

Hallucinogenic Mushrooms in Mexico: An Overview¹

GASTÓN GUZMÁN

Instituto de Ecología, 91000, Xalapa, Veracruz, P.O. Box 63, Mexico; e-mail: gaston.guzman@inecol.edu.mx

Hallucinogenic Mushrooms in Mexico: An Overview. *Psilocybe*, with 53 known hallucinogenic species in Mexico, is the most important and diverse group of sacred mushrooms used by Mexican indigenous cultures. *Psilocybe caerulescens*, known by the present-day Nahuatl Indians as *teotlaquilnācatl*, is hypothesized to be the ceremonially-used *teonanācatl* mushroom cited by Sahagún in the 16th century, the true identity of which has remained obscure for centuries. Correcting a widely disseminated error derived from early published information on Mexican hallucinogenic mushrooms, emphasis is placed on the fact that *Panaeolus* species have never been used traditionally in Mexico. Reports of the use of species of *Amanita*, *Clavaria*, *Conocybe*, *Cordyceps*, *Dictyophora*, *Elaphomyces*, *Gomphus*, *Lycoperdon*, *Psathyrella*, and *Stropharia* as sacred or narcotic mushrooms are discussed. A brief history of the discovery of hallucinogenic mushrooms in Mexico is presented, as well as notes on their taxonomy, distribution, and traditional use in Mexico.

Hongos Alucinógenos en México: Historia, Taxonomía, Distribución Geográfica y Uso Tradicional. *Psilocybe*, con 53 especies alucinógenas conocidas en México, es el grupo más importante y más diverso de hongos sagrados usados por las culturas indígenas mexicanas. Se propone aquí que *Psilocybe caerulescens*, nombrado por los nahuatl de hoy día *teotlaquilnācatl*, es el hongo ceremonial *teonanācatl* citado por Sahagún en el siglo XVI, cuya identidad verdadera permanece oscura desde hace siglos. A fin de corregir un error muy diseminado derivado de los primeros datos publicados sobre los hongos alucinógenos mexicanos, se hará hincapié en el hecho de que las especies *Panaeolus* nunca han sido usadas tradicionalmente en México. Se discutirán aquí informes sobre el uso de especies de *Amanita*, *Clavaria*, *Conocybe*, *Cordyceps*, *Dictyophora*, *Elaphomyces*, *Gomphus*, *Lycoperdon*, *Psathyrella* y *Stropharia* como hongos sagrados o narcóticos, y se presentará también una breve historia del descubrimiento de hongos alucinógenos en México, como también algunos datos sobre su taxonomía, su distribución, y su uso tradicional en México.

Key Words: Ethnomycology, sacred mushrooms, *Psilocybe*, distribution, shamanism, hallucinogens.

Introduction

Hallucinogenic mushrooms, known variably as entheogenic, magic, medicinal, neurotropic, psychedelic, psychoactive, sacred, saint, or visionary mushrooms, were used by different indigenous groups in Mexico prior to the Spanish Conquest (see Fig. 1), but were unknown to science until the 20th century. Since the 1950s, when their ceremonial use by indigenous peoples was rediscovered

(Wasson 1957; Heim and Wasson 1958), hallucinogenic mushrooms have received a great deal of scientific and medical as well as popular attention. The explosion in recreational use of these mushrooms during the 1960s, and the resulting crackdown by law enforcement agencies, has produced negative consequences and legal difficulties for researchers as well as for traditional users of the mushrooms (Guzmán 2003), yet ceremonial use persists among certain peoples in Mexico. The present paper traces some of the historical confusion surrounding the identities of these mushrooms and comments on their taxonomy, distribution, and traditional use in Mexico.

¹Published online 23 October 2008.

