

Chapter 17

Fungi in the Maya Culture: Past, Present and Future

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INTRODUCTION

Fungi are strongly connected with the indigenous cultures in Mesoamerica. Fungi have been used in rituals; for medical purposes; or as food, as observed in the Mazatec, Nahuatl, Purepecha, Raramuris, and Zapotec cultures, among others in Mexico (Heim and Wasson 1958; Guzmán 1984, 1997; Lowy 1972a, 1974, 1977; Mapes, Guzmán, and Caballero 1981; Sahagún 1569–1582; Schultes and Hofmann 1979; Wasson and Wasson 1957; Wasson 1980). However, the information available is often sketchy because, at the beginning of the Spanish Colony following the Conquest, the indigenous cultures were languishing to extirpate their religious ceremonies (Lowy 1972b; Wasson 1980). The work of Sahagún (1569–1582), with his *Magliabecchiano* and *Florentino* Codices, is a good expression of the Nahuatl Culture concerning the knowledge of fungi. In the *Magliabecchiano* Codex, for instance, it is possible to see an Aztec eating a sacred mushroom with a personage at his back. For the Catholic Church, this personage is the devil; but, for the Indians, it is the god of the mushroom, *Teonanácatl*, who takes the Indian to his sacred and hallucinogenic world (Heim and Wasson 1958; Guzmán 1984; Wasson and Wasson 1957; Wasson 1980).

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Wasson (1980) observed that we know virtually nothing about the fungi of the Maya Culture despite its great interest. Considered that the Maya area encompasses the whole of the Yucatán Peninsula; almost all of the Mexican states of Chiapas and Tabasco; and the Central American countries of Guatemala, Belize, El Salvador, and Honduras, the extent of the problem is apparent. The lack of information is not due to the absence of fungi use among the Maya, but to the great destruction that the Spanish Conquest inflicted on Maya Culture. Diego de Landa (1560) freely admitted that he burned codices and destroyed numerous idols in Yucatán; in his defense, de Landa stated that their destruction was necessary because those things contained nothing but superstitions and devils (Lowy 1972a, b; Wasson 1980). There are, however, many studies on the Maya Culture. In 1990, for example, an international symposium was held at Wakayama University in Japan; the main subject of this symposium was the Maya Culture (Guzmán 1992; Miyanishi 1992). Sadly, numerous mushroom stones and a few codices are the only information that we have on the culture of fungi among the past Maya Culture. Although we have evidence of the use of fungi as food or medicine in the Maya region, it seems that the practice of using ceremonial fungi has long since disappeared.

This paper summarizes the available information on mushroom use among the Maya, both in the past and present. This work is divided into three sections: (1) an historical examination of what we know about past Maya fungi use; (2) an overview of current mycological and ethnomycological studies in the Maya region; and (3) the first results of the fungi inventory at El Edén Ecological Reserve, which are currently being carried out.

KNOWLEDGE IN THE PAST

In spite of the destruction effected by de Landa (1560) in Yucatán, Lowy (1972a, b) noted that it is still possible to study the numerous mushroom stones and four important codices (i.e., Madrid, Paris, Dresden, and Galindo) remaining from the Maya Culture. The Galindo Codex was named by Lowy after he found it in the house of Mr. José Galindo (now deceased), a Guatemalan Indian in Huehuetenango.

Lowy (1972a, b) deduced that the Galindo Codex is a copy of the Madrid Codex after observing a similar image in both codices, in which an Indian painted in black is seen making an offering to an important seated personage. According to Lowy, the special object in the Indian's right hand is a stylized fruit body of *Amanita muscaria* (L. : Fr.) Hook., with typical wart-like patches on the cap. Lowy based his interpretation on the fact that this mushroom is now common in pine forests in both Guatemala and Chiapas, where it is

surrounded in some mystery for the Indians. At present, they call this mushroom by the common Quiche names of “kaquiljá” (or “thunderbolt”) and “itzel ocox” (or “evil mushroom”).

