

four of the Mexicans."

The arrangement for grinding is described by Castañeda, in connection with Tiguex; but we introduce ^{his account} ~~him~~ here, as the manner of milling was essentially alike in all the pueblos; he ~~indicates~~ relates:

"They keep the separate houses where they prepare the food for eating and where they grind the meal, very clean. This is a separate room or closet, where they have a trough with three stones fixed in stiff clay. Three women go in here, each one having a stone, with which one of them breaks the corn, the next grinds it, and the third grinds it again. They take off their shoes, do up their hair, shake their clothes, and cover their heads before they enter the door. A man sits at the door playing on a fife while they grind, moving the stones to the music and singing together. They grind a large quantity at one time, because they make all their bread of meal soaked in warm water, like wafers."

Footnote *Winship's Castañeda, Bu. Eth. Ann. XIV, 522.

Of milling in recent years at Zuñi itself, we have the following account by Mrs. Stevenson:

"The Pueblo mills are among the most interesting things about the town. ~~These~~ These mills, which are fastened to the floor a few feet from the wall, are rectangular in shape, and divided into a number of compartments, each about twenty inches wide and deep, the whole series ranging from five to ten feet in length, according to the number of divisions. The walls are made of sandstone. In each compartment a flat grinding stone is firmly set, inclining at an angle of forty-five degrees. These slabs are of different degrees of smoothness, graduated successively from coarse to fine. The squaws, who alone work at the mills, kneel before them and bend over them as a laundress does over the wash-tub, holding in their hands long stones of volcanic lava, which they rub up and down the slanting slabs, stopping at intervals to place the grain between the stones. As the grinding proceeds the grit is passed from one compartment to the next until, in passing through the series, it becomes of the desired fineness. This tedious and laborious method has been practiced without improvement from time immemorial, and in some of the arts the Zuñians have actually retrograded."

Milling in the pueblos of the Hopis, is described by Mr. John G. Owens in the Journal of American Ethnology and Archaeology (1893) as follows:

"In every house will be found a trough about 5 feet long, 2 feet wide, and 8 inches deep, divided into three or more compartments. In the older houses the sides and partitions are made of stone slabs, but in some of the newer ones they are made of boards. Within each compartment is a stone (trap rock preferred) about 18 inches long and a foot wide, set in a bed of adobe and inclined at an angle of about 35°. This is not quite in the center of the compartment, but is set about 3 inches nearer the right side than the left, and its higher edge is

Copied by Morgan in his
Archaeology of the
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footnote.

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against the edge of the trough. This constitutes the nether stone of the mill. The upper stone is about 14 inches long, 3 inches wide, and varies in thickness according to the fineness of the meal desired. The larger stone is called a mata and the smaller one a mataki. The woman places the corn in the trough, then kneels behind it and grasps the mataki* in both hands. This she slides, by a motion from the back, back and forth over the mata. At intervals she releases her hold with her left hand and with it places the material to be ground upon the upper end of the mata. She usually sings in time to her grinding motion. *

⁷Op. cit., Vol. II, p. 63; also quoted ~~Mindeleff~~ by Winship in Bu. Eth. Ann. XIV, p. 522. For illustrations of Zuni and Hopi milling, see Plate VI of Sitgreaves' Zufi and Colorado River Report, and the plate ~~Mindeleff~~ already cited for Hopi wafer-bread-making. For plan, views, and descriptions of Hopi mealting troughs, see Bu. Eth. Ann. ~~Mindeleff~~ Rep. VIII, Figs. 20, 101, 105, and related text by Victor Mindeleff.

To corn and beans, ~~which alone are~~ mentioned by Coronado as staple food-plants of Cibola, some of the other accounts, as translated by Winship, add "melons"; but in one instance at least—the Relación Postrera—the Spanish word so translated is "calabazas," which, as applied to food-plants ~~which alone are~~ in the Southwest, commonly means ^{squash or} pumpkins, ~~which alone are~~ and, even if in some of the contemporary accounts of Cibola the Spanish text reads "melones," ^(as in the letter of Melchior Diaz) it is quite certain that true melons (Cucumis spp.) were not cultivated by the Pueblo Indians until after the coming of the Spaniards. ~~which alone are~~ Squashes ^{and pumpkins} (Cucurbita ^{maxima} and C. pepo) are ^{believed to have been} indigenous in North America, and one or both, together with gourds (Lagenaria spp. and Cucurbita spp.), were found to be ^{already} under cultivation by the aborigines of a great portion of present United States territory—both east and west—at the advent of Europeans. ~~which alone are~~ All so-called "melons" seen in the pueblo region at the time of Coronado's coming thither, were either ^{squash or} pumpkins; ~~which alone are~~ while at the same time gourds were raised ~~which alone are~~ to serve as utensils. ~~which alone are~~ In certain instances

