

1. Antiquity of the Use of New World Hallucinogens

Richard Evans Schultes, Ph.D., F.M.L.S

"In the exudates and decoctions from trees and herbs, man has found principles that have permitted him to experience a kinship with the whole of creation." -- William Emboden (1979)

Abstract:

A review of psychoactive plants known from archaeological contexts and artistic representations shows that their use has spanned centuries, continuing in places in Mexico and South America to the present day. The discovery of the unusual properties of these plants took place as part of the exploration of the physical milieu of the Western Hemisphere. That these plants must in some cases be made into infusions in order to be consumed reveals ancient enterprise in manipulating aspects of the environment. The surprising results obtained from treating psychoactive plants allowed their users to communicate more directly with the unseen world which they believed to exist.

It was the great German toxicologist Louis Lewin (1931) who wrote that "from the beginning of our knowledge of man, we find him consuming substances of no nutritive value, but taken for the sole purpose of producing for a certain time a feeling of contentment, ease and comfort."

There is ample material proof that narcotics and other psychoactive plants, such as hallucinogens, were employed in many cultures in both hemispheres thousands of years ago. The material proof exists in some archaeological specimens of the plants in contexts indicating magico-religious use and in art forms such as paintings, rock carvings, golden amulets, ceramic artifacts, stone figurines, and monuments.

Aquifoliaceae Guayusa (*Ilex Guayusa*)

Guayusa, while probably not hallucinogenic as ordinarily used, is definitely psychoactive, due to its high concentration of caffeine. A tea of the leaves is still used by the Jivaro and other Indians in Ecuador as a stimulant and, in highly concentrated doses, as an emetic for purification before ceremonies or important tribal conferences. These functions were well developed long before the Spanish Conquest, and the Jesuits early established a lucrative market for the leaves in Europe as a cure for syphilis and other diseases; according to their records, they maintained a large plantation of *Ilex Guayusa* in southern Colombia, the remnants of which can still be seen (Patiño 1968; Schultes 1979). Today, guayusa leaves are sold for medicinal purposes in Quito, Ecuador, and Pasto, Colombia, where they were believed to cure a wide spectrum of ills.

It was with great surprise that an archaeological find indicated the early use of these leaves in distant Bolivia. In the tomb of a medicine man of the culture, dated about A.D. 500, were found several perfectly preserved bundles of flattened leaves neatly tied with fibrous material. In association with these bundles was a snuffing tube, other tubes that have been interpreted as clysters, bamboo storage tubes for powder, spatulas, snuff trays, and a mortar and pestle. The guayusa leaves, which were prepared for

the grave with great care, gave positive tests for caffeine after 1500 years (Schultes 1972).

Several caffeine-yielding species of *Ilex* have been the source of beverages, especially yerba maté in Argentina, yaupon in the southeastern United States, shui-chatze in Tibet and China (Hartwich 1911; Hu 1979). The presence in the Bolivian burial of so much equipment associated with snuffing and the actual remnants of a powder clearly indicate that the leaves were taken as a snuff: there is no reason to believe that caffeine administered in this way would not be absorbed into the general circulation through the nasal mucosa. This discovery is the only one which unequivocally shows that a caffeine-rich product was used as a snuff.

If the extra tubes are correctly interpreted as clysters, they may further indicate application by enema, in which caffeine could likewise be absorbed into the general circulation. No caffeine-rich plant has ever been known to have been used in this way, although rectal administration of tobacco, yopo, and other drugs in the New World is clearly substantiated.

Yaupon (*Ilex vomitoria*)

In the southeastern part of the United States, the Indians were employing a strong tea of *Ilex vomitoria* - known as the Black Drink - as a

ceremonial stimulant and emetic when the first Europeans arrived (Hale 1891; Milanich 1979). This tea was made by boiling large doses of leaves for a long time, until the resulting solution was a dark green. In such concentrated infusions, the plant easily acts as an emetic and, so far as we know from early records, this ritualistic cleansing of the body before important tribal convocations was its principal use amongst the American Indians - a custom closely paralleled by the use of guayusa today among the Jivaros of Ecuador.

