The Aboriginal Therapeutic Uses of Lophophora Williamsii

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Lophophora Williamsii (Lemaire) Coulter in Contrib. U. S. Nat. Herb., *3* (1894) 131.
Peyotl zacatensis Hernandez De Historia Plantarum Novae Hispaniae, *3* (1790) 70.
Echinocactus Williamsii Lemaire ex Salm-Dyck in Allg. Gartenz., *13* (1845) 385.
Ariocarpus Williamsii (Lemaire) Voss in Vilmorin's Illustr. Blumengärtn., (1872) 368.
Anhalonium Williamsii (Lemaire) Lemaire in Förster Handbuch der Kakteenkunde, ed. 2, (1885) 233.
Anhalonium Lewinii Hennings in Gartenfl., *37* (1888) 410.
Mammillaria Williamsii (Lemaire) Coulter in Contrib. U. S. Nat. Herb., *2* (1891) 129.
Anhalonium Rungei Hildmann in Monatschr. f. Kakteenk., *3* (1893) 68; nomen nudum.
Anhalonium subnodusum Hildmann in Monatschr. f. Kakteenk., *3* (1893) 68; nomen nudum.
Lophophora Williamsii (Lemaire) Coulter var. *Lewinii* (Hennings) Coulter in Contrib. U. S. Nat. Herb., *3* (1894) 131.
Anhalonium Jourdanianum Rebut Catalogue de Cactées et Plantes Grasses Diverses, undated. Lewin in Ber. Deutsch. Bot. Gesel., *12* (1894) 289; nomen nudum.
Echinocactus Lewinii (Hennings) K. Schumann in Engl. & Prantl. Natürl. Pflanzenfam., *3*, 6a, (1894) 173.
Mammillaria Lewinii (Hennings) Karsten Deutsch. Fl., ed. 2, *2* (1895) 457.
Echinocactus Lewinii (Hennings) K. Schumann var. *Jourdanianus* Michaelis Beitrage zur Vergleichenden Anatomie de Gattungen *Echinocactus, Mammillaria,* und *Anhalonium,* (1896).
Anhalonium Visnagra K. Schumann in Monatschr. f. Kakteenk., *6* (1896) 174; in synon.
(1) *Contribution from the Laboratories of Economic Botany, Botanical Museum, Harvard Univ.*
Lophophora Lewinii (Hennings) Rusby in Bull. Pharm., *8* (1894) 306. Thompson in Rept. Mo. Bot. Gard., *9* (1898) 133.
Echinocactus Jourdanianus (Rebut) Rebut ex Maass in Monatschr. f. Kakteenk., *15* (1905) 122; nomen nudum.
Echinocactus Williamsii (Lemaire) *pseudo-Lewinii hortulorum* Rouhier in Trav. Lab. Mat. Med. Pharm. Gal., *17*, for 1926 (1927) 61.
Echinocactus pseudo-Lewinii Thompsonii Rouhier in Trav. Lab. Mat. Med. Pharm. Gal., *17*, for 1926 (1927) 62.
Echinocactus Williamsii (Lemaire) var. *lutea* Rouhier in Trav. Lab. Mat. Med. Pharm. Gal. *17*, for 1926 (1927) 65.
Echinocactus Williamsii pseudo-Lewinii Thompsonii Rouhier in Trav. Lab. Mat. Med. Pharm. Gal., *17*, for 1926 (1927) fig. 33; nomen nudum.
Lophophora Williamsii (Lemaire) Coulter *cristata* A. D. Houghton in Journ. Cact. & Succ. Soc. Am., *2* (1931) 490.

Much has been written about the use of the narcotic peyote (*Lophophora Williamsii*) (Lemaire) Coulter as a religious sacrament among Mexican and American Indians. Recently, several papers have made this voluminous literature available in concise form (4, 15, 16, 17, 18, 19). The extensive use of peyote as a medicine, however, has not been sufficiently emphasized.

Up to nine alkaloids are known to occur in varying amounts and proportions in peyote; anhaline, anhalamine, anhalonidine, anhalonine, anhalinine, anhalidine, lophophorine, mescaline, and pellotine. Because of the physiological activity of these constituents of the cactus, peyote is capable of inducing an intoxication which is characterized by a feeling of ease and well-being, by control of the limbs and senses, by absence of violence, and occasionally by visual and auditory hallucinations and abnormal synaesthesiae. There are seldom uncomfortable after-effects among users. As a result of this remarkable type of intoxication, peyote has come to be regarded by many Indians as the vegetal incarnation of a deity.

