



**DROGUES,  
SANTÉ ET  
SOCIÉTÉ**

Research results

# **Peruvian traditional medicine, psychoactive plants, and the psychedelic renaissance**

**Dr. Ilana Berlowitz**, PhD

University of Zurich – Faculty of Medicine – Institute of Anatomy (Switzerland)

University of Fribourg – Department of Psychology – Clinical and Health Psychology

## **Correspondence**

Dr Ilana Berlowitz

University of Zurich

Winterthurerstrasse 190, 8057 Zürich

E-mail: [ilana.berlowitz@unifr.ch](mailto:ilana.berlowitz@unifr.ch)

[ilana.berlowitz@uzh.ch](mailto:ilana.berlowitz@uzh.ch)

Version anglaise originale telle que soumise.

## Abstract

Peruvian traditional healing systems, some of which have been estimated to date back to pre-historic times, are known for their prominent usage of psychoactive plants: For curing traditions in the Andean highlands or *sierra*, it is probably the coca bush (*Erythroxylum coca*) that plays the protagonist role. Healing traditions that have arisen in the deserts of the northern Pacific coast (*costa*), on the other hand, are characterized by the usage of the psychoactive huachuma cactus (*Echinopsis pachanoi*). Finally, medical systems that have evolved east to the Andes in the tropical forests of the Amazon make use of diverse psychoactive plants, of which especially ayahuasca (*Banisteriopsis caapi*) is internationally known. The present contribution takes reference to the Peruvian healing tradition and mainly its Amazonian branch in the context of the ongoing psychedelic renaissance. We argue that culturally inclusive studies are critical in the scope of the revival of psychedelic research and present two examples of cross-cultural clinical field research in this context. The first one involved a collaborative study with an Amazonian traditional healer specializing in the usage of the tobacco plant (*Nicotiana rustica*) for therapeutic purposes, while the second one focused on an integrative Peruvian addiction treatment program, in which Amazonian medicine is combined with psychotherapy. The examples point to promising therapeutic means and underscore the utility of an intercultural approach in view of both clinical utility and cultural equality in the psychedelic renaissance.

**Keywords:** psychoactive plants, psychedelic renaissance, traditional medicines, amerindian healing, Peru, Amazon, tobacco, *Nicotiana rustica*, ayahuasca

## Background: The new wave of “psychedelic research”

The mental health field is in the midst of what has been termed a «psychedelic renaissance»: Substances with psychoactive properties like psilocybin mushroom, ayahuasca, iboga, or cannabis, formerly considered as inevitably harmful drugs, are now widely studied for their therapeutic benefits and show promise for instance for mood disorders, anxiety, pain, or substance use disorders (e.g., Bogenschutz, 2013; Coe & McKenna, 2017; Crippa, Guimarães, Campos, & Zuardi, 2018; de Veen, Schellekens, Verheij, & Homberg, 2017; Dos Santos, Bouso, Alcazar-Corcoles, & Hallak, 2018; Garcia-Romeu, Kersgaard, & Addy, 2016; Griffiths et al., 2016; Hill, 2015; Izzo, Borrelli, Capasso, Di Marzo, & Mechoulam, 2009; Kyzar, Nichols, Gainetdinov, Nichols, & Kalueff, 2017; Labate & Cavnar, 2014; Majic et al., 2017; Nielsen et al., 2018; Nunes et al., 2016; Osorio Fde et al., 2015; Thomas, Malcolm, & Lastra, 2017). Western science first became involved in therapeutic uses of such substances around the mid-20th century, but, due to socio-political developments and resultant prohibitive legislations, academic engagement was largely dropped. Currently, however, the popularity of this field is growing again and international academic institutions are creating specialized research centers to study these substances’ clinical applications and their effects on human consciousness (e.g., Center for Psychedelic and Consciousness Research of the Johns Hopkins Hospital (Carey, Published Sept. 4, 2019).

Though currently investigated as a clinical innovation in modern science labs around the globe, several of these substances originally stem from ancient Amerindian healing systems (Dillehay et al., 2010; El-Seedi, Smet, Beck, Possnert, & Bruhn, 2005; Guerra-Doce, 2015). Examples in Latin America are numerous, found from the Mesoamerican Huichols and Mazatecs using peyote or psilocybin mushrooms (Díaz, 1977; French, 2008) to indigenous Amazonian groups like the Ecuadorian Shuar or Venezuelan Piaroa making use of ayahuasca or yopo (e.g., (Bennett, 1992; Rodd, 2002), reaching as far as the southern cone where “magic plants” are part of the Paraguayan Ayoreos’ healing culture (Schmeda-Hirschmann, 1993). It is however especially in Peru that sophisticated traditional medical systems around psychoactive plants have been developed and preserved to this day.

## Peruvian traditional medicine

The third-largest country of South America, Peru is typically described in terms of its three highly distinct geographic regions: The arid deserts along the Pacific coastline (*costa*), the tropical rainforests of the Amazon basin (*selva*), and the imposing Andean mountain range (*sierra*) separating the former two regions (Brack & Bravo, 2005; Bussmann & Sharon, 2006, 2009). The country’s striking cultural and biological diversity represents the foundation of its indigenous or endemic healing practices. It is therefore not surprising that three distinctive traditional healing systems have evolved in these three regions. All of them have in common, however, that locally growing psychoactive plants play a key role in the practices aimed at maintenance and reinstatement of health. Thus, based on generations of direct application and experience, a wealth of traditional

knowledge around these plants' therapeutic potentials has developed within the Peruvian traditional medicine landscape.

### **Andean traditional medicine and the coca plant**

Traditional medicine in the Andes (*sierra*) is and has historically been intimately linked to the coca plant (*Erythroxylum coca*). Revered by the pre-Colombian Incas as a sacred plant (Martin, 1970), the earliest archaeological evidence of coca leaf usage in Peru predates the Incas by several millennia, estimated to stem from 8000 years BP (Dillehay et al., 2010). This suggests coca as one of the oldest cultivated plants of the American continent (Conzelman & White, 2016). The plant continues to be central in contemporary Andean life and is widely used for nutritional, medicinal, and spiritual purposes (Allen, 1981). The leaves are a common household remedy (for gastrointestinal complaints for instance) and they are extensively used in therapeutic-ritual offerings (*Despachos*) or payments to the earth (Greenway, 1998b; Martin, 1970; Monigatti, Bussmann, & Weckerle, 2013). The earth in Andean ontology is understood as sentient and sacred; the Aymara and Quechua, for example, venerate the earth (*Pacha* or *Pachamama*) and its ice-capped Andean peaks (*Apus*) as prime deities (Greenway, 1998a; Mamani-Bernabé, 2015; Sarmiento, 2015). In this understanding, the cultivation of a respectful and reciprocal relationship of man with the rest of the natural world is considered vital and bears a direct relevance for health: «Rather than regarding illness as a specific process, such as the failure of one particular organ system, they [Andean Aymara and Quechua] view it, instead, in a much broader context as the result of a disruption in the normal balance between an individual and his family, or his community, or his land. The land is all-important and has a corresponding influence on an individual's health that Westerners find difficult to conceptualize. How to explain to urban North American apartment dwellers that gastric upsets may be caused by the angry spirits of the earth?» (p. 2813; Byard, 1987). The coca plant in this context functions as a sort of bridge between man, nature, and the spirit realm. It is understood not as simply an object, but as a sentient subject – a subject in fact with knowledge superior to that of human subjects.

