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Magic Plants

Rainer W. Bussmann

Abstract More than 20,000 of the about 400,000 known vascular plants are known for their medicinal use. A very small number of medicinal plants contain compounds that alter the function of the human mind. Although entering Western culture mostly since the 1960s, “magic” plants have been part of traditional medicine for millennia. Most of these hallucinogens are derived from plants. Interestingly, New World cultures have always been known to employ more magic plants than their counterparts on the Old World, although botanical diversity does not provide a conclusive explanation to this phenomenon. Hallucinogenic plants are traditionally used to induce altered perceptions, and ultimately mystic/religious experiences, and contact to the spirit world. In addition, such plants are often employed in traditional healing, to divine the type of illness and the needed remedy, as well as to put patients at ease to allow for a better diagnosis. The present chapter attempts a very short introduction into the world of “magic plants.”

Introduction

In many societies, the use of magic plants dates back millennia. Such plants are most prominently known to be used for mind-altering purposes; however, in many societies, “magic” plants are also very frequently employed to cleanse patients (e.g., [Albuquerque et al. 2007](#); [Bussmann and Sharon 2006](#)). In Western cultures, the present use of magic plants dates mostly back to the 1960s and focuses almost entirely on their hallucinogenic properties. The latter has led to a plethora of detailed publications on the subject ([Schultes and Hofmann 1992](#)).

The most common hypothesis on the discovery of magic plants is that, while ingesting plants for food and medicine, humans found that some species had profound mental effects and caused visions, allowing transgressing reality. These effects are generally visual, but some hallucinogens can also involve other senses.

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The active principle in most magic plants are alkaloids—nitrogen-containing compounds essentially derived from the amino acid tryptophan. The compounds causing such effects most likely evolved as protective compounds in plants, essentially in defense against being eaten by animals. All magic and hallucinogenic compounds are organic, i.e., contain carbon atoms, and most of them also contain nitrogen. The latter are classified as alkaloids, a large and very diverse group, and thousands of different types have been found. Alkaloids are only found in plants, and their name simply indicates that they react slightly alkaline. Many alkaloids are derived from the amino acid tryptophan and are classified as indoles. Many medicinal plants, as well as species used as stimulants, are active due to their alkaline content. Coffee (*Coffea arabica* and *C. canephora*), for example, contains the alkaloid caffeine; other examples are tea (*Camellia sinensis*), which contains L-theanine, theanine, and theine, cocoa (*Theobroma cacao*), which contains theobromine, and tobacco (*Nicotiana tabacum* and *N. rustica*), which contain nicotine. Well-known medicinal species include opium poppy (*Papaver somniferum*) that yields morphine and derivatives and the fever tree (*Cinchona officinalis*) used to produce quinine for the treatment of malaria.

Many hallucinogenic species, for example, *Anadenanthera* and *Viola*, however contain *N-N*-dimethyltryptamine (DMT) and closely related compounds, which are structural analogues to serotonin and melatonin in the human brain, which easily explains their psychotropic effects. Most of these compounds are easily broken down in the digestive tract, which is why they are traditionally snorted or ingested with other plant additives that contain beta-carbolines, especially harmaline and harmine, that block monoamine oxidase, the enzyme that breaks down tryptamines. In South America, these plants are collectively known as “ayahuasca,” but the same compounds are also found in *Peganum harmala* (Syrian rue), which is found in the Middle East and Central Asia (Schultes and Raffauf 1992). The most important DMT-containing plants are species of *Viola* and *Anadenanthera*. The use of *Anadenanthera* (huilco) as hallucinogen in South America is documented archaeologically for at least 3000 years, and many place names, e.g., “Vilcabamba,” derived from “huilco-pampa,” i.e., “plain of the huilco tree,” refer to this use. Other important hallucinogenic alkaloids include psilocybin, found in “magic mushrooms,” and mescaline, only known from psychotropic cacti like *Echinopsis pachanoi* (San Pedro cactus) and *Lophophora williamsii* (peyote) (Schultes and Hofmann 1992).

The most important psychoactive non-nitrogen compounds are cannabinoids, e.g., THC and CBD, the active ingredients in marijuana, derived from *Cannabis sativa* and *C. indica*. *Cannabis* is probably the most popular psychotropic species but is now also widely used medicinally and for that purpose legal in many countries.

The use of hallucinogenic has always had profound meaning in traditional uses. They are employed to diagnose and treat illness, help to divine the future in normal life, and allow deciding on when to plant and hunt, on peace and war, and are used to manage relations among individuals as well as between different villages.