*Of the gourds, besides the strong-shelled, long-necked, flask-shaped *Lagenaria* (calabashes) used for rattles, dippers, and canteens, etc., other forms—some of them apparently species of *Cucurbita*—were anciently in use among the Pueblo Indians. From a ruin in Cañon de Chelly, I have seen a small, well-preserved gourd that was ~~bilobate~~ ^{or pyriform;} ~~the somewhat smaller~~ it contained a quantity of small, unidentified seeds, and was associated with ~~receptacles~~ made of reeds fastened together.

seeds
of wild gourd about

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er in the form of cylinders 3 or 4 inches in diameter, containing ^{large} dark-colored beans. According to Doctor Russell, (The Pima Indians, page 91,) three species of wild gourd—Cucurbita foetidissima, C. digitata, and Apodanthera undulata—are quite common along the Gila River. The first-named of these, according to Rydberg, (Flora of Colorado, page 325,) ranges as far north as Nebraska and Colorado; its fruit is a fleshy globe, 2 or 3 inches in diameter. "The seeds of this wild gourd," says Russell, "are roasted and eaten."

In Early Far West Paper, No. 1, we have seen that, in his letter to the viceroy, reporting what the San Pedro River Indians said as to the products of Cibola, and after mentioning other food-plants, Melchior Diaz wrote, "y otras simillas como chia." This we translate, "and other ~~seeds~~ ^{Seeds} ~~such as~~ such as chia." Chia is not noticed by any of the annalists of Coronado's expedition, as one of the agricultural products of Cibola; but the same is true of all the lesser plants—except beans—that were regularly cultivated by the Cibolans and Tusayans in their small terraced gardens, and elsewhere in New Mexico and Arizona then and much earlier, as is attested by remains of such gardens in connection with ancient house ruins.

In the dictionaries, chia is given as the Spanish name of the lime-leaved sage, Salvia tiliifolia; but in California it is applied to S. columbariae, and among the Mahua races in Mexico and among the Pueblos of the Cibola region, ^{This} chia seems to have been anciently and regularly cultivated.

~~in the Report of the United States Geographical Survey West of the One Hundredth Meridian, Volume VI, 1875, by Doctor Rothrock gives an interesting note submitted~~
~~especially dedicated by him in the Botanical Bulletin~~

as to the chia of California, of which the following is a part:

"During the summer of 1875 my attention was called, while in Southern California, to a mealy preparation in popular use among the Indians, Mexicans, and prospectors. On inquiry, I found it was called 'Chia.' Further examination proved that it was furnished by the seeds of Salvia columbariae, Benth. The seeds are collected, roasted, and ground, in the native way, between two stones. This puts it in the condition in which I first saw it. It is used as a food by mixing it with water and enough sugar to suit the taste. It soon develops into a copious mucilaginous mass, several times the original bulk. The taste is somewhat suggestive of linseed meal. One soon acquires a fondness for it, and eats it rather in the way of a luxury than with any reference to the fact that it is exceedingly nutritious besides. It is in great demand among the knowing ones who have a desert to cross, or who expect to encounter a scarcity of

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water, and what there is, of bad quality. By preparing it so thin that it can be used as a drink, it seems to assuage thirst, to improve the taste of the water, and, in addition, to lessen the quantity of water taken, which in hot countries is often so excessive as to produce serious illness. As a remedy it is invaluable, from its demulcent properties, in cases of gastro-intestinal disorders. It also holds a place among domestic remedies, for the same purpose that flaxseed occasionally does with us, i.e., a grain of the seed is placed in the ^{eye} (where it gives no pain) to form a mucilage by means of which a foreign body may be removed from the organ. I have found it of great service as a poultice. As a matter of archaeological interest, it may be noted that quantities of this seed were found buried in ~~the~~ graves several hundred years old. This proves that the use of the seed reaches back into the remote past."