Since 1885 (17), the ancient peyote-worshipping cult has spread, in a modified form, to more than thirty-two American Indian tribes. In 1922, the membership of the peyote-cult in the United States was conservatively placed at 13,300 (15); the constituency is probably much greater to-day.

Figure I. *Lophophora Williamsii*. Photo courtesy Botanical Museum, Harvard University

As a result of the physiological activity of its alkaloids, peyote possesses many properties which the natives regard as valuable in the treatment of disease, both spiritual and physical. Indeed, the primary use of *Lophophora Williamsii* in the religious cult seems to have been based upon the appeal of its supposed curative and stimulating properties. The narcotic effects of the cactus, especially the extraordinary colour-visions induced, were of secondary importance in the establishment and perpetuation of the cult (18). Peyote is, without any doubt, the most important medicine used among North American Indians at the present time and seems to be replacing other older, but less spectacular, plant remedies (18,20). It is used commonly in daily life as a remedial agent, and the peyote-ceremonies of almost all tribes of Mexican and American Indians include a definite curing ritual in which the narcotic is administered in large doses to the ill.

The sustaining and stimulating properties of *Lophophora Williamsii* which enable the user to do an excessive amount of work without feeling fatigue are hardly separable from those properties which may be called curative. The stimulating and curative properties of peyote were known to the ancient Mexicans, and this knowledge persists undiminished to the present time. It is significant that tribes which never

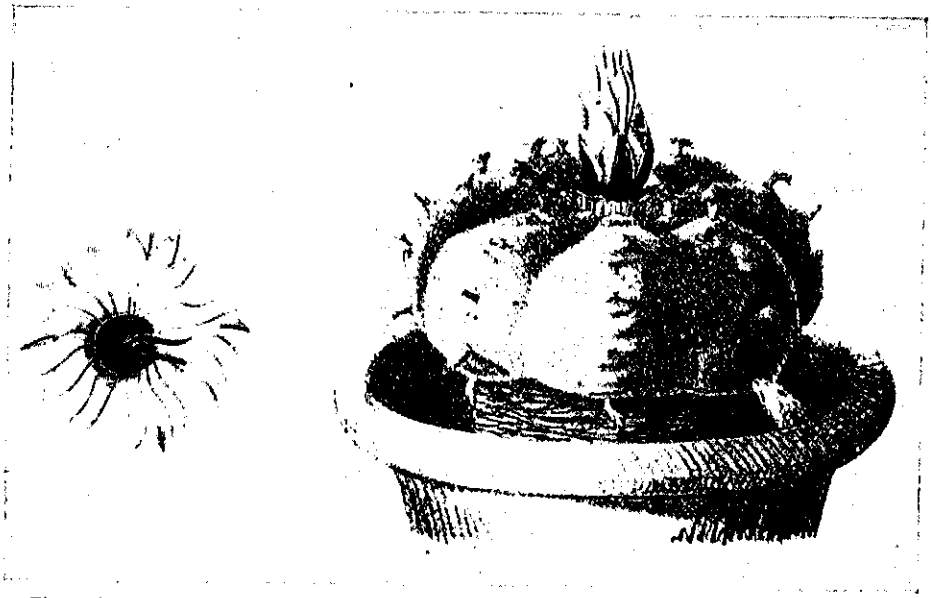

Figure II. Earliest illustration of Lemaire's *Echinocactus Williamsii*. From Pfeiffer and Otto—*Abbildung und Beschreibung blühende Kakteen*, Vol. 2 (1846) 35.

praticed the religious rites of the peyote-cult esteem the plant as a panacea.

The examples of the medicinal use of *Lophophora Williamsii* among natives are very numerous. A few, however, will illustrate the extent of the faith which is placed in the curative powers of the plant[2]. In Mexico, the Spaniards found a number of tribes using peyote, or *peiotl*, as a medicine. Writing very shortly after the conquest, Hernandez (3) reported that the Aztecs used *Peyotl zacatensis* (the peyote of Zacatecas) in treating rheumatism. The Tarahumare and Huichol Indians were found by the explorer Lumholtz (6) to be utilizing the narcotic plant as a remedial agent in cases of snake and scorpion bites, bruises, cuts, rheumatism, and many other ills. The Opata tribe used dried and powdered peyote to apply to deep arrow-wounds as a cleaning and healing medicine (4). The Acaxee and the Lagunero Indians ate peyote as a stimulant during games and races (10). The Sonoran Indians, like the Opatas, packed powdered peyote into wounds until they were healed (1). The Lipans used peyote similarly (4). During battles with the Spaniards at the time of the conquest, the natives of the Sierra de Alica ate the cactus steadily as a tonic and stimulant (14). The Tamaulipas take peyote as a stimulant during long dances (12). The Caxcanes are said to employ a decoction of *Lophophora Williamsii* for cramps, swoonings, and spasms (14).

