50). The beans were gathered from early July until the end of August, and while certain trees were known for their large, sweet beans, they were not private property. Women went out in groups and several men usually accompanied them as protection. Gathering proceeded day after day until the bushes held no more, for mesquite was their staple (129:50-1). After a day's gathering, the dry beans were put on the roof of the house to dry more completely. Load after load was piled, one on top of the other, until the last load had been dried for three or four days. If the weather should turn cloudy or wet the beans were removed from the roof and covered. When thoroughly dry, they were stored away in huge granaries. A single family would have one granary completely filled, with a surplus in large pots within the house (129:51). The green beans which had been sorted out at the end of each day's gleanings were prepared at once by pounding in a mortar, and, without removing the hard seeds, the meal was placed in water for a drink. This might be boiled and used as a liquor to mix with the meal of other seeds (129:51). Maricopa mortars for pounding seeds were cottonwood or mesquite logs burned to length and with a hollow burned in the end or, less commonly, in the side. Those of mesquite are said to have been as large as those of cottonwood and, being harder, were much more highly prized (129:128). Beans that were discarded, as not of storage quality, were pounded and made into cakes. The ground meal was sifted in a Pima tray by shaking it over the edge onto a cloth. The sifted flour was poured into an elliptical hole which had been dug in the ground. The flour was sprinkled, and layer after layer added, until the hole was full, at which time it was

finally sprinkled and covered with dirt. The following morning the hard cake of flour was removed and stored away for use when the weather prevented damp pods from being prepared. A woman would prepare twenty or more of these cakes, about eighteen inches long, twelve inches wide, and ten inches thick. For use, a bit of the cake would be broken off, soaked in water and drunk, or boiled and mixed with the meal of the other seeds. It was, ordinarily, the daily task of the woman to grind mesquite pods, as this formed the basis of most food preparations, although at times a quantity was ground and stored in a pot, and eaten by the pinch with a swallow of water. Often the dry pods were boiled without being pounded and the liquor added to the meal of other seeds (129:51).

The Opatá, who call the plant *quiot*, gathered two crops of mesquite annually. The first was the young tender leaf crop appearing in April and which these Indians picked, dried, and boiled, and afterwards ate in their stews. The other crop was the ripe pods known as *pechit*, and was gathered in June. The latter were either eaten raw or stored, to be used in making atole. The gummy secretion of the bark, called *quiochucat*, also was eaten (119:153; 41:Ser. 3, IV, 524). Among the Indians in the vicinity of San Fernando de Velicatá Mission, in Baja California, the seeds of chamiso and mesquite, roasted hearts of agave, and the fruits of the cacti were supplemented by less toothsome, but more constantly available, products of animal origin (122:292).

The Pima sometimes ate the mesquite flower spikes, stripping off the flowers between the teeth (132:252; 120:75), and employed the inner bark of the plant as a substitute for rennet (120:75). They also used the white gum, which exudes from the limbs, in making candy (120:75). The Opatá smoked a fungus which grew on the tree (37:670).

Screwbeans were unsuited for use until quite dry, being insipid, but were very sweet and palatable when ripe and divested of moisture. Both the Paiutes and the Indians along the Colorado and Gila rivers considered them a superb article of diet, and large quantities were collected and stored for winter use. The pods, like those of mesquite, would keep a long time, but were subject to the attacks of the same insect. As noted before, the insect became a part of the meal upon grinding, although if the whole beans were stored without partial grinding, the insect, in time, escaped. This coarse meal underwent an enzymatic change, and after a short time acquired the desired taste. When bread was to be made from the beans or the partially pulverized meal, the whole mass was finely ground in a mortar, mixed with water, kneaded vigorously, and baked in the sun. This cake, like that of mesquite, would keep for a long time and was considered more nutritious than mesquite bread. The flour made an excellent gruel, or formed a beverage when mixed with water. A pleasant, stimulating, wine-like drink was made from the fruit. When the coarse meal was boiled with water a good syrup was obtained (109:412; 9:56).

