



A SUCCESSFUL COINCIDENCE: THE HALLUCINOGENIC MUSHROOMS, THE GENUS *PSILOCYBE*, THE TRADITIONS AND THE DEVELOPMENT OF MYCOLOGY IN MEXICO

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ABSTRACT

In Mexico there are more hallucinogenic species of *Psilocybe* than in any other part of the world, with 54 species of that genus, of which 44 are hallucinogens. The great indigenous traditions and knowledge of edible, medicinal and sacred species of fungi are discussed with respect to their influence on the development of modern mycology in Mexico. Important research carried out in the 1950s on hallucinogenic mushrooms (mainly of the genus *Psilocybe*) is also reviewed.

INTRODUCTION

The knowledge of fungi has grown with man since the beginning of civilization. In Mesoamerica several past and present cultures (the Aztec, Mazatec, Zapotec and Maya, among others) have had close ties to fungi. However, information on Mexico's mushroom heritage is not easily available due the great destruction that the Spanish conquistadors inflicted on Mexico in the sixteenth century (Wasson and Wasson 1958, Wasson 1959, 1980, Lowy 1972, 1980). Even a search for information is difficult. The poor development of science and the great influence of the church during the seventeenth through the nineteenth centuries in Mexico resulted in obscurantism during that period, which has impeded research. An example of this is the great work of the indigenous author Martin de la Cruz (1552): nothing about fungi appears in this discussion of the medicinal plants used by indigenous people, despite the fact that mushrooms were commonly used in curative and spiritual activities. Another example is a color figure portraying the ingestion of teonanácatl, the sacred fungus of the Aztecs, found in the Magliabechian Codex. (Heim and Wasson 1958, Wasson and Wasson 1957, Sahagún 1569-1582 a). There is a discussion of a figure behind an indigenous person

eating a mushroom. According to the Church, the figure was Evil incarnate, because the Church absolutely forbid the use of these types of mushrooms, but for the native people, the figure was the god of the mushrooms sacred to them.

This study will deal with the importance of fungi in indigenous cultures. It shows how their knowledge of the sacred or hallucinogenic species of mushrooms contributed to the development of mycology in Mexico.

MATERIALS AND METHODS

The present paper is an analysis and a recapitulation of those published by the author (Guzmán 1983, 1984, 1990 a, b, 1992, 1994, 1995, 1997, 1998a, b) and by Mapes *et al.* (1981). It is also based on an exhaustive analysis of the existing bibliography on the subject and also on fieldwork carried out by the author during several years in many parts of Mexico.

RESULTS

Mushrooms in Mexican tradition

Mexico has at present a great tradition of fungi, as a heritage of the indigenous cultures of more than five hundred years ago. (Guzmán 1984). This knowledge is due in part to the enormous diversity of fungi in the country. Guzmán (1998 a, b) established that there are more than 200,000 species of fungi in the country, but only 5% of these fungi are identified. This shows how incompletely developed mycology is in this country.

There are many evidences of the use and/or cult of mushrooms among the Mexican indigenous people, as seen especially in several Aztec pottery pieces dating before the Spanish Conquest. The Magliabechian and Florentin Codices directed by Sahagún (1569-1582a, b) are also good examples (Heim and Wasson 1958, Wasson and Wasson 1957, Wasson 1980; Schultes and Hofmann 1979). In the Madrid Codex, there is a representation of the cult of *Amanita muscaria* by the Maya, according to Lowy (1972) and Wasson (1980). In the Dresden Code of the Mayas, there are four men falling through space surrounded by leaves that according to Lowy (1980) are hallucinogenic fungi, although other authors (e.g. Schultes and Hofmann 1979) believe these leaves are from hallucinogenic plants. Lowy (1974) stated that the thunderbolt legend in Guatemala and Mexico (Chiapas) is related to *Amanita muscaria*, because this is a rare fungus for the Indians and it has the strength of a thunderbolt. However,

Guzmán (2001) proposed that the fungus related in that legend may be *Ustilago maydis*. The indigenous people in Yucatan (a Maya area) named this fungus “ta chaak”, “the god of the rain”, because for them, the fungus reaches the corn through the rain, and it has the violence of a thunderbolt. In contrast to the richness of pre-hispanic times, there is little information on fungi from the Spanish colonial period. The books of Martín de la Cruz (1552) and Gregorio López (1674) are perhaps the only pertinent ones from that time. In the Lopez book the only information on mushrooms is an interesting discussion of how to recover after the ingestion of poisonous mushrooms.

