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Abstract

Therapeutic applications of the psychedelics or hallucinogens found cross-culturally involve treatment of a variety of physical, psychological, and social maladies. Modern medicine has similarly found that a range of conditions may be successfully treated with these agents. The ability to treat a wide variety of conditions derives from variation in active ingredients, doses and modes of application, and factors of set and setting manipulated in ritual. Similarities in effects reported cross-culturally reflect biological mechanisms, while success in the treatment of a variety of specific psychological conditions points to the importance of ritual in eliciting their effects. Similar bases involve action on the serotonin and dopamine neurotransmitter systems that can be characterized as psychointegration: an elevation of ancient brain processes.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 1/21

Chapter 1
Therapeutic Applications of Ayahuasca and Other Sacred Medicines

Michael J. Winkelman

Abstract Therapeutic applications of the psychedelics or hallucinogens found cross-culturally involve treatment of a variety of physical, psychological, and social maladies. Modern medicine has similarly found that a range of conditions may be successfully treated with these agents. The ability to treat a wide variety of conditions derives from variation in active ingredients, doses and modes of application, and factors of set and setting manipulated in ritual. Similarities in effects reported cross-culturally reflect biological mechanisms, while success in the treatment of a variety of specific psychological conditions points to the importance of ritual in eliciting their effects. Similar bases involve action on the serotonin and dopamine neurotransmitter systems that can be characterized as psychointegration: an elevation of ancient brain processes.

Therapeutic Application of Sacred Medicines in the Premodern and Modern World

Societies worldwide have discovered therapeutic applications of psychoactive plants, often referred to as sacred medicines, particularly those called psychedelics or hallucinogens. Hundreds of species of such plants and fungi were used for

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Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 2/21

medicinal and religious purposes (see Schultes et al. 1992; Rätsch 2005), as well as for a variety of psychological and social conditions, culture-bound syndromes, and a range of physical diseases (see Schultes and Winkelman 1996). This review illustrates the range of uses and the diverse potential of these substances for addressing human maladies. The ethnographic data on indigenous uses of these substances, combined with a brief overview of some of the modern medical studies, illustrate that a wide range of effects are obtained with these plants. These cultural therapies involve both pharmacological and ritual manipulations. Highly developed healing traditions selectively utilized different species of the same genus, different preparation methods and doses, varying admixtures, and a variety of ritual and psychotherapeutic processes to obtain specific desired effects. The wide range of uses of these plants suggests that they can contribute new active ingredients for modern medicine, particularly in psychiatry.

As was illustrated by our illustrious contributors to *Psychedelic Medicine* (Winkelman and Roberts 2007a, b), there are a number of areas in which psychedelics have been established in treating what have been considered intractable health problems. While double-blind clinical trials have been sparse (but see Griffiths et al. 2006), this is not due to the lack of evidence for efficacy, but rather the administrative prohibitions that have drastically restricted clinical research. Nonetheless, using the criteria of phases of clinical evaluation, Winkelman and Roberts (2007c) concluded that there is at least Phase II[1] evidence for the effectiveness of most of these psychedelics, supporting the continuation of more advanced trials. Furthermore, their success with the often intractable maladies, ranging from depression and cluster headaches to Post Traumatic Stress Disorder (PTSD), Obsessive-Compulsive Disorders, wasting syndromes, and addictions justifies their immediate use with these desperate patient populations. In addition, the wide variety of therapeutic uses found for these substances in cultures around the world suggest the potential for far greater applications.

Therapeutic Uses of Psilocybin-containing "Magic Mushrooms"

The Aztecs called these fungi *teonanacatl*, meaning "food of the gods"; there is evidence of the use of psilocybin-containing mushrooms from many different genera in ritual healing practices in cultures around the world and deep in prehistory (see Rätsch 2005). One of the best documented therapeutic uses of psilocybin involves Maria Sabina, the Mazatec "Wise One" (Estrada 1981). Several different *Psilocybe* species are used by the Mazatec, as well as mushrooms of the

[1] Phase II studies or trials use small groups of selected patients to determine effectiveness and ideal doses for a specific illness after Phase I trials have established safety (lack of toxicity) and safe dose ranges.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 3/21

Conocybe genera. In addition, other psychoactive plants are also employed, including *Salvia divinorum* Epl. and tobacco (*Nicotiana rustica* L., Solanaceae).

Maria Sabina's life and practice illustrates typical shamanic features in the role of the mushrooms in selection and training. Mazatec shamans typically are self-initiated after being taught directly by the mushrooms. Maria Sabina discovered the "saintly children" alone in the forests as a starving child and ate them for sustenance; she encountered spirits in her experiences which taught her how to become a "wise one" (*sabia*) and heal. The wisdom and the ability to heal come from the "language of the mushrooms," which is central in the training and provides the means to diagnose and heal.

The mushrooms are ingested during an all-night vigil which is held in a house removed from other dwellings. The ingestion of the mushrooms by the healer and sometimes the patient permits diagnosis of the condition and guidance of the treatment. Patients seek remedies to illness, solutions to problems, to determine the possibility of recovery, to find lost animals or other objects of value, or to determine the condition of separated family members or loved ones. The healer's visions reveal the origin of the malady, wounds of the spirit, hexes, or how to recover the soul or spirit of the person that has been robbed or lost. The healer deals with illness caused by human enemies, as well as illness caused by malevolent spirits, driving them from the body. She calms the quarrels and disputes that disrupt the household, clears away bad air, purifies, undoes witchcraft, and restores peace. Cures are also directed to physical problems—to cure sick children, fever, chills, yellow skin, toothache, pimples, and physical pains—but with causes identified at the spiritual level.