Specialized Andean traditional healers hence harness these properties of the coca leaves to communicate with the spirit realm, for divination, or to diagnose and remedy health problems (Greenway, 1998b; Velasco & Organismo Andino de Salud, 2010). An example is its usage in the treatment of fright sickness or *susto*<sup>1</sup>, a health disturbance resulting from a shock or fright, associated with a pattern of symptoms understood to be caused by the loss of one's soul (Greenway,

---

<sup>1</sup> *Susto* (aso: *Manchari*, *Espanto*, *Cutipar*, etc.) is a widely known condition in the Latin American context and has thus been included in the international *Diagnostic and Statistical Manual of Mental Disorders* (DSM 5; American Psychiatric Association, 2013) under culture-specific illnesses, defined as follows: «Susto is an illness attributed to a frightening event that causes the soul to leave the body and results in unhappiness and sickness, as well as difficulties functioning in key social roles. Symptoms may appear any time from days to years after the fright is experienced. In extreme cases, susto may result in death. There are no specific defining symptoms for susto; however, symptoms that are often reported by people with susto include appetite disturbances, inadequate or excessive sleep, troubled sleep or dreams, feelings of sadness, low self-worth or dirtiness, interpersonal sensitivity, and lack of motivation to do anything. Somatic symptoms accompanying susto may include muscle aches and pains, cold in the extremities, pallor, headache, stomachache, and diarrhea. Precipitating events are diverse, and include natural phenomena, animals, interpersonal situations, and supernatural agents, among others.» (p. 836)

1998a; Maduro, 1983; Weller et al., 2002). In order to address this problem, the healer consults with the coca plant to help him/her locate the dissociated part of the patient's soul, vital energy, or psyche in space and time, and subsequently reintegrates it into his psychophysical system, which leads to remission of symptoms: «When a '*jampiri*' [Andean healer] consults the coca plant, he receives the diagnosis of the patient through a transcendental communication process in which a sacred being communicates to him the details of the patient's illness [...] as well as indications and procedures to follow in order to restore the patient's health» (translated from Spanish, p. 150; Velasco & Organismo Andino de Salud, 2010). The Andean medical tradition thus highly values the coca plant for its therapeutic properties, which are understood to consist of both physical and meta-physical aspects.

### **The *Huachuma* or *Mesa* tradition of the Peruvian coastal deserts**

The northern deserts of the Peruvian Pacific coast (*costa*) and adjacent highlands are considered a convergence point of Peru's traditional healing systems, described by some authors as the "health axis" of the Central Andean culture extending between Ecuador and Bolivia (Bussmann & Sharon, 2006; Camino, 1992). Traditional healers of this region characteristically make use of *Huachuma*, a psychoactive cactus that grows in this area (also called *San Pedro*; *Echinopsis pachanoi*; Joralemon, 1984; Sharon, 2015). Archaeological discoveries in this region include Pre-Incan ceramic artefacts that show representations of this cactus in the context of healing altars (from the Cupisnique, Mochica, and other cultures; Bussmann & Sharon, 2009; Torres, 1995), suggesting a healing tradition with thousands of years of history. The cactus continues to be an important tool and ally for contemporary healers of this region (Dobkin de Rios, 1977; Glass-Coffin, 2010). They perform curative ceremonies called *mesadas*, often at spiritually significant natural sites in the Huancabamba area (Bussmann & Sharon, 2006; Carod-Artal & Vazquez-Cabrera, 2006; De Feo, 2004; Dobkin, 1968). As with the coca plant in the Andean tradition, the psychoactive cactus is not understood as merely a substance from which to prepare a medicine, but as a sentient being with consciousness and agency, who informs and assists the healer in the curing process. More about the concept of medicinal plants as sentient others will be said in the following section regarding the Amazonian tradition.

In the course of a *mesada* characteristic of the coastal tradition, which may last all night, patients partake in the ritual guided by the trained *Huachumero* (also called *Sanpedrero*). The latter will typically drink the huachuma decoction to perform the healing; patients may or may not be asked to ingest the medicine as well. Diagnosis and treatment are carried out via complex interventions by the healer and the cactus, using the ritual objects if the *mesa* (healing altar) as an interface (Pérez Villarreal, 2009; Sharon, 2015). Other traditions using this psychoactive cactus extend beyond the Peruvian border, for instance into Ecuador, where the cactus is a central tool of the Saraguro healers (Armijos, Cota, & González, 2014). It goes without saying, however, that the pharmacopoeia of Peruvian coastal or Andean healing is by no means limited to the plants mentioned here or to psychoactive plants in general; numerous other phytotherapeutic means are employed in these regions (Bussmann, Sharon, Vandebroek, Jones, & Revene, 2007; Monigatti

et al., 2013). This of course holds true also for the Amazon region –the most biodiverse area of the planet (Cleary, 2001) –, which will be discussed next.

### **Amazonian traditional medicine and psychoactive plant use**

Medical systems that have evolved east to the Andes in the tropical Amazon region (*selva*) involve an intriguing application of rainforest medicinal plants (psychoactive and not) using sophisticated traditional techniques (Beyer, 2009; Jovel, Cabanillas, & Towers, 1996; Luna, 1986; Sanz-Biset, Campos-de-la-Cruz, Epiquien-Rivera, & Canigual, 2009). This healing system comprises a wealth of therapeutic means, with different functions and effects, including also the well-known ayahuasca brew (*Banisteriopsis caapi* and admixture plants; McKenna, 2004; Riba et al., 2003). As mentioned before, the latter is currently studied extensively in the context of the psychedelic renaissance, with applications for depression, anxiety, or substance use disorders (Coe & McKenna, 2017; Domínguez-Clavé et al., 2018; dos Santos, Osório, Crippa, & Hallak, 2016; Labate & Cavnar, 2014; Nunes et al., 2016; Osorio Fde et al., 2015; Palhano-Fontes et al., 2018; Renelli et al., 2018; Thomas, Lucas, Capler, Tupper, & Martin, 2013). However, as will become evident within brief, ayahuasca is but one among many psychoactive plants used in the complex Amazonian healing system (Shepard, 1998).

Psychoactive plants hence play a central role in Amazonian medicine and, like in the case of the Coastal and Andean traditions, are understood as more than simply a herbal remedy; they are «other-than-human-persons» (for Amazonian animist ontologies, see also Costa & Fausto, 2010; Harvey, 2006; Rosengren, 2006) who may offer assistance to the sick and function as teachers to the aspiring healer. If an Amazonian healer is asked how he/she has learned the trade of a healer, a typical answer is «the plants have taught me» (Luna, 1984). The specific plant considered one's main teacher is then what imparts an Amazonian healer his/her field of specialization: Among mestizo *curandero/as* (healers) an “*ayahuasquero/a*” is an Amazonian healer whose principal plant teacher is the ayahuasca plant; a *tabaquero* is a healer whose main teacher is the tobacco plant; an Amazonian *palero* works primarily with medicinal trees (*palos*); and so on. This cross-species collaboration and communication (Callicott, 2013) is reported especially in relation to a class of plants valiantly referred to as *plantas maestras* (master or mentor plants), *plantas con madre* (plants with mother), *plantas que enseñan* (plants that teach), or *doctores* (doctors) (Luna, 1984; Shepard, 1998). Jauregui and colleagues (2011) report: “While conducting a study of the medicinal plants commercialized in the popular markets of the Peruvian Amazonian city of Pucallpa (Jauregui, 2008), the following words were frequently heard: “this plant has a mother and is dieted so it can teach you”, referring to particular plants that have the capacity to teach the initiated the secrets of traditional medicine. According to the beliefs of the Shipibo-Konibo inhabiting the region of Ucayali, the *ibos*, which means the *madres* (mothers), *dueños* (owners), or *espíritus* (spirits) of things and places, are the ones who guide the process of knowing and teach about the properties and applications of the plants. To access nature's wisdom, Indigenous people commit themselves to the practices of rigorous *dietas* (shamanic diets), in which each *ibo* or *madre* shares their knowledge with the apprentice.” (p. 740).

