CLINICAL TOXICOLOGY, 1(1), pp. 81-85, March, 1968

# A Study of Peyote

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Through the ages men have sought out drugs that would dull their physical and mental pains and aid in making contact with a divine presence [11]. The use of hallucinogens contained in plants have been used by certain Indian tribes for a number of centuries. Of these plants, one of the older ones, and one of the less well known, is the southwestern desert cactus *Lophophora williamsii* (Lemaire: 1894) [3] *(Anhalonium lewinii)*, the peyote cactus.

Peyote has been used since pre-Columbian times, with the earliest records found among Aztec remains in Mexico [7]. Cortez and his company in 1520 observed the plant, its use, and its effects upon the Indian users. His physician, Francisco Hernandez [8], recorded in his notes that the Spanish tried the product but found it bitter and nauseous. Cortez did note that the Aztec priests gave peyote in fairly large quantities to sacrificial victims so that human sacrifice could be made without a cry or struggle. They noted that the senses of the victim seemed dull and that he apparently felt no pain.

By 1770, Apaches raided Mexico and were introduced to the "flesh of the gods" [16]. Trade routes were soon established to supply the northern tribes with the cactus during the cold winter months. By 1885 peyotists in the southwestern United States felt the need to band together in a common group, now called the Native American Church [16].

Peyotism had reached western Canada by 1902 [15]. Today peyotists represent at least 50 Indian tribes, encompassing 225,000 users in Mexico, the United States, and Canada [13, 15]. Their distribution is indicated in Fig. 1.

*L. williamsii*,is a cactus, curious in appearance. Seven-eighths of the plant is buried in the ground in the form of a single, fleshly taproot like that of a turnip. The stem is gray-green in color, globular, and divided into 7 to 13 segments. There are no spines, but tufts of silky hairs dot the surface (Fig. 2). Flowers are borne on the top of the stem and range in color from lavender to green and white [1, 3, 17]. Preparation for use consists of gathering the plant in October, slicing the top part of the stem into "buttons" (Fig. 3), and drying these.

Geographically, peyote is localized in a narrow band of arid, rocky country along the Rio Grande River between Eagle Pass and Brownsville, Texas [3]. It has been transplanted into colder northern latitudes, but these areas are not conducive to its rapid propagation. The cactus grows slowly even in its natural habitat so there is no rapid reproduction. Continued extensive collection of the plant suggests complete disappearance in the future.