Suppl.—There are ^(17/7) both a small-seeded and a large-seeded chia in use in Mexico. The small-seeded chia is ~~widely~~ used throughout the republic, and is kept on sale in El Paso, Texas, and probably ^(S. polystachia) elsewhere along the U.S.-Mexican border. The chia con semillas grandes, known also as chia de Sinaloa, is more locally distributed.]

The flour, or pinole, made from the seed of chia ("chianpinolli") ^{probably} was ^{regarded} by the Aztecs as something choice; for, in the quadrennial ceremony of initiating certain children into the service of the gods at the Aztec temple of "Teteionan or Toci, 'mother of the gods,'" an offering of the "flour of chian seed" was made.

^{Footnote} See Bancroft's Native Races, Vol. II, p. 280. In a footnote on page 374 of Vol. I of same, Bancroft says, "Pinole is an Aztec word, and is applied to any kind of grain or seeds, parched and ground, before being made into dough;" and he quotes from Molina's Vocabulario en Lengua Castellana y Mexicana (Mexico, 1571,) the definition, "Pinolli, la harina de mayz y chia, antes que la deslimp." He adds, "The Aztecs made pinole chiefly of maize or Indian corn."

From Castañeda we learn that, besides the products of cultivated plants, the Cibolans annually collected and stored the nuts of the Piñon tree; ^{seeds of} and there were certain species of ^{grass} and other plants, and certain native fruits, which, although not mentioned by the Coronadoan chroniclers, we may be sure that the Cibolans harvested. Winship's Translation, Bu. Am. Eth. XIV, 518.

Coronado's letter continues, "They have very good salt in crystals, which they bring from a lake a day's journey from here." We have already quoted the author of the *Translado de las Nuevas*, who, recognizing the very superior quality of this salt, called it "the best and whitest that I have seen in all my life."

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As to the distance ~~from~~ of this salt lake from Cibola, Captain Diaz had been more correctly informed in the winter of 1539-40 by the Sobkipuris, ~~which~~ and had reported of the Cibolans, "They have salt from a marshy lake, which is two days from the province of Cibola." Three hundred and forty-five years later, a prominent Zufi Indian conducted the James Stevenson party from the pueblo of Zufi to this ^{modest} salt lake in two days,* which is the time taken by the Zufis for their ceremonial journeys thither.

Though the Stevenson party did not reach the lake until morning of the third day, they made a stop on the way, to examine some ruins; so that their time of actual travel did not exceed two days.

The salt lake to which the letters of Coronado and Diaz referred, is ~~that~~ which is now generally known as "the Zufi Salt Lake," although as a source of salt supply, its use is by no means confined to the Zufis. Says ^{Matilda Cox} Mrs. Stevenson, "It has been said that the Zufis claim the salt lake exclusively and demand tribute from the other tribes, but such is not the case. In fact, the records tend to show that this locality has been from time immemorial the great source of salt supply for the Indians near and far. The writer has made careful inquiries on several occasions when the Hopi caravan stopped at Zufi on their return from the salt lake. The Zufis made no demands upon the Hopis whatever, but on the contrary treated them as distinguished guests." The

~~Navahos and Apaches~~

*The Handbook of American Indians ^{states} on the authority of Doctor Fawkes, "The Hopi have obtained their salt from time immemorial from the Grand Canyon of the Colorado, westward from their villages about 100 m. Here salt is gathered with ceremony by making sacrifices to the Goddess of Salt and the God of War, whose shrines are there." (C. D. cit., Pt. II, p. 419.) It is obvious ~~that~~ that there is no single and exclusive source of salt supply today among the Hopis; ~~and~~ it is not known whether the division in the salt supply among the Hopis, is one of practical or ceremonial origin.

Navahos and Apaches also collect salt here, each tribe being accorded

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complete freedom in collecting the salt, although the lake is claimed as the special mother of each of the various tribes.*

Footnote "In his Coronado's March to Quivira, Hodge remarks, "The Zuñi salt lake is well known throughout this region, and, if I am not in error, the ~~Laguna~~ and ~~Agua~~ Indians obtain salt from the same place." According to the Handbook of American Indians (II, 419), "The Rio Grande Pueblos acquired salt principally from the Manzano salines, in central New Mexico;" which adjoin Castañeda's province of Tutabaco.