Lowy (1974) noted the connection between the Thunderbolt Legend and *A. muscaria*. According to him, the Indians in Guatemala and Chiapas link this fungus with the thunderbolt because of its strong, rare power (the next section, however, presents another interpretation of the fungus and its relationship to the Thunderbolt Legend). Lowy (1974) also observed that the common name “yuyo” (from the name of a red common wild fruit) was applied both to the edible *Amanita caesarea* (Scop. : Fr.) Grev. as well as the poisonous *A. muscaria*; the latter is also called “yuyo del rayo” or “yuyo del trueno” (“rayo” and “trueno” mean thunderbolt). Guzmán and Ramírez-Guillén (2001) found that *A. caesarea* in Chiapas is a complex of four species: *A. jacksonii* Pomerleau, *A. laurae* Guzmán and Ramírez-Guillén, *A. tullossii* Guzmán and Ramírez-Guillén, and *A. yema* Guzmán and Ramírez-Guillén — all of them named “yuyo.” *A. caesarea* s. str. is confined only to the central and northern portions of Mexico.

It seems that the Quiche Indians of Guatemala consider *A. muscaria* to be a sacred fungus because, according to Wasson and Wasson (1957), the name “holom-ocox” in the ancient religious pre-conquest book “Popol Vuh” means *A. muscaria*. Interestingly, in both Mexico and Guatemala, *A. muscaria* is now considered to be a “diabolical” mushroom because it is “very poisonous”; at the same time, however, the Indians treat it with respect as a special fungus. In 1977, Villacorta and Villacorta (cited in Torres 1984) postulated that the ancient Maya used sacred mushrooms in their Chichén Itzá sacrifices; in fact, they believed that the victims ate toxic mushrooms before their deaths.

Referring to the Dresden Codex (Dresden Codex Reproduction 1981), Lowy (1980) observed four men (displayed on two pages—two men per page) falling through space, with special leaves on their bodies. Lowy believed that these leaves were stylized mushrooms that related to *A. muscaria*. Other authors believe that those leaves belong to the hallucinogenic plants *Turbina corymbosa* (L.) Raf. (a Convolvulaceae) or *Salvia divinorum* Epl. and Jativa-M. (a Lamiaceae) (Ott 1993; Schultes and Hofmann 1979; Torres 1984), which are now used as narcotic plants by other Indians in Mexico. Another interpretation of the Dresden Codex “falling men” lies in their relationship with the god of rain (Chak) and the fungus *Ustilago maydis* (DC.) Corda, which will be discussed later in the chapter.

All of the above observations on the use of sacred mushrooms have a connection with the ancient mushroom stones found in the Maya highlands. Wasson and Wasson (1957) and Wasson (1980) presented these mushroom stones as evidence of the ritual involving hallucinogenic mushrooms among the Maya. Sapper, was the first to find a mushroom stone in El Salvador in

1898 (Heim and Wasson 1958; Wasson and Wasson 1957). Sapper's original discovery is now in a museum in Zurich.

Kobayasi, who was very interested in the ethnomycology of Mexico, made several facsimiles of the Sapper mushroom, which he presented in 1983 at the Third International Mycological Congress in Tokyo, Japan. At present, there are more than 300 known pieces of mushroom stone, the majority of them the Maya area in Guatemala, although a few are from other cultures in Mexico (de Borhegyi 1961; Lowy 1971; Mayer 1977).

Guzmán (in Mapes, Guzmán, and Caballero 1981) and Guzmán (1984) reported the existence of a small mushroom stone (34 mm high) from an archaeological site of the Purepecha Culture in Patzcuaro, Michoacán, México, which he identified with a button of *A. muscaria*. The Maya mushroom stones are figures 28 to 38 cm high, with a standing man or animal represented below the cap of a mushroom. Torres (1984) and Ohi and Torres (1994) discussed these figures from Guatemala. Along with the little mushroom stone from the Purepecha region, de Borhegyi (1961) found miniature mushroom stones in Guatemala that are 10 to 19 cm high.