Those participating in the ceremonies must maintain certain prohibitions, including fasting from breakfast on, no eggs or alcohol consumption for 4 days, and also no sexual acts for 4 days before and after the ceremony. Pregnant women are excluded from the ritual. Roman Catholic elements are incorporated into the indigenous Mazatec practices including, praying to Christ, Mary, and the saints while the mushrooms, the "saintly children," are cleansed in the smoke of copal incense. The mushrooms are generally eaten raw, accompanied with a cup of chocolate, and may be ground to release the juice, which is then drunk. Sometimes tobacco, mixed with lime and garlic, is rubbed on the arms of the sick person or placed in the mouth.

The healing ceremony involves chanting, whistling, humming, percussive artistry, ventriloquistic effects, and dancing by the healer; first in pitch darkness, and later by candlelight. The healer chants monophonically most of the night and sometimes hums. Saints are evoked, herbal remedies advised, pilgrimages directed, evil influences commanded to leave, and healing energies directed to the patient. The patients themselves experience visions, often of a terrifying and overpowering nature. Their vomiting, crying, and other emotional reactions reflect the cathartic nature of their experiences. Although the principal stated means of curing are the mushrooms and the chants, other therapeutic modalities are combined in the ceremony. Maria Sabina used the mushroom language in singing and chanting, percussive utterances, alliteration, and repetition of grammatical

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 4/21

structures as part of the healing ritual. The chants' content suggests they also play a therapeutic role in establishing attitudinal postures and in encouraging positive motivation and expectation. The healer's performance indicates the enactment of roles that produce cathartic experiences in the patients.

Modern Medicinal Applications of Psilocybin

The use of psilocybin mushrooms in the successful treatment of the notorious cluster headaches has been documented by Sewell and Halpern (2007). The treatment of this condition was accidentally discovered by some of the victims of these headaches, who also noted the effectiveness of psilocybin and Lysergic acid diethylamide (LSD) and shared their experiences online and eventually in conferences. In the case of cluster headaches, we see the clear ethical and moral necessity of supplying patients with these substances because of the virtually untreatable nature of this condition within biomedicine, and the desperate situation of the patients, illustrated by the other name of this ailment: suicide headaches. The research of Moreno and Delgado (2007) on "Psilocybin Treatment of Obsessive-Compulsive Disorder" illustrates another area where these ancient medicines offer promise for conditions that are often not effectively treated by conventional biomedical remedies. Grob (2007) and Grob et al. (2011, 2013) has researched psilocybin's applications in treating problems associated with terminal cancer, such as existential anxiety, despair, and fear often encountered by dying patients and their families. The spirituality-inducing effects of these substances go beyond conventional psychotherapies to facilitate core psychological processes involved in end-of-life issues. These studies demonstrate that psilocybin has the capacity to facilitate the emergence of experiences of spiritual transcendence that have powerful therapeutic impact and enhance emotional well-being.

We should not, however, leave these profound psychological impacts for the end of life. Roland Griffiths and colleagues have provided an impressive series of publications (e.g., see Griffiths et al. (2006) on psilocybin that indicate that they not only induced mystical experiences but also long-term personality changes. Griffiths et al. (2006) carefully designed double-blind study showed that psilocybin has effects on participants' attitudes, moods, and experiences of spirituality that persist for months. In addition to significantly higher ratings on the scales used to assess mysticism, internal and external unity, sacredness, transcendence of time and space, ineffability, and experiences of oceanic boundlessness, the psilocybin sessions had significantly higher levels of positive mood, peace, harmony, joy, and intense happiness. There were lasting effects noted from the psilocybin experiences, including an enhanced positive attitude about life and themselves and positive altruistic social behaviors noted by third-party community observers. These effects point to the broader social implications of these substances as therapeutic agents.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 5/21

The Mescaline-Containing Cactaceae: Peyote (*Lophophora williamsii*) and San Pedro (*Trichocereus* spp.)

A number of different genera of the Cactaceae family are used in healing practices (see Schultes et al. 1992). The most important of these psychoactive Cactaceae are: peyote (*Lophophora williamsii*), the plant used in ancient Mexico and found today in the deserts of northern Mexico and across the Rio Grande in Texas; and the *Trichocereus* genus, particularly *Trichocereus pachanoi*, a cactus used for thousands of years in Peru and in mestizo traditions today (Sharon 1978; Joralmon and Sharon 1983). There are many alkaloids in these cacti, with the principal active ingredient being mescaline.

Peyote is the sacrament of the "Peyote Religion" or Native American Church (NAC), an organization founded more than 100 years ago in the wake of the complete domination of the indigenous peoples of North America. The peyote traditions were transferred from indigenous peoples of Mexico and given a new ritual format that blended the symbols of Christianity with indigenous beliefs. Aberle (1966) characterized the Peyote Religion as serving many different purposes, including religious, miraculous curing, transcendence, self-knowledge, incentive to work, release from guilt, and temperance from alcohol. In most cases, the initial recourse to peyote was for curing, and people stayed to maintain good health and mind, for:

> relief from feelings of aimlessness and helplessness, to overcome misfortunes, for future guidance and future good fortune, to access knowledge about causes of illness or misfortune, to foretell future occurrences, and to provide security against witches and ghosts. And so peyotism appeals to the person who seeks only a cure after crises, to the disorganized and unhappy, to the alienated and marginal, to the philosopher, to the mystic, and to the person who seeks guidance and a sense of purpose and sustaining motive (Aberle 1966, p. 194).

