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TEONANACATL HALLUCINOGENIC MUSHROOMS OF NORTH AMERICA

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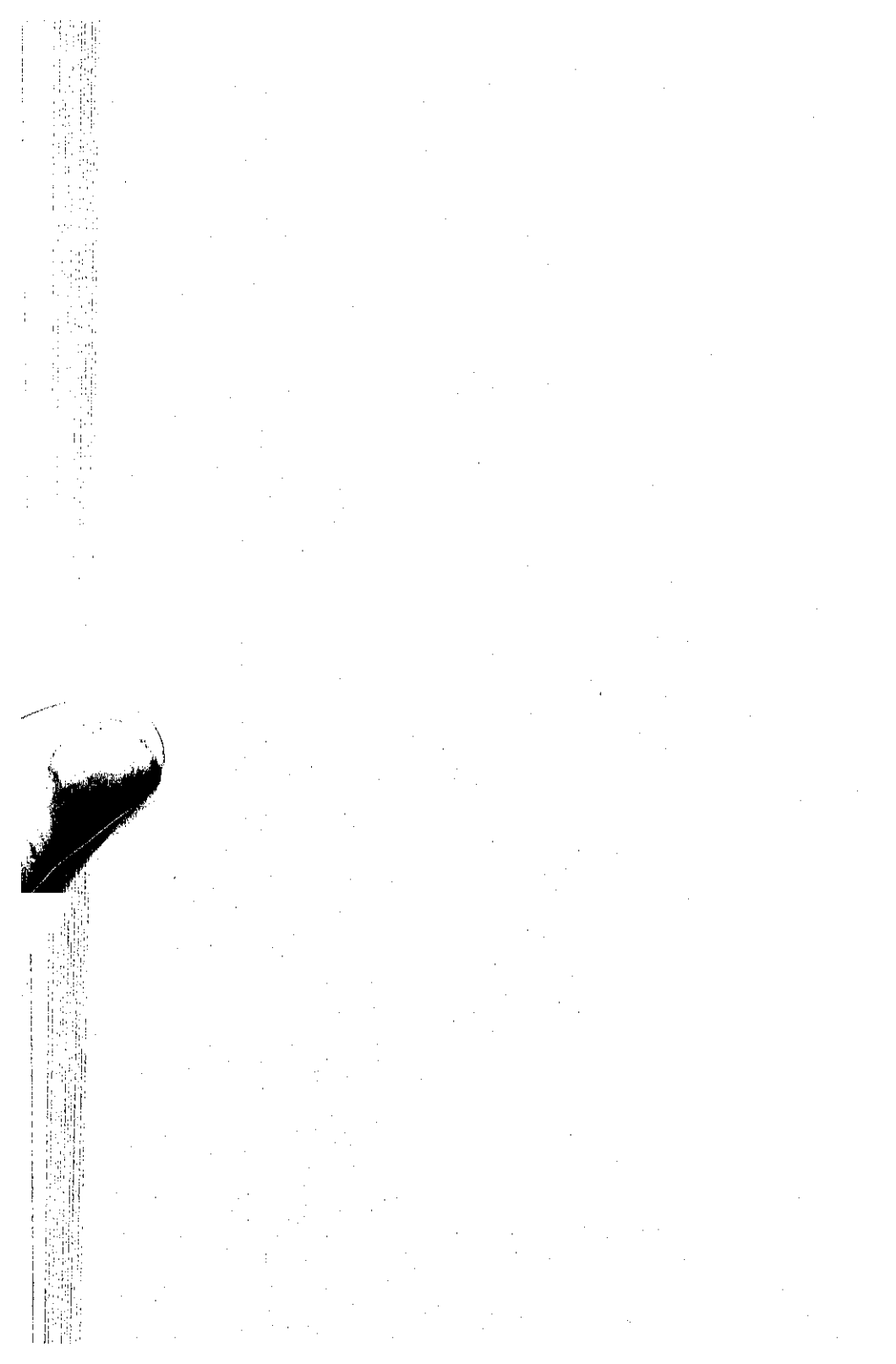
TEONANACATL: HALLUCINOGENIC MUSHROOMS OF NORTH AMERICA

