



INVITED SUBMISSION

Ayahuasca Treatment Center Safety for the Western Seeker

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ABSTRACT

Ayahuasca, an ancient Amazonian psychedelic tea traditionally used ceremonially among indigenous peoples, has recently become known as a possible treatment for a wide range of disorders. The awareness of this sacred medicine has grown exponentially over the past decade, attracting westerners from a wide variety of backgrounds, hoping to find treatment for a myriad of emotional and physical illnesses, as well as spiritual needs. In the wake of the commercialization and westernization of the use of ayahuasca, and the subsequent proliferation of ayahuasca treatment centers, this paper examines the benefits and possible risks of this form of therapy in an effort to create a safety protocol for Westerners in this context. The most practical approach to increasing safety for Westerners attending these Amazonian treatment centers is to educate the seeker prior to treatment and to provide access to specialized therapeutic aftercare services.

KEYWORDS: ayahuasca, psychedelic therapy, ayahuasca treatment center, harm reduction, entheogen

In recent years, the context of ayahuasca usage has changed. It is no longer a practice of indigenous Amazonian tribes and mestizo shamans of South America alone. There are now Christian-oriented ayahuasca churches based in many countries including Brazil, the United States, Australia, and parts of Europe where ayahuasca is taken as a form of communion. There has also been a dramatic increase in interest, from Westerners outside of these churches, as a result of Amazonian tourism, media coverage, and the Internet (Tupper 2008; 2009).

As more westerners and tourists to the Amazon have shown interest in the use of ayahuasca in its native environment, shamans have increasingly advertised their services for ayahuasca ceremonies. This practice has been termed *ayahuasca tourism* (Tupper 2009). Some westerners are drawn to these ceremonies seeking “spiritual enlightenment, self-actualization, mystical experiences or treatment of physical or psychological ailments” (Tupper 2009:120). These sorts of promises can be found on numerous websites advertising ayahuasca ceremonies for westerners (see Figure 1 for information contained on 18 ayahuasca treatment center websites in 2012 near Iquitos, Peru).

The number of nonindigenous shamans who advertise their services for ayahuasca ceremonies to tourists has increased alongside demand for treatment. They may not have proper training and may be more motivated by monetary gain, as they are able to charge higher prices to westerners in an area of increasing demand (Tupper 2009). As of November 2012, there are now numerous ayahuasca treatment centers in Peru, a country in which this practice is legal, advertising their services online (see Figure 1). Many of these ayahuasca treatment centers claim to cure a multitude of mental and physical ailments. Some westerners may seek out these centers as a last resort when western medicine has failed to produce desired results (Tupper 2008, 2009).

Information contained on many ayahuasca treatment websites places a great emphasis on information concerning benefits, without much attention to the risks associated with usage (see Figure 1). Although the research concerning benefits has been promising, using this medicine can be dangerous. For example, the risks include possible hypertensive crisis, psychosis, and death (dos Santos 2013b). These risks can be reduced, with proper safety education about the effects of potent monoamine oxidase inhibitors (MAOIs) found in the *banisteriopsis caapi* (*B. Caapi*) vine. MAOIs can be dangerous due to their effect on many forms of neurotransmitters in the brain. While the MAOI action may, itself, be blamed for the risk of hypertensive crisis, the addition of dimethyltryptamine (DMT), a chemical believed to be released by the pineal gland (Strassman 2001), can produce visions that are very frightening and contribute to psychosis in more vulnerable populations (Salak 2006; Johnson et al. 2008).

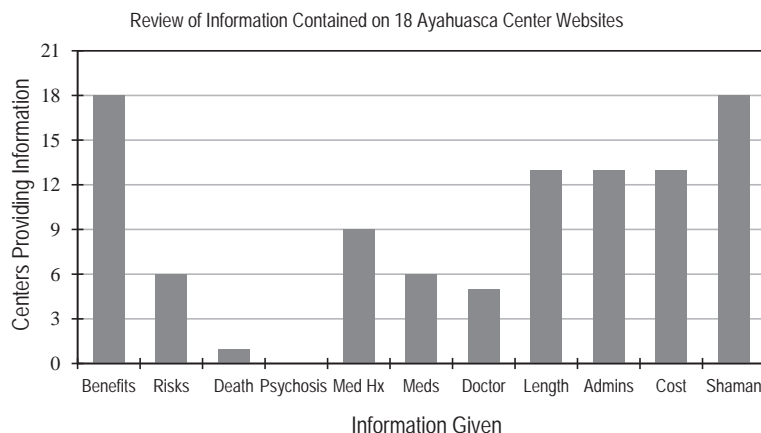


FIGURE 1. REVIEW OF INFORMATION CONTAINED ON 18 AYAHUASCA TREATMENT CENTER WEBSITES. THIS FIGURE ILLUSTRATES INFORMATION COMMUNICATED THROUGH THE WEBSITES OF AYAHUASCA TREATMENT CENTERS IN THE AREA OF IQUITOS, PERU, AS OF NOVEMBER 2012, OBTAINED THROUGH AN EXPLORATORY QUANTITATIVE ANALYSIS OF WHETHER OR NOT THE CENTER'S WEBSITE CONTAINED INFORMATION CONCERNING EACH FACTOR. BENEFITS REFER TO POSITIVE ASSERTIONS CONCERNING THE OUTCOME OF AYAHUASCA TREATMENT, WHILE RISKS REFER TO THE MENTION OF POSSIBLE NEGATIVE OUTCOMES OF AYAHUASCA TREATMENT. MED HX = MEDICAL HISTORY. MEDS = MEDICATIONS. ADMINs = NUMBER OF AYAHUASCA ADMINISTRATIONS.¹

The first author in this work began investigating alternative treatments for mental disorders as a graduate student of psychology. This interest in treatment of mental health issues outside of traditional western approaches is likely linked to the first author's personality traits, as measured by the NEO personality inventory, which measures the traits of *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* (NEO-PI-3; Costa and McCrae 1995). On the NEO-PI-3, the first author scored high on the Extraversion scale and very high on Openness. Individuals scoring high on Openness are more likely to be curious, open-minded, and enjoy exploring new ways of thinking (DeYoung 2006:1148). The coupled traits of high Extraversion and Openness have been linked to sensation-seeking behaviors or seeking new experiences that may be complex, risky, and intense (Aluja et al. 2003). The experience of traveling to the Amazon to drink an ancient and intensely psychedelic tea in the effort to learn more about this new treatment for westerners would be in line with this personality trait theory. It is likely that many others who make this journey are risk takers in some respect, as well. In this vein, seekers of ayahuasca treatment are probably more adventurous individuals who might engage in unorthodox treatments without necessarily doing their research, although this study did not directly

examine this hypothesis. Regardless, it is important to delineate risks for seekers in an attempt to reduce harm.