Modern Medicinal Perspectives on Peyote's Therapeutic Effectiveness

Therapeutic effects of peyote are widely attested to not only by Native American users, but also by anthropologists, social workers, addictions counselors, and physicians who have observed the effects of this sacred medicine. While further research is needed on specific physiological mechanisms of peyote, evidence exists regarding its relative safety and effectiveness (see Halpern et al. 2005; Halpern 1996). Evidence of acceptance equivalent to Phase III[2]—approved therapeutic

[2] Phase III studies use clinical trials, ideally with randomized controls, to confirm effectiveness, monitor adverse drug effects and interactions, and/or to compare to other commonly used treatments.

use—is found in the practice of the Indian Health Service, a branch of the U.S. Federal Government, of providing reimbursement for road men who use peyote for treatment of alcoholism among Native Americans (see Calabrese 2007).

The NAC has many effects on social, psychological, and emotional well-being. Aberle points to the ability of peyote to induce a sense of connection with the spiritual world that was lost by many Native American individuals and groups in their forcible assimilation to European-American culture. The significance of spiritual experiences for rehabilitation of the addicted self has been noted in many therapeutic traditions, and may be particularly relevant for Native American groups deprived of their own spiritual traditions. The psychiatrist Jilek (1994) conveys the peyotists' perspective that the peyote ritual combats alcoholism by reducing physical and mental stress and enhancing mental and physical strength through contact with the supernatural. A widely noted effect involves management of cultural alienation experienced by young Native Americans, providing a context for a ritual death and rebirth and construction of a positive identification with one's culture. Peyotism provides internal peace and harmony instead of competition and conflict, and a reference group of close relations who meet needs for approval and esteem. Peyotism offers status, an assertion of self-worth, and a means of countering the effects of prejudice by providing validation of their separate identity. Peyotism is able to provide an alternative because it rejects dominant society values of acculturation and assimilation and the emphasis on materialism. The Peyote Church has been credited as an important factor towards the control of alcoholism amongst the participants.

Calabrese (1997, 2007, 2013) describes the Peyote Way as a cultural psychiatry involving "meaning-manipulative" therapies engaging social and intrapsychic processes. He characterizes peyote as a "desematicizing" agent that facilitates a reinterpretation of self. The cultural psychosocial therapies of the Native American Church treat alcoholism through a process of emplotment of their lives, a reintegration of the self into cultural patterns. These processes of meaning making take a significant role in the process of overcoming addictions; a recreation of the self in spiritual terms. Calabrese (1997, pp. 238–239) characterizes the effects in terms of a "social manipulation of consciousness states and symbols to support socially valued patterns of ritual experience, self-awareness, and emotional control… [rendering] adults more suggestible and thus more open to education and mental health interventions." In this sense, peyote rituals heal by shaping consciousness in ways that facilitate symbolic healing processes.

Ayahuasca: The Enigmatic Combination

The current international widespread use of ayahuasca reflects not only the wide range of its indigenous use across the Amazon Basin, but also the many modern adaptations in spiritual healing practices and organized churches. Medicinal and religious use of ayahuasca was widespread among hundreds of indigenous groups

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 7/21

of South America, and provided the source for numerous urban adaptations in the mestizo populations, where the plant preparations are employed for sorcery, healing, and prophecy, as well as more mainstream religious purposes such as in the União do Vegetal and Santo Daime churches. Luna (1986) points to the widespread premodern use of ayahuasca for dealing with all aspects of life. The widespread use of ayahuasca may reflect some special properties derived from its enigmatic nature based in an unlikely combination of two plants: the *Banisteriopsis* vine, which provides a MAO inhibitor that allows the principal active ingredient, N,N-Dimethyltryptamine (DMT), from other plants (normally *Psychotria viridis* or *Diplopterys cabrerana*) to be active via oral administration. In addition, other plants were commonly added in prehistoric and premodern practices. McKenna et al. (1995) report more than 50 genera of plants that are added to the basic ayahuasca mixture as biodynamic constituents intended to have additional effects. Consequently a wide range of effects is reported, also varying as a function of mode of preparation, dosage, setting, and ceremonial processes.

Shamanic Training

Ayahuasca is used in the training of healers. Traditional training (see Luna 1986) requires extensive food restrictions and sexual abstinence and segregation from virtually all contact with women. Dietary prohibitions of alcohol, pork, chicken, fats, salt, sugar, condiments, fruit, vegetables and cold beverages are widely reported. Plantains, smoked fish, and some jungle animals, occasionally augmented by rice and manioc, constitute the preferred diet. In traditional practice, the violations of these prohibitions are believed to cause illness or even death. Diet is viewed as a tool to help maintain the altered state of consciousness that permits the plant teachers to instruct, provide knowledge, and enable the initiate to acquire their power. The diet is viewed as a means of making the mind operate differently, providing access to wisdom and lucid dreams. The training period involves learning songs, chants, and medicinal recipes and enhancing the trainees' artistic and intellectual skills. The spirit-taught magical chants and songs which are central to the ayahuasquero's learning about the plant-teacher spirits and their powers. The chants learned serve many purposes: calling souls and spirits, affecting the actions of the ayahuasca or specific plant teachers, curing specific illnesses, and in love magic. In the practice of healing, ayahuasca is ingested along with tobacco juice in order to enable the healer to see into the patient's body and diagnose the cause of illness. In the visionary state, the healer can locate illness-causing darts within the patient's body and then suck them out. The visions also enable the healer to see the individual responsible for causing the patient's illness.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 8/21

