An Ethnopharmacological and Ethnomycological Update on the Occurrence, Use, Cultivation of Known Species, Chemical Analysis, and SEM Photography of Neurotropic Fungi from Thailand, Cambodia and other Regions of South, Southeast Asia, Malaysia, Indonesia and Bali.

By

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Summary

In the continuing studies began by Allen and Merlin in the late 1980s and early 1990s, as well as the recent discoveries of a 2nd bluing *Psilocybe* from SE Asia (*Psilocybe antioquensis*), first found at the Temple of the Women (Citadel of the Women) known as Banteay Srei, situated near the hill of Phnom Dei, 25 km (15 miles) north-east of the main group of temples at Angkor Wat, and the presence of *Psilocybe samuiensis* is also noted now from Kampuchea (formally Cambodia). Because of these new findings, the authors of this present study were prompted into presenting an updated report concerning the known species of neurotropic fungi found in certain regions of South and Southeast Asia, Oceanea and the Asian/Polynesian Pacific. Previous investigations on the Thai islands of Koh Samui, Koh Pha-Ngan, Phuket and in various locales situated in Orissa, India, Kampuchea, Vietnam, Burma, Malaysia, Indonesia and Bali, and in several tourist resort locations in the Philippine Islands, indicated that three species of psilocybian fungi (*Psilocybe cubensis*, *Psilocybe subcubensis* and a complex mixture of variations of *Copelandia* species, consisting primarily of *Copelandia cyanescens*), are used for ludible purposes amongst foreign tourists vacationing in that region of the world. A single specimen of *Copelandia cyanescens* and spore prints obtained from 2 separate collections of *Psilocybe cubensis* were successfully cultivated along with *Psilocybe samuiensis*, *Psilocybe antioquensis*, *Psilocybe mexicana*, as well as another species, *Psilocybe pegleriana.* Cultivation of several species of *Psilocybe* are presented along with their comparative chemical analyses of several related species (*Psilocybe samuiensis*, *Psilocybe mexicana*, *Psilocybe antioquensis*, *Psilocybe semilanceata*, including *Psilocybe weilii* and *Inocybe aeruginascens*), and are herein described, along with SEM photography of the first above four noted species. SEM (scanning electron microscopy) results of fragments from collected specimens of the Malaysian collections are presented, as are SEM images of spores from several other known neurotropic species in Southeast Asia. Additional collections of both *Psilocybe cubensis* and *Copelandia cyanescens* from Phuket Island along the Andaman Sea off the East Coast of Thailand facing India were forwarded to México for proper identification by Guzmán. Additionally, JWA traveled to Angkor Wat in Siem Riap, Kampuchea where he again collected specimens of both *Psilocybe cubensis* and *Copelandia cyanescens*. This is the first report of *Copelandia cyanescens* from the temple grounds of Angkor Wat, Kampuchea. Three new unidentified *Psilocybe* species were also studied but have not as yet been identified. A new species was given the tentative name, *Psilocybe violacea* nom. prov., due to the nature of a violet spore deposit that was present on several caps of a single collection of the wild fungi. That species was discovered in 2002 by Travis Canaday wild grasses more than ten feet

in height at Ban Tai, Koh Samui. However, Guzmán readily identified this mushroom as *Psilocybe pegleriana*, a coprophilous fungi common in tropical Asia. Two unidentified *Psilocybes* are partially also described in this study. Under discussion, the authors also present an updated overview of the etiology and history of the ludible and/or recreational use and occurrence of some SE Asia neurotropic species from southern Thailand appearing in the tropics and neotropics of both hemispheres and in other countries of the world. This is the 1st report of *Psilocybe samuiensis* from Kampuchea and from Ranong Province in Thailand and the 2nd for *Psilocybe antioquensis* from Kampuchea, and 2nd report of *Psilocybe pegleriana* from Thailand. Additionally, we present several images representing what appear to be mushroomic symbolisms found in various temples in Thailand and Angkor Wat compounds in Kampuchea, including: Davatas, asparas, and bas relief's that featured sculpted mushroomic like hand-held figures. Furthermore we also note the presence in Thailand of a new suspected active species belonging to the Genus *Amanita*, *Amanita mira* (see figure .

KEYWORDS: *Psilocybe* sp., *Copelandia* sp., *Hypholoma* sp., *Amanita* sp. *Copelandia cyanescens*; *Psilocybe antioquensis, Psilocybe cubensis*, *Psilocybe samuiensis*, *Psilocybe pegleriana, Amanita mira*, cultivation, chemical analysis, SEM images. Micrographs and Recreational and/or ludible use.

Materials and Methods

In 2006, the senior author (JWA) returned to Southeast Asia to finish a 23-year follow-up study of the use and occurrence of neurotropic mushrooms by foreign tourists in various locations in both Thailand and Cambodia. Looking back in retrospect, we note that in 1991, a new species, *Psilocybe samuiensis* Guzmán, Bandala and Allen, was reported from Koh Samui Island. Gartz, Allen, and Merlin later determined the chemistry and cultivation of *Psilocybe samuiensis* during the summer and fall months of 1993, reporting that Guzmán, Bandala and Allen had determined the species to be microscopically directly related to *Psilocybe mexicana*. In the early summer of 2005, JWA again harvested 30 specimens of *Psilocybe samuiensis* in a rice paddie at Angkor Wat in Kampuchea.

Specimens of a bluing *Psilocybe* were discovered by JWA's friends during a foray to Banteay Kdei and Banteay Srei in the early August of 2002. Later a 2nd collection was harvested in June of 2003 near Banteay Kdei. Guzmán, Allen and Sihanonth (2006) later identified this new species as *Psilocybe antioquensis,* a bluing *Psilocybe* first reported from Antioquia, Colombia, S. A. Later Guzmán reported the same species from Jalisco and Veracruz, México and now from Angkor Wat. Additionally several collections of *Psilocybe cubensis* and *Copelandia cyanescens* were harvested from dung of cattle at Alor Setar in the Kedah State of Malaysia, just north of Kuala Lumpur near the Southern Thai border. Similar mixed *Copelandia spp*., were also found in Thailand at the Suphanburi Bann kwai (buffalo house) as well as in Bangkok, Koh Samui, and Phuket. *Psilocybe cubensis* and *Psilocybe samuiensis* from Koh Samui were also collected in the fall of 2002 and 2003, and June and July of 2004. *Psilocybe cubensis* and *Copelandia* cyanescens were found in 2004 by JWA just north of Hanoi, Vietnam.

Between 1986 and 1991, JWA led several expeditions into the jungles of Thailand and Cambodia seeking out new species of psilocybian fungi. And years later, in 1998 through 2006, JWA conducted an additional 10 expeditions to Southeast Asia (June of 1998, September-October 1999, September-October 2000, 2001, July 20 through August of 2003 and June through August of 2004, May-July of 2005, September-October of 2005, as well as in September-October of 2006). Additional specimens of *Psilocybe cubensis*, *Psilocybe subcubensis*, and *Copelandia cyanescens*, as well as several other neurotropic species and some unidentified *Psilocybe* species were also studied and harvested for herbarium deposit. In 1998, 1999, and 2000, Guzmán had identified two species of the team's herbarium deposits as *Psilocybe cubensis and Copelandia* cyanescens collected by JWA and friends in Kuala Lumpur, Malaysia.

Other species under discussion include *Psilocybe samuiensis* from two new locations in rice paddies at Na Muang, Koh Samui and in rice paddies in Ranong Province, in the Eastern peninsula of Thailand facing the Andaman Sea and India. Both *Psilocybe antioquensis* and *Psilocybe samuiensis* were also collected and identified by the author and by Guzmán from locations at various temples at Angkor Wat, Kampuchea. Guzmán verified the above noted herbarium collections, as well as specimens of *Psilocybe pegleriana* from Koh Samui and Suphanburi, Thailand; also three unidentified *Psilocybe* species (2 from Koh Samui and 1 from Suphanburi, Thailand) had bluing in the stipes.

Cultivation of Species

Copelandia cyanescens:

While traveling to Suphanburi in the late summer of 2002, the authors harvested a small collection of *Copelandia cyanescens*. However, observations of a cap on a single specimen from that collection revealed that it did not macroscopically resemble any known species of *Copelandia*. Thus the authors were somewhat skeptical in their macroscopic identification of the partially dried specimen. Throughout the cultivation of this specie we were able to determine that it was indeed *Copelandia cyanescens*. The next three Figures (Figs. 1 to 3) are a result of our first attempt to grow this species from spores that were extracted from a single-mangled dried specimen resulting in some very beautiful results quite large specimens now named on the Internet as Pan Goliath's.

Fig. 1. A dried specimen collected at Suphanburi, Thailand. It appeared to belong to the genus *Copelandia*, most likely *Copelandia cyanescens.*

After some careful agar work we were able to extract a viable culture from spores clinging to the dried gills. It fruited easily and quickly. On our second attempt in cultivating this species, we grew them on cased sterile horse manure processed in a presealable injection port mycobag. Since the bag was hermetically sealed before sterilization, most likely there should be no rupture.

Fig. 2. 1st flush 7 days after casing with a thin layer of sterile peat and calcium carbonate.

Fig. 3. 2nd flush. The largest specimen had a cap diameter of more than over 4 cm (1.5 in) and not fully expanded. This strain tends to produce particularly large well-formed fruits quickly in culture.

Pinhead coloration is a brownish olive that fades to grayish white with maturity. Spore production is heavy over a long period of time. Flesh blues intensely when cut or bruised. The largest specimen of *Copelandia cyanescens* grown is recorded at nearly 2 inches (4 cm) across which is huge for *Copelandia cyanescens*.

Fig. 4. 1st flush 7 days after casing with a thin layer of sterile peat and calcium carbonate.

Fig. 5. 1st flush. The largest mushroom has a cap diameter over 4 cm (1.5 inches) and did not fully expand.

Fig. 6. 2nd flush long shot.

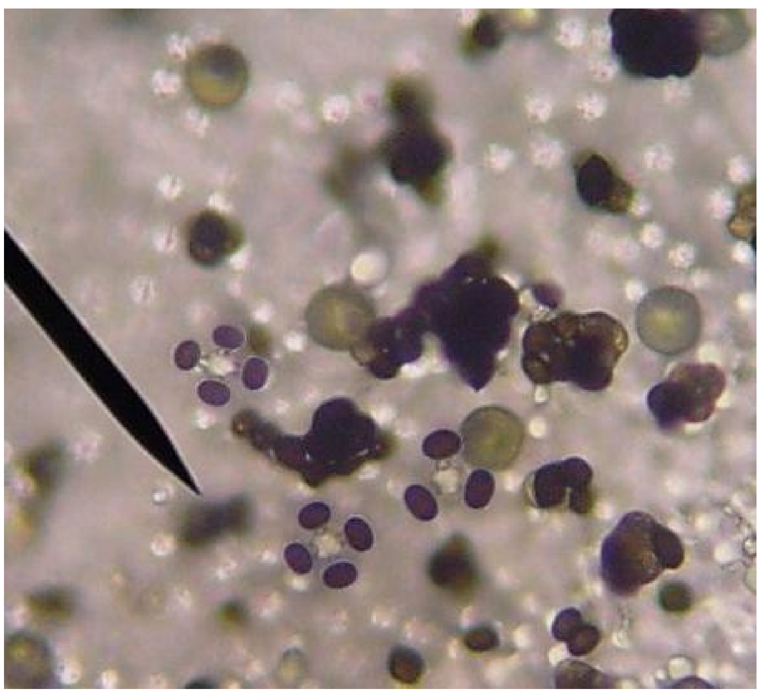


Fig. 7. Close up of gill surface showing basidia with spores. Pointer is approximately 8.4 micrometers in width.

The largest mushroom (so far) pictured below on the following page, measured out at just over 5 centimeters. It seems when grown *in vitro,* fruiting bodies never resemble their natural outdoor cousins.

Fig. 8. Grid in the background is 1/2 inch per square.

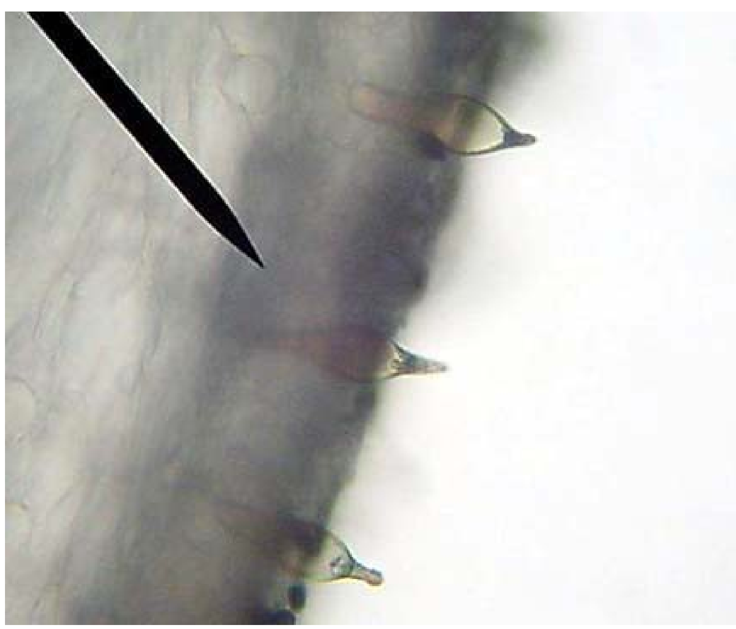


Fig. 9. Pleurocystidia. In this figure, the pointer is 8.4 micrometers in width.

The Natural Occurrence of *Copelandia cyanescens* in a Man-Made Environment

During a recent walk along the garden pathway surrounding the administration building at the Department of Microbiology's Faculty of Science at Chulalongkorn University in Bangkok, one of the authors of this study (PS), noticed the occurrence of numerous small colonies of *Copelandia cyanescens* fruiting in the gardens of the office building.

This was very similar to the finding of mass fruiting's of *Copelandia cyanescens* in gardens at Suphanburi, Thailand, where, in 2003, three of the authors of this paper learned gardeners there had used kwai (water buffalo) fertilizer to enhance the gardens topsoil at the Bann kwai farm.

Later, PS learned that the gardeners had added to the soil, several 10-20 pound bags of commercially mixed composting manured soil they had recently purchased at a public market in Bangkok. The fertilizer apparently was instrumental in enhancing the garden area surrounding the office and lab building at Chulalongkorn University and it was within several weeks after the fertilizer had been mixed with the surrounding topsoil that PS noticed the occurrence of the *Copelandia* mushrooms pictured below.