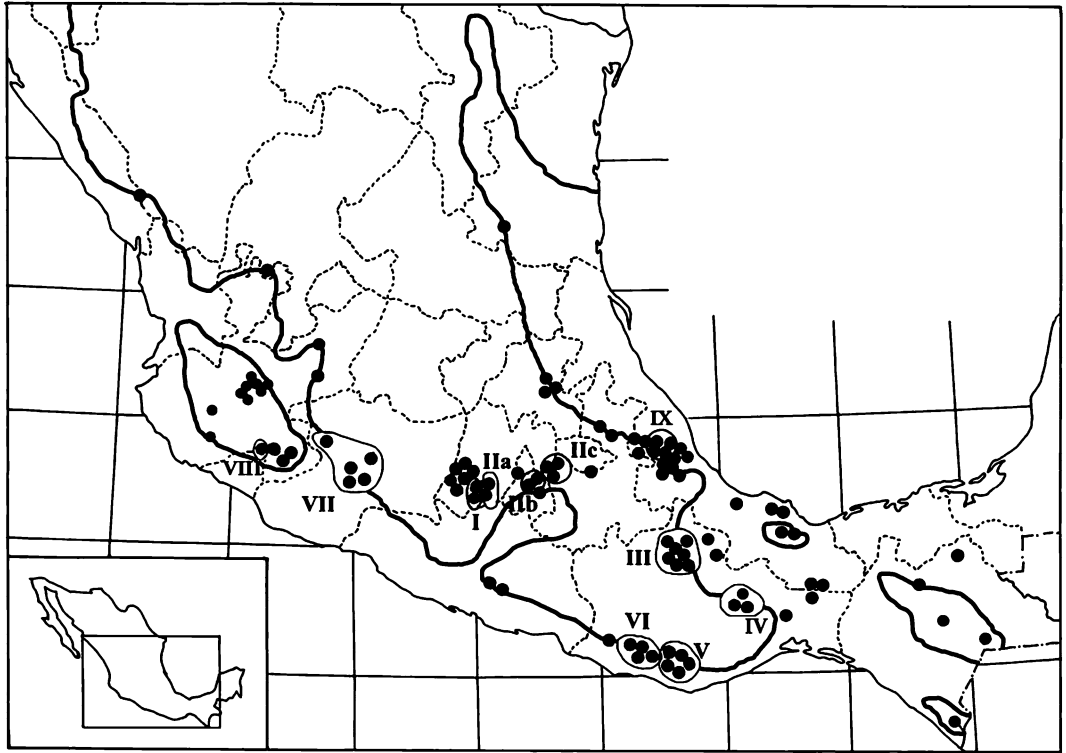


Fig. 1. Distribution of sacred species of *Psilocybe* in Mexico and the indigenous peoples who use them. Each dot represents one locality, or several adjacent localities. The thick solid line delineates mountainous areas with a temperate climate (1,500 m altitude or higher). Dotted lines indicate state borders within Mexico. Thin solid lines encircle current territories of mushroom-using indigenous groups: I: Matlazincas; II: Nahuatls (a: Nevado de Toluca; b: Popocatepetl volcano; c: Necaxa); III: Mazatecs; IV: Mixes; V: Zapotecs; VI: Chatins; VII: Purepechas (Michoacan); VIII: Nahuatls (Colima); IX: Totonacs (Veracruz). All groups indicated have been confirmed to use ceremonial mushrooms through the present except for the Colima Nahuatls (VIII).

The Rediscovery of Hallucinogenic Mushrooms in Mexico

References to sacred mushroom use in Mexico are found in the very earliest written documents or codices produced in the Spanish New World. The Franciscan Fray Bernardino de Sahagún (1569–1582) mentions mushrooms used in special ceremonies by the Nahuatl Indians; he called these mushrooms *teonanácatl*, meaning “flesh of the gods.” In the Magliabechiano Codex, Sahagún presents a color drawing of a Nahuatl Indian eating a blue-staining mushroom, probably *Psilocybe caeruleascens* (discussed later). The Spaniards, however, suppressed ceremonial mushroom usage, and all mention of sacred mushrooms disappeared from the literature, leading an American botanist (Saffor 1915) to posit that *teonanácatl* was not a mushroom at all but *Lophophora williamsii* (Lemaire) Coulter,

the hallucinogenic *peyote* cactus of Mexico and from the southwestern United States.

The identity of *teonanácatl* as a mushroom was ultimately confirmed by renowned ethnobotanist Richard Schultes (1939). Schultes acted on information provided to him by the Austrian physician Blas Pablo Reko, who reported that Mazatec Indians in the mountain town of Huautla de Jiménez in northern Oaxaca used mushrooms in religious rites. Reko gathered specimens of the mushrooms, which he sent to anthropologist Roberto Weitlaner. The North American anthropologist Jean Bassett Johnson, following Weitlaner’s lead, went to Huautla de Jiménez in 1939 and became, as far as we know, the first Western scientist to observe a nocturnal sacred mushroom ceremony, although he did not ingest the mushrooms himself (Schultes 1940;

Reko 1945; Wasson and Wasson 1957; Heim and Wasson 1958; Singer 1958).