Premodern Amazonian Patterns of Ayahuasca Use

Andritzky (1989) notes two premodern Amazonian patterns of ayahuasca use, one involving the communal consumption by adult group members, and the other the ingestion by the healer in treatments of individual clients. When consumed in a group context, the consumption and intents are an individual issue, with no group leader or formal ceremony. Participants chant their own songs independently, without any coordination of the rhythm of the different chanters. The group context, including physical contact among the participants, is an important part of the modulation of the experiences. But each participant has their own focus of attention, a personal experience and search for knowledge or information of importance to the individual. Andritzky (1989) suggests that such ingestion by the adult members of the community strengthens social cohesion and identity. In individual healing sessions, the healers ingest ayahuasca, while the patients usually refrain. However, the interaction between healer and patient, as well as other ritual factors, serve to evoke visions and personal unconscious material in the patient. Andritzky suggests that the ayahuasqueros help people deal with the problems of acculturation. Their rituals mediate between the Euro-American and indigenous worlds, creating a synthesis of the traditional and the new through the use of emotionally relevant images of culture change from the indigenous point of view. The treatment and practices are a method of symbolic confrontation with psycho and sociotherapeutic effects. Ayahuasca apparently gives the user conscious access to the process of symbolization, with the effects shaped by songs, stories, and mythological worlds that structure visions. These prepare the patients for the experiences, and enable them to assimilate effects through collective motifs, rather than be flooded with unconscious personal material. The use of stories and their interpretations allow the healer to control the level of anxiety and the depth of regression of the individual. These and other factors contribute to the powerful set and setting effects that characterize experiences induced by ayahuasca.

Ayahuasca Among Contemporary Peruvian Vegetalistas

Dobkin de Rios (1992) summarizes uses of ayahuasca among Peruvian vegetalistas as including: acquiring protective spirits; determining the causes and cures of diseases; prophesizing the future; determining if wives were unfaithful; sending messages to other groups; discovering enemies and their plans; and in preparation for war or hunting expeditions. The illnesses treated are diverse, but those characterized as magical illnesses and culture-bound syndromes include: *susto* (fear), caused by an intense experience of fear interpreted as causing the loss of the person's soul; *dano* (harm), caused by sorcery of others who have feelings of envy or desire for vengeance; *mal de ojo* (evil eye), caused by envy, evil intentions or a glance; and *pulsario*, a painful abdominal ball believed to be caused by repressed

emotions such as anger or sorrow. Dysfunctions in social or sexual relations, emotional problems, dependences and excesses, bad luck, as well as psychological, somatic and physical problems are also treated.

Dobkin de Rios also discusses urban adaptations of Peruvian vegetalistas to diagnose the cause of illness through analysis of the visionary experiences. The ayahuasquero channels the experiences through chants and whistling, which are followed by periods of silence alternated with chanting. These visions might reveal causes embodied in animal forms, the hate felt by others toward the patient, or a person carrying out harmful rituals against the patient. The determination of the cause then permits the ayahuasquero to effect a cure through neutralizing the influences which caused the illness. These treatments normally include many of the widely practiced healing techniques found throughout the Amazon Basin and many other parts of the world: singing, chanting, recitations, whistling, blowing smoke, and sucking on afflicted parts of the patient's body. The next morning as the effects fade, discussion and commentary about the experiences ensue. Sessions may be repeated several times over the next month or so, but there is very little or no follow-up by the ayahuasqueros.

My own recent unpublished research[3] reveals that the contemporary Peruvian neoayahuasquero practitioners conceptualize ayahuasca as a sacrament that has the ability to address physical, emotional, psychological, and spiritual conditions. Among the varied conceptions of the healing or "whole-ing" provided by ayahuasca is that it can heal the soul, the body, and past trauma. Ayahuasca is often seen as opening the heart, expanding love for others, and leading to healing of both self and relationships. Ingesting the brew is seen as expanding awareness, healing the personality, and providing the insight and energies to restore personal relations. The effects also enable people to better deal with anticipating their own death and dying, as well as that of their loved ones, and the grieving processes. Ayahuasca sometimes produces a radical rebirth that changes one's life for the better, helping people find their own true path with divine purpose. Using this sacrament is generally seen as opening one's mind to new possibilities, changing beliefs, particularly moving beyond the self-limiting beliefs regarding self and reality, and expanding one's understanding of life, God, and the universe. Some spoke of ayahuasca as putting one in touch with the god within and one's true self; opening the heart to spiritual healing. Others characterized ayahuasca as enabling the participants to control their own spiritual energies and integrate with the divine, mirroring God in their own lives; some specifically characterized the effects of ayahuasca as helping to establish a connection with Jesus. Ayahuasca is also seen as providing collective spiritual experiences and an experience of the divine. It may be used to create a communal connection while celebrating the cycles of the cosmos and nature, with special ceremonies to mark the cycles of the seasons, the

[3] This research was carried out in the Tarapoto and Iquitos areas of the Peruvian Amazon during May and June 2012 as part of services for a Peruvian neoayahuasquero evaluating contemporary practices and the nature of the clients in his retreats.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 10/21

end of the year, and the full moons. The connection with a community of others is a significant feature of the ayahuasca experience, one that also elicits a sense of the need for service to others.

