

somewhat disagreeable, unless it be disguised by a suitable vehicle, such as a mixture of fluid extract licorice and elixir yerba santa. The powdered drug is best administered in wafer paper, cachets, or capsules.

THE MESCAL PLANT AND CEREMONY.

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About five years ago, while making investigations among the Kiowa Indians on behalf of the Bureau of Ethnology, the attention of the writer was directed to the ceremonial use of a plant for which were claimed wonderful medical and psychologic properties. So numerous and important are its medical applications, and so exhilarating and glorious its effect, according to the statements of the natives, that it is regarded as the vegetable incarnation of a deity, and the ceremonial eating of the plant has become the great religious rite of all the tribes of the southern plains.

The plant is a small cactus, having the general size and shape of a radish, and covered on the exposed surface with the characteristic cactus prickles. As the nomenclature of the cactus family is unsettled, its botanic name is still a matter of dispute. It was at one time called a *Mamillaria*, but this name seems now to be entirely discarded. Growing specimens in the Missouri Botanical Garden at St. Louis are labeled *Echinocactus Williamsii*, with a variety, *Lewinii*. In the Botanical Garden at Washington, growing specimens are labeled *Anhalonim Williamsii* and *Anhalonium Lewinii*, but the botanist in charge expressed the opinion that both are the same species in different conditions of growth.* As a matter of fact, there are several varieties, probably all of the same genus, used by the Indians in a ceremonial way. The explorer Lumholtz mentions three varieties among the Tarahumari of northern Mexico (see his article in *Scribner's Magazine* for October, 1894). A different sort, from the lower Rio Grande, is used by the Kiowas and associated tribes, and a smaller variety is found among the Mescalero Apaches of eastern New Mexico. In each language it has a different name, usually referring to the prickles. Among the Kiowas it was *señi*; among

the Comanches, *wokowi*; with the Mescaleros, *ho*; and with the Tarahumaris, *hikori*. The traders of the Indian Territory commonly call it mescal, although it must not be confounded with another mescal in Arizona, the *Agave*, from which the Apaches prepare an intoxicating drink. The local Mexican name upon the Rio Grande is *peyote* or *pellote*, from the old Aztec name *peyoll*.

The use of the plant for medical and religious purposes is probably as ancient as the Indian occupancy of the region over which it grows. There is evidence that the ceremonial rite was known to all the tribes from the Arkansas to the valley of Mexico, and from the Sierra Madre to the coast. The Mescalero Apaches take their name from it. Personal inquiry among the Navajos and Mokis proved that they had no knowledge of it.

In proportion as the plant was held sacred by the Indians, so it was regarded by the early missionaries as the direct invention of the devil, and the eating of the peyote was made a crime equal in enormity to the eating of human flesh. From the beginning it has been condemned without investigation, and even under the present system severe penalties have been threatened and inflicted against Indians using it or having it in their possession. Notwithstanding this, practically all the men of the Southern Plains tribes eat it habitually in the ceremony, and find no difficulty in procuring all they can pay for. In spite of its universal use and the constant assertion of the Indians that the plant is a valuable medicine and the ceremony a beautiful religious rite, no agency physician, post surgeon, missionary, or teacher—with a single exception—has ever tested the plant or witnessed the ceremony.

A detailed account of mythology, history and sacred ritual in connection with the mescal would fill a volume. Such an account, to be published eventually by the Bureau of Ethnology, the writer is now preparing, as the result of several years of field study among the Southern Plains tribes. As this article is intended primarily for medical readers, the ceremonial part will be but briefly noted here.