Said practice of *dietas* is at the core of Peruvian-Amazonian (O'Shaugnessy & Berlowitz, under review). It provides the necessary conditions for a healer to receive teachings from the teacher plants, and at the same time also presents the optimal conditions for using plants to treat the sick (Jernigan, 2011; Sanz-Biset & Canigual, 2011). The *dietas* is sometimes described as an Amazonian-developed technology for using medicinal plants (Berlowitz et al., 2017). It involves periods of retreat during which a strict dietary regime, social isolation, and other restrictions must be followed, while the medicinal plants are ingested (Sanz-Biset & Canigual, 2011). Not respecting these rules may compromise the effectiveness of the intervention and/or lead to adverse effects (Jernigan, 2011) ranging from skin rash to madness, in extreme cases even death (Sanz-Biset & Canigual, 2011). As mentioned in the above quote, apprenticing healers of this tradition undergo a lengthy and demanding training process that includes the study of medicinal plants (especially psychoactive ones) in the scope of such *dietas* (Dev, 2018; Jauregui et al., 2011). It is one of the distinguishing features of Peruvian Amazonian healing, along with the skilled usage of tobacco and medicinal chants (*soplar*, *icarar*; see also Barbira-Freedman, 2015; Berlowitz, Garicía Torres, et al., 2020 for further descriptions of these concepts).

From a clinical scientific point of view, the concepts and medical epistemologies underlying Amazonian treatments are still not well understood, but efforts to this end are underway (Berlowitz et al., forthcoming). Ethnographic accounts of different Peruvian Amazonian ethnic groups like the Ashéninka (Lenaerts, 2006), Matsigenka, Yora (Shepard, 1998, 2004), or mestizos (Kamppinen, 1988; Luna, 1986) point to refined concepts of health, healing, and plant medicines. Subtle factors often labelled “energetic” or “spiritual” are understood to play a key role in the etiology of illnesses by interacting with biological, psychological, and social factors (Berlowitz et al., 2017; Lenaerts, 2006; Luna, 2011). Shepard (1998) describes the Amazonian health concept from the perspective of the Matsigenka people: «Well-being for the Matsigenka –a concept embracing physical and psychological health, as well as successful gardening, hunting, and harmonious social interactions– depends upon the strength and purity of the soul and its relations with the spirit world. Psychoactive plants used in the context of shamanic ceremonies or in daily health practices are essential for maintaining the harmony between soul, society and the all-powerful spirits.” (p. 323).

### **Peruvian psychoactive plants in the psychedelic medicine revival: cross-cultural research frameworks needed**

The current revival of psychedelic medicines takes place in the context of a highly globalized healthcare paradigm in which these substances are studied within a (psycho-)pharmacological scientific frame. Therapeutic sessions with the psychoactive substance are usually combined with psychotherapy (“psychedelic-assisted therapy”), similar to earlier models in this context (e.g., psycholytic therapy). However, even though many of the substances in this emerging research paradigm (e.g., ayahuasca) originally stem from an indigenous medicine system (in this case: Amazonian medicine tradition with its myriad of other plants and techniques), these are usually excluded: Traditional methods and concepts such as the ones touched upon in previous sections, are typically not part of the clinical study protocol, nor are the traditional healers who are the



experts in this field (Bouso & Sánchez-Avilés, 2020). This exclusion, however, implies an unfortunate loss of clinically relevant information and an exacerbation of pre-existing inequalities, for the often resource-poor cultures associated are not being involved (Feinberg, 2018; George, Michaels, Sevelius, & Williams, 2020).

Our research (University of Fribourg & University of Zurich, Switzerland) aims to address some of these cultural and epistemological disjuncts by conducting cross-cultural clinical research that includes the traditional knowledge systems around psychoactive substances. We do this by bringing the clinical laboratory to the field, so to speak, using a combination of clinical psychological and ethnographic research methods. The approach advocates the inclusion of traditional healers in partnership to research (e.g., transdisciplinary research frame, Jahn, Bergmann, & Keil, 2012) when studying these substances. Two examples of research projects in which we implemented this approach will be presented in what follows. In the first one we focused on a psychoactive plant that so far has been neglected in the scope of the psychedelic revival, namely the tobacco plant, which is considered a key medicinal plant in Amazonian healing. The second example focuses on a contemporary application of Amazonian medicine in Peru, an integrative treatment for addictions using Amazonian psychoactive plants and psychotherapy combined. In both of these case examples, the research objective was two-fold: The work simultaneously focused on (a) relevant concepts and techniques of the traditional healing system, based on interviews with traditional healers (qualitative methods), and (b) the effects and health outcomes of the intervention under study, using quantitative methods from clinical psychology. The description that follows will present both projects in overview to illustrate this research approach and will include selected findings from each. More specifically, in the description of example 1, only qualitative findings from healer interviews regarding traditional applications and concepts (i.e., findings from the (a)-part of the project) will be reported; conversely, the description of example 2 will focus on treatment outcomes alone (i.e., findings from the (b)-part of the project). A full report of findings from these two studies would be beyond the present scope, but references for further reading are provided in the corresponding section.

### ***Example 1: Tobacco as medicine in Peruvian Amazonian healing***

**Background.** The spreading popularity of ayahuasca around the globe is obviously a young phenomenon. But even in Amazonia itself, the emphasis on this plant might be relatively recent and at least in part related to the increase of travellers looking for ayahuasca over the last century (Brabec de Mori, 2011). Consultation of the ethnographic literature quickly reveals that there is in fact another psychoactive plant that in many ways, although intimately associated with ayahuasca, appears to be more fundamental in Amazonian healing – namely, tobacco. To the point that in several Amazonian languages, the generic term for “healer” is etimologically linked to the word for “tobacco” (Russell & Rahman, 2015; Shepard, 1998). The plant is ubiquitously found in Amerindian healing traditions (Russell & Rahman, 2015; Wilbert, 1993) and described as the main curing tool of Amazonian healers (Barbira-Freedman, 2015). Using an intercultural, transdisciplinary field research approach as described before, we have been conducting an exploratory



study to generate first clinical scientific data on Amazonian tobacco uses. A multidisciplinary scientific team from Switzerland has paired up with a Peruvian Amazonian healer who is a so-called *Maestro Tabaquero*, an accomplished medical specialist in tobacco-based treatments. The study aimed to (a) document in detail how the tobacco plant is applied in Amazonian medicine from the perspective of a Maestro Tabaquero using qualitative interview methods, and (b) to collect quantitative patient data on the effects of an Amazonian therapy involving the ingestion of a liquid tobacco remedy, using validated psychological tests and questionnaires. Results from the patient assessment are underway and will be reported elsewhere; a brief summary of methods and findings from the healer interviews is next presented (for more detail the reader is referred to Berlowitz, Garicía Torres, et al., 2020).

**Methods.** Using a single-respondent key informant design (Meuser & Nagel, 2009; Sandelowski, 1996; Tremblay, 1957), we employed the systematizing expert interview method (Bogner & Menz, 2009) to collect in-depth information on the therapeutic uses of the tobacco plant according to the practice of a reputed Maestro Tabaquero. The informant was a 51-year-old Amazonian traditional healer and Maestro Tabaquero from Río Tigre in the Peruvian province of Loreto. He was trained in Amazonian medicine from an early age, and as a 12-year-old discovered his calling to specialize in tobacco medicines. Over his life he became a highly esteemed tabaquero, with 36 years of clinical experience, attending to national and international patients at his practice in Loreto. We conducted repeated interview sessions with the informant at his workplace. The data collected was audio-recorded and transcribed verbatim. A manifest content analytic approach was used to condense the rich information and systematize it relative to the research questions (Bengtsson, 2016; Graneheim & Lundman, 2004; Mayring, 2008).