Evidence of its use in North America from archaeological contexts is circumstantial but convincing. Cult objects from gravesites such as shell drinking cups engraved with cult symbols have been interpreted as vessels for the ceremony of the Black Drink. These shell cups, dating ca. A.D. 1200, were widespread in the Southeast. Residues believed to be from evaporated Black Drink have been found in some (Milanich 1979).

Bolbitiaceae, Strophariaceae

Teonanacatl (Stropharia cubensis; Panaeolus sphinctrinus)

The early Spanish ecclesiastics in conquered Mexico were much disturbed by pagan religions centered upon the sacramental use of several mushrooms known in Nahuatl as teonanacatl ("flesh of the gods"). Divination, prophecy, communion with the spirit world, and curing rituals depended upon the narcotic intoxication induced by these mushrooms and interpretation of the visual and/or auditory hallucinations accompanying the intoxication. Persecution drove these Indian practices into the hinterland, so no archaeological evidence of the magico-religious use of mushrooms was found for a long time. It was even doubted that teonanacatl was a mushroom; the idea that, because a dried mushroom resembled the dried top of the peyote cactus, teonanacatl was but another name for peyote was widely accepted (Safford 1915). Not until the late 1930s and early 1940s were identifiable mushrooms collected from contexts interpreted as ceremonial (Schultes 1939). The modern center of the area in which this mushroom is used is in the Mexican state of Oaxaca, among the Mazatecs.

The velada or mushroom ceremony among the Mazatecs is usually held in response to a request by a person needing to consult the mushrooms about a problem. A complicated diagnostic or curing ritual frequently takes place during an all-night ceremony (Schultes 1939; Wasson et al. 1974). One or two monitors who do not take the mushrooms must be present to listen to what is said. Certain abstinences must be practiced preparatory to the ceremony. It is

now known that mushroom ceremonies in southern Mexico use at least two dozen species of mushrooms in several genera, the most important being *Stropharia*, *Psilocybe*, and *Panaeolus* (Guzmán 1959; 1977; Heim 1963; Ott and Bigwood 1978; Schultes 1939; 1969; Singer 1958; Wasson 1973; Wasson and Wasson 1957).

The mushrooms are usually employed fresh and dry. Their shamanistic use is today extraordinarily important, especially among the Indians of Oaxaca. The officiating shaman in tribes of southern Mexico - Mazatecs, Zapotecs, and others - may often be a woman. The all-night ceremony among the Mazatecs of the Sierra Juarez of Oaxaca often includes a curing ritual; the most famous of the shamans of this region, Maria Sabina, sings throughout the night and prays for power from spiritual realms through the mushrooms. Since the modern ceremony is part-Christian, part pagan, all possible help is implored. The following sampling of the night-long chants in Mazatec (translated) shows their variety:

*The law which is good
Lawyer woman am I.
Woman of paper work am I.
I go to the sky,
Woman who stops the world am I.
Legendary woman who cures am I.
Father Jesus Christ
I am truly a woman of law,
I am truly a woman of justice...
Woman of space am I,
Woman of day am I,
Woman of light am I...
I give account to my Lord
And I give account to the judge,
And I give account to the government,
And I give account to the Father Jesus Christ,
And my mother princess, my patron mother.
Oh, Jesus, Father Jesus Christ,
Woman of danger am I,
Woman of beauty am I...*

The antiquity of sacred mushroom cults in Mexico and adjacent areas is now well established, and they appear to have deep roots in centuries of native tradition. Frescoes from central Mexico dated to AD 300, indicate that mushroom worship goes back at least 1700 years (Wasson 1980). Stylized mushroom caps - undoubtedly *Psilocybe aztecorum* - decorate the pedestal of a statue of Xochipili (Aztec god of flowers) discovered on the slopes of Mount Popocatepetl and dated to approximately AD 1450 (Wasson 1973). A terra-cotta artifact, ca. 100-300 AD, found in Colimo, shows figures dancing around

a Psilocybe-like mushroom (Furst 1974). Clay figurines with mushroom effigy "horns" from Jalisco are about 1800 years old (Furst 1974). A terra-cotta figurine of the Remojadas style found in Vera Cruz depicts a curandera praying over a mushroom; the artifact is about 2000 years old (Heim 1967).