The ceremony occupies from twelve to fourteen hours, beginning about 9 or 10 o'clock and lasting sometimes until nearly noon the next day. Saturday night is now the time usually selected, in deference to the white man's idea of Sunday as a sacred day and a day of rest. The worshippers sit in a circle around the inside of the sacred tipi,

*Since this was written, Mr. Coville, botanist of the Agricultural Department, has made a distinct genus of the mescal plant, calling it *Lophophora Williamsii Lewinii*.

with a fire blazing in the centre. The exercises open with a prayer by the leader, who then hands each man four mescals, which he takes and eats in quick succession, first plucking out the small tuft of down from the centre. In eating, the dry mescal is first chewed in the mouth, then rolled into a large pellet between the hands, and swallowed, the man rubbing his breast and the back of his neck at the same time to aid the descent. After this first round the leader takes the rattle, while his assistant takes the drum, and together they sing the first song four times, with full voices, at the same time beating the drum and shaking the rattle with all the strength of their arms. The drum and rattle are then handed to the next couple, and so the song goes on round and round the circle—with only a break for the baptismal ceremony at midnight, and another for the daylight ceremony—until perhaps 9 o'clock the next morning. Then the instruments are passed out of the tipi, the sacred foods are eaten, and the ceremony is at an end. At midnight a vessel of water is passed around, and each takes a drink and sprinkles a few drops upon his head. Up to this hour no one has moved from his position, sitting cross-legged upon the ground and with no support for his back, but now any one is at liberty to go out and walk about for a while and return again. Few, however, do this, as it is considered a sign of weakness. The sacred food at the close of the ceremony consists of parched corn in sweetened water; rice or other boiled grain; boiled fruit, usually now prunes or dried apples; and dried meat pounded up with sugar. Every person takes a little of each, first taking a drink of water to clear his mouth.

After midnight the leader passes the mescal around again, giving to each man as many as he may call for. On this second round I have frequently seen a man call for ten and eat them one after the other as rapidly as he could chew. They continue to eat at intervals until the close. There is much spitting, and probably but little of the juice is swallowed. Every one smokes hand-made cigarettes, the smoke being regarded as a sacred incense. At intervals some fervent devotee will break out into an earnest prayer, stretching his hands out towards the fire and the sacred mescal the while. For the rest of the time, when not singing the song and handling the drum or rattle with all his strength, he sits quietly with his blanket drawn about him and his eyes fixed

upon the sacred mescal in the centre, or perhaps with his eyes shut and apparently dozing. He must be instantly ready, however, when his turn comes at the song, or to make a prayer at the request of some one present, so that it is apparent the senses are always on the alert and under control of the will.

There is no preliminary preparation, such as by fasting or the sweat-bath, and supper is eaten as usual before going in. The dinner, which is given an hour or two after the ceremony, is always as elaborate a feast as the host can provide. The rest of the day is spent in gossiping, smoking, and singing the new songs, until it is time to return home. They go to bed at the usual time, and are generally up at the usual time the next morning. No salt is used in the food until the day after the ceremony.

As a rule, only men take part in the regular ceremony, but sick women and children are brought in, and, after prayers for their recovery, are allowed to eat one or more mescals prepared for them by the priest.

The mescal ceremony was first brought to public notice in a lecture delivered by the writer before the Anthropological Society of Washington, on November 3, 1891. About two years ago I brought back to Washington a large quantity of the mescal, for the purpose of having it analyzed and tested in order that the results might be incorporated in the final monograph to be published by the Bureau of Ethnology. The chemical analysis was entrusted to Prof. H. W. Wiley, of the Agricultural Department, by whom the work was assigned to Mr. Erwin Ewell of the chemical force. The experimental test was undertaken by Dr. D. W. Prentiss, medical lecturer in the Columbian University at Washington, with the collaboration of Dr. Francis P. Morgan and the efficient assistance of Mr. John W. Mitchell, who offered himself as a subject. The first results of this work were published by Drs. Prentiss and Morgan in the *THERAPEUTIC GAZETTE* of September 15, 1895, and the indications are that the final result will be an important addition to our materia medica list. Partial analyses, together with some experiments upon small animals, were made by a German chemist, Lewin, as early as 1888, and by Heffter in 1894.

