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ETHNOBOTANY OF THE ZUNÍ  
INDIANS

BY

MATILDA COXE STEVENSON

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ZUÑI PUEBLO FROM THE SOUTH, ZUÑI RIVER IN THE FOREGROUND

# ETHNOBOTANY OF THE ZUÑI INDIANS

By MATILDA COXE STEVENSON

## INTRODUCTION

**T**HERE is perhaps no tribe of North American Indians which has interested the intelligent world more than the Zuñi, who live in an arid country in the extreme western part of New Mexico. Their great community pueblo (pls. 1, 3) occupies the site of one of the seven villages inhabited by the tribe at the time of the invasion of the Spanish conquerors, before the middle of the sixteenth century.

Although the Zuñi form a distinct linguistic stock, according to Powell's classification, it is known from a study of their prayers and rituals that they are a composite people, some having come from the north, while others came from the south. According to their traditions they journeyed from the far northwest in quest of the "middle place of the world," and on reaching their goal were contented to remain. The migration legend of the Zuñi relates that they were driven from their homes at this "middle place" by a great flood that covered the earth, to To'wa yäl'lännë ('corn mountain'), a beautiful mesa of red and white sandstone, about three and a half miles to the eastward. The pueblo ruins on the summit of this mesa would seem to indicate that the height was occupied for a considerable time. There are also on the mesa many interesting shrines to the Sun Father, Moon Mother, and Gods of War.

The Zuñi again took refuge on To'wa yäl'lännë when the Spaniards first invaded their country, and again at the time of the Pueblo revolt against Spanish authority in 1680. These sojourns on the mesa, however, were mere episodes in the life of the Zuñi people, for they returned each time to their valley homes where they continued to elaborate their philosophy and system of rituals. They held so tenaciously to their autochthonous institutions, resisting all external interference, that they lived, as it were, a life unto themselves.

Such was the condition of the Zuñi in 1879, when the late Mr. James Stevenson, of the Bureau of Ethnology, accompanied by the writer and others, made his first visit among these people, who at once took the visitors into their confidence, inviting them to be present at all social and ceremonial functions.

The long winter nights were devoted by the Zuñi to the ceremonies of their secret fraternities, exhorting their most benevolent gods; rain priests in retreat invoked their anthropic deities for rain to fructify the earth, and elders taught the youths, sitting attentively at their knees by the flickering firelight, the mysteries of their life and religion. Of all the secrets of their lives none is more strictly guarded or more carefully transmitted than the knowledge of healing. The "doctor" instructs in the lore of plants, and the relation of plants to man and beast.

Many changes have taken place at Zuñi since the year above noted. Houses then lighted by day with tiny windows formed of a mosaic of translucent selenite, and at night by the light from the family fire, now have modern triple windows, factory doors with transoms, and hanging lamps. There has been a gradual decrease in the attention given by the youths to instruction in the tribal religion, and with few exceptions the men of today perform the elaborate rituals with only a superficial knowledge of the esoteric meaning of all they do and say. The days of the Zuñi seers are numbered, and with the passing of the few that remain the curtain will fall forever on the underlying principles and teachings of their rituals, although their outward form may survive, in one form or another, as long as the Zuñi remain a communal people, for their religious beliefs, though fraught with fear of their gods, are the pivot upon which they turn with all their hopes and joys. To the present time the Zuñi have persistently refused to accept the religion of the white man, except when compelled to do so outwardly under the early Spanish régime, always declaring that they would never renounce their own beliefs, and that "one could not have two religions and be a man."

The Zuñi live with their plants—the latter are a part of themselves. The initiated can talk with their plants, and the plants can talk with them. Plants are sacred to the Zuñi, for some of them were dropped to the earth by the Star People; some were human beings before they became plants; others are the property of the gods, and all, even those from the heavens, are the offspring of the Earth Mother, for it was she who gave the plants to the Star People before they left this world and became celestial beings. The Zuñi love their plants. The breath prayers to their rain-makers carried by the spiritual essence of the plumes planted in the earth are invocations to these gods to send the rains to fructify the Earth Mother that she may give of the fullness of her being, and make the world beautiful by her gifts. (See pl. 2.) Vegetation is symbolized by blue-green on the sacred dance-kilts worn by the personators of the rain-makers, and there are many other designs on fabrics, ceramics, and ceremonial objects, symbolizing the fullness of the earth.

In all the poetic conceptions of the Zuñi one great object is paramount—food to support the physical man.

Thus—May the rain-makers water the Earth Mother that she may be made beautiful to look upon. May the rain-makers water the Earth Mother that she may become fruitful and give to her children and to all the world the fruits of her being, that we may have food in abundance. May the Sun Father embrace our Earth Mother that she may become fruitful, that food may be bountiful, and that our children may live the span of life, not die, but sleep to awake with their gods.

While it was generally observed by early travelers among the Indians that they employed plants for medicinal purposes, it was long believed, even by scientific students, that the practices of Indian doctors were purely shamanistic. The late Dr. Washington Matthews, however, declared from the beginning of his ethnological investigations that the Indians employed many plants of real value in medicine. Mr. Stevenson made the same assertion, and the writer discovered in the beginning of her researches among the Zuñi Indians in 1879 that they had many legitimate plant medicines, among which was a narcotic, of which more will be said later.

In addition to their use in medicine and for food, plants are employed by the Zuñi in weaving and dyeing, in making basketry, mats, brushes, rope and cords of various kinds, and also in pottery decoration, in the toilet, and in ceremonies. Clans, individuals, and localities are named for plants.

In this memoir medicinal plants will be first considered. Where a common name is known, it is given; where the native name or its derivation is omitted, it is because the writer did not succeed in recording the data.

The specimens of plants dealt with in the following pages were collected largely by the writer and Me'she, the late younger-brother Bow-Priest of Zuñi, who gave his heart not only to the collecting of the plants, but to their classification according to the Zuñi system and to their use by his people. After careful study of the plants with Me'she, the writer at various times verified the information through others, both men and women, especially versed in plant lore.

Usually the Zuñi have a name for each species of a genus of plants, but in some cases they employ the same name for different genera. This is not due to their lack of appreciation of the botanical difference, but to the fact that two or more plants may serve the same purpose or have similar characteristics. Some plants are curiously associated in name with animals, others are named from the medicinal qualities attributed to them, while others receive their names from those of animals to which they are believed to belong. Of the last-mentioned class there are, for example, the cougar, the bear, the badger, the wolf, the eagle, and the shrew medicine, these animals being assigned

to the six cosmic regions—north, west, south, east, zenith, and nadir. There are also medicines belonging to the hummingbird and others of the feathered kingdom.<sup>1</sup>

The plants herein noted are probably only a portion of those employed by the Zuñi, and it is probable also that the medicinal plants may be used in the treatment of a greater number of diseases than it has been possible to determine even after a long period of close study. This memoir is presented as preliminary therefore to more extended comparative ethnobotanical researches among the Pueblo tribes of the Southwest.

The writer is pleased to make acknowledgment to the following gentlemen for courtesies extended during the preparation of this paper: Mr. F. W. Hodge, ethnologist-in-charge of the Bureau of American Ethnology; Mr. W. H. Holmes, head curator of anthropology, United States National Museum; Dr. Walter Hough, curator of ethnology, United States National Museum; Dr. Frederick V. Coville, curator, United States National Herbarium; Dr. J. N. Rose, associate curator, division of plants, United States National Museum; Mr. Paul C. Standley, assistant curator, division of plants, United States National Museum (who kindly furnished a complete classification of the plants mentioned in the paper); Mr. E. S. Steele, editorial assistant, division of plants, United States National Museum; Dr. Rodney H. True, in charge of drug-plant investigation, Department of Agriculture; Miss Alice Henkel, assistant in drug-plant investigation, Department of Agriculture; Dr. George Tully Vaughan and Dr. Henry Krogstad, of Washington; and Mr. John P. Harrington, of the School of American Archaeology, Santa Fe, New Mexico. The writer desires to express her indebtedness also to her Zuñi friends, especially the late Nai'uchi, elder-brother Bow-Priest, and the most renowned medicine-man of his time, if not of any period, among his people; his son, Halian, an associate rain priest; the high priest, also a prominent medicine-man, and his son Hun'ki, the two being members of the medicine order of the Galaxy fraternity, one of the original organizations of the Zuñi; Cantina, a member of the Eagle-down fraternity; Zuñi Nick, a member of the Great Fire fraternity; Tsi'nahe, a member of the Sword Swallowers fraternity, and his wife, a member of the Shu'maakwe, and others—to all these she owes a debt of gratitude for their friendly interest and for their earnest, conscientious, and voluntary aid.

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<sup>1</sup> The association of plant medicines with animals has caused some students erroneously to believe that these medicines are part of, or are prepared from, the animals or birds which bear their respective names.





DANCE OF THE UWANNAMI (RAIN MAKERS)

## MEDICAL PRACTICES AND MEDICINAL PLANTS

Medical treatment is older than intelligence in man. The dog hunts the fields for his special grass medicine; the bear dresses the wound of her cub or fellow-bear with perhaps as much intelligence, as primitive man observes in his empirical practice. Primitive man does not know why his medicine cures; he simply knows that it does cure. He believes disease to be the result of malign influence, including that of his fellow man, to whom he attributes the power of sorcery which he himself is unable to overcome; hence he must summon the aid of the beast gods, who alone possess the power of combating the malevolent practices of the sorcerer,<sup>1</sup> while he administers their medicine. The plants of the gods could not effect a cure, however, by the mere use of the medicines concocted from them; during the treatment of the patient prayers and supplications must be offered to the gods to whom the medicine belongs.

Although the therapeutics of the Indians is largely associated with occultism, these people have discovered through the ages and brought into practical use numerous valuable plant medicines; but in the first stages in the use of plants it was not understood that they were endowed with healing properties, except as they were associated with the gods, and the old conception is still adhered to. The plants regarded as the sole property of man no doubt were discovered at a later period.

The Gods of War and other anthropic deities have their particular medicines, which are employed by those privileged to administer them. The rain priests possess medicines of celestial bodies, and of sacred birds, and they also make use of *Datura meteloides* (see pp. 89, 90). This precious plant, which is believed to have been once a boy and a girl, may be used only by the rain priests and by the directors of the Little Fire and Cimex fraternities.

There are other plant medicines belonging to medicine orders of the secret fraternities that are not the property of the gods. While all legitimate medicines have come into use by accident or through experiment, there is a great difference in the Zuñi mind between the medicines of the gods and those that have become known to the fraternities through members who have given the secrets of their immediate ancestors one to another or to the fraternity at large. A high ethical standard is recognized by the members of the fraternities.

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<sup>1</sup> The beast gods were originally human beings who preceded the Zuñi to this world. They brought with them the knowledge of mystery medicine (healing of ills produced by witchcraft) from the undermost world. See *3d Ann. Rep. Bur. Amer. Ethn.*, p. 49.

If, for example, a member of a fraternity gives his medicine to a fellow member, it is customary for the recipient to return the favor in kind. These medicines are usually presented with the understanding that they may be introduced into the medicine order of the fraternity to which the recipient belongs. Again, a man may present his medicine to an individual to be held in inviolate secrecy by him; or a man may forever hold secret the medicinal properties of plants the knowledge of which has come to him through inheritance for generations. Many medicines of this last-named class are administered in the most practical manner.

Mention has already been made of plant medicines associated in the Zuñi mind with animals.

The Zuñi assert that the reason of the late Nai'uehi's great success as a doctor was his exclusive knowledge of certain medicinal plants. Only those in affluent circumstances could afford to command Nai'uehi's services, because of his exorbitant charges. The secrets pertaining to plants often sell at a considerable price.

There are also among the Zuñi medicines free to the people at large, which may be administered by laymen, one member of a family prescribing them for another or for a neighbor, without the advice of a "doctor."

In some cases the theurgist makes no use of medicine, but, acting under the influence of the animal gods, with the mind's eye he penetrates the flesh, locates the cause of the disease which has been "shot" into the body by means of sorcery, and extracts it by sucking; or he may merely manipulate the spot with his hand and draw the malevolent substance from the body. This is so dextrously done that, although the writer has been seated beside the nude theurgist innumerable times, she was never able to observe that he had secreted any object in his mouth or hand until Nai'uehi, in an almost dying condition, treated a patient who imagined a sorcerer had injured his eyesight. It was then evident to the writer, who sat by the side of the old man, that the pebbles he was supposed to press from the patient's eyes were held in the most remarkable manner in the palm of his right hand, which apparently was held in a natural position. Such treatment is usually practiced on one who imagines that he has been face to face with a wizard or a witch and so subjected to malign influence.

It is when a theurgist realizes that a person is genuinely ill that he brings his plant medicine into use. It is usual for the doctor to treat the patient with his personal or fraternity medicine for ordinary ailments; if the disease does not yield, he knows that his patient is not suffering from some minor enemy, such as ants,<sup>1</sup> but has been

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<sup>1</sup> Ants cause many cutaneous troubles because of their anger over the disregard shown for their houses. "Ants shoot tiny pebbles into the flesh," the Zuñi say.

bewitched by man. Then he acts in the capacity of theurgist, employing the medicines of the gods, whom he invokes for their spiritual presence and bestowal on him of power to heal the disease.

Medicines supposed to belong to the gods are administered with much ceremony, for the medicines themselves are of virtue because they are the property of certain gods who must be present in spirit and give power to the theurgist to act for them, otherwise the remedies would not be efficacious.

The use of *Datura* by the Indians has long been known. In the dark age of medical science "the Royal Society of London gravely inquired of Sir Philiberto Vernatti, 'Whether the Indians can so prepare the stupefying herb *Datura*, that they make it lie several days, months, or years, according as they will have it, in a man's body, and at the end kill him without missing half an hour's time?'"<sup>1</sup>

There can be no question as to the early use of antiseptics and narcotics by the Zuñi, as well as by other primitive peoples,<sup>2</sup> but with civilized man it remained for Lister to revolutionize surgery by the introduction of scientific antiseptic treatment. *Datura stramonium* was introduced to the medical profession in 1762 by Baron Storcck, of Vienna, and it was given a place in the homeopathic pharmacopœa about a century ago when Hahnemann established its action and therapeutic uses. It is claimed that the European gypsies in the middle ages employed the smoke of *Datura stramonium* to delude their dupes. The Zuñi rain priests administer *Datura meteloides* that one may become a seer, and the Zuñi "doctor" gives the root of the plant to render his patient unconscious while he performs simple operations—setting fractured limbs, treating dislocations, making incisions for removing pus, eradicating diseases of the uterus, and the like. The narcotic is seldom employed by the Zuñi for the extraction of bullets, as men, they say, are not like women, and they must be *men*. In such cases the Zuñi "doctor" makes an incision with his flint knife in the form of a cross, after

<sup>1</sup> Bigelow, *Amer. Medical Botany*, 1817, vol. 1, pp. 21-22.

<sup>2</sup> The Pueblos of New Mexico and Arizona generally, the California Indians, the Mohave, the Pima, and perhaps many others, make use of *Datura meteloides* and *D. stramonium*. See Dodge in *Report of the Commissioner of Agriculture for 1870*, p. 423, Washington, 1871; Palmer in *Amer. Jour. Pharmacy*, 4th ser., vol. 8, p. 589, Phila., 1878. In 1879 the present writer obtained a specimen of *Datura meteloides* in powdered form and submitted it to Prof. F. W. Clarke, chief chemist of the United States Geological Survey, but the quantity was not sufficient for analysis, and it was not until 1902 that she learned the identity of the drug.

In 1891 Mr. James Mooney, of the Bureau of American Ethnology, found the peyote (*Anhalonium lewinii*, "mesal button") extensively employed in ceremony by the Kiowa and other tribes of the southern plains for the purpose of bringing about an ecstatic state. In 1894 Mr. Mooney brought to Washington a quantity of peyote, which was subjected to analysis by Dr. E. E. Ewell, of the Department of Agriculture, and subsequent investigation showed that the peyote possesses properties unlike those of any other known drug. "The study of *Anhalonium lewinii*," say Doctors Prentiss and Morgan (Mescal Buttons, *Medical Record*, Washington, Aug. 22, 1896), "is of comparatively recent date, the subject having been brought to the attention of the medical world in 1888 by Doctor Lewin, of Berlin, who published at that time the results of his observations upon the drug. In 1894 Doctors Lewin and Heffter, of Germany, reported the results of further study of the subject."

which the four sections are laid back, the flaps to be restored to place after the missile is extracted.

While powdered piñon gum (*Pinus edulis* Engelm.) is in general use as an antiseptic, the Zuñi employ other plants also for this purpose. As these could be procured only in the form of powder and in very small quantities, analysis was not possible. Doctor Matthews observed a Zuñi Indian cleanse a wound with a decoction of red willow; the wound healed in a short time.

*Achillea lanulosa* Nutt. Yarrow. CARDUACEÆ. Thistle family.

*Ha'tsenawe*, 'cold leaf' (*ha* < *ha'li*, leaf; *tse'nawe*, cold).

The leaves of this plant are said to produce a cooler sensation, when applied to the skin, than those of any other plant.

Such fraternity men as manipulate with fire chew the blossoms and root of this plant and rub the mixture on their limbs and chests previous to passing live coals over their bodies. The same mixture, in liquid form, is employed for bathing the bodies of those who dance in fire, and is placed in the mouth before taking live coals into it.<sup>1</sup> When employed for the above purpose the plant is the exclusive property of the secret fraternities which perform with fire.

The entire plant ground and mixed with cold water is applied to burns. When thus used the medicine is common property.

*Achillea* was known to the ancients. Pliny states that the generic term, *Achillea*, was named for Achilles, a physician who was one of the first to use a species of this plant as a vulnerary. Yarrow is sold by the native herbalists of India, like rosemary, where it is used as a bitter and in medicated vapor baths for fevers (Dymocōk). The Italians employed it in intermittent fevers, and in the Scottish highlands it is made into an ointment for wounds. According to Linnaeus the Dalecarlians used it as a substitute for hops in the making of ale, believing it to impart to it intoxicating qualities. Both Stahl and Haller used this plant extensively.<sup>2</sup>

*Artemisia frigida* Willd. Wormwood. CARDUACEÆ. Thistle family.

*To'shoch'a'chik'ia*, 'seeds leaf sweet' (*to'shoc*, seeds; *ha* < *ha'li*, leaf; *chi'kia*, sweet).

This plant, which belongs to the people in general, is made into a tea and drunk warm as a remedy for colds.

*Artemisia wrightii* A. Gray. Wormwood.

*Hä'lo k'ia'we*, 'ant seeds' (*hä'lo*, ant; *k'ia'we*, seeds).

The plant is held downward over a bowl of live coals while the maker of medicine-water of the Ant fraternity (the only person privileged to administer this medicine) rubs off the seeds upon the coals. During the process the patient stands nude, astride the bowl, with head bent and the entire body covered with blankets. This sweat-bath is administered to relieve pains through the body caused

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 407. When present at fire ceremonies the writer noted that live coals were held in the mouth thirty to sixty seconds.

<sup>2</sup> King, *Amer. Disp.*, 1898, vol. 1, p. 19.





TO WA YÁL'LÁNNĒ (CORN MOUNTAIN), ZUÑI PUEBLO IN THE FOREGROUND

by a severe cold. When thus employed the plant belongs only to the Ant fraternity.

*Aster hesperius* A. Gray. Aster. CARDUACEÆ. Thistle family.  
*Kwi'minnē lo'k'iana*, 'gray root' (*kwi'minnē*, root; *lo'k'iana*, gray).