Screwbean grew in the territory of the Yuma (49:90) and was a very important item of the diet, as both it and mesquite insured against starvation in years of irregular flood (49:116). Curtis lists it among the prehistoric foods of the tribe (38:II, 66, 115a).

Hrdlička (79:23) and Curtis (38:II, 111a) mention it among the Papago, although it was uncommon in their territory and of much less importance than mesquite. Among the Kamia, it was a close second to mesquite as a wild food; the "screws" were collected and ground in July (53:23). The Apache made a bread of the beans and seeds (131:458), and Hough (76:637) and Kniffen (82:52) rank it as important to the Cocopa, while Harrington records its use among the Southern Paiute (63:82).

The Western Yavapai also gathered screwbean in July. The pods were dried under hot ashes, pounded until finely

pulverized, and the meal soaked in water to make a drink. The wet meal was scooped up in the hand, placed in the mouth, sucked for the sweet liquid and the solids expectorated (56:258, 259).

Screwbean was less plentiful than mesquite in the territory of the Maricopa (129:50). When picked, it was sour or bitter, so was buried in a pit, located near the dwelling, until it became soft and sweet. The beans in the pit were lined above and below with green arrowweed, and the whole covered with dirt (129:51).

The plant also grew sparingly in the southwestern part of the territory of the Walapai (87:33), but sometimes was given to them by their Mohave friends (87:209, 222). The beans were dried, ground, soaked in water, and squeezed, the coarse meal being thrown away and the sweet liquid drunk. The meal often was kept in loaves (87:54, 222).

The pods were much used by the Pima (129:59) as the tree grew abundantly on the banks of the Gila. "Cooking" of the pods was done in pits lined with arrowweed bushes set on end, the beans placed in layers, alternating with cocklebur (*Xanthium commune*) leaves, and the whole covered with earth and left to stand for three or four days. It was then taken out and spread to dry, and was ready for use, or storage in arrowweed baskets on the housetops. Further preparation was done by pounding in the mortar, and the fine flour eaten as pinole. The coarser portion was taken up in the hands with water, the juice sucked through the fingers, and the remainder rejected (120:75).

Among the Mohave, also, screwbean was an important food (15:10; 71:I, 920; 79:24; 84:276; 85:737), as it grew luxuriantly along the sandy valley of the Colorado. The fresh "screws" were "cooked" by being stored in a damp pit fifteen feet across, and four or five feet deep, lined and covered with arrowweed. From time to time, water was sprinkled on the mass. After about a month, the pods turned brown and were very sweet (85:737; 1:616). Curtis lists it as a prehistoric food (38:II, 50, 112a).

Trippel, in speaking of the Yuma, probably was referring to the screwbean rather than mesquite, when he recounted how, in June, a large shed was built and the beans soaked in water and buried in the ground for two or three days, after which the almost solidified sticky mass was removed and stacked in piles in the shed. This procedure continued for several days while the harvest was in progress. Finally, at a given signal, all rushed into the shed carrying away as many bundles as possible (49:118).

The authors ascertained through Yuma informants, in October, 1937, that this tribe anciently made considerable use of mesquite and screwbean as food. Mesquite was never treated in a pit as was screwbean. The latter was "cooked" in a pit in the ground, the bottom, but not the sides of which, was lined with arrowweed. This was done in a manner very similar to that described above for the Pima and Mohave. The pods were left in the ground for about a month, or until they turned an ocher color; otherwise they were bitter. Sometimes these "cooked" pods were ground and the flour molded into cakes or the meal was later eaten as pinole.

Certain of the tribes, the Pima, Opata, Papago, and others, made a kind of effervescent beer from the beans of mesquite (18:50; 121:388; 5:586). Likewise, a fermented drink was prepared from the pods of the screwbean by the Indians of the Colorado river (132:350). The *atole*, prepared by mixing mesquite flour and water, readily underwent fermentation, producing a kind of beer, which was much relished by the Gila River Indians (109:410; 67:37); screwbean meal also could be used (67:37; 109:412). The San Carlos Apache occasionally put into their *tulbai* some inner bark of the mesquite, which "just makes the drink taste sweeter and better, so we like to drink it" (79:27).