The purpose of this paper is to delineate risks associated with the consumption of ayahuasca in order to protect the well-being of westerners seeking this form of therapy. There is an understandable cultural difference among the western medical paradigm and that of the shamans of the Amazon. Due to vast cultural differences, it is likely that the expectations of westerners may be skewed, allowing them to blindly trust in the safety of these centers, although they are currently not under any health organization's governance.

In this article, the authors begin by reviewing the psychopharmacological and physiological effects of the components found in the ayahuasca brew. Next, research concerning benefits of ayahuasca treatment are explored, followed by the further review of effects in relation to safety concerns associated with administration of this sacred medicine in the context of the Ayahuasca Treatment Center. In the conclusion, suggestions are provided wherein safety for westerners attending these centers could be improved.



EFFECTS OF AYAHUASCA

Those drinking ayahuasca can expect to experience effects on a variety of levels. Psychopharmacological effects will be explored, delving into the mechanisms on a neurological level that may affect the users' mental state and behavior. Next, physiological effects, or how ayahuasca works in the body, will be discussed. Both psychopharmacological and physiological effects can have an influence on the psychological experience of the user as well, or their overall subjective experience, leading into a discussion of the psychological aspects. Finally, long-term effects reported will be explored.

Psychopharmacological Effects

The ayahuasca brew is most unique as a psychedelic, as the psychotropic action is dependent upon the synergy between two plant materials: the ayahuasca vine and any plant containing DMT (McKenna 2004:113). Ayahuasca's chemical makeup includes beta-carbolines, found in the *B. Caapi* vine, along with the serotonergic chemical DMT (Riba et al. 2006:94). Interestingly, the metabolites, or byproducts, of both beta-carbolines and those of DMT are not only found in the ayahuasca tea but are endogenous to the biology of all species, plants, and mammals alike, including humans (McKenna 2004:116).

Three main alkaloids are found in *B. Caapi*: harmine, harmaline, and tetrahydroharmine (THH). Harmine and harmaline function specifically as

selective, reversible inhibitors of monoamine oxidase A (MAO-A), while THH functions as a weak serotonin reuptake inhibitor (SRI) (Callaway 1999; Metzner 1999). Thus, it is thought to be mostly the action of harmine and harmaline, working as MAOIs that allows the DMT to bind to serotonin sites in the brain. Monoamine oxidase inhibition is instrumental in keeping orally consumed DMT from being metabolized in the stomach and liver, allowing it to cross the blood–brain barrier where it has psychopharmacological activity (Callaway 1999).

Additionally, ayahuasca alkaloids affect the function of the serotonin (5-HT) neurotransmitter (Metzner 1999; McKenna 2004). These alkaloids are capable of increasing the concentration of serotonin platelets in the brain while blocking their degradation. THH, as a weak SRI, additionally works to increase levels of 5-HT in the synaptic cleft. Finally, because DMT is a serotonergic agent, its effects may be heightened in the presence of THH due to competition with 5-HT at postsynaptic receptor binding sites. Long-term users of ayahuasca have shown an increase in 5-HT transporter platelets, and it is hypothesized that regular usage can alter neurochemistry to stimulate 5-HT production (Callaway 1999). The implications of this observation remain unknown at this time.

The possible psychopharmacological risks of ayahuasca use seem to stem mostly from the interactions with certain substances and health conditions with the MAOIs found in *B. Caapi* (Brierly and Davidson 2012; dos Santos 2013a). The intensity of the psychoactive action of DMT can also be of concern (dos Santos 2013a), and this type of activity has been theorized to give rise to psychosis (Johnson et al. 2008). In addition, admixtures beyond the requisite *B. Caapi* and DMT-containing plant vary widely according to the shaman and ceremonial purpose (McKenna et al. 1995; McKenna 2004).

As far as the dangers known about MAOIs, the real risk may be found in the interaction with many common drugs and foods. Drugs known to cause adverse effects include antidepressants, such as SSRIs and tricyclics. While SSRIs, as well as other serotonin agonists, are capable of producing adverse effects when used alone, life-threatening conditions generally only occur when they are used in combination with an MAOI (Sun-Edelstein et al. 2008), as is found in ayahuasca. This adverse combination can cause what is known as *serotonin syndrome* (dos Santos 2013b), a set of symptoms brought about by excessive serotonergic activity in the brain that can be deadly. For this reason, this syndrome is also referred to as *serotonin toxicity*, as serotonin becomes a poison, able to rapidly kill in severe cases (Boyer and Shannon 2005). Signs and symptoms of serotonin syndrome include anxiety, agitation, sweating, confusion, tremors, restlessness, lack of coordination, and rapid heart rate, and one is advised to seek immediate medical attention if any of these signs or symptoms is present (Mayo Clinic Serotonin Syndrome, n.d.).

Death may stem from severe hypertension, tachycardia, and hyperthermia (Boyer and Shannon 2005:1113).

Serotonin syndrome may be brought on by a wide range of dangerous central nervous system (CNS) serotonin actions, caused by seemingly innumerable substances. Substances that cause increased serotonin production (i.e., l-tryptophan), increased serotonin release (i.e., dextromethorphan [DXM]), inhibition of serotonin reuptake (i.e., cyclobenzaprine, SSRIs, and methadone), inhibition of serotonin metabolism by MAO (i.e., *B. Caapi*), and stimulation of serotonin receptors (i.e., buspirone) may cause a possibly fatal serotonin toxicity. Beyond these interactions, persons taking any serotonergic drug may have a toxic reaction in combination with any drug that blocks the metabolic pathway needed to rid the body of serotonin, cytochrome P450 isozyme 2D6 (CYP 2D6). Additionally, it has been found that certain individuals are more susceptible to serotonin toxicity due to some populations' genetically-linked weakened CYP 2D6 pathway (Brown 2010; Brierly and Davidson 2012).