Even more remarkable are the so-called "mushroom stones" found at highland Mayan sites in Guatemala. These are dated at about 500 BC or earlier. Each consists of an upright stipe with a human or animal figure, the whole crowned with an umbrella-shaped top. Long puzzling to archeologists, they were once interpreted as phallic symbols. Now it is quite widely accepted that they were associated with a mushroom cult, perhaps, as has been suggested, with a Meso-American ball game ritual, itself a religious ceremony. These artifacts appear to indicate a very early sophisticated mushroom cult far beyond the present Mexican geographical limits of the magico-religious use of the fungi (Borhegyi 1961; Furst 1974; Mayer 1977; Ott and Bigwood 1978).

There is today no evidence that hallucinogenic mushrooms are ceremonially employed by Indian groups in South America. It is possible, however, that they were so used in northern Colombia at a period from 100 to 350 AD. In the Gold Museum in Bogota, there are many anthropomorphic pectorals from the Sinú Culture (Schultes and Bright 1979). The earlier, more realistic of these gold artifacts have hemispherical caps separated from the head by definite stipes; in later models, both the human figure and the dome shaped cap become stylized - the domes losing their stipe and becoming affixed directly to the idol. These spherical domes have led to their identification as pectorals for lack of a better explanation of their use, "telephone bell gods", because of the two domes on the heads that suggested old fashioned telephones. Significant is the presence on many of these pectorals of a toad or frog, animals of great magico-religious importance in connection with intoxication in ancient and modern Andean cultures. The discovery in the region of the Sinú Culture of a number of species of Psilocybe, some of which are provided with the hallucinogenic constituent psilocybin, strengthens the suggestion that these pectorals may indicate the ceremonial use of psychoactive mushrooms in magico-religious rituals among the Indians of northern Colombia (Schultes and Bright 1979).

Cactaceae

Peyote (*Lophophora williamsii*) - It has long been suspected that the use of the Mexican hallucinogenic cactus peyote (*Lophophora*

williamsii), today widely valued as a sacred intoxicant in magico-religious ceremonies in central and northern Mexico and the basis of a religious cult among Indians of the United States and Canada - was of great age. It is the spineless top of the peyote cactus that is usually taken in Indian ceremonies. Most frequently, it is dried into a so-called "peyote button," but sometimes the freshly severed crown of the plant may be used (Schultes 1938). The Huichol Indians of Mexico, for example, make an annual sacred pilgrimage to Wiricuta - home of the peyote plant - to collect with complex ceremonies enough crowns of the cactus for use during the coming year (Furst 1972; Meyerhoff 1974). In the United States, in regions far removed from areas in which peyote exists, the members of the peyote cult, organized into the Native American Church, may receive their supplies of peyote quite legally in the form of dried peyote buttons (Schultes 1937). These "buttons" are consumed ceremonially with no preparation. Held in the mouth until thoroughly moistened, they are then swallowed; a native worshipper in the all-night peyote ceremony in the United States may consume up to 25 or 30 buttons in one night (La Barre 1964).

There is now firm evidence of the great antiquity of the reverence of this cactus as a divine or sacred plant. The earliest European reports of peyote intimate that the Chicimecos and Toltecs of Mexico were acquainted with it as early as 300 BC, although the accuracy of the dating depends on the interpretation of native calendars (Anderson 1980; Schultes 1938); thus the date may even be earlier.