Among the peyote-worshipping Indians of the United States, the appeal of the plant as an all-powerful medicine is equally as strong as it is in Mexico. Almost every tribe which uses the narcotic as a religious sacrament uses it also as a panacea. The Taos Pueblo Indians have extreme faith in the efficacy of peyote as a snake-bite remedy (9). Cases of blindness have been reported by Indians to have been "cured" with peyote among the Wichita and Winnebago tribes (4,13). During ethnobotanical studies among several Oklahoma tribes, I found that peyote was used as a panacea: among the Kiowa, Kickapoo, and Shawnee Indians, *Lophophora Williamsii* is prescribed for tuberculosis, hemorrhages, pneumonia, influenza, colds, grippe, intestinal ills, scarlet fever, diabetes, rheumatism, and venereal diseases (15,18); to this list, LaBarre (4) adds hiccoughs, childbirth, skin diseases, breast pains, and pulmonary troubles in general. A Shawnee told me that a decoction of peyote was good as an antiseptic and healing wash for wounds and bruises and was soothing if rubbed warm on aching limbs (15). The Shawnee are also said to value it as a remedy for sores and snake-bites (4). Partly chewed mescal buttons (the dried tops of the plant) are packed around an aching tooth to bring relief (15). Peyote is often eaten in daily life among the Plains Indians as a tonic or as "aspirin" (15, 18). This is exactly parallel to its use among rural Mexicans as a stimulating tonic and analgesic; the verb *empeyotizarse* has become accepted in Spanish as spoken in Mexico and signifies self-medication with peyote, aspirit, or

any other medicine to relieve indisposition following alcoholic intoxication (18).

Among the Plains Indians of the United States, the most important therapeutic use to which *Lophophora Williamsii* is put is in the treatment of tuberculosis. Extreme faith is placed in its efficacy in alleviating or curing this disease. Mooney (8), for example, reported a "cure" of consumption with peyote, adding that "the returned students from the east, who invariably 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."

The fact that the curing rituals (18) are often an incorporate part of the peyote-ceremonies of worship and that ceremonies are held more frequently in times of sickness is evidence that the appeal of peyote as a physical as well as spiritual panacea is of fundamental import.

Yet the cures which *Lophophora Williamsii* are supposed to effect go far beyond the realm of the physical being. According to Indian belief, the plant is "inhabited" with forces which are allies not only in combating physical ills but also in ridding the mind of spells and supernaturally created dangers. For example, the Tarahumare and Huichol Indians of Mexico attribute health and longevity to the constant use of peyote; peyote is eaten at death-feasts to fortify the living against death; when rubbed on the knees it is thought to give strength in walking (2, 6). The Tarahumare regard peyote as a

FIGURE III. Entire plant of peyote (*Lophophora Williamsii* (Lem.) Coult.) showing details of the chlorophyll-bearing crown of the plant. Variation in the number and appearance of the ribs has given rise to much confusing taxonomic controversy, but this thirteen-ribbed form is typical of older plants. It is this crown which, when cut from the root and dried, is known as the *mescal button*, two of which are illustrated in figure IV. Natural size.

FIGURE IV. Mescal buttons, the dried crowns of *Lophophora Williamsii*. These are "type" specimens collected in Mexico in 1897 by the explorer, Carl Lumholtz, and sent to the Gray Herbarium. The Mexican Indians who collect peyote string the newly cut crowns on rope and hang them on the backs of mules to dry on the journey home from the peyote fields, hence the central perforation in the lower button. *Above:* View of the top of the dried crown showing the tufts of matted hair still persisting on the areolae. *Below:* View of the base of the crown where it was cut from the root. Natural size. Fruit Room Collection (unnumbered), Gray Herbarium, Harvard University; on loan in Botanical Museum, Harvard University. (Photos courtesy Botanical Museum, Harvard Univ.)

safeguard against witchcraft (6). From a Comanche Indian, LaBarre learned (4) that the belief exists that peyote enables a user to "hear" the approach of an enemy.

The wide variety of uses to which peyote is put by Indians is evidence that the plant is of exceptional value in Indian life and economy. It is at once clear, however, that one plant can hardly be efficacious in all of these therapeutic applications. Even with its extremely complex alkaloidal make-up, *Lophophora Williamsii* is not a panacea. The fact remains, nevertheless, that it *is* used as such by thousands of Indians and that its users have absolute faith in its powers as a sacred medicine.