**Selected findings.** The descriptions of the Tabaquero revealed refined knowledge on how to prepare and apply tobacco for therapeutic purposes. He reported using leaves of *N. rustica* to prepare a variety of remedies, often combining the tobacco with further medicinal plants, depending on the specific purpose or illness to be targeted. He mentioned different routes of administration (oral, nasal, topical) and a range of types of remedies (liquid, solid, smoke-form), but a liquid preparation for oral ingestion is what he employed most frequently. It is administered in the scope of retreats (“dietas”) or ceremonies and involves a pronounced psychoactive component, as well as physiological response: effects characteristically start with dizziness and vomiting, giving way to an altered state. The informant described: “About 30 minutes after having ingested the tobacco, after having vomited, there is an opening of the psychic-mental. The person starts to reflect and there are like stories surfacing, possibly from childhood. This is because the psychic-mental has opened—a bit like a memory chip of a cell phone where there is information. And there the person will see or feel a lot of bad things, and a lot of good things. These things are not perceptions of something external, but they are emerging from their own mind, it is their mind that is releasing or liberating things. These are the effects. And later on, if the body and the tobacco have aligned, the person feels a sort of inner peace. It has this effect.” (p. 5, Berlowitz, Garicía Torres, et al., 2020). An extensively trained and specialized healer was emphasized to be imperative for safe treatment delivery: Knowledge of correct dosage, interactions with other substances, identification of

contraindications, and techniques in case of adverse effects, are critical, the informant explained, as tobacco ingestion is not without risk: “The curandero needs to be a curandero. If a person that is not a curandero serves tobacco, he can kill the patient. [...] The medicine is very good—that is why it is called ‘medicine’—but used incorrectly it can kill, like any potent medicine.” (p. 8; Berlowitz, García Torres, et al., 2020). The healer describes the effect of tobacco as clearing and “centering the mind”. The main indications for tobacco-based remedies pointed out by the informant were psychological (“problems of the mind”), physical, (e.g., conditions of the respiratory system like sinusitis, skin/intestinal parasites), or falling into the Amazonian epistemic category of spiritual/energetic problems (e.g., energetic disturbances in the body, unhealthy spirit relations). According to the Tabaquero, it is especially in the scope of latter –the spiritual/energetic domain– that the tobacco plant has its most extraordinary potency: “There are many excellent medicines, but for energetic problems, tobacco is number one.” (p. 7; Berlowitz, García Torres, et al., 2020). This is especially critical from the Amazonian epistemic perspective, “because illnesses first arise in the spirit-body, then in the energy-body, and only then manifest in the physical body,” as the Tabaquero explains (p. 7; Berlowitz, García Torres, et al., 2020). It implies the tobacco’s capacity to intervene at a very fundamental level of pathogenesis, thus explaining the supreme position this plant has in Amazonian medicine and other Amerindian traditions. The healer further explains that tobacco also has a unique place in Amazonian medicine since it is the one plant used to direct or potentiate all other plants. For this purpose, he explains, “All plant remedies have to be blown with tobacco smoke” (p. 8; Berlowitz, García Torres, et al., 2020). Amazonian healers undergo an extensive training or preparation period during which they also learn to use tobacco in smoke form. Without this preparation period, the informant considers the usage of tobacco smoke unsafe. Overall, these findings contribute to the emergent research literature on psychedelic-assisted therapies and could open intriguing new treatment avenues using this plant. Our findings demonstrate that the Amazonian tradition may offer valuable medical knowledge and guidance on safety profile, domain and manner of application of this contentious plant for therapeutic purposes, which so far has not been examined in the context of the psychedelic renaissance.

### *Example 2: A Peruvian addiction treatment using Amazonian medicine*

**Background.** Using a similar cross-cultural approach and multimodal design, we have investigated a contemporary implementation of Amazonian medicine’s psychoactive plants at a Peruvian addiction treatment centre. Working since the early 90s, this accredited therapeutic facility offers treatment for substance use disorders (short: SUDs) based on a combination of Amazonian medicine and psychotherapeutic methods. This combination somewhat parallels the current trend of “psychedelic-assisted therapy”, with the difference that it involves not just a single psychoactive plant coupled with psychotherapy, but the implementation of one medicine system (Amazonian) along with methods from another (Western); it is thus more accurately described as an integrative treatment (Bell et al., 2002). The treatment thus presents an interesting case for study in the context of the psychedelic renaissance and offers advantageous conditions for clinical-scientific assessment (focus on a specific clinical population (SUD patients), residential rather

than outpatient setting, defined treatment protocol). We used a mixed methods approach to find out (a) how SUD is conceived in this application of Amazonian medicine and which Amazonian methods were being used for its treatment (interviews with practitioners of Amazonian medicine associated with this center), as well as (b) what the short-term outcomes of the treatment were, including clinical and sociodemographic profile of treatment-seekers (quantitative assessment of residential patients). A comprehensive description of the overall research would be beyond the present scope, but the interested reader is referred to Berlowitz (2017); Berlowitz et al. (2017); Berlowitz, Walt, Ghasarian, Mendive, and Martin-Soelch (2019); Berlowitz, Walt, et al. (2020). A summary of main findings from the patient assessment (b) is presented after the content of the treatment program itself will be briefly sketched.

As mentioned before, the residential SUD therapy program at the Takiwasi Center involves Amazonian plant-based therapies combined with a conventional western psychotherapy approach. The latter includes weekly psychotherapy sessions (individual and group), cohabitation in a therapeutic milieu, occupational therapy (gardening, cooking, etc.), as well as occasional biomedical health checks. While these concepts are likely familiar to the reader, the Amazonian therapeutic means used in the treatment may deserve some further elaboration. They mainly include purging rituals with emetic plants, dietary retreats with teacher plants, and healing ceremonies with plants such as ayahuasca (Berlowitz et al., 2017). In purging rituals, emetic plants are administered under the guidance of a traditional healer in a ritual setting. The plant is ingested along with several liters of water and subsequently vomited. The intervention is understood to detoxify the body, alleviate withdrawal symptoms and drug craving; it is thus applied frequently in the first, detoxification phase of the treatment, but continues to be employed with a lesser frequency throughout the entire duration of the treatment. The overall duration of treatment may range between 1 and 12 months but is determined on an individual basis depending on a patient's clinical needs. In the second treatment phase, after the initial detoxification process has been completed, healing ceremonies and dietary retreats are the main Amazonian methods used, both of which aim to achieve deeper therapeutic work to tackle the problems underlying the SUD. In healing ceremonies, psychoactive plants like ayahuasca are administered in ritual by a traditional healer. The intervention aims to bring to awareness unconscious material but is also described as an “energetic surgery” that serves to clear and restructure subtle aspects of the body and personal history (Berlowitz et al., 2017). Dietary retreats involve spending a week in an isolated hut in the forest while ingesting teacher plants (the *dieta* technique described in previous sections). The traditional healer visits the patient to administer the medicines and supply basic food while strict nutritional and behavioural rules are in place. During this time of solitude in the forest, with the help of the plant medicines, memories and underlying problems may come to the surface and insights be gained (Berlowitz et al., 2017). Finally, a third phase of the treatment aims at the gradual reintegration of patients into regular life, including a progressive return to professional engagement.

**Methods.** In order to characterize the patients seeking treatment at this center and to collect first evidence as to therapeutic outcomes, we used a test battery made of structured clinical interviews and questionnaires that measured SUD-symptoms and other well-being indicators (Berlowitz

et al., 2019; Berlowitz, Walt, et al., 2020). They included the *Mini International Neuropsychiatric Interview* (MINI; Sheehan et al., 1998) based on the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; American Psychiatric Association [APA] 2000), the *Addiction Severity Index* (ASI; McLellan et al., 1992), the *Hospital Anxiety and Depression Scale* (HADS; Quintana et al., 2003; Zigmond & Snaith, 1983), the *Craving Experience Questionnaire* to measure substance craving (CEQ; May et al., 2014), the *World Health Organization Quality of Life-BREF* (WHOQOL-BREF; Lucas-Carrasco, 2012; WHOQOL Group, 1998), and other instruments. We tested 53 SUD-diagnosed males admitted to the Takiwasi treatment to assess their clinical and sociodemographic characteristics (Berlowitz, Walt, et al., 2020) and, using a longitudinal naturalistic design, assessed a sample of 36 patients before and after the treatment in order to explore short-term effects of this integrative therapy (Berlowitz et al., 2019). We compared baseline scores of the sample on the scales assessing SUD-symptoms and well-being at treatment admission (T1) and again at treatment completion (T2). All statistical analyses were performed using SPSS for Windows (Version 17.0. Chicago: SPSS Inc).