Both Schultes and Reko went to Huautla in 1938 and brought two species of "sacred mushrooms," but Schultes gathered in the field a third collection, all of them deposited in the Farlow Herbarium at Harvard University. Only the third of the three packages was identified at that time, as *Panaeolus campanulatus* var. *sphinctrinus* (Fr.) Bres., better known as *P. sphinctrinus* (Fr.) Quél. Apparently underestimating the complexity and diversity of sacred mushroom usage in Mexico, Schultes (1939) assumed *P. sphinctrinus* collected in the Mazatec area of Oaxaca to be the *teonanácatl* of the Nahuatl (Davis 1996; Guzmán 1959).

In the 1940s, mycologist Rolf Singer studied Schultes's collections at Harvard University. He confirmed the identification of the first package as *Panaeolus sphinctrinus*, while identifying the other two packages as *Psilocybe cubensis* and *Deconica* sp. Singer (1949) published two little notes, one under *Panaeolus* and the other under *Psilocybe*, in which he referred to them as narcotic mushrooms used by Mexican Indians. Though Singer (1975) later removed *Panaeolus* from the list of sacred mushrooms used in Mexico based on information supplied by Guzmán (1959), the continued citation of Singer's (1949) note has led to the persistent misconception that species of *Panaeolus* are among the sacred mushrooms of Mexico.

Though hallucinogenic species of *Panaeolus* do occur in Mexico, e.g., *P. subbalteatus* Berk. and Broome and *P. cyanescens* Berk. and Broome (= *Copelandia cyanescens* [Berk. and Bromme] Sacc.), no species of *Panaeolus* appears to have been used in any way by indigenous peoples in Mexico; indeed, they are typically considered poisonous (Guzmán 1959). How, then, was Schultes's and Reko's collection of *Panaeolus* first mistaken for one of the sacred Mazatec mushrooms? Apparently one package—the one identified as *Panaeolus*—was personally collected by Schultes, while the other two packages were sold to Schultes by a Mazatec Indian (Davis 1996). It is possible, then, that Schultes mistook the dung-inhabiting *Panaeolus sphinctrinus* in the field for one of the sacred mushrooms, for instance, *Psilocybe mexicana*, which it closely resembles in appearance.

The true identity of Mazatec sacred mushrooms and the nature of their use was finally

revealed by R. Gordon Wasson and his wife, Valentina Pavlovna. They first came to Mexico in 1952 looking for clues to understanding the mushroom stones of the ancient Maya. Following in Schultes's footsteps, they reached Huautla de Jiménez in 1953, accompanied by Weitlaner, and there met the Mazatec shaman, María Sabina. Two years later, Wasson returned, accompanied by the photographer Allan Richardson. At that time he participated in the sacred mushroom rite under María Sabina's guidance, thus becoming the first scientist to consume sacred mushrooms in a ritual context (Wasson 1957; Wasson et al. 1974).

Wasson subsequently persuaded the French mycologist Roger Heim to accompany him to Huautla de Jiménez in 1956, where they consumed sacred mushrooms with María Sabina (Heim and Wasson 1958). Heim (1956) was the first to identify several species of *Psilocybe* as the principal sacred mushrooms of Mexico. Heim supplied the Swiss chemist Albert Hofmann with *Psilocybe mexicana* cultured from specimens gathered in Huautla de Jiménez, and Hofman's team (whose isolated the LSD-like indole alkaloid) subsequently isolated the indol they called psilocybin (Hofmann et al. 1958).

After working with Schultes's initial herbarium collections a decade prior (Singer 1949), Singer arrived in Mexico in 1957 to study the hallucinogenic mushrooms, with Gastón Guzmán as his assistant (Singer 1958). Singer also collaborated with mycologist Alexander Smith to produce the first monograph on the hallucinogenic *Psilocybe* species (Singer and Smith 1958). Guzmán, who had also established collaborations with Schultes, Wasson, and Heim, began working on *Psilocybe* at this time (see Guzmán 1959, 1960). During his studies in the Farlow Herbarium at Harvard University, Guzmán found that the second package of mushrooms bought by Schultes and identified by Singer as *Deconica* sp. was actually *Psilocybe caerulescens*, an important sacred mushroom among the Mazatecs (see Table 1).