Fig. 10. A **small colony of *Copelandia cyanescens*. Unintentionally introduced into a garden surrounding the administration building of the Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok**.

Again we have a situation where man-made environments are ideal for the outdoor cultivation of many different species of both edible and psilocybian mushrooms in locations across the world where either manure or alder-mulched gardens abound causing shrooms to fruit outside of their natural habitats with much success.

Fig. 11. Introduced *in situ Copelandia cyanescens*. Garden of administration building. Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok.

Fig. 12. *Copelandia cyanescens* over 10 cm in height. Garden, administration building. Department of Microbiology, Faculty of Science, Chulalongkorn University, Bangkok.

Fig. 13. Gill structure of a fresh specimen of *Copelandia cyanescens.*

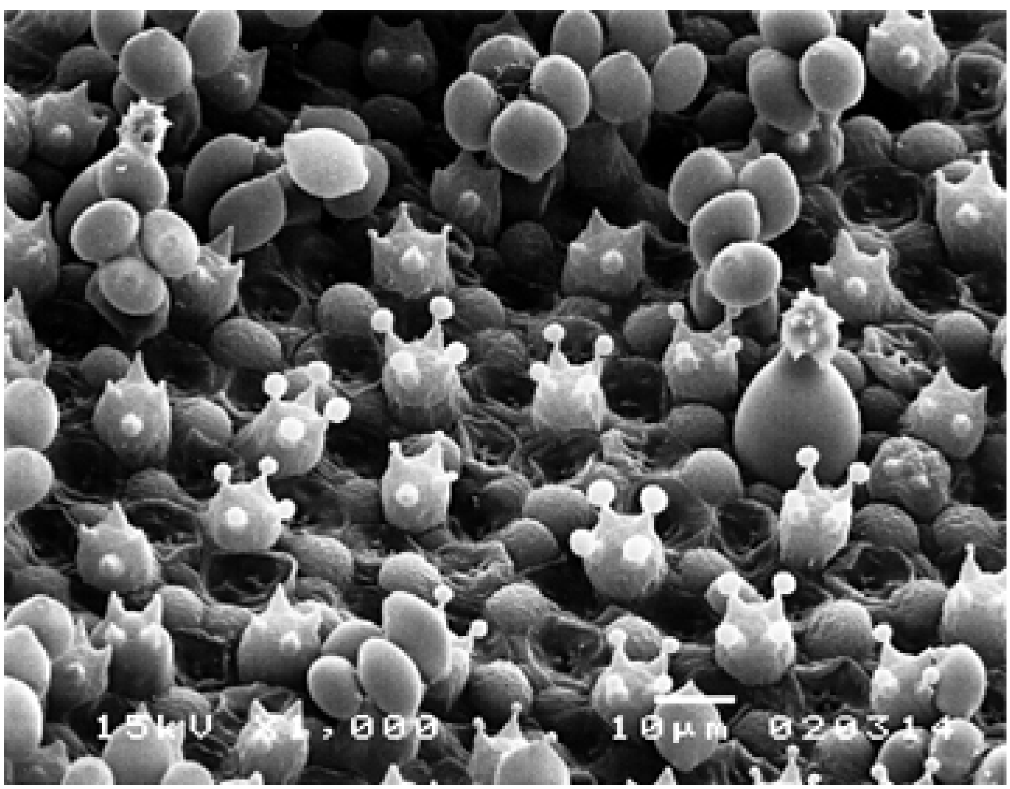


Fig. 14. SEM micrograph of gill fragment of *Copelandia cyanescens* showing basidium modvard, various ages of basidiospores including the crycholicstidiata.

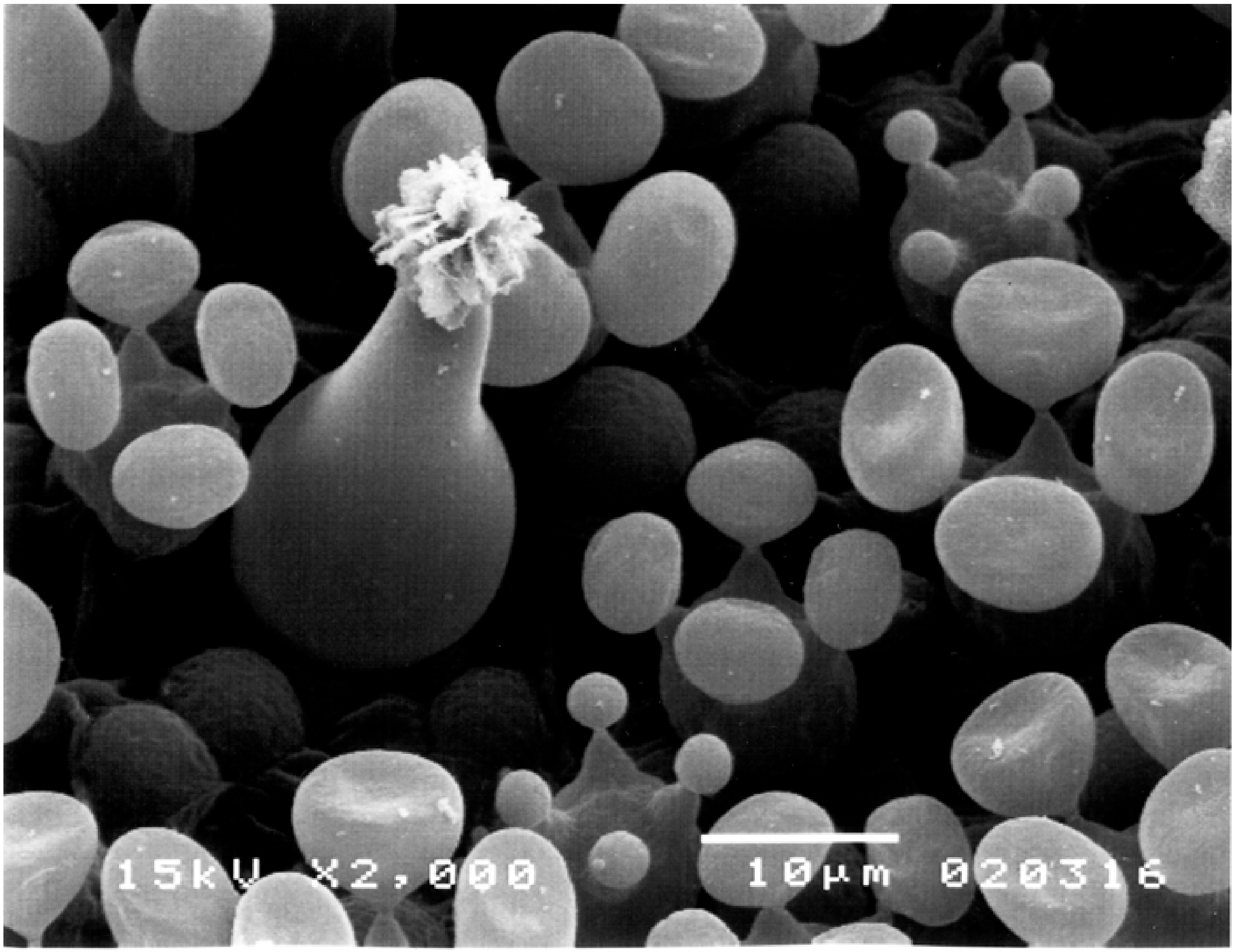


Fig. 15. High magnification SEM of basidiospores and crown cheilocystidia.

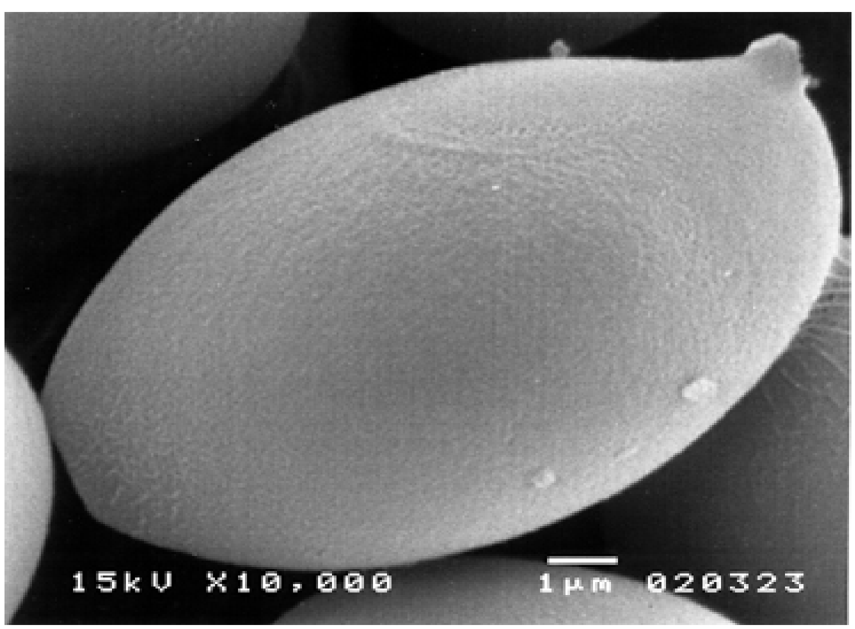
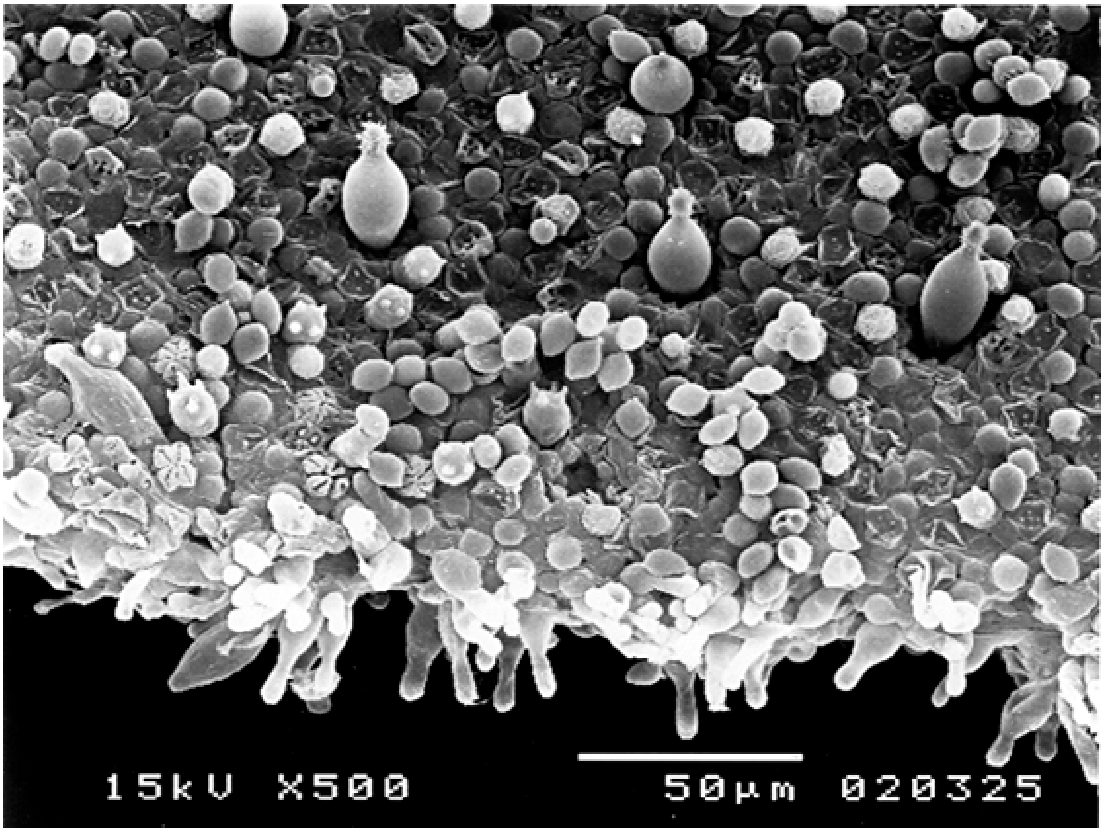


Fig. 16. High magnification SEM of basidiospores of *Copelandia cyanescens* showing the spores lemon-shape and typical germ pore.



Figs. 17. High magnification of gill tissue and cheilocystidia crowns aligning to show the edge of the gill fragments at the bottom of the image of *Copelandia cyanescens*.

Psilocybe antioquensis:

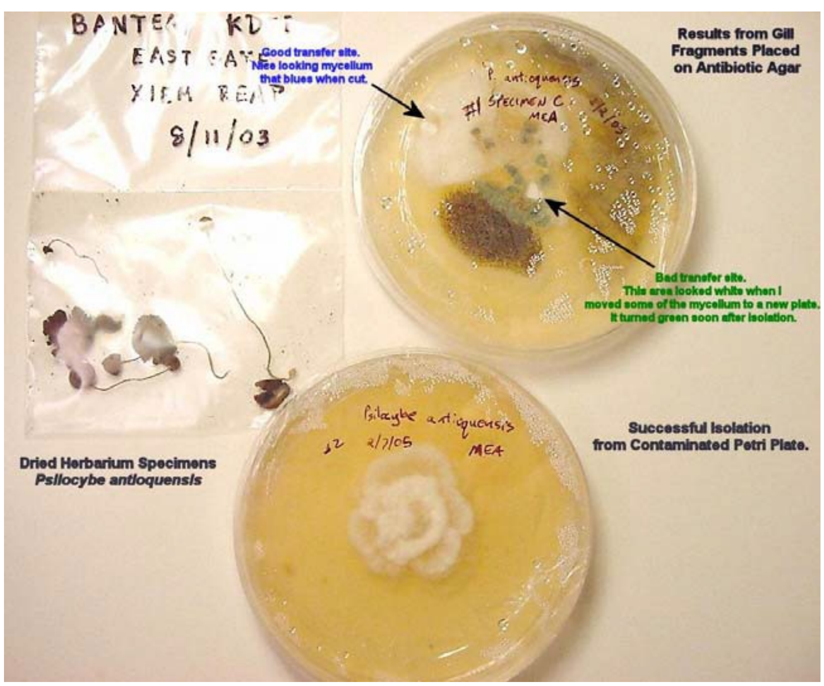


Fig. 18. Isolation of viable mycelium from spores attached to gills of a dried mushroom.

Fig. 19. The conida of a species of Pestola.

Well, the nice white mycelium pictured above in the Petri plates turned out not to be mushroom mycelium after all, but are actually the conidia of a species of *Pestalotia*, a genus of andolse endorphytic fungi that often causes disease in mangrove plantations and other plants. A 2nd experiment using agar dosed with benlate fungicide to inhibit sporulating molds, eventually allowed the mushroom spores to germinate. A preliminary report of the first attempt to cultivate *Psilocybe antioquensis* collected in Cambodia was noted. Below is an image of the first single collection of *Psilocybe antioquensis* from Banteay Kdei and from Banteay Srei (The Temple of the Women). Information regarding the conidia can be found on the Internet at the following URL posted directly below:

http://www.botany.utoronto.ca/ResearchLabs/MallochLab/Malloch/Moulds/Pestalotiopsis.html/

Fig. 20. A dried specimen of Psilocybe antioquensis with a nickel for scale.

Fig. 21. ***Psilocybe antioquensis*** **collected at the Citadel of the Cell (Banteay Kdei), an ancient prison at Angkor Wat, Kampuchea.**

Fig. 22. Spores extracted from a dried specimen of *Psilocybe antioquensis*. Pointer is 8.4 micrometers in width.

Fig. 23. Pins resulting from a culture isolated from the dried specimen.

The substrate is sterilized horse manure cased with peat/oyster shell. Pins formed 5 weeks after casing at 78F. The fresh mushrooms reportedly blued and the cultured mycelium definitely bruises blue on agar.

Fig. 24. While some pins get bigger, some are also stalling. Only one seems to be still going strong.

Fig. 25. A mature fruiting body of *Psilocybe antioquensis.*

Fig. 26. Most previous minodium pind aborted and many continued to do so. This lone survivor formed a less fully mature fruiting body. It appears to be sporeless and abnormal. The image shows a 1-1½ in. pinner.

Cultures:

Spores were streaked on 2% malt extract agar with gentamycin sulfate antibiotic. The spores were extracted from a dried specimen germinated in at 27°C in 10 days. The mycelium stained blue when cut on the agar. Fructifications were obtained on sterile horse manure, with no supplements, cased with sterilized peat moss with 25% crushed oyster shell by volume at 25°C after 5 weeks. The mushrooms reached their complete development in 30 days after pinheads were noted, and were normal, except that they presented a larger, whiter stipe with a small pileus." Most of the developing mushrooms aborted before growing to maturity and no spores were visible on the gills.

In the image posted directly below, we were able to obtain a successful isolation of healthy mycelium from dried mushroom specimens using benlate (mold specific fungi) in concentrations of 10 mg per liter and gentamycin sulfate (antibiotic) malt agar. No contamination occurred after the addition of benlate and gentamycin sulfate introduced into the culture medium. We did streak dried gill tissue over the surface using sterile forceps to spread out the spores, then we left the tissue on the agar at the end of the streak. Typically, the tissue mass contaminates but spores left by the streaking usually germinate cleanly. We were certain by now that only the spores produced the mycelium but there was no definite way of knowing as we had several mycelial types growing.

Fig. 27. Addition of benlate (10mg per liter) gentamycin sulfate (100mg per liter) attempt worked great. No signs of molds or bacteria at all. A vast difference compared to the earlier attempt with only gentamycin.

Updated info on a 2nd attempt to cultivate *Psilocybe antioquensis*

More specimens of *Psilocybe antioquensis* were later collected by (JWA) and some Cambodian children along a cattle trail at the east gate to Banteay Kdei (Citadel of the Cell), all basically found fruiting in manured soil at Angkor Wat in Xiem Riap, Kampuchea.

Fig. 28. Freshly harvest fruiting bodies of *Psilocybe antioquensis*.

Fig. 29. *In situ* image of the second collection (2003) of *Psilocybe antioquensis*.

Fig. 30. Dried mushroom specimens of *Psilocybe antioquensis* used for spore extraction and cultivation.

Fig. 31. Young *Psilocybe antioquensis* mushrooms developing on grass seed cased with pasteurized peat/calcium carbonate in small glad-ware container.

Fig. 32. Maturing mushrooms. In the 1st flush, there was heavy bluing on the damaged and aborted mushrooms. None of these early fruits grown in the lab resembled the Naturally occurring wild specimens collected in Cambodia.

Fig. 33. Fruiting bodies of *Psilocybe antioquensis.*

Fig. 34. Freshly harvested fruiting bodies of *Psilocybe antioquensis*.

Fig. 35. Mature fruiting bodies of *Psilocybe antioquensis.*

Fig. 36. Freshly harvested specimens of *Psilocybe antioquensis*.

Fig. 37. *Psilocybe antioquensis.* 2nd cultivation attempt in 2009. Photo: Workman.

Fig. 38. *Psilocybe antioquensis* 2nd cultivation attempt (2009). Photo: Workman.

SEM's of *Psilocybe Antioquensis*

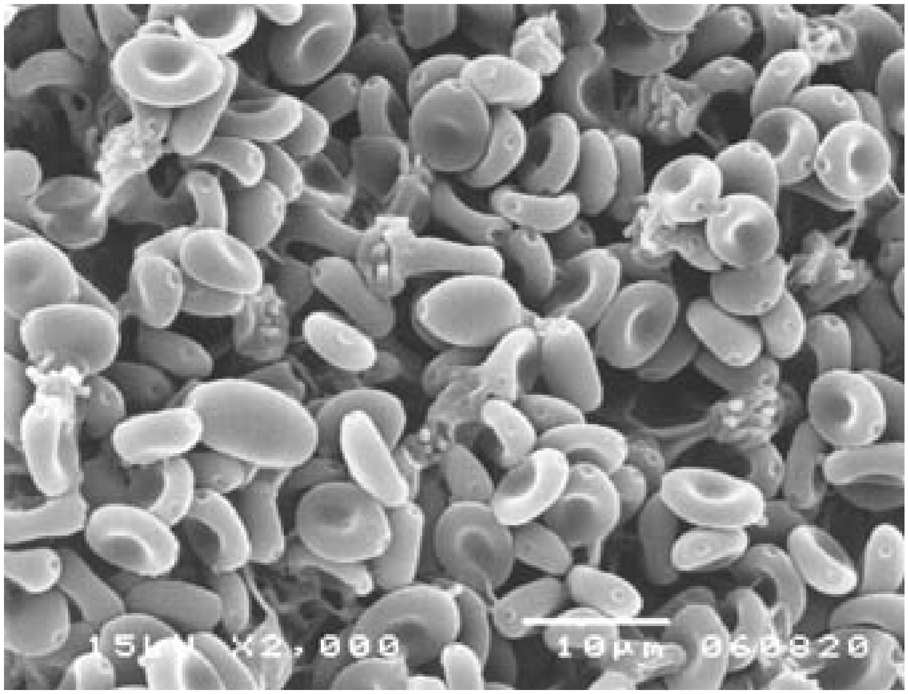


Fig. 39. SEM micrograph of the basidiospores of *Psilocybe antioquensis.* Observe the ellipsoid shape and red blood cells of the spores.

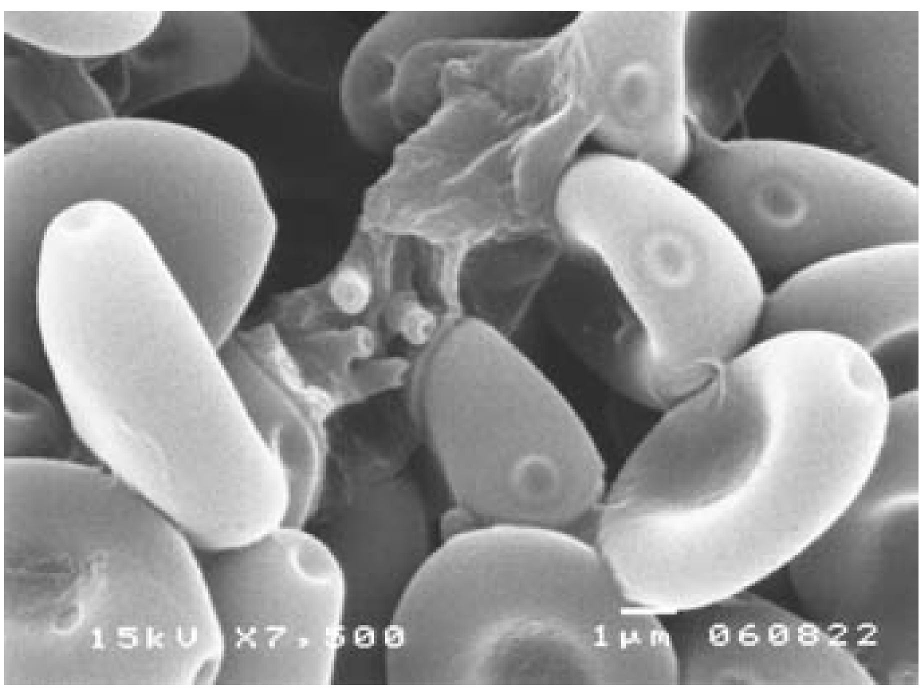


Fig. 40. High magnification SEM of the basidiospores of *Psilocybe antioquensis* attached to gill tissue with marked of germ pore.

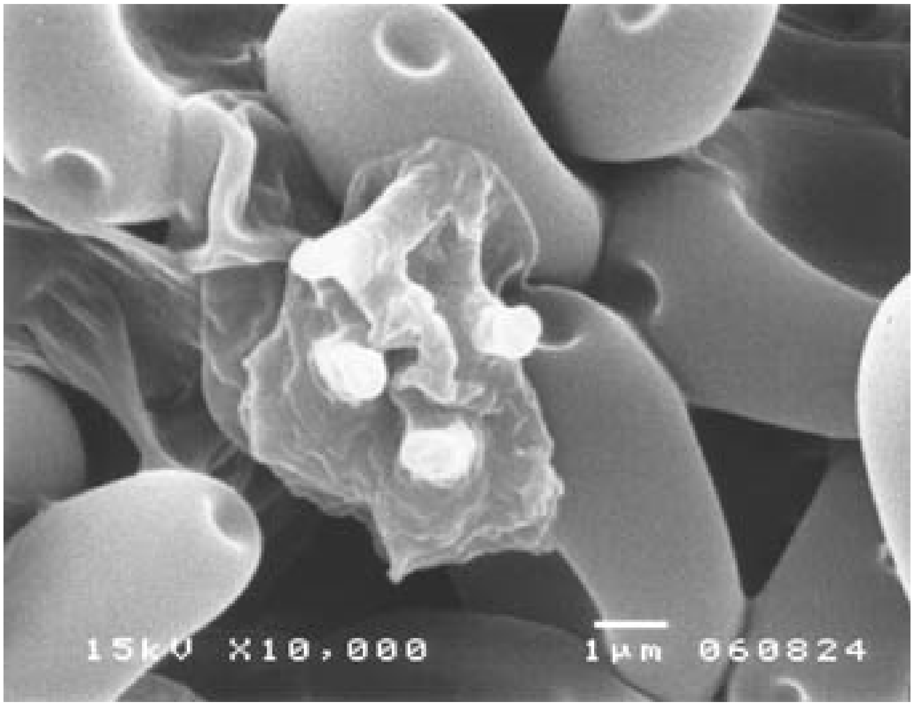


Fig. 41. *Psilocybe antioquensis* SEM.

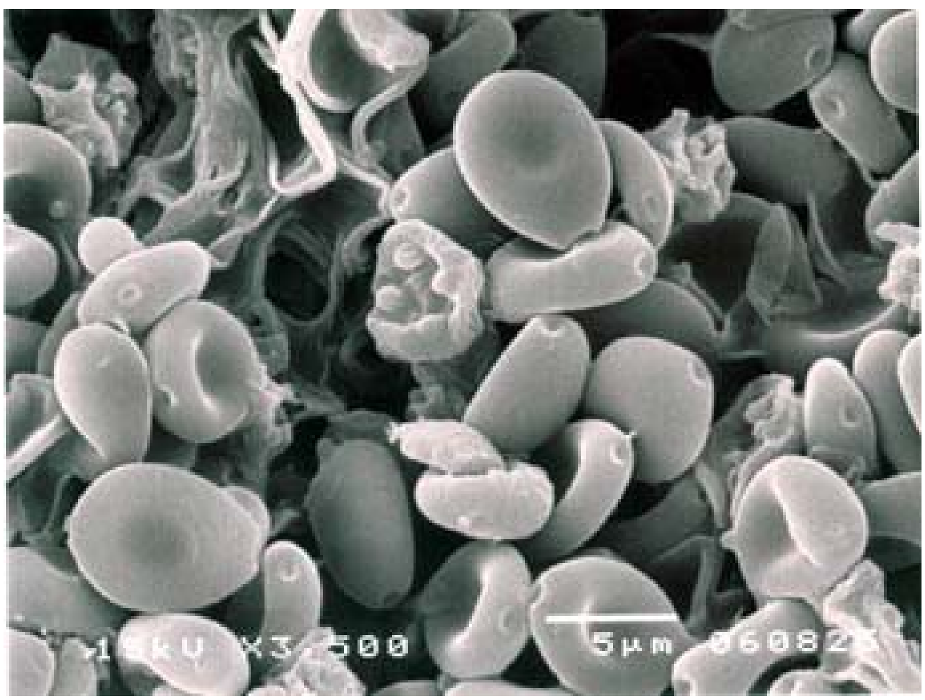


Fig. 42. Psilocybe antioquensis SEM.

Psilocybe cubensis:

Spore prints for the cultivation of *Psilocybe cubensis* were obtained in decomposing elephant dung compost near Na Muang, Koh Samui, Thailand. See discussion for comments on the appearance of *Psilocybe cubensis* in elephant dung.

While traveling around the tropical isle of Koh Samui, the senior author turned onto a side road into the interior of a coconut grove near the region of Na Muang. This is an area where they cart various collections of elephant dung from around the region and dispose of the defecation in a sterile manner in brush away from human habitats. Eventually after some composting, especially during the monsoon season, the elephant handlers eventually cover the elephant dung balls with palm fronds. It was in such an area as seen in the next image where the senior author (JWA) discovered several species of mushrooms in the elephant dung balls. One species was *Psilocybe cubensis*.

Interestingly, in 1988, one of the authors (JG), together with G. K. Muller, grew *Psilocybe cubensis* on elephant dung obtained from the Leipzig Zoo. They were cultivated in the Botanical Gardens at 23-27 degrees Celsius. The spawn was rye grain with fruitings appearing in 4 weeks.

Fig. 43. An elephant at Na Muang, Koh Samui and composting dung-balls.

Utilizing a fresh spore print (July 2005) obtained from a specimen collected in elephant dung, we used PDA to grow mycelium and were able to obtain a nice sized pinner in a petri plate. The spawn grew rapidly within 8 days permeating the medium in pre-sterilized rye berry seed. Then we mixed the colonized rye berry seed with pasteurized wheat-straw and horse manure compost. In 20 days of mixing the two in a mycobag, we started to see pinners forming throughout the cake and the cake was then transferred to a terrarium.

Fig. 44. *Psilocybe cubensis* in elephant dung with patches of white mycelium.

Fig. 45. *Psilocybe cubensis* in elephant dung, Na Muang, Koh Samui.

Below is a series of pictures showing the development of *P. cubensis* grown on organic compost cultures (20, 21, and 22 days) after inoculation of spawn and compost. This was a most interesting cultivation project as it eventually produced 2 terrariums of 4 flushes each within 47 days after inoculation of the rye berry spawn and mycelia with pasteurized compost. We grew some really interesting specimens, including one that resembled an elephant's eye and truck.

Fig. 46. Day 20.

Fig. 47. Day 21.

Fig. 48. Day 22.

A large 5-pound cake was split into two terrariums. The above image is the result of terrarium number 1 after 22 days since mixing spawn with the compost.

Fig. 49. Day 23 of the end of the 1st flush of box 2.

Fig. 50. Day 36 of the 3rd. flush. Eye of Elephant

Interestingly, this odd mutated growth happen to resemble the eye of an elephant with its trunk curled up, similar in photo below of an elephant walking on a highway north of Erawan, Thailand in the NE region of the country. Eventually this strain produced 2 terrariums and a total of four flushes each, ending on the 47th day of their growth.

Fig. 51. The real "Eye of Elephant," near Erawan, Thailand.

The Tak Mountain Cube

On a misty mountain Sunday morning, in July of 2005, the senior author, along with two professors and four students from Chulalongkorn University, were wrapping up a three-day mushroom foray at an altitude of 1000 meters at the Taksinmaharat National Forest in Tak, Thailand. We had been collecting micro-fungi and other species for research at the University.

Fig. 52. Taksinmaharat National Forest. Tak, Thailand, 7 a.m., July 2004.

Around 8:30 in the morning, one of the authors (PS) ask that JWA accompany him outside to a nearby lawn were he believed he had just found a single specimen of hed kee kwai (mushroom which appears after water buffalo defecates, *Psilocybe cubensis*) growing from a grassy lawn with no visible manure heap.

This was totally unexpected at this altitude in the mountainous regions of Tak. However, nearby was a lean-to shanty shed with aluminum siding for a roof and in that opened-aired shed was a mound or powdered buffalo manure, used to fertilize the lawns in the National Forest along the roads where the lodges were and in the general public areas. We inquired of the rangers at the Park regarding the presence of the powdered manure and learned that the manure came from water buffalo belonging to various Hill-Tribe peoples living in the mountainous jungle regions of Tak and the powdered manure was sprinkled on the grounds as a fertilizer.

Fig. 53. An *in situ* photo of a single Taksinmaharat National Forest Mountain Cube at 1000 meters altitude, Tak, Thailand.

Fig. 54. *Psilocybe cubensis* from Tak.

Two attempts were made to grow the Tak mushroom. The first time the large mycobag developed a pool of green liquid at the bottom of the bag due to aspergillus mold. When the bag was opened to place the 5-pound cake into the terrarium, green water ran onto the cakes compost and spawn mixture, thus contaminating the cake. We tried to resolve this contamination by immediately soaking the cake in cold tap water that should have shocked it into growth. Two flushes resulted from this action and they were very small. The first flush yielded two long 8" mushrooms. The 2nd flush occurred one week later producing a flush of 8 mushrooms. One mushroom was quite large (cap 4" in diameter).

The 2nd attempt to cultivate this mushroom was quite successful as seen in the images below. Pinners appeared on the 18^{th} day after mixing the spawn composed of rye berry seed and pasteurized wheat-straw mixed with horse manure.

Fig. 55. First flush. Tak Mountain Cube. 21 days after mixing spawn with compost.

Fig. 56. Day 22. First Flush.

Fig. 57. Day 23. First flush.

Fig. 58. Day 24. First flush.

Fig. 59. Day 24. First flush. 4 hours later.

The 2nd flush also produced some beautiful large pinners as seen in the images below; some appeared to be very sexual in their forms. The caps of these specimens were from 2 to 3 1/h inches in diameter.

Fig. 60. A small corner of the 2nd flush of the Tak Mountain Cube 27 days later.

Fig. 61. A few hours later. Center fungi removed for cloning purposes. 28-days.

Fig. 62. A Bouquet of the Tak Mountain Cube. Day 32.

Fig. 63. Day 28 of the 2nd flush.

Below, we see from a chopped in half cake from the third flush of the Tak Mountain Cube, a new fast flush.

Fig. 64. Day 37 of the third flush.

Psilocybe mexicana Heim.

Fig. 65. Mycelium forming in agar.

Fig. 66. A jar of spawn of *Psilocybe mexicana*.

Roger Heim first cultivated *Psilocybe mexicana* in 1958. The majority of those 1st *in vitro* cultivations often resulted in spore less fruiting bodies of the species. Caps curled and over turned inwards and upwards observed in the selected photo images posted below

Fig. 67. *Psilocybe mexicana* with a single sterile spore less cap.

Fig. 68. A handful of curled up caps producing spores.

Fig. 69. A close up of the above *in vitro* fruiting bodies.

Psilocybe mexicana Heim – Jalisco Strain.

A multi-spored culture of *Psilocybe mexicana* - Jalisco strain fruited on grass seed cased with peat/calcium carbonate. Several phenotypes were observed and documented.

Fig. 70. Fruiting bodies of the Jalisco strain.

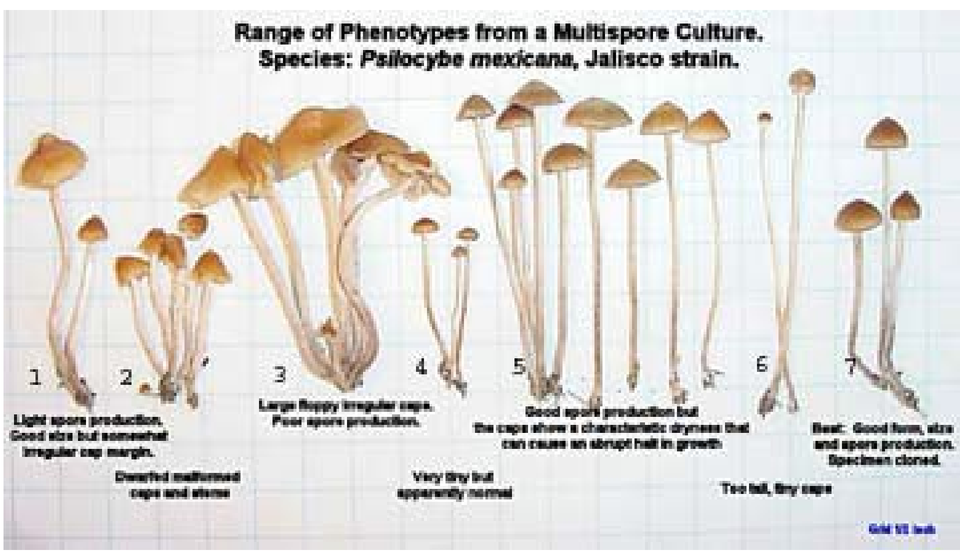


Fig. 71. 1. Light spore production. Good size but somewhat irregular cap margin. 2. Dwarfed malformed cap and stems. 3. Large floppy irregular caps. Poor spore production. 4. Very tiny but apparently normal. 5. Good spore production but the caps show a characteristic dryness that can cause an abrupt halt in growth. 6. Two tall, tiny caps. 7. Best: Good form, size and spore production. Specimen cloned. Grid is ½ inch in diameter.

Results show fruiting of cloned mushroom (1st flush). Evidence that increased spore production trait was retained as shown by spore deposit on a lower cap.

Fig. 72. Beautiful fruiting bodies similar to *in situ* specimens.

A good early sign that a strain will produce spores as well is a very dark caramel colored cap. Pale and/or orangish [ochraceous] specimens produce spores poorly. No sclerotia are visible in the casing layer at this time. Typically, other strains of *Psilocybe mexicana* put a great deal of energy into large lumps of sclerotia that heaved up the casing layer prior and during fruiting. The Jalisco strain of *Psilocybe mexicana* did produce some sclerotia *in vitro* after an extended incubation times. That first flush of fruiting bodies occurred after we obtained and cloned a pinner isolated from mycelium grown in agar (PDA). The *in vitro* grown *Psilocybe mexicana* actually resembled the macroscopic features associated with this species when observed in manured fields of wild grasses where cattle and sheep graze

In contrast to these results, Gartz (1994) obtained from another strain, sclerotia from a rice/water substrate with an early beginning after only 2 weeks of cultivation.

The sclerotia contained:
0.18 – 0.65% psilocybine,
Up to: 0.39% psilocine, and
only: 0.01% – 0.02% baeocystine, (Dry weight).

Fig. 73. A flush of the Jalisco strain of *Psilocybe mexicana*.

Fig. 74. *In situ Psilocybe Mexican* from Jalisco. Photo: Fulvio Castillo Suarez.

Fig. 75. *In situ Psilocybe mexicana* strain, Mexico. Photo: Alan Rockefeller.

Fig. 76. Freshly harvested specimens of the Jalisco strain.

Psilocybe mexicana Heim – The A Strain.

Psilocybe mexicana strain A is noted for its exceptional sclerotia forming abilities but it can be fruited under controlled conditions. Note the beautiful formation of the sclerotia in the image posted directly below. On Dec 2, 2008, the Dutch parliament banned the possession and sales of psilocybian mushrooms because many tourists were consuming too many mushrooms, causing problems for the local populations and the Dutch Parliament actually used a paper by Guzman, Allen and Gartz (1998) to note what species would become illegal in the Nederland. However, the lack of judgement amongst the uniformed Dutch 'lawmakers' unkowningly also banned several species of edible fungi, yet failed to include as illegal, the active sclerotia of *Psilocybe tampanensis*, *Psilocybe mexicana* and other fungi items such as spores, and grow kits which wnen used will produce tryptamine alkaloids noted in the banned fungi. So mushroom farms are still successful from tourist influence due to legal sales of active sclerotia in Smart Shops, along with grow kits and spore prints. All still available in the Nederland and no recent shroomatic problems between tourists and magic mushrooms have arisen since the ban went into effect.

Fig. 77. The sclerotia of *Psilocybe mexicana* Heim.

In the images below, substrate grass seed was used and cased with sterile peat and calcium carbonate in a 4:1 ratio. Fruiting temperature was between 75-78°F with a good exchange of air.

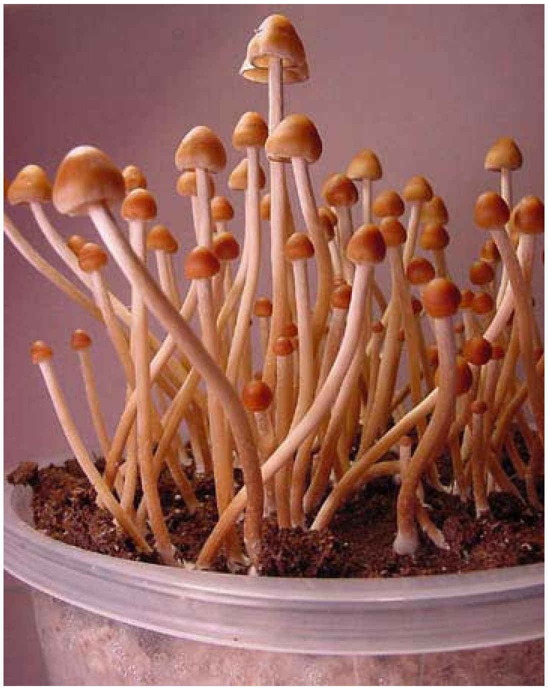


Fig. 78. Tall thin young fruiting bodies of *Psilocybe mexicana* A strain.

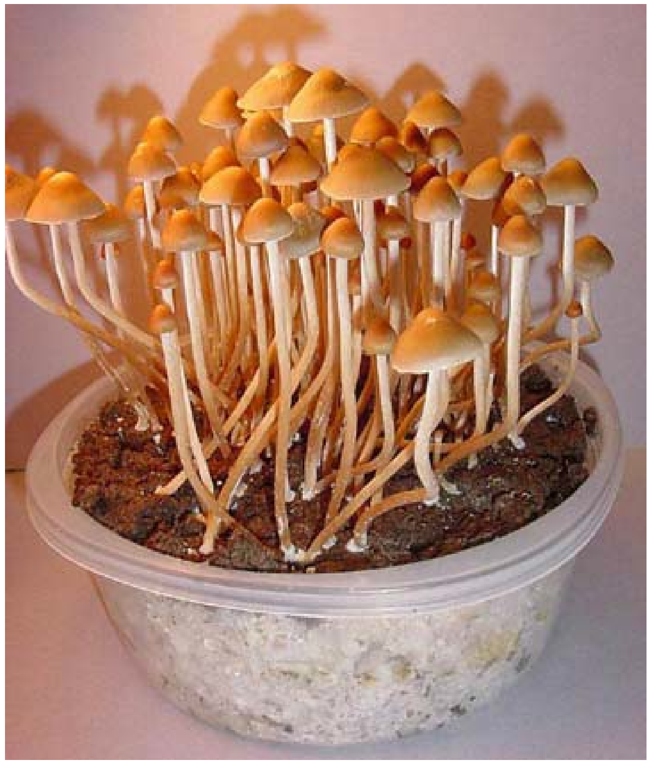


Fig. 79. Mature fruiting bodies of the A strain.

Fig. 80. A close up of the in vitro grown specimens. They are very close macroscopically to their natural occurring cousins in Oaxaca, Mexico.

Fig. 81. A single specimen of the A strain of *Psilocybe mexicana* Heim.

SEM Photographs of the *Psilocybe Mexicana* Jalisco Strain.

Fig. 82. Gill fragments of *Psilocybe mexicana* magnified 40X under the stereomicroscope.

Below SEM micrographs of basidiospores of *Psilocybe mexicana* show some ellipsoid shaped spore and typical germ pores. Collapsed red blood cell shapes are also present.

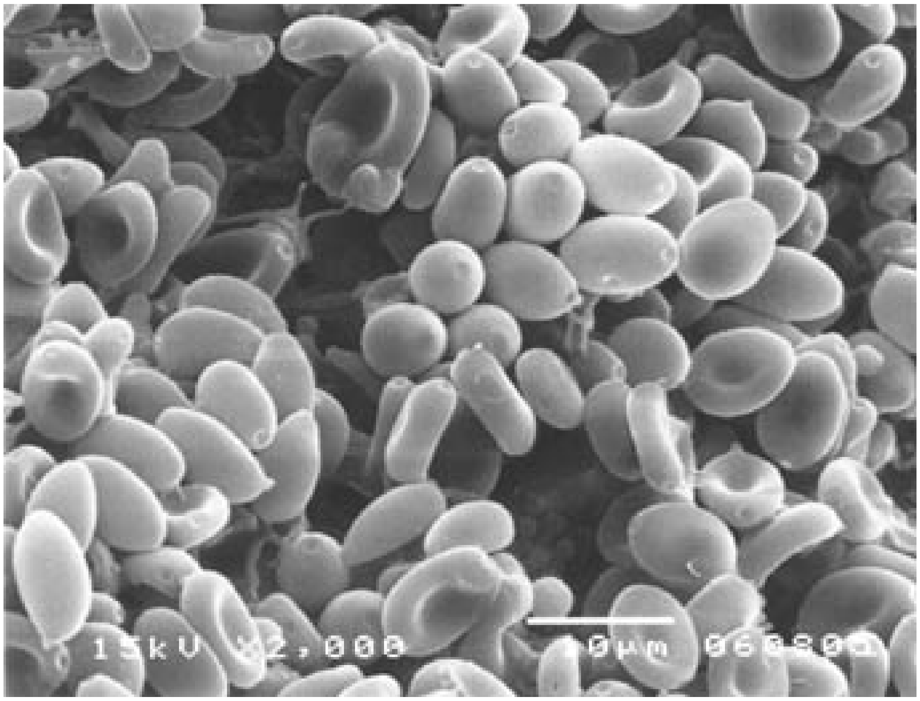


Fig. 83. Germination of spores of *Psilocybe mexicana*, Jalisco strain.

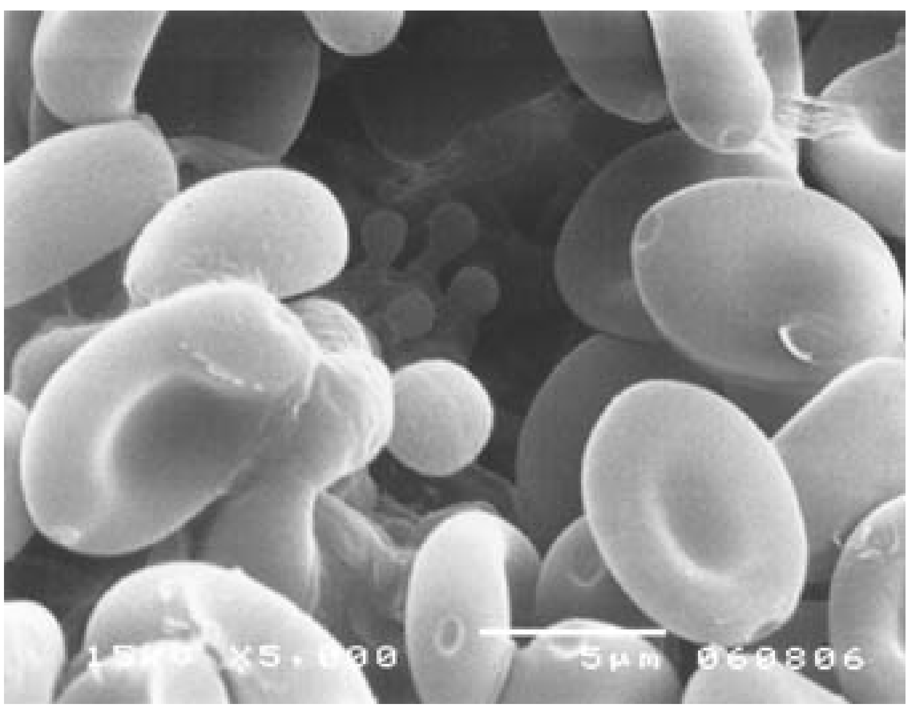


Fig. 84. High magnification scanning electron micrograph showing formation of 4-spored young basidiospores of *Psilocybe mexicana* (center of image).

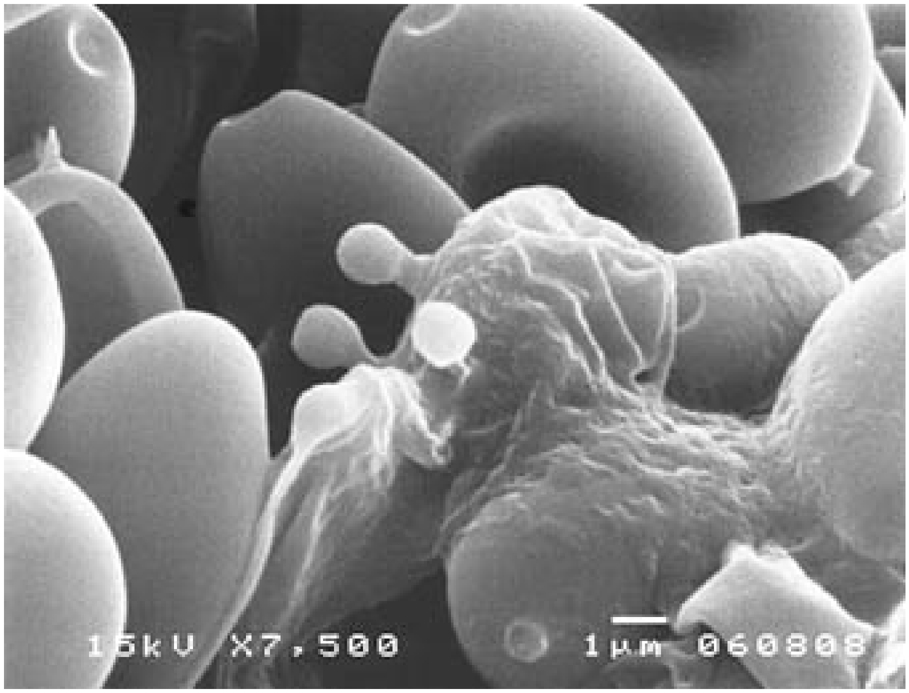


Fig. 85. The germination of spores with four young basidiospores forming on Basidium.

Psilocybe pegleriana

Fig. 86. *Psilocybe pegleriana*, Ban Tai, Koh Samui, Thailand, 2001.

At first, *Psilocybe pegleriana* was assumed to be a new species, distinguished by its heavily violet spore deposit. It was discovered in the fall of 2001 at Ban Tai, Koh Samui in the manure of the SE Asian water buffalo and given the tentative name of *Psilocybe violacea* Nom. Prov. The name was provisional since a published identification was unknown at the time. Since no spore prints were available, a dried specimen was acquired from Chulalongkorn University in Bangkok where the collection was deposited. Unfortunately, the received specimens arrived pulverized into a fine powder. This made it impossible to observe microscopic gill structures. So Intact spores were visible in the powder and were streaked onto PDA media with 10mg/liter of benlate fungicide added to inhibit molds. On 4/20/02, we streaked some spore deposits on the Petri plate.

By 4/23/02, a rapid growth of whitish slime with some yellowish slime areas began to appear in the agar. On 5/01/02, a possible patch of mushroom mycelium began to emerge from the slimy areas in the agar and by 5/06/02; dark lumps were forming in mycelium in the petri plate images featured below.

Fig. 87. An agar plate (PDA with benlate fungicide) showing slimy like contaminantes and dark structurlike lumps soon began to grow and develope from the presumed target mycelium and soon began to resemble what appeared to be sclerotia.

Fig. 88. **Close-up of above agar plate showing minodia formation on tiny mushrooms. Many are malformed but some look like normally shaped carpophores. Image (5/11/02). Grown on MEA (malt extract agar).**

Fig. 89. Micro-mushroom excised from culture plate: Cap size 1 mm. in diameter.

The gill area is dark so an attempt was made to retrieve some spores to confirm that the mushrooms are from the spore sample and not from an outside contaminate.

Fig. 90. Spore sample of micro-mushrooms with original sample inset and at the same scale. The spores appear to be identical in shape but are much smaller.

Samples of mushroom producing mycelium have been isolated on new antibiotic (gentamycin sulfate 100 mg/liter) malt agar media. The ease and speed of mushroom generation was encouraging. Isolates were placed on grass seed for further growth tests. The agar-grown mushrooms were surprisingly pale and tiny, but it was assumed that growth on a more complete medium without antibiotics or fungicides would result in larger and more colorful specimens.

Fig. 91. A 2nd attempt at germinating spores.

This occurred as a result of using a crushed specimen using a potato dextrose agar mixture with 10mg/1 liter benlate fungicide and 100mg/1 liter gentamycin sulfate antibiotic. Using this method we were able to show a much reduced slime growth and a much quicker spore germination of small fruiting bodies in the plate of agar. The image is at 14 days after streaking. This plate was stored upside down and several prints were deposited on the lid of the plate. Surprisingly this method worked out quite well as seen in the photos posted below.

Fig. 92. A few harvested mushrooms from the above plate next to a penny for scale.

Fig. 93. Isolation transfers to malt agar on 5/11/02 from the plate shown near the top of the page (streaked at 4/20/02). Note missing wedge that was used to transfer to birdseed. Although this petri dish is labeled as *Psilocybe violacea*, the species is as noted above, *Psilocybe pegleriana.*

Fig. 94. Close up of above plate showing developing mushrooms 4 days after transfer. A clean wedge was taken from this plate at day 2 and place on sterile birdseed. Good growth on birdseed noted in less than 24 hours. Hyphal knots visible at day 2. Pinhead mushrooms on day 3, with fruits of fungi on day 4 (above image).

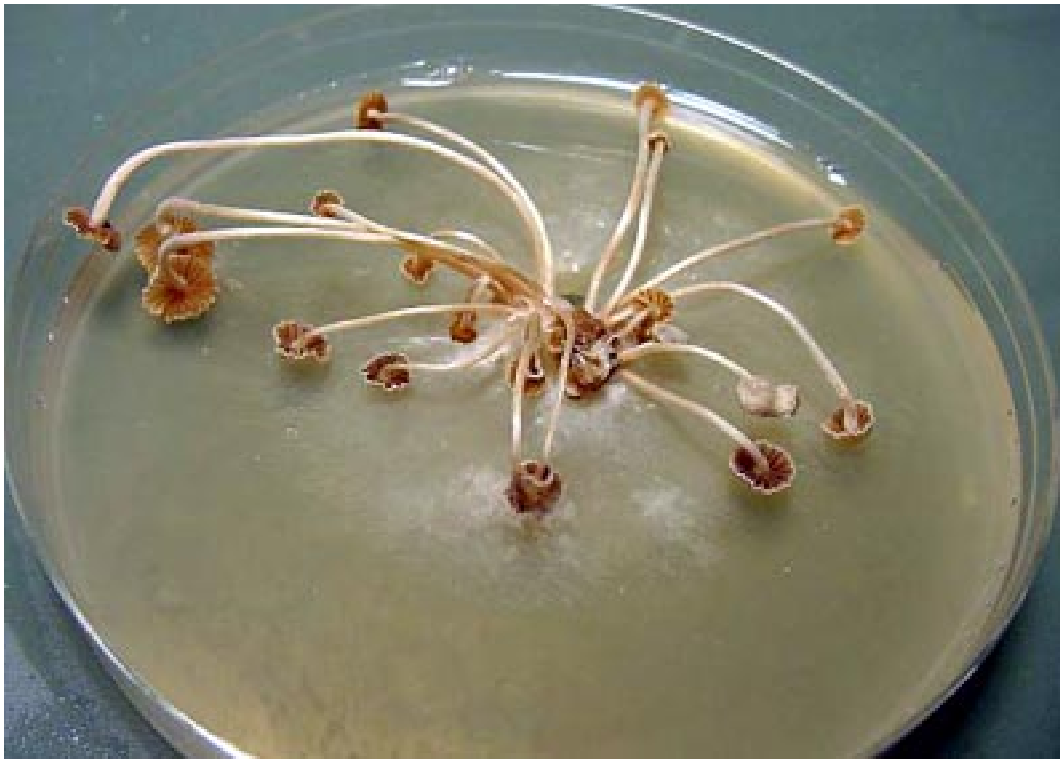


Fig. 95. Same plate day 7 after agar wedge transfer.

Over incubated sterilized horse manure in a quart jar inoculated with birdseed spawn generated from the above plate. These mushrooms seemed to appear instantly and so we cased this jar and place it in the fruiting chamber.

Fig. 96. See close-up of top of jar posted below.

Fig. 97. A close-up of the top of the jar pictured above.

Fig. 98. 2 days later than previous image.

Fig. 99. *Psilocybe pegleriana* fruiting bodies growing along the stems of same. These are not of a parasitic nature.

Another attempt to cultivate this species produced a massive entanglement of 9 to 12 inch-high fruiting bodies interwoven amongst each other like banyan branches spreading outward and upward; like vines creeping up the length of the cake as seen in the images posted directly below. We were thus able to obtain numerous fruiting bodies that appeared along the bottoms and sides of the cake.

Fig. 100. *Psilocybe pegleriana* fruiting in a 10-pound mycobag of Kowanite compost. See below for results of a smaller 2nd flush on day 25 of this project).

Fig. 101. Looking down into the top of the mycobag of *Psilocybe pegleriana*.

Fig. 102. A partial section of the matted mycelium of the mycobags 1st flush. These unusual *in situ* specimens of *Psilocybe pegleriana* are, like most indoor cultivated fungi, quite macroscopically different in appearance than their natural occurring cousins.

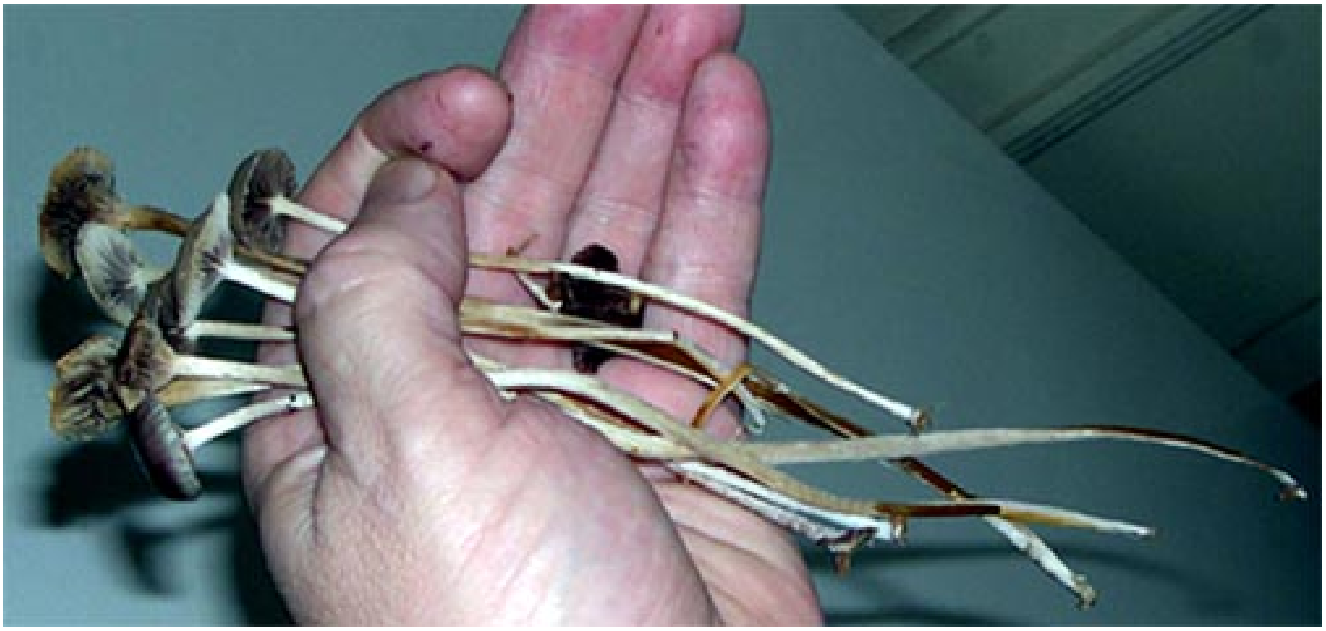


Fig. 103. A small hand-held bouquet of *Psilocybe pegleriana* on day 25 of a 2nd flush.

Fig. 104. Mature fruiting bodies of a 2nd Flush of *Psilocybe pegleriana*. This small 2nd flush produced fruiting bodies similar to those from a natural pastureland habitat.

Fig. 105. The final results of a 3rd flush produced only a few fruiting bodies.

Fig. 106. The last of the 3rd flush indoor cultivation of *Psilocybe pegleriana* from a sporeprint obtained from Spore Works Laboratory in Tennessee.

Since *Psilocybe pegleriana* is not known to be an active species, no chemical analysis was permormed on this species.

SEM of *Psilocybe pegleriana*

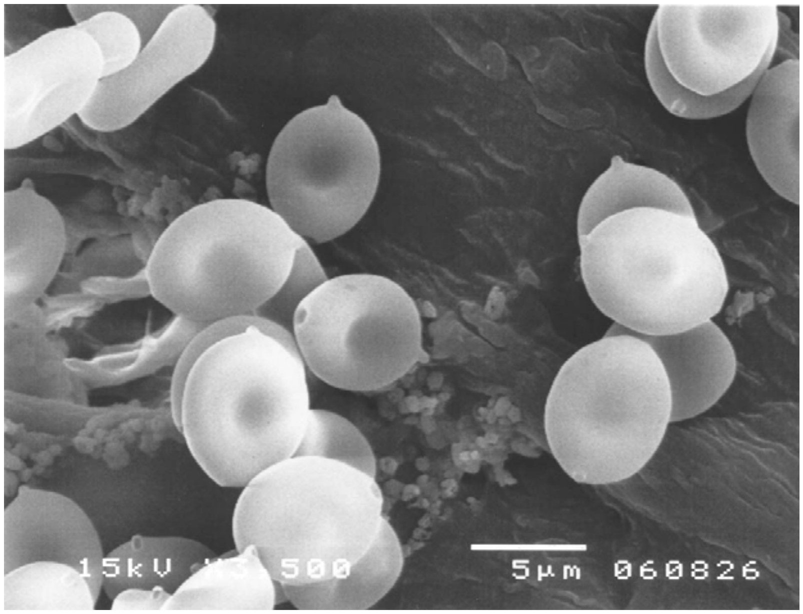


Fig. 107. *Psilocybe pegleriana*. SEM of the germination of spores.

Psilocybe samuiensis. Guzmán, Bandala, and Allen.

Gartz, Allen and Merlin (1992) were the first to successfully cultivate *in vitro* specimens of *Psilocybe samuiensis*. Mycelium was obtained from the spores of a dried specimen of *Psilocybe samuiensis* by methods described by Stamets and Chilton (1983) and was stored as stock culture on 6% malt agar. Strains on agar of a related species *Psilocybe tampanensis* Guzmán and Pollock and *Psilocybe semilanceata* from Germany were also obtained. In a ratio of 1 to 6% on malt agar, the whitish mycelium of *Psilocybe samuiensis* grew at a faster pace than that of similar mycelium of *Psilocybe semilanceata*. The rapid growth of *Psilocybe tampanensis* was similar to the growth of *Psilocybe samuiensis*; however, the former species soon formed brownish sclerotia on the agar as it does with *Psilocybe mexicana* (Stamets and Chilton 1983). Even after a relatively long growth period (3 months), the mycelium of *Psilocybe samuiensis* formed only a few small brownish sclerotia.

Similar conditions were observed while cultivating the three species on Lolium seed/water (1:1.5). The same conditions were also observed in complete darkness; and *Psilocybe tampanensis* and *Psilocybe samuiensis* both grew with rapid speed. Observations on the rapid formations of sclerotia in *Psilocybe tampanensis* after a few weeks of cultivation were already reported by Stamets and Chilton (1983). In contrast, *Psilocybe samuiensis* in cultivation only formed thick whitish mycelium (rhizomorphs, diameter 2 to 3 milliliters) throughout the media, and produced no sclerotia. Under the same conditions of cultivation, *Psilocybe semilanceata* grew slowly, producing only a fine and whitish mycelium with no formation of sclerotia or rhizomorphs.

Until this present study, it was not possible to produce complete fruit bodies of *Psilocybe samuiensis* on either malt extract agar or Lolium seed medium. Some small incomplete fruit bodies of *Psilocybe samuiensis* (up to 2 centimeters high) appeared, but failed to develop into normal sporulating mushrooms. These premature formations only occurred on agar with a low concentration of malt (0.5% to 1.5%). After stopping their natural growth, these incomplete fruit bodies began to exhibit a slight spontaneous bluing reaction.

At this time it was not possible to cultivate mushrooms on a lolium seed/water mixture (Stamets and Chilton. 1983). *Psilocybe samuiensis* also grows well on some grains such as rye or rice. A mixture of rye/horse dung/water (2:1:2) did produce fruit bodies of *Psilocybe samuiensis* after 4 months cultivation, and 3 weeks after casing with peat/chalk (2:1) (Stamets and Chilton, 1983). Two flushes produced eight mushrooms but only six of the mushrooms were analyzed (Gartz, Allen & Merlin, 1994).

Fig. 108. After 4-months, *Psilocybe samuiensis* fruited from Lolium seed in horse/dung compost. Photo: Jochen Gartz.

Fig. 109. *Psilocybe samuiensis* in Lolium seed & horse/dung compost. Images below represent a slow minimal cultivation of this species that grow similar to *Psilocybe semilanceata, Psilocybe antioquensis* and *Psilocybe mexicana* (grass-root attachers in tall-rank grass), often somewhat difficult to fruit *in vitro*.

Fig. 110. A few specimens began to fruit. Photo: Stephan.

Fig. 111. *Psilocybe samuiensis* cultivated indoors. Photo: Stephan.

Fig. 112. *Psilocybe samuiensis* cultivated indoors. Photo: Stephan.

Fig. 113. Indoor cultivation of *Psilocybe samuiensis*. Photo: Fungus Maximus.

Fig. 114. *Psilocybe samuiensis*. Photo: Courtesy of Spore Works Labs.

Fig. 115. *Psilocybe samuiensis*. Photo: Courtesy of Spore Works Labs.

Fig. 116. ***Psilocybe samuiensis*****. Notice the sclerotia formation in the jar.**

Fig. 117. ***Psilocybe samuiensis*** **indoor cultivation by Ralph.**

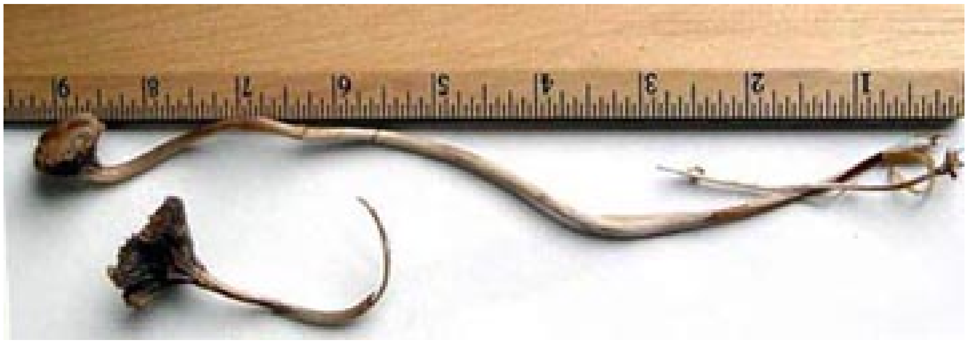


Fig. 118. ***Psilocybe pegleriana*** **with ruler for size comparison.**

Psilocybe samuiensis also cultivated at a local Thai University.

Psilocybe samuiensis was found growing in Ranong Province by Dr. Scott Leibler, an expert in orchids from Thailand who had earlier read of research by JWA and Mark D. Merlin (1992). Fresh specimens were harvested for study. A print made from a fresh cap was placed into agar (MEA) plus yeast, resulting in a small growth that took 6 weeks to germinate 78° F. Once germinated, the mycelium grew rapidly and spontaneously and fruited about 2 weeks after growing out, which also took 2 weeks.

Fig. 119. *Psilocybe samuiensis* Photo: Courtesy of Scott Leibler.

Fig. 120. A complete fruiting body of *Psilocybe samuiensis*. Photo: Scott Leibler.

Fig. 121. Blue-green staining in the stipes of *Psilocybe samuiensis* grown in the above petri plate. Photo: Courtesy of Scott Leibler.

SEM's of *Psilocybe samuiensis* 2003 basidiospores

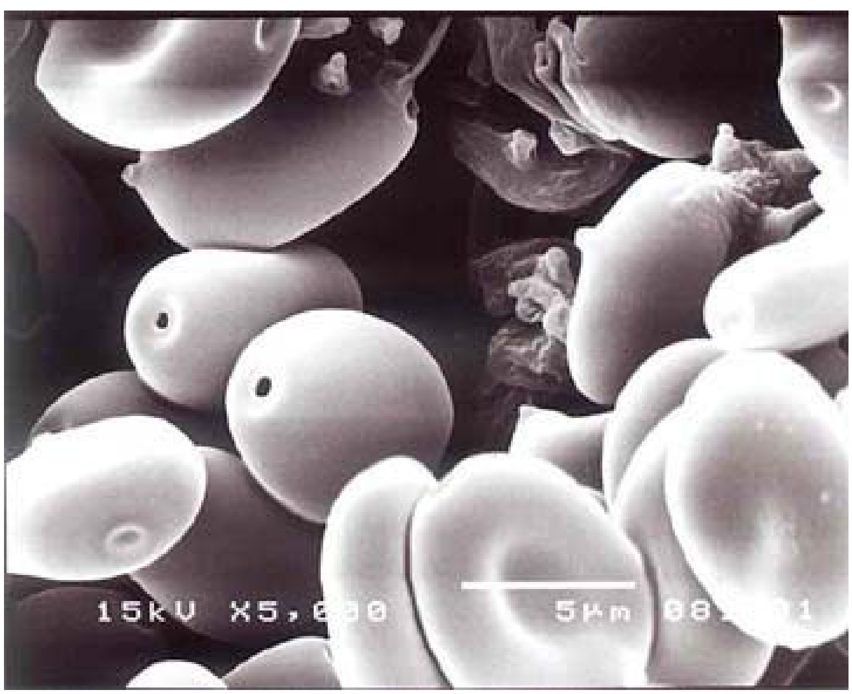


Fig. 122. *Psilocybe samuiensis*. 2003-1. Also observed in this image are the germ pores and nipples of the spores.

Fig. 123. Scanning electron micrograph of *Psilocybe samuiensis* basidiospores show a similarity to red blood cells. 2003-2.

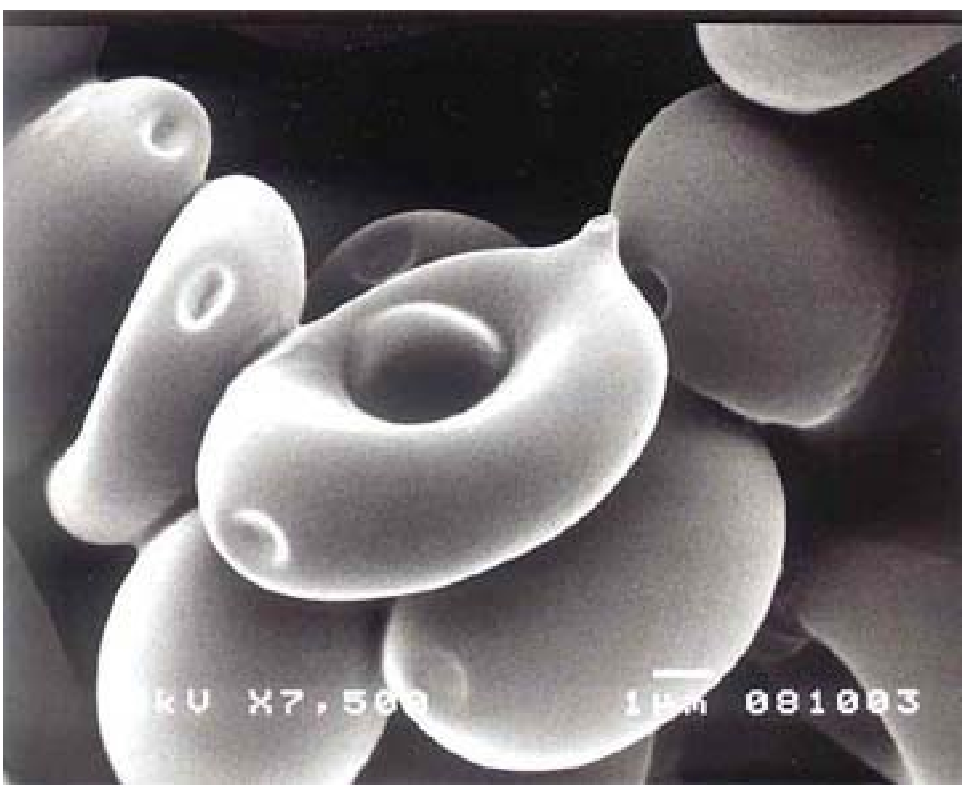


Fig. 124. High-magnification of *Psilocybe samuiensis* basidiospores we see the nipple and the germ pore on each end of the center spore. 2003-3.

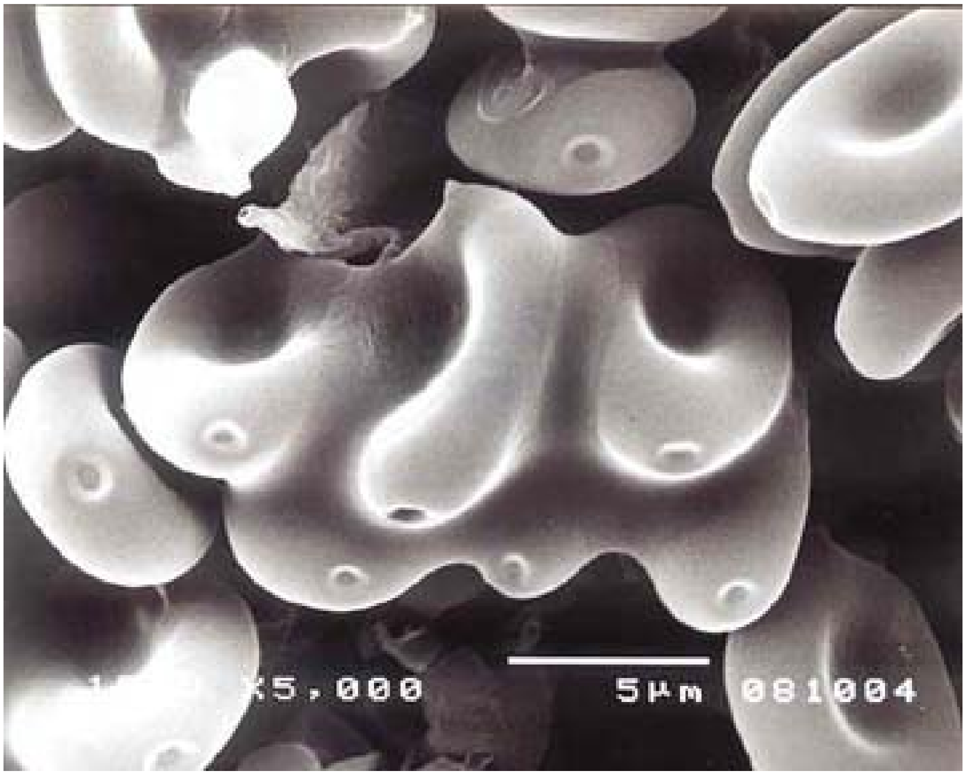


Fig. 125. ***Psilocybe samuiensis*. Observe the basidiospores binding together. 2003-4.**

SEM of *Psilocybe samuiensis* 2004

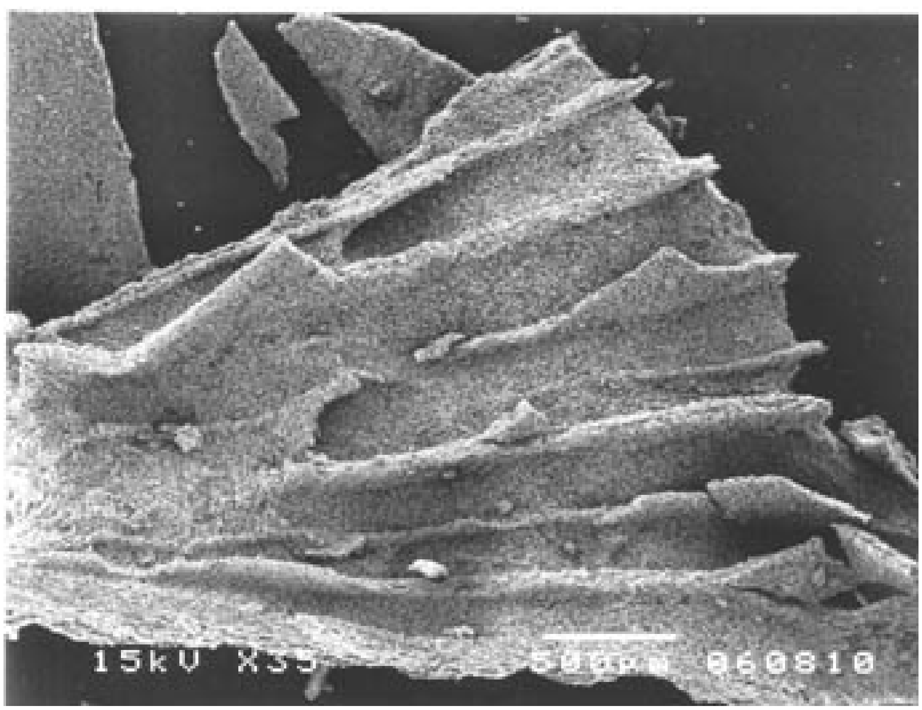


Fig. 126. A low magnification scanning electron micrograph of a gill plate of *Psilocybe samuiensis.* 2004-1.

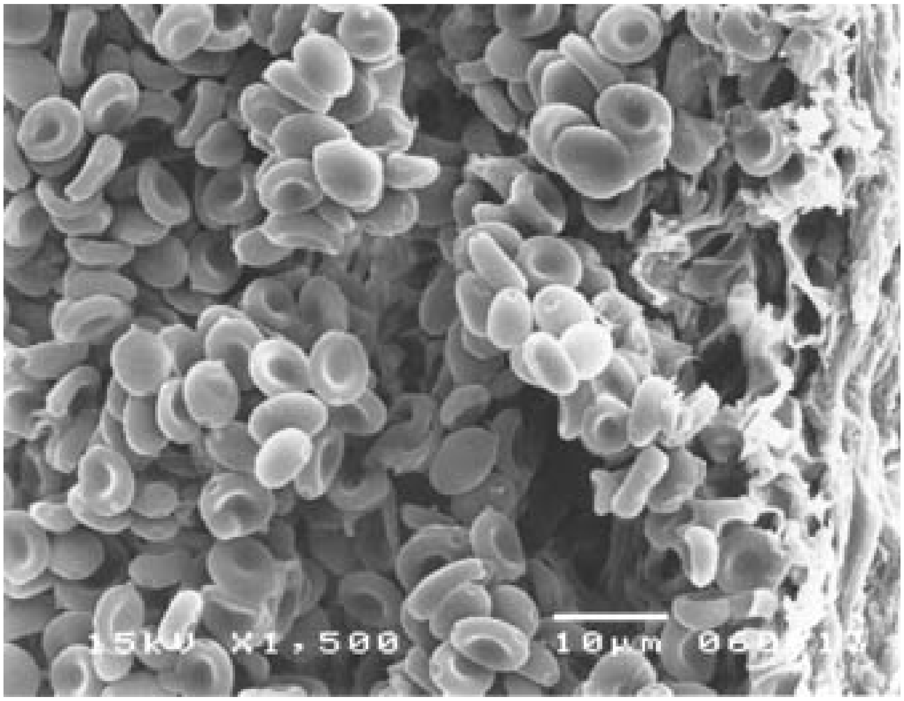


Fig. 127. SEM of *Psilocybe samuiensis* basidiospores. 2004-2.

Results of Chemical Analysis

Analysis of *Copelandia cyanescens*

T. STIJVE (1992) reported the results of a chemical screening for tryptamine derivatives carried out on samples from Koh Samui (Thailand), gathered in 1990:

Psilocybine	< 0,025
Psilocine	0,95
Baeocystine	< 0,025

(All results are expressed in percentage on dry weight).

Comparing the above data with those reported in the same paper for samples of *Copelandia cyanescens* from other sites, it is evident that the content in psilocybine and psilocine varies appreciably, while the content in baeocystine does not.

The fact that the Thailand samples analysed practically contain no psilocybine could point to a lack of a phosphorylating enzyme; moreover, a small but detectable amount of tryptamine was found (0,005 % on dry weight), possibly a precursor in the biosynthesis of psilocine.

According to Stijve (1992), the presence of psilocine in a certain number of *Panaeolus* could be interpreted as a consequence of a genetical accident. According to this hypothesis, initially these species produced more or less significative quantities of serotonine (5-hydroxytryptamine), then after a mutation they were able to produce 4-hydroxylated tryptamines, along with the 5-substituted ones.

Analysis of *Psilocybe samuiensis* from Cambodia

Analytical investigations showed that the collection of *Psilocybe samuiensis* from Cambodia contained, in fact, near identical concentrations of psilocybine, psilocine and small amounts of baeocystine as to those found in the collections from Koh Samui, Thailand.

Psilocybe samuiensis from Angkor Wat.

Fruit Bodies	Psilocybine	Psilocine	Baeocystine (% dry weight)
1	0.51	0.31	0.02
2	0.48	0.41	0.03
3	0.35	0.28	0.05
4	0.52	0.25	0.03
5	0.63	0.31	0.05

Fig. 128. Herbarium specimens of *Psilocybe samuiensis.* Chulalongkorn University, Bangkok, Thailand.

In an earlier study, 15 specimens of naturally occurring fruit bodies of *Psilocybe samuiensis*, collected by [JWA] from Ban Hua Thanon, Koh Samui, and were later analyzed by HPLC and TLC techniques (Gartz, 1987).

Table 2: Amounts of indole alkaloids in *Psilocybe samuiensis* (analysis of methanolic extracts of dried fruit bodies-fb-by using HPLC, previously unpublished).

Sample	part of the Mushroom	psilocybine	psilocine (.% in dry weight)	baeocystine
1	Basidome	0.40	0.30	0.01
2	Basidome	0.52	0.30	0.01
3	Basidome	0.61	0.10	0.03
4	Basidome	0.55	0.62	0.04
5	Basidome	0.23	0.81	0.02
6	Basidome	0.81	0.13	0.04
7	Basidome	0.63	0.05	0.01
8	Basidome	0.59	0.20	0.02
9	Basidome	0.50	0.05	0.01
10	cap	0.71	0.32	0.01
	stem	0.23	0.41	0.02
11	cap	0.65	0.13	0.03
	stem	0.23	0.22	0.04
12	cap	0.75	0.21	0.02
	stem	0.36	0.62	0.01
13	cap	0.62	0.51	0.05
	stem	0.49	0.32	0.02
14	cap	0.48	0.30	0.02
	stem	0.26	0.21	0.03
15	cap	0.90	0.12	0.05
	stem	0.23	0.48	0.01

Analysis of the above concentrations are noted in Gartz, (1987, 1989a, 1989b, and 1994).

Psilocybine was found to be present in the cultured, non-bluing mycelium of *Psilocybe samuiensis* grown on 6% malt agar. Amounts of psilocybine, ranging from 0.24 to 0.32% dry-weight were analyzed in 5 different batches of mycelium grown over a four-week period. Analyses also revealed that these quantities of psilocybine were much lower than those detected in the naturally occurring fruit bodies obtained from the field. Interestingly, no other indole derivatives were detected in the extracts of the in vitro grown mycelium.

Alkaloidal levels obtained from the slightly bluing sclerotia of *Psilocybe tampanensis* were high. Additionally, the amount of psilocybine obtained from five different cultivations grown on 6% malt agar and Lolium seed ranged from 0.34% to 0.68% by dry weight, and from 0.41% to 0.61% in three sections of sclerotia obtained from a single cultivation on Lolium seed. The sclerotia obtained from Lolium had a concentration of psilocine from 0.11% to 0.32%. The sclerotia obtained from malt agar also contained 0.21% to 0.52% psilocine, but no baeocystine was detected.

High amounts of psilocybine were detected (0.23% - 0.90% dry weight); and a few specimens contained similar amounts of psilocine (0.05% - 0.81% dry weight). Baeocystine, a precursor to psilocybine, was also detected (0.01% - 0.5% dry weight) in all naturally occurring specimens of *Psilocybe samuiensis* but in much smaller concentrations than psilocybine. This is in sharp contrast to the high concentrations of baeocystine and very small amounts of psilocine (only in a few specimens), which were detected in naturally occurring field specimens of *Psilocybe semilanceata* from various origin (Gartz, 1993), and in vitro cultivated fruit bodies of *Psilocybe semilanceata* (Gartz, 1991a, 1991b).

In contrast to the cultivated specimens of *Psilocybe cubensis* by Gartz (1987), it was revealed that where the accumulation of psilocine is often higher in the stems than in the caps, analyses of *Psilocybe samuiensis* revealed that the caps contained more psilocybine than the stems. Identical concentrations of the alkaloids (psilocybine, psilocine, and baeocystine) were found in the cultivated fruit bodies of *Psilocybe samuiensis* and *Psilocybe semilanceata* grown in rye/horse dung (Gartz, 1991a, 1991b). Stijve also found similar concentrations of psilocine and psilocybine in 5 naturally occurring fruit bodies of *Psilocybe samuiensis* (collection F, 8 August, 1991, psilocybine, 0.14%; psilocine, 50%; baeocystine, 0.01%).

Fig. 129. *Psilocybe weilii* cultivated on woodchip after 2 months of mycelial growth.

Fruit Bodies	psilocybine	psilocine	baeocystine (% dry weight)
1	0.52	0.28	0.05
2	0.38	0.18	0.03
3	0.63	0.31	0.02
4	0.54	0.40	0.03
5	0.48	0.21	0.04

Both wood debris and lawns habitats in America, as well as *in vitro* cultivated fruit bodies of *Psilocybe weilii* as noted above, revealed similar concentrations of alkaloids and a minute amount of baeocystine. Earlier analysis of natural grown fruit bodies of *Psilocybe weilii* from Georgia, USA in the autumn of 1995 by [JG], showed a similar analytical result as first published by Stamets (1996), but without the name [JG] who in 1997 was the first pioneer to cultivate *Psilocybe weilii* on rice/water and later was able to fruit on woodchip compost without a casing. This occurred because of an acceleration of the mycelial growth achieved by using plant hormones (brassinosteroids).

Similar observations by [JG] occurred with the cultivation of *Psilocybe cubensis* on woodchips and on simple mycelial growing on compost and a horse dung/rice-mixture (Gartz *et al.*, 1990)

Psilocybe antioquensis from Cambodia also contained very similar concentrations of the 3 primary active known alkaloids.

Psilocybe antioquensis

Fruit Bodies	Psilocybine	Psilocine	Baeocystine (% dry weight)
1	0.33	0.28	0.02
2	0.48	0.31	0.05
3	0.51	0.22	0.06
4	0.21	0.18	0.02
5	0.31	0.20	0.03

The following table covers the concentrations of alkaloids found in the "classical teonanácatl" from Oaxaca, Mexico (cultivated fruit bodies).

***Psilocybe mexicana* (in Vitro)**

Fruit Bodies	Psilocybine	Psilocine	Baeocystine (% dry weight)
1	0.31	0.33	0.05
2	0.64	0.20	0.03
3	0.48	0.15	0.04

It is interesting to note that the analysis of sclerotia from a 2nd strain of *Psilocybe mexicana* grown on rice/water mixture was very similar to the growth of the above noted fruit bodies (Gartz, 1994). In contrast to these subtropical mushrooms, the much studied *Psilocybe semilanceata* (Fr.) Kumm., from the temperate zone looked macroscopically very similar to *Psilocybe mexicana* and revealed high amounts of the precursor alkaloids, psilocybine and baeocystine. In some cases, only trace amounts of psilocine were detected.

On the chromatogram (page 73), another mushroom from the temperate zone with significant amounts of baeocystine is also shown. German and Hungarian specimens of *Inocybe aeruginascens* Babos were harvested from both sand and grass between May-June of 2006 (Gartz 1987, 1989a, 1989b; and Jansen, Gartz & Laatsch, 2006a, 2006b). This species and *Psilocybe semilanceata* both synthesize psilocybine in a biochemical process of methylation from baeocystine. *Inocybe aeruginascens* also contains the newly discovered indole derivative aeruginascine (see chromatogram [page 73], Gartz, 1987; Gartz, 1989a, 1989b; and Jensen, Gartz & Laatsch, 2006a). The isolation and synthesis of this close relative of psilocybine was successful (Jansen, dissertation, 2004; Jansen, Gartz & Laatsch, 2006b).

Fig. 130. Mature fruiting bodies of *in vitro* grown specimens of *Psilocybe semilanceata*.

Psilocybe semilanceata (naturally grown near Mansfeld-Harz Mountains in Germany.

Fruit Bodies	psilocybine	psilocine	baeocystine (5 dry weight)
1	0.98	__	0.34
2	1.08	0.01	0.42
3	1.13	--	0.38
4	0.89	0.02	0.28

All of the above investigations and many others by (JG), including many other species (for example, *Psilocybe natalensis* from South Africa and *Psilocybe samuiensis* from Koh Samui, Thailand (Gartz, 1994; Gartz, Allen & Merlin, 1994), over a 23-year-study period by JWA and his colleagues were able to revealed that subtropical and tropical mushroom species tend to contain large amounts of psilocybine and psilocine and only a few concentrations of baeocystine. This is a sign that the synthesis of psilocybine via psilocine is the main biochemical route. Of course, psilocine can also be a splitting product from psilocybine as a result of the action of the enzyme phosphatase, which is very common in organisms including fungi.

The temperate species tend to a significant synthesis of baeocystine as a direct precursor for the synthesis of psilocybine. Only some species such as *Psilocybe azurescens* (Gartz, 1994; Stamets and Gartz, 1995) contain both high amounts of psilocine and baeocystine. Such as it may be it appears that such species have both main routes of synthesis of psilocybine or more probably that significant amounts of psilocybine reacted to psilocine during a high activity of phosphatase.

Fig. 131. Fresh fruiting bodies of *Psilocybe samuiensis*. Chulalongkorn University, Bangkok, Thailand.

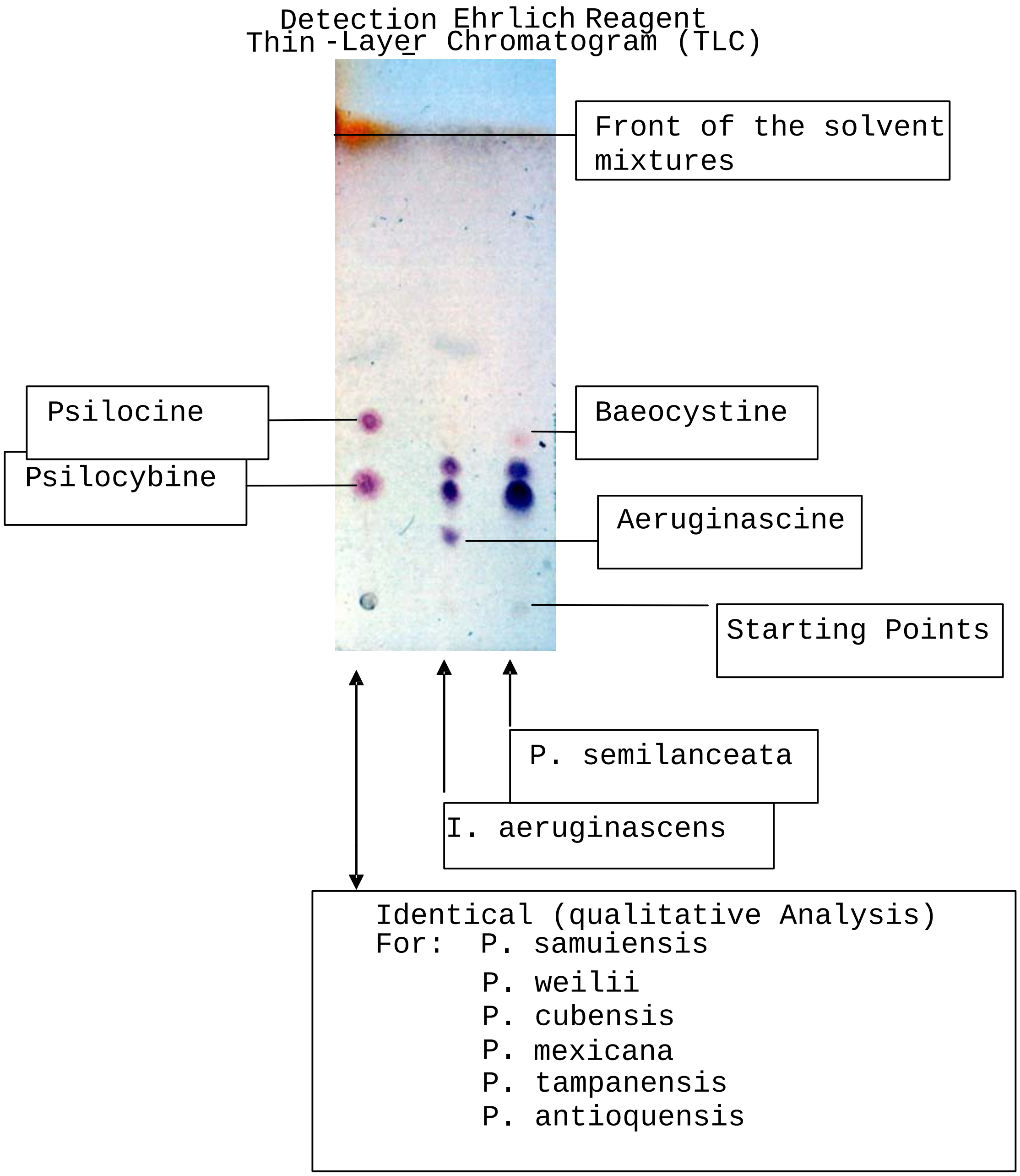


Fig. 122. Chromatogram of studied species.

Psilocybe pegleriana from Koh Samui and Suphanburi, Thailand

During the fall months of 2001, what appeared to be a possible new species of *Psilocybe* was found on a single manure dung heap of a kwai (water buffalo) in a rice paddie at Ban Tai, Koh Samui, Thailand. As noted earlier in this study, the authors tentatively named this species, *Psilocybe violacea* nom. prov. The name was derived due to the natural dense violet spore deposits that fell onto the tops of the fresh caps. Later Guzmán examined the Ban Tai Samui fungi of 2001 and noted that they were conspecific with *Psilocybe pegleriana*, a tropical species common in Asia (Guzmán *et. al.*, 2007). Two years later during the summers of 2003 and 2004, two of the present authors (PS and JWA) visited the Suphanburi Bann kwai (buffalo house) farm. While there we photographed and collected similar related fungi. Although this interesting species bares a macroscopic resemblance to *Psilocybe pseudobullacea*, including the veil remnants on the stipes of the collected specimens, we found no indication of any violet-colored spore deposit on the 2003-2004 Suphanburi specimens as observed on the caps of the previous Ban Tai, Koh Samui collection of 2001. See violet-spore deposit image (fig. 86; p. 46).

Fig. 133. *Psilocybe pegleriana*, Suphanburi, Thailand.

Fig. 134. *Psilocybe pegleriana*. Suphanburi, Thailand.

During several trips between 2001 through 2004, JWA observed an unidentified species, later identified by Dr. Roy Watling of the Royal Botanic Gardens, Edinburgh, Scotland as a possible species of *Psilocybe*. This unidentified species was first observed fruiting abundantly in grassy areas of manured sandy-clay-like soils in rice paddies at two locations on Koh Samui). Specimens of various sizes were forwarded to Dr. Gastón Guzmán, who macroscopically identified them only as a non-hallucinogenic species of *Hypholoma* with no relationship to *Psilocybe*. However, one of the authors (JG) found that analyzed specimens that contained 0.02% tryptophan are common in many mushrooms and a potential precursor to psilocybine.

Fig. 135. Unidentified *Hypholoma* sp., Koh Samui, Thailand.

Fig. 136. Unidentified *Hypholoma* sp., Koh Samui, Thailand.

Fig. 137. Unidentified *Hypholoma* sp. with fly. Koh Samui, Thailand.

Fig. 138. Unidentified *Hypholoma* sp., Koh Samui, Thailand.

Fig. 139. Gill structure of unidentified *Hypholoma* sp. Koh Samui, Thailand.

Fig. 140. A Basket of drying specimens of an unidentified species of *Hypholoma*.

Fig. 141. A field of the unidentified Species of *Hypholoma*.Na Muang, Koh Samui.

Fig. 142. A single specimen of the unknown *Hypholoma* sp. amongst a small colony of *Psilocybe samuiensis* at the rice paddies of Na Muang, Koh Samui, Thailand.

Fig. 143. Gill fragments of the unidentified *Hypholoma* in preparation for SEM work.

SEM of ellipsoid-shaped basidiospores of unidentified *Hypholoma.*

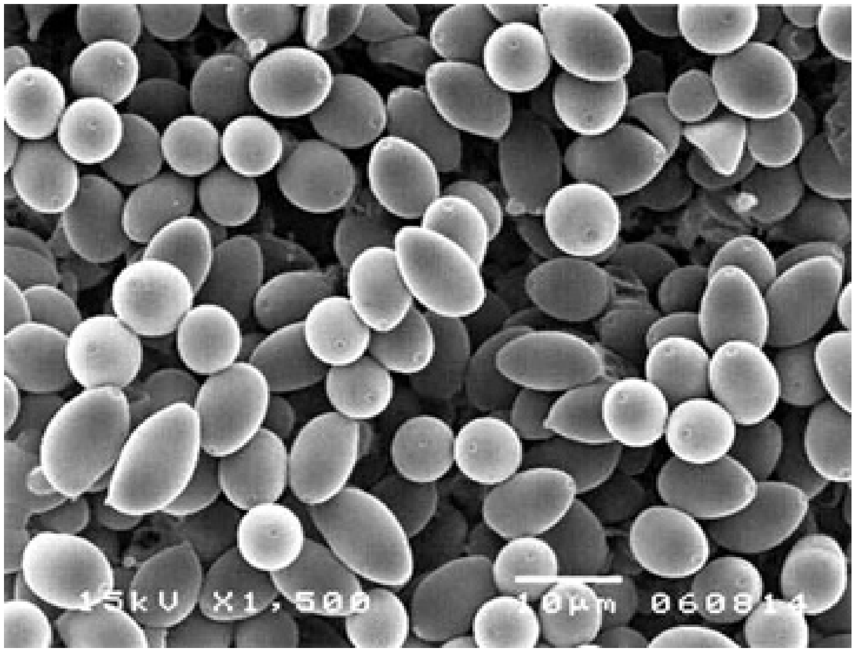


Fig. 144. Spores of an unidentified species of *Hypholoma*.

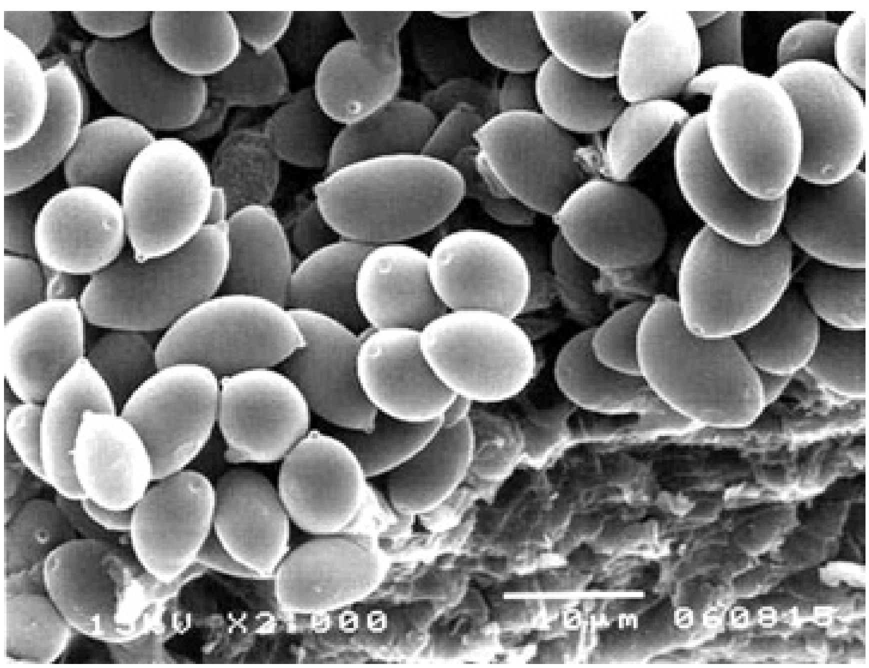


Fig. 145. SEM of basidiospores on gill-fragment tissue of an unknown *Hypholoma* sp., with the typical oval shape and germ pore.