This name is applied when the entire plant is used. The term *ha'mopiwa*, 'leaf balls', referring to the inflorescence and the rays of the aster (*ha* < *ha'li*, leaf; *mo'piwa*, balls), is applied to the plant when the blossoms only are used.

The entire plant is ground between stones in the fraternity chamber of the Shu'maakwe,<sup>1</sup> at noon during the elaborate ceremony of the preparation of the fraternity medicine in August, by the A'wantsi'ta ('great mother' of the fraternity), to the accompaniment of the pottery drum, rattle, and song. This medicine is in the exclusive possession of the *a'kwamosi* (director of medicine), and is used only on the faces of the personators of the Shu'maikoli, patron gods of this fraternity.

The dry powdered medicine is applied to such parts of the face as have been chafed by the mask, and soon brings relief. When the plant is employed for this purpose it belongs only to the Shu'maakwe.

This plant is used also by the Priesthood of the Bow for the treatment of bullet or arrow wounds. A tea is made by boiling the entire plant. If practicable, the missile is removed by squeezing. The wound is washed out with a bit of twisted cloth dipped into the warm tea. When possible the cloth is passed through the cavity of the wound; a slender twig wrapped with raw cotton is then dipped into the tea and the wound is again washed until thoroughly cleansed. Piñon gum, softened by chewing, is made into a pencil, rolled in the powdered root, and inserted into the wound. After withdrawing the gum pencil a quantity of the root powder is sprinkled into the wound; then a pinch of finely ground piñon moistened with spittle is put on the wound, and bandaged in place. This treatment is repeated in the morning and at sunset. Previous to the dressing of the wound each time, if the missile has not been removed the medicine-man endeavors to extract it by pressure. The younger-brother Bow Priest informed the writer that usually not more than two days were required for the extraction of the bullet or arrow by means of this process; but should it not be removed in this way, resort was had to the knife.

For bleeding at the nose the blossoms of this plant are crushed and sprinkled on live coals, and the smoke is inhaled. The remedy is said to be a specific for this ailment. When used for this purpose it belongs to all the people.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 543.

*Atriplex canescens* (Pursh) James. Salt-bush. CHENOPODIACEÆ.  
Goosefoot family.

*Kc'mawe*, 'salt weed' (*ke*, weed; *ma'we*, salt).

The dried root and blossoms are ground separately and the two powders combined. Moistened with saliva, this mixture is employed externally to cure ant bites. When the powder is not at hand the fresh blossoms, bruised, are applied.

*Bahia woodhousei* Gray. CARDUACEÆ. Thistle family.

*Ha'pali*, 'biting leaf' (*ha* < *ha'li*, leaf; *pa'li*, biting, like pepper).

The entire plant is steeped in water and the tea drunk while hot for sick stomach; copious vomiting ensues.

This medicine belonged only to the Shu'maakwe fraternity until given by the Shu'maakwe<sup>1</sup> to the Great Fire fraternity.

*Berula erecta* (Huds.) Coville. Water Parsnip. APIACEÆ.  
Carrot family.

*Pi'tk'iaia*, 'spring plant'. This plant is found around the springs.

The leaves and blossoms of the plant constitute an ingredient of the medicinal pats of the Shu'maakwe fraternity.<sup>2</sup>

*Campanula parryi* A. Gray. Bluebell. CAMPANULACEÆ. Bell-flower family.

*U'tea li'anna*, 'blue flower' (*u'tea*, flower; *li'anna*, blue).

The blossoms are chewed and the saliva is applied to the skin to render it depilous. According to the statements of the Zuñi this medicine removes only young hair. It belongs to the people in common. For reducing bruises the chewed root is applied with bandages. When employed for this purpose the remedy belongs only to the fraternities.

*Carduus ochrocentrus* (A. Gray) Greene. Thistle. CARDUACEÆ.  
Thistle family.

*Ko'wakätsi*, a name supposed to have been given this plant by Ko'mokätsi, mother of the anthropic gods, after her own name, which signifies 'old dance woman.'<sup>3</sup>

The entire plant is placed over night in a vessel of cold water. The water is drunk morning, noon, and at sunset as a cure for syphilis (*su'towe*).<sup>4</sup> Immediately after taking each dose the patient, if a man, runs rapidly to promote perspiration and to accelerate action

<sup>1</sup> Since her work on the Zuñi Indians was published (*23d Ann. Rep. Bur. Amer. Ethn.*) the writer has learned the full meaning of *Shu'maakwe* (*shu'ma* < *shu'minné*, spiral shell; *kwe*, people of a fraternity). This fraternity was named by the Shu'maikoli, certain anthropic gods; but the gods had no shells to give to the fraternity. When the Great Fire fraternity learned that the Shu'maakwe did not possess the spiral shells for which the latter were named, the directors of the Fire fraternity shared with them the shells which they had brought from the underworld.

<sup>2</sup> See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 545.

<sup>3</sup> *Ibid.*, p. 33.

<sup>4</sup> Syphilis is quite common among the Zuñi, having increased greatly since these people came into closer contact with the white race. When the writer first visited Zuñi, in 1879, it was rare to find a girl who was not virtuous, and the finger of scorn was always pointed at one who had departed from the path of rectitude; but at the present time immorality is common and syphilis is spreading in the tribe.

of the kidneys. On returning to the house he is wrapped in blankets. If the patient be a woman she does not run, but sits bundled in heavy blankets. The medicine often induces vomiting. It belongs to all the people.

*Chenopodium cornutum* Benth. & Hook. CHENOPODIACEÆ.  
Goosefoot family.

*Ha'techi*, 'strong odor leaf' (*ha* < *ha'li*, leaf; *t'chi*, strong odor).

The plant is steeped in water and the vapor is inhaled to relieve headache. This remedy belongs to all the fraternities.

*Crassina grandiflora* (Nutt.) Kuntze. Zinnia. CARDUACEÆ.  
Thistle family.

*Tu'na ik'apok'ia*, 'put into eyes' (*tu'na*, eyes; *i'k'apok'ia*, to put into).

The entire plant is reduced to powder between stones; this is sprinkled over hot stones, beside which sits a fever patient, who inhales the fumes. This treatment is accompanied with a sweat-bath, both the patient and the stones with the medicine being covered with heavy blankets. The powder is also ejected from the mouth upon a bruise, which is then bound with a cloth. The blossoms are crushed in cold water to make an eye-wash.

The plant belongs to all the fraternities.

*Croton texensis* (Klotzsch) Muell. Arg. Croton. EUPHORBACEÆ.  
Spurge family.

*Ha'suski*, 'coyote leaf' (*ha* < *ha'li*, leaf; *su'ski*, coyote). So named from the odor of the plant.

A tea made by boiling the entire plant is drunk as a remedy for sick stomach. This tea is used also as a purgative, and to stimulate action of the kidneys.

The plant belongs to all the fraternities.

*Cryptanthe crassisepala* (Torr. & Gray) Greene. BORAGINACEÆ.  
Borage family.

*Ha'uheya'we*, 'leaf-down come out' (*ha* < *ha'li*, leaf; *u'he*, down [reference to coma]; *ya'we*, come out).

The entire plant is ground and a handful of the powder is well stirred in a small bowl of hot water. To relieve extreme fatigue, the infusion is applied with raw cotton, or with the hand, to the feet and legs. An application at night is said to insure relief. This plant belongs to all the fraternities.

*Cucurbita pepo* L. Squash. CUCURBITACEÆ. Gourd family.

*Mo'teyäla*, 'egg-shaped inside seeds sit down' (*mo* < *mo'li*, round or egg-shaped; *te'yä*, inside; *la*, sit down). The word for seed is not expressed, but it is fully understood. The name has reference to squash and melons always resting on the ground in the field and on the floor in the house, never standing.

Squash blossoms form one of the ingredients of the pats or cakes made by the Shu'maakwe.<sup>1</sup>

Squash seeds and blossoms are used externally by the Cactus fraternity to bring relief from the cactus needles after whipping with the plant.<sup>2</sup>

*Datura meteloides* DC. Jamestown Weed; called also Thorn-apple. SOLANACEÆ. Nightshade family.

*A'neglakya*, name of a mythic boy; see legend below. The sister of the boy was named *A'neglakyatsi'tsa* (*A'neglakya*, personal name; *tsi'tsa*, postfix denoting feminine gender).

The following legend is related of this plant:

In the olden time a boy and a girl, brother and sister (the boy's name was *A'neglakya* and the girl's name *A'neglakyatsi'tsa*), lived in the interior of the earth, but they often came to the outer world and walked about a great deal, observing closely everything they saw and heard, and repeating all to their mother. This constant talking did not please the Divine Ones (twin sons of the Sun Father). On meeting the boy and the girl the Divine Ones asked, "How are you?" and the brother and sister answered, "We are happy." (Sometimes *A'neglakya* and *A'neglakyatsi'tsa* appeared on the earth as old people.) They told the Divine Ones how they could make one sleep and see ghosts, and how they could make one walk about a little and see one who had committed theft. After this meeting the Divine Ones concluded that *A'neglakya* and *A'neglakyatsi'tsa* knew too much and that they should be banished for all time from this world; so the Divine Ones caused the brother and the sister to disappear into the earth forever. Flowers sprang up at the spot where the two descended—flowers exactly like those which they wore on each side of their heads when visiting the earth.<sup>3</sup> The Divine Ones called the plant *a'neglakya*, after the boy's name. The original plant has many children scattered over the earth; some of the blossoms are tinged with yellow, some with blue, some with red, some are all white—the colors belonging to the four cardinal points. (The medicine of the *Datura* is sometimes called *u'tawe ko'hanna*, 'flowers white.')

The medicine is the property of the rain priests and the directors of the Little Fire and Cimex fraternities. It is administered with great care and is given medicinally only by the directors of these fraternities. Each director must collect the medicine which he uses, and must prepare and deposit prayer-plumes to the sacred plant in order that his treatment may be successful. The powdered root is given as a narcotic.<sup>4</sup>

<sup>1</sup> Consult 23d Ann. Rep. Bur. Amer. Ethn., p. 543. See also p. 50 of the present memoir.

<sup>2</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 569.

<sup>3</sup> This flower is represented in Zuñi and in other pueblos by interlacing colored yarns around the desiccated fruit of *Martynia louisiana* Mill. which is attached to a leather band passing around the head. On the forehead the band is covered by the bangs of the maiden wearing the flower. This headdress is worn by women in the dance. Students have described it as symbolizing the squash blossom, an error only too pleasing to the Zuñi, as the blossom of the *Datura* is most sacred to them.

<sup>4</sup> The writer observed the late Na'uehi, the most renowned medicine-man of his time among the Zuñi, give this medicine before operating on a woman's breast. As soon as the patient became unconscious he cut deep into the breast with an agate lance, and, inserting his finger, removed all the pus; an antiseptic was then sprinkled over the wound, which was bandaged with a soiled cloth. (The writer obtained samples of the antiseptic, but each time the quantity proved too small for chemical analysis.) When the woman regained consciousness she declared that she had had a peaceful sleep and beautiful dreams. There was no evidence of any ill effect from the use of the drug.

The root and flowers of *Datura meteloides*, ground together into meal, are applied to wounds of every description by the directors of the fraternities above mentioned. Wounds are said to heal rapidly under this treatment.

*Datura stramonium* acts very powerfully upon the cerebro-spinal system, causing a line of symptoms showing it to be a narcotic-irritant of high degree. The symptoms collated from many cases of poisoning by this drug are: Vertigo, with staggering gait, and finally unconsciousness; stupor and deep sleep, with stertorous breathing; mania, with loquaciousness or melancholia; hallucinations of terrifying aspect, the patient bites, strikes and screams, and throws the arms about, or picks and grasps at unattainable objects; congestive headaches, with dull beating and throbbing in the vertex. The pupils are dilated, and the patient suffers from photophobia, diplopia, and hemeralopia; the eyes are wide open, staring, and set, or are contorted, rolling, and squinting. The face becomes red, bloated, and hot, the mouth spasmodically closed, and the tongue dry and swollen; the patient suffers greatly from thirst, but the sight of water throws him into a spasm and causes great constriction of the throat, foaming at the mouth, and other symptoms similar to those of hydrophobia. There is often nausea, but seldom vomiting. The sexual functions are often excited, more especially in women, in whom it causes nymphomania. Spasms of the muscles of the chest are of frequent occurrence; inspiration is slow and expiration quick. Paralysis of the lower limbs and loss of speech, with twitchings and jerkings of the muscles often mark a case. Its action will be seen to be similar to that of Belladonna, yet differing in many respects.

A few of the many cases of poisoning by this plant will serve to show its mode of action:

Beverley states<sup>1</sup> that some of the soldiers sent to Jamestown to quell the rebellion of Bacon gathered the young sprouts of Stramonium and ate them as a pottage, "the Effect of which was a very pleasant Comedy; for they turn'd natural Fools upon it for several Days: One would blow up a Feather in the Air; another wou'd dart Straws at it with much Fury; another, stark naked, was sitting up in a Corner, like a Monkey, grinning and making Mows at them; a Fourth would fondly kiss and paw his Companions, and sneer in their Faces with a Countenance more anticke than any in a Dutch Droll . . . A thousand such simple Tricks they play'd, and after Eleven Days, return'd to themselves again, not remembering anytbing that had pass'd."

J. R. Dodge states<sup>2</sup> that "*Datura meteloides* grows abundantly on the Colorado River, in Arizona, and that the Mohave Indians gather the leaves and roots, bruise and mix them with water, and after being allowed to stand several hours, the liquid is drawn off. It is a highly narcotic drink, producing a stupefying effect, which is not very easy to remove." . . . The California Indians use a decoction of this species to stimulate young females in dancing. The Pah-Utes call the plant *Main-oph-weep*; they ferment in the sun a watery infusion of the bruised seeds and drink the liquor for the purpose of intoxication.<sup>3</sup>

Dr. Schlesier met a case<sup>4</sup> in which the subject, a boy, æt. 4, mistook the fruit of stramonium for poppy heads, and ate a quantity of them. "Soon afterward his face was flushed, his eyes were glistening and in constant motion, the pupils much dilated, and the countenance was that of an intoxicated person. He sat up in bed quite unconscious, but continually babbling and occasionally starting up suddenly, his hands apparently directed at imaginary objects in the air. His pulse was very

<sup>1</sup> *History of Virginia*, Book II, p. 24, London, 1705.

<sup>2</sup> *U. S. Agric. Rep.* 1870, p. 423, Washington, 1871.

<sup>3</sup> Dr. Ed. Palmer in *Amer. Nat.*, 1878, p. 650.

<sup>4</sup> Canstatt, *Jahrbuch*, 1844, p. 297.

slow; there was no fever, but intense thirst and violent perspiration from incessant motion." Dr. Turner<sup>1</sup> describes the effects upon two children who had eaten the seeds: "In an hour and a half they were fully under the influence of the poison. They were lying on their backs, eyes bright, pupils widely dilated and insensible to light, conjunctiva injected, faces deeply suffused, and of a dark-crimson color; difficulty of breathing, inability to articulate, and in a state of complete insensibility, broken occasionally by a paroxysm, during which they would utter some indistinct sounds and throw their hands about, as if trying to ward off some threatening evil. They then fell into a comatose state, but were easily roused into a state of violent excitement; they grasped at imaginary objects; there was picking of the bedclothes, with paroxysms of excessive laughter."

The Thugs, a society of stealthy fanatic murderers of India, often employ *D. fastuosa* and *alba* to render their intended victims unconscious . . .

From the symptoms caused by this drug, its homoeopathic adaptability to hydrophobia will be at once evident. There is no drug so far proven that deserves as thorough and careful a trial in this dread disease as stramonium. The following, from a letter written by the Catholic Bishop of Singapore to the *Straits Times*, has just come to my notice. This Bishop says he thinks it is his duty to publish the remedies used in the missions in Tonquin for the cure of hydrophobia. These, he says, consist, first, in giving as much star-aniseed as may be contained on a cent piece; and, secondly, in making the patient take some water in which a handful of the leaves of stramony, or thorn-apple, or pear-apple, is infused. These will cause an access of the convulsions or delirium, during which the patient must be tied; but on its abatement he will be cured. If the remedy act too violently, either by too much being administered, or on account of there being no virus of real hydrophobia, the consequences may be ameliorated by making the patient drink an infusion of licorice root, a most precious antidote against poisoning by stramony. In 1869, the Bishop relates, a very honorable member of the clergy of Paris was bitten by a pet dog, which died thirty hours afterwards with the most characterized convulsions of rabies. The following day he felt the first symptoms of the dreadful disease, and these augmented in intensity every day. The priest, however, applied at once all sorts of known remedies, ancient and modern, and even employed a very small dose of stramony. Each time he used the latter the progress of the disease ceased for some hours, even days, and then continued its ravages with greater intensity than before. When the fatal issue was at hand, just at the crisis of the disease, when the paroxysms had attained the greatest violence, the patient, with almost superhuman energy, began chewing a pinch of dried stramony leaves, swallowing the juice. The effect was not long in making itself felt. In half an hour the disease had attained its height, the patient being delirious during the convulsions; but on the following day he was perfectly cured. "The same remedy," concludes the Bishop, "is used in India, and is always successful."—MILLSPAUGH, *Medicinal Plants*, vol. II., 1887, pp. 127-4 to 127-6.

*Dithyrea wislizeni* Engelm. Spectacle-pod. BRASSICACEÆ.  
Mustard family.

*Ha'ko'lokta*, 'Sand-hill crane'; so named because the plant is a favorite of this bird.

The entire plant is boiled by the officiating theurgist, who administers the tea for delirium.<sup>2</sup> This medicine originally belonged to the

<sup>1</sup> *Amer. Jour. Med. Sci.*, 1864, p. 552.

<sup>2</sup> It has been observed (p. 89) that *D. wislizeni* Engelm., made into a tea, is taken ceremonially by the Galaxy fraternity "to loosen their tongues and make them talk like fools." From this it would appear that sometimes, at least, they practice the homeopathic principle in doctoring.

Galaxy fraternity, but in recent years the Galaxy has given it to other fraternities. As an external remedy, however, the plant still belongs exclusively to the Galaxy fraternity. When employed for external use this plant bears another name, *u'sha a'wa a'kwawa*, 'snake all medicine' (*u'sha*, a species of snake; *a'wa*, all; *a'kwawa*, medicine).

The entire plant, ground, is mixed with a small quantity of warm (not hot) water, and the infusion is applied externally for reducing swelling of any part of the body, especially the throat.

*Ephedra nevadensis* S. Wats. Commonly known as Teamster's tea. GNETACEÆ. Joint-fir family.

*Tsi'posho*, 'stiff-jointed.'

The plant, minus the root, is made into a tea and drunk during the first stage of syphilis. It belongs to all the people.<sup>1</sup>

*Eriogonum alatum* Torr. POLYGONACEÆ. Buckwheat family.

*Shi'pa*, 'slightly bad smelling.'

The root is ground by women on the grinding-slabs in the ceremonial chambers of all the fraternities and gathered into bowls by the officers of the fraternity. It is afterward distributed by the maker of medicine-water to each adult member of his fraternity. The powdered root is received in the palm of the hand and deposited in a piece of deerskin, which is tied securely. A pinch of the powder in a cup of warm water is taken morning, noon, and sunset to relieve "general miserable feeling" or after a fall.

*Eriogonum fasciculatum* Benth. POLYGONACEÆ. Buckwheat family.

*Sus'ki*, 'coyote,' also *a'kwa a'kohanna*, 'white medicine' (*a'kwa*, medicine; *a'kohanna*, white), because of the whiteness of the root after the removal of the bark.