Although standing figures are represented in the above stones, Wasson (1980) and Lowy (1980) mentioned two other interesting figures, where men are falling or plunging into a dreamlike state. These figures show a man with his feet supporting the cap of the mushroom. These falling figures have a strong relationship with the hallucinogenic effects of the sacred mushrooms, because and a person flying in space. According to Lowy (1980), these figures relate to the falling human figures represented in the Dresden Codex, where the falling men are plunging gods—floating or falling from the sky. In fact, anyone who eats hallucinogenic mushrooms feels as if he or she is flying in space; when the effects subside, he or she falls back to earth. According to Wasson (1980) and Lowy (1980), these falling men in the Guatemalan mushroom stones are strong evidence of the ceremonial use of hallucinogenic fungi in the Maya Culture. However, as noted with the Dresden Codex “falling men,” another interpretation of these figures (i.e., in relation to Chak, the god of rain, and *Ustilago maydis*) will be discussed later in this paper.

The use of hallucinogenic mushrooms belonging to *Psilocybe* is unknown in the entire Maya region, in spite of the fact that *P. mexicana* Heim, *P. cubensis* (Earle) Singer, *P. subcubensis* Guzmán, and *P. zapotecorum* Heim emend. Guzmán have been reported (Sommerkamp in Ohi and Torres 1994; Torres 1984; Wasson 1980). The first report on a hallucinogenic *Psilocybe* from the Maya region was made by Lowy (1977) in Guatemala. Close to the Yucatán Peninsula in the Tehuantepec Isthmus region (Uxpanapa zone), Guzmán (1979) described the following hallucinogenic species of *Psilocybe*: *P. naematoliformis* Guzmán, *P. singerii* Guzmán, *P. uxpanapensis* Guzmán,

and *P. weldenii* Guzmán. It is possible that the use of *A. muscaria* was replaced a long time ago by species of *Psilocybe*, which is what happened in other parts of Mexico. However, at present, there is no evidence of the use of any sacred mushrooms in the Maya area.

MYCOLOGICAL AND ETHNOMYCOLOGICAL STUDIES IN THE MAYA AREA

In spite of the great diversity of fungi not only in the Maya area, but in all the tropical regions, as noted by Guzmán (1998), there are few reports on the fungi of the Maya region. Guzmán (1998) established that although there are more than 200,000 species of fungi in Mexico, we know only about 6,000 of them. As there are more than 70 percent of all fungi in tropical regions, and we only study a few species every year, it would take more than 200 years (at the present pace) to know all the fungi of Mexico. This slow progress is especially disturbing as tropical vegetation is being destroyed at an alarming rate.

The first records of fungi in the Maya area were made by Millspaugh (1896, 1898), who reported relatively few fungi (among them, *Agaricus yucatanensis* Ellis and Everhart) in his study of Yucatán flora. Standley (1930) researched the same area; in his study, Standley presented a checklist of the 22 fungi species recorded from Yucatán. Hedrick (1935) recorded some lichens from Yucatán, while Guzmán (1982, 1983); Guzmán and Johnson (1974); Guzmán and Madrigal (1967); Guzmán-Dávalos and Guzmán (1982); Mata (1987); Pérez-Moreno and Villarreal (1988); Pérez-Silva, Herrera, and Valenzuela (1992); and Ulloa (1974) studied the fungi of the Maya area of Mexico. Of these works, Ulloa (1974) is the only one confined to molds, although Guzmán (1982) described a few micromycetes.

Ulloa (1974) studied the molds that form pozol—a Mayan beverage that was also recorded by de Landa (1560). Guzmán (1982, 1983), and Guzmán-Dávalos and Guzmán (1982), discussed more than 250 species of fungi from 66 localities on the Yucatán Peninsula; some of them were new records, and others were new species. The papers of Guzmán (1983) and Mata (1987) also deal with the ethnomycology of Yucatán. Related to this latter ethnomycological point, Laughlin (1975) presented several Tzotzil names on fungi, while Barrera-Vázquez, Bastarrachea, and Brito-Sansores (1980) considered some few names on fungi in their respective dictionaries of the Maya Region (also transcribed by Guzmán 1997). However, neither Barrera-Vázquez, Bastarrachea, and Brito-Sansores (1980) nor Laughlin (1975) presented any names related with the sacred mushrooms.