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PART I

DISCOVERY OF TEONANACATL AND PSILOCYBIN



A. EVOLUTION OF THE
IDENTIFICATION OF THE
SACRED HALLUCINOGENIC
MUSHROOMS OF MEXICO

BY RICHARD EVANS SCHULTES

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PLANTAE MEXICANAE II

BY

RICHARD EVANS SCHULTES

THE IDENTIFICATION OF TEONANACATL,
A NARCOTIC BASIDIOMYCETE OF THE AZTECS

I. Introduction

Investigations dealing with the vegetable narcotics, intoxicants, and poisons used by primitive peoples comprise studies which involve some of the most fundamental culture-traits. The narcotic plants of the New World especially are attracting popular attention while stimulating scientific interest. In this connection, a large ethnobotanical and ethnopharmacological literature is being developed. A recent anthropological study (13) has briefly summarized some of the information concerning the primitive uses of a number of narcotics and has emphasized the importance to theoretical anthropology of correctly identified and thoroughly investigated ethnobotanical material. Indeed, this summary and other recent papers have clearly emphasized the need, as well as the desirability, of further botanical and ethnological investigations of plant narcotics, their uses, and their significance.

The plant narcotics of Mexico are of unique interest because careful records of their uses at the time of the Spanish Conquest are often available. It is possible, therefore, to compare their past uses with the uses made of

[87]

Facsimile of Schultes' original publication
of the identification of *teonandcatl*

I dentification of the ancient, sacred, hallucinogenic mushrooms in the broadest sense is not a recent event, even though critical botanical determination of the kinds of basidiomycetes had to wait until the first half of the twentieth century. The accomplishments in this effort at understanding the basic elements of one of the most interesting and significant of plant uses represent one of the most fascinating stories of modern ethnobotany.

We must credit the earliest Spanish intruders into Mexico for our first knowledge of the mushrooms used by Mexican natives as sacramental agents. The newly arrived hordes of Europeans, for the most part, were rabble. Yet, submerged in this mass of foreigners bent primarily on plunder, sex, and murder, there were hidden a few men of culture. And it is through the records left by these educated people—religious leaders, physicians, teachers, and a few governmental officials—that we know as much as we do about native inebriants, especially *teonanácatl*, 'divine mushrooms.' These records inform us over and over again, unequivocally, that *teonanácatl* were *hongos* or mushrooms.

I have always found it incredible that, in what must have been a time of such utter chaos, change, upheaval, disruption, despair, and hopelessness, so much ethnobotanical information

should have been preserved, and so many detailed and valuable ethnopharmacological reports should have been written down. Even as we marvel at the extent of these data on native Mexican plant-lore, nonetheless can we forget that, insofar as hallucinogens are concerned, the wealth of knowledge that has come down to us owes its origin almost wholly to the ferocity of governmental and ecclesiastical hatred and opposition on the part of the Spaniards to the use of inebriants as sacraments in pagan religion. For the Spaniards were most certainly less than tolerant of any religious cult but their own.

One of the earliest and most reliable writers on *teonanácatl* was Fray Bernardino de Sahagún (16), who worked in Mexico during the later half of the sixteenth century. In a general consideration of useful plants, he reported that the Chichimecas used *nanacatl* or "harmful little mushrooms which intoxicate the same way as wine," and he compared them to peyote. Elsewhere, under narcotics and intoxicants, he was more specific, stating: "There are some small mushrooms in that region which are called *teonanácatl*. These grow under the grass of the fields and pastures. They are round, having a rather high stipe, slender and terete. When eaten, they have a bad taste, hurting the throat, and they cause intoxication." In still a third place, he detailed the symptoms of the intoxication, referring repeatedly to "little mushrooms" and "small, black mushrooms." There is no doubt in Sahagún's writing that *teonanácatl* was a mushroom. *Teonanácatl* was the term for the intoxicating types employed ceremonially, whereas *nanacatl* referred to mushrooms in general. This generic use of *nanacatl* is seen in another reference from Sahagún: "The cone-shaped mushrooms (*nanacatl*) *genus campos agrorum* in the mountains are good to eat." One of the words still used in Mexico for mushrooms is *nanacatl* or *nanacates*.