Recent archeological finds in shelters and caves in the Cuatro Ciénegas Basin in Coahuila, Mexico, and trans-Pecos, Texas, dated by ¹⁴C and spanning some 8000 years of intermittent human occupation, included, among other plant remains, identifiable specimens of *Lophophora williamsii* - often in abundance and in a context that suggests ritual use. The peyote was accompanied by quantities of seeds of the hallucinogenic red bean (*Sophora secundiflora*) and the toxic Mexican buckeye (*Ungnadia speciosa*) which is suspected to be psychotropic (Adovasio and Fry 1976).

Of great significance are ceramic bowls from Colima, Mexico, dated about 100 BC to 200-300 AD, with four peyote like ornaments and a male hunchbacked figure (also from Colima and of the same age) holding a pair of peyote plants (Furst 1974). It has been suggested that the plants in the Colima peyote effigy may indicate incipient or temporary domestication of the cactus in prehistoric times.

San Pedro Cactus (*Trichocereus pachanoi*)

There exists today a folk-healing ceremony based in part on the use of the hallucinogenic cactus known in Andean South America as San Pedro, San Pedrillo, aguacolla, and gigantón. A brew of the stems of this tall cactus is prepared, often with other psychoactive plants added (e.g., the Solanaceous *Brugmansia candida* or floripondio). The brew is employed in magic ceremonies, as a medicine and to protect homes, "as if it were a dog." A drink prepared of the soft interior of the stems of the cactus is also administered in ceremonial contexts. In the highland Indian markets of Peru and Bolivia, cut pieces of the stem of the cactus are sold for preparation of the sacred, intoxicating drink. The San Pedro cactus is now widely employed in Peru and Bolivia in curing ceremonies that combine Christian and pre-Columbian native elements (Davis 1983; Sharon 1972; 1978). The use of this cactus goes far back in prehistory, and there is evidence that its ritual utilization was widespread in the central Andes at the time of the Spanish Conquest. There exist two references to this "plant with which the devil deceived the Indians" from European ecclesiastical reports of the mid-fifteenth century (Sharon 1972).

There are, in addition, artifacts that indicate that its use in Peru goes back at least three thousand years. The oldest known evidence of this kind is a stone excavated at Chavín de Huantar in the northern Peruvian Andes; dating from about 1300 BC, it is carved with a mythological being holding a section of stem of the cactus. Chavín textiles from the south coastal region of Peru show the cactus in association with the jaguar, an animal associated throughout Andean South America with intoxication and hallucinogens; these textiles are dated in the first millennium BC (Sharon 1972). Ceramics dating from 500 to 1000 AD depict sections of the San Pedro cactus together with the jaguar (Furst 1972). The use of this hallucinogen apparently continued on the southern coast of Peru after the decline of the Chavín influence; four ceramic urns in the form of mummy bundles from the Nasca culture, dated from 100 BC to AD 500 have been found with representations of the stem of the cactus protruding from each shoulder (Sharon 1972). In northern Peru, ceramic vessels with representations of San Pedro date to about 400 to 200 BC. (Sharon 1972). At the present time, the ritual is extensively practiced by shamans in the coastal regions of Peru, where it has heavy Christian overtones (Sharon 1972). *Trichocereus pachanoi* has as its active hallucinogenic constituent mescaline, the same

alkaloid that is responsible for the visions induced by the peyote cactus (Schultes 1980).

Convolvulaceae

Ololiuqui (*Turbina corymbosa*, *Ipomoea violacea*)

A number of Spanish chroniclers of the time of the Conquest of Mexico described in detail the religious and medicinal use of a small lentil-like seed known to the Aztecs as ololiuqui. Its source was a vine called coatlxouhqui, which was clearly a morning glory (Reko 1934; Schultes 1941). For nearly four centuries, no species of the Morning Glory Family was found in use as a divinatory hallucinogen, and no psychoactive principle was known until recently in the family Convolvulaceae. Many writers accepted the suggestion that ololiuqui was a member of the toxic Nightshade Family (a species of *Datura*), although there were voices of protest (Reko 1934). It was not until the 1930s that identifiable material associated with its magico-religious use as collected in Oaxaca (Schultes 1941). The source plant encountered "in almost all the villages of Oaxaca (where) one finds seeds still serving the natives as an ever present help in time of trouble" (Wasson 1963).