The root is boiled and the tea drunk hot after confinement, to heal laceration. The theurgist, man or woman (usually the latter), who is summoned, carries the root to the house of the patient, where a woman of the family makes the tea, which is administered by the attending theurgist. The hot tea is drunk also for hoarseness and for a cold when the throat is affected. The powdered root is ground with ceremony, including dancing, in the ceremonial chamber of the Little Fire fraternity.<sup>2</sup> It is applied to cuts of any kind, and to arrow or bullet wounds. The wound is bathed each day, fresh powdered root is applied, and the wound bandaged. When applied to wounds the root is the property of the Priesthood of the Bow.

<sup>1</sup> The plant is used for the same purpose by Indians and Mexicans generally. See Palmer in *Amer. Jour. Pharm.*, vol. 50, p. 591.

<sup>2</sup> See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 553.

*Eriogonum jamesii* Benth. POLYGONACEÆ. Buckwheat family.  
*Ta'loo'*, 'wood strong or hard to break,' in reference to the root  
of the plant.

This is administered for sore tongue. The theurgist places a bit of the root in the patient's mouth, where it remains a day and a night, except when removed so the patient may eat. The mouth is washed with water after eating and the piece of root returned to the mouth. When the theurgist removes the root he places with it a piece of turquoise and white shell beads, and deposits all in an excavation in the river bottom in order that it may go to Ko'łuwala'wa, Abiding Place of the Council of the Gods.<sup>1</sup>

*Erysimum* sp. BRASSICACEÆ. Mustard family.  
*Ha'sikahlto'we*.

The entire plant is ground and mixed with a small quantity of water, and the infusion is applied to the forehead and temples to relieve headache caused by exposure to heat. This medicine is also rubbed over the exposed parts of the body to prevent sunburn, and the top of the head is often bathed with it before one goes into the sun.<sup>2</sup>

*Eupatorium occidentale arizonicum* A. Gray. CARDUACEÆ.  
Thistle family.

*Ha'kochi*, 'rat leaf' (*ha* > *ha'li*, leaf; *ko'chi*, a species of rat).

The blossoms are combined with those of other plants, including the blossoms of the native squash, in the preparation of pats, or cakes, by the Shu'maakwe,<sup>3</sup> who make them annually with great ceremony in the fraternity chamber. This plant belongs solely to the Shu'maakwe, when combined in the pats, which are regarded as a specific for rheumatism and swellings. It is in great demand by the people generally, and there is seldom a time when male or female theurgists are not treating patients with it in their homes. A portion of a cake is broken into a small quantity of water and the infusion applied externally, the theurgist praying in a low tone while he rubs gently with the medicine.<sup>4</sup>

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 20.

<sup>2</sup> For ceremonial use of *Erysimum*, see p. 92. When this plant is employed ceremonially it bears the name *ha'uni tsan'na* 'leaf long small' (*ha* < *ha'li*, leaf; *u'ni*, long; *tsan'na*, small).

<sup>3</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 543.

<sup>4</sup> A guest of the writer, while at Zuñi, was troubled with a swelling the size of a hen's egg, on her cheek. It was thought she would be obliged to make a journey to a physician, but it was decided to try first the Shu'maakwe medicine. A female theurgist was summoned, and after three treatments, one each day, the swelling had disappeared entirely. There was no recurrence of the trouble.

Later the writer suffered from rheumatism in the right shoulder, and consulted a physician. After many days of treatment without relief, she called in a Shu'maakwe doctor, and six applications of the medicine above described resulted in her complete recovery.

Regarding *E. perfoliatum* L., Rafinesque (*Med. Bot.*, vol. I, p. 177) says: "A valuable sudorific, tonic, alterative, antiseptic, cathartic, emetic, febrifuge, corroborant, diuretic, astringent, deobstruent and stimulant. It was one of the most powerful remedies of the native tribes for fevers, etc."

*Euphorbia polycarpa* Benth. Spurge. EUPHORBIACEÆ. Spurge family.

*I'kwik'ak'ia tsan'na*, 'make little milk' (*i'kwik'ak'ia*, make milk; *tsan'na*, small, little).

Four pinches of the ground plant are put with the several fingers into a cup of warm gruel made of white cornmeal, which is drunk for retarded flow of milk after childbirth. Its action is said to be rapid. There is a belief that only white corn must be used for the gruel, otherwise the milk would not be white. When the plant is used for this purpose it belongs exclusively to the women.

*Euphorbia scryphillifolia*, Pers. Spurge. EUPHORBIACEÆ. Spurge family.

*I'kwik'ak'ia*, 'make milk.'

This plant also is used to increase the flow of milk. It is administered too as an emetic and a cathartic by the theurgists of the secret fraternities.<sup>1</sup>

*Eurotia lanata* (Pursh) Moq. Winter Sage. CUENOPODIACEÆ. Goosefoot family.

*Tan'asi*, 'winter sage.'

Remedy for burns. The fresh root is chewed, and the dry root is ground between stones. In both cases the theurgist takes a quantity of the root into his mouth and ejects it into his hand. Placing both hands together, he blows four times into them, that the "good of his heart" may enter into the medicine; he then expectorates on the palms of his hands, and, rubbing them together, applies the root to a burn, which he binds with a cotton cloth. This medicine belongs to all the fraternities.

*Gaertneria acanthicarpa* (Hook.). Britton. Ragweed. AMBROSIACEÆ. Ragweed family.

*Mo'watapa*, 'hail prickly' (*mo* < *mo'piawe*, hail (pl.); *wa'tapa*, prickly).

So named because the seed-pods are prickly.

They fall to the ground, are covered with soil, and germinate just as do the seeds that are left on the ground by hail-stones which bring the seeds from the undermost

<sup>1</sup> "The scientific name *Euphorbia* is said to have been given to this genus of plants by a celebrated African monarch, King Juba of Mauritania. This king was son of the partisan Juba, of the wars of Pompey and Cæsar. It is claimed that he was exceptionally learned and had some knowledge of botany and medicine. Having found purging properties in a plant growing in his dominion, he called the attention of his renowned court physician, Euphorbus, to it and named it in his honor—*Euphorbia*. The trivial name, spurge, seems to have arisen from the reputed property given by King Juba, as it is but a contraction of 'espurge,' a French term meaning to purge."—KING, *Amer. Dispensatory*, vol. 1, 1898, p. 745.

"*Euphorbia polycarpa*, called by Mexicans Golendrina.—A strong decoction made from this plant and applied to snake bites soon produces reaction. Many cures effected in this way are reported. In fact, the Indians of Arizona and Southern California rely entirely upon it in such cases. Some years since, being in San Diego, and wading in the salt water, a fish (Sting-Ray) plunged the bony projection at the base of its tail into my left foot, and soon the swelling and pain became excessive. A Mexican woman made several gallons of a very strong decoction from this plant, and plunged my leg up to the knee into it while hot, and in a few hours relief came."—PALMER in *Amer. Jour. Pharm.*, 1878, vol. 50, p. 590.

world so as to replenish those which the Zuñi brought with them from this inner world. These seeds were brought by the rain priests in their precious *é'towe*.<sup>1</sup>

When the Kia'kwemosi, Rain Priest of the North, sent his son and daughter ahead to look for a place for 'their others',<sup>2</sup> he placed *mo'watapa* seeds in the belt of each with instructions to plant them. The youth and maiden afterward became the first ancestral god and goddess, respectively, and the plant is frequently referred to as the medicine of the Ko'mokätsi, the first goddess and the mother of all the ancestral gods, she having named the plant and first planted the seeds in the outer world.

The entire plant is made into tea, which is drunk warm for obstructed menstruation. The tea is also rubbed over the abdomen while it is massaged. The Zuñi claim that the tea taken sufficiently strong will produce abortion. While this vice exists in Zuñi, cases are very rare. The ground root is placed in a hollow tooth to relieve toothache.

The plant belongs to all the people.

*Gilia multiflora* Nutt. *Gilia*. POLEMONIACEÆ. Phlox family.  
*Ha'sililiwe li'anna*, 'blue leaves in delicate motion' (*ha* < *ha'we*, leaves; *sililiwe*, in delicate motion; *li'anna*, blue), in reference to the leaves of the flower.

The entire plant is ground in the chamber of the Shu'maakwe and Cactus fraternities. The Shu'maakwe gave this medicine to the Cactus fraternity many years ago.

The face is bathed in warm water and the powdered plant applied to relieve headache. In addition to its use by both fraternities for this purpose, it is employed by the Cactus fraternity in dressing wounds, the doctors of this organization being called on in the absence of members of the Priesthood of the Bow. When the remedy is thus used the wound is first cleansed, then the powder is applied, and the wound bandaged. The treatment is given in the home of the patient or wherever he may be, and he is expected to join the Cactus fraternity after his recovery.

The blossoms are called *pok'tina u'teawe*, 'smoking flowers' (*pok'tina*, to smoke; *u'teawe*, flowers). When employed to relieve strangulation the flowers are crushed in the hand and made into cigarettes with corn-husks and smoked. When used for this purpose the medicine belongs only to the Galaxy fraternity.

*Gilia* sp. POLEMONIACEÆ. Phlox family.

*Ha'wimo*, 'leaf seeds make' (*ha* < *ha'ti*, leaf; *wi'mo*, seeds make), in allusion to the seeds on the leaf.

The leaves are chewed slightly, or the entire fresh plant, bruised between the hands, is put into a small quantity of cold water and the infusion is drunk. The dried plant is ground between stones and mixed with water. This medicine is administered for headache,

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 163.

<sup>2</sup> *Ibid.*, p. 32.

swelling of the throat, fevers, to produce mild vomiting, and to act on the bowels and kidneys. For headache and for swelling of the throat the medicine is applied externally on the head and throat; for fevers it is rubbed over the whole body. A tea made of the entire plant is drunk warm to produce vomiting or to act on the bowels or kidneys. When the patient is relieved his head is washed by a female member of the family of the officiating theurgist.

The medicine belongs to all the fraternities.

*Gutierrezia filifolia* Greene. Snakeweed. CARDUACEÆ. Thistle family.

*Kīa'hapoko*, 'waters gathered together' (*kīa* < *kīa'wi*, water; *ha'poko*, to gather together).

This plant is supposed to have received its name from the Gods of War "because they observed that it was very fond of drinking water, and drew about it waters from all directions just as the people of fraternities meet together under one roof."

A small quantity of the blossoms of this plant is steeped for a short time in boiling water and the tea given to relieve retention of urine; it is claimed to cure the most obstinate cases. After drinking the tea the patient runs rapidly for some distance, and, returning, wraps in heavy blankets to induce perspiration. The medicine is also given to make one strong in the limbs and muscles.

This remedy belongs to all the fraternities.

*Helianthus annuus* L. Sunflower. CARDUACEÆ. Thistle family. *O'matsapa*, 'on tip of stem.'

This plant is employed in conjunction with others to cure rattlesnake bite. Its root is combined with the roots of *ha'tsoliko*, 'leaf mouse,' *Psilostrophe tagetina* (Nutt.) Greene; *a'nitolan*, 'rainbow' (so named from its banded roots), *Amsonia brevifolia* Gray, and *hu'techi* 'mephitic odor,' *Ximinesia exauriculata* (Rob. & Greenm.) Rydb.

This medicine belongs to all the fraternities, and a person contemplating absence from his village may obtain it from the director of his fraternity.

As soon as a theurgist reaches a patient who has been bitten by a rattlesnake, he takes a quantity of the ground plant of *u'tea li'akwa*, 'turquoise flower' (*u'tea*, flower; *li'akwa*, turquoise), into his mouth and proceeds to suck the wound. When he is satisfied that he has extracted as much of the poison as possible, he chews bits of the roots of the three plants mentioned above (each piece about as thick as the little finger and the length of the index and middle fingers measured across), and applies the mass to the wound with a bandage. Should the patient be troubled with throbbing in the part affected, the

theurgist unbinds the wounds and puffs smoke from a corn-husk cigarette filled with native tobacco, *a'na* (*Nicotiana attenuata* Torr.), well over the body.

During the period of treatment of a male patient he must not look on the face of a woman who is nourishing an infant, otherwise "his poisoned limb would swell and he would surely die within four days." He is isolated during his illness, seeing only his doctor and such members of his family as do not have infants. The treatment is repeated every day until all danger is past. Usually by the fifth day the patient has recovered, in which event, on the morning of the fifth day his head is washed with yucca suds by a woman of the fraternity to which the officiating theurgist belongs. The theurgist prays for the patient: "May your heart be good, that you may follow the straight road of the Sun Father. May your road of life be long, that you may not die, but sleep to awake in Ko'luwala'wa" (Abiding Place of the Council of the Gods).<sup>1</sup> Placing his *mi'li*<sup>2</sup> to the lips of the patient, the theurgist continues, "Inhale the sacred breath of life."

A man was once bitten in the foot by a rattlesnake early in the morning at Ojo Caliente, one of the farming districts, fifteen miles southwest of Zuñi Pueblo. Having no medicine at hand, he was compelled to walk to Zuñi before receiving treatment. On reaching the village, at noon, his leg was swollen to the thigh. A theurgist attended him at once, but he died in great agony before night. This is the only death from rattlesnake bite known to the Zuñi for more than fifty years.

*Hoffmanseggia jamesii* Torr. CASSIACEÆ. Senna family.

Called by Mexicans *camote de raton*.

The entire plant is soaked in a large bowl of cold water over night and the infusion given to sheep to drink that they may be prolific. The Zuñi have implicit confidence in this use of the plant.

*Hymenopappus filifolius* Nutt. CARDUACEÆ. Thistle family.

*Ha'uheyawe*, 'leaf cotton-wool' (*ha* < *ha'li*, leaf; *u'heyawe* [pl.], cotton-wool, in allusion to cotton on many stems. Cotton from a single stem would be *u'heyane*).

This plant is efficacious in the treatment of swellings, especially swelling of the glands. The affected part is rubbed with mutton grease or lard and the chewed root of the plant is ejected from the mouth over the swelling, after which the woolly-like fiber from the pod is bound on.

The plant is gathered in summer by fraternity men, but only the directors remove the coma from the pods; this is done during a cere-

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 20.

<sup>2</sup> Ibid., pp. 24, 416.

mony in the fraternity chamber. Men and women dance to the accompaniment of rattle, drum, and song. The coma is deposited in large bowls, which are placed by the altar, and is afterward gathered by directors into deerskin sacks. At the time the coma is prepared, pieces of the root of the plant are given by the director of the fraternity to each adult member, and it may be obtained from a director at the request of a theurgist of the fraternity.

The root is boiled and the tea drunk warm as an emetic.

The medicine belongs to all the fraternities.

*Juniperus monosperma* (Engelm.) Sargent. Cedar. JUNIPERACEÆ. Juniper family.

*Ho'manč*, 'cedar.' The plural form, *ho'mawe*, is more commonly used when referring to the tree medicinally, because a number of twigs are employed in preparing the medicine.

Delicate twigs are roasted in a fireplace and then steeped in hot water, and the tea is drunk by women previous to childbirth, to promote muscular relaxation. The tea must not be taken long before parturition, otherwise the child would be dark in color. When possible, twigs bearing *o'lipoli*, mistletoe (*Phoradendron juniperinum* Engelm.), are collected, as they are supposed to be more efficacious. The tea is taken also after childbirth to hasten the cessation of catamenia.

*Lavauria triloba* (Nutt.) Spach. Evening Primrose. ONAGRACEÆ. Evening Primrose family.

*Kwi'minně shi'lowa*, 'red root' (*kwi'minně*, root; *shi'lowa*, red).

The entire plant, ground, forms one of the constituents of the cakes or pats made by the Shu'maakwe fraternity.<sup>1</sup>

*Leptilon canadense* (L.) Britton. Horseweed. CARDUACEÆ. Thistle family.

*Ha'mo u'teawe*, 'leaf ball flowers' (*ha < ha'li*, leaf; *mo < mo'li*, ball-shaped; *u'teawe*, flowers). So named from the appearance of the inflorescence when the rays have been removed.

The rays of the blossoms, crushed between the fingers, are inserted into the nostrils to cure rhinitis. Sneezing results, and relief is soon found. This medicine belongs to all the people.

*Leucelene ericoides* (Torr.) Greene. CARDUACEÆ. Thistle family.

*U'mok'ianak'ia*, 'suds making' (*u'mok'ia*, suds; *na'kia*, making).

The entire plant is ground and mixed with a small quantity of cold water, and the infusion rubbed over the whole body to reduce swelling, and to overcome pain from cold or rheumatism. For such use the plant belongs to all the fraternities.

It is also made into a tea which is drunk warm to hasten parturition. When used for this purpose the plant is the property of obstetrical doctors, who are women.

<sup>1</sup> Consult 23d Ann. Rep. Bur. Amer. Ethn., p. 543. See also p. 50 of the present memoir.

*Linum puberulum* (Engelm.) Heller. Yellow Flax. LINACEÆ.  
Flax family.

*Tu'nawena a'wa a'kwawa*, 'eye-sick all medicine' (*tu'na*, eye;  
*wena*, sick; *a'wa*, all; *a'kwawa*, medicine).

The berry of this plant is tied in a bit of cloth and the juice squeezed into the eye to relieve inflammation. The plant belongs to all the people.

*Lithospermum linearifolium* Goldie. Puceoon. BORAGINACEÆ.  
Borage family.

*Kwi'minně kwin'na*, 'black root' (*kwi'minně*, root; *kwin'na*, black).

The medicine is administered by Kwe'lele, one of the three patron gods of the Great Fire fraternity,<sup>1</sup> to relieve sore throat and swelling of any part of the body.

The root is ground to a powder in the morning, on a ceremonial grinding-stone, in the room of the patient, and gathered into a deer-skin sack. The remainder of the plant is made into a tea by boiling in water, which is given warm to the patient as soon as made. After the tea has been drunk the stone upon which the root was ground is heated, a small quantity of water is poured on the stone, and when the water is boiling Kwe'lele loosens the medicine which adheres to the stone, and, lifting the latter with both hands, rubs it over the affected part of the body of the patient. The tea is again given at noon, and Kwe'lele returns at sunset with his two godly impersonators and with much ceremony applies the powdered root medicine to the parts affected.<sup>2</sup>

*Lobelia splendens* Willd. Cardinal Flower. LOBELIACEÆ. Lobelia family.

*Wa'yasiwulu*, 'fog or mist ascending like clouds from the earth.'  
(A satisfactory explanation of this name could not be obtained.)

This plant is one of a number employed by the Shu'maakwe fraternity in the preparation of their pat medicine.<sup>3</sup>

*Machæranthera glabella* (Nutt.) Greene. CARDUACEÆ. Thistle family.

*Ha'mopiawe*, 'hail leaf' (*ha* < *ha'li*, leaf; *mo'piawe* [pl.], hail).

The plant is ground and mixed with warm (not hot) water, and the tea is drunk as an emetic for sick stomach. This medicine is also rubbed over the abdomen. It belongs to all the fraternities.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 485.

<sup>2</sup> Ibid., p. 487.

<sup>3</sup> Ibid., p. 543. See also p. 50 of the present memoir.

*Mentzelia pumila* Torr. & Gray. Stick-leaf. LOASACEÆ. Loasa family.

*Mi'hana i'pachik'ia*, 'sacred embroidered cotton blanket hold-fast' (*mi'ha*, sacred embroidered cotton blanket; *i'pachik'ia*, hold-fast), meaning that when the plant touches the blanket it adheres to it. The plant is supposed to have received its name from having touched a *mi'ha* and held fast to it when worn by a personator of an anthropic god.