Heim and Wasson (1958) also reported the ceremonial usage of *Cordyceps capitata* (Holms.:Fr.) Link and *C. ophioglossoides* (Fr.) Link as well as *Elaphomyces* spp. by the Nahuatl. These reports have been confirmed, as described below. Hofmann was unable to detect any hallucinogenic compounds in *C. capitata* (see Heim and Wasson 1958), but since the specimens he assayed were dry and stale, further investigation is warranted.

TABLE 1. THE PRINCIPAL HALLUCINOGENIC SPECIES OF *PSILOCYBE* IN MEXICO AND THE INDIGENOUS GROUPS THAT USE THEM.

Species	Indigenous Group									
	Charins	Matlazincas	Mazatecs	Mixes	Nahuatl	Purepechs	Totonacs	Zapotecs		
<i>P. aztecorum</i> R. Heim emend. Guzmán					X					
<i>P. barretiae</i> Cifuentes and Guzmán emend. Guzmán					X					
<i>P. caeruleus</i> Murrill var. <i>caeruleus</i>			X	X	X	?	X		X	
<i>P. caeruleus</i> var. <i>mazatecorum</i> R. Heim =										
<i>P. caeruleus</i> var. <i>nigripes</i> R. Heim =										
<i>P. caeruleus</i> var. <i>albida</i> R. Heim										
<i>P. caeruleus</i> var. <i>ombrophila</i> (R. Heim) Guzmán			X	X						
<i>P. caeruleus</i> var. <i>mazatecorum</i> f. <i>ombrophila</i> R. Heim =										
<i>P. mixaeensis</i> R. Heim			X							
<i>P. candidipes</i> Singer and A.H. Smith			X	X			X			
<i>P. cordispora</i> R. Heim			X	X	X				X	
<i>P. cubensis</i> (Earle) Singer = <i>Stropharia cubensis</i> Earle	X									
<i>P. fagicola</i> R. Heim emend. Guzmán = <i>P. wassoniorum</i> Guzmán and Pollock					?		?			
<i>P. hoogshagenii</i> R. Heim var. <i>hoogshagenii</i>				X					X	
<i>P. mexicana</i> R. Heim	X		X	X	X				X	
<i>P. muliercula</i> Singer and A.H. Smith = <i>P. wasonii</i> R. Heim		X								
<i>P. sanctorum</i> Guzmán		X								
<i>P. subcubensis</i> Guzmán	X		X	X	X				X	
<i>P. yungensis</i> Singer and A.H. Smith = <i>P. acutissima</i> R. Heim			X							
<i>P. zapotecorum</i> R. Heim emend. Guzmán = <i>P. zapotecorum</i> f. <i>elongata</i> R. Heim	X		X				X		X	

Aside from *Cordyceps* and *Elaphomyces*, and the hypothesized ancient usage of *Amanita muscaria* (L.:Fr.) Pers. ex Hook. (see Lowy 1974; Schultes and Hofmann 1979; Mapes et al 1981), *Psilocybe* is the only genus of sacred mushroom definitely used in Mexico. However, a number of other “narcotic” mushrooms have been dubiously or erroneously reported from Mexico (Schultes 1939, 1940, 1976; Reko 1945; Heim and Wasson 1958; Schultes and Hofmann 1979). These include species of *Conocybe*, *Clavariadelphus* (as *Clavaria*), *Dictyophora*, *Gomphus* (as *Neurophyllum*), *Lycoperdon*, *Panaeolus* (as already described), and *Psathyrella*. The causes of confusion differ in each case. With *Lycoperdon*, for instance, the error can be traced to a single inebriated informant (Ott et al. 1975), while *Clavariadelphus* and *Gomphus* were falsely implicated because they shared with *Cordyceps* the vernacular name *hongo amarillo* (“yellow mushroom”).

The Hallucinogenic *Psilocybes* of Mexico

Guzmán (1983) showed that hallucinogenic species of *Psilocybe* occur on all continents. However, only in Mexico and perhaps in New Guinea (see Heim et al. 1967) are they confirmed to be traditionally consumed as visionary or “sacred” mushrooms. There is also some evidence to suggest ceremonial use of *Psilocybe* in Colombia and Africa (Samorini 2001; Guzmán et al. 2004). A recent review of all the known taxa of *Psilocybe* (Guzmán 2005) included around 250 species, 150 of which are hallucinogenic. Of these, 53 hallucinogenic species have been identified in Mexico (Guzmán 2005), though less than a third of these are known to be used ceremonially (see Table 1).