Many hallucinogens are used in initiation ceremonies that mark the transition from adolescence to adulthood and often literally take the initiates into a zone between death and rebirth and are highly dangerous. Native North Americans,

e.g., the Algonquin, used Jimson weed (*Datura stramonium*, wysocan) that caused profound memory loss over a period of time. In West Africa, iboga (*Tabernanthe iboga*) serves the same purpose, while in Amazonian South America, ayahuasca (mostly from *Banisteriopsis caapi* and *Psychotria viridis*) is used. Both ayahuasca and preparations of *Datura* and *Brugmansia* are widely used for divination, prophecy, and healing rituals (Schultes and Raffauf 1998).

Magic Plants in Northern Peru: A Case Study

A great example for the traditional use of hallucinogens is the north coast of Peru. The use of sacred psychoactive plants (entheogens), in particular the San Pedro cactus (*Echinopsis pachanoi*), is a vital component in Andean healing practices and has been around for millennia (Camino 1992; Polia 1988; Sharon 1978). Archaeological evidence for this sacred cactus has been found at Guitarrero Cave (8200–6800 B.C.) in the highlands of Peru (Lynch 1980) and Garagay (1643–879 B.C.) on the central coast (Burger 1992). The San Pedro cactus is frequently depicted in Cupisnique, Chavín, Moche, Nazca, and Lambayeque iconography (Glass-Coffin et al. 2004). At Chavín, Torres (2008) has also identified *Anadenanthera* (vilca, cebil), *Brugmansia* (borrachero, floripondio, misha), *Nicotiana* (tobacco), and *Erythroxylum* (coca) in the religious iconography of the site. Early ethnobotanically oriented studies focused mainly on the famous “magical” and “mind-altering” flora of Peru. A first study on “cimora”—another vernacular name for the San Pedro cactus—dates back to the 1940s (Cruz Sánchez 1948). The first detailed study of a hallucinogen in Peru focused on the San Pedro cactus (*Echinopsis pachanoi*) (Dobkin de Rios 1968, 1969). A variety of works including some on the “daturas” (*Brugmansia* spp.) followed (Bristol 1969; Dobkin de Rios 1977; Dobkin de Rios and Cardenas 1980). Coca (*Erythroxylum coca*) also attracted early scientific attention (Martin 1970; Naranjo 1981; Plowman 1984a, b) as did the Amazonian ayahuasca (*Banisteriopsis caapi*) (Rivier and Lindgren 1972; McKenna et al. 1986; Schultes and Raffauf 1992; Bianchi and Samorini 1993). More comprehensive accounts followed (Cabieses Molina 1990; Schultes and Hofmann 1992).

Five hundred years of suppression of traditional healing practices starting in colonial times and continuing to manifest in the prejudices of contemporary national administrations have not managed to destroy this tradition. The use of San Pedro cactus, together with additives like angel’s trumpet (*Brugmansia* spp.) and tobacco (*Nicotiana tabacum* and *Nicotiana rústica*), is still a central part of the curing ceremonies of healers in Northern Peru. Healers are in fact experimenting with what for them are new hallucinogens, with some northern *curanderos* including decoctions of ayahuasca (*Banisteriopsis caapi*) in their rituals (Bussmann and Sharon 2009a).

Healing altars (*mesas*) in Northern Peru often follow the old tradition by including all kinds of “power objects,” frequently with a “pagan” background. Objects such as seashells, pre-Hispanic ceramics, staffs, stones, etc., are very common on Peruvian

mesas and are blended with Christian symbols such as crosses and images of saints. As also found in other studies (Albuquerque et al. 2007), patients are often cleansed by spraying them with holy water and perfumes, and herbal baths or “spiritual flowerings” (*baños de florecimiento*) are very important components of the healing tradition. In most cases, the cleansing of the patients involves the nasal ingestion of tobacco juice and perfumes. While the incantations and songs (*tarjos*) used by healers during their curing sessions include Christian components, e.g., the invocation of Christ, the Virgin Mary, and any number of saints, references to Andean cosmology, e.g., to the sacred lagoons (*lagunas*) and mountain spirits (*apus*), are very common as well. The use of guinea pigs as diagnostic instruments is standard (Bussmann and Sharon 2007).