The powdered root is employed to relieve constipation, the medicine being inserted into the rectum with the finger. The remedy belongs to all the people.

*Pectis papposa* Harv. & Gray. CARDUACEÆ. Thistle family.  
*Ham'pasa*.

A good pinch of the blossoms is tied tight in a small piece of cloth, which is well moistened with water. This small sack is squeezed, allowing the medicine to drop into the eyes to relieve suffering from the effect of their exposure to snow. The medicine belongs to all the people.<sup>1</sup>

*Pinus edulis* Engelm. Piñon. PINACEÆ. Pine family.

*He'sho tsi'tonnë*, 'gum branch' (*he'sho*, gum; *tsi'tonnë*, branch).

The tree takes its name from the quantity of gum which exudes from it.

The needles of the tree are given for syphilis. The patient chews the needles, and after swallowing them drinks a quantity of cold water and then runs for about a mile, or until he perspires profusely, when he returns home and wraps in a heavy blanket. The kidneys are so acted on that frequent micturation is the result. Women afflicted with the same disease wrap in blankets after taking the medicine, but do not run. Frequently a tea is made of the twigs and drunk warm in conjunction with the needles. The ulcers are scraped with the finger-nail until they bleed, when the powdered

<sup>1</sup> Dr. Washington Matthews (Navajo Names for Plants, *Amer. Naturalist*, 1886, vol. XX, p. 769) records the following interesting observation on the belief of the Navaho respecting *Pectis*:

"I met the same Indian carrying, in the fold of his blanket, some specimens of *Pectis angustifolia*, a plant which on the dry mesas of New Mexico does not attain a height of more than two or three inches, but it has a delightful odor, like that of lemon verbena, and its infusion is used by the Navajos as a carminative. Their attention has therefore been drawn to it. The name given for the plant was so peculiar, signifying 'a breeze blowing through a rock,' *tseganülhecc*, that I made no delay in getting an explanation from him. He led me to the top of a desert mesa where the plant grew fresh. Here he picked up a piece of sandstone about a foot square and three inches thick, and held it up to my nose saying, 'Do you smell anything on that stone?' The dry hard stone was of course inodorous. He then rubbed a little of the fragment *Pectis* on one of the broad surfaces of the stone and immediately applied the opposite surface to my nostrils. The agreeable odor was at once distinctly perceptible through the rock. Some minutes later it could be detected in all parts of the fragment; but at first it was perceived at a point directly opposite to the point of application. Later he performed the experiment on a large stone nearly two feet thick; the results were the same as with the smaller stone, but more time was required for the odor to penetrate the sandstone. The odor he said, went through the rock as if it were blown by a breeze, hence the name."

piñon gum is sprinkled over them. If there is swelling at the groin it is lanced by the attendant theurgist and the powdered gum sprinkled into the incision as an antiseptic.

This medicine belongs to all the fraternities.

*Polygonum lapathifolium* L. Smartweed. POLYGONACEÆ.  
Buckwheat family.

*Ha'tashawe*, 'long leaf' (*ha* < *ha'li*, leaf; *ta'sha*, long; *we*, plural postfix).

The root of the plant is boiled and the tea administered as an emetic and purgative. It belongs to all the fraternities.

*Psoralea tenuiflora* Pursh. FABACEÆ. Pea family.

*Ha'tsanna*, 'small leaf' (*ha* < *ha'li*, leaf; *tsan'na*, small).

The leaves, moistened with water, are applied to the axilla, feet, or any other part of the body, for purification.

The plant is the common property of the tribe.

*Ptiloria tenuifolia* (Torr.) Raf. CICHORIACEÆ. Chicory family.  
*La'matsa*.

Cure for rattlesnake bite. The entire plant, which is not broken until required for use, is ground between stones, a small quantity of water being added from time to time during the grinding. The wound is sucked as quickly as possible, after which the powder is applied to it. The application is repeated four mornings. The patient eats only *he'we* (wafer bread made of corn meal), and drinks sparingly of water into which a small quantity of the powdered medicine has been sprinkled.

The plant belongs to all the fraternities.

*Quamoclidion multiflorum* Torr. Wild Four-o'clock. ALLIONIACEÆ. Four-o'clock family.

*Shi'kwamu*, 'swelling reduced' (*shi'kwa*, swelling; *mu*, reduced).

Men gather the root of this plant and give it to the women of the family. A small quantity of the powdered root, in cold or warm water, is given to adults and children to afford relief from the effects of overeating. Children especially suffer from the affection named. The woman who administers the medicine takes some into her mouth, and, ejecting it into her hands, rubs them over the abdomen of the patient. The medicine belongs to all the women. Women frequently slip a pinch of the powdered root into water to be drunk at meal time by the young men of the family, to prevent them overindulging their appetites. The powder is also put into *he'we* that is to be carried by men on long journeys, that they may not become too hungry to be satisfied with what they have.

This plant also bears the name *a'wan sa'pipi a'wa i'tonak'ia*, 'great young fowls all eating food' (*a'wan*, great; *sa'pipi*, young fowls; *a'wa*,

all; *i'tonak'ia*, eating food). The blossoms of the plant are fed to newly hatched turkeys.<sup>1</sup>

*Radicula sinuata* (Nutt.) Greene. BRASSICACEÆ. Mustard family.

*Tu'nawena a'wa a'kwawa*, 'eye sick all medicine' (*tu'na*, eye; *we'na*, sick; *a'wa*, all; *a'kwawa*, medicine).

The entire plant is crushed in the hands and put into cold water; the infusion is used as an eye-wash. The blossoms are powdered and sprinkled over live coals in a bowl; the patient holds his face over the bowl to induce a copious flow of tears, which is said to give speedy relief from any ordinary eye trouble caused by inflammation.

The medicine belongs to all the fraternities.

*Ratibida columnaris* (Sims) D. Don. Cone Flower. CARDUACEÆ. Thistle family.

*Ya'konak'ia*, 'bile vomit' (*ya'ko*, bile, or any nauseous substance in the stomach; *na'k'ia*, to vomit).

The entire plant is soaked or steeped in water and the infusion is drunk as an emetic.

This medicine belongs to all the fraternities.

*Rumex mexicanus* Weinm. Dock. POLYGONACEÆ. Buckwheat family.

*Kwi'mi i'topona*, 'painted root' (*kwi'mi* < *kwi'minnë*, root; *i'topona*, painted).

A tea made by boiling the root in water is drunk by members of the Sword Swallowers fraternity and of the Sword order of the Great Fire fraternity, after swallowing the sword,<sup>2</sup> to soothe the throat. The root, ground to powder, is given by theurgists to their patients for sore throat.

This remedy belongs to all the fraternities, including the *Le'wekwe*, Sword Swallowers.

*Senecio multicapitatus* Greenm. Senecio. CARDUACEÆ. Thistle family.

*Pi'naku*, 'grind leaf' (*pi* [archaic], leaf; *na'ku*, to grind). So named from noise made by animals in eating this plant.

The blossoms are moistened with cold water and tied in a cloth through which the medicine is dropped into the eyes to relieve inflammation. Used in this way it belongs to all the people.

The root, ground to powder in the fraternity chamber, is mixed with cold water and the infusion rubbed over the limbs for "aching bones." This medicine is applied morning, noon, and night by the chosen theurgist, who must invoke the cougar of the north and the

<sup>1</sup> Turkeys are raised for their feathers, which rank with eagle plumes in ceremonial importance.

<sup>2</sup> See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 482.

bear of the west during the application, as this medicine is the special property of these zooic gods. It is thus used by all the fraternities.

*Solanum elæagnifolium* Cav. Bull Nettle. SOLANACEÆ.  
Nightshade family.

*Ha'watapa*, 'prickly leaf' (*ha* < *ha'li*, leaf; *wa'tapa*, prickly).  
The chewed root is placed in the cavity of an aching tooth.  
This remedy belongs to all the people.

*Solanum rostratum* Dunal. Buffalo Bur.

*Mo'kiachipa*, 'prickly pod' (*mo* < *mo'li*, round or roundish, *mo* denoting the pod; *křa'chipa*, prickly). As will be seen above, *wa'tapa* also means 'prickly'. There are cases in which two words have the same meaning and a single word may embody two meanings.

A pinch of the powdered root is put into a small quantity of water and the infusion is drunk to relieve sick stomach. It does not act as an emetic.

This medicine belongs to all the fraternities.

*Solidago canadensis* Gray. Goldenrod. CARDUACEÆ. Thistle family.

*Ha'chiltowe*, 'inside flower seeds' (*ha* < *ha'li*, leaf, referring to petals of blossoms; *chiltowe*, inside seeds, in allusion to the seeds in the blossom).

The crushed blossoms are put into water and the infusion is drunk to relieve pains through the body; they are also chewed for sore throat, and are considered excellent for both troubles. The medicine belongs to all the people.

*Stanleya pinnata* (Pursh) Britton. BRASSICACEÆ. Mustard family.

*Kwi'minně lupsině*, 'yellow root' (*kwi'minně*, root; *lupsině*, yellow).

This plant is regarded by the Zuñi as a specific for syphilis in the primary stage. The entire plant is ground to a powder. The ulcers are scraped with the finger-nail until blood appears, when the parts are bathed with cold water and the powder is applied by the attending theurgist either by sprinkling with the fingers or by taking the medicine into his mouth and ejecting it on the ulcers. The remedy belongs to all the fraternities.

*Tetranuris scaposa* (DC.) Greene. CARDUACEÆ. Thistle family.

*Hä'lo a'kwawa*, 'ant medicine' (*hä'lo*, ant; *a'kwawa*, medicine).

The entire plant is soaked in cold water for several hours, when it is ready for use. The infusion is employed externally for sore eyes and for cutaneous affections, and it is claimed that this treatment always brings relief unless the patient has a "bad heart." This

medicine belongs to the Ant, Eagle-down, and Rattlesnake fraternities.<sup>1</sup>

*Thalesia fasciculata* (Nutt.) Britton. Cancer Root. OROBANCHACEÆ. Broom-rape family.

*We'kwinně*, 'foot.' So named because this plant is supposed to have grown in great abundance in the undermost world, and when the people trod upon it it was refreshing to their bare feet.

The whole plant is ground to powder between stones; this powder is considered a specific for hemorrhoids. A small roll of rabbit-skin, or a rabbit's tail dipped into warm water is inserted as far as possible into the rectum five or six times. The index finger is then moistened with water, dipped in the powdered plant, and applied to the anus; then the finger is inserted into the rectum, carrying the powdered root with it. As a medicine for this purpose the plant belongs to all the fraternities.

*Tripteroalyx wootonii* Standley. ALLIONIACEÆ. Four-o'clock family.

*U'shaa'wa*, 'painted in all colors.' *U'shaa'wa* is the name of a snake having a skin spotted in various colors. This snake is said to eject a fluid not from the head, but through the skin of the body, which causes much suffering to one touched thereby. The plant is said to be efficacious in the treatment of a person so afflicted.

A pinch of the ground root is put into a vessel of warm (not hot) water, and the infusion is drunk morning, noon, and night, to relieve the ill effect of the poisonous fluid from the snake. The attending theurgist also chews a quantity of the root, and, ejecting it into his hands, rubs the afflicted portion of the body. Crushed leaves of the plant are put into a bowl containing live coals, and the patient stands nude over the bowl, both patient and vessel being well covered with blankets. Three doses of the medicine and the heated crushed leaves are supposed to produce the desired sweat-bath.

A quantity of the powdered root in a cup of warm (not hot) water is drunk morning, noon, and night, for swollen glands, especially those of the throat.

This medicine belongs to all the fraternities.

*Ustilago zeæ*. Corn Smut.

*He'kwitola*, 'black bread,' referring to a particular kind of bread.

(*he* < *he'we*, wafer-like bread made of corn meal; *kwitola* [archaic], black). The name was given to the fungus on account of its similarity in texture and color to *he'we*.

<sup>1</sup> The Rattlesnake fraternity plays no part with the live rattlesnake, this body being a division of the Eagle-down fraternity. The members of the Eagle-down fraternity differed in opinion, with the result that many left the parent fraternity and organized one of their own. It is said that they quarreled with the main body "like angry snakes," hence the name.

This medicine is given to women during parturition to hasten childbirth by increasing the severity of labor. It is given also to stop hemorrhage after childbirth, and for abnormal lochial discharge. The treatment is the same for the three ailments—a pinch of the *Ustilago* is put into a small quantity of warm or cold water and the infusion is taken at intervals.

This remedy belongs to all the female theurgists.<sup>1</sup>

*Villanova dissecta* (A. Gray) Rydb. **CARDUACEÆ.** Thistle family.

*Hä'lo kĩa'we*, 'ant seeds' (*hä'lo*, ant; *kĩa'we*, seeds).

The entire plant is ground to powder, which the theurgists, to whom the medicine belongs, keep in deerskin sacks. It is considered a specific for rheumatism and for pains in the head. The theurgist takes the powder into his mouth, then ejects it into his hands, which he places on the parts of the body of the patient that are affected. This treatment is sure to bring relief unless the patient has an "evil heart," say the Zuñi. It belongs to all fraternities.

*Wedeliella glabra* (Choisy) Cockerell. **ALLIONIACEÆ.** Four-o'clock family.

*Ha'pewikĩapa*, 'leaves flat in all directions' (*ha* < *ha'li*, leaf; *pe'wikĩapa*, flat in all directions), so called in allusion to the spreading habit of the plant in disk form upon the ground.

This plant is inimical to healing and is consequently the enemy of all healing plants. "If separated with the hands it will cause the skin to break."

*Xanthium commune* Britton. Cocklebur. **AMBROSIACEÆ.** Ragweed family.

*Mo'kiachipa*, 'prickly pod' (*mo* < *mo'li*, round or roundish; *kĩa'chipa*, prickly). *Wa'tapa* is another term for prickly.

Seeds of the bur are ground with native squash seeds and with grains of corn that have been buried by crows and found by members of the Cactus fraternity. The grinding is done on stone slabs in the fraternity chamber. This mixture is applied externally to extract cactus needles or splinters, to heal wounds from nails, and for similar purposes. The theurgist expectorates on the wound, then on the medicine, which he applies to the wound, patting it until it adheres firmly to the flesh. He then binds on a cloth when this can be done;

<sup>1</sup> "Dr. W. A. N. Dorland has found that in doses of one or two drachms of the fluid extract [of *Ustilago zeæ*] it markedly increases the uterine pains during labor. He claims for it that it will not produce a prolonged tonic contraction, as does ergot. This is, however, doubtful."—*The Dispensatory of the United States of America*, by DR. GEO. B. WOOD and DR. FRANKLIN BACHE, 17th edition, p. 1766, Phila., 1894.

"*Ustilago* was introduced into practice chiefly through the efforts of the Homœopaths. Inasmuch as it acts promptly upon the gravid uterus, exciting contraction, it may be employed in labor, under the same circumstances, and observing the same precautions as named under ergot. . . . It also arrests prolonged lochial discharge, and gives a healthy tone to the uterine walls."—KING, *American Dispensatory*, 18th edition, vol. II, 1900, pp. 2035, 2036.

but in instances when the medicine is applied after a ceremony, in the performance of which the entire body has been exposed to the cactus, and no bandaging can be done, the medicine is used more freely. The officiating theurgist expectorates on the body wherever the pain indicates the presence of cactus needles, and applies the paste. The Zuñi claim that this medicine usually causes the spines or splinters to come to the surface in a day, and that never more than two days are required for their extraction by this treatment. The medicine is applied morning and evening until relief is afforded.

To protect the flesh from the spines the seeds are chewed by members of the Cactus fraternity, who eject the mass into the hands and rub it over the entire body prior to the ceremony with the cactus.

*Ximenesia exauriculata* (Rob. & Greenm.) Rydb. Crownbeard.

CARDUACEÆ. Thistle family.

*Hu't'chi*, 'mephitic odor.'

A specific for cramps in the stomach. The blossoms are chewed and swallowed, after which water is drunk. Copious vomiting is the result. When employed for the above purpose the plant belongs to all the people. The root of this plant is employed with other roots in treating the bite of a rattlesnake.<sup>1</sup>

From the foregoing pages it is evident that for a long period the Zuñi Indians have extensively employed legitimate medicines for healing the sick. Remedies were discovered by chance and then came the period of experimentation. They learned the value of *Datura meteloides* as a narcotic perhaps centuries before the birth of Baron Stoereck, of Vienna, who first brought it to the attention of the medical profession, and the use of antiseptics while Lister was still unknown. How long ergot has been employed by the Zuñi for the chief purpose to which it is devoted by civilized man, no one can say.

The Zuñi do not understand how the old medicines came into use. They believe that the anthropic and zoic gods possess these remedies, allowing the Zuñi to act as their agents in administering them. They must not be employed, however, prior to the offering of proper supplications and prayers to the gods whose medicines are to be administered; therefore there is much ceremony connected with healing the sick. In fact, the life of the Zuñi is a prolonged ceremony from birth to death, of which plant life forms a conspicuous feature; but plants are revered apart from their association with ceremony and the curing of the sick. The Zuñi have a passion for the beautiful in nature; they love flowers because they are beautiful to the eye, and their fragrance, too, is pleasing. The youth loves to pluck the

<sup>1</sup> In the knowledge of plant medicines the Zuñi are no exception to the other Pueblos. A preliminary study by the writer of the medicines of the Taos, Tewa, and Sia Indians discloses a close relationship among them.

blossoms and wear them in his headkerchief when he seeks the maiden of his choice at their trysting place. Flowers are associated with butterflies and music. The god of music created the *tenatsäli*, a mythical plant bearing blossoms of the colors of the six cardinal points—yellow blossoms for the north, blue for the west, red for the south, white for the east, all colors for the zenith, and black for the nadir. He can with his flute draw to him the flowers and butterflies of the world.

## EDIBLE PLANTS

*Amaranthus blitoides* S. Wats. Tumbleweed. AMARANTHACEÆ.

Amaranth family.

*Ku'shutsi*, 'many seeds.'

The seeds of the plant are supposed to have been brought from the undermost world in the precious *d'tetlive*<sup>1</sup> of the rain priests and scattered by them over the earth. Originally the seeds were eaten raw, but the Zuñi say that after they became possessed of corn, these seeds were ground with black corn meal, mixed with water, and the mixture was made into balls, or pats, and steamed, as are those eaten at the present time. A network of slender sticks or slats is fitted snugly inside the pot in the center, and the meal cakes or balls are placed thereon. The pot contains sufficient water to steam them.

*Artemisia wrightii* A. Gray. Wormwood. CARDUACEÆ. Thistle family.

*K'ia'tsanna*, 'small seeds' (*k'ia* < *k'ia'we*, seeds; *tsan'na*, small).<sup>2</sup>

The seeds ground and mixed with water are made into balls or pats, and steamed. This dish is now rarely prepared, but the Zuñi declare that *k'ia'tsanna* was among their most ancient foods, and that they depended much on it when they first emerged into the outer world.<sup>3</sup>

*Asclepias galioides* H. B. K. Milkweed. ASCLEPIADACEÆ. Milkweed family.

*Ha'watseki*, 'leaf boy' (*ha* < *ha'li*, leaf; *wats'eki*, boy). The young boys search for the plant in order to secure the first buds to eat, hence the name.

*Asclepias involucrata* Engelm. Milkweed. ASCLEPIADACEÆ. Milkweed family.

*Po'kia a'wa tsi'sinakia*, 'all jackrabbit sucking-food' (*po'kia*, jackrabbit; *a'wa*, all; *tsi'sinakia*, sucking-food); so named because the milk of the weed is a favorite food of this animal.