Some common drugs known to have adverse reactions when combined with an MAOI include amphetamines, the common cough medicine dextromethorphan (DXM), cold and allergy medications, asthma inhalers, opioids, 3,4-methylenedioxymethamphetamine (MDMA), cocaine, (dos Santos 2013b), antimigraine agents, triptans, selective norepinephrine reuptake inhibitors (SNRIs), buspirone, antipsychotics, anticonvulsants, anti-Parkinsonian drugs, analgesics, the antibiotic linezolid, lithium, lysergic acid diethylamide (LSD), cyclobenzaprine, (Brown 2010), and certain alcoholic beverages, such as cognac, sherry, and cask ales. Certain supplements such as St. John's wort and ginseng may also cause synergistic toxicity (dos Santos 2013b). This list is not by any means exhaustive. As mentioned above, drugs should be checked for any interactions with serotonin as well as for the inhibition of CYP 2D6 (Boyer and Shannon 2005). It is also important to note that some drugs metabolize very slowly, such as the MAOI and SSRI, meaning that a toxic interaction could possibly occur up to six weeks apart (Brown 2010).

Many foods are contraindicated in the use of ayahuasca as well. Foods containing the amino acid tyramine, ingested in combination with an MAOI such as *B. Caapi*, may cause hypertensive crisis (dos Santos 2013b). Tyramine is found in varying quantities in different types of food, and levels tend to increase as foods are left to age, ferment, or spoil. For this reason, foods are listed on a continuum of risk from those that must be avoided to those that may be eaten in small amounts. A non-exclusive list of food that must be avoided for high tyramine content include banana peels; fermented soy beans; broad beans; cheeses (except cream cheese and cottage cheese); smoked, fermented, aged fish and meat; protein extracts; sauerkraut; shrimp paste; soups (due to protein/soy extracts); live yeast; or any food that may be

spoiled. Foods that must be used with caution are those that can be eaten in small quantities safely (1/2 cup or less) due to a lower tyramine content. A selection of these include avocados (if not overripe), caffeine, chocolate, fresh dairy, nuts, raspberries, spinach, and soy sauce (Saklad 1994). The traditional ayahuasca diet requires the drinker to refrain from eating a wide variety of foods (Tupper 2009), including many of the foods previously listed.

It must be noted that much of the research used for possible contraindications with the MAOI was not research unique to the exact action of the type found in *B. Caapi*, the monoamine oxidase inhibitor, type A (MAOI-A), thought to be highly selective (Gable 2007:28). Harmine, harmaline, and THH, alkaloids found in *B. Caapi*, act as MAOIs of the MAOI-A type (Brierly and Davidson 2012), which has also been theorized to have a reversible action (Callaway et al. 1999). Thus, the MAOI found in *B. Caapi* is thought to be somewhat less dangerous than the irreversible action that may be commonly found in many pharmaceutical antidepressants (Nair et al. 1993; dos Santos 2013a), possibly meaning that less time may be taken for dietary and medicinal restrictions before and after imbibing.

There has, thus far, been only one published report in which the ayahuasca preparation in conjunction with the use of an SSRI (fluoxetine) seemed to bring about symptoms related to serotonin toxicity. However, this reaction only lasted about 4 hours, the approximate duration of the action of ayahuasca (Callaway and Grob 1998). This allows one the theory, again, that the MAOI-A in *B. Caapi* is reversible and short acting. Although it seems this last report was more of an acute intoxication, with no lingering adverse effects, it appears that, still, lacking much research specific to the action of the MAOI in ayahuasca preparations, it would be safest to avoid the use of any serotonin-acting agents in conjunction with *B. Caapi* and to follow guidelines concerning length of abstinence before and after administration.

Physiological Effects

A number of studies have been performed concerning the physiological effects observed under the influence of ayahuasca. In one study, Jordi Riba et al. (2006) examined regional cerebral blood flow during ayahuasca administration using single-photon emission tomography (SPECT) and found significant activation in the frontal and paralimbic areas of the brain. Blood flow also significantly increased in the anterior insula, with the right side revealing greater potency, as well as in the anterior cingulate and frontomedial cortex of the right hemisphere. These areas are all associated with emotion. Activation that was shown in the areas of the left amygdala and parahippocampal gyrus is also linked with emotionality. This SPECT study concluded that, through the influence of serotonergic processes, ayahuasca influences brain regions that are important in the regulation of emotional

arousal (Riba et al. 2006). For more information regarding the effect of ayahuasca on emotion, see Riba and Manuel Barbanj 2005.

Interestingly, in a study using electroencephalogram (EEG) as a measure of brain wave activity, David Stuckey, Robert Lawson, and Eduardo Luna (2005) found that ayahuasca produced an abnormally high rate of gamma activity, very similar to that found among those who reach deep meditative states. Thus, one theory is that coherent gamma activity may highlight a connection between the psychedelic and meditative states. Importantly, Stuckey et al. also postulated that the changes in EEG activity may be more linked with the subjective experience of the psychedelic than with its psychopharmacology, due to the fact that these changes were not observed in all participants in the study. Researchers have noted that it can be hard to differentiate between purely psychological and biological effects when studying psychedelics, due to their interaction with one another (Stuckey et al. 2005).

Cardiovascular effects of ayahuasca use, including heart rate and blood pressure, have been the focus of research as well. One study exploring the pharmacological and physiological effects of 15 subjects after ayahuasca consumption in the ceremonial context of the União do Vegetal (UDV) church, performed by J. C. Callaway et al. (1999) found changes in heart rate and blood pressure throughout. It was reported that both heart rate and blood pressure increased with administration of the tea. The researchers in this study concluded that, though these changes were significant, they did not reach levels associated with hypertensive crisis. In addition to these observations, Riba and Barbanj (2005) concluded that individual differences may have an effect on heart rate, making it difficult to reliably predict how the ayahuasca brew will affect any individual.

Individual differences are also observed in the metabolism of ayahuasca. CYP 2D6 is the main enzyme responsible for the metabolism of harmine. CYP 2D6 is already known to work differently in various populations. This enzyme is believed to be behind the individual variations found in the metabolism of various substances and is postulated to elicit differing behavioral and physiological effects, as a result. In the analysis performed by Callaway (2005) that measured the variations in metabolism of harmine, he reports the individual differences that were found. Fourteen longtime members of the UDV church were all administered the same dosage of the ayahuasca brew, which was adjusted and standardized according to each individual's body weight. Even among this small sample, Callaway observed individual differences in metabolism of harmine, finding statistically significant variability among the participants. Seven men fell into the "fast metabolizers" group and the other seven tested as "slow metabolizers" of harmine. It is reported that normally these men would not receive the same dosage, as the leaders of ceremonies in the UDV church learn to increase or decrease the amount

given based on each individual's tolerance. This is hypothesized to be due to the individual differences in the metabolism of certain alkaloids present in the brew, such as was observed with harmine. Additionally, Callaway points to the purgative effects, a part of the physiological experience, as a built-in safety measure for those who are slow metabolizers, although vomiting under the influence of ayahuasca is still a part of the process for most who consume it (2005).