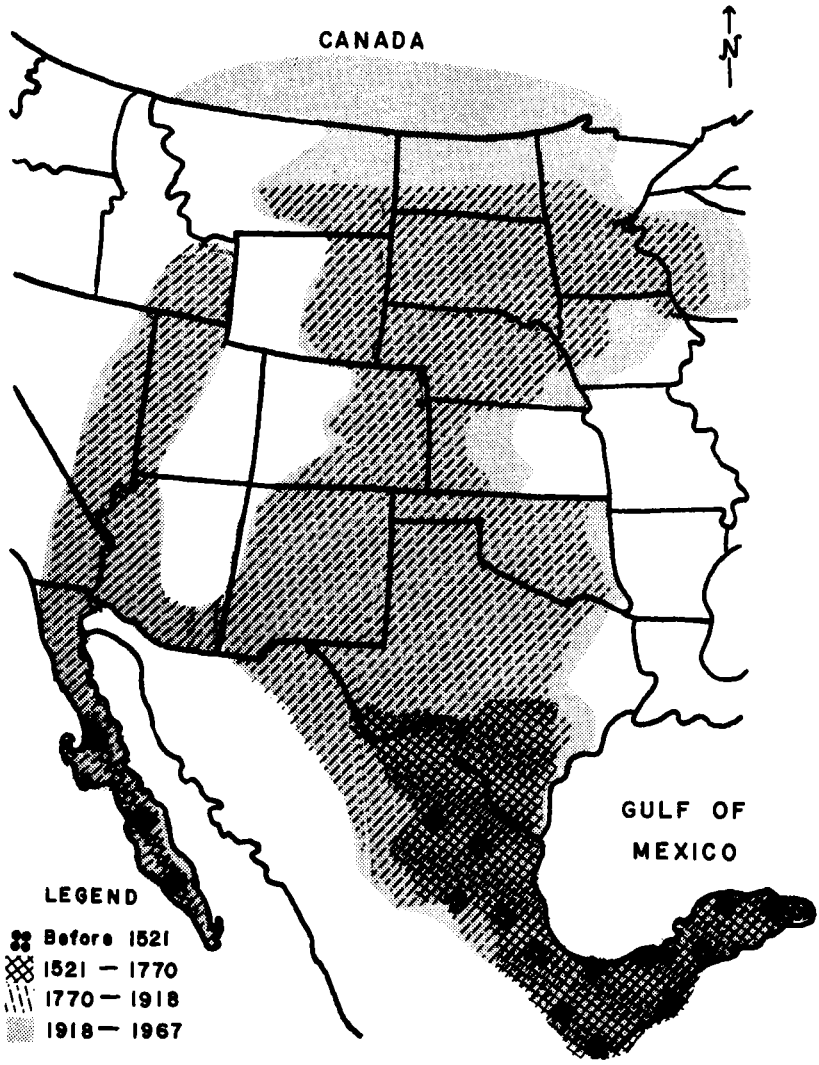


**Fig. 1.** Distribution of peyote use.

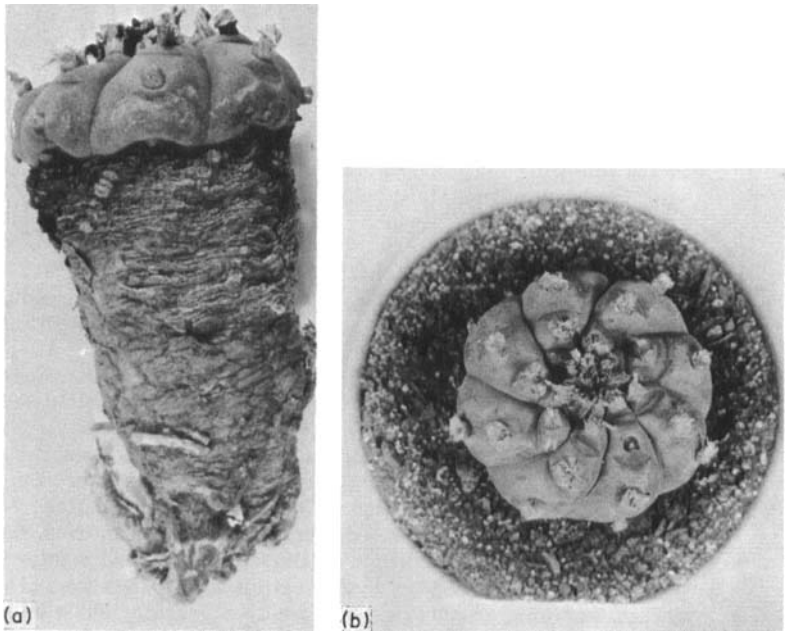


**Fig.** 2. Peyote cactus.

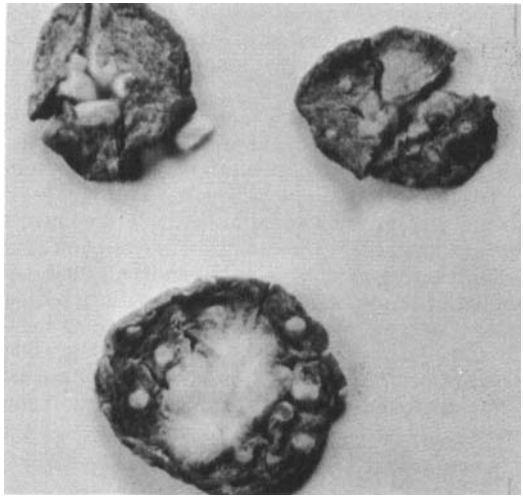

**Fig.** 3. Peyote buttons.

Besides its use as a hallucinogen among certain Indian tribes, peyote is also used as a curative of ills, physical and mental, and as a builder of strong moral character. Its medicinal preparation includes powdering and packing it into wounds and around aching teeth, or making it into a paste to rub over burned areas of skin as a pain-relieving ointment. It is allegedly ingested as a cure for tuberculosis and other internal ailments. Some Indian communities consider it to be an antialcoholic, for those particular communities of peyotists are supposed to abstain from all alcoholic beverages [18].