*Astragalus diplysus* Gray. Milk Vetch. FABACEÆ. Pea family.

*Ha'onawe*, 'leaf teeth' (*ha* < *ha'li*, leaf; *o'nawe*, teeth); so named because of the serrated leaf.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 163. The words *d'tetlive* and *é'towe* are synonymous.

<sup>2</sup> It will be observed that this plant when used for food bears an Indian name different from the one employed when it is used medicinally. See p. 42.

<sup>3</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 24.

The pods are gathered in the autumn and eaten fresh, and they are also dried for winter use. Boiled and salted, they are regarded as a delicacy.

*Atriplex powellii* S. Wats. Orache. CHENOPODIACE.E. Goose-foot family.

*Sul'tokia*, 'minute seeds.'

The Zuñi say that before the people had corn the seeds of this plant, like those of others, were eaten raw. After corn came the seeds were ground with corn meal and made into mush. "When we depended entirely on the small seeds of plants for our food, our flesh was not firm and good as it is now."

*Chenopodium leptophyllum* (Moq.) Nutt. Narrow-leaved Lambs-quarter. CHENOPODIACE.E. Goosefoot family.

*'Kia'tsanna*, 'small seeds' (*'kia* < *'kia've*, seeds; *tsan'na*, small).

The Zuñi declare that the seeds of this plant, with those of another plant (*Artemisia wrightii* Gray), called also *'kia'tsanna*, were among their principal foods when they first reached this world. The seeds are ground, mixed with corn meal seasoned with salt, and made into a stiff batter, which is formed into balls or pats and steamed. "Upon first reaching this world the seeds were prepared without the meal, as the Zuñi had no corn at that time."<sup>1</sup> Now the young plants are boiled either with or without meat, and are greatly relished.

*Coreopsis cardaminefolia* Torr. & Gray. Coreopsis. CARDUACE.E. Thistle family.

*Kia'naitu*, 'water seeds' (*'kia* < *'kia've*, water; *nai'tu* seeds, reference being to these particular seeds).

This plant was introduced among the Zuñi many years ago by the Navaho for making into a beverage, which continued in favor as a hot drink until the introduction of coffee by traders, after which no one drank *kia'naitu* who could find the means for purchasing the commercial berry. The plant was folded while fresh, a number of folds being attached one below the other, and hung on the wall to dry; a fold was detached when required for use.

*Coriandrum sativum* L. Coriander. APIACE.E. Carrot family.

*Ku'lantu*. Corruption of the Spanish name *culantro*.

This plant was introduced long ago among the Zuñi by the Mexicans. It is grown along the water courses in the farming districts, and in the gardens, which are cultivated exclusively by women. The leaves are relished as a salad, and the seeds are powdered and mixed with ground chile for use as a condiment with meat.

*Cucurbita pepo* L. Squash. CUCURBITACE.E. Gourd family.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 24.

*Me'teyäla*, 'round, inside seeds sit down' (*mo* < *mo'li*, round egg-shaped; *te'yäla*, inside sit down). The word for seeds is not expressed, but it is fully understood in reference to squash or melons. "Melons never stand but sit upon the ground or floor." The tendrils of the squash vine are called by the Zuñi *to'nikännë* (*to* < *to'nini*, native cotton rope; *kännë*, coiled).

Fresh squash is either cut in pieces and boiled or is roasted whole in the ashes; it is cut in spiral strips, folded into hanks, and hung up to dry for winter use. Squash blossoms are cooked in grease, and are also used as a delicacy in combination with other foods, as *he'palok'ä*, with which they are especially relished.<sup>1</sup> Gourds are fashioned into cups, ladles, dippers, and are put to various other uses.

*Cycloloma atriplicifolium* (Spreng.) Coulter. Winged Pigweed.

CHENOPODIACEÆ. Goosefoot family.

The blossoms are winnowed in a basket, the tiny seeds are collected and ground, and a small quantity is mixed with corn meal, which is then made into balls or cakes and steamed. "Before the Zuñi had corn, flour made only from other seeds was used."

*Ephedra nevadensis* S. Wats. Teamster's Tea. GNETACEÆ.

Joint-fir family.

*Tsi'posho*, 'stiff-jointed' (*tsi*, stiff; *posho*, jointed).

The plant, minus the root, is occasionally steeped in hot water and the decoction drunk as a beverage.

*Eriocoma cuspidata* Nutt. POACEÆ. Grass family.

*Köw'dëłthi*.

The Zuñi declare that the seeds of this grass formed one of their food staples before they had corn. Since the introduction of corn (it is certain that these people had corn centuries ago), it has been the custom to combine the ground *Eriocoma* seeds with meal and water, then to form the mixture into balls, or pats, which are steamed.

*Eriocoma cuspidata*. This is a singular species of grass which is found growing wild in moist sandy spots in Nevada, Arizona, and New Mexico, and produces a small, black, nutritious seed, which is ground into flour and made into bread. It is held in high estimation by the Zuñi Indians of New Mexico, who, when their farm crops fail, become wandering hunters after the seeds of this grass, which is abundant in their country. Parties are sometimes seen ten miles from their villages, on foot, carrying enormous loads for winter provision.<sup>2</sup>

*Euphorbia serpyllifolia* Pers. Spurge. EUPHORBACEÆ. Spurge family.

*Pa'näshtu*, 'mouth sweetened' (*pa* < *pash'toye*, in the mouth; *nash'tu*, sweetened).

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 365, and p. 46 of the present memoir.

<sup>2</sup> Palmer in Ann. Rep. Dept. Agriculture, 1870, p. 419, Washington, 1871.

The root, which is generally gathered by the men and carried to the female members of the family, to whom it properly belongs, is broken into bits and preserved in sacks. After the mouth has been thoroughly cleansed, a small piece of the root is placed therein by each of the women who are to make the sweetening for corn-meal *he'palok'ia*.<sup>1</sup> The root remains in the mouth two days, except when removed to enable the woman to take refreshment and to sleep. Each time the mouth is cleansed with cold water before the root is returned thereto. The root is finally removed when the process of sweetening the corn meal is begun. Either yellow or black corn is used, according to taste. The corn is freshly and finely ground. With her fingers the woman puts as much meal into her mouth as it will hold. The meal is not chewed, but held in the mouth until the accumulation of saliva forces her to eject the mass, which is deposited in a small bowl. This process is continued until the desired quantity of *chi'kwawc* (pl.), 'sweetening,' has been prepared for the *he'palok'ia*.

To a great extent sprouted wheat has taken the place of corn meal for sweetening *he'palok'ia*, but for this purpose the wheat is never taken into the mouth.

The Euphorbia leaves are chewed also on account of their pleasant taste.

*Hymenopappus filifolius* Nutt. CARDUACEÆ. Thistle family.  
The root is used as chewing-gum.

*Lactuca pulchella* DC. Wild Lettuce. CICHORIACEÆ. Chicory family.

*La'posho*, 'gray ear' (*la* < *la'shoktonč*, ear; *po'sho* [archaic], gray or ash color).<sup>2</sup> The full but unexpressed meaning is 'rabbit-ear leaf,' the gray of the leaf resembling the gray of a rabbit's ear.

The gummy substance from the root is prepared and used as chewing-gum. The young plants are uprooted when several inches high and hung to dry. The roots may be used at any time. A few cuts allow the gum to exude; it is then carefully dried before chewing.

*Lycium pallidum* Miers. Tomatillo. SOLANACEÆ. Nightshade family.

*K'ia'puli*, 'water fall down' (*k'ia* < *k'ia'wuc*, water; *pu'li*, fall down). So named because the rains cause many berries of the plant to fall.

The berries are boiled, and, if not entirely ripe, they are sometimes sweetened. This dish, which is regarded as a great delicacy, is called *k'ia'puli mo'li*, 'water-fall-down berry' (*mo'li*, round or egg-shaped). The berries are also eaten raw when perfectly ripe.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 365.

<sup>2</sup> The modern name for gray or ash color is *lo'klana*.

*Lycoperdon* sp. Puffball. LYCOPERDONACEÆ. Puffball family.

Mushrooms of the puffball variety are gathered in large quantities in the fresh state for food, and are also dried for consumption in winter.

*Opuntia whipplei* Engelm. & Bigel. Cane Cactus. CACTACEÆ.  
Cactus family.

'*Ko'shi*, 'cactus.'

The fruit, *me'awe*, is removed with wooden tongs and the spines are carefully rubbed off. It is eaten raw or stewed and is also dried for winter use. The dried fruit is ground to a flour, which is mixed with parched corn meal and made into a mush.

*Parosela lasianthera* (Gray) Heller. FABACEÆ. Pea family.

*Kwi'mi chulok'ia*, 'root chew' (*kwi'mi* < *kwi'minnë*, root;  
*chu'lok'ia*, to chew).

The root is chewed and greatly enjoyed, especially by children.

*Pectis papposa* Harv. & Gray. CARDUACEÆ. Thistle family.  
*Ham'pasa*.

The plant is gathered for winter use and hung in the house to dry. The flowers are crushed in the hand and sprinkled into meat stew as a flavoring, after it is cooked. The Zuñi declare that when the product of the hunt was their only meat, and they had only stone vessels in which to cook, *ham'pasa* was much esteemed as a seasoning for their game.

*Peritoma serrulatum* (Pursh) DC. Rocky Mountain Bee Plant.  
CAPPARIDACEÆ. Caper family.

*A'pilalu*, 'hand many seeds' (*a* < *a'si*, hand; *pi'talu*, many seeds). The leaf of the plant is referred to as a "hand."

This plant bears the same name as *Polanisia trachysperma*, not because the Zuñi do not recognize the difference between the species, but because the two plants are similar in appearance.

The tender leaves are cooked, usually boiled with corn on or off the cob, and highly seasoned with chile. Large quantities of the leaves are gathered and hung indoors to dry for winter use.

*Phaseolus vulgaris* L. Bean. FABACEÆ. Pea family.  
*No've*, 'beans.'

Next to corn, beans are the most important article of food cultivated by the Zuñi. These are grown from the native species. As much care is observed in securing beans of different colors as in the case of corn. The beans are yellow, blue, red, white, all colors, and black, symbolizing the six cardinal points—north, west, south, east, zenith, and nadir, respectively.

Beans are served in a variety of ways. They are boiled and fried in a considerable quantity of grease. Another style of preparation

consists in crushing boiled beans and mixing them with mush, baking them wrapped in corn husks. Still another favorite dish is meat stew well filled with beans.

*Physalis fendleri* A. Gray. Ground Cherry. SOLANACEÆ.  
Nightshade family.

*Ke'tsütokĭa*. Named for an insect that feeds upon the plant.

The fruit is boiled in a small quantity of water and then crushed and used as a condiment.

*P. longifolia* Nutt. bears the same Indian name as *P. fendleri*. This plant grows wild on the lowlands, and is also cultivated in the small gardens worked by the women. When ripe the fruit is red and its flavor is much like that of the tomato.

The berry is boiled, then ground in a mortar with raw onions, chile, and coriander seeds. This highly prized dish is eaten with a ladle or a spoon.

*Pinus edulis* Engelm. Piñon of the Southwest. PINACEÆ.  
Pine family.

*He'shotsi'tonnĕ*, 'gum branch' (*he'sho*, gum; *tsi'tonnĕ*, branch), in allusion to the quantity of gum that exudes from it.

The nuts from the cones are gathered in great quantities and stored for winter use. They are toasted, not only because the flavor is improved by this process, but because they are better preserved in this condition. What the Zuñi do not gather themselves they secure from the Navaho Indians. These nuts afford one of the choicest of their food supplies.

*Ribes inebrians* Lindl. Wild Currant. GROSSULARIACEÆ.  
Gooseberry family.

*Ke'lashiwu'nana*, 'weed first come out' (*ke*, weed; *lashiwu'nana*, first come out).

This plant is the first to show young leaves in the spring. The fresh leaves are eaten with uncooked mutton fat, or with deer fat when it can be obtained. The berries are highly relished.

*Salix irrorata* Anders. Willow. SALICACEÆ. Willow family.

Eight or a dozen willows trimmed at the ends and tied together are used for stirring corn, popcorn, and other food toasting over the fire.

Cottonwood is employed for a variety of purposes in the household.

*Solanum elæagnifolium* Cav. Bull Nettle. SOLANACEÆ. Nightshade family.

*Ĥa'watapa*, 'prickly leaf' (*ĥa* < *ha'li*, leaf; *wa'tapa*, prickly).

Goat's milk curdled with the berries is regarded by the Zuñi as a delicious beverage.

*Solanum fendleri* A. Gray. Native Potato. SOLANACEÆ. Nightshade family.

*K'ia'pimo*, 'round, uncooked, watery' (*k'ia'pi*, uncooked or watery; *mo* < *mo'li*, ball-or egg-shaped).

The potato is eaten raw, and after every mouthful a bite of white clay is taken to counteract the unpleasant astringent effect of the potato in the mouth.

*Solanum triflorum* Nutt. Nightshade. SOLANACEÆ. Nightshade family.

*Ha'liawe*, 'blue leaf' (*ha* < *ha'li*, leaf; *li'awe*, blue).

The ripe fruit is boiled, ground in a mortar, mixed with ground chile and salt, and eaten as a condiment with mush or bread.

*Triticum vulgare* L. Wheat. POACEÆ. Grass family.

*K'ia'we*, 'wheat.'

Wheat has been a staple article of food among the Zuñi since its introduction by the Spaniards. A light bread (*mu'loows*) raised with sour dough is made into turnovers and fanciful designs and baked in ovens outdoors.<sup>1</sup>

*He'pachiwe*, tortillas, thick cakes, are baked on polished stone slabs supported over stones in the fireplace.<sup>2</sup>

Sprouted wheat is used for making *he'palok'ia* which consists of a small quantity of the wheat ground and mixed with a batter made of wheat flour.<sup>3</sup>

Fragments of dried *he'palok'ia*, ground as fine as possible in a mill and mixed with water, constitute a beverage which is enjoyed by the Zuñi.

*Mu'tsikowe*, doughnuts, were adopted from the Mexicans many years since. A soft dough is made of flour and cold water, and salt is added. A bit of the dough broken from the mass is shaped into a cake about 4 by 4 inches. The cakes are cooked in boiling beef fat or mutton grease, or in lard if it can be secured. Each doughnut is punched with a slender stick which is employed to turn it over in the grease and to remove it from the pot. The doughnut is held over the pot for a moment or two to allow the grease to drip from it and then is deposited in an eating bowl.

*Xanthium commune* Britton. Cocklebur. AMBROSIACEÆ. Ragweed family.

*Mo'k'achipa*, 'prickly pod' (*mo* < *mo'li*, round or egg-shaped; *k'ia'chipa*, prickly).

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 364.

<sup>2</sup> Ibid., p. 363.

<sup>3</sup> Ibid., p. 365.

The seeds are ground, mixed with corn meal, made into cakes or balls, and steamed. This was a common dish among the poorer class of the Zuñi in 1879.

*Yucca baccata* Torr. Datil. LILIACEÆ. Lily family.

*Ho'kšapa*, 'long leaf wide.'

The fruit of this plant is regarded by the Zuñi as a great luxury. Before they obtained wagons it was gathered and carried in blankets on the backs, and later on the backs of burros.

The fruit, which is called *tsu'piyaně* (pl. *tsu'piyarč*, 'long oval'), after being pared is eaten raw, and is also boiled. When the boiled fruit becomes cold, the skin is loosened with a knife and pulled off. The fruit is greatly relished when prepared in this way, but is still more highly esteemed as a conserve, which is prepared in the following manner: After being pared the fruit is heaped in large bowls; this part of the work is done by the women of the household assisted by their female friends. They labor industriously throughout the day, and at night the party is joined by male friends and relations, as many as possible sitting around the filled and empty receptacles, while the others sit near by. The fruit is bitten off close to the core containing the seeds, which is cast aside. Then, after being chewed, the fruit is ejected from the mouth into a bowl by those immediately around the receptacle, while the others discharge the fruit into their hands, and, reaching over, place it in the vessel. The chewing continues until late in the night, and when the work is finished a supper is served by the hostess assisted by her women friends. The bowl of chewed fruit, covered with a stone slab, is deposited on the roof for the remainder of the night. In the morning it is emptied into a large cooking vessel balanced over hot embers in the fireplace; no water is used, and the fruit is constantly stirred with a slender rod. When it is sufficiently cooked it is transferred to large bowls; on becoming cold, the mass is made into thick pats about three inches in diameter. These are placed on polished stone slabs and dried in the sun on the roof. About three days are required for the drying process. Those sleeping on the roof keep an eye on the pats, that no harm may come to them. When sufficiently dried several pats at a time are taken into the hand and squeezed together; then the mass is worked on polished stone slabs into rolls about 12 inches long and 3½ inches in diameter. The rolls, which are perfectly smooth, are deposited on polished boards or stone slabs and again carried to the roof, where they remain five or ten days, or until perfectly firm. Many of these fruit rolls, covered with stone slabs, are hidden in the walls of dwellings, while others are deposited in large pottery vases, covered with stone slabs, and sealed. When needed, usually a piece the width of four fingers is cut crosswise from the roll, broken into a bowl half filled with water, and then manipulated with the fingers

until thoroughly dissolved. This liquid, or syrup, is regarded as delicious, and the dry fruit is eaten as a conserve.

Before the introduction of coffee and sugar, the dissolved conserve was used to sweeten the native beverages and also boiled green peaches.

*Yucca glauca* Nutt. Soapweed. LILIACEÆ. Lily family.

*Ho'tsanna*, 'long leaf small' (*ho* < *ho'kiapa*, long leaf wide; *tsan'na*, small), resembling the leaf of *ho'kiapa* (*Yucca baccata*), but more slender and not so long.

The seed pods, which are slightly sweet, are boiled. The young pods are considered far superior as food to the older ones. While the seeds of the former are eaten with the pods, those of the latter are not regarded as edible. These pods are not combined with other foods, and they are never eaten warm or with meals. "They would not agree with the stomach if taken with other food."

*Zea mays* L. Corn. POACEÆ. Grass family.

*Chu'we*, 'corn.'

Though not indigenous to the United States, corn was the staple food of the inhabitants of the Southwest long before the coming of the Spaniards in the middle of the sixteenth century, having been brought to this section either by peoples migrating from the south or by aboriginal traders. It is found, charred, in almost every cliff-house of the Southwest. Corn is made into a great variety of dishes, and is also employed in liquid form. See p. 76.

*He'we*, a paper-like bread, is made of corn crushed on the coarsest milling stones and then toasted in a bowl supported on stones in the right-angle fireplace. The corn is stirred continually with a bunch of osiers. The toasted meal is passed through in a mill of the next degree of fineness and afterward through a third mill, the final product being a very fine flour. A quantity of this meal mixed with cold water is stirred into a pot of boiling water, and the mixture is stirred constantly during the cooking. After the pot has been removed from the fire and the mush has cooled sufficiently it is placed on the floor by the side of the bread maker. A bowl of thin batter made of uncooked meal and cold water is put by the side of a large bowl. If the *he'we* is to be of a bluish-green color, the water from slaked lime is poured into the batter. The woman at the baking stone deposits in the empty bowl a double handful of the mush, adding a handful of batter. When the two are thoroughly mixed she dips a quantity with her hand and passes it rapidly over the heated slab,<sup>1</sup> which is supported on stones at one end of a long fireplace provided with a Chineselike awning hood. The hand is passed from right to left, beginning at the far side of the slab, and by the time the slab is covered the gauzy sheet is baked; the bread is lifted from the slab and

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 361.

laid on a straw mat, and it soon becomes cool and crisp. After a number of sheets are baked they are laid together on the baking slab and heated sufficiently to allow the bread to be folded. This bread is usually served in basket trays.