Briefly stated, it may be said that the Indians regard the mescal as a panacea in medicine, a source of inspiration, and the key which opens to them all the glories of another

world. They consider it particularly effective in hemorrhage and consumptive diseases. For this reason the returned students from the East, who almost inevitably acquire consumption in the damp eastern climate, are usually among the staunchest defenders of the ceremony, having found by experience that the plant brings them relief.

A marked instance is the case of my Kiowa interpreter, Paul Setkopti, a man now forty-two years of age. Twenty years ago, at the close of the last unsuccessful outbreak of these tribes, he was one of sixty warriors sent as prisoners of war to Fort Marion, Florida. Here, being young and unusually intelligent, he attracted the notice of a benevolent lady from the North who taught him English and finally secured permission to take him with her to her home in New York State, where she undertook to educate him to go back as a missionary and physician to his people. But he had already contracted consumption in Florida, and during nearly the whole of his four years in New York he was stretched upon a sick-bed, racked with cough and frequent hemorrhages, until at last, as there seemed no chance for life, he was sent back, at his request, to die among his own people. He arrived completely prostrated; and, being strongly urged by his Indian friends, he ate a few mescals—with such speedy relief from the cough that he continued the practice. That was thirteen years ago, and he is still alive and in fairly good health, although he spits constantly, has occasional hemorrhages, and is not strong enough for hard labor. His mind is keen, however, and he makes an excellent interpreter, faithful above the average. He is a leader in the ceremony, and defends it in eloquent English, because, as he says, the mescal keeps him alive. He never misses an opportunity to be present at the ceremony if he can reach the place in time. It is particularly to be noted that this man, after years of training and education in a refined home for the special purpose of making him a Christian missionary and a physician in his tribe, has become an apostle of the proscribed mescal rite, on account of his personal experience of the virtues of the plant.

On one occasion, when I was present alone in a camp where they were preparing to eat mescal that night, he rode in late in the evening, through a cold drizzling rain, and told me that he had been eating mescal the previous night at a camp about twenty miles away, and hearing that they were going to eat in our

camp that night and that I had no interpreter with me, he had come to stay with me and explain the ceremony. I tried my best to get him to go to bed and not to lose two nights' sleep, in addition to the exposure in the rain in his weakened condition, but all I could get for reply was: "I will stay with you." I finally persuaded him to lie down at least until he should hear the drum. On hearing the signal, about 11 o'clock at night, he came into the tipi and bent over the fire to warm himself, when he was seized with such a fit of coughing that it seemed as if his lungs would be torn to pieces. I again tried to persuade him to go back to bed, but he said: "No; I shall eat mescal, and soon I shall be all right." He then took and ate four mescals, stepped into his place, and when it was his turn then and throughout the night sang his song like the others, and came out as fresh as they in the morning, after two consecutive nights without sleep. There was no more coughing after eating the first four mescals.

The Indians frequently use the mescal in decoction, without any ritual, for fevers, headaches, and breast pains, and it is sometimes used in the same way by the Mexicans of the lower Rio Grande. I have also seen an Indian eat one between meals as a sort of tonic appetizer. The habit never develops into a mania, but is always under control.

As to its effect upon age or condition, I have seen a twelve-year-old boy, at his first initiation, eat six mescals and sit through the long night ceremony, without any worse result than a sleepiness which came over him after dinner, so that he slept all that afternoon and night until the next morning. I have seen a tottering old man, who had been a priest of the ceremony for half a century, led into the tipi by the hand like a child, eat his four mescals, and then take the rattle and sing the song in a clear voice, and repeat it as often as his turn came until morning, when he came out with the rest, so little fatigued that he was able to sit down and answer intelligently all the questions I asked. Imagine a white man of eighty years of age sitting up in a constrained position, without sleep, all night long and nearly all morning, and then being in condition to be interviewed.