USES OF MESQUITE GUM

Among the Pima, red pottery and cream-colored ware were decorated with a black decoction made from mesquite gum (86:46; 38:II, 6). The Quahatika prepared a brilliant

black dye by boiling chips of mesquite wood to a syrup, and this was applied with a brush made by chewing a strip of yucca leaf (38:II, 43). The mesquite chips, from portions of the tree on which black gum had dried into hard scales, was boiled in a small earthen pot, or in a segment of a large one. The dye, when applied, was so pale that it was scarcely distinguishable on the dark clay, but after the vessel had been given a slight burning the pattern appeared in deep black (120:125). This use of mesquite gum as a paint for Pima pottery accounts for the poor preservation of the figures on many of their vessels (78:44). The decoration of the Kamia pottery rattle was lines of black mesquite juice and red mineral pigments (53:44); the juice was used likewise by Maricopa and Cocopa pottery makers (54:272, 273, 277; 88:119). Among the Papago the gourd masks used in some of their dances had black bands outlined on them, made by the use of mesquite gum and oxide of iron (89:94). Sometimes a mixture of mesquite gum and charcoal in water decorated the shiny black shield of the Pima warrior (88:93).

Handles of Yuma gourd rattles were cemented into the gourd with mesquite or arrowweed gum (49:130), which also served to attach the feathers to shafts of the arrows, after which the feathers were bound in place with fine sinew (49:171). The Seri used the gum in fastening the point of the turtle harpoon into a foreshaft of hard wood, as well as to attach arrow points to the foreshaft (96:198). This use of mesquite gum to attach arrowpoints, and in feathering arrows, was quite general among the Indians of the Southwest (75:61). Apache basketry water jars were rendered water-tight by coating inside and out with the gum (42:194). The bark of screwbean was torn off in strips by the Mohave and used for binding pottery (42:275).

It was the custom of the Yuma women to wear the hair loose and flowing, keeping it clean and glossy by occasionally plastering the head with a mixture of mesquite gum and clay, which was left on for a few days and then washed off,

leaving it black and lustrous. The uncut hair of the men was divided into a large number of small tresses, each of which was plastered with mud and mesquite gum and coiled into long pencil-like rolls (49:97).

The Mohave men wore their hair in long tresses or curls, which were never cut except at the edges, as a sign of mourning. These locks were dyed with the black gum exuding from mesquite, mixed with the blue mud of the river bottoms (13:176; 79:14). The women and children likewise plastered their heads with mud and mesquite gum to restore the rich blue-black color, faded by exposure to the sun, and to kill vermin (85:729; 13:177; 79:14). Since the nits survived and hatched the application of mud and gum was repeated frequently (85:729).

To overcome the more or less rusty color caused by the sun, the Pima dyed their hair with the juice of mesquite, mixing this substance, which was obtained by boiling the exudation formed especially on old trees, with fine river mud. The paste was applied for one or two nights and washed off in the morning. This treatment caused the hair to remain beautifully black and glossy for a long time (50:45; 78:45; 79:14; 88:57; 59:414). Sometimes the gum was diluted with warm water and applied as a wash before the mud was laid on. The mud killed vermin and cleansed the hair as does soap, and the gum was believed to darken the hair and prevent it from growing gray (120:159). The hair of the Kamia frequently was washed in a boiled decoction of black gum from the bark of mesquite. This enhanced its natural blackness and was thought to stimulate growth. Mud also was boiled in this decoction and plastered on the hair for the same purpose and to kill lice, or mud alone might be used for the latter purpose (53:36). The use of mesquite gum and mud likewise was practiced by the Maricopa and Cocopa (79:14; 129:100; 54:279).