*He'we* is the staple article of food carried on long journeys, especially when one travels on foot. It is very light in weight and a sufficient quantity can be carried in a cloth tied around the waist to nourish a man for days. Occasionally the Zuñi color *he'we* red with *Amaranthus*, which they raise in their gardens around the village.

A variety of this bread is sometimes made with cold boiled native beans; these are pounded into a paste with the addition of cold water, which is mixed with the batter instead of mush. Salt is added to the mixture.

Occasionally *he'we* is made of untoasted meal, and in this case also salt is added. Fragments of *he'we* which necessarily accumulate are laid away until a sufficient quantity is gathered, when they are toasted in a bowl over the fire and stirred with a bunch of osiers during the toasting; when done the *he'we* is crushed with the hand and deposited in a basket tray. This toasted bread is warmed in grease or moistened with water before it is eaten.

*He'yahoniwe* is made of corn-meal mush; after being ground twice the corn is mixed with cold water and salt and boiled; water from slaked lime is added to produce a bluish-green color. A handful of the mush is added to a quantity of batter sufficient for a sheet of *he'we*, and this mixture is made into cakes about 10 by 12 inches and many times thicker than the *he'we* sheets; these are baked two on a slab similar to that used for baking *he'we*. This bread is in common use at Zuñi.

*Mu'tkřapawe* is another favorite dish of the Zuñi. To meal twice ground a sufficient quantity of boiling water is added to make a stiff dough, and water from slaked lime to give the desired color; enough cold water is then added to give the mush the proper consistency to enable it to be shaped into large oval balls, which are cooked in a pot of boiling water. *Mu'tkřapawe* is eaten cold.

*Mu'tkřalive*, another variety of mush, is prepared in the same manner as *he'yahoniwe*, except that the mush is rolled into rope-like strips from which fragments are broken and made into balls an inch or more in diameter; these are dropped into a pot containing just enough boiling water to cook them. The mush thickens in the water and the mixture is eaten with a ladle or spoon.

*He'pachive* is made by pouring diluted lye over corn, which is left until the hulls are shed, after which the corn is thoroughly washed and dried and then ground. The meal, mixed with water (no salt is used), is made into cakes 6 or 8 inches in diameter and about two-thirds of an inch thick; these are baked on *he'pachive* slabs.

*He'palok'ia* is usually made of yellow or black corn when wheat is not used for the purpose. The corn is ground twice and the meal is sifted through a very fine sieve. A quantity of meal is placed in a large bowl, boiling water is added, and the mixture is well stirred; then about a cupful of meal which has been held in the mouth of several young girls to sweeten it, is also put into the vessel. As each girl finds it necessary she ejects the meal into a small bowl. Nine or ten slabs, each about 10 by 10 inches, are stood on end in a cavity in the same fireplace in which the *he'we* is cooked, and cedar wood is placed around each slab and kindled. When the wood is reduced to embers and the cavity and surfaces of the slabs are adequately heated, the slabs are laid to one side while the embers are removed and the fire bed is thoroughly swept. Dried corn husks are dampened and laid flat and the batter is spread over them. Husks are then placed along the edges of the stiff batter to a depth sufficient to prevent the overlying slab touching it. The arranging in layers of the sheets of batter and the slabs continues until all but one of the slabs are in use. Then the remaining slab is laid over the whole and a fire is kindled upon it. The heat from the slabs below and the fire above is sufficient to cook the *he'palok'ia*, which remains overnight in the improvised oven.

Another way of cooking *he'palok'ia* is as follows: A large pot filled with the batter is set on a deep bed of hot embers in a permanent pit outside the house made specially for the purpose. A small fire is built around the pot, the batter is stirred until it begins to boil, and a stone slab is laid over the mouth of the pit on which a fire is kindled. This process, which also includes baking overnight, has never been in so great favor as baking indoors because "witches have greater opportunity to affect food outside the house, by which those who partake of the food are made ill."

Corn *he'palok'ia* is dear to the Zuñi palate, though that made of wheat is also regarded as a great delicacy.

A more modern way of making *he'palok'ia* is to cook the mixture in an iron pot placed in the outdoor oven used for baking light bread. The oven having been properly heated, the pot is allowed to remain in it overnight.

*He'palok'ia* is also made into pats, wrapped in corn husks, and baked in the outdoor oven, which is heated as for light bread. This process is regarded, however, as a mere makeshift.

Portions of *he'palok'ia* spread on cloths are dried in the sun when the weather is clear, otherwise the cloths are spread by the fire in the house. When thoroughly dried they are ground in the finest mill. The meal is eaten mixed with cold water; it is also eaten dry, as one eats bonbons. In the past it was common to see an old man with a

quantity of this meal in a bowl beside him, taking a pinch every little while as he worked on his beads or moccasins.

Mush made in a variety of ways is often mixed with meat wrapped in corn husks, and boiled or baked. The boiled preparation is a favorite dish of the Mexicans, which they call *tamales*.

*Chu'tsikwanawe* ('corn without skin'), 'hominy,' is one of the staple articles of food of the Zuñi. Corn removed from the cob is put into a large pot of cold water containing wood ashes previously dampened. After the corn has boiled a short time it is stirred with a slender stick. After boiling three hours, during which time it is constantly stirred, the corn is removed from the pot to a basket, tray, or bowl and carried to the river, where it is thoroughly washed. Then the hominy, which does not require soaking previous to cooking, is ready to prepare for the meal. Hominy prepared by the Zuñi housewife can not be surpassed.

*M'lowe* (roasted sweet corn) is regarded as a great delicacy. An excavation 10 or 12 feet deep and 3 or 4 feet in diameter is made in the cornfield. Cedar branches are thrown into this pit and on them are heaped hot embers; then more cedar wood is added until the pit is filled to a quarter of its depth. As soon as a mass of live embers has accumulated the corn in the husks is deposited in the oven and covered thick with stones, upon which are heaped hot embers. The corn remains in the oven from late in the afternoon until after sunrise the following morning, when the owners of the field, with their families and friends, enjoy the feast. What is not consumed in the field is hung up in the storage room to dry, each ear having the husk pulled back, exposing the corn. Corn preserved in this way remains good for months. When it is to be eaten the husks are removed and the corn is boiled.

*Ta'kuna* ('bead bread'), popped corn. The corn is toasted in bowls balanced on stones in the fireplace, the grains being stirred constantly with a bunch of slender cottonwood sticks until they pop and become as white as snowflakes. The corn is sprinkled with salt while hot.

Gruel made of white or blue meal is constantly whipped during the boiling, so that it is light and frothy when ready to eat.

*Ta'kuna kia'we* ('bead water') is made of popped corn ground as fine as possible. The powder is put into a bowl and cold water is poured over it. The mixture is strained before it is drunk. While this beverage may be drunk at any time, it is used especially by the rain priests and personators of anthropic gods during ceremonies.

A native drink which the Zuñi claim is not intoxicating is made from sprouted corn. The moistened grain is exposed to the sun until it sprouts; water is then poured over it and it is allowed to stand for some days.

## USE OF PLANTS IN WEAVING

*Asclepias galioides* H. B. K. Milkweed. ASCLEPIADACEÆ. Milkweed family.

*Ha'watscki*, 'leaf boy' (*ha* < *ha'li*, leaf; *wat'scki*, boy). The plant is so named because the young boys search for the first buds to eat.

The pods are gathered for spinning when about two-thirds ripe; the Zuñi say that the fully ripe coma can not be used for this purpose. The coma, or "cotton" as the Zuñi call it, is placed on a piece of cotton cloth laid on the floor. "When the plant is gathered at the proper time," they say, "and is perfectly fresh, the coma is sufficiently pliable to work; but after the second day following the gathering of the cotton it must be lightly sprinkled with water. The cotton may be kept for months, but it is necessary to dampen it before spinning."

The aged Zuñi declared at the time of the writer's first visit to the pueblo, in 1879, and they continue to assert, that beautiful white dance-kilts, women's belts, and other articles were woven from the fiber of *Asclepias galioides*.

The spindle employed in the spinning of this "cotton" as well as of the true cotton, was a slender stick, heavier than a lead pencil and the length of four fingers crosswise, plus the distance from the tip of the thumb to the tip of the middle finger, the fingers extended. This spindle had no whorl, nor were any of the more ancient spindles furnished with whorls. The primitive spindle is still in use by the rain priests for spinning native cotton and *Asclepias* for ceremonial purposes.

*Gossypium hirsutum* L. Cotton. MALVACEÆ. Mallow family.

*U'we*, 'down.' All down is referred to as *u'we*; thus *kää'küli u'we*, eagle down.

The Zuñi declare that they brought the cotton and the milkweed from the innermost world and that they began cultivating both when at Hān'lipinkā ('Place of sacred stealing').<sup>1</sup>

There is no question that the Pueblos of the Rio Grande Valley, as well as the Hopi of Arizona, and others, cultivated cotton long before the advent of the Spaniards. Cliff-dwellings and cavate dwellings of the Southwest have yielded to explorers beautiful specimens of cotton cloth. Ceremonial garments were woven of native cotton as late as 1879. Cotton is not indigenous, however, to New Mexico

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 40.

and Arizona, and must have been brought from Mexico either by Indians moving from the south northward, or through trade.

Mr. G. N. Collins, assistant botanist of the United States Department of Agriculture, states that "neither corn nor cotton are known to be indigenous in the United States. In fact, neither of these plants has been found anywhere where they could be considered indigenous. Cotton is supposed to have originated in Mexico, though it was extensively cultivated in the Orient before the discovery of America."

The only Pueblo Indians cultivating cotton to any considerable extent at the present time are the Hopi of Arizona. These people, however, no longer depend entirely on the native cotton for weaving ceremonial garments, but purchase the cotton twine of commerce. For certain ceremonial purposes, however, they must have native cotton.

*Yucca baccata* Torr. Datil. LILIACEÆ. Lily family.

*Ho'k'āpa* 'long leaf wide.' This term is applied to yucca and similar leaves. The name for other leaves is *ha'li* (pl. *ha'we*).

Fiber from the leaves of this plant was used largely in weaving fabrics before the introduction of sheep by the Spaniards. Many beautiful specimens of cloth woven of yucca fiber have been found in prehistoric ruins in the Southwest.

When the central or new leaves are gathered, each leaf is folded about four inches in length and tied with a fragment of the leaf. These folds are placed in a pot of boiling water, and when boiling hard a small quantity of cedar ashes is added. When sufficiently cooked the folds are removed from the pot and placed in a basket or bowl. When the leaves are cold, youths and maidens peel off the epidermis; an end of the leaf is taken between the teeth and is chewed and gradually drawn into the mouth. The other end of the leaf is then taken into the mouth and chewed, until the entire leaf has been sufficiently treated. After the chewing is completed all the fibers are separated, each one being straightened and laid on the floor. They are then gathered into bunches and tied with fiber strings and hung in an inner room to dry. When required for the loom, the bunches of fibers are soaked in cold water to soften them. They are then worked into thread-like cords, spun, and woven into a variety of garments. At least, such was the procedure in the past. No such weaving is done at the present time. The yucca leaves are still boiled and chewed, however, and from their fibers a cord is made by twisting two strands by rolling on the right knee with the right hand, and then doubling and twisting them. After the cord is finished it is chewed to bleach it, and it is also rubbed in white corn meal to intensify the color.

These cords are used principally to tie prayer-plume offerings together and for other ceremonial purposes.

The split leaves are plaited into mats for covering hatchways, grain vases, and other vessels. They are employed also to make cincture pads for supporting water vases upon the head, winnowing baskets, baskets for serving food, baskets for transporting every variety of material that can be readily carried on the human back or at the side of a burro, and baskets for collecting grasshoppers, which the Zuñi roast and enjoy as a delicate tidbit. Split yucca leaves take the place of cords or rope for many purposes.

*Yucca glauca* Nutt. Soapweed. LILIACEÆ. Lily family.

*Ho'tsanna*, 'long leaf small' (*ho* < *ho'kiapa*, long leaf large; *tsan'na*, small). It resembles the leaf of *ho'kiapa* (*Yucca baccata* Torr.), but is more slender and not so long.

After the leaves have been soaked in water to soften them, they are made into rope by knotting them together. The fibers of the leaves are separated and lengthened for making a coarse cord. Like those of the larger yucca, the leaves are employed for making mats, cincture pads, and other articles.

## USE OF PLANTS IN DYEING

Dyeing may be classed among the lost arts of the Zuñi, so completely have aniline dyes of commerce superseded their beautiful native vegetal colors.

*Alnus tenuifolia* Nutt. Alder. BETULACEÆ. Birch family.

*I'shinak'atsi'kwanč*, 'grease gaming-stick' (*i'shinak'ia*, grease; *tsi'kwanč*, gaming stick). The stick referred to is used in foot races and is never touched by the hand after it is once tossed with the foot. Some of these racing-sticks are made of this wood; hence the name.

The bark is employed for dyeing deerskin reddish-brown.

*Castilleja integra* A. Gray. Indian Paint Brush. SCROPHULARIACEÆ. Figwort family.

*Tsu'yaa'wa tsi'sinak'ia*, 'hummingbird all sucking-food' (*tsu'ya*, hummingbird; *a'wa*, all; *tsi'sinak'ia*, sucking-food). So named because the blossoms of this plant are a favorite food of the hummingbird.

The bark of the root is used in conjunction with minerals for coloring deerskin black.

*Chrysothamnus bigelovii* (A. Gray) Greene. Rabbit Brush. CARDUACEÆ. Thistle family.

*Ha'koha lup'tsina*, 'white leaf yellow' (*ha* < *ha'li*, leaf; *ko'ha* < *ko'hanna*, white; *lup'tsina*, yellow). Named for the yellow blossom and silvery leaf.

The blossoms are used for dyeing yellow.

*Coreopsis cardaminefolia* Torr. & Gray. Coreopsis. CARDUACEÆ. Thistle family.

*K'ia'naitu*, 'water seeds' (*k'ia* < *k'ia'we*, water; *nai'tu*, seeds).

The blossoms are employed in conjunction with other flowers for dyeing yarn mahogany red.

*Psilostrophe tagetina* (Nutt.) Greene. CARDUACEÆ. Thistle family.

*Ha'tsoliko*, 'leaf mouse' (*ha* < *ha'li*, leaf; *tsoti'ko*, mouse). Named for a species of mouse that feeds on the leaves of the plant.

A yellow dye is produced from the blossoms.

## USE OF PLANTS IN BASKETRY

*Chrysothamnus bigelovii* (A. Gray) Greene. Rabbit Brush.  
CARDUACEÆ. Thistle family.

*Ha'koha lup'tsině*, 'white leaf yellow' (*ha* < *ha'li*, leaf; *ko'hanna*, white; *lup'tsině*, yellow). Named for the silvery leaf and yellow blossom.

The stems of this plant are worked into baskets. The outer bark is removed and the stems are covered with damp sand to render them more pliable. The stems are often dyed and some of the completed baskets are decorated in color.

*Parryella filifolia* Torr. & Gray. FABACEÆ. Pea family.  
*Ma'tsuli*.

This plant is in common use for weaving into baskets. Its fragrance is especially pleasing to the Zuñi.

*Rhus trilobata* Nutt. Sumac. ANACARDIACEÆ. Sumac family.  
*Ko'se o'tsi*, 'biting man' (*ko'tsi*, biting; *o'tsi*, man; referring to the male plant). So named because the stems are pungent or "biting to the tongue."

The stems with the bark removed are used in making the fine "Apache" and other baskets. The bark-covered stems are employed to form the patterns in the weave.

*Salix irrorata* Anders. Willow. SALICACEÆ. Willow family.

Baskets are made from the more slender switches. Willows were in general use for filling in between the house-rafters until within more recent years.

*Sporobolus strictus* (Scribn.) Merrill. Drop Seed Grass. POACEÆ.  
Grass family.

*Bi'shileawe*.

The grass is divided into bunches, which are fastened together and made into mats for covering hatchways and other openings in houses. Arranged in the manner described, this material is used to construct shelters in or near the distant fields.

*Yucca baccata* Torr. Datil. LILIACEÆ. Lily family.

*Ho'k'apa*, 'long leaf wide.'

Winnowing baskets are made by interlacing ribboned leaves. These baskets or trays are used for a variety of other purposes.

## USE OF PLANTS IN POTTERY DECORATION

*Peritoma serrulatum* (Pursh) DC. Rocky Mountain Bee Plant.

CAPPARIDACEÆ. Caper family.

*A'pilatu*, 'hand many seeds' (*a<a'si*, hand; *pi'talu*, many seeds). The leaf of the plant is referred to as "hand."

The entire plant, minus the root, is boiled for a considerable time, and the water in which it is cooked is allowed to evaporate. The firm paste secured from precipitation is used in conjunction with a black mineral paint for decorating pottery.

*Yucca glauca* Nutt. Soapweed. LILIACEÆ. Lily family

*Ho'tsanna*, 'long leaf small' (*ho<ho'k'apa*, long leaf large; *tsan'na*, small).

This plant takes its name from the similarity of its leaf to that of *Yucca baccata* Torr. It is much more slender and not nearly so long.

The brushes employed for decorating pottery are made from the leaves of this plant, which, for this purpose, are cut the proper lengths and fringed at one end. *Yucca* brushes are also used for decorating a variety of other objects, including ceremonial masks, and altars.

## USE OF PLANTS FOR THE TOILET

*Amaranthus hybridus paniculatus* (L.) Uline & Bray. Purple  
Amaranth. AMARANTHACEÆ. Amaranth family.

*I'shilowa yäl'tok'ia*, 'red face paint' (*i'shilowa*, red; *yäl'tok'ia*,  
face paint).

The leaves and blossoms, crushed and moistened with spittle or a small quantity of water, are rubbed on the cheeks with a cloth, as a rouge.

*Bouteloua gracilis* (H. B. K.) Lag. Blue Grama. POACEÆ.  
Grass family.

Bunches of this grass securely wrapped serve more than one purpose: The severed end is used as a hair brush, while the other end is employed as a broom, sometimes as a strainer for goats' milk.

*Pectis papposa* Harv. & Gray. CARDUACEÆ. Thistle family.  
*Ham'pasa*.

The blossoms are chewed by both sexes, especially the women, ejected into the hands, and rubbed over the neck, limbs, and clothing as a perfume, before taking part in a dance in ceremonies of the secret fraternities. On detecting the fragrance, the men have many words of compliment for the women, declaring them to be very sweet.

*Yucca glauca* Nutt. Soapweed. LILIACEÆ. Lily family.

*Ho'tsanna*, 'long leaf small' (*ho* < *ho'küapa*, long leaf wide;  
*tsan'na*, small). The leaf resembles the leaf of *ho'küapa*  
(*Yucca baccata* Torr.), but is more slender and not so long.

The root is freed of the bark, pounded, and made into suds by the use of cold water. These suds are used by all the Indians of the Southwest for washing the head and for cleansing woollen garments and blankets.

## USE OF PLANTS IN FOLK-LORE

*Aster incanopilosus* (Lindl.) Sheldon. Aster. CARDUACEÆ.  
Thistle family.

*Ha'mopiawe*, 'leaf ball' (*ha* < *ha'li*, leaf; *mo'piawe* [pl.], round or egg-shaped).

The blossoms, ground to a fine meal, are sprinkled into a bowl of yucca suds used for bathing a new-born infant. This medicine is said to make the hair grow on the head and to give strength to the body. The remedy belongs to all women.