To date, nine alkaloids have been isolated from the peyote cactus. All are considered to be by-products of the plant's metabolism which are stored within the plant [2, 8, 13, 17]. As such, they may be generally termed excretory products.

Seven of the nine alkaloids have been analyzed and their chemical compositions elucidated. All have been found to be related chemically to epinephrine or adrenaline [2, 5, 8]. Four of these which are important to the peyotist are the following: (a) lophophorine ($C_{13}H_{17}O_3N$), which is probably the most toxic, for in its pure state it causes convulsions and ultimately leads to death; (b) pellotine ($C_{13}H_{19}O_3N$), which causes drowsiness; (c) anhalonidine ($C_{12}H_{17}O_3N$), which stimulates the central nervous system; and (d) mescaline ($C_{11}H_{17}O_3N$), which induces hallucinations.

Psychological effects of peyote include a "split" personality and hallucinations. The hallucinations may be visual, often in vivid color, olfactory (smelling pleasant odors), and/or aural (hearing quiet sounds). A feeling of quiet euphoria accompanies its use in many instances. The user does not actually sleep, but enters a trance for the period of time the alkaloids are in his system.

The physiological effects include drying of the lips and the tongue; the tongue may become coated even though excess saliva is produced. The skin first flushes and then turns dry and harsh with a gray pallor. As the alkaloids are released into the blood stream in larger quantities, the eyes dilate so that focusing becomes difficult. Urine is scanty and highly colored. Insomnia and restlessness occur in most instances. Nausea and vomiting, often reaching extreme proportions, occur without warning since the individual seems to lack the ability to control his body functions. Pain around the heart is not uncommon, and the pulse may be irregular. Severe diarrhea and body odor accompany the more serious cases and excessive nasal discharge is present. Numbness, heavy breathing, headache, indigestion, and giddiness may also occur. Mescaline tends to stimulate the contractions of the intestine and uterus [10].

Not every individual who uses peyote has a pleasant experience [14, 15, 18]. Some users report shocking or terrifying experiences. Tremors may result and manic depressive psychosis may exhibit itself, although no suicides have been attributed to the use of peyote [14, 15, 18]. Individuals who do suffer undesirable experiences seem to be those who have liver diseases or blood disorders [14, 18]. The effects of peyote last from a few hours to a few days.

Radioactive studies on rats reportedly indicate that mescaline does not enter the brain cells proper, but is retained by the so-called blood-brain [14] barrier. Only 42% is absorbed, and the remaining 58% is recovered unaltered in the urine of the user [10]. Since mescaline does not enter the brain cells, indirect alteration of human metabolites by peyote seems to account for its psychological and physiological effects. One theory is that the body's chemistry is altered, with sugars being most vulnerable to alteration by peyote [5, 10]. However, another theory indicates that the effect of serotonin on the brain, may be altered [2, 5].

To date, peyote has not been considered to be addicting. It is not considered to be a true narcotic as it induces a trance and not a deep sleep [9, 10]. The Federal Government has no rules or regulations with regard to peyote as a narcotic, but some states do [18]. In such areas as Indian reservations regulated by Federal agencies, but within the boundaries of a state banning peyote, smuggling is evident and illicit daytime use by both Indians and whites appears to be increasing [6, 12]. Peyotism still spreads despite attempted legislation and the arguments of opposition groups. As the authorities

are not in agreement as to the status of peyote, more study is needed to determine if peyote is harmful before definite conclusions can be reached.

## SUMMARY

*Lophophora williamsii*, the peyote cactus, has been and still is used by certain Indian tribes for its effects upon the mind and nervous system of the user. The chemical compunds believed responsible for the hallucinating properties have been largely determined. Physiological and psychological reactions indicate the need for further study to determine the extent of its full effects upon the human mind and body.

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