The Southeastern Yavapai picked up mesquite gum from the ground, boiled it with mud, and tied the mixture on the head for a day and a night. The mud killed the lice, the gum

blackened the hair. It was believed necessary to wash out this plaster and put on a new application before daylight, lest the sun "burn up the hair and turn it red or yellow." Three or four consecutive applications were made (55:229). This also was the practice of the Northeastern Yavapai, among whom sexual intercourse was taboo for twenty-four hours or more while the mud was left on, otherwise the hair would not dye properly (56:278). The Western Yavapai did this to rid the hair of lice; the gum also dyed the hair, and the mud helped it to grow (56:278).

At arrival of puberty among Yuma girls, the mother prepared a plaster of mesquite gum and clay, which the girl put on the heads of any men who came to her home at the time during which the puberty ceremony was being observed. The men left this mud in their hair overnight, washing it out the next morning. On the night of the fourth day the mother plastered the girl's hair with clay and gum, which was allowed to remain until morning, when she bathed and the puberty ceremony ended (38:II, 72). Font made almost this same observation when accompanying Anza on the latter's Californian expedition (12:III, 336). Forde, in his account of this ceremony, states that the heads of the girl and all visitors at the ceremony were covered with a paste, made by mixing mud with the adhesive fluid obtained by boiling a quantity of mesquite bark, or with the pulverized root of arrowweed (49:152). He states the girl received this treatment for four consecutive days, each morning her hair being washed, deloused, and replastered.

A Pima warrior, after killing an Apache, underwent a cleansing ceremony of sixteen days, divided into periods of four days each. At the beginning of the second interval, his head was plastered with mud and mesquite gum, which was not washed out until the night of the eighth day. The performance was repeated without mud on the ninth morning, and on the evening of the twelfth it was washed out (59:416-17).

Following a war expedition, the Maricopa warriors stopped at the Salt River and observed a sixteen-day purification period, likewise divided in four-day periods. During these sixteen days the warriors were given only a little soup of mesquite bean flour, and that only at dawn as the sun barely appeared above the horizon. Each night of the second four days, every man daubed his head with a mixture of mud and boiled mesquite bark (129:181).

USES AS MEDICINE

Among some of the Mexicans and Indians, the tips of mesquite branches were rubbed up in water, allowed to stand over night, and then applied as a lotion to cure sore eyes (17:125). The Pima also used a solution made from the gum in treating sore eyes and open wounds (132:352; 120:79). They sometimes placed a small piece of mesquite gum in the eye and kept it there as long as the patient could bear it. The tears dissolved part of it, coloring the eye brown and occasionally the remedy was of assistance (79:245). For sore eyes, the Papago boiled the juice, and after cooling, put some of it into the eyes; they likewise used it for soreness of the eyelids (79:242). The Maricopa dried the juice, ground it fine, and applied it as a powder to the lids, but not to the eye itself. After a time it was washed off with warm water (79:247).

The Yuma frequently used an infusion of mesquite leaves to relieve painful micturition in cases of gonorrhoea (49:204). A decoction of the inner bark was taken by the Pima as an emetic and cathartic (132:352), while that of the root bark of screwbean was used as a dressing for wounds, and, as the wound healed, the dried and pulverized bark was substituted (132:350; 120:79). Mesquite sap served as a remedy for sore throat, the juice, together with the bark over which it flowed, being boiled and the resulting tea drunk hot. It was said to cure when the soreness was "deep down" (79:245). The sap found further use as a remedy for pimples and sores, common on the face and hands of children,

while the boiled sap was applied directly to the sores and was said to heal them (79:245). Mesquite "froth" (probably a decoction of the plant) was used by the Opata to heal ulcers (119:153; 41:ser. 3, IV, 524).