**Selected findings.** Treatment drop-out in the sample was 32%, a rate similar to conventional psychosocial SUD treatments (Dutra et al., 2008). The mean age of the treatment completers (N = 36) was 30.86 years (SD = 8.17), all of which were male (Berlowitz et al., 2019). Most of them had never been married (86.1%) and were living with their parents or other relatives (47.2%). Most of the sample were Peruvian (40%) or from other Latin American countries (40%), and the rest came from Europe or North America. All participants were diagnosed with SUD as part of the inclusion criteria. Only 16.7% used exclusively one substance, while the others were using multiple substances simultaneously. Dependence was diagnosed for cannabis (72.2%), alcohol (63.9%), cocaine or cocaine base paste (61.1%), opiates (13.9%), amphetamines and related stimulants (11.1%), and tranquilizers (11.1%). Anxiety (36.1%) and affective disorders (58.3%), were the most common comorbid psychopathologies, as is characteristic of SUD patients in other treatment settings (Merikangas et al., 1998). Antisocial personality disorder was also common (27.8%) in the sample (for an extensive description of clinical and sociodemographic patient characteristics of a larger sample (N = 50), including also data on motives for treatment selection, see Berlowitz, Walt, et al., 2020). Using paired-samples t-tests to evaluate changes between T1 and T2 in the outcome variables (see Berlowitz et al., 2019 for further detail on statistical analyses performed), we found statistically significant improvements of addiction severity from baseline assessment at entry to treatment completion on the ASI composite scores (McLellan et al., 1992) of drug use ( $p < .001$ ), alcohol use ( $p < .001$ ), social/familial relationships ( $p < .001$ ), and psychiatric status ( $p < .001$ ). Furthermore, substance craving ( $p < .001$ ) on the CEQ (May et al., 2014) decreased significantly from T1 to T2, as did emotional distress ( $p < .001$ ) on the HADS (anxiety and depression symptoms combined; Zigmond & Snaith, 1983). Quality of life on the WHOQOL-BREF (WHOQOL Group, 1998) increased significantly from T1 to T2 ( $p < .001$ ).

The results point to beneficial changes in key symptomatic features of SUD after completing the Amazonian medicine-based integrative treatment but, given the naturalistic design and lack of control condition, these findings are preliminary. They are generally in line with studies reporting

benefits of ayahuasca for SUD (e.g., Labate & Cavnar, 2014; Nunes et al., 2016; Thomas et al., 2013) and with studies suggesting methods from other indigenous medicines to be a promising avenue for SUD treatment (Bill et al., 1993; Lu et al., 2009). It remains for future research using follow-up measures to determine if the beneficial changes we found persist over time and assess relapse rates among discharged patients at various follow-up intervals. Overall, the study supports the utility of traditional Amazonian medicine for SUD and invites further scientific exploration of methods and treatment concepts.

## Conclusion

Psychoactive plants are a key component of Peruvian traditional healing systems across Amazon, Andes, and Pacific coast. The indigenous populations of these regions hold rich, empirically developed methods and concepts around these plants, some of which have been touched upon in the first part of this work. However, in the scope of the current psychedelic renaissance, these knowledge systems and its traditional healers tend to be excluded from the clinical research agenda (George et al., 2020). This may lead not only to a large body of practice experience overlooked, but also to a further exacerbation of cultural inequalities. Indeed, some authors consider the international popularization of ayahuasca a neo-colonialist or culturally appropriative phenomenon (Fotiou, 2016; Labate & Cavnar, 2018; Tupper, 2009). Thus, as these substances enter the global public health arena, it is of paramount importance to design inclusive research in which the traditional healers and countries in question take part. The two studies here presented exemplify a research framework that may address some of these challenges and support the relevance and utility of a traditional medicines' perspective to the scientific exploration of psychedelic substances in the psychedelic renaissance.

## Literature

Allen, C. J. (1981). to be Quechua: the symbolism of coca chewing in highland Peru. *American Ethnologist*, 8(1), 157-171. <https://doi.org/10.1525/ae.1981.8.1.02a00100>

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed. text rev. Vol.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Washington, DC: Author.

Armijos, C., Cota, I., & González, S. (2014). Traditional medicine applied by the Saraguro yachakkuna: a preliminary approach to the use of sacred and psychoactive plant species in the southern region of Ecuador. *Journal of Ethnobiology and Ethnomedicine*, 10(1), 26. <https://doi.org/10.1186/1746-4269-10-26>

Barbira-Freedman, F. (2015). Tobacco and shamanic agency in the Upper Amazon: historical and contemporary perspectives. In A. Russell & E. Rahman (Eds.), *The Master Plant: Tobacco in Lowland South America* (pp. 63-86). London, New York: Bloomsbury.

Bell, I. R., Caspi, O., Schwartz, G. E. R., Grant, K. L., Gaudet, T. W., Rychener, D., . . . Weil, A. (2002). Integrative Medicine and Systemic Outcomes Research: Issues in the Emergence of a New Model for Primary Health Care. *Archives of Internal Medicine*, 162(2), 133-140. <https://doi.org/10.1001/archinte.162.2.133>

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open*, 2, 8-14. <https://doi.org/10.1001/archinte.162.2.133>

Bennett, B. C. (1992). Hallucinogenic plants of the Shuar and related indigenous groups in Amazonian Ecuador and Peru. *Brittonia*, 44(4), 483-493. <https://doi.org/10.2307/2807199>

Berlowitz, I. (2017). *Traditional Amazonian medicine adapted to treat substance use disorder* (PhD Thesis). Switzerland: University of Fribourg.

Berlowitz, I., Garicía Torres, E. G., Walt, H., Wolf, U., Maake, C., & Martin-Soelch, C. (2020). «Tobacco Is the Chief Medicinal Plant in My Work»: Therapeutic Uses of Tobacco in Peruvian Amazonian Medicine Exemplified by the Work of a Maestro Tabaquero. *Front Pharmacol*, 11, 594591. <https://doi.org/10.3389/fphar.2020.594591>

Berlowitz, I., Ghasarian, C., Walt, H., Mendive, F., Alvarado, V., & Martin-Soelch, C. (2017). Conceptions and practices of an integrative treatment for substance use disorders involving Amazonian medicine: Traditional healers' perspectives. *Brazilian Journal of Psychiatry*, 40(2), 200-209.

Berlowitz, I., Walt, H., Ghasarian, C., Mendive, F., & Martin-Soelch, C. (2019). Short-Term Treatment Effects of a Substance Use Disorder Therapy Involving Traditional Amazonian Medicine. *Journal of Psychoactive Drugs*, 51(4), 323-334. <https://doi.org/10.1080/02791072.2019.1607956>

Berlowitz, I., Walt, H., Ghasarian, C., O'Shaughnessy, D. M., Mabit, J., Rush, B., & Martin-Soelch, C. (2020). Who Turns to Amazonian Medicine for Treatment of Substance Use Disorder? Patient Characteristics at the Takiwasi Addiction Treatment Center. *J Stud Alcohol Drugs*, 81(4), 416-425.