Western Ayahuasca Pilgrimages

The Western practice of pilgrimage to foreign sites for ayahuasca rituals is a relatively new phenomenon (see Foutiou 2010; Winkelman 2005), developing in the last few decades as knowledge about these ancient spiritual practices entered into the postmodern world. Foutiou's research on the globalization of ayahuasca practices in Peru involves what she calls "shamanic tourism," which is similar to other contemporary pilgrimages. This Western search for ayahuasca is not a pretext for drug abuse, but rather a spiritual quest that addresses an urgent need for self-transformation regarding fundamental religious and existential concerns. Foutiou characterizes this as an intercultural exchange that enables Westerners to adopt shamanic discourse, a view espoused by many contemporary sacred healers. These ayahuasca tourists seek self-exploration and spiritual growth, as well as physical and emotional healing. Ayahuasca is particularly attractive because it addresses both the spiritual component of healing as well as the physical diseases that result from a spiritual disconnect from nature, spirit, and other humans. Ayahuasca experiences are appealing to Westerners because they offer direct access to the spiritual and the "divine within," a more direct path to the divine than offered by their own religions, and a process of healing that is also part of a larger project for transforming humanity.

In one study (Winkelman 2005), participants in a retreat in Amazonia were queried in open-ended questions regarding their motivations for attending the retreat and their experience in the sessions. In contrast to the notion of ayahuasca use involving some form of drug use, only one respondent spoke of what might be considered hedonistic reasons for the retreat (to obtain artistic creativity, among other more spiritually oriented motivations). In direct contrast to the notion of drug-seeking behavior, a number of respondents saw this spiritual encounter as providing some assistance in addressing their personal substance abuse issues. Some saw ayahuasca as providing a tool for insight into personal abusive behaviors and motivation for ending alcohol abuse, a theme widely attested to in the varied literature on the use of these sacraments as tools for ending abusive drug behaviors.

While some spoke of seeking emotional healing, the vast majority of responses attested to a desire to establish greater spiritual awareness, direct spiritual relations, and enhanced spiritual development. Respondents spoke of imbibing ayahuasca to connect with some sacred dimension of nature, communing with God, engaging in a spiritual quest, and connecting with some spiritual dimension greater than them. Personal spiritual development was a main theme, with participants speaking of finding out about some true aspect of their selves, development of

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 11/21

spirit mediumship abilities, obtaining spiritual healing, obtaining spiritual and philosophical insights, obtaining guidance and direction in life, and getting clarity about individual paths and purposes that could help with resolving personal problems.

The benefits that respondents obtained from the ayahuasca experiences echoed themes similar to their intents. They generally reported that the experiences increased their personal development, providing insights into their lives through access to deeper levels of the self, strengthening of the spiritual identity, and increasing self-awareness. Some spoke of personal enlightenment and enlightenment regarding the human condition, an increased capacity for meditation, calmness, and control of anxiety. In summary, the experiences speak to genuine spiritual and transpersonal concerns involving an increase in personal spiritual awareness and awareness of spiritual dimensions of the universe that contributed to enhanced personal spiritual development.

An assessment[4] of the motivation of Western ayahuasca pilgrims and the experiences they had found that the vast majority of the respondents ascribed spiritual, mystical, or metaphysical motivations as being moderately or very important reasons for their participation. All affirmed that their motivations included to "establish relations with the plants, their wisdom, God, spirits or a higher power" and to "enhance your relationship to the universe and acquire a better understanding of the unknown… [and to] establish a personal connection with the spiritual or sacred." Most also subscribed to the idea that ayahuasca enabled them to "learn about or experience the divine aspects of myself, some inner truth or divine immanence" and to "receive guidance or personal direction in life from the wisdom of the plant teachers, the spirits, the universe, God, etc." The respondents' experiences with ayahuasca also pointed to the central significance of spiritual themes in their responses, that ayahuasca gave "an increase in personal spiritual development." Their own personal spiritual development was attested to in an increased sense of awareness of the spiritual dimensions of the universe, an experience of the divine aspects of self, and an enhanced sense of personal connection with the spiritual or sacred.

Modern Medicinal Applications of Ayahuasca

Ayahuasca has also been examined in laboratory, clinical, and medicinal studies for its potentials to contribute to modern medicine. One of the primary areas of application is attested to in many of the papers of this volume: the field of addictions treatment (also see Mabit 2007). These applications constitute perhaps the most compelling reason for its' immediate medical use, given the general lack of long-term success of conventional addictions treatment programs. As is the case

[4] See footnote 5.

Layout: T1 Standard SC | Book ID: 313804_1_En | Book ISBN: 978-3-642-40425-2
Chapter No.: 1 | Date: 17-8-2013 | Page: 12/21

with peyote, ibogaine, and chemical substances such as LSD and ketamine, the psychedelics have been found to provide dramatic relief of symptoms of addiction and provide powerful forces for reorganizing the lives of addicts to help them achieve sobriety (see articles in Winkelman and Roberts 2007b). The recognition of these potentials goes back to the 1960s, when the contributions of LSD to the treatment of alcoholism were first recognized. While the studies of the early period did not generally meet standards of research of today, they nonetheless established the dramatic initial increases in the sobriety of the LSD treatment groups as compared to controls, with effects tapering off over time. Recent retrospective studies and meta-analyses (e.g., Bogenschutz and Pommy 2012; Krebs and Johansen 2012; Ross 2012) continue to bear out the hypothesis that there are significant therapeutic mechanisms from these substances that can be applied to the treatment of addictions.