*Coreopsis cardaminefolia* Torr. & Gray. Coreopsis. CARDUACEÆ.  
Thistle family.

*Kīa'naitu*, 'water seeds' (*kīa* < *kīa'we*, water; *nai'tu*, seeds).

The plant, minus the root, is made into a tea, which is drunk by women desiring girl babies.

This medicine belongs to all women.

*Cycloloma atriplicifolium* (Spreng.) Coulter. Winged Pigweed.  
CHENOPODIACEÆ. Goosefoot family.

*A'kwa lup'tsinē*, 'yellow medicine' (*a'kwa*, medicine; *lup'tsinē*, yellow).

This medicine belongs to the grandmother of the Gods of War. She gave it to them with instructions that when near the enemy they should bite off some of the blossoms of the plant and chew them, ejecting the mass into their hands and rubbing the hands well together. As soon as the Gods of War had done this a peculiar yellow light spread over the world, preventing the enemy from seeing how to aim their arrows truly.

This medicine was exclusively in the keeping of the late *Nai'uchi* and his ceremonial brother, *Me'she*, who were the earthly representatives of the Gods of War. The secret of its use passed away with their death, as they did not see fit to confide it to others of the Bow Priesthood.

*Mentzelia pumila* Torr. & Gray. Stick-leaf. LOASACEÆ. Loasa family.

*Mi'hana i'pachikīa*, 'white embroidered sacred blanket catch hold tight' (*mi* < *mi'ha*, white embroidered sacred blanket; *na*, to catch; *i'pachikīa*, hold tight).

The name signifies that when the plant touches the blanket it adheres to it. "Once when a personator of an anthropic god was wearing a sacred blanket," say the Zuñi, "in passing one of the plants referred to, the plant attached itself to the blanket and the wearer could not shake it off; and ever since that time the plant has borne the name *mi'hana i'pachikīa*."

Children of both sexes, especially boys, are whipped with the fresh plant that they may be strong to hold on to a horse or other object and not release their hold and fall.

The plant belongs to all the people.

*Phaseolus angustissimus* A. Gray. Wild Bean. FABACEÆ. Pea family.

*Ha'tsumere*, 'strong leaf' (*ha* < *ha'li*, leaf; *tsu'mere*, strong).

*Tsu'mere* has reference to the strength of the people who have been treated with the plant.

This medicine belongs to the Gods of War and is named *A'hayuta*, which name is borne by the Gods of War in time of peace, both gods bearing the one name when peaceful and on good terms with all the world. The medicine is referred to as *A'hayuta an kwi'minnē* (*A'hayuta's* root).

When an infant boy evinces timidity his father carries a small quantity of corn meal wrapped in a bit of corn husk to the warrior of his choice, and, presenting it, requests that the warrior apply the *A'hayuta* medicine to his child, that he may have a brave heart and never be afraid of the enemy. Crushed leaves and blossoms with the powdered root of this plant are chewed by the officiating warrior and ejected into his hands, which he rubs over the nude body of the child; he also gives the child a small quantity of the crushed blossoms to eat. "This, of course, is sure to give the boy a brave heart, and he manifests a desire to fight on the slightest provocation."

*Rumex mexicanus* Weim. Dock. POLYGONACEÆ. Buckwheat family.

*Kwi'mi i'topona*, 'painted root' (*kwi'mi* < *kwi'minnē*, root; *i'topona*, painted).

A very strong tea is made of the root by a husband who has no offspring, and he gives it to his wife, morning, noon, sunset, and at bed-time, for a month or one moon. "This treatment is sure to place the woman in condition for becoming pregnant. If the medicine fails it is because the wife's heart is not good."

When used for this purpose the remedy belongs to all men.

*Thelypodium wrightii* A. Gray. BRASSICACEÆ. Mustard family.

*Ha'ko'lokta no'we a'wa a'kwawe*, 'sandhill-crane beans all medicine' (*ha'ko'lokta*, sandhill-crane; *no'we*, beans; *a'wa*, all; *a'kwawe*, medicine).

The seeds are removed from the pods and crushed by women of the Sandhill Crane clan, and mixed with beans that are to be planted. This procedure is said to cause the bean crop to be as abundant as the seeds from the pods. This medicine belongs to the Sandhill Crane clan.

CLAN NAMES AND OTHER NAMES DERIVED FROM  
PLANTS

*Berberis fremontii* Torr. Barberry. BERBERIDACEÆ. Barberry family.

*Ta'tuptsině*, 'yellow wood' (*ta < ta'we*, wood; *łup'tsině*, yellow). Yellow Wood Clan, Tałuptsikwe.

*Nicotiana attenuata* Torr. Wild Tobacco. SOLANACEÆ. Nightshade family.

*A'na*, 'tobacco.' Tobacco Clan, A'nakwe.

*Sophia halictorum* Cockerell. BRASSICACEÆ. Mustard family.

*Ai'yaho*. Ai'yahokwe Clan.

*Svida stolonifera riparia* Rydb. Dogwood. CORNACEÆ. Dogwood family.

*Pi'chiko*.

Dogwood Clan, Pi'chikwe. The Pi'chikwe is regarded with special significance, not only because the Sun Priest must be chosen from this clan, but also for the reason that it is associated with a number of the sacred myths of the Zuñi.

*Zea mays*. Indian Corn. POACEÆ. Grass family.

*To'wa* (archaic), 'corn.' Corn Clan, To'wakwe.

*Kwın'ikwa*, 'black corn.'

Black Corn Clan, Kwın'ikwakwe.

Many children, especially girls, are named for plants.

Mountains, springs, lakes, and towns are also named for plants. The most beautiful mesa in the Southwest is To'wa yál'länně, Corn Mountain—so named, the Zuñi say, because they carried their corn on their backs to the summit of this mountain when they fled from the great flood which destroyed most of the world.

Of the many stopping-places mentioned in the recital of the migration legends of the Zuñi in quest of the middle place of the world, several have plant names:

*Pi'kiaia*, 'spring plant' (*Berula erecta* (Huds.) Coville). Water Parsnip.

*To'seluna*, 'high grass,' referring to a special variety.

*U'hana kwi*, 'moss place.'

*Pi'shu kiaia kwi*, 'poison oak spring place.'

*To'loknäna kwi*, 'rushes place.'

## CEREMONIAL USES OF PLANTS

*Amaranthus hybridus paniculatus* (L.) Uline & Bray. Pigweed.

AMARANTHACEÆ. Amaranth family.

*I'shilowa yäl'tokša*, 'red face-paint' (*i'shilowa*, red; *yäl'tokša*, face-paint).

The feathery part of this plant, which is cultivated in the little gardens worked by the Zuñi women, ground to a fine meal, is used in coloring *he'we*<sup>1</sup> (wafer bread made of corn meal; see p. 73) red. The *he'we* is carried by personators of anthropic gods and thrown by them to the populace between the dances.

*Anogra albicaulis* (Pursh) Britton. Evening Primrose. ONAGRACEÆ. Evening Primrose family.

*U'tea Ko'hakwa*, 'flower of the White Shell Bead Mother' (*u'tea*, flower; *Ko'hakwa*, White Shell Bead Mother).

The Zuñi believe that the mother of the sun was originally a woman, but that she became a white shell from which the sacred beads were made. "The White Shell Bead Mother lives in the west, and it is to her home the Sun Father goes before descending into the lower world for the night. The Sun Father always was, and always will be. No one knows anything about his creation, for he always was." The Zuñi do not believe that the sun was born of the White Shell Bead Woman, but that she was and is one of the greatest of beings, and is respected and beloved as a mother by the Sun Father.

The blossoms are given by the High Priest and the Sun Priest of Zuñi to the maidens who dance in the drama of "The Coming of the Corn Maidens."<sup>2</sup> The girls take the blossoms into their mouths, and, after chewing them, eject them into their hands and rub the neck, breast, arms, and hands, that they may dance well, so that the White Shell Bead Mother, "mother of the Sun Father," may be pleased and the rains will come to fructify the earth that the corn may grow.

*Artemisia frigida* Willd. Sagebrush. CARDUACEÆ. Thistle family.

*To'shocha'chikša*, 'wild sage.' "Medicine of the Corn Maidens."

Sprigs of the plant, together with ears of corn, are attached to decorated tablets carried in the hands of certain female dancers in the drama of "The Coming of the Corn Maidens."<sup>2</sup>

<sup>1</sup> The Hopi employ daily the same kind of coloring for *he'we* (called by them *pi'ki*), but the Zuñi use the coloring for their *he'we* only when it is to serve the purpose here described.

<sup>2</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 180.

At planting time the corn is sprinkled with twigs of artemisia dipped in water, "that it may grow in abundance and be well developed."

*Asclepias galioides* H. B. K. Milkweed. ASCLEPIADACEÆ. Milkweed family.

*Ha'watsēki*, 'leaf boy' (*ha* < *ha'li*, leaf; *wat'sēki*, boy). The plant receives its name from the fondness the boys have for the first buds, which they consider a great treat.

At the present time the rain priests make cords of the coma, using only their fingers in this work. The cords are employed for fastening plumes to the prayer sticks that are offered to the *č'tonc*.<sup>1</sup> These offerings are planted in the fields and in sacred springs. An excavation is made in the bed of the spring, in which the offerings are deposited, with a stone attached, and covered with soil from the bottom.

*Atriplex canescens* (Pursh) James. Salt-bush. CHENOPODIACEÆ. Goosefoot family.

*Ke'mawe*, 'salt weed' (*ke*, weed; *ma'we*, salt).

Prayer plumes are attached to twigs of this plant and sacrificed to the cottontail rabbit at the winter solstice, with prayers that the rabbits may appear in large numbers when sought by the hunter.

*Berberis fremontii* Torr. Barberry. BERBERIDACEÆ. Barberry family.

*Ta'tup'tsinē*, 'yellow wood' (*ta*, wood; *tup'tsinē*, yellow).

The crushed berries are used for coloring purple the skin as well as objects employed in ceremonies. These berries are thus used only by the people of the *ki'witsiwe*,<sup>2</sup> and for this purpose the tree belongs solely to them.

*Cucurbita pepo* L. Squash. CUCURBITACEÆ. Gourd family.

*Mo'teyāla*, 'round, inside seeds sit down' (*mo* < *mo'li*, round or egg-shaped; *te'yāla*, inside sit down). The word for seeds is not expressed but fully understood in reference to squash or melons. "Melons never stand but sit upon the ground or floor."

Gourds of the long variety are worn in phallic dances, symbolizing fructification. They are employed also as receptacles for storing precious articles. Gourds of both the round and the oval variety are made into rattles which are used in ceremonies in both anthropic and zoic worship. The former are also employed by theurgists in legerdemain.

*Datura meteloides* DC. Jamestown Weed, Thorn-apple. SOLANACEÆ. Nightshade family.

<sup>1</sup> See *25d Ann. Rep. Bur. Amer. Ethn.*, p. 163.

<sup>2</sup> *Ibid.*, p. 62.

*A'neglakya*, name of a mythic boy; see legend, page 46. The sister of the boy *A'neglakya* was named *A'neglakyatsi'tsa*. This plant is sometimes called *u'teawe ko'hanna*, 'white flowers' (*u'teawe*, flowers; *ko'hanna*, white).

A minute quantity of the powdered root is put into the eyes, ears, and mouth of each of the *A'shiwanni* (rain priests) when they go at night to ask the birds to sing for rain. "The birds are never afraid to tell the *A'shiwanni* that they will sing when they have the powder in their ears, eyes, and mouths."

When a rain priest is to gather the plant for the purpose mentioned, he prepares four *te'likyina'we* (plume offerings),<sup>1</sup> one to *A'neglakya*, one to *A'neglakyatsi'tsa*, and two to his deceased predecessors. Each plume offering has an underwing plume of the *to'na* (turkey); one white fluffy plume of the *kïäkïä* (eagle) from the top of the tail; one tail plume from the *e'ya* (teal duck); one tail or wing feather from the *o'nulikïa*, long-tail chat (*Icteria-longicauda*), bird of the north; one tail or wing feather from the *mai'ya*, long-crested jay (*Cyanocitta macrolopha*), bird of the west; one tail or wing feather from the *mu'la*, macaw (bird of the south); one tail or wing feather from the *kä'tetasha*, spurred towhee (*Pipilo-megalonyx*), bird of the east; one tail or wing feather of the *kïa'wulokïa*, purple marten (*Prognosubis*), bird of the zenith; and one tail or wing feather of the *he'alonssetto*, painted bunting (*Passerina ciris*), bird of the nadir. The rain priest deposits each offering separately in an excavation which he makes with an ancient bean-planter, and, addressing *A'neglakya*, *A'neglakyatsi'tsa*, and his ancestors, says: "I place my *te'likyina'we* (prayer plumes), and I take your medicine that I may talk to the birds of the six regions, that the rains may come and fructify Earth Mother and make her beautiful."

A small quantity of the powdered root of *Datura meteloides* is administered by a rain priest to put one in condition to sleep and see ghosts. This procedure is for rain, and "rains will surely come the day following the taking of the medicine, unless the man to whom it is given has a bad heart."

Frequently when a man has been robbed and wishes to discover the thief, he summons to his aid a rain priest, who prepares plume offerings, similar to those described, and plants them at sunrise of the day he is to treat the man who has lost his property, with the following prayer to *A'neglakya*, *A'neglakyatsi'tsa*, and his ancestors: "I give you *te'likyina'we* [plume offerings] and collect your medicine which I will give to my child at night that he may see the one who has robbed him."

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 171.

When the rain priest arrives at the home of the man whom he is to treat, he finds him seated in darkness in an inner room. He wears a white cotton shirt and trousers. His hair is dressed in the usual style. He has new blue woolen leggings, but he wears no shoes, nor does he have the usual headkerchief. There must be no fire in the room at this time. The rain priest sits by the man's side, and, taking a bit of the root of *D. meteloides* from the palm of his left hand, places it in the man's mouth, telling him to chew the medicine that he may be possessed of the power to sleep soundly and to see the one who has robbed him. Then the man lies upon a pallet without speaking a word, and the rain priest retires to an adjoining room and sits by the communicating door, which he closes. He listens attentively. He must not smoke. "Should the rain priest smoke, the man could not see the robber, as A'neglakya does not like smoking at this time."

After a time the man leaves his bed and walks about the room. When he speaks, the rain priest is eager to catch every word. The man walks and lies down alternately during the night. At daybreak the rain priest goes into the man's room and takes his arm; he may be either lying down or walking at this time. He is led into the adjoining room, and the two take seats side by side, facing eastward. The rain priest repeats to him what he has heard him say during the night, and gives him the name of the person he mentioned. The man declares that he has no recollection of what passed. After, directing him to go to the house of the one whose name he called during the night, the rain priest makes a fire, heats water, and gives the man about a quart to drink, which induces vomiting. The drinking of the water is repeated four times, each time resulting in copious vomiting, and after the last draft the root of the *Datura* is supposed to be entirely ejected. (Should the warm water not be drunk and the medicine thereby thoroughly ejected, the flowers of *Datura* would appear over the body.)<sup>1</sup> The man remains in his room while the rain priest goes to his own home and notifies his wife and other women of his family that a bowl containing yucca root must be carried to the house of the person whom he has treated, where yucca suds must be made and the man's head washed. During the hair washing he kneels on a blanket, and the rain priest sits back of him with a hand on each shoulder. His family may be present at this time, but they take no part in this performance. The rain priest presents four ears of corn tied together, to be planted apart from the other corn during the coming year, and the man gives a few yards of calico, or sometimes a shirt and trousers, to the rain

<sup>1</sup> The Zuñi say: "When one touches a *Datura* blossom with moist hands, the impression will be imprinted on the hand and wherever the hand touches the body. The blossoms will appear on the hair if the hand is placed on the head."

priest, whose family bring food from his home where it has been cooking during the night, and prepare a meal. After the repast the man visits the person whom he had seen while under the influence of the *Datura* and tells him that he saw him in his dreams and knows that he stole his property. It is said that "the accused alway returns the property, for he is ashamed of having been discovered."

*Dithyrea wislizeni* Engelm. BRASSICACEÆ. Mustard family.  
*Ha'ko'lokta*, 'sandhill crane.' So named because the plant is a favorite food of this bird.

A tea made by boiling the entire plant is drunk by members of the Galaxy fraternity in their ceremonial chamber, as they say, "to loosen their tongues that they may talk like fools and drunken men."<sup>1</sup> The female members of this organization never take this medicine, as "women should not be made to talk too much."

*Epicampes rigens* Benth. POACEÆ. Grass family.  
*Pi'shu li'awe*, 'come up quick tall' (*pi'shu*, come up quick; *li'awe*, tall, long).

This grass is used only by the Galaxy and Shu'maakwe fraternities to attach to the sticks of plume offerings to their anthropic gods. A single spear of grass is measured from the top with the four fingers crosswise, and then the length from the tip of the thumb to the tip of the middle finger, the fingers extended. At this point the spear of grass is attached midway of the plume-stick, the length of which is measured from the metacarpus to the tip of the middle finger. The sticks designate the god to whom the offerings are made, and the plumes of the eagle and of other birds convey the breath prayers to the gods.<sup>2</sup>

*Eriogonum jamesii* Benth. POLYGONACEÆ. Buckwheat family.  
*Chi'kwa k'ianak'ia*, 'make sweet' (*chi'kwa*, sweet; *k'ianak'ia*, to make). This name is given because the plant sweetens the saliva when it is chewed.

The dance director of a *ki'witsinē* (chamber dedicated to anthropic worship)<sup>3</sup> administers the blossoms of this plant, which have been ground between stones to a powder, to the dancers who are to personate anthropic gods, after they are dressed for the ceremony. The director rolls in the meal a pencil-shaped stone, about 2½ inches long, which is kept in a deerskin sack with the flower meal, and places it in the mouth of each dancer, the meal being collected on the stone for each person, that the dance may bring rain. Each dancer ejects the medicine from his mouth over his body and apparel.

<sup>1</sup> The members of the Galaxy fraternity are the clowns and "delight makers." See 23d Ann. Rep. Bur. Amer. Ethn., p. 420.

<sup>2</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 171.

<sup>3</sup> Ibid., p. 62.

*Erysimum* sp. BRASSICACEÆ. Mustard family.

*Ha'lini tsan'na*, 'long small leaf' (*ha* < *ha'li*, leaf; *li'ni*, long; *tsan'na*, small), in allusion to the long slender leaf of the plant.

The plant is cut close to the root and deposited in the large serrated bowl of the flutists of Pa'yatämu (god of music, butterflies, and flowers) at the drama of "The Coming of the Corn Maidens."<sup>1</sup> A crystal, supposed to have been brought from the undermost world, is laid in the center of the plant. Water is then put into the bowl and sprinkled with corn pollen. The flutes of Pa'yatämu are laid across the bowl and the whole is covered with an embroidered white cotton kilt. A shell to be used for administering the water is placed on the kilt. When the water is given to the flutists by the director of the order of Pa'yatämu, they eject it into their hands and rub it over their bodies, "that their hearts may be as beautiful as the flowers and butterflies of Pa'yatämu; that the rains may come to make the corn and all vegetation grow."<sup>2</sup>

When used ceremonially, this plant belongs only to the order of Pa'yatämu.

*Gossypium hirsutum* L. Cotton. MALVACEÆ. Mallow family.  
*U'we*, 'down.'

Cotton plays an important part in Zuñi ceremonies, symbolizing white clouds. Cords made of native cotton are tied loosely around the wrists and ankles of the newborn child, while supplications are offered that the rain makers will water the earth and make her beautiful to look upon, that she may be auspicious and yield her fruits, providing for the child full nourishment to the end of its span of life in this world.