Further evidence of the meaning of *nanacatl* is found in the various combinations made by adding prefixes denoting the color, habitat, or attributes of the plant. Dr. Francisco Hernández, personal physician to the King of Spain, spent seven years in Mexico in the sixteenth century studying Aztec ethnomedicine, and wrote a treatise *De historia plantarum Novae Hispaniae* (7). In the section, *De nanacatl seu fungorum genere*, he spoke of several different mushrooms, considering *teonanácatl* as including *teyhuinti*, or the "intoxicating" kind, and distin-

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guishing it from several other types of mushrooms: *iztacnancame* ("white mushrooms"), *tlapalnanacame* ("reddish mushrooms"), and *chimalnanacame* ("yellow-orbicular mushrooms"). He had discussed previously a lethal kind called *ciilalnanacame*.

Jacinto de la Serna (22), an ecclesiastic who worked in Mexico in the seventeenth century, wrote, in 1656, a guide for missionaries, a document arguing against Indian idolatries and for the extirpation of them. He reported: "And it so happened that an Indian had come . . . bringing some of the colored mushrooms which are gathered in the hills, and with these he performed a great idolatry." He further wrote that "...the said mushrooms . . . which are called *quautlannanacatl* . . . were small and yellowish . . ."

There are other less explicit references to the use of intoxicating mushrooms in post-Conquest Mexico. All of these sources together leave no shadow of a doubt that mushrooms constituted



Teonanácatl, a sixteenth century Indian drawing from the Magliabechiano Codex. Redrawn by E. W. Smith

TEONANACATL: HALLUCINOGENIC MUSHROOMS OF NORTH AMERICA
one of the sacred intoxicants of numerous tribes of Mexican
Indians.

Not only do passages in Mexican literature attest to the identification of *teonanácatl* as mushrooms, but there are actual illustrations that indicate the same meaning. In the Florentine Codex of Sahagún's writings, there is a sixteenth century illustration of a devil dancing upon the mushrooms: the figure is entitled *Teonanacatl*. In another sixteenth century source, the Magliabechiano Codex, the devil is depicted encouraging an Indian to eat the diabolical mushroom: the figure is entitled *Teomanacatl*.

Scholarly research into linguistics and philology, furthermore, has indicated the certainty that *nanacatl* referred to basidiomycetes.

A Nahuatl dictionary prepared in 1571 (9) enumerated under the Spanish word *hongo* ("mushroom") a series of *nanacatls*: *xochi-nanacatl* ("flower mushroom"); *tepexi-nanacatl* ("cliff



Teonanácatl, a sixteenth century European drawing
from the Florentine Codex of Sahagún's writing.
Redrawn by E. W. Smith

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mushroom'''); *ixtlauacan-nanacatl* ("savannah mushroom'''); *macauacan-nanacatl* ("mushroom of the stag's places'''); *teyhuinti-nanacatl* ("mushroom of divine intoxication''').

The *Dictionnaire de la Langue Nahuatl ou Mexicaine* (23), published in 1885, clearly points out the meaning of *nanacatl*: *Nanacatl*, 'mushroom'; *guaubile-nanacatl*, 'mushroom of the forest'; *teonanácatl*, 'species of little mushrooms of bad taste, intoxicating, hallucinogenic'; *teyhuinti*, 'intoxicating'; *teyhuinti-nanacatl*, 'intoxicating mushroom.'

To the best of my knowledge, no further attempts to identify *teonanácatl* were made until the present century, when the



Dr. William E. Safford
Photograph courtesy of the Hunt Botanical Library

American economic botanist Dr. William E. Safford became interested in a number of useful plants of the Aztecs. Much of Safford's research was outstanding, but he fell into grave error in his identification of *teonanácatl*.

A search of herbaria failed to uncover for Safford a Mexican mushroom with known narcotic properties (14,15). He wrote:

"Three centuries of investigation have failed to reveal an endemic fungus mentioned either in works on mycology or pharmacography; yet the belief prevails even now that there is a narcotic Mexican fungus. . . ." Safford must have known of the extremely sparse representation of cryptogamic specimens from Mexico in any herbarium of the world at that time; he must have been cognizant of the widespread presence of toxic mushrooms in other parts of the world, and, probably, in Mexico. But Safford proceeded to search among other plants and plant products for something that the early writers or the Indians might have confused with a dried mushroom. Furthermore, he was motivated by distrust of the Mexican Indians and the chroniclers. "A knowledge of botany," he wrote, "has been attributed to the Aztecs which they were far from possessing. . . . The botanical knowledge of the early Spanish writers Sahagún, Hernández, Ortega, and Jacinto de la Serna, was perhaps not much more extensive." Moreover, he intimated that perhaps the Indians were purposefully pointing out the wrong plants to the ecclesiastical authorities in order to protect their sacred plants from desecration at the hands of the Spaniards.