There is also a potential role for ayahuasca in the treatment of depression, as discussed in this volume in the paper by Fontes et al. This possibility is supported by the research of Osório et al. (2011), who found that harmine, a β-carboline alkaloid that is found in the *Banisteriopsis* genus, has antidepressant effects in studies of both animals and humans. Harmine is a monoamine oxidase (MAO) inhibitor, an action that is one of the primary effects of the typical antidepressant drugs. Osório et al. research found evidence of antidepressant effects in the central nervous system of rodents, supporting further experimentation with harmine as a candidate for the pharmacological management of depression. Their exploratory study, using ayahuasca on nonpsychotic patients with clinical diagnoses of recurring depressive disorders, showed a decrease in depressive symptoms persisting for about 2 weeks.

Further applications of ayahuasca are suggested by several studies that have examined its usefulness in the treatment of Parkinson's disease, a currently incurable neurological disorder characterized by the loss of dopamine-producing neurons in the substantia nigra area of the brain. A study by Serrano-Dueñas (2001) using state-of-the art methodologies (double-blind, randomized, placebo-controlled trials) examined the effects of a single dose of *Banisteriopsis caapi* on the motor function of Parkinson's patients, using a standard assessment tool (Unified Parkinson's Disease Rating Scale). They found beneficial behavioral effects from the *Banisteriopsis* that they hypothesize were primarily due to the interaction of harmaline at glutamatergic receptors, specifically the glutamate receptor antagonist effects caused by the harmalines. They note evidence that harmaline binds to N-Methyl-D-aspartate (NMDA) receptors as an agonist which mimics the action of glutamate and postulate that it is this interaction of harmaline with the glutamatergic receptors that plays a central role in restoring the loss of motor function associated with Parkinson's disease. They postulate that these effects of harmaline may result from counter-acting the excitatory effects of glutamate and its roles in the neurodegeneration of dopaminergic neurons within the

substantia nigra. They propose that this antiglutamate action of harmaline, which is responsible for the blockage of glutamatergic receptors, corrects imbalances caused by dopamine deficiency and consequently contributes to a restoration of normal motor function.

A more recent study conducted by Samoylenko et al. (2009) examined evidence of the effectiveness of compounds derived from aqueous extract of *Banisteriopsis caapi* stems in the treatment of Parkinson's disease by examining effects on MAO-A and MAO-B, with laboratory findings showing the presence of potent in vitro MAO-A inhibitory and antioxidant activities. Their tests for MAO inhibition found that an extract from *Banisteriopsis caapi*, as well as pure harmine, both exhibited an inhibitory effect on MAO-A, and increased release of dopamine. In addition, they concluded the evidence for inhibition by harmine and harmaline of MAO-B activity indicated that they provided protection against neurodegeneration, and consequently have potential for the treatment of Parkinson's diseases. Furthermore, they noted the potential therapeutic value of ayahuasca because of the presence of the potent antioxidants epicatechin and procyanidin B2. Since oxidative stress is associated with the pathogenesis found in neurodegenerative disorders such as Parkinson's and Alzheimer's diseases, they concluded that because of their selective MAO-B inhibitory activity, these antioxidants have significant potential in providing protection for neuronal cells that are damaged by oxidative free radicals.

Therapeutic Mechanisms of Psychoactive Sacramentals

How are such diverse effects obtained from relatively similar substances? The answer to this question involves a least three different mechanisms. First, in spite of similar chemical substances in diverse plants, there is also a broad range of different psychoactive substances in single plants and the combinations of plants characteristic of ayahuasca and the snuffs. There are dozens of different alkaloids in various psilocybin mushrooms, as well as the *Banisteriopsis*, *Psychotria*, and *Diplopterys* species and the additional plant teachers that may be included in ayahuasca combinations. Consequently, there are a variety of different pharmacological mechanisms that provide therapeutic effectiveness. Second, a range of effects is induced by factors that make set and setting influences very important. These plants have been known to produce a state of extreme susceptibility to ritual and other expectancy-based effects. This capacity of context and expectation to powerfully shape the effects of these substances has been widely recognized in the different psychiatric models described below (psychotic, psycholytic, and psychedelic) which were developed to explain the varied effects elicited by psychedelics.

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Chapter No.: 1 | Date: 17-8-2013 | Page: 14/21

Pharmacological Effects of the Sacred Medicines

A significant feature of the pharmacological effects of psychedelics in the treatment of addictions is manifested in an "after glow" effect of positive affect and increased openness to therapeutic intervention that lasts for several weeks following sessions. Furthermore, a crucial therapeutic role came to be attributed to the responses to large doses; the resultant "peak experience" that produced the personal transformation of the addict to attempt an engagement with sobriety. These transformative potentials were the basis for new views of the potentials of these substances embodied in the concept of the psychedelic paradigm of psychotherapy. The after-glow effects suggest the necessity of combining psycholytic and psychedelic mechanisms in addiction treatment.