As to the mental effect of the habitual use of the plant, it may be sufficient to say that the great high priest of the rite among the Comanches is Zuanah, the half-breed chief of the tribe, and any who know him at home or in Washington will admit that there is no more shrewd or capable business man in the

Southwest. On one occasion I was with him when he sat up all night leading the ceremony, eating perhaps thirty mescals. Coming out in the morning, he found two cattlemen awaiting him on important business, which occupied him and his white secretary all that afternoon; next day he was up before daylight ready for an early breakfast before starting for Texas to conclude the deal. This after eating a large quantity of the cactus and losing a night's sleep; and Zuanah is entirely too smart a man to attend to business when his brain is not in working order.

On every occasion when I have been present at the ceremony I have carefully observed the participants, sometimes as many as thirty at a time, to note the after-effects, but have seen no indication of a reaction that day or afterward. They unanimously declare that there is no reaction; which agrees with my own experience. After sitting twelve or fourteen hours in a constrained position, each in turn enacting his part several times in the course of the night, and eating from ten to possibly fifty mescals apiece, they come out bright and cheerful, eat their dinner with good appetite, and afterward sing, smoke and gossip until it is time to return home. There is no sign of fatigue or any abnormal physical or mental condition, unless it be the tendency to continue singing the songs in an undertone and beating time with the finger for a rattle for hours afterward. I am unable to say whether this is the effect of the plant or is due to pure fondness for the songs; probably it is a result of both these influences. Once after the ceremony I found myself involuntarily beating time to a song that had particularly struck my fancy. I think, however, that this was largely because I wanted to learn the song, as immediately after coming out from the tipi I had spent some time posing and photographing the company, which I could hardly have done without full control of my faculties and movements.

I know from experience that the mescal is a powerful stimulant and enables one to endure great physical strains without injurious reaction; in which respect it seems to differ from all other known stimulants. During my first all-night attendance at the ceremony I ate none, as I did not feel sure that I could keep my brain clear for observation otherwise, and the result was that from cold, numbness and exhaustion I was hardly able to stand upon my feet when it was over. Since then I have always taken three or four, and

have been able to take note of all that occurred throughout the night, coming out in the morning as fresh as at the start to make pictures of the men, afterward writing, reading, or talking with my friends until bedtime. I have never felt the full mental effect of the plant, having eaten only small quantities at a time, and keeping my mind constantly tense and alert for observation. I am probably also less sensitive to such influences, from long familiarity with Indian ceremonies. I have experienced enough, however, to be satisfied that what the Indians say of the mental effect is true.

The largest number of mescals that I have eaten at one time is seven. The taste is extremely disagreeable and nauseating, and a greater number would probably cause me to vomit. The Indians say this usually happens on first eating the plant, but not afterward. I have seen it happen only on one occasion—in the case of two Kiowa soldiers who had recently returned from three years of army life and rations. They had each taken fifteen or eighteen mescals, and after vomiting returned and ate several more before the close of the ceremony.

The Indians say that no mental effect is produced by less than ten, which is probably true of the seasoned initiates. From twelve to twenty is a common number for one person in the course of the night, and many have eaten thirty or more on occasions. The man with the highest record among the Kiowas is said to have once eaten more than ninety at a single sitting, or nearly a pound and a half. I do not vouch for this, but believe it possible, as he is a recognized leader in the ceremony and powerfully built. The Indians themselves, however, admit that such a quantity is excessive and extraordinary. I have myself seen this man chew up ten, one after another, like so many lozenges, without pausing. I have never heard of any serious results from over-indulgence, and it may be that vomiting relieves the stomach in such cases.

The psychologic effect is perhaps the most interesting, as it certainly is the most wonderful, phenomenon in connection with the plant. Much of this is undoubtedly due to the ceremonial accompaniments of prayer and song, the sound of the drum and rattle, and the glare of the fire. The psychologic measure of these accompaniments can be gauged only by observation of the ceremony, but from the results of the recent experiments and from other testimony in possession of

the writer it is evident that marked psychologic effects are produced by the plant itself without any of these aids. There is a visible increase in the power of the songs after the midnight ceremony. The neophyte is constantly exhorted not to allow his eyes to wander, but to keep them fixed upon the sacred mescal in the centre of the circle.