"The ~~minimim~~ place is neutral ground, and in times of war one was safe from the attacks of the enemy so long as one remained within the recognized limits of the lake. Many thrilling stories are told by the Zuñis of their efforts in the past to anticipate the hated Navahos in reaching the lake, knowing that by so doing they would be preserved from harm."*

Footnote *Bu. Am. Eth. Ann. XXIII, 357.

Of the situation of the lake and its approach from Zuñi, she says, "The salt lake, according to Mr. Darton, is 42 miles south by east from Zuñi." (and in a footnote she comments, "Mr. Darton evidently refers to the Indian trail, as the distance by the road is much farther.") "and is reached before sunset on the second day. Several ranges of mountains are crossed, but the trail is good, running largely through long stretches of timbered country, the one drawback being the absence of water." There are several shrines between Zuñi and the

Footnote *At the end of the first day's journey, however, at the ruin Kya'mah, a little off the trail, there are, as noted ~~more particularly~~, fine springs of water.

lake, at which plume offerings to the Sun Father and Moon Mother are deposited."*

Footnote *Ibid., p. 355.

In a footnote (page 354) she introduces the following geographical and geological description, furnished by Mr. N. H. Darton, of the United States Geological Survey:

"The Zuñi salt lake is situated on the south slopes of the valley of Carrizo Creek, 42 miles south by east from Zuñi pueblo. Sinking abruptly below the sloping plain of the surrounding valley is a round, crater-like depression about a mile broad and 200 feet deep. In its center rise two symmetrical volcanic cinder cones about 150 feet high, to the north of which is the salt lake, and to the south a nearly ~~smooth~~ smooth plain floored with wash from the slopes. The lake is an oblong body of water extending east and west across the northern end of the depression, with a length of about 4,000 feet and a breadth somewhat less. Apparently the lake occupied the entire floor of the depression at one time, but by evaporation and the deposition of mud

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it has greatly diminished in size. The waters of the lake are saturated with common salt, containing 26 per cent, according to Professor C. L. Herrick. As the natural evaporation progresses salt is deposited. Although no deep borings have been made the depression appears to contain a salt deposit of considerable thickness, mixed with a small amount of mud washed from the surrounding slopes and dust carried by the wind."* * Ibid., p. 354. Footnote

Of the lake as it was on the arrival of the Stevenson party there in 1884, Mrs. Stevenson says: "Not a living thing was to be seen; all was somber gray except a patch of grass here and there and the salt lake with its clear waters and the two peaks reflected therein. Two circular walls, about 5 feet high and 15 inches thick, with an aperture in each, stand in the lake. These walls are composed of the blue clay of the lake bed and are respectively the houses of the rain priests and Ko'yemshi. As but little time is required for these walls to wear away, they must be rebuilt when occasion requires. Similar structures in the southwestern portion of the lake are the property of the Hopi Indians, and are used by them when they visit the lake to collect salt." But "On a subsequent visit in 1902 there was found quite a Mexican settlement, earning a livelihood by dealing in salt. The apparatus used in securing the salt from the lake bed is of the crudest type." There was now no evidence of the circular walls of blue clay. "The presence of Mexicans at the lake prevents the ceremonies which were previously enacted within these walls."†

Footnote

"Ibid., page 357.

"The annual journey to the Zuñi salt lake for the purpose of gathering salt," says Mrs. Stevenson, "is an important event with the Zuñis, as it is with the other pueblos, and is accompanied ~~by~~ by elaborate ceremonies." For a detailed account of these ceremonies the reader must be referred to Mrs. Stevenson's memoir in the 23d Annual Report of the Bureau of American Ethnology. Suffice it here to say that this annual journey is made ~~entirely~~ by the men only, and in July, when "the first body of A'shiwanni (rain priests) gather together in the ancestral chamber of the Kya'kwemoci (rain priest of the North and high priest of Zuñi) to arrange for" it, and that "early the following morning the elder brother Bow priest announces from the house top that those in need of salt must be ready to start in four days, inclusive of that day, for the home of the Salt Mother."‡

Footnote
"Ibid., p. 354. For a view of the Zuñi Salt Lake, see same Report, plate LXXXVIII.

Continuing his statement about the Cibola country, Coronado says, "No information can be obtained among them about the North sea or that on the west, nor do I know how to tell Your Lordship which we are nearest to. I should judge that it is nearer to the western, and 150