For chronic indigestion, the Papago collected the inner bark of mesquite, pounded it as fine as possible, and boiled it in water to which salt was added. The sick person took a dose of the decoction early each morning (79:242). A tea, made from the macerated bark of mesquite twigs, was one of the most common cathartics used by the Yaqui, and a tea made of Brazilwood and mesquite leaves was used to relieve fainting (72:84). The gum was used in the treatment of ant bites (72:85). For umbilical hernia, the Maricopa made a tea by boiling mesquite roots, which had been cut in small pieces, and administered this to the child. Sometimes large black ants were gathered and allowed to bite the swelling (79:248). An albino was thought to be caused by the pregnant mother eating mesquite beans or other products which had been gnawed by a gopher (129:313). At birth, the Pima generally cut the umbilical cord about one and one-half inches from the body, and to prevent or cure soreness of the cord they applied powdered bark of mesquite, finely ground red pigment (probably ocher), pulverized dry creosote bush (*Covillea glutinosa*) mixed with fine dry mud from the river, or the dry spores of a little puffball (79:74).

The Tewa are supposed to have obtained screwbean pods from the Mescalero Apache. These were twisted into the ear as a cure for ear-ache (117:69).

It was regarded as very dangerous by Mexicans and Indians to stand under a mesquite tree during a storm due to the danger of being struck by lightning (17:130).

USE OF MESQUITE WOOD IN GAMES

One of the most important of the Papago games was a foot-race by two men, in which a ball, usually made of mesquite wood, was kicked along by each contestant (89:358-59; 23:25; 37:670), or sometimes the ball was of mesquite gum

(37:670-71). About six miles from Caborca, in the Papago country, stands an old mesquite tree which used to be the goal of the Papago ball players (89:149). Among the Yuma, the ball race was played by two or more men, each of whom used a ball of mesquite wood about three and one-fourth inches in diameter. Starting level the ball was lifted on one foot and flung as far as possible, then sent forward. The runners carried the ball in this manner out and back over a prearranged course of two to five miles each way (49:132). Foot-cast ball of the Kamia, both a men's and a women's game, was a form of shinny, with six players to a side. The ball was of willow bark string or mesquite wood, although the latter was considered dangerous, as a player struck on the head with the ball might be killed. The women never used the mesquite ball when playing the game (53:45). Two connected balls of mesquite bark were used by the Cocopa women in playing shinny (54:281). The Pima played a game known as "kits" using mesquite sticks (37:151). Pima footballs, usually of wood and sometimes covered with mesquite gum, have been found (37:671). Their kicking ball was about the size of a croquet ball, made either of mesquite or palo verde wood, and covered with creosote bush gum (37:671).

USE OF MESQUITE AND SCREWBEAN WOOD AS FUEL

Rotten mequite or screwbean wood was used by the Kamia as fuel, willow being regarded as unsatisfactory because it burned too quickly (53:20). As a rule the dead wood was the source of fuel for the Yaqui (72:71). San Carlos Apache women cut most of the mesquite wood needed in the household while the men cut wood for sale (79:32). Like the Kamia, the Maricopa considered mesquite branches the best firewood. Men would burn down and break up the wood, but it was the women's task to carry it home. The men, however, would kindle the fire to warm the house in the evening. The fire, over which cooking was done, was built of several large chunks of wood at the sides, with

smaller sticks between (129:79). A mesquite fire was used to bake their pottery. The pots were lifted out with a pair of sticks, and a fine gruel of ground mesquite beans poured into them, while still hot, to make them non-porous (129:107-08). Designs, which turned black on firing, were painted on the exterior of the pots and bowls, using the chewed end of a little stick to apply a decoction of boiled black mesquite bark (129:108). Mesquite sticks were used to make the fire, before which Cocopa pottery was baked, and to heat the juice for the Papago ceremony of *Vikita* (39:175; 54:272). Two green mesquite poles formed the sides of the Cocopa funeral pyre (54:294).

USE OF MESQUITE IN TATTOOING

Mesquite charcoal was used by the Yuma in tattooing girls, as a ceremony associated with the puberty rite. Pricking and scratching with cactus thorns and rubbing in the charcoal was the means employed, and the operation was performed by a relative, usually a woman (49:155). Tattooing was also practiced by the Kamia as a sort of puberty rite, taking place after the first menses. The design was often placed on the girl's face, although sometimes vertical lines were also tattooed on the chest. Mesquite charcoal was rubbed on first, then the skin pricked with a splinter of deer leg bone, the pattern being completed in one operation (53:36). The Cocopa used two or three mesquite thorns tied together as needles to tattoo a girl on the chin after her sixth or seventh menstruation (54:277).