The purgative effects of ayahuasca, as mentioned, are a very common side effect, as well as possible coinciding diarrhea. This is believed to be due to the action of 5-HT on the vagus nerve, associated with nausea, as well as its action in the gastrointestinal tract. It is also understood that effects will depend on the individual's physiology, the strength of the ayahuasca brew, and the amount consumed (Callaway 1999:253). There may be further risk due to the similarly common experience of paralysis. Leaders of the ceremony could take advantage of this state that is caused by a tonic effect on movement, allowing for opportunistic rape or robbery (Freedland and Mansbach 1999).

Psychological Effects

Beyond the physiological adverse effects that may be experienced due to the MAOI action of *B. Caapi*, serious psychological reactions may occur from the DMT component of ayahuasca, believed to be the constituent "producing intense and profound psychedelic, visionary, and entheogenic effects" (Dalgarno 2008:2). The user may be overwhelmed with psychological distress, causing them to engage in dangerous behaviors. Traumatic injuries may occur due to the altered perceptions of reality or combative or destructive behavior. The intense pressure on the psyche may cause one to go into a full-blown episode of depression or induce psychotic episodes (Johnson et al. 2008). For this reason, a closer look at the safety protocol for special populations with mental disorders is in order, especially for the ayahuasca treatment centers that advertise specifically to these individuals.

Long Term Effects

Long-term effects of ayahuasca usage have been studied as well. Callaway et al. (1999, 1996, 1994) and Grob et al. (1996) published a series of studies, termed the *Hoasca Project*. These studies examined the health of longtime UDV church members in a broad attempt to gain preliminary insights concerning ayahuasca and its usage. Four main facets made up the core of this research: delineating components found in the ayahuasca itself, reporting the acute effects the tea had on participants, researching effects on the serotonergic system with long-term use, as well as exploring components of the tea found in the plasma of participants after administration. The UDV members

were compared to peers of the same age and backgrounds who abstained from using ayahuasca (Callaway et al. 1994, 1996, 1999; Grob et al. 1996).

The UDV studies concluded that regular, long-term drinkers of the tea were less depressed, more social, and more organized than matched controls. Furthermore, these researchers found no physical or mental side effects associated with long-term use in healthy individuals. Older members who participated in these ayahuasca churches for decades showed no signs of poor health (Callaway et al. 1994, 1996, 1999; Grob et al. 1996).

Grob et al. (1996: 6–9) also reported that many UDV members were dysfunctional prior to their commitment to the UDV, with two-thirds of this group reporting prior diagnoses of psychiatric issues including depression, hypochondriasis, and alcoholism. These members no longer met the criteria for these disorders at the time of this study, and, reportedly, were considered cured of these issues after membership with the UDV. Eleven of these members reported that they used alcohol prior to joining the church, ranging from moderate to heavy consumption, and that they all had retained complete abstinence after membership with the UDV. However, it is unknown whether church membership alone could have improved the functioning of some members. Further research is needed in order to eke out factors responsible for these phenomena, which might include the social context, spiritual beliefs, and diet, in conjunction with the regular consumption of ayahuasca.



RESEARCH: THEORIES AND BENEFITS

In the 1920s and 1930s, pharmacologists began studying the *B. Caapi* vine in order to harness and study its active ingredients. Louis Lewin, a well-known German psychopharmacologist, was able to isolate one of the active alkaloids in *B. Caapi*: harmine (Grob 1999). At Lewin's request, neurologist Kurt Beringer conducted an experiment administering harmine to 15 patients suffering from postencephalitic Parkinsonism. Beringer noted that those patients experienced extensive relief of the common symptoms associated with Parkinson's, such as rigidity. Although harmine would eventually be replaced by newer pharmaceuticals, this discovery marks the first recognized benefit of *B. Caapi* by the scientific community (Grob 1999:81).

Since the 1960s, research surrounding the use of ayahuasca has been lacking, likely due to the stigma that has been held in the scientific community concerning psychedelics. The common ideology among those practicing traditional western medicine, since that time, has been that psychedelics are harmful because of their ability to alter one's consciousness, a phenomenon that has been viewed as "psychopathological" in nature (Anderson 2012:46).

Historically, the medicinal use of psychedelics by indigenous peoples has been seen as psychologically abnormal. In some communities, their practices have been disregarded altogether as unimportant and their healers deemed to be psychotic. Active research surrounding the use of psychedelics, for the most part, disappeared in the 1960s due to this associated stigma held by much of the scientific community (Grob 1999).

Decades after the virtual disappearance of active research in this realm, attitudes towards psychedelics have begun to change. With growing interest in plant medicines among westerners, scientists and seekers alike, research and exploration of the properties of these plants have begun to reemerge (Grob 1999). Concerning the ayahuasca brew, thus far, findings have been encouraging surrounding benefits associated with its usage (McKenna 2004; Anderson 2012). The use of ayahuasca for the treatment of mood and anxiety disorders, such as depression, post-traumatic stress disorder (PTSD), other anxiety disorders, and bipolar disorder, has proven promising (Grob 1999; McKenna 2004; dos Santos et al. 2007; Anderson 2012). Beyond benefits found with mental and mood disorders, alcohol and substance abuse treatment appears to have been most effective through intensive ayahuasca therapy (Grob et al. 1996; Mabit et al. 1996; Grob 1999; McKenna 2004; Mabit and Sieber 2006; Trichter 2010; Anderson 2012; Brierly and Davidson 2012). Not only has ayahuasca been found beneficial for the treatment of mental disorders, validated through scientific research, but there is also much anecdotal evidence suggesting its usefulness in treating a multitude of physical ailments such as chronic pain, hepatitis C, and some cancers (Schmid et al. 2010). Indeed, this treatment deserves focused research. Ayahuasca has also been associated with increased spirituality and a sense of meaning in life (Bouso et al. 2012; Trichter 2010; Kjellgren et al. 2009).

Mental Disorders

The potential benefits of ayahuasca used in the treatment of mental disorders has been found through numerous research studies. In 2007, R. G. dos Santos et al. conducted a double-blind, placebo-controlled study measuring levels of anxiety, panic, and feelings of hopelessness in members of a Santo Daime church. It was found that participants scored significantly lower on the indices for panic and hopelessness while under the influence of ayahuasca. The researchers in this study theorized that it is likely the facilitatory action of the MAOI found in ayahuasca on the serotonergic system, the system implicated in the efficacy found with more traditional, pharmaceutical antidepressants. It is also postulated that the action of DMT as a serotonin agonist worked to reduce measures of hopelessness and panic-like states (dos Santos et al. 2007:511), as this type of serotonergic action has been associated with a reduction in panic symptoms (Graeff et al. 1996).

One theory for benefits associated with certain mood disorders, such as depression and bipolar disorder, is that the most common ayahuasca brew, containing DMT, has the ability to help heal the brain at the neuronal level. DMT bonds to the 5-Hydroxytryptophan (5-htp) receptor sites—the same sites as serotonin. DMT bonds at a higher rate, and the body adapts to this by increasing the number of 5-htp receptor sites, making better use of natural serotonin levels (Callaway et al. 1994; Callaway 1999). A study performed by Inaba-Hasegawa et al. (2011) on the differential action of MAOIs concluded that reversible MAOI-As are helpful as they are implicated in the expression of genes that protect neurons from injury or degeneration. It is thought that ayahuasca could function through this mechanism of neuroprotection as an anti-depressant that may treat the cause, rather than masking symptoms, and one that may have a better psychological outcome (McKenna 2004:123). Of course further research of ayahuasca on the various types of depression is needed to better delineate the effects.

Treatment of Addictions

Another significant area in which ayahuasca has shown promise through research, as well as anecdotal evidence, is in the treatment of alcohol and substance addictions (Grob et al. 1996; Mabit et al. 1996; Mabit 2002; Mabit and Sieber 2006). For instance, individuals were studied who consumed ayahuasca regularly within the context of the UDV church, the majority of whom reported having issues with substance abuse. All substance abuse issues were said to be resolved after their entrance into the church, attributed to the use of ayahuasca in a socially supportive setting (Grob et al. 1996; Metzner 1999).

Besides research of addiction cessation associated with usage within the UDV church, there have been ongoing studies in other settings, such as at the Takiwasi Treatment Center in the Peruvian Amazon, a center run by French doctor, Jacques Mabit. By 2006, after 15 years in practice and hundreds of patients seen, it had been found that, on average, two-thirds of these patients reported that they had maintained a life without substance dependence (Mabit and Sieber 2006). This success is attributed to many facets of protocol followed at this center, including the patient's intentions for undergoing treatment, the acknowledgement and inclusion of the spiritual dimension of their psyche, usage in a communal and ritualistic setting, as well as integration facilitated by psychotherapists experienced with ayahuasca themselves. Importantly, ayahuasca has also been observed to have somewhat the opposite of addictive properties and is not seen to be used as any sort of substitute for other substances. Paradoxically, it has been reported that users become more sensitive to the effects, requiring smaller doses as treatment continues (Mabit 2002).

Physical Conditions

Ayahuasca has been reported to heal a wide array of physical ailments, such as chronic pain, cancer, and hepatitis C (Topping 1998; Schmid et al. 2010). In one anecdotal report, a professor published a paper about his journey to heal liver cancer, with astounding results. Dr. Donald Topping (1998) was diagnosed with liver cancer in the late 1980s. After having half of his liver removed and his only option in western medicine being chemotherapy, he decided to look for any alternative to what he perceived as a further deleterious attack on his body. This search led him to the Amazon to consume ayahuasca, having read others' anecdotal reports of having been cured. After just four ayahuasca ceremonies, Dr. Topping returned to his physician in the United States who found that he not only no longer had this cancer, but his cancer activity was below average for the population. He reported that he was cured and attributed this miracle to the powers of the ancient medicine, ayahuasca. Though Dr. Topping passed away in June of 2003 from colon cancer, it is considered remarkable that he survived approximately 15 years. As Stephan Beyer notes, this particular type of cancer has a fatality rate of more than 90% after 3 years and more than 94% after 5 years. Still, with a lack of research and only anecdotal reports, it is unclear if it was purely the consumption of ayahuasca that helped Dr. Topping's cancer into remission (2009). Thayelee Purayil Hamsa and Girija Kuttan (2011) found that one alkaloid in *B. Caapi*, harmine, contains properties that caused the death of cancerous cells in vitro. This finding may help to explain anecdotal reports such as Dr. Topping's remission report.

In a study performed by Janine Tatjana Schmid, Henrik Jungaberle, and Rolf Verres (2010), 15 participants were observed before and after treatment with ayahuasca for various disorders such as chronic pain, inflammation, tumors, and cancer. Five of these individuals were reportedly cured, including those with tumors, hepatitis C, and influenza. Another six reported that symptoms of their disorders became more manageable. The other four participants reported either no remission or were not included in the final results due to missing medical records to confirm their condition. However, all participants reported that ayahuasca had a positive effect overall. The authors of this study concluded that, due to the individual differences reported among those with similar complaints, the effects of ayahuasca on medical illness may have more to do with positive psychological interventions that lead to changes in lifestyle and enhanced quality of life (Schmid et al. 2010). It is also believed that these alterations in health could be a result of possible immune potentiating properties, as are found in numerous plants. These reports, among many others, point to the need for further research into how ayahuasca may be used to treat physical illnesses (Metzner 1999; McKenna 2004).

Increase in Spirituality

Many individuals report an increase in spirituality after consuming ayahuasca, a brew that is often described as not only a psychedelic but an *entheogen* or a substance capable of “generating the divine within” (Trichter et al. 2009:121). The dimension of spirituality is noted as often being ignored in modern western society, though it is believed by many psychologists to be an important part of one’s sense of well-being (Trichter et al. 2009). Positive experiences with entheogenic substances are believed to enhance one’s sense of spirituality and thus one’s perspective concerning their own psyche and to provide meaning in life in such a way that these experiences have been described as life altering (Metzner 1999; Kjellgren et al. 2009). If it is true that a lack of spirituality is associated with mental pathology, then the reported entheogenic effect of ayahuasca could be a useful tool for enhancing overall mental health.

At present, research has shown that even one experience with ayahuasca is directly linked to enhanced spirituality after consumption (Trichter 2010) and that motivations for seeking ayahuasca may be spiritual in nature (Kjellgren, Eriksson, and Norlander 2009). It is noted, however, that the spiritual lessons learned during the experience must be remembered and integrated into the individual’s psyche in order to have a lasting, positive effect (Trichter, Klimo, and Krippner 2009; Trichter 2010). This points to the usefulness of a specialized therapy in helping one to define and integrate the entheogenic experience for maximum therapeutic potential.



SAFETY CONCERNS

Although research has pointed to some significant benefits that may be found through the use of ayahuasca, there are dangers associated with its usage as well. Thus far, there is no academic research directly indicating the toxicity of the *B. Caapi* vine itself in lethality, but some media reports, as well as academic papers, have claimed deaths were related to the use of ayahuasca or an ayahuasca-like brew. Due to the rise in ayahuasca usage internationally, and unclear media reports, this is an area that requires more in-depth exploration (dos Santos 2013a).

In a study performed by Robert Gable (2007) comparing lethal toxicity levels among hallucinogens, he found that there were no reported incidences of DMT lethality and reported no toxic levels known. It is known, however, that there are innumerable other admixtures that may be used and that have been noted as being toxic (McKenna et al. 1995). Unfortunately, there has not yet been much pharmacological research into the many admixtures that might be used. Jonathan Ott (1993) documented the

use of a multitude of admixtures being used throughout the Amazon basin, many of which are classified as psychotropics, including plants with stimulant properties, such as *Erthroxylum coca*, containing cocaine alkaloids, *Ilex guayusa*, and *Paullinia yoco*, each of which contain high amounts of caffeine. Admixture plants exhibiting more biodynamic and psychotropic compounds are commonly used as they are traditionally regarded as those plants that may offer the user the most power and wisdom. However, the shaman is conscious of the fact that with this power and wisdom comes the likelihood that these plants may be highly toxic if not properly dosed (McKenna et al. 1995).

There have been more pronounced concerns about certain other admixtures known to be commonly used that may be more dangerous in conjunction with *B. Caapi*. These admixtures, thus far, seem to mostly include those of the genera: *Brugmansia* sp., *Brunfelsia* sp., and *Nicotania Rustica*, all members of the *Solanaceae*, or *nightshade* family (McKenna et al. 1995; Ott 1993). Some admixtures are fatally toxic and/or more likely to induce psychoses.

For instance, a member of the *Brugmansia* genera, also known as *angel's trumpet*, and commonly referred to as *toè* in the Amazon, has been implicated in possibly fatal toxicity due to its anticholinergic effects (Aronson 2009). Additionally, the use of this admixture has been attributed to more intense visions as well as more complications, including a higher risk of psychosis. Shepard notes that users of this plant medicine fall fast asleep, then awaken into an intense psychedelic state in which they are unable to tell the difference between visions and reality. In higher doses, this admixture can cause the user to hallucinate for days, weeks, or worse: forever (Shepard 1998:327–328).

The phenomenology of this experience makes the risks a bit more obvious. Beyond intense hallucinations the user may be highly mobile, allowing for more dangers, if not properly supervised. The fact that the user will most likely not remember much of the experience leaves them much more vulnerable to an attack, such as rape or robbery. A similar level of vulnerability and danger could be held for certain species of *Brunfelsia*, as well, referred to as *chirisanango* in the Peruvian Amazon, which, in higher doses, is capable of inducing seizures and a comatose state (Shepard 1998:328).

Nicotania Rustica, referred to as *black tobacco*, is quite commonly added to the ayahuasca brew and can also be toxic in higher doses (Shepard 1998; Hearn 2013). Due to the combination of the MAOI found in *B. Caapi* and similar effects found in tobacco, it is postulated that *B. Caapi* increases the likelihood of nicotine poisoning (dos Santos 2013a). Due to the toxic nature of admixtures found within the genera of the *Solanaceae* family, in theory,

the best practice may be to eliminate toxic plants that interact with *B. Caapi* to reduce severe side effects in the brew.

While there is much anecdotal evidence as well as research to support the many possible benefits of ayahuasca (Mabit et al. 1996; McKenna 2004; Barbosa et al. 2009), there are still some concerns about the safety of users in the context of ayahuasca tourism. Its growth has brought about a wave of opportunistic mestizo shamans, charlatans, and profiteers who may not have been properly trained and are out to exploit naïve tourists (Tupper 2009). Considering the cost of living in Peru, prices that range in the thousands for traditional jungle treatments, in a basic, jungle environment, may cause one to question the underlying motivation of many ayahuasca treatment centers. Because the use of ayahuasca can be beneficial to westerners when used properly, but can be fatal when used in a haphazard manner, it is of utmost importance to now be sure that the ayahuasca treatment centers are well advised as to how to safely administer this medicine and are monitored for compliance.

Basic communication and education are areas that should significantly improve safety practices. Many westerners likely receive information concerning the safety of ayahuasca use from the ayahuasca center websites or from contact with the centers themselves. A review in November 2012 of 18 ayahuasca treatment center websites in the area of Iquitos, Peru, provided some descriptive data revealing that all websites highlighted the benefits of ayahuasca. Only one-third of sites, however, reported any possible risk. Even when letting a potential client know there may be some risk, the very real risk of death was not mentioned on all but one website, and the possibility of psychosis was never mentioned (Figure 1). In the research, there is very little discussion of risks as well, further suggesting that ensuring education surrounding the risks and management of expectations associated with ayahuasca is needed.

Many centers are advertising to the general population of individuals seeking relief from mental and physical illnesses and who are more likely to be taking medications deemed unsafe to use in combination with the ayahuasca tea. Specifically, individuals taking SSRIs (such as Prozac, Zoloft, and Effexor), commonly prescribed in the United States, should abstain from taking them before and after imbibing or the user may suffer from serotonin toxicity that may lead to death (Brown 2010). Indeed, the risks associated with discontinuing the use of an SSRI compounds the risks associated with ayahuasca therapy, and these persons would be best advised to do this in consultation with their physician or psychiatrist.

As mentioned, there are many associated risks concerning the usage of ayahuasca, however, much of the risk involved may be mitigated through proper medical screening, education, and communication. Communication is most

important due to the inherent cultural differences and expectations westerners may have when visiting a treatment center, coming from the Western medical paradigm where the patient has rights and the center would be held liable for their care. The indigenous peoples of the Amazon are not of this paradigm and may leave it up to the spirit of Mother Ayahuasca to care for the client. This perspective cannot be held as invalid, as this method seems to have worked for millennia. Only once westerners became involved with this ancient practice, and the subsequent commercialization of this practice, have things apparently become much more complex, reinforcing the need to explore and communicate any possible risks with this treatment. It is important to educate those who might be considering this form of treatment, which has shown promise for various disorders, concerning the possible benefits and risks of ayahuasca therapy, with management of expectations and harm reduction measures in mind.

Anthropological (and growing contemporary scientific) evidence suggests... ayahuasca [is not harmful in and of itself]: ayahuasca has long been revered as a traditional therapeutic agent over a large geographical region and throughout a wide variety of cultures, and it arguably deserves more attention from modern medical researchers and clinical practitioners. [Callaway et al. 2006:406]



DISCUSSION: INCREASING SAFE OUTCOMES FOR AYAHUASCA TRAVELERS

The fairly recent reemergence of research on ayahuasca has shown great promise for possible usage as an adjunct to psychotherapy. As transpersonal psychology is gaining support, there is a growing recognition of the importance of the inclusion of the body, mind, and spirit in healing various mental disturbances. Ayahuasca may be able to work holistically in this way, with the oft-missing spiritual dimension that may be accessed through the use of this ancient medicine. There is an expanding awareness, or opinion, that ayahuasca has this ability to heal as well as to share much ancient wisdom with all of humanity.

As awareness of the value of ayahuasca has grown, dozens of ayahuasca centers, mostly based in Peru, have opened. Some of these centers have advertised ayahuasca as a panacea, with abilities to quickly cure a wide range of physical and psychological illnesses, including things such as depression, PTSD, bipolar disorder, cancer, anxiety, and addiction, to name a few. While research has highlighted ayahuasca's potential to heal past trauma and addiction, it is clear that, as with any psychedelic therapy, there must be some

structure in place to help protect the patient's psyche, as more harm can be done in the absence of culturally appropriate therapeutic protocols. The traditions and techniques of mestizo and indigenous shamanic healing, while an appropriate container for patients in those cultures, fall short of the long-term needs of western travelers.

There is a great difficulty in truly vetting centers for following any safety protocol, as these centers are located in a country in which practices without any protocol are completely legal. It would be the job of the Peruvian Ministry of Health (PMH) to supervise practices at these centers, and this is not currently a practice. It is possible that these centers will become either illegal or the PMH (Ministry of Health 2015) will decide to get involved in enforcing a safety protocol, as media reports increase concerning negative outcomes, malpractice, and negligence for individuals seeking treatment. Again, at this time, the most practical approach to keeping individuals safe should occur, prior to visiting the center, in the seekers' native western countries.

Without supervision to ensure proper protocol, as well as education, communication of cultural differences, and management of expectations, some westerners are reporting psychological harm. They are reaching out for help in the United States and online through venues like the Ayahuasca.com forums (Ayahuasca.com 2016) and the Ayahuasca After Care Facebook group (AAC Aya After Care 2015). However, these resources are no substitute for an understanding therapist experienced in the practice of psychedelics who has the ability to apply appropriate integrative therapies.

To this first author, the need for this type of therapist became most apparent when a social worker, who was in need of direction after attending an ayahuasca retreat, found me and asked for help. The center he attended is one of the most popular, highly advertised in this realm and appears very well-informed online. He reported not only many discrepancies in the information he was given prior to attending but that this experience was most detrimental, psychologically. He said he had never taken any prior psychedelics and bravely went down to the Amazon in the hope of curing his anxiety only to find that there was no true therapy, or cure, as he had expected. He said this experience only worsened his condition. He reported that he was no longer a social worker and, approximately 1 year later, at the time of this writing, he is still unable to work. He said he worried most that he now "had no one to talk to." This last piece, that he "had no one to talk to," sparked the understanding that there is a need for therapists with psychedelic experience and therapeutic techniques to help folks like himself. He is one of many who are now reaching out for help here in the United States (Anonymous, personal communication 2015).

People are reaching out in online forums and are now contacting me, via email, for help. Here is just a glimpse of some of their reports, post trip:

“[The] intention was to heal”; “[now suffering from] new problems like depression, panic attacks, depersonalization, and extreme fear”; “keep feeling like life is worthless”; “I am in desperate need of help”; “I used to be full of life”; “[now] dysfunctional... lost my job... most importantly, my peace of mind”; “Is there some hope for me?” [AAC Aya After Care Facebook Group 2015; Anonymous, personal emails 2015; Anonymous, personal email 2015]

One woman recently made this analogy to describe her post-ayahuasca experience:

I keep feeling it's all an illusion like Maya. But I can't function properly with this new knowledge. I don't know what to do. I feel like I'm a kindergarden [sic] student that took the short cut to a postdoctorate [sic] degree and I can't cope with it, I want to go back to kindergarden [sic]. I just don't know how to explain it. I want to feel happy again, motivated and I need for this dark cloud to go away. Please! [Anonymous, personal email December 22, 2015]

These cries for help are only a very small sample of what is being reported at this time, and they prompt immediate action to address the safety of ayahuasca seekers.

Given the fact that ayahuasca has shown promise, we not only have the humane duty to help those in need but also the responsibility to protect the reputation of ayahuasca and its traditional stewards by speaking with decision makers in our own culture. This will aid in allowing research to continue while still protecting traditional practices. Because of the colossal challenges inherent in navigating multicultural spaces and the lack of understanding outside of the anthropological community regarding conflicting paradigms of urban capitalism and jungle reciprocity, we must do our best as westerners to prepare, prior to their trip, those in our own communities who are called to this experience. This preparation will include education and materials for full informed consent and give instruction and resources in the event that further care is required upon return.

Education and Preparation

We have learned that there are potentially fatal consequences when combining certain substances with the ayahuasca brew, and therefore, we must educate westerners on what to avoid and suggest they speak with their physician concerning the use of an MAOI prior to ayahuasca treatment. We must also communicate health conditions that carry some risk, such as cardiovascular conditions. Adverse physiological effects may also be seen due to toxic levels

of admixtures, such as the more popular usage of *N. Rustica* and *Brugmansia*. Each shaman will have their own method of brewing, with some including other, riskier compounds that may be undisclosed to the clientele. There should be full informed consent here, with constituents of the brew revealed, along with all associated risks, however, it is unlikely for someone to have the ability to implement and ensure protocol at these treatment centers. Thus, again, it is important to find a way to engage and educate seekers before they engage in ayahuasca treatment.

The physical safety of those seeking help at ayahuasca treatment centers could be enhanced through educating seekers about possible risks. The seeker must be aware that sexual and physical abuse have reportedly occurred and that they should take their time in choosing a center, in researching the shaman and staff, and getting referrals from reliable resources. There are currently at least a few methods of getting this sort of information. For example, Openmindtrips.com (Open Mind Trips 2015) provides a space for reviews of centers. The Ayahuasca.com forums (Ayahuasca.com 2016) provide a space for discussion of safety and reports of harm. The “AAC Aya After Care group” (2015) found on Facebook is another online forum, focused on uniting those who return with any psychological difficulties.

The seeker should also be aware of the center’s possible motivations. For example, it would be advised to look for a center that does not charge exorbitant amounts of money or offers ceremonies to large groups for profit without giving full informed consent as to the possible dangers. In this scenario, one could imagine that safety of the clientele may not be as important as profits. Centers that have established research and therapeutic interest over any commercial interest may show a more compassionate motivation and concern for their clientele. Aside from doing diligent research on the center and its reputation, it is recommended that travelers bring a friend with them who will sit sober, as a deterrent for opportunistic crimes.

The psychological risks associated with the ayahuasca treatment center may also be lessened with further education, as well as a mental health screening before consuming the brew. The Psychedelic and Continuing Care Program in New York City offers this sort of screening to help identify potential dangers for those interested in psychedelic therapy (Center for Optimal Living 2015). Seekers who have a history of mental illness themselves, or in one or more of their close family members, should be extra cautious, as there is not enough research yet to know what may trigger a psychotic break. Those with a history of mental illnesses such as schizophrenia, psychotic breaks, bipolar disorder, and personality disorders are at higher risk of psychosis when using hallucinogens (Dalgarno 2008; Johnson et al. 2008). These individuals may want to avoid the use of ayahuasca at this time. If the

individual feels they are still being called to this experience and they are aware of mental illness in themselves or a family member, they should speak with the centers concerning their mental health history and inquire about the centers' experience in treating these disorders. If the center does not seem appropriately educated in this area, does not act concerned, or refuses to appreciate and address possible risks, they may not be a good choice. Again, having a travel companion and seeking medical advice from your family physician would be a good practice for those who are prone to mental illness, as advised for anyone attending these centers.

For those attending in the hope of getting cured of their mental illness—or any illness—managing client expectations concerning this form of treatment should be a part of this education. Ayahuasca does not cure everyone and some report having difficulty processing the experience. There may also be a number of individuals seeking ayahuasca therapy who reportedly have no prior experience with any psychedelic. As ayahuasca is considered a very powerful psychedelic, education on mental preparation is of utmost importance. The need for the availability of aftercare for those seeking help upon returning home is very important.

Aftercare Services

Currently in the works is “The Aftercare Project” (TAP). TAP, based in the United States, is a multinational patient advocacy and outreach initiative that will serve ayahuasca patients leaving Amazonian treatment centers who are increasingly reporting the need for aftercare that addresses the western psyche. The main goals of TAP are (1) minimizing harm and maximizing potentially good outcomes of ayahuasca treatment in the Amazon by creating and disseminating educational materials to ayahuasca seekers and (2) improving outcomes of ayahuasca experiences by providing counseling and therapeutic integration services to ayahuasca drinkers. This initiative is important because those traveling to South America for ayahuasca treatment may be ill-prepared and can experience cultural, psychological, or physical dangers and challenges. An outreach organization such as this is critical for those in need of help and integrating their experiences (Aftercare Project 2015).

TAP will provide professional outreach and the building of a professional network of counselors through utilization and expansion of existing therapeutic techniques, as well as ongoing training for counselors and therapists. This will be the basis for the creation of a specialized training protocol for counselors. TAP seeks to provide 24-hour counseling support and connection to expert care with trained therapists for more individualized therapy as a way to aid those who are reaching out for help upon their return home (Aftercare Project 2015).

For further research into the best therapy techniques, TAP will integrate feedback mechanisms for seekers on the therapy provided and their treatment center experiences. Trends concerning reports of treatment at different centers will be provided as well. These reports, in the form of anonymous feedback, will be made public so that seekers might be better informed prior to ayahuasca treatment. TAP will also reach out to ayahuasca treatment centers, in the hope that these centers will be open to collaboration by helping to provide information and access to specialized aftercare services for clients needing help after returning home (Aftercare Project 2015).

Overall, TAP aims to be a centralized space for ayahuasca seekers not only for aftercare but for education, management of expectations, full informed consent, and other preparation materials. TAP also seeks to be a space for continued research into the best protocols for reintegrative therapy and further information concerning center practices. The hope is that these measures will work to reduce harm and keep westerners informed and safe in their use of ayahuasca as a form of treatment (Aftercare Project, 2015). This project is an attempt to help decrease risks for westerners attending ayahuasca treatment centers during a time in which there is no governance of the protocol that may be followed at these centers. In conclusion, empowerment of the seeker through education, preparation, and access to aftercare services appears to be the best route to increasing safety at ayahuasca treatment centers until the governments in these countries can ensure the safety of these patients.



NOTES

- 1 *Sources:* Ayahuasca Foundation, 2012; Blue Morpho 2012a; Blue Morpho 2012b; Blue Morpho 2012c; Choque Chinchay Journeys 2012a; Choque Chinchay Journeys 2012b; Choque Chinchay Journeys 2012c; Choque Chinchay Journeys 2012d; Five Spirits Temple 2012a; Five Spirits Temple 2012b; The Hummingbird Center 2012a,b; The Hummingbird Center 2012c; The Hummingbird Center 2012d; The Hummingbird Center 2012e; The Hummingbird Center 2012f; Infinite Light Peru 2012; Luz Kozmika 2012; Mishki Taki: Center for Amazonian Natural Medicine, 2012; Nature's Hospital 2012a; Nature's Hospital 2012b; Mundo Magico 2012a; Mundo Magico 2012b; Mundo Magico 2012c; Mundo Magico 2012d; Mundo Magico 2012e; Refugio Altiplano Natural Medicine 2012a; Refugio Altiplano Natural Medicine 2012b; Refugio Altiplano Natural Medicine 2012c; Refugio Altiplano Natural Medicine 2012d; Refugio Altiplano Natural Medicine 2012e; Refugio Altiplano Natural Medicine 2012f; Sachamama Ethnobotanical Garden 2012a; Sachamama Ethnobotanical Garden 2012b; Sarita Colonia 2012a; Sarita Colonia 2012b; Soul of the Elder 2012a; Soul of the Elder 2012b; Spiritual Dimensions 2012a; Spiritual Dimensions 2012b; Spiritual Healing Center Dios Ayahuasca Sanaciones 2012a; Spiritual Healing Center Dios Ayahuasca Sanaciones 2012b; Spiritual

Healing Center Dios Ayahuasca Sanaciones 2012c; Temple of the Way of Light 2012a; Temple of the Way of Light 2012b; Temple of the Way of Light 2012c; Temple of the Way of Light 2012d; Yacu Puma Ayahuasca Healing Center 2012a; Yacu Puma Ayahuasca Healing Center 2012b; Yacu Puma Ayahuasca Healing Center 2012c.

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