The use of these morning glory seeds as sacred intoxicants in curative ceremonies of ancient origin seems to be focused in Oaxaca, Mexico. In the Mazatec country of that state, the seeds must be ground on a metate (quern) by a maiden and prepared in a cold-water solution. The resulting drink is given to the patient, and the mumblings that he makes during his intoxication are interpreted by an assistant whose task is to listen.

Two species of morning glories are employed in Oaxaca: *Turbina corymbosa* with small, round, brown seeds, and *Ipomoea violacea* with larger, angular, jet black seeds. The chemical constituents in the two species differ. The total ergoline alkaloid content of the seeds of the former species is 0.012 percent, whereas of the latter it is 0.06 percent. This fact explains why Indians use smaller quantities of seeds of *I. violacea* than of *T. corymbosa* (Schultes 1980).

Ololiuqui was one of the most important hallucinogens in ancient Mexico. The plant is depicted in mural painting at Teotihuacan and Tepantitla. These murals show the water goddess with a stylized vine of the sacred hallucinogenic morning glory (Furst 1974).

We know much about the pre-Conquest use of ololiuqui because of the numerous detailed reports made immediately after the arrival of the Spaniards. The personal physician of the king of Spain, Dr.

Francisco Hernández, wrote of the medicinal and magico-religious use of *ololiuqui* among the Aztecs between 1570 and 1575, a five-year period during which he was studying the native medicinal plants of Mexico; he figured the source plant was a morning glory (Schultes 1941). A painting in the Florentine Codex definitely illustrates a morning glory which the Spanish ecclesiastical authorities considered a gift of the devil (*ibid.*).

Leguminosae

Red Bean or Mescal Bean (*Sophora secundiflora*)

The red seeds of *Sophora secundiflora*, a beautiful shrub of the dry parts of northern Mexico and the southwestern United States, once formed the basis of a vision-seeking ceremony practiced by a number of Indian tribes (Adovasio and Fry 1976; Schultes 1969; Schultes and Hofmann 1979). The ceremony was known variously as the Red Bean Dance, the Wichita Dance, or the Deer Dance (Campbell 1958). The ingestion of the red beans is extremely dangerous, since the active alkaloid - cytisine - is highly toxic and can cause death by asphyxiation, by attacking the phrenic nerve controlling movement of the diaphragm. As the ritual employment of the safe peyote cactus spread northward from Mexico, the use of the red bean gradually died out, although it is believed that occasionally both hallucinogens were taken together in the early days of peyote use in the United States. It is true, however, that today in certain American tribes part of the ritual dress of the leader of the peyote ceremony consists of a necklace of this once sacred narcotic seed - the only vestige of the former role of this toxic hallucinogen. Cabeza de Vaca, one of the early Spanish explorers of Texas, reported in 1539 that these seeds were an article of trade among the Indians of the region (Schultes 1980). Now, however, there is archaeological evidence for the use of *Sophora secundiflora* (Adovasio and Fry 1976). Caches of the red bean have been discovered in numerous archaeological sites in northeastern Mexico and trans-Pecos Mexico, often in association with peyote and Mexican buckeye seeds. These sites, dated by ¹⁴C, span the period from 7000 BC to AD 1000. The vegetal materials often provided evidence of potential ceremonial use, possibly in a hunting cult (Adovasio and Fry 1976).