These pharmacological effects are exemplified in the use of ibogaine and ketamine in the treatment of opioid, methamphetamine, and alcohol addictions. Iboga roots used in indigenous spiritual practices of the Bwiti of West Central Africa provided the original basis for the ibogaine extract. Both have a history of use in informal treatment of addiction in addict communities, functioning largely within the context of both addict and medical subcultures rather than in conventional medical settings. Ibogaine became an important element in heroin self-help groups and harm reduction movements among addicts in the Netherlands (Alper et al. 2008). Alper and Lotsof (2007) review the many forms of evidence regarding the efficacy of ibogaine in reducing withdrawal cravings, particularly the elimination of opioid and cocaine withdrawal symptoms and the lasting resolution of the acute withdrawal syndromes for several weeks to months. Alper and Lotsof indicate that the mechanisms of action of ibogaine are different from other addiction treatments: It is neither an opiate agonist nor an opiate antagonist, nor does it appear to operate on a serotonin model. They suggest that ibogaine causes a "resetting" or "normalization" of basic neuroadaptations that maintain dependence. Krupitsky and Kolp (2007) have documented the effectiveness of ketamine hydrochloride in psychedelic psychotherapy for the treatment of both alcoholics and heroin addicts. Ketamine represents an unusual case of a drug already approved by the FDA for use as an anesthetic now being applied off label for addictions. They review a history of studies showing ketamine's use for treating a range of conditions, as well as a powerful tool for catapulting psychedelic treatments beyond impasses experienced with LSD treatments. Krupitsky and Kolp review best uses and practices for applying ketamine's ability to induce ego-dissolving transpersonal peak experiences as a key part of treatment of addiction.

Psychointegration as a Pharmacological Mechanism

Therapeutic effects of sacred medicines are derived from the general principles underlying their effects of altering consciousness in general. In a series of publications (Winkelman 2001, 2007, 2010), I have provided a synthesis of laboratory,

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Chapter No.: 1 | Date: 17-8-2013 | Page: 15/21

clinical, and ethnographic findings on the effects of sacred medicines that involve what I call "psychointegration." The central and common effects of these diverse substances involve the evocation of a similar response from the organism that elicits a serotonin-based triggering of slow and synchronized brainwaves, typically theta (3–6 cycles/s). This physiological elicitation of brain wave responses from the ancient levels of the brain evokes unconscious processes that are inherently therapeutic.

This concept of psychointegration reflects similar effects revealed by neurophysiologic, clinical, and cross-cultural studies, reflecting their action within the serotonin system, which has multiple roles, as reflected in its characterization as a neuromodulator that regulates the balance among many neurotransmitter systems. Psychointegrative effects are epitomized in the functions of serotonin in modulating the activities of dozens of bodily and brain processes and neurotransmitter systems; and by the psychointegrators' systemic effects on the serotonergic neurotransmitter system that enhances the integration of information across levels of the brain. This enhanced integrative function is manifested in the systemic effects at the level of the raphe and reticular formation, where there is an enhancement of excitatory effects, and the limbic brain, where emotions and memories are formed.

The effects of psychointegrators are reflected in synchronized alpha and theta brain wave hyperactivity across the neuraxis, the nerve bundle linking the structural levels of the brain from the brain stem to the frontal cortex. In the process of inducing synchronous discharges across this nerve bundle, psychointegrators elicit processes central to awareness and fundamental aspects of self, emotions, and attachments. These processes of psychointegration are revealed physiologically in the typical coherent theta wave discharges that produce a synchronization of brain waves across the neuraxis and lobes of the brain. Psychointegration is also manifested in psychological experiences, particularly those related to emotional healing and the sense of interconnectedness, such as in states of cosmic consciousness and other transpersonal experiences. Psychointegrators' effects on neural, sensory, emotional, and cognitive processes enhance consciousness by integrating normally unconscious emotional and self information into the frontal cortex and consciousness. This integration of the unconscious into consciousness underlies the general potentials of psychointegrators as therapeutic agents.

Set and Setting as Therapeutic Processes

The broad applications of psychointegrators are explained by studies that implicate individual and environmental factors in these substances' effects. The "set" (individual characteristics and expectations including attitude, motivation, mood, and personality) and "setting" (the physical and social context of use) produce quite varied experiences under psychedelics (see Passie et al. 2007). The primacy of set and setting effects is reflected in the different psychotherapeutic traditions in the clinical study of LSD, three different models of the nature of its effects. These

three paradigms—called psychotomimetic, psycholytic, and psychedelic (see Grof 1975, 2001; Lukoff et al. 1990)—show that different effects may be derived from the same substance as a consequence of the state of extreme neurobiological flexibility produced. These different medical models help to establish that the rituals accompanying the sacred use of the substances are basic to their effects. Roberts and Winkelman (2013) propose these primarily involve psycholytic, psychedelic, and entactogen effects.

The psycholytic model. The positive aspects of the LSD experience led to the psycholytic paradigm, based on recognition that LSD could aid psychotherapy. The psycholytic approach employs a series of low doses of LSD in conjunction with therapy sessions. The term "psycholytic" means "mind-dissolving," reflecting the hallucinogen-induced relaxation of the ordinary sense of self, altering the relationship between the conscious and unconscious, and allowing repressed material to become conscious (Passie 2007). This weakens psychological defenses and heightens emotional responsiveness, easing memory blocks and promoting catharsis. Doses are low enough for the patient and psychiatrist to discuss memories when they emerge. This discussion-type treatment may last several drug-free sessions, and new doses are used only if required to dislodge more memories. The ability to relive early life memories and to retain the memories for reflection in post-LSD sessions facilitates the progress of psychotherapy. Psycholytic therapy appears effective with psychosomatic problems and psychic rigidity; isolated individuals and those fixated at egocentric levels; concentration camp survivors with rigid defenses; patients with whom classic psychoanalysis has been unsuccessful; disorders rarely healed by psychotherapy, such as severe chronic compulsions and severe alcoholism; and severe character neuroses, depression, and compulsion (Passie 2007).