In his search for a non-fungal plant that he believed satisfied the qualifications described for *teonanácatl*, he came up with the peyote cactus, *Lophophora Williamsii*. He reasoned that the dried, brown, disk-like crown of the spineless cactus—the so-called 'mescal button'—resembled "a dried mushroom so remarkably that, at first glance, it will even deceive a mycologist." In fairness to mycologists, however, it must be admitted that there really is very little similarity between a mescal button and a dried mushroom. It is true that both assume upon drying a drab brown hue, but the resemblance ends there. A heavy cushion of closely-packed, areolate tufts of silky hairs clothes the upper surface of the dried cactus-crown, while the fibrovascular region is clearly visible on the lower surface. It seems highly improbable, therefore, that either the Indians or the chroniclers were deceived in this way. As Dr. Weston La Barre (8) summed up the problem: "Safford identifies the two by a somewhat casual use of his evidence and mystifies himself with the consistent contradiction offered by all the early Spanish writers to his assumption. He composes the contradiction by assuming that the Aztecs did not recognize the dried, discoidal button as the same plant as the green cactus; despite over-

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Dr. Blas Pablo Reko. Drawn by E. W. Smith

whelming etymological evidence, he supposes that they called the former *teonanácatl* and the latter *peyote*."

Unfortunately, Safford's "identification" was accepted by some writers and found its way into literature.

At first, there was no published objection to Safford's identification. At an early date, however, Dr. Blas Pablo Reko, an Austrian physician who worked for long periods in the hinterland areas of Mexico, and who carried out very important botanical collecting and significant ethnobotanical investigations, maintained that peyote and *teonanácatl* were not identical. From information that he had heard and from his confidence in the dependability of the early Spanish reports, he insisted that narcotic mushrooms were indeed known to Mexican Indians. In 1919, he stated (12) that *nanacatl* was "div. géneros de hongos,

especialmente un hongo negro que crece sobre estiércol y produce efectos narcóticos." Shortly thereafter, in 1923, he wrote to Dr. J. N. Rose of the Smithsonian Institution: "...I see in your description of *Lophophora* that Dr. Safford believes this plant to be the *teonanacatl* of Sahagún, which is surely wrong. It is actually, as Sahagún states, a fungus which grows on dung-heaps and which is still used under the same old name by the Indians of the Sierra Juárez in Oaxaca in their religious feasts. . . ."

The first published objection, however, appeared in 1936, when Mr. Victor A. Reko, an Austrian journalist living in Mexico and a cousin of Blas Pablo Reko, published a rather superficial book on intoxicants: *Magische Gifte: Rausch- und Betäubungsmittel der Neuen Welt* (13). "This [the Safford identification] must be contradicted," he wrote. "The nanacates are poisonous mushrooms which have nothing to do with peyote. It is known from olden times that their use induces intoxication, states of ecstasy and mental aberrations, but, notwithstanding the dangers attendant upon their use, people everywhere they grow have taken advantage of their intoxicating properties up to the present time."

He suggested, with reserve, but with no corroborative evidence, that *nanacatl* might be a species of *Amanita*—he even invented and published the names *Amanita mexicana* and *A. muscaria* var. *mexicana* for it. It is probable that V. A. Reko's chapter on *nanacatl* was based upon information that he took down in note form—as was his custom—from his cousin B. P. Reko, but that he elaborated with journalistic freedom. Yet V. A. Reko's refutation of Safford's identification was significant in that it once again focussed attention on this problem.

In 1937 and 1938, La Barre and I, writing on peyote (8, 18, 19), summarized the evidence then available against Safford's identification. In 1937, B. P. Reko sent me several pieces of a mushroom that he had received from Don Roberto Weitlaner of Mexico City, who reported that the Otomi Indians of Puebla and neighboring regions employed the fungus as a narcotic. These specimens were so poorly preserved upon arrival that I could not identify them beyond the genus *Panaeolus*.

Reko sent specimens, apparently from this same Weitlaner

*Letter attached to an herbarium specimen of *Lophophora Williamsii* in the United States National Herbarium.

collection, to Dr. Carl Gustaf Santesson of Stockholm for phytochemical analysis. Santesson published a report in 1939 that this mushroom, "probably belonging to a *Panaeolus*," gave a negative test for alkaloids but a positive test for a glycoside (17). This report is significant in being the first chemical information on the sacred hallucinogenic mushrooms of Mexico. At the same time, Santesson received another sample which was identified as *Armillariella mellea*. Dr. Rolf Singer, some 19 years later, presumed—but gave no evidence for such a presumption—that "it is more likely the material consisted of *Psilocybe mexicana* and *P. cubensis*, but it may conceivably have been a mixture of numerous elements."

In 1938, I began ethnobotanical studies in northeastern Oaxaca among the Mazatec Indians. During the preliminary stages of this work, I was accompanied by B. P. Reko. We heard repeated reports in and near Huautla de Jiménez of the prevalence of mushroom rites, and, finally, were able to collect good specimens of two basidiomycetes. The specimen that was considered by the Mazatecs to be the more important of the two I was able to identify as *Panaeolus sphinctrinus* (*P. campanulatus* var. *sphinctrinus*) (20,21)—an identification corroborated at the time by Dr. David H. Linder at the Farlow Herbarium, Harvard University, and later by Dr. Roger Heim and Dr. Rolf Singer.

On the same expedition, Reko and I collected a second kind of mushroom which, according to our informants, was not so important in local rituals. It was inserted in the Farlow Herbarium undetermined and was not included in my identification of *teonanácatl* as *Panaeolus*. This mushroom, called *kee-sho* in Mazatec, was found in the Farlow collections, and was determined by Singer in 1941 as *Stropharia cubensis*, and included by him in the genus *Psilocybe*.^{*} Singer published this identification in 1951 (24). Subsequent field studies by Heim and Dr. R. Gordon Wasson, Dr. Singer, and Dr. Gastón Guzmán indicate that *Stropharia cubensis* is one of the more important, sacred

^{*}Editor's note: *Kee-sho* (landslide) is the Mazatec name for *Psilocybe caerulescens*. As Wasson has pointed out, Schultes' field notes unmistakably describe *P. caerulescens*. Singer's determination of the material as *S. cubensis*, however, was later verified by Heim, who noted the discrepancy and reprinted Schultes' herbarium card for the collection. This suggests that a mixed collection was involved. See Heim and Wasson: *Les Champignons Hallucinogènes du Mexique* (pp. 184-185) and Wasson: *Botanical Museum Leaflets* 20(6): 167-8, 1963 for further details.



Dr. R. Gordon Wasson
Photograph courtesy of R. Gordon Wasson

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Mexican mushrooms, much more important than *Panaeolus sphinctrinus*.

No further work was done on the identification of the hallucinogenic Mexican mushrooms until the 1950's, when Wasson became interested in the problem as a result of reading my earlier papers. Long a student of mushrooms in relation to human affairs, he began in 1953 a series of well-organized expeditions to Oaxaca and other parts of Mexico in search of more and deeper ethnomycological information. This search is still going on in the 1970's. It has stimulated research by other specialists, oftentimes far beyond the field of mycology. Furthermore, Wasson insisted that, whenever possible, he be accompanied on his expeditions by experts in diverse fields of study—mycology, chemistry, musicology, photography, etc.—with the result that his work, which has spanned some 20 years, has been truly interdisciplinary in nature.

These expeditions have led not only to the identification of a large number of species of mushrooms hallucinogenically employed in Mexico, but also to a wealth of data on native beliefs with mythological significance and historical pertinence.

As a result of Wasson's work and that of his numerous colleagues, mushrooms in four different genera are now known to be used by Indians in Mexico in divinatory or otherwise magico-religious curative rituals.

Wasson's first trip—short and planned without experience—was so successful that it encouraged him to return again and again, usually accompanied by specialists anxious to advance various aspects of this most fertile field of study. Among these specialists were the French mycologist Roger Heim, whose studies, together with Wasson's, resulted in the description of many species of mushrooms new to science, and Dr. Albert Hofmann, a Swiss chemist, who eventually isolated, identified, and synthesized the psychoactive constituents of the mushrooms, psilocybin and psilocin.

The work of Wasson and Heim (5,6,26) has indicated that the following species are employed in Mexico as hallucinogens: *Conocybe* (one species)—*C. siligineoides*; *Psilocybe* (twelve species)—*P. acutissima*, *P. aztecorum*, *P. caerulescens* with two varieties, *mazatecorum* and *nigripes*, *P. cordispora*, *P. fagicola*, *P. Hoogshagenii*, *P. mexicana*, *P. mixaeensis*, *P. semperviva*,

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Professor Roger Heim
Photograph courtesy of Roger Heim

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P. Wassonii (*P. muliercula*), *P. yungensis*, and *P. zapotecorum*; and *Stropharia* (one species)—*S. cubensis*.

Wasson has pointed out (26) that not all the divinatory mushrooms are hallucinogenic. Some are eaten because of their suggestive shape: *Cordyceps capitata*, *Elaphomyces granulatus*, *E. variegatus* and *Dictyophora phalloidea*. Reports maintain that *Clavaria truncata* and *Nevrophyllum floccosum* are used, but always with *Psilocybe Wassonii* (6,26).

Singer visited the Mazatec country briefly, investigated the species employed by the Indians of Oaxaca in 1957, and concluded that six species make up the mycopharmacopoeia of the Mexican mushroom rituals: *Psilocybe* (*P. aztecorum*, *P. caerulescens*, *P. candidipes*, *P. mexicana*, *P. muliercula*) and *Stropharia cubensis* (which he considered to be a *Psilocybe*) (25).

The Mexican mycologist, Gastón Guzmán, has carried out sustained studies of this problem and has devoted special taxonomic attention to *Psilocybe* (2,3). He has enumerated the following twelve species as sacred hallucinogens: *Psilocybe aztecorum*, *P. caerulescens* and its variety *nigripes*, *P. caerulipes*, and its variety *Gastonii*, *P. cordispora*, *P. Hoogshagenii*, *P. isauri*, *P. mixaeensis*, *P. muliercula*, *P. yungensis*, *P. zapotecorum*, and *Stropharia cubensis* (which he too includes in the genus *Psilocybe*). He fur-



Dr. Gastón Guzmán. Photograph courtesy of Gastón Guzmán

ther listed five species in four genera as doubtfully used: *Anel-laria sepulchralis*, *Dictyophora phalloidea*, *Panaeolus fimicola*, *Psathyrella sepulchralis* and *Psilocybe acutissima*.

Even when differences of taxonomic judgement are taken into account, it is obvious that these three lists show appreciable variance. Wasson and Heim, Singer, and Guzmán failed to find *Panaeolus sphinctrinus* in use and, as a result, have assumed that it should not be included in the list of hallucinogenically used Mexican mushrooms. Heim has asserted that the Indians do not take *Panaeolus sphinctrinus* in their rituals (4). Singer, after one short field trip, categorically stated that *Panaeolus sphinctrinus* is not used and, perhaps, had been mistaken for *Psilocybe mexicana* (25). Guzmán has called *Panaeolus sphinctrinus* a "false teonanacatl" (3). This belief has spread and persists (1).

Panaeolus was collected independently as one of the hallucinogens by two groups of investigators: Weitlaner's and Schultes and Reko. It has been shown that *Panaeolus* and *P. sphinctrinus* possess the intoxicating principle psilocybin (1, 10, 11).

There are so many species now known to be employed ceremonially in Mexico for inebriation that it is to be expected that each group of investigators may find a different assortment of species in use. Mushrooms vary in their abundance from year to year and at different seasons of the same year. There may be years when one or more species are rare or even absent—they vary in their distribution and are not ubiquitous. Furthermore, each *curandero* has his own favorite kinds of mushrooms and may forego using others: María Sabina, for example, will not use *Stropharia cubensis* (27). Finally, certain mushrooms are used for specific purposes. All of this means simply that each expedition should not expect to return with the exact same list of species employed, even in the same locality.

The probability that even more species will be found in use by future investigators is far from remote. Chemical studies have indicated that psilocybin and, to a lesser extent, psilocin are present in many species of several genera in widely separated parts of the world. The whole problem—botanically, ethnobotanically, chemically and in other fields—would seem to be open for continued and even more intensive research. What is most important for us to realize is the urgency of this research in view of the rapid disintegration and disappearance of indigenous cultures in many parts of the world, including, especially,

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Mexico. Ethnobotanists and ethnomycologists must dedicate themselves to this task. To neglect it would be tantamount to the closing of a door, forever to entomb a peculiar kind of native knowledge with the culture that gave it birth.

Richard Evans Schultes
Cambridge, Massachusetts
January 3, 1978

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