Yopo and Vilca

(*Anadenanthera peregrina* and *A. colubrina*)

It is not usual that archaeological remains of plants are found in the wet tropics, although this is

true of yopo, a hallucinogenic snuff prepared from the beans of a leguminous tree - *Anadenanthera peregrina*, formerly known by the binomial *Piptadenia peregrina* (Altschul 1964). This psychoactive powder was widely used in much of the Caribbean (where it was known as cohoba) at the time of the Spanish Conquest (Safford 1916) but it persists now only in the Orinoco of Colombia and Venezuela and adjacent parts of Brazil (Altschul 1972; Safford 1916). Archaeological remains of snuffing tubes and trays can definitely be associated with the use of this hallucinogen (Torres et al. 1991). The first scientific report of yopo was given by the explorer Baron von Humboldt, who witnessed the preparation of the snuff on the Rio Orinoco in 1801 (Schultes and Hofmann 1980). The British botanist Spruce in 1851 offered an extremely detailed description of the preparation and use of the drug (*ibid.*). The glossy black beans - five to twenty in each pod - are toasted and pulverized. The powder is then sifted and mixed in equal parts with the alkaline ashes of certain barks or leaves, especially ashes of the bark of a wild member of *Theobroma*, the genus that yields cacao or chocolate (*ibid.*).

A missionary in the Colombian Orinoco wrote in 1560 that the Indians living along the Rio Guaviare "are accustomed to take yopo and tobacco, and the former is a seed or pip of a tree . . . they become drowsy while the devil, in their dreams, shows them all the vanities and corruptions he wishes them to see and which they take to be true revelations in which they believe, even if told they will die" (Schultes and Hofmann 1979). Yopo was so important in pre-Conquest Colombia that Indians of the highlands, where the tree will not grow, acquired the drug in trade from the tropical lowlands.

Yopo snuff is often taken daily as a stimulant, but it is more commonly employed by *payés* ("medicine men") to induce trances and visions and communicate with the *hekula* spirits; to prophesy or divine; to protect the tribe against epidemics of sickness; to make hunters and even their dogs more alert. Yopo is quick acting. It first causes a profuse flow of mucous from the nasal passages and occasionally a noticeable quivering of the muscles, particularly of the arms, and a contorted expression of the face. This period soon gives way to one in which the shamans begin to prance, gesticulating and shrieking violently. This expenditure of energy to frighten away the *hekula* spirits lasts up to an hour. Eventually fully spent, the shamans fall into a trance-like stupor, during which nightmarish hallucinations are experienced.

In the more southerly parts of South America, the Indians prepared a snuff from another species of

Anadenanthera: *A. colubrina* (Califano 1976). It is still employed by Indians in northern Argentina, where it is known as huilca or vilca and cebil (Altschul 1967). There is evidence from native art that vilca was a plant associated in Peru with mythology.

Concluding Remarks

The discovery of plants with psychoactivity must be attributed to millennia of trial and error experimentation with most or all of the plants in the ambient vegetation of native peoples. There can be no other explanation. When the unearthly and inexplicably weird physical and psychic effects of these few plants were experienced, it did not take long for primitive societies to regard them as sacred elements of the flora, and their use eventually fell into the province of the shamans or medicine men who explained their effects as proof that these species were the home of spirits or spiritual forces enabling man through various hallucinations to communicate with ancestors or with spirits in the outer realms.

Thus, most of these powerful members of the vegetal kingdom became the central figures in magico-religious rituals - rituals which have persisted in many regions to the present time. The role of the plants, as archaeological artifacts and other ancient records attest, has changed little with the passage of time. They remain, in effect, what has been called "plants of the gods."

References

Adovasio, J. M. and G. F. Fry (1976) Prehistoric Psychotropic Drug Use in Northeastern Mexico and Trans-Pecos Texas. *Economic Botany* 30: 94-96.

Altschul, S. von R. (1964) A Taxonomic Study of the Genus *Anadenanthera*. *Contrib. Gray Herb.* 193. 3-65.