Piercing the nasal septum with a needle of screwbean was a boy's puberty ceremony with the Kamia, and without this operation a boy could not marry (53:54). A similar practice existed among the Cocopa, who pierced the septum with either a mesquite or a screwbean thorn (54:291).

USE OF MESQUITE AS FIBER

The Cocopa women made baskets from mesquite roots (29:203), while a small pointed mesquite stick was used by

the Yuma for inserting the binding willows in their coiled basketry (49:125). The Havasupai never used mesquite for twined basketry; *Acacia Greggii* was used instead (128:128).

Merrill (103:237) lists mesquite bark as one of the materials used as woof in Mohave basketry, while the Kamia considered mesquite inner bark, and later cowpea vine, the strongest fibers for string. In the preparation of the inner bark of both mesquite and willow for string, it was placed between two layers of arrowweed, and immersed for a month in a pool, being weighted down with a log. Spinning was done on the bare thigh (53:32). Their warmest garment, the rabbit-skin blanket, was made of narrow strips of skin. While fresh, these were twisted around mesquite-bark fiber string, these stretched tight, and the rabbit-skin allowed to dry (53:33). The mesquite bark fiber, sometimes used in making warrior girdles, was dyed black by soaking for four days in water containing black mesquite-bark gum (53:34). The rectangular arrowweed cage for mocking birds was lashed with mesquite-bark string (53:48).

Cordage, among the Seri, used for purposes other than apparel, was commonly made of fiber extracted from roots of mesquite or stipes of agave. Usually it was well twisted and notably uniform in size and texture. Such fiber was used in making bowstrings, harpoon cords, *balsas*, as well as native fabrics. The agave stipes or mesquite roots were rotted in convenient lagoons, and then hatched with a *hupf* or the edge of a shell. The fibers were then gathered in slender wisps of loosely wound coils. The fibers were next sorted patiently into strands, sized in the fingers, and twisted by rolling on the thigh, the strands being subsequently combined in similar fashion. Fabrics woven from these resemble coarse bagging (96:228-29). The bundles of canes used by the Seri in the manufacture of the *balsa* were wrapped and held together in a cylindrical form with mesquite root fiber, three such bundles being lashed together with cordage of mesquite root or agave fiber (96:216).

To transport meal or dried fruit the Northeastern Yavapai used a carrying frame of mesquite, sahuaro, or juniper (56:285).

Fringed petticoats of shredded bark were once worn by Papago women (76:636; 109:410-11). Beargrass (*Nolina* sp.), young ocotillo (*Fouquieria splendens*) stems, splints of sahuaro ribs, and, occasionally, wheat straw (in post-Columbian times) formed the foundation element for Papago baskets, with mesquite and other barks as the binding element; the Pima used wheat straw for the foundation and willow or mesquite bark for the binder (81:137).

For coarse coiling the Pima, in post-Spanish days, used a foundation element of wheat straw with binding material of willow, mesquite, acacia, or the bark of a few other trees, while the Papago, for foundation, used beargrass, wheat straw, or ocotillo, with a binding of mesquite bark or yucca. Willow bark, mesquite bark, and other barks were stripped from the standing tree, and only a little removed from each, so as not to injure growth of the tree. Bark had to be used while still green, or, if allowed to dry after cutting, it had to be well soaked before pliable enough for use (81:183).

The hairbrush of the Maricopa was a bundle of stiff fibers (fresh roots of a tall grass), bent at their middles, and bound together with mesquite or willow bark (129:100).

A musical instrument, used in the Corn Festival of the Pima and Maricopa, consisted of three upturned, flattish baskets upon which had been spread a layer of mesquite gum. This, when rubbed with a bone, produced a sound somewhat resembling a squawk or shriek (21:688).