Sommerkamp (1991) and Sommerkamp and Guzmán (1990) presented a discussion of the 21 known edible species from the popular markets in Guatemala, and a checklist of the fungi in the Herbarium of the University of San Carlos of Guatemala; Sommerkamp (1994) discussed the known hallucinogenic species of *Psilocybe*. Guzmán, Torres and Logemann (1985) described *Morchella guatemalensis* Guzmán, Torres, and Logemann from Guatemala. Guzmán (1987) discussed *Pseudofistulina radicata* (Schw.) Burdsal from Yucatán, Guatemala, and El Salvador, this latter report being based on Escobar and Toledo (1977). Logemann et al. (1987) reported a fatal case of poisoning with *Amanita magnivelaris* Peck in Guatemala. There are at present more than three hundred species of fungi known from the Maya area.

Important species of fungi used at present in Yucatán are *Geastrum saccatum*, *Clathrus crispus*, *Pleurotus djamor*, and *Ustilago maydis*, among others (Guzmán 1983). *Geastrum saccatum* is named “looi lu um” (or “flower of the earth”), and is used to stop diarrhea in children known as “mal de ojo.” *Clathrus crispus* is known as “chaaha quai” (i.e., colander of the medicine man or wizard), and is used to control some eye infections using the liquid that is obtained when the mushroom is squeezed. *Pleurotus djamor* is a common pantropical edible fungus known as “xikin che” (or “ear of the woods”); in the present tourist resort of Xcaret (which is close to Cancun, Quintana Roo), employees have a laboratory and greenhouses to cultivate this fungus and cook it in their restaurants. Furthermore, the University of Yucatán, in Merida, has a program on the cultivation of this fungus to teach the technology to the farmers.

There are some important ethnomycological observations to be made regarding *Ustilago maydis*, the edible fungus of the Nahuatl culture known as “huitlacoche”, which is a parasitic fungus on corn. This fungus is called “ta chaak,” “ta chak ixim,” “ixim chaak,” and “nal chaak,” among other names, all of which are related to Chak, the god of rain. It is believed that this fungus falls on the corn from rain, and that the fungus has concentrated the violence of the thunderbolt (Guzmán 1983; Mata 1987). These interesting observations on the fungus that falls from the sky with all the violence of the thunderbolt are strongly related, and demonstrate the connection of *Ustilago maydis* with the Thunderbolt Legend, the Dresden Codex, and the mushroom stones portraying “falling men,” as discussed earlier. Lowy (1974, 1980) stated that the Thunderbolt Legend—which related the thunderbolt with a fungus, and the falling men in both the Dresden Codex and the mushroom stones—are related to the ingestion of *A. muscaria*. Why, then, is all this information not connected with the important edible fungus *Ustilago maydis*, which is also

said to fall from the sky? This is a new interpretation, and may be the most proper way of relating “falling men” and the Thunderbolt Legend. As long as different interpretations exist, it is clear how much study is still needed on the Maya Culture in relationship with the fungi.

THE PROJECT ON THE FUNGI OF EL EDÉN ECOLOGICAL RESERVE, QUINTANA ROO

To cope with the high destruction of vegetation on the Yucatán Peninsula, Arturo Gómez-Pompa (University of California, Riverside) founded a private ecological reserve in the north of Quintana Roo, called “Reserva Ecologica El Edén,” to conserve and study the biodiversity of this site. Two explorations took place in 2000—one in July, and the other in November—to gather all the fungi possible.

More than 400 specimens of fungi, mainly macromycetes, were gathered, as well as some lichens and myxomycetes. A preliminary checklist of studied species was prepared (Table 17.1) noting 65 species, of which *Leucopaxillus gracillimus* is first reported in Mexico. This species was only previously known in Florida, U.S.A., Brazil, and the Antilles (Dennis 1970; Pegler 1983). Moreover, *Fomitopsis rosea*, *Panellus stypticus*, and *Trogia cantharellus* were also first reported on the Yucatán Peninsula.