As a rule, hallucinogenic *Psilocybe* species can be distinguished from non-hallucinogenic *psilocybes* by their tendency (in almost all cases) to oxidize blue, and by their farinaceous odor and taste. The hallucinogenic Mexican species can be divided into three broad groups corresponding to different geographical-ecological zones (Fig. 1). The first group is found in mountainous areas with a temperate climate, typically in meadows or open, grassy pine forests. *Psilocybe aztecorum*, *P. muliercula*, and *P. sanctorum* are prominent members of this group. The second group is found in tropical lowlands, and includes little-known forest species such as *P. uxpanapensis* Guzmán,

P. weldenii Guzmán, *P. singeri* Guzmán, and *P. veraecrucis* Guzmán and Pérez-Ortiz, as well as the cosmopolitan dung-inhabiting pasture species, *P. cubensis* and *P. subcubensis*. The third group, encompassing the great majority of hallucinogenic species in Mexico, is found in the intermediate zones where a moist, subtropical climate and hilly terrain give rise to mesophytic cloud forest at elevations of 1,000–1,600 m. *Psilocybe yungensis*, the *P. fagicola*-group, and *P. candidipes* are common forest species in this zone, while *P. mexicana* and *P. cubensis* are found in meadows, and *P. zapotecorum*, *P. subzapotecorum* Guzmán, *P. caeruleascens*, and *P. hoogshagenii* are found in ravines with muddy eroded soil, often without vegetation (Guzmán 1978, 1983, 1990).

Sacred Mushroom Usage in Modern Mexico

Several indigenous groups have been confirmed to practice the ceremonial use of sacred mushrooms in Mexico: the Nahuatl in the states of Mexico, Morelos, and Puebla; the Matlazinc in the state of Mexico; the Totonacs in the state of Veracruz; and the Mazatecs, Mixes, Zapotecs, and Chatins in the state of Oaxaca.

To the western of the volcano Popocatepetl (state of Mexico), Nahuatl ritually consume *Psilocybe aztecorum*, which grows in alpine meadows mixed with pines. Their name for it, *apipitzin* (or *niño de las aguas* in Spanish), means “rain water child” (Heim and Wasson 1958; Guzmán 1978). On the southern slope of the same volcano (but in the state of Morelos), in the subtropical cloud forest around Tetela del Volcán, the Nahuatl consider *P. barrerae* to be sacred (Elizur Montiel-Arcos and Víctor Mora, personal communication).

The Nahuatl from the townships of Tenango del Valle and San Pedro Tlanixco (both in the Nevado de Toluca region, state of Mexico) use *Psilocybe muliercula*, which they call *siwatsitsintli* or *mujercitas* (“little women”), often in tandem with *Cordyceps capitata* or *C. ophioglossoides*, known as *hombrecitos* (“little men”). In their sacred mushroom ceremonies, some people eat only *mujercitas*, and others eat only *hombrecitos* (apparently, no one eats both, and the sex of the mushroom eater does not determine the “sex” of the mushrooms they eat). One or more specimens of *Elaphomyces* (the truffle-like, hypogeous mushroom from which the *Cordyceps* grows) typically

occupy center stage during the ritual, usually on the altar or on a sleeping mat on the ground. At the end of the ceremony everyone partakes of *el gran mundo* (“the great world”), as *Elaphomyces* is called.

Also in the Nevado de Toluca region, but to the west of the Nahuatl, are the Matlazincas. Their sacred mushrooms are *Psilocybe muliercula* and *P. sanctorum* (Guzmán and López-González 1970), which they call *santitos* (“little saints”).

Further to the east, the Nahuatl of Necaxa (state of Puebla) use *Psilocybe caerulescens* and *P. mexicana* as sacred mushrooms (Guzmán 1960). They call these mushrooms *teotlaquilnanácatl*, meaning “sacred mushroom that paints or describes.” As the blue-staining mushroom depicted in Sahagún’s Magliabechiano Codex bears a strong resemblance to *P. caerulescens*, and the contemporary Nahuatl word bears a striking resemblance to the enigmatic name *teonanácatl* originally reported by Sahagún in the 16th century, this author hypothesizes that they are one and the same.

Still further to the east, the Totonacs (state of Veracruz) used *P. caerulescens* as well as *P. cordispora* extensively in the past, though the tradition is now mostly extinct (Stresser-Péan and Heim 1960). Guzmán et al. (2005) also found hallucinogenic mushrooms of the *P. fagicola*-group growing commonly in the Totonac region.