In some of the experiments noted by Drs. Prentiss and Morgan, the subject had more or less of horrible visions and gloomy depression. As such feelings are entirely foreign to my own experience or to that of any Indian with whom I have talked, it may have been due to fear of the result. It must be remembered that the Indian is familiar with the idea from earliest childhood, and comes to it for the first time with his mind filled with pleasant anticipation. On the other hand, Drs. Prentiss and Morgan state that in nearly every case the pulse of the subject was abnormally high from excitement, even before beginning to eat. Lumloltz experienced only a nervous, wakeful effect, followed by depression and chill, after drinking some of the decoction as the Tarahumaris prepared it.

In all experiments we must consider also the difference between the Indian life, with its comparatively regular routine and freedom from worries, and the civilized life with all its stress of thought and irregularities of habit. The Indian eats on Saturday night in order that he may rest and keep quiet on Sunday, while in several of the medical experiments the patient seems to have hastily swallowed a sandwich and plunged at once into exciting action.

THE TREATMENT OF VESICAL CALCULUS IN YOUNG CHILDREN.

By FRANCIS PATTERSON, M.D., PHILADELPHIA, PA.

(Concluded from page 809.)

STATISTICS OF THE CRUSHING OPERATION.

HISTORY.—*Lithotrites.*—The credit of the invention of the operation for crushing a stone (though not evacuating all of the fragments at a single sitting) is usually given to a Bavarian surgeon named Gruithausen, who described his operation in 1813, though a claim of priority has been advanced for two Italians who lived in the seventeenth century. The first surgeon to perform this operation on the living subject was Civiale, in 1824. He used the "trilabe"—a drill consisting of a central pin or axis and three

claws; this he introduced into the bladder by way of the urethra, when the claws caught the calculus, which was then reduced to fragments by drilling holes in it in various directions. The process was thus one of drilling rather than crushing.

On this model all modern lithotrites have been constructed. In 1831, Baron Huerteloup advocated the placing of the patient on a peculiarly shaped bed, to which a vise had been attached. After the lithotrite had been introduced and the calculus caught within its jaws, the lithotrite was fixed in the vise, and the disintegration of the calculus was accomplished by the blows of a hammer applied to the handle of the instrument.

For the introduction of the "screwing process" we are indebted to Hodson, of Birmingham, while Sir William Fergusson gets the credit for the adoption of the "rack and pinion" system.

Lastly, Sir Henry Thompson adopted the cylindrical handle, which, combined with Weiss's method, whereby the sliding motion may be changed to a screwing one, is the general characteristic of all of the modern instruments.

Evacuators.—In 1845, Cornay brought to the notice of the profession his "lithetie," and thus opened the way for the invention of many ingenious forms of evacuators that have done so much towards placing litholapaxy on its present high plane of perfection. This consisted of a glass bulb, to which was attached an air-pump. The bulb was filled with liquid and attached to a two-way catheter, thus making it possible to alternately inject and empty the bladder, on the principle of pneumatic aspiration.

This apparatus differs but slightly from that of Sir Philip Crampton, of Dublin, who, one year later (1846), invented his evacuator—a large soda-water bottle, which, when exhausted of air, was applied to a catheter previously introduced into the bladder.

Then Clover designed his syringe—an india-rubber bulb and a glass reservoir, from which water was alternately pumped into and withdrawn from the bladder through a catheter.

Next came Fergusson, who tried to complete the operation at one sitting by bringing away the fragments while they were still retained within the jaws of the lithotrite. Needless to state, this method of procedure was soon abandoned, on account of the danger of producing a laceration of the urethral mucous membrane, besides causing cystitis in nearly every case.