New species will be described from the material that is now being studied. The ultimate plan is to publish articles and descriptions of any new or interesting species. The main objective of this project is to prepare an illustrated book with color plates of the main fungi of El Edén.

TABLE 17.1. A preliminary checklist of the fungi of El Edén Ecological Reserve

Ascomycotina	<i>Cookeina sulcipes</i> (Fr.: Fr.) Dennis
	<i>C. tricholoma</i> (Mont.) Kuntze
	<i>Daldinia eschscholzii</i> (Ehenb.: Fr.) Rehm
	<i>Hypoxyton rubiginosum</i> (Pers.: Fr.) Fr.
	<i>Phillipsia domingensis</i> (Berk.) Berk.
	<i>Phylacia globosa</i> Lév.
	<i>P. poculiformis</i> (Mont.) Mont.
	<i>Xylaria bomboensis</i> Lloyd sesu San Martin & Rogers
	<i>X. cocoophora</i> Mont.
	<i>X. phyllocharis</i> Mont.
	<i>X. polymorpha</i> (Pers.:F.) Grev.

TABLE 17.1. (continued)

Basidiomycotina

Agrocybe retigera (Speg.) Singer
Auricularia fuscusuccinea (Mont.) Farlow
A. mesenterica Pers.
A. polytricha (Mont.) Sacc.
Clathrus crispus Turpin
Coprinus radians (Desm.) Fr.
Coriolopsis byrsina (Mont.) Ryv.
C. polyzona (Pers.) Ryv.
Dacryopinax elegans (Berk. & M.A. Curtis) Martin
Daeladea sprucei Berk.
Dictyopanus pusillus var. *riphidium* (Berk.) Singer
Earliella scabrosa (Pers.) Gilbn. & Ryv.
Fomitopsis feel (Fr.) Kreisel.
Ganoderma curtisii (Berk.) Murrill
Geastrum campestre Morgan.
G. saccatum Fr.
Gloeophyllum striatum (Sw.: Fr.) Murrill
Hexagonia papyracea Berk.
H. tenuis Fr.
Lepista singeri Guzmán
Leucocoprinus birnbaumii (Corda) Singer
Leucopaxillus gracillimus Singer & A.H. Smith
Mycenoporella clypeata (Pat.) R. Heim
Panaeollus antillarum (Fr.) Dennis
Panus badius (Berk.) Singer
P. crinitus (L.: Fr.) Singer
Phellinus extensus (Lév.) Pat.
P. gilvus (Schw.: Fr.) Pat.
P. linteus (Berk. & M.A. Curtis) Teng
P. pectinatus (Kl.) Quéf.
Phylloporia spathulatha (Hook.) Ryv.
Pleurotus djamor (Fr.) Boedijn
P. hygrophanus (Mont.) Dennis
Pogonomyces hydroides (Sw.: Fr.) Murrill
Polyporus tenuiculus (Beauv.) Fr.
P. tricholoma Mont.
Pycnoporus sanguineus (L.: Fr.) Murrill
Rigidoporus microporus (Fr.) Overeem
Schizophyllum commune Mont.
S. fasciatum Pat.
Scleroderma sinnamariense Mont.
Trametes maxima (Mont.) David & Rajch.
T. villosa (Fr.) Kreisel
Trichaptum perottettii (Lév.) Ryv.
Tremella rubromaculata Lowy.
Trogia cantharellus (Mont.) Pat.
Volvariella volvacea (Bull. : Fr.) Singer

Lichens

Coenogonium linkii Ehrenb.
Graphis librata (L.) Anch.
Strigula complanata Mont.

Myxomycota
(*Myxomycetes*)

Arcyria denudata (L.) Wettst.
Ceratiomyxa fruticulosa (Müll.) Macbr.
Stemonites splendens Rostafineski

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