Magic Plants in a Global World

There is no standard way hallucinogenic preparations are traditionally ingested. In some cases, plants might simply be eaten, either fresh or dry, such as peyote or magic mushrooms. More often, a concoction is prepared and drunk, as in ayahuasca, preparations of San Pedro cactus and *Datura*, or tobacco. In particular in Northern Andean culture, liquid preparations of San Pedro cactus, tobacco, and *Brugmansia* are often inhaled through the nose, thus potentiating the effect. Most of these hallucinogens have a long-lasting effect—from a whole night curing session to various days. The use of *Brugmansia* and *Datura* is so dangerous, however, that in traditional context, these plants are only employed in particularly serious cases of illness and divination. In contrast, DMT-containing hallucinogens derived from *Virola* and *Anadenanthera* are almost entirely snuffed, as a simple way to avoid the need to also ingest a MAO inhibitor (Bussmann and Sharon 2006; Bussmann et al. 2010).

Interestingly, there are clear differences in hallucinogen use between the Old and the New World—the floras of both regions have a large number of plants potentially containing psychotropic compounds, but only about 20 species of hallucinogenic plants are used in the Old World, compared to over 100 in the New World.

Eastern psychotropic plants include *Cannabis* sp. (marijuana) in Asia and various members of the nightshade family (Solanaceae), such as *Atropa belladonna* (belladonna), *Solanum nigrum* (nightshade), *Mandragora officinalis* (mandrake), and *Hyoscyamus niger* (henbane), mostly known from “witch balms,” in Europe. Fly agaric mushrooms (*Amanita muscaria*) were widely used in shamanism in Siberia and Northern Europe, while African hallucinogenic use mostly centered on iboga and *Datura* sp.

In great contrast, hallucinogenic use in the Western hemisphere seems to be much more widespread. Cultures in North America used relatively few hallucinogens, especially *Datura* sp., *Sophora* sp. (mescal beans), and *Lophophora williamsii* (peyote), which spread to the north from Mexico only in the second half of the nineteenth century. In Mexico itself, the use of mushrooms (*Psilocybe* sp., *Panaeolus* sp.) is particularly noteworthy. Other commonly used species are *Salvia divinorum*

(divine sage) and *Turbina corymbosa* (morning glory). In the latter case, the seeds are the plant part used. However, recent studies indicate that the effective alkaloids (*psilocybin* and derivatives) are in fact not the product of the plant itself but produced by endophytic fungi colonizing the plant. In Andean culture, *Echinopsis pachanoi*, *Nicotiana rustica*, and *Brugmansia* sp. are still the most widely used psychotropic plants, while the use of *Anadenanthera* sp. essentially disappeared already in pre-Columbian times. Similarly, the use of *Guarea* sp. (ulluchu) as hallucinogen is only reported in a short period in Moche culture (Bussmann and Sharon 2009b). In the Amazon, the most widely used hallucinogenic mixture is ayahuasca (yage, caapi), employing most often a mixture of *Banisteriopsis caapi* (with MAO-inhibiting) compounds and *Psychotria viridis* (as DMT source). Depending on the region, dozens of other species are employed to substitute for one or both of these species. In some small areas, snuffs derived from *Virola* sp. and *Anadenanthera colubrina* are used.

In Western society, the use of psychotropic plants has become more common since the 1960s, mostly as a tool to achieve “enlightenment” or simply as recreational activity. This use however occurs mostly without any traditional context that would help to mediate unexpected and possibly dangerous side effects and thus has nothing to do with the traditional use regarded as sacred in many areas of the world.

Conclusions

Interestingly, but not surprising, the sanctioned stimulants of contemporary Western society, e.g., coffee, tea, and tobacco, are all geared toward making people work longer and more efficiently or are, such as alcohol, used as a rather sloppy way to relieve stress. Compounds that lead to longer intoxications, or allow for more mystic experiences, are outlawed for societal and religious reasons, because they do not fit the traditional Calvinist-capitalist model. Which species should be controlled and/or prohibited is of course also a matter of debate, but it is interesting to note that *Cannabis* is generally a controlled substance, while *Datura* sp. and *Brugmansia* sp., all of which are much more lethal in often very small dosages, are freely available in horticulture.

However, the use of psychotropic plants in nontraditional context and for recreation clearly remains problematic. None of the plants mentioned, when used traditionally, provide anything of a “pleasant” experience. All are employed to profoundly purify both patients and healers, and nausea and vomiting are some of the lesser side effects. The use of hallucinogenic plants is, in a traditional context, always tightly controlled by a healer or shaman and covered by taboos. Nonexpert use of such plants or nontraditional mixtures of hallucinogens, as often employed by self-designated “shamans” catering to “enlightenment tourists,” especially in South America (Fig. 1), is irresponsible, highly controversial, and very dangerous, leading to frequent cases of poisoning and sometimes death.

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