The psychedelic model. The subsequent LSD paradigm was referred to as psychedelic therapy, a term reflecting the "mind-manifesting" properties of the substances. The psychedelic model derived from the effects of large doses of LSD, particularly on alcoholics. These studies indicated that those who benefited most from LSD therapy had reported mystical experiences that produced profound personality changes, and suggested that the mystical insights were responsible for the therapeutic outcomes. The psychedelic approaches induce peak and mystical experiences that produce a profound sense of interconnectedness, unity, and meaningfulness that contribute to a feeling of rebirth. These experiences gave the patient a greater sense of self-control and the opportunity to make use of these insights for life changes.

Roberts and Winkelman (2013) propose that there are two main purposes of psychedelic, high dose therapy. The first is to produce a powerful, mystical experience in the client. Typically in mystical experiences, this includes a sense of ego-loss and self-transcendence. The mystical, peak experience is itself psychotherapeutic. Among the conditions that mystical experiences solve or ameliorate are: PTSD, alcoholism and addictions, obsessive–compulsive disorder, depression, death anxiety, and various neuroses and psychoses. Most contemporary research has used the psychedelic model, exemplified in the psilocybin research at Johns

Hopkins that has found effects including mystical experiences, meaningfulness, spirituality, openness, and altruism (Griffiths et al. 2006, 2008).

The second type of psychedelic psychotherapeutic experience pushes the boundaries of transpersonal psychology even further, taking us into the realm of paranormal phenomena, past lives, and alternate realities. Material that emerges in these sessions goes beyond the normal ideas of objective reality, but may reflect an extraordinary "symptom" that can support the therapeutic responses when its significance is recognized. Grof (007) proposes that these substances have the power to both identify a problem and its solution, guided by the power of the unconscious. AQ1

Entactogen or empathogen model. This model is derived from the effects of MDMA (3,4-methylenedioxy-N-amphetamine), a drug more commonly called "Ecstasy." MDMA has some properties typical of LSD-like psychedelics because it is a phenethylamine, but its effects are more related to the stimulants, as it also is an amphetamine. The use of MDMA in psychotherapy facilitates connections with the traumatic memories necessary for engaging in therapeutic resolution of the trauma. MDMA allows the client to reduce or even wholly disconnect from the fear associated with memories of a traumatic event or other stressors. Mithoefer (2007), Mithoefer et al. (2013) has used MDMA in the treatment of PTSD. MDMA's ability to facilitate PTSD therapy involves its ability to reduce acute stress reactions and anxiety, curtailing the cycle of the body's stress response. By reducing anxiety-provoking feelings, conditioned fear responses, and avoidance of feelings, MDMA makes it easier for patients to trust the validity of their own feelings and release the associated emotional blockages. As illustrated in the chapter in this volume by Nielson and Megler, ayahuasca is also a promising candidate for treatment of PTSD.

Future Directions and Conclusions

Perhaps one of the most significant, yet heretofore unexplored, areas of medicinal application of the psychointegrators involves the snuffs. There are a variety of indigenous South American traditions involving the use of *Virola* and *Anadenanthera* species, combined with other plants (see Altschul 1972; De Smet 1985; Schultes et al. 1992). The principal active ingredients of both genera involve a number of different forms of DMT and other tryptamines, with the *Anadenanthera* species characterized by the presence of 5-methoxy-N,N-dimethyltryptamine, as well as bufotenine (Torres and Repke 2006). The snuffs are normally snorted, although some are also smoked, and some preparations may be made for oral ingestion. The nasal application may make it particularly useful for experimentation with cocaine and methamphetamine users accustomed to this route of drug administration. AQ2

In some of the indigenous groups, the snuffs have been employed primarily by shamans, who use it ritualistically for a variety of purposes. In addition, the *Virola*

snuffs are used in a variety of communal functions in the Amazon region. Typically, groups of men from different villages take snuffs together as a part of building and solidifying alliances. These experiences are seen as occasions for men to relieve frustrations without personal responsibility for their behaviors. Under the influence of the snuff, many of the usual avoidance taboos are overlooked, permitting a release of the emotions and strains of everyday life. Chagnon (1983) suggests that one of the primary functions of the snuff-induced experiences is to allow snuffers to work off pent up antagonisms and frustrations by being fierce and expressing passions they are not ordinarily able to exhibit. It may, however, also release antisocial behavior, including violence and homicide. However, the use in intercommunity ceremonies clearly serves to reduce intergroup tensions. Those who have grievances against others may seek them out for vengeance through a chest-pounding exchange. The snuff is believed to enable them to withstand the pain. This chest-pounding exchange is followed by squatting together with arms around each other's neck in an extended period of shouting as they gradually reduce their excitement.

As illustrated in Schultes et al. (1992) *Plants of the Gods*, humanity still has an immense unexplored pharmacological bounty. The generations of shamans who tested these plants have provided guidelines for humanity in this exploration. The evidence available indicates that these sacred medicines have efficacy in treating a wide range of conditions, physical as well as psychological and social. While a variety of factors have impeded effective research, the many forms of evidence available, including the contributions to this volume, illustrate the therapeutic efficacy and potentials of these plants. Physicians and governments have a moral obligation to make the psychointegrators available for clinical use. Activists may find useful guidelines for promoting these changes in a variety of political, bureaucratic, and policy-making endeavors outlined in *Psychedelic Medicine*, particularly Winkelman and Roberts (2007c). AQ3

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