Stone mushrooms are silent evidence of the cult of mushrooms among the Maya. Some of these represent a man falling into a dream-like state with his feet supporting a mushroom cap (Wasson and Wasson 1980, Heim and Wasson 1958, Lowy 1980). Among the Purepechas, a 34 mm high mushroom stone was found representing an *Amanita muscaria* button according Guzmán (Mapes *et al.* 1981, Guzmán 1984, 1992).

At present, there are more than 3000 common names for the fungi of Mexico, many of them in indigenous languages (Guzmán 1997). This indicates the importance of the fungi in folk tradition. More than 200 species of edible mushrooms are consumed in Mexico (Guzmán 1977). It is interesting to see these mushrooms being sold in popular markets, all of them classified with different common names. Among them, the *Amanita caesarea* complex, (comprising more than thirteen species, seven of them common in Mexico) (Guzmán and Ramírez-Guillén 2001), are the most appreciated fungi because of their delicate flavor. Others, such as those belonging to *Morchella* (e.g. *Morchella esculenta*), (seven of which are common species in this country) are also very appreciated (Guzmán and Tapia 1999). The medicinal mushrooms used in traditional Mexican medicine play an important role in traditional mycology (Guzmán 1994).

The Wassons and the discovery of Mexican hallucinogenic mushrooms

R.Gordon Wasson and W. Plavovna Wasson observed differences in ideas about mushrooms between Anglo-Saxon people and Russian people, groups which they themselves represented. They began a search for the reasons for these differences, and discovered that the *Amanita muscaria* was accepted as a hallucinogenic mushroom in a primitive Siberian community and supposedly originated the use of this fungus in Europe, where it is very common. However, after they received a picture of a stone mushroom from Guatemala from an Italian friend, they understood that what they were looking for was actually in Mesoamerica. In 1952, they learned of the existence of a

mushroom cult in Mexico, and undertook the task of finding everything that had been published about it (Wasson 1959, 1961, 1980, Wasson and Wasson 1957). They found the first scientific report on hallucinogenic mushrooms in Mexico written by Schultes (1939), and many references in sixteenth and seventeenth century literature (e.g. Sahagún 1569-1582 a, b). Each year from 1953 to 1959 the Wassons made expeditions to Mexico. Their mentor for mycological identifications was R. Heim, who at that time was the Director of the National Museum of Natural History in Paris, and who accompanied them on their visits to Mexico. Heim also published several works on Mexican hallucinogenic mushrooms (e.g. Heim 1956, Heim *et al.* 1967 and Heim and Wasson 1958).

After his trips to Mexico with Heim, Wasson published an important and attractive article, in which he introduced the hallucinogenic mushrooms in water color figures by Heim and also discussed the cult and use of sacred mushrooms (Wasson 1957). This article, which was also translated into Spanish, opened the world of hallucinogenic fungi to a wide readership. Numerous articles and books published by Wasson and Heim attracted the attention of scientists all over the world, as well as young students looking only for adventure.

In 1957 R. Singer came to Mexico to study these mushrooms, which he had previously studied and discussed in two short notes (Singer 1949, pages 472 and 506). After his trip to Mexico, Singer published numerous articles on these fungi, reporting on them from almost all over the world (Singer 1958 a, b, 1959, Singer and Smith 1958). The great work of the Wassons, continued by Wasson alone and supported by Heim, was the beginning of an interest in studying all Mexican mushrooms (Figure 1). It is possible to divide the history of Mexican mycology into two parts: “before Wasson”, and “after Wasson” (Guzmán 1999a). Singer, along with Wasson, can be considered as the father of the Mexican mushroom mycology.