USE OF MESQUITE IN BUILDING

Mesquite, cottonwood, and willow provided an abundance of building material for all the Gila and Colorado River tribes except for the Quahatika, who used only ribs of the giant cactus (38:II, 42). Numerous stave-like ribs of mesquite were tied to horizontal poles to form the walls of the early Pima dwelling (38:II, 6-7), and often the roof

supports were of mesquite (88:7). The supporting uprights and rafters of many of the Papago dwellings were of mesquite fastened together with yucca twine, and atop this dome-shaped framework was piled coarse grass or brush (89:7-8, 51; 45:203; 76:636). Likewise the uprights for the tiny sheds that served as storehouses were of mesquite poles (89:86), as were also the rude fences which, in the historic period, surrounded the fields of both Papago and Pima (89:37, 91). In some sections, the Papago made a hole in the ground of sufficient depth to hold their dead in a sitting position, and erected over it a roof of mesquite or palo verde poles taken from the deceased man's own house (89:11). Mesquite logs were commonly used in Yaqui architecture for the supporting columns and horizontal beams (72:72). The low ceiling of their houses was influenced by the fact that the forked mesquite trees did not offer very long vertical posts without involving excess diameter and crookedness. The wood later found further use as fence posts (72:76).

The low, semi-globular summer-house of the Yuma was nothing more than an arbor to protect them from the sun. This was made by thrusting willow saplings into the ground, and bringing these together at the top, then covering the exterior with mesquite boughs (45:200). The bows of the Seri habitation were of ocotillo and the tie sticks mesquite, sahuaro ribs, ocotillo, etc. (96:221). Mesquite posts, about thirty inches high, supported water jars and were located beneath sheds built against the Maricopa dwelling (129:88).

USE OF MESQUITE FOR CRADLES

The Yuma cradle was made by the father immediately after birth of the child. A slender length of mesquite wood was bent to a long U-shape on which flat transverse slats were lashed, then hoops of mesquite wood curved over the upper end as a frame for the awning. This form of cradle was found also among the Mohave and Pima (49:160). The women made the cradle of the Northeastern Yavapai, the frame of which was of mesquite wood (56:283). Among

the Kamia, the sides and top of the cradle were of a U-shaped half loop of peeled mesquite root, with crosspieces of the same material, attached so as to form a sort of ladder. The crosspieces fitted transversely between the two sides of the cradle and were lashed into place with split pieces of small mesquite roots. The cradle hood was made of thin mesquite roots split in two and woven in wicker technique (53:39). Cradles of Papago and Pima were constructed of mesquite root, sahuaro ribs, cat's claw (*Acacia* sp.) and willow, with a binding element of sinew, thong, or fine mesquite roots used while still green (81:147).

USE OF MESQUITE AND SCREWBEAN FOR WEAPONS

Yuma war clubs and spears were fashioned from mesquite. The clubs were of two sorts, a short one and a long tapering truncheon. The spear was simply a stabbing stick made from a four-foot stake of mesquite sharpened at one end and hardened in the fire (49:170-71). Mesquite also afforded the best bow wood but it was difficult to obtain a suitable straight length, and willow was, therefore, most commonly used (49:170). The main shaft of the foreshafted arrow was of light cane (*Phragmites communis*) while the tip was made of arrowweed or mesquite, about six inches long, pointed and hardened in a fire, and wedged tightly into the cane (49:171). The Cocopa, like the Yuma, possessed two types of war clubs, made either of mesquite or screwbean wood (54:274).

The club of the Northeastern Yavapai was of mesquite or cat's-claw and had a rounded or ball-like head with no sharp edge. It was about fifteen inches long with buckskin about the handle, leaving a loop to suspend the club from the wrist (56:287). A potato-masher type club, of mesquite, was used by the Western Yavapai, with the wrist-strap put through a hole in the handle. Throwing clubs of the Northeastern Yavapai were of mesquite or cat's-claw (56:288), while those of the Kamai were made of screwbean wood, and were used especially to kill jackrabbits (53:28).