A review of the very interesting work which pharmacologists and physiologists have conducted to ascertain how useful the peyote-alkaloids might be in curative medicine is beyond the scope of this brief article. It should be pointed out, however, that the results of pharmacological studies indicate that *Lophophora Williamsii* and some of its alkaloids are actually efficacious in alleviating some of the ills which the Indians "cure" with the plant.

Peyote and some of its alkaloids have been utilized as respiratory stimulants in the treatment of angina pectoris and asthma (5, 14); some of the alkaloids have been suggested as antispasmodics for asthmatic complaints, convulvions, abdominal pains, and colic, as analgesics for nervous headaches, as substitutes for opium in delirium, as sedatives in cases of melancholy, hypochondria, and neurasthenia (11,14). Rouhier (14) suggests the use of peyote-extracts or alkaloids as analgesics in treating rheumatism, as febrifugal agents, and as aids in the cure of opium and alcohol habits.

While the peyote-alkaloids have never been major medicinals, several have found minor uses in pharmaceutical practice (21). Anhalonine and anhalonidine have been sold as cardiac and respiratory stimulants (7), and pellotine is employed as a calmative (21). As further studies are made, it is possible that the peyote-alkaloids may assume places of greater importance in medicine.

During the last fifteen years, methods of synthesizing these alkaloids have been discovered. This will increase the availability of these substances and may prove to be an incentive to further investigation. Although a number of scientific writers seem to have exaggerated the therapeutic potentialities of *Lophophora Williamsii,* it is entirely possible that more complete and systematic pharmacological studies may result in the discovery of new applications for these exartordinary alkaloids in therapeutical practice. Certainly the ancient and persistent faith of the natives of Mexico and the United States in the therapeutic powers of *Lophophora Williamsii* justifies more concentrated pharmacological work than has hitherto been carried out.

(The literature concerning peyote is very extensive, over 400 references being known to the writer. This brief list includes only a few which may be used for an extension of the concentrated information contained in the foregoing article.)

1. Alegre, Francisco Javier "Historia de la Compania de Jesus en Nueva España," *2* (1841).
2. Bennett, Wendell & Robert M. Zingg "The Tarahumara," (1935).
3. Hernandez, Francisco "De Historia Plantarum Novae Hispaniae," *3* (1790) 70.
4. LaBarre, Weston "The Peyote Cult," Yale Univ. Publ. Anthrop., *19* (1938). [Especially recommended.]
5. Landry, S. F. Ther. Gaz., *4* (1888).
6. Lumholtz, Carl "Unknown Mexico," *2* (1902).
7. Merck's Index, Rahwey, N. J., (1930).
8. Mooney, James "The Mescal Plant and Ceremony," Ther. Gaz., *20* (1896).
9. Parsons, Elsie Clews "Taos Pueblo," Gen. Ser. Anthrop., *2* (1936).
10. Peréz, Andres "Historia de los Triumphos de Novestra Santa Fee en los Missiones de la Provincia de Nueva España," (1645).
11. Prentiss, D. W. & F. F. Morgan "*Anhalonium Lewinii* (Mescal Buttons). A Study of the Drug with Especial Reference to its Physiological Action upon Man," Ther. Gaz., *19* (1895).
12. Prieto, Alejandro "Historia y Estadisticas del Estado de Tamaulipas," (1873).
13. Radin, Paul "Crashing Thunder—the Autobiography of an Indian," (1926).
14. Rouhier, Alexandre, Trav. Lab. Mat. Med. Pharm. Gal., *17* for 1926 (1927).
15. Schultes, Richard Evans "Peyote and Plants Used in the Peyote Ceremony," Bot. Mus. Leafl., Harvard Univ., *4,* 8 (1937).
16. Schultes, Richard Evans "Peyote (*Lophophora Williamsii*) and Plants Confused with It," Bot. Mus. Leafl., Harvard Univ., *5,* 5 (1937).
17. Schultes, Richard Evans "Peyote—an American Indian Heritage from Mexico," El. Mex. Ant., *4* (1938).
18. Schultes, Richard Evans "The Appeal of Peyote (*Lophophora Williamsii*) as a Medicine," Am. Anthrop., *40* (1938).
19. Shonle, Ruth "Peyote, the Giver of Visions," Am. Anthrop., *27* (1925).
20. Vestal, Paul A. & Richard Evans Schultes "The Economic Botany of the Kiowa Indians as It Relates to the History of the Tribe" (1939).
21. Remington, Joseph P. et al. "The Dispensatory of the United States of America," ed. 20, (1918).