After death the heads of rain priests<sup>3</sup> are covered with cotton down, symbolizing their duties in this world and also their obligations in the undermost world whence they came and whither they return.

The crowns of certain masks also are covered with raw cotton, indicating that the gods represented are rain makers or are specially associated with the rain makers.

*Gutierrezia filifolia* Greene. Snakeweed. CARDUACEÆ. Thistle family.

*Ki'aha'poko*, 'water gathered together' (*ki'a* < *ki'a'we*, water; *ha'poko*, or *ha'poně*, gathered together), in allusion to the fact that the plant grows in abundance in wet places.

Sprigs of the plant are attached to the base of the grass wands carried by the *pa'mosona* (male scalp custodian) and his deputy,

<sup>1</sup> See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 180.

<sup>2</sup> The Little Fire and Cimex are the only fraternities having an order of Pa'yatämu; the Cimex is entitled to this order because originally the two fraternities were one, under the name of Little Fire fraternity. See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 568.

<sup>3</sup> See *23d Ann. Rep. Bur. Amer. Ethn.*, p. 163.

and by the *pa'moso'nok'ia* (female scalp custodian) and her deputy, in the scalp ceremony. These wands denote officership.<sup>1</sup>

*Helianthus annuus* L. Sunflower. **CARDUACEÆ.** Thistle family.  
*O'matsapa*, 'on tip of stem.' This is the name for sunflower, which is symbolized by a cluster of yellow feathers supposed to be from the parrot, but more frequently from other birds and dyed in imitation of parrot feathers. Each personator of the Uwannami (rain makers) wears the symbol of the sunflower attached to the forelock. A mask covers the face.

The blossoms are gathered by men selected by the director of a chamber for anthropic worship. They remove the flowers from the stems, with fingers spread, directly into sacks, which they carry at sunset to women chosen to grind them. The women loosen the rays from the flower-head and, combining them with blossoms of *ha'tsoliko*, 'leaf mouse' (*Psilostrophe tagetina*), pulverize them in the family mills without ceremony.

"The Council of the Gods<sup>2</sup> desire that these flowers shall be ground after the Sun Father has gone to his house and the winds have ceased to move."

*Juniperus monosperma* (Engelm.) Sargent. Cedar. **JUNIPERACEÆ.** Juniper family.

*Ho'maně.*

Cedar is a favorite firewood with the Zuñi, but its most important place is in the ceremonies. The fibrous bark, shredded, is used as tinder to ignite the sparks from the fire sticks employed for making the New Year fire, and at other times firebrands are made of the bark and carried by personators of certain gods, the most conspicuous being *Shu'laawitsi*, deputy to the Sun Father.

*Leucelene ericoides* (Torr.) Greene. **CARDUACEÆ.** Thistle family.

*U'mok'ia'nak'ia*, 'suds making' (*u'mok'ia*, suds; *nak'ia*, making).

The plant is employed ceremonially to symbolize clouds. The powdered root is deposited in a ceremonial vessel with water, and the mixture is whipped with a slender reed until suds rise high above the rim of the bowl. These "cloud-suds" are prepared by the rain priests during their summer retreat.<sup>3</sup>

*Lithospermum linearifolium* Goldie. Puccoon. **BORAGINACEÆ.**  
Borage family.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 578.

<sup>2</sup> Ibid., p. 33.

<sup>3</sup> Ibid., p. 175.

*Kwi'minnē kwīn'na*, 'black root' (*kwi'minnē*, root; *kwīn'na*, black). The leaves of this plant are called *ha'wi poli*, 'irregular leaf' (*ha* < *ha'li*, leaf; *wi'poli*, irregular), in reference to the irregular distribution of the leaves on the stem.

In time of war several leaves, with their tips pointing downward, were often bound on the arrow-shaft, close to the point, and entirely obscured by the sinew wrapping. The Zuñi claim that this leaf is so deadly poisonous that an arrow thus prepared will cause the immediate death of one pierced by it. Used for this purpose, the plant belongs solely to the Priesthood of the Bow.

*Lycium pallidum* Miers. Tomatilla. SOLANACEÆ. Nightshade family.

*Kīa'puli*, 'water fall down' (*kīa* < *kīa'we*, water; *pu'li*, fall down). So named because the rains cause many of the berries to fall from the plant.

This plant is sacred to the Bow Priesthood. The elder and younger Bow Priests watch the plant, constantly sprinkling meal at its base until the berries appear, and then the entire plant is sprinkled with meal with the following prayer:

*Hom a'tūchu, to'ma ho'o n'tsi kīa'wāiwe ho'o an'teshema ko'mashiko mo'chikwa'we.*  
My father you I give prayer-meal I want many peaches.

In other words, "May the peaches the coming season be as abundant as the berries of the *kīa'puli*."<sup>1</sup>

*Machæranthera glabella* (Nutt.) Greene. CARDUACEÆ. Thistle family.

*U'tea o'kīa*, 'flower woman' (*u'tea*, flower; *o'kīa*, woman).

The following legend explains the naming of the plant:

Once when the Zuñi were on the warpath, several of their number, leaving the camp and cautiously approaching the Navaho, their hated enemy, found many of the warriors sleeping in a *hogan* [a Navaho house]. One of the Zuñi threw over the sleeping Navaho a quantity of the blossoms and delicate twigs of this plant, ground together, while others made a circle of the medicine around the *hogan*; then all hastened back to their camp. They called their fellow warriors to arms and made an attack on the enemy. When the Zuñi gave the war-whoop on approaching the enemy's camp, the Navaho awoke and endeavored to use their arrows, but they were so weak from the effect of the medicine that they could not hold them firmly—"they were as weak and helpless as women."

All the Navaho were killed, and since that time the plant has borne the name *u'tea o'kīa*.

The delicate twigs, leaves, and blossoms are ground together between stones by the elder and younger Bow Priests and placed in deerskin sacks.

When the Zuñi went on the warpath, as soon as they discovered the enemy the elder-brother and younger-brother Bow Priests gave

<sup>1</sup> Berries of the *kīa'puli* are not expressed in the prayer, but the full meaning is understood by the Zuñi mind.

a pinch of the powder to each warrior, who placed it in his mouth, and, ejecting it into his hands, rubbed them over his face, arms, and body, so that if the enemy's arrows should fly thick about him they could not reach him. Since intertribal wars have ceased, a drama known as the Scalp Ceremony has been performed quadrennially—at least, such was the case until within ten years ago—and on each occasion the elder-brother Bow Priest gave a pinch of the medicine to each personator of a victor.

*Nicotiana attenuata* Torr. Wild Tobacco. SOLANACEÆ. Nightshade family.

*A'na*, native tobacco.

While the leaves of this plant are smoked ceremonially by the Zuñi, commercial tobacco is always preferred for general smoking, even in the fraternity chamber and in the chambers dedicated to anthropic worship.

While the Zuñi, like other Indians, smoke a large number of cigarettes during a day, they do not use nearly as much tobacco as the average white smoker, since each roll of paper or corn-husk contains only a very small quantity of tobacco. Smoking by the Indians was originally ceremonial, and it is still one of the most important features of their ritualistic practices. Pipes are in general use among most tribes, including the Pueblos, but the Zuñi have not smoked pipes for a very long period. The pipes found in the ruins around Zuñi would indicate that at some remote time pipe smoking was a feature of Zuñi ceremony.

*Opuntia arborescens* Engelm. Cane Cactus. CACTACEÆ. Cactus family.

*'Ko'shi*, 'cactus.'

This variety of cactus is claimed as the special property of the *'Ko'shi* fraternity. They maintain a bed of the plant about three miles from Zuñi, on which no one dares to trespass. Part of the ceremony of this fraternity consists in decorating the cactus with fluffy white eagle plumes and in sprinkling meal on the part bearing the plumes. The plants employed for whipping the bodies of members of the fraternity during their ceremonies are gathered from this bed.

Very long switches of willow made into bunches are also carried by members of the Cactus fraternity, and are used unmercifully on one another when the cactus is not brought into play.

*Pentstemon torreyi* Benth. Beard-tongue. SCROPHULARIACEÆ. Figwort family.

*Po'k'ča a'wa kwi'minnē*, 'jackrabbit all root' (*po'k'ča*, jackrabbit; *a'wa*, all; *kwi'minnē*, root).

The root is chewed and rubbed over the rabbit stick to insure success in the hunt. "A rabbit-stick thus treated is sure to kill every rabbit at which it is aimed, provided the thrower has a good heart."

*Peritoma serrulatum* (Pursh) DC. Rocky Mountain Bee Plant. CAPPARIDACEÆ. Caper family.

*A'pīlalu*, 'hand many seeds' (*a* < *a'si*, hand; *pi'lalu*, many seeds). Named from the handlike appearance of the leaf and the quantity of seeds.

After boiling the entire plant in water for a long time, it is removed and the tea allowed to evaporate. The paste precipitated is used in conjunction with a black mineral paint to color sticks of plume offerings to the anthropic gods. The mineral is supposed to have been brought from the underworld when the Zuñi ascended to this world.

*Pinus edulis* Engelm. Piñon. PINACEÆ. Pine family.

*He'sho tsi'tonně*, 'gum branch' (*he'sho*, gum; *tsi'tonně*, branch).

This tree takes its name from the quantity of gum that exudes from it.

The young buds or shoots are eaten by members of the Sword Swallowers order of the Great Fire fraternity, at the close of a ceremony, if they desire female children.<sup>1</sup>

*Pinus brachyptera* Engelm. Yellow Pine. PINACEÆ. Pine family.

*A'shek'ia*, 'long-needle pine.'

The young buds or shoots are eaten by members of the order of Sword Swallowers of the Great Fire fraternity, at the close of their ceremony, if they desire male children.<sup>1</sup>

*Polanisia trachysperma* Torr. & Gray. Clammy Weed. CAPPARIDACEÆ. Caper family.

*A'pīlalu*, 'hand many seeds' (*a* < *a'si*, hand; *pi'lalu*, many seeds).

On the return of the Cactus fraternity from the last dance at sunset, in the plaza, to their fraternity chamber, they are whipped with switches of *'ko'shi* (*Opuntia whipplei* Engelm.) and *pi'la*, willows (*Salix irrorata* Anders.), after which *Polanisia* root and blossoms are chewed and ejected over the bodies of those subjected to the whipping.

*Populus angustifolia* James.<sup>2</sup> Narrow-leaf Cottonwood. SALICACEÆ. Willow family.

*Pi'la o'tsi*, 'cottonwood man' (*pi'la*, cottonwood; *o'tsi*, man, referring to the male tree).

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 517.

<sup>2</sup> *Populus wislizeni* (S. Wats.) Sargent is designated by the Zuñi as *pi'la o'kia*, "cottonwood woman," meaning the female tree.

The slender twigs are employed by all members of the Kō'tikili (mythologic fraternity)<sup>1</sup> in preparing offerings to the Sun Father, the Moon Mother, and the ancestral gods.

*Pseudotsuga mucronata* (Raf.) Sudw. Douglas Spruce. PINACEÆ. Pine family.

*Kīa'lātsilo*, 'water comes out arms' (*kīa* < *kīa'we*, water; *lātsilo*, 'come out arms'—extend arms). In the special rain ceremonies, the rain priests and the dancers who personate the rain-makers, addressing the *kīalātsilo*, invoke them to extend their arms (referring to the branches) and water the earth. The breath from the gods of the undermost world is supposed to ascend through the trunks of these trees and form clouds behind which the rain-makers work.<sup>2</sup>

*Psilostrophe tagetina* (Nutt.) Greene. CARDUACEÆ. Thistle family.

*Ha'tsoliko*, 'leaf mouse' (*ha*, leaf; *tsoliko*, a species of mouse). So named because this particular species of mouse feeds on the leaves of the plant.

The blossoms are used by personators of anthropic gods for painting masks and for coloring their limbs and bodies yellow. They are gathered by men who are sent by the directors of the *kī'witsiwe*<sup>1</sup> (chambers dedicated to anthropic worship). The flowers are ground by the wives or daughters of the officers of the *kī'witsiwe*, and the director combines the flower meal with yellow ocher and urine, in the *kī'witsine* that is to furnish the personators of the anthropic gods. This paint is used also by the Sword Swallowers fraternity and by the Sword Swallowers order of the Great Fire fraternity for decorating their persons for certain dances.

When ceremonially employed the plant belongs to the people of the *kī'witsiwe*, the Sword Swallowers fraternity, and the Sword Swallowers order of the Great Fire fraternity.

*Rhus trilobata* Nutt. Sumac. ANACARDIACEÆ. Sumac family.

*Kō'tse o'tsi*, 'biting man' (*kō'tse*, biting; *o'tsi*, man, referring to the male plant). So named because the juice from the stem of the plant is pungent or "biting" to the tongue.

The twigs are employed by members of the Sword Swallowers fraternity to attach to plume offerings to their *č'towc*. (sing. *č'tone*)<sup>3</sup> the most sacred fetish of the fraternity.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 62.

<sup>2</sup> Ibid., p. 20.

<sup>3</sup> Ibid., p. 163.

*Rumex mexicanus* Weinm. Dock. POLYGONACEÆ. Buck-wheat family.

*Kwi'mi i'topona*, 'painted root' (*kwi'mi* < *kwi'minně*, root; *i'topona*, painted).

The powdered root is sprinkled into a ceremonial bowl of water in the fraternity chamber, and the water is consecrated with elaborate ceremony. Six stone animal fetishes, each representing one of the six regions, are deposited separately, and in order, in the bowl, while incantations are sung to the zoöic gods.<sup>1</sup>

The *a'kwamosi* (maker of medicine) administers the consecrated water to members of the fraternity and to the invited guests, for physical purification.

*Sphaeralcea lobata* Wooton. Nigger Weed. MALVACEÆ. Mallow family.

*Ko'wa*, 'red pepper pod' (*ko* < *ko'li*, red-pepper pod; *wa*, meaning unknown). Named from the red color of the blossoms of the plant.

The root, which is the only part of the plant used, is boiled and the tea drunk hot each evening during the ceremony of the Sword Swallowers fraternity. This root is also pulverized between stones, then taken into the mouth, ejected into the hands, and rubbed over the body, especially on the throat and chest, by the members of the fraternity of the Sword Swallowers and the order of the Sword Swallowers of the Great Fire fraternity, previous to swallowing the sword, to prevent injury from the weapon.<sup>2</sup>

*Svida stolonifera riparia* Rydb. Dogwood. CORNACEÆ. Dogwood family.

*Pi'chiko*.

The delicate stems are employed by the rain priests to make plume offerings. The Zuñi believe that the Divine Ones<sup>3</sup> were so pleased with the beauty of the young shoots of the *pi'chiko* that they named it *la'pichiko* (*la* < *la've*, sacred stick offerings), and requested the rain priests to use the twigs for this purpose.<sup>4</sup>

*Thalesia fasciculata* (Nutt.) Britton. Cancer Root. OROBANCHACEÆ. Broom family.

*We'kwinne*, 'foot'; so named because this plant is supposed to have grown in great abundance in the undermost world,<sup>3</sup> and as the people trod upon it, it felt pleasant to the feet.

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 552.

<sup>2</sup> Ibid., p. 452.

<sup>3</sup> Ibid., p. 24.

<sup>4</sup> The stick indicates to whom the prayers are offered; the attached plumes carry to the gods supplicated the prayers breathed into them; the spiritual essence of the plume conveys the breath prayer. The material part of the plume and stick remains where the prayer offering is planted.

The entire plant is boiled and the tea drunk hot on the first four mornings during the eight days' ceremony of the Sword Swallowers fraternity, to enlarge the throat and prepare the stomach for the swallowing of the sword.<sup>1</sup>

*Yucca baccata* Torr. Datil. LILIACEÆ. Lily family.

*Ho'kiapa*, 'long leaf wide.'

The central stalk of a yucca plant is carried in the hand of each of a number of personators of anthropic gods, who use it for whipping people for various reasons. Some ask to be whipped to be relieved of bad dreams; others are flogged for being derelict in performing their religious duties; children are whipped with the yucca at involuntary and voluntary initiation into the Ko'tikili.<sup>2</sup>

The fibers of the leaf after being prepared in a certain way (see p. 78) and then after soaking are employed by the Priesthood of the Bow to arrange at the base of the idols of the Gods of War on the occasion of the winter and summer solstice ceremonies, and also at the time of the scalp ceremony.<sup>3</sup> As previously mentioned, cords made of this fiber are used to tie prayer-plume offerings together before planting them to the gods, and for other ceremonial purposes.

A narrow band of the yucca leaf is worn around the head almost universally by personators of anthropic gods in the dances, though it cannot be seen on account of the mask when the dance occurs outdoors, and it is also worn by members of fraternities in their ceremonies. Personators of certain anthropic gods adorn their wrists and ankles with yucca ribbons, and the novitiate into the medicine order of a secret fraternity has his or her wrists adorned with yucca ribbons.

Yucca is used ceremonially for a great variety of purposes.

*Zea mays* L. Corn. PEACEÆ. Grass family.

*Chu'we*, 'corn'.

Great care is observed by the Zuñi to secure corn in a variety of colors for ceremonial purposes. They must have the colors for the cardinal points: yellow corn for the north, blue for the west, red for the south, white for the east, all colors for the zenith, and black for the nadir. The red varies from palest pink to deep maroon. There are several shades also of blue, yellow, and purple. The white is true to color and the black is intense. There is a great variety of shades in each color. This corn is a conspicuous feature in many ceremonies; it is brought every four years by the great plumed serpent as a gift from the gods of the undermost world for planting in the Zuñi fields. Ears of the several colors are placed around the

<sup>1</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 444. The uninitiated are so afraid of even the fumes from this medicine that the family occupying the house in which the ceremonies are held seal the interior doors leading into the ceremonial chamber until after it is used.

<sup>2</sup> See 23d Ann. Rep. Bur. Amer. Ethn., p. 103.

<sup>3</sup> Ibid., pp. 113, 597.

medicine-bowl before the altar, the bowl symbolizing the center and the corn the four world quarters, and the above and the below.

Ears of corn are carried in the dance by many personators of anthropic gods and, attached to tablets, by maidens. The perfect ear of corn is worn secreted in the belt by certain dancers. Ribboned corn-husks decorate the hair and skull caps of the Ne'wekwe Galaxy, one of the oldest fraternities, in their ceremonies.

Corn meal wrapped in bits of husk is presented to the theurgist who is asked to visit the sick. Similar presents are made to men and women invited to take part in ceremonies and are used also to notify members of organizations of meetings, etc. The packages are always presented with a prayer and the recipient prays.

A delicate mush of white meal made by a male member of the family is forced down the throat of a dying rain priest that he may not fail to have sufficient nourishment during his four days' journey to Ko'luwala'wa, through which he passes to reach the undermost world whence he came. Ko'luwala'wa is supposed to be in the depths of a lake.<sup>1</sup>

Balls of corn-husks covered with woven cotton are used with the long fringes on the white cotton ceremonial sashes, symbolizing corn and a desire for bountiful crops.

When sweet corn is ceremonially distributed (thrown by the dancers to the populace), it is boiled without removing the husks; these are turned back and serve for holding the corn when thrown out. Other corn is given uncooked and the happy recipients plant it the coming year.

Ribboned husks are fashioned into small square pads to which small plumes are attached upright, in the center, forming the shuttlecocks for use in the game of battledore and shuttlecock, enjoyed principally by the younger Zuñi.

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<sup>1</sup> See *25d Ann. Rep. Bur. Amer. Ethn.*, p. 20.

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