The bow of the Kamia was of the simple type, usually of mesquite, screwbean, or willow, and equipped with a string of deer sinew (53:28). Their war club was of mesquite or screwbean, of the potato-masher shape common to the Lower Colorado tribes. The handle was perforated for suspension from the wrist by a cord (53:30). The bows used by the clowns in the annual harvest festival of the Papago were of crooked mesquite roots with strings attached (89:93). A Maricopa boy's bow was of mesquite, while war clubs used by the men were of mesquite or ironwood (*Olneya tesota*) (129:133, 135).

Among the Havasupai, oak and ash were commonly used for sinew-backed bows, although mesquite also was used if it contained a dark streak (128:148). The mallet-headed club of mesquite was a weapon of the Mohave, as was a straight-stick club of screwbean. The straight club was for breaking heads, the mallet type was thrust upward to crush an opponent's face after his long hair had been seized with the free hand (85:751). The Pima club was of heavy mesquite, about sixteen inches long, half handle and half club proper. With it they struck an enemy on the head (59:416). In battle, the Maricopa and Halchidhoma carried a feathered pike of mesquite wood. It was a sort of standard and the bearer was in the front of the battle, in which sense he was a sort of leader (129:165-66).

MISCELLANEOUS USES OF MESQUITE AND SCREWBEAN

Two simple agricultural tools were used by the Yuma, the weed cutter and the planter or dibble. Both were of mesquite wood and similar to the Mohave tools (49:112). The Kamia dug wells in the subsea-level floor of Imperial Valley with a mesquite wood shovel (53:9). Holes for the posts, which supported the dwelling, were made with digging sticks, and sand for covering the roof and banking the walls was shoveled with a mesquite or screwwood shovel. Weeding of crops was done with a sword-like, flattened piece of mesquite (53:22). The digging sticks were made of hard

screwbean or mesquite and were about four feet long and two inches in diameter sharpened by burning. Mesquite roots were dug by means of it, and it was also used by the men for digging out and killing beaver (53:43).

Among the Seri, the mainshaft of the turtle harpoon was of cane or mesquite root (96:187). The end poles of the fish nets used by the Yuma were usually of mesquite or willow (49:120). The paddles used by the Maricopa in pottery making were of mesquite, as was also the weaving sword used to ram in the picks (129:108). The fire-drill of the Havasupai consisted of hearth and drill. The hearth was a section of the dry flower-stalk of beargrass (*Nolina microcarpa*), while the drill was of dry mesquite root. Other materials might be used but beargrass and mesquite were regarded as best (128:143).

For the first four days after birth of a Maricopa child the faces of mother and child were anointed with preparations made by boiling mesquite beans, which were then strained and boiled down to a syrup, which was mixed with red paint. This was said to take the grease off their faces (129:312).

Mesquite was associated with some tribal customs of the Mohave. When the first baby was born the father bathed from head to foot twice a day, at sunrise and sunset, in one of the sloughs, fasted all this time and did not touch salt. When the fast was ended he still curtailed his diet, especially avoiding mesquite and pumpkin seeds for thirty days, after which he could eat as he pleased. Failure to do this was believed to result in future sterility of the mother. Four days of fasting and lustration only were required at subsequent births.

At the time of the first menses, a young maiden was buried up to the armpits in the hot sand; this was supposed to develop the muscles of her arms, legs, and breasts; she ate no mesquite, meat, corn, salt, or pumpkin—nothing but grass seeds and, later, muskmelons, and also drank no

coffee. The Mohave believed she would grow rapidly for five months thereafter and then stop (13:183-84).

* * * * *

The uses, as well as the methods and extent of utilization of mesquite and screwbean, as described in the following pages, were verified for the Colorado and Gila River tribes, by the authors. On an extended mission of field study in October, 1937, all the tribes along these rivers were visited, and detailed investigation made as to aboriginal economy with reference to mesquite, screwbean, and other wild plants. Considerable negative evidence regarding the utilization of these two plants was also obtained in field work among Pueblo Indians of the Rio Grande, the Zuñi, and the Acoma, in the fall of 1937.

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