- Beyer, S. V. (2009). *Singing to the Plants: A Guide to Mestizo Shamanism in the Upper Amazon*. Albuquerque: University of New Mexico Press.
- Bill, A., Glaser, F. B., Hester, R. K., Jilek, W. G., Kalant, H., Rosovsky, H., . . . Weisner, C. (1993). *Approaches to treatment of substance abuse*. Geneva: World Health Organization.
- Bogenschutz, M. P. (2013). Studying the effects of classic hallucinogens in the treatment of alcoholism: rationale, methodology, and current research with psilocybin. *Current drug abuse reviews*, 6(1), 17-29. <https://doi.org/10.2174/15733998113099990002>
- Bogner, A., & Menz, W. (2009). The Theory-Generating Expert Interview: Epistemological Interest, Forms of Knowledge, Interaction. In A. Bogner, B. Littig, & W. Menz (Eds.), *Interviewing Experts* (pp. 43-80). London: Palgrave Macmillan UK.
- Bouso, J. C., & Sánchez-Avilés, C. (2020). Traditional Healing Practices Involving Psychoactive Plants and the Global Mental Health Agenda: Opportunities, Pitfalls, and Challenges in the «Right to Science» Framework. *Health Hum Rights*, 22(1), 145-150.
- Brabec de Mori, B. (2011). Tracing hallucinations. Contributing to a critical ethnohistory of ayahuasca usage in the Peruvian Amazon. In B. C. Labate & H. Jungaberle (Eds.), *The Internationalization of Ayahuasca* (pp. 23-47). Zürich: LIT-Verlag.
- Brack, A., & Bravo, F. (2005). *Perú: Legado Milenario. Millenary Legacy*. Peru: Universidad Privada San Martín de Porres. .
- Bussmann, R. W., & Sharon, D. (2006). Traditional medicinal plant use in Northern Peru: Tracking two thousand years of healing culture. *J Ethnobiol Ethnomed*, 2(47), 47-65. <https://doi.org/10.1186/1746-4269-2-47>
- Bussmann, R. W., & Sharon, D. (2009). Shadows of the colonial past: Diverging plant use in Northern Peru and Southern Ecuador. *Journal of Ethnobiology and Ethnomedicine*, 5, 4. <https://doi.org/10.1186/1746-4269-5-4>
- Bussmann, R. W., Sharon, D., Vandebroek, I., Jones, A., & Revene, Z. (2007). Health for sale: the medicinal plant markets in Trujillo and Chiclayo, Northern Peru. *Journal of Ethnobiology and Ethnomedicine*, 3, 37. <https://doi.org/10.1186/1746-4269-3-37>
- Byard, R. W. (1987). Impressions of folk medicine in the Andes. *Canadian Family Physician*, 33, 2813-2815.
- Callicott, C. (2013). Interspecies communication in the Western Amazon: Music as a form of conversation between plants and people. *European Journal of Ecopsychology*, 4(1), 32-43.
- Camino, L. (1992). *Cerros, plantas y lagunas poderosas : la medicina al norte del Perú*.
- Carey, B. (Published Sept. 4, 2019). Johns Hopkins opens new Center for Psychedelic Research. *The New York Times*. Retrieved from <https://www.nytimes.com/2019/09/04/science/psychedelic-drugs-hopkins-depression.html> website.
- Carod-Artal, F. J., & Vazquez-Cabrera, C. B. (2006). Mescaline and the San Pedro cactus ritual: archaeological and ethnographic evidence in northern Peru. *Revista de neurologia*, 42(8), 489-498.



- Cleary, D. (2001). Towards an environmental history of the Amazon: from prehistory to the nineteenth century. *Latin American Research Review*, 36(2), 65-96.
- Coe, M. A., & McKenna, D. J. (2017). The therapeutic potential of ayahuasca. In D. Camfield, E. McIntyre, & J. Sarris (Eds.), *Evidence-Based Herbal and Nutritional Treatments for Anxiety in Psychiatric Disorders* (pp. 123-137). Cham: Springer International Publishing.
- Conzelman, C. S., & White, D. M. (2016). The botanical science and cultural value of Coca leaf in South America. In M. Fielding (Ed.), *Roadmaps to Regulation: Coca, Cocaine, and Derivatives*. Oxford: Beckley Foundation.
- Costa, L., & Fausto, C. (2010). The Return of the Animists. *Religion and Society*, 1(1), 89-109.
- Crippa, J. A., Guimarães, F. S., Campos, A. C., & Zuardi, A. W. (2018). Translational Investigation of the Therapeutic Potential of Cannabidiol (CBD): Toward a New Age. *Front Immunol*, 9, 2009-2009. <https://doi.org/10.3389/fimmu.2018.02009>
- De Feo, V. (2004). The ritual use of Brugmansia species in traditional Andean medicine in Northern Peru. *Economic Botany*, 58 (1), 221-229.
- de Veen, B. T., Schellekens, A. F., Verheij, M. M., & Homberg, J. R. (2017). Psilocybin for treating substance use disorders? *Expert review of neurotherapeutics*, 17(2), 203-212. <https://doi.org/10.1080/14737175.2016.1220834>
- Dev, L. (2018). Plant knowledges: Indigenous approaches and interspecies listening toward decolonizing ayahuasca research. In B. C. Labate & C. Cavnar (Eds.), *Plant Medicines, Healing and Psychedelic Science: Cultural Perspectives* (pp. 185-204). Cham: Springer International Publishing.
- Díaz, J. L. (1977). Ethnopharmacology of sacred psychoactive plants used by the Indians of Mexico. *Annual Review of Pharmacology and Toxicology*, 17(1), 647-675.
- Dillehay, T. D., Rossen, J., Ugent, D., Karathanasis, A., Vásquez, V., & Netherly, P. J. (2010). Early Holocene coca chewing in northern Peru. *Antiquity*, 84(326), 939-953. <https://doi.org/10.1017/S0003598X00067004>
- Dobkin de Rios, M. (1977). Plant hallucinogens and the religion of the Mochica-an ancient Peruvian people. *Economic Botany*, 31(2), 189-203. <https://doi.org/10.1007/bf02866590>
- Dobkin, M. (1968). Trichocereus pachanoi: a mescaline cactus used in folk healing in Peru. *Economic Botany*, 22(2), 191-194.
- Domínguez-Clavé, E., Soler, J., Pascual, J. C., Elices, M., Franquesa, A., Valle, M., . . . Riba, J. (2018). Ayahuasca improves emotion dysregulation in a community sample and in individuals with borderline-like traits. *Psychopharmacology*. <https://doi.org/10.1007/s00213-018-5085-3>
- Dos Santos, R. G., Bouso, J. C., Alcazar-Corcoles, M. A., & Hallak, J. E. C. (2018). Efficacy, tolerability, and safety of serotonergic psychedelics for the management of mood, anxiety, and substance-use disorders: a systematic review of systematic reviews. *Expert review of clinical pharmacology*, 11(9), 889-902. <https://doi.org/10.1080/17512433.2018.1511424>

- dos Santos, R. G., Osório, F. L., Crippa, J. A. S., & Hallak, J. E. C. (2016). Antidepressive and anxiolytic effects of ayahuasca: a systematic literature review of animal and human studies. *Brazilian Journal of Psychiatry*, 38, 65-72.
- Dutra, L., Stathopoulou, G., Basden, S. L., Leyro, T. M., Powers, M. B., & Otto, M. W. (2008). A meta-analytic review of psychosocial interventions for substance use disorders. *American Journal of Psychiatry*, 165(2), 179-187. <https://doi.org/10.1176/appi.ajp.2007.06111851>
- El-Seedi, H. R., Smet, P. A. G. M. D., Beck, O., Possnert, G., & Bruhn, J. G. (2005). Prehistoric peyote use: Alkaloid analysis and radiocarbon dating of archaeological specimens of *Lophophora* from Texas. *Journal of ethnopharmacology*, 101(1), 238-242. <https://doi.org/10.1016/j.jep.2005.04.022>
- Feinberg, B. (2018). Undiscovering the Pueblo Mágico: Lessons from Huautla for the Psychedelic Renaissance *Plant medicines, healing and psychedelic science* (pp. 37-54): Springer.
- Fotiou, E. (2016). The globalization of ayahuasca shamanism and the erasure of indigenous shamanism. *Anthropology of Consciousness*, 27(2), 151-179. <https://doi.org/10.1111/anoc.12056>
- French, L. A. (2008). Psychoactive agents and Native American spirituality: Past and present. *Contemporary Justice Review*, 11(2), 155-163. <https://doi.org/10.1080/10282580802058270>
- Garcia-Romeu, A., Kersgaard, B., & Addy, P. H. (2016). Clinical applications of hallucinogens: A review. *Experimental and clinical psychopharmacology*, 24(4), 229-268. <https://doi.org/10.1037/pha0000084>
- George, J. R., Michaels, T. I., Sevelius, J., & Williams, M. T. (2020). The psychedelic renaissance and the limitations of a White-dominant medical framework: A call for indigenous and ethnic minority inclusion. *Journal of Psychedelic Studies*. 4(1), 4. <https://doi.org/10.1556/2054.2019.015>
- Glass-Coffin, B. (2010). Shamanism and San Pedro through time: Some notes on the archaeology, history, and continued use of an entheogen in Northern Peru. *Anthropology of Consciousness*, 21(1), 58-82. <https://doi.org/10.1111/j.1556-3537.2010.01021.x>
- Graneheim, U. H., & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*, 24(2), 105-112. <https://doi.org/10.1016/j.nedt.2003.10.001>
- Greenway, C. (1998a). Hungry earth and vengeful stars: soul loss and identity in the Peruvian Andes. *Social Science & Medicine*, 47(8), 993-1004.
- Greenway, C. (1998b). Objectified selves: an analysis of medicines in Andean sacrificial healing. *Medical Anthropology Quarterly*, 12(2), 147-167. <https://doi.org/10.1525/maq.1998.12.2.147>
- Griffiths, R. R., Johnson, M. W., Carducci, M. A., Umbricht, A., Richards, W. A., Richards, B. D., . . . Klinedinst, M. A. (2016). Psilocybin produces substantial and sustained decreases in depression and anxiety in patients with life-threatening cancer: A randomized double-blind trial. *J Psychopharmacol*, 30(12), 1181-1197. <https://doi.org/10.1177/0269881116675513>
- Guerra-Doce, E. (2015). Psychoactive Substances in Prehistoric Times: Examining the Archaeological Evidence. *Time and Mind*, 8(1), 91-112. <https://doi.org/10.1080/1751696X.2014.993244>