Finally, in the state of Oaxaca, sacred mushroom usage is well documented for the Mazatecs of Huautla de Jimenez, the Mixes of Mazatlan, the Zapotecs of San Agustín Loxicha, and the Chatins of Yaitepec. The well-known species *P. caerulescens*, *P. mexicana*, *P. cubensis*, and *P. zapotecorum*, as well as several others (see Table 1), are used in this region.

In addition to the confirmed reports listed above, there is vestigial evidence of sacred mushroom usage elsewhere in Mexico. Pieces of pottery found in the eastern foothills of Nevado de Colima (state of Colima) suggest that the Capacha and maybe the Nahuatl used sacred mushrooms. One piece (see Schultes and Hofmann 1979) shows four Indians with amazed eyes surrounding a very tall mushroom that closely resembles *P. zapoteco*. Another piece (Doniz et al. 2001) shows a woman with large eyes holding a tall mushroom in her right hand. In both cases, the large eyes may depict dilated pupils, while the tall mushrooms may illustrate the perceptual alteration

known as gigantism; both are commonly-noted effects of hallucinogenic *Psilocybe* consumption (e.g., Guzmán 1990).

Still another indigenous group that may have used hallucinogenic mushrooms are the Purepechas in the state of Michoacán, where Guzmán (1983) reported *Psilocybe caerulescens*. The Tzotzil Maya of Chiapas may also have been users in the distant past, but there are no indications of use today or in recent times (Laughlin 1975).

The Sacred Mushroom Ceremony

When Reko (1945), Schultes (1939, 1940), Wasson and Wasson (1957), and Guzmán (1959, 1960) conducted their research, they noted how the sacred mushroom ceremonies had been strongly influenced by five centuries of contact with Catholicism. Now, after five decades of contact with recreational drug users and tourists, the mushroom ceremonies have been further changed. Sacred mushrooms are now widely commercialized, and even the ceremonies themselves have become a kind of tourist attraction.

Despite regional cultural and language differences, as well as different species of mushrooms used, the sacred mushroom ceremonies show some common elements throughout Mexico. The ceremony is always held at night, apparently in order to reduce distractions and intensify the mental concentration of the mushroom takers. The ceremony is always held under the guidance of a shaman or an older experienced person, either woman or man, and is usually held in the guide’s home in front of a Catholic altar.

Typically the mushrooms are placed in a gourd, or *jicara* (*Crescentia cujete* L.), and incensed with *copal* resin (mostly from *Protium* spp.). The ceremonies show a mixture of native and Catholic elements; prayers may be in Spanish and/or indigenous tongues. The mushrooms are typically counted out in “male-female” pairs, though only one species of mushroom is used for a given ceremony (except in the Nevado de Toluca region, where, as noted above, *Cordyceps* and *Elaphomyces* are used in conjunction with *Psilocybe*). Participants are traditionally offered up to six pairs of mushrooms, though with the advent of psychedelic tourism, outsiders may be initially offered only one or two, and are required to pay more if they want a higher dose. It is widely believed that excessive doses (more than 12 mushrooms) can produce mental disorders,

and that different species of *Psilocybe* should not be mixed. The mushrooms are eaten on an empty stomach, and alcohol and medicines are avoided before and during the ceremony, and other restrictions (for example, avoiding travel in the days following the ceremony) may be observed (Guzmán 2003).

Conclusion

Despite a great deal of confusion in the literature, it is now clear that the sacred mushrooms of Mexico belong almost exclusively to the genus *Psilocybe*. Although several hallucinogenic species of *Psilocybe* occur in the lowlands of Mexico, traditional ceremonial usage survives today only at higher elevations (1,500 m and above; see Fig. 1). This is likely due to the persecution of mushroom worship by the Catholic Church during the Spanish Colonial period, so that the ceremony persisted only among groups that remained in or retreated to remote mountainous areas.

A modern anecdote about the "Mushroom Church" of the Nahuatl near Chignahuapan in the state of Puebla (Guzmán et al. 1975) is only tangentially related to sacred mushroom use, but nevertheless illustrates the tenacity of indigenous mushroom worship and the continuing efforts of the Church to suppress it.