Schultes, R. E., *Vilca and its Use*. (1967) In: Efron, D.H. (Ed.) *Ethnopharmacologic Search for Psychoactive Drugs*. Washington, D.C., US. Public Health Service Publ. no. 1645, pp. 307-314

Schultes, R. E., *The Genus Anadenanthera in Amerindian Cultures*. (1972) Cambridge, Mass., Botanical Museum, Harvard University.

Anderson, E. F. (1980) *Peyote - the Divine Cactus*. Tucson, University of Arizona Press.

Borhegyi, S. A. (1961) Miniature Mushroom Stones from Guatemala. *American Antiquity* 26: 498-504.

Califano, M. (1976) *El Chamanismo Mataco*. *Scripta Ethnologica* no. 3, pt. 2- 7-60

Campbell, T. N. (1958) Origin of the Mescal Bean Cult. *American Anthropologist* 60: 156-160.

Davis E. W (1983) *Sacred Plants of the San Pedro Cult*. Botanical Museum Leaflets (Harvard University) 29: 367-386

Furst, P. T. (1972) *To Find Our Life: Peyote among the Huichol Indians of Mexico*. In: Furst, P.T. (Ed.) *Flesh of the Gods*. New York, Praeger, pp. 136-184.

Furst, P. T. (1974) *Hallucinogens in Precolumbian Art*. In: King, E.M. and Traylor (Ed.) *Art and Environment in Native America*. Texas Technical University, Special Publications of the Museum, no. 7, pp. 55-102.

Guzmán, H. G. (1959) Sinopsis de los conocimientos sobre los hongos alucioyenos mexicanos. *Boletín Sociedad Botánico de Mexico* 24: 14-34.

Guzmán, H. G. (1977) *Identificación de los Hongos Comestibles y Alucinantes*. Mexico City, Editorial Limusa.

Hale, E. M. (1891) *Ilex cassine, the Aboriginal North American Tea*. U.S.D.A Division of Botany Bulletin 14: 7-22., Washington, D.C., Govt. Printing Office

Hartwich, C. (1911) *Die menschlichen Genussmittel*. Leipzig, Chr. Herm. Tauchnitz.

Heim, R. (1963) *les Champignons toxiques et hallucinogènes*. Paris, N. Boubée et Cie.

Hu, Shiu-Ying (1979) *The Botany of Yaupon*. In: Hudson, C.M. (Ed.) *Black Drink - A Native American Tea*. Athens, University of Georgia Press, pp. 10-39.

la Barre, W. (1938) *The Peyote Cult*. Yale University Publications in Anthropology, no. 19. New Haven, Yale University Press; rev. ed., Shoe String Press, Inc., Hamden, Connecticut (1964).

Lewin, L. (1931) *Phantastica: Narcotic and Stimulating Drugs*. London, Kegan Paul, Trench, Trubner & Co., Ltd.

Moyer, K. H. (1977) *The Mushroom Stones of Mesoamerica*. Ramona, California, Acoma Books.

Meyerhoff, B. G. (1974) *Peyote Hunt. The Sacred Journey of the Huichol Indians*. Ithaca, Cornell University Press.

Milanich, J. T. (1979) *Origins and Prehistoric Distributions of Black Drink and the Ceremonial Shell Drinking Cup*. In: Hudson, C.M. (Ed.) *Black Drink - A Native American Tea*. Athens, University of Georgia Press, pp. 83-119.

Ott, J. and J. Bigwood, (Eds.) (1978) *Teonanacatl. Hallucinogenic Mushrooms of North America*, part I: 5-113. Seattle, Washington, Madrona Publishers.