The development of the Mycology in Mexico

Mexican mycology began in the 1940s with medical studies on fungus-related illnesses, and with yeast studies, as Guzmán observed (1990 b). However the development of studies on mushrooms had begun in the nineteenth century with European specialists (Fires, Kunth, Patouillard, Cooke and Berkeley), who based their work on fungi gathered by European travelers in Mexico. Nevertheless, modern studies on Mexican mushrooms started with the discovery of the hallucinogenic fungi made by Wasson, Heim and Singer. When these specialists arrived in Mexico between 1953 and 1959,

studies on Mexican mushrooms were poorly developed. Herrera and Guzmán were beginning their studies, and later took in interest in hallucinogenic mushrooms and published papers on the subject (Zenteno and Herrera 1958, Guzmán 1959). Ruíz-Orozco and Singer provided instruction in mycology to Herrera and Guzmán respectively. Ethnomycological studies and mycology in general were, then, closely related to the discovery of the Mexican hallucinogenic mushrooms in the 1950s. Those studies, carried out in 1956-1958 (Heim 1956, Heim and Wasson 1958, Singer and Smith 1958), opened the door to the development of mycology in this country (Guzmán 1999a, b).

In the 1960s and 70s Herrera and Guzmán took on several students in mushrooms who carried on studies of mycology. In 1965 Herrera and Guzmán founded the Mexican Society of Mycology, and in 1976 Guzmán organized the first exhibition of mushrooms in Mexico, now a common event all over this country (Guzmán, 1990 a, b, 1992).

The genus *Psilocybe* and the development of mushroom studies in Mexico

As discussed in the previous section, Herrera and Guzmán published the first paper on mushrooms in Mexico. Guzmán then undertook a study of the taxonomy, ecology and distribution of the hallucinogenic species of fungi, mainly *Psilocybe*, under Singer's guidance. In 1970 he organized the material into a monograph providing a description of these mushrooms throughout the world, a work he later published (Guzmán 1982), and supplemented (Guzmán 1995).

The genus *Psilocybe*, then, played an outstanding role in the history of the development of Mexican mycology. Important hallucinogenic species of *Psilocybe* are present in Mexico (*P. aztecorum*, *P. cubensis*, *P. mexicana* and *P. zapotecorum*, (of which *P. cubensis* is a pantropical fungus). At present, there are more known hallucinogenic species of *Psilocybe* in Mexico than in any other part of the world. Mexico has 54 species, of which 44 are hallucinogenic, compared to 69 species of which 40 are hallucinogenic in Central and South America; 58 species, of which 22 are hallucinogenic in the USA and Canada, 52 species, of which 16 are hallucinogenic in Europe; 25 species, of which 19 are hallucinogenic in Asia; 20 species, of which 15 are hallucinogenic in Australasia; 16 species, of which 11 are hallucinogenic in the Antilles; 3 species, of which 2 are hallucinogenic in Africa; and 2 species, with none hallucinogenic in Antarctica. Attention should be paid to the fact that both Europe and the USA have been intensively explored (more than Mexico), but the richness of species in Mexico remains unequalled. South America may be the richest source of

hallucinogenic mushrooms in the world . It is still poorly explored and already presents a high number of species of *Psilocybe*.

In conclusion, *Psilocybe* knowledge represents a successful coincidence of mycology in Mexico with the traditions of hallucinogenic mushrooms among several indigenous groups. Thanks to Schultes, Wasson, Heim and Singer's research, the study of mushrooms in Mexico has reached a significant level, not only in respect to taxonomic and biodiversity studies, but also in the development of technologies for edible mushroom culture. The works of various Mexican mushroom researchers are attracting increased international attention. The choice of Cuernavaca as a venue for this Fourth International Conference on Mushroom Biology and Mushroom Products represents one more historical moment for the development of mycological science in Mexico.

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APPENDIX.

Classification and authorities of the fungi considered.

Ascomycetes

Morchella esculenta Pers. ex St. Amans

Basidiomycetes

Amanita caesarea (L.: Fr.) Hook.

A. muscaria (Scop.: Fr.) Pers. ex Schwein.

Ustilago maydis (DC.) Corda

Psilocybe aztecorum R. Heim emend. Guzmán

P. caerulescens Murrill var. *caerulescens*

P. cubensis (Earle) Singer

P. mexicana P. Heim

P. zapotecorum P. Heim emend. Guzmán



Figure 1. A Japanese facsimile of the first Maya mushroom stone found in Central America and deposited now in Zurich. This Japanese reproduction bought in Kobayasi, Tokyo by the author in 1983, is now the only Maya mushroom stone in Mexico. (Photo D. Martínez-Carrera).