The "Mushroom Church" was built to honor a specimen of the shelf mushroom *Ganoderma lobatum* (Schwein.) G.F. Atk. that shows an image of Christ traced on its pale, pore-bearing undersurface. The mushroom was found in the forest by a Nahuatl native more than 200 years ago, an event considered to be a miracle by local people. Guzmán et al. (1975) speculate that this supposed "miracle" may have been fabricated by some creative 18th-century priest as a way of enticing the Nahuatl away from their secretive worship and consumption of hallucinogenic mushrooms, and redirecting their mushroom reverence toward Christ. For two centuries, the holy mushroom was guarded and revered privately in local households. Finally, in the 1940s, a special church was built to honor the miraculous mushroom. The mushroom was displayed in a crystal box at the main altar and the church was named *Nuestro Señor del Honguito* ("Our Lord of the Little Mushroom"). Recently, however, the Catholic authorities, ever vigilant for pagan revivals, changed the name of the church to

Nuestra Señora del Sagrado Corazon de Jesús ("Our Lady of the Sacred Heart of Jesus"), and removed the mushroom from the central place of worship to a corner alcove where they placed it in a metal box with a cross. Nevertheless, the Nahuatl continue to worship the mushroom, praying in front of the metal box before proceeding to the main altar.

Acknowledgments

This author expresses his thanks to his colleagues Etelevina Gándara, Virginia Ramírez-Cruz, and Florencia Ramírez-Guillén (all of them in Instituto de Ecología at Xalapa), Laura Guzmán-Dávalos (Universidad de Guadalajara), Elizur Montiel-Arcos and Victor Mora (Universidad de Morelos), and James Q. Jacobs (Arizona) for their help in the laboratory and with other information. In the past, professors Richard E. Schultes, Rolf Singer, Roger Heim, and R. Gordon Wasson provided much important information and bibliographic material. Teofilo Herrera (University of Mexico) assisted in making initial contacts with Singer and Heim. Manuel Hernández (Instituto de Ecología at Xalapa) helped with computer tasks. David Arora and Glenn H. Shepard, Jr. assisted in the final revision of the manuscript.

Literature Cited

- Davis W. 1996. One River. Touchstone, New York.
- Doniz, R., Ma. de los A. Olay, and J. C. Reyes. 2001. Museo Universitario Alejandro Rangel Hidalgo. Pages 16–31 in *Los Tesoros de Colima. Arqueología Mexicana*, ed. especial 9.
- Guzmán G. 1959. Sinopsis de los Conocimientos Sobre los Hongos Alucinógenos Mexicanos. *Boletín de la Sociedad Botánica de México* 24:14–34.
- . 1960. Nueva Localidad de Importancia Etnomicológica de los Hongos Neurotrópicos Mexicanos. *Ciencia, México*, 20:85–88.
- . 1978. Variation, Distribution, Ethnomycological Data and Relationships of *Psilocybe aztecorum*, a Mexican Hallucinogenic Mushroom. *Mycologia* 70:385–396.
- . 1983. The Genus *Psilocybe*. *Beihefte Nova Hedwigia* 74, Cramer, Vaduz.
- . 1990. Wasson and the Development of Mycology in Mexico. In TH. J. Riedlinger, ed., *The Sacred Mushroom Seeker: Essays for*