- Patiño, V. M. (1968) Guayusa, a Neglected Stimulant from the Eastern Andean Foothills. *Economic Botany* 22: 310-316.
- Reko, B. P. (1934) Das mexikanische Rauschgift Ololiuqui. *El Mexico Antiguo* 3, nos. 3-4: 1-7.
- Safford, W. E. (1915) An Aztec Narcotic. *Journal of Heredity* 6: 291-311.
- Safford, W. E. (1916) Identity of Cohoba. *Journal of the Washington Academy of Sciences* 6: 547-562.
- Schultes, R. E. (1937) Peyote (*Lophophora williamsi*) and Plants Confused with It. Botanical Museum Leaflets (Harvard University) 5: 61-88.
- Schultes, R. E. (1938) Peyote - an American Indian Heritage from Mexico. *El Mexico Antiguo* 4, nos. 4-6: 199-208.
- Schultes, R. E. (1939) Plantae Mexicanae II. The Identification of Teonanacatl, a Narcotic Basidiomycete of the Aztecs. Botanical Museum Leaflets (Harvard University) 7: 37-54.
- Schultes, R. E. (1941) . A Contribution to our Knowledge of *Rivea corymbosa*, the Narcotic Ololiuqui of the Aztecs. Cambridge, Mass., Harvard Botanical Museum.
- Schultes, R. E. (1969) Hallucinogens of Plant Origin. *Science* 163: 245-254.
- Schultes, R. E. (1972) *Ilex Guayusa* from 500 AD to the Present. *Etnologiska Studier* 32: 115-138.
- Schultes, R. E. (1979) Discovery of an Ancient Guayusa Plantation in Colombia. Botanical Museum Leaflets (Harvard University) 27: 143-153.
- Schultes, R. E. and A. Bright (1979) Ancient Gold Pectorals from Colombia: Mushroom Effigies? Botanical Museum Leaflets (Harvard University) 27:113-141. Reprinted in *Sweat of the Sun, Tears of the Moon: Gold and Emerald Treasures of Colombia*. Natural History Museum of Los Angeles County, Los Angeles: 37-43 (1981)
- Schultes, R. E. and A. Hofmann (1979) Plants of the Gods - Origins of Hallucinogenic Use. New York, McGraw-Hill Book Co.
- Schultes, R. E. and A. Hofmann (1980) The Botany and Chemistry of Hallucinogens. 2nd ed., Springfield, Illinois, Charles C. Thomas.
- Sharon, D. (1972) The San Pedro Cactus in Peruvian Folk Healing. In: Furst P.T. (Ed.) *Flesh of the Gods: the Ritual Use of Hallucinogens*. New York, Praeger, pp. 114-135.
- Singer, H. (1958) Mycological Investigations on Teonanacatl, the Mexican Hallucinogenic Mushroom. Part 1. The History of Teonanacatl, Field Work and Culture Work. *Mycologia* 50: 239-261.
- Torres, Constantino M.; Repke, D.; Chan, K.; McKenna, D.; Llagostera, A. and Schultes, R. E. (1991) Snuff powders from Pre-Hispanic San Pedro de Atacama: Chemical and contextual analysis. *Current Anthropology*, vol. 32, no. 5: 640-640.
- Wasson, R. G. (1980) The Wondrous Mushroom: Mycolatry in Mesoamerica. New York, McGraw Hill Book Co.
- Wasson, R.G. (1963) Notes on the Present Status of Ololiuqui and the other Hallucinogens of Mexico. Botanical Museum Leaflets (Harvard University) 20: 161-193.
- Wasson, R.G. (1972) The Divine Mushroom of Immortality. In: Furst, P.T. (Ed.) *Flesh of the Gods - the Ritual Use of Hallucinogens*. New York, Praeger, pp. 185-200.
- Wasson, R.G. (1973) The Role of 'Flowers' in Nahuatl Culture, a Suggested Interpretation. Botanical Museum Leaflet (Harvard University) 23: 305-324.
- Wasson, R. G., G. and F. Cowan, and W. Rhodes. (1974) *Maria Sabina and the Mushroom Velada*. New York, Harcourt Brace Jovanovich.
- Wasson, V. P. and R.G. Wasson (1957) *Mushrooms, Russia and History*. New York, Pantheon.

This article was adapted from an earlier publication that appeared in "Integration 5", in Autumn 1994.