- Harvey, G. (2006). Animals, animists, and academics. *Zygon*, 41(1), 9-20. <https://doi.org/10.1111/j.1467-9744.2006.00723.x>
- Hill, K. P. (2015). Medical marijuana for treatment of chronic pain and other medical and psychiatric problems: A clinical review. *JAMA*, 313(24), 2474-2483. <https://doi.org/10.1001/jama.2015.6199>
- Izzo, A. A., Borrelli, F., Capasso, R., Di Marzo, V., & Mechoulam, R. (2009). Non-psychotropic plant cannabinoids: new therapeutic opportunities from an ancient herb. *Trends in pharmacological sciences*, 30(10), 515-527. <https://doi.org/10.1016/j.tips.2009.07.006>
- Jahn, T., Bergmann, M., & Keil, F. (2012). Transdisciplinarity: Between mainstreaming and marginalization. *Ecological Economics*, 79, 1-10. <https://doi.org/10.1016/j.ecolecon.2012.04.017>
- Jauregui, X., Clavo, Z. M., Jovel, E. M., & Pardo-de-Santayana, M. (2011). «Plantas con madre»: plants that teach and guide in the shamanic initiation process in the East-Central Peruvian Amazon. *Journal of ethnopharmacology*, 134(3), 739-752. <https://doi.org/10.1016/j.jep.2011.01.042>
- Jernigan, K. A. (2011). Dietary restrictions in healing among speakers of Iquito, an endangered language of the Peruvian Amazon. *Journal of Ethnobiology and Ethnomedicine*, 7, 20-20. <https://doi.org/10.1186/1746-4269-7-20>
- Joralemon, D. (1984). The role of hallucinogenic drugs and sensory stimuli in Peruvian ritual healing. *Culture, Medicine and Psychiatry*, 8(4), 399-430. <https://doi.org/10.1007/bf00114665>
- Jovel, E. M., Cabanillas, J., & Towers, G. H. (1996). An ethnobotanical study of the traditional medicine of the Mestizo people of Suni Mirano, Loreto, Peru. *Journal of ethnopharmacology*, 53(3), 149-156.
- Kamppinen, M. (1988). Espiritus incorporados: The roles of plants and animals in the Amazonian Mestizo folklore. *Journal of Ethnobiology*, 8(2), 141-148.
- Kýzar, E. J., Nichols, C. D., Gainetdinov, R. R., Nichols, D. E., & Kalueff, A. V. (2017). Psychedelic Drugs in Biomedicine. *Trends in pharmacological sciences*, 38(11), 992-1005. <https://doi.org/10.1016/j.tips.2017.08.003>
- Labate, B. C., & Cavnar, C. (2014). *The therapeutic use of ayahuasca*. Berlin, Heidelberg: Springer.
- Labate, B. C., & Cavnar, C. (2018). *The Expanding World Ayahuasca Diaspora: Appropriation, Integration and Legislation*. New York: Routledge.
- Lenaerts, M. (2006). Substances, relationships and the omnipresence of the body: an overview of Ashéninka ethnomedicine (Western Amazonia). *Journal of Ethnobiology and Ethnomedicine*, 2(1), 49. <https://doi.org/10.1186/1746-4269-2-49>
- Lu, L., Liu, Y., Zhu, W., Shi, J., Liu, Y., Ling, W., & Kosten, T. R. (2009). Traditional medicine in the treatment of drug addiction. *Am J Drug Alcohol Abuse*, 35(1), 1-11.
- Lucas-Carrasco, R. (2012). The WHO quality of life (WHOQOL) questionnaire: Spanish development and validation studies. *Quality of Life Research*, 21(1), 161-165. <https://doi.org/10.1007/s11136-011-9926-3>
- Luna, L. E. (1984). The concept of plants as teachers among four mestizo shamans of Iquitos, northeastern Peru. *Journal of ethnopharmacology*, 11(2), 135-156.

- Luna, L. E. (1986). *Vegetalismo shamanism among the Mestizo population of the Peruvian Amazon*. Stockholm: Almqvist & Wiksell International.
- Luna, L. E. (2011). Indigenous and mestizo use of ayahuasca. An overview. In R. Guimarães dos Santos (Ed.), *The ethnopharmacology of ayahuasca* (1st ed., pp. 1-21). Trivandrum, India: Transworld Research Network.
- Maduro, R. (1983). Curanderismo and Latino views of disease and curing. *The Western Journal of Medicine*, 139(6), 868-874.
- Majic, T., Jungaberle, H., Schmidt, T. T., Zeuch, A., Hermle, L., & Gallinat, J. (2017). [Psychotherapy with Adjuvant use of Serotonergic Psychoactive Substances: Possibilities and Challenges]. *Fortschritte der Neurologie-Psychiatrie*, 85(7), 383-392. <https://doi.org/10.1055/s-0043-103085>
- Mamani-Bernabé, V. (2015). Spirituality and the Pachamama in the Andean Aymara Worldview. In R. Rozzi, F. S. Chapin Iii, J. B. Callicott, S. T. A. Pickett, M. E. Power, J. J. Armesto, & R. H. May Jr (Eds.), *Earth Stewardship: Linking Ecology and Ethics in Theory and Practice* (pp. 65-76). Cham: Springer International Publishing.
- Martin, R. T. (1970). The role of coca in the history, religion, and medicine of South American Indians. *Economic Botany*, 24(4), 422-438.
- May, J., Andrade, J., Kavanagh, D. J., Feeney, G. F., Gullo, M. J., Statham, D. J., . . . Connor, J. P. (2014). The craving experience questionnaire: a brief, theory-based measure of consummatory desire and craving. *Addiction*, 109(5), 728-735. <https://doi.org/10.1111/add.12472>
- Mayring, P. (2008). *Qualitative Inhaltsanalyse*. Weinheim und Basel: Beltz Verlag.
- McKenna, D. J. (2004). Clinical investigations of the therapeutic potential of ayahuasca: rationale and regulatory challenges. *Pharmacology & Therapeutics*, 102(2), 111-129. <https://doi.org/10.1016/j.pharmthera.2004.03.002>
- McLellan, A. T., Kushner, H., Metzger, D., Peters, R., Smith, I., Grissom, G., . . . Argeriou, M. (1992). The Fifth Edition of the Addiction Severity Index. *J Subst Abuse Treat*, 9(3), 199-213.
- Meuser, M., & Nagel, U. (2009). Das Experteninterview — konzeptionelle Grundlagen und methodische Anlage. In S. Pickel, G. Pickel, H.-J. Lauth, & D. Jahn (Eds.), *Methoden der vergleichenden Politik- und Sozialwissenschaft: Neue Entwicklungen und Anwendungen* (pp. 465-479). Wiesbaden: VS Verlag für Sozialwissenschaften.
- Monigatti, M., Bussmann, R. W., & Weckerle, C. S. (2013). Medicinal plant use in two Andean communities located at different altitudes in the Bolivar Province, Peru. *Journal of ethnopharmacology*, 145(2), 450-464. <https://doi.org/10.1016/j.jep.2012.10.066>
- Nielsen, S., Germanos, R., Weier, M., Pollard, J., Degenhardt, L., Hall, W., . . . Farrell, M. (2018). The use of cannabis and cannabinoids in treating symptoms of Multiple Sclerosis: a systematic review of reviews. *Curr Neurol Neurosci Rep*, 18(2), 8. Retrieved from
- Nunes, A. A., dos Santos, R. G., Osório, F. L., Sanches, R. F., Crippa, J. A. S., & Hallak, J. E. C. (2016). Effects of ayahuasca and its alkaloids on drug dependence: A systematic literature review of quantitative studies in animals and humans. *Journal of Psychoactive Drugs*, 48(3), 195-205. <https://doi.org/10.1080/02791072.2016.1188225>

- Osorio Fde, L., Sanches, R. F., Macedo, L. R., Santos, R. G., Maia-de-Oliveira, J. P., Wichert-Ana, L.,... Hallak, J. E. (2015). Antidepressant effects of a single dose of ayahuasca in patients with recurrent depression: a preliminary report. *Revista brasileira de psiquiatria (Sao Paulo, Brazil : 1999)*, 37(1), 13-20. <https://doi.org/10.1590/1516-4446-2014-1496>
- Palhano-Fontes, F., Barreto, D., Onias, H., Andrade, K. C., Novaes, M. M., Pessoa, J. A., . . . Araújo, D. B. (2018). Rapid antidepressant effects of the psychedelic ayahuasca in treatment-resistant depression: a randomized placebo-controlled trial. *Psychological Medicine*, 1-9. <https://doi.org/10.1017/S0033291718001356>
- Pérez Villarreal, A. M. (2009). Traditional medical system with Sanpedro and the teachings of Maestro Marco Mosquera Huatay to healers. *Cultura y Droga*, 14,(16), 89-102.
- Quintana, J. M., Padierna, A., Esteban, C., Arostegui, I., Bilbao, A., & Ruiz, I. (2003). Evaluation of the psychometric characteristics of the Spanish version of the Hospital Anxiety and Depression Scale. *Acta Psychiat Scand*, 107(3), 216-221. <https://doi.org/10.1034/j.1600-0447.2003.00062.x>
- Renelli, M., Fletcher, J., Tupper, K. W., Files, N., Loizaga-Velder, A., & Lafrance, A. (2018). An exploratory study of experiences with conventional eating disorder treatment and ceremonial ayahuasca for the healing of eating disorders. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*. <https://doi.org/10.1007/s40519-018-0619-6>
- Riba, J., Valle, M., Urbano, G., Yritia, M., Morte, A., & Barbanoj, M. J. (2003). Human pharmacology of ayahuasca: subjective and cardiovascular effects, monoamine metabolite excretion, and pharmacokinetics. *J Pharmacol Exp Ther*, 306(1), 73-83. <https://doi.org/10.1124/jpet.103.049882>
- Rodd, R. (2002). Snuff synergy: Preparation, use and pharmacology of Yopo and Banisteriopsis caapi among the Piaroa of Southern Venezuela. *Journal of Psychoactive Drugs*, 34(3), 273-279. <https://doi.org/10.1080/02791072.2002.10399963>
- Rosengren, D. (2006). Transdimensional relations: on human-spirit interaction in the Amazon. *Journal of the Royal Anthropological Institute*, 12(4), 803-816. <https://doi.org/10.1111/j.1467-9655.2006.00364.x>
- Russell, A., & Rahman, E. (2015). *The master plant: tobacco in lowland South America*. London, New York: Bloomsbury.
- Sandelowski, M. (1996). One is the liveliest number: The case orientation of qualitative research. *Research in Nursing & Health*, 19(6), 525-529. [https://doi.org/10.1002/\(sici\)1098-240x\(199612\)19:6<525::aid-nur8>3.0.co;2-q](https://doi.org/10.1002/(sici)1098-240x(199612)19:6<525::aid-nur8>3.0.co;2-q)
- Sanz-Biset, J., Campos-de-la-Cruz, J., Epiquien-Rivera, M. A., & Canigüeral, S. (2009). A first survey on the medicinal plants of the Chazuta valley (Peruvian Amazon). *Journal of ethnopharmacology*, 122(2), 333-362. <https://doi.org/10.1016/j.jep.2008.12.009>
- Sanz-Biset, J., & Canigüeral, S. (2011). Plant use in the medicinal practices known as «strict diets» in Chazuta valley (Peruvian Amazon). *Journal of ethnopharmacology*, 137(1), 271-288. <https://doi.org/10.1016/j.jep.2011.05.021>
- Sarmiento, F. O. (2015). The Antlers of a Trilemma: Rediscovering Andean Sacred Sites. In R. Rozzi, F. S. Chapin Iii, J. B. Callicott, S. T. A. Pickett, M. E. Power, J. J. Armesto, & R. H. May Jr (Eds.), *Earth Stewardship: Linking Ecology and Ethics in Theory and Practice* (pp. 49-64). Cham: Springer International Publishing.

- Schmeda-Hirschmann, G. (1993). Magic and medicinal plants of the Ayoreos of the Chaco Boreal (Paraguay). *Journal of ethnopharmacology*, 39(2), 105-111.
- Sharon, D. (2015). *Wizard of the four winds: a shaman's story* (revised, 2nd edition ed.). USA: Simon & Schuster.
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., . . . Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J Clin Psychiatry*, 59(20), 22-33.
- Shepard, G. H. (1998). Psychoactive plants and ethnopsychiatric medicines of the Matsigenka. *Journal of Psychoactive Drugs*, 30(4), 321-332.
- Shepard, G. H. (2004). A sensory ecology of medicinal plant therapy in two Amazonian societies. *American Anthropologist*, 106(2), 252-266. <https://doi.org/10.1525/aa.2004.106.2.252>
- Thomas, G., Lucas, P., Capler, N. R., Tupper, K. W., & Martin, G. (2013). Ayahuasca-assisted therapy for addiction: results from a preliminary observational study in Canada. *Current drug abuse reviews*, 6(1), 30-42.
- Thomas, K., Malcolm, B., & Lastra, D. (2017). Psilocybin-Assisted Therapy: A Review of a Novel Treatment for Psychiatric Disorders. *J Psychoactive Drugs*, 49(5), 446-455. <https://doi.org/10.1080/02791072.2017.1320734>
- Torres, C. M. (1995). Archaeological evidence for the antiquity of psychoactive plant use in the Central Andes. *Annali dei Musei Civici Rovereto*, 11, 291-326.
- Tremblay, M.-A. (1957). The key informant technique: A nonethnographic application. *American Anthropologist*, 59(4), 688-701. <https://doi.org/10.1525/aa.1957.59.4.02a00100>
- Tupper, K. W. (2009). Ayahuasca healing beyond the Amazon: the globalization of a traditional indigenous entheogenic practice. *Global Networks*, 9(1), 117-136. <https://doi.org/10.1111/j.1471-0374.2009.00245.x>
- Velasco, O., & Organismo Andino de Salud. (2010). "Aún nos cuidamos con nuestra medicina": inventario sistematizado de las prácticas sanitarias tradicionales existentes en las poblaciones originarias de los países andinos. Peru: Organismo Andino de Salud-Convenio Hipolitio Unanue.
- Weller, S. C., Baer, R. D., de Alba Garcia, J. G., Glazer, M., Trotter, R., Pachter, L., & Klein, R. E. (2002). Regional variation in Latino descriptions of susto. *Culture, Medicine and Psychiatry*, 26(4), 449-472. <https://doi.org/10.1023/a:1021743405946>
- WHOQOL Group. (1998). Development of the World Health Organization WHOQOL-BREF quality of life assessment. The WHOQOL Group. *Psychol Med*, 28(3), 551-558.
- Wilbert, J. (1993). *Tobacco and shamanism in South America*: Yale University Press.
- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatr Scand*, 67(6), 361-370.