- R. Gordon Wasson. Historical, Ethno-and Economic Botany Series 4. Discorides, Portland.
- . 2003. Traditional Uses and Abuses of Hallucinogenic Fungi: Problems and Solutions. *International Journal of Medicinal Mushrooms* 5:57–59.
- . 2005. Species Diversity of the Genus *Psilocybe* in the World Mycobiota, with Special Attention to Hallucinogenic Properties. *International Journal of Medicinal Mushrooms* 7:305–331.
- and A. López-González, 1970. Nuevo Hábitat y Datos Etnomicológicos de *Psilocybe muliercula*. *Boletín de la Sociedad Mexicana de Micología* 4:44–48.
- , J. Q. Jacobs, F. Ramírez-Guillén, D. Murrieta, and E. Gándara. 2005. The Taxonomy of *Psilocybe fagicola*-Complex. *Journal of Microbiology (Korea)* 43:158–165.
- , F. Ramírez-Guillén, and M. Torres. 2004. The Hallucinogenic Species of *Psilocybe* in Colombia, Their Indian Use, New Records, and New Species. *International Journal of Medicinal Mushrooms* 6:83–93.
- , R. G. Wasson, and T. Herrera, 1975. Una Iglesia Dedicada al Culto de un Hongo, “Nuestro Señor del Honguito,” en Chignahuapán, Puebla. *Boletín de la Sociedad Mexicana de Micología* 9:137–147.
- Heim, R. 1956. Les Champignons Divinatoires Utilizes dans les Rites des Indes Mazatèques, Recueillis du Cours de Leur Premier Voyage an Mexique in 1953, par M^{me} Valentina Pavlovna Wasser et M.R. Gordon Wasson. *Comptes Rendus des Séances de l'Academie des Sciences* 242:965–968.
- , R. Cailleux, R. G. Wasson, and P. Thévenard. 1967. Nouvelles Investigations sur les Champignons Hallucinogènes. *Archives du Muséum d'Histoire Naturelle*, 7^e Série, IX, Paris.
- and R. G. Wasson. 1958. Les Champignons Hallucinogènes du Mexique. Ed. *Museum National d'Histoire Naturelle*, Paris.
- Hofmann, A., R. Heim, A. Brack, and H. Kobel. 1958. *Psilocybin*, ein Psychotroper Wirkstoff aus dem Mexikanishchen Rauppilz *Psilocybe mexicana* Heim. *Experientia* 14:107–109.
- Laughlin, R. M. 1975. The Great Tzotzil Dictionary of San Lorenzo Zinacatán. *Smithsonian Contributions to Anthropology Series*, #19. Washington, D.C.
- Lowy, B. 1974. *Amanita muscaria* and the Thunderboltd Leyend in Guatemala and Mexico. *Mycologia* 66:188–190.
- Mapes, C., G. Guzmán, and J. Caballero. 1981. *Etnomicrología Purépecha*. El Conocimiento y uso de los Hongos en la Cuenca de Pátzcuaro, Michoacán. Dirección de Culturas Populares and Sociedad Mexicana de Micología, Mexico City.
- Ott, J., G. Guzmán, J. Roman, and J. L. Díaz. 1975. Nuevos Datos Sobre los Supuestos Lycopérdicos Psicotrópicos y dos Casos de Intoxicación Provocados por Hongos del Género *Scleroderma* en Mexico. *Bol. Soc. Mex. Mic.* 9:67–76.
- Reko, B. P. 1945. *Mitobotánica Zapoteca*. Private ed., Tacubaya, D.F.
- Saffor, W. E. 1915. An Aztec Narcotic. *Journal of Heredity* 6:291–311.
- Sahagún, Fray B. de. 1569–1582. *Historia de las Cosas de la Nueva España*. Mexico City (with several reprints both in Spanish and English, besides two Indian bilingually codexes, in Nahuatl and Spanish, directed by Sahagún, also reprinted).
- Samorini, G. 2001. *Fungi Allucinogeni*. Studi Etnomicrologici. Telesterion, Duzza, Italy.
- Schultes, R. E. 1939. *Plantae Mexicanae II*. The Identification of Teonanácatl, a Narcotic Basidiomycete of the Aztecs. *Botanical Museum Leaflets, Harvard University* 7:37–56.
- . 1940. Teonanácatl: The Narcotic Mushroom of the Aztecs. *American Anthropologist* 42:429–443.
- . 1976. *Hallucinogenic Plants*. Golden Press, New York.
- and A. Hofmann. 1979. *Plants of the Gods: Origins of Hallucinogenic Use*. McGraw-Hill Books, New York.
- Singer, R. 1949. The Agaricales (Mushrooms) in Modern Taxonomy. *Lilloa* 22:5–832.
- . 1958. *Mycological Investigations on Teonanácatl, the Mexican Mushroom I*. *Mycologia* 50:239–261.
- . 1975. *The Agaricales in Modern Taxonomy*. Third ed. Cramer, Vaduz.
- and A. H. Smith. 1958. *Mycological Investigations on Teonanácatl, the Mexican Mushrooms II*. A Taxonomic Monograph of *Psilocybe*, Section *Caerulescentes*. *Mycologia* 50:262–303.
- Stresser-Péan, G. and R. Heim. 1960. Sur les Agarics Divinatoires des Tonaques. *Comptes*

- Rendus des Séances de l' Academie des Sciences 250:1115-1160.
- Wasson, R. G. 1957. Seeking the Magic Mushroom. *Life*, May 13, New York.
- , G. Cowan, F. Cowan, and W. Rhodes. 1974. María Sabina and Her Mazatec Mushroom Velada. *Ethnomicological Studies* 3. Harcourt Brace Jovanovich, New York (four cassettes).
- Wasson, V. P. and R. G. Wasson. 1957. *Mushrooms, Russia and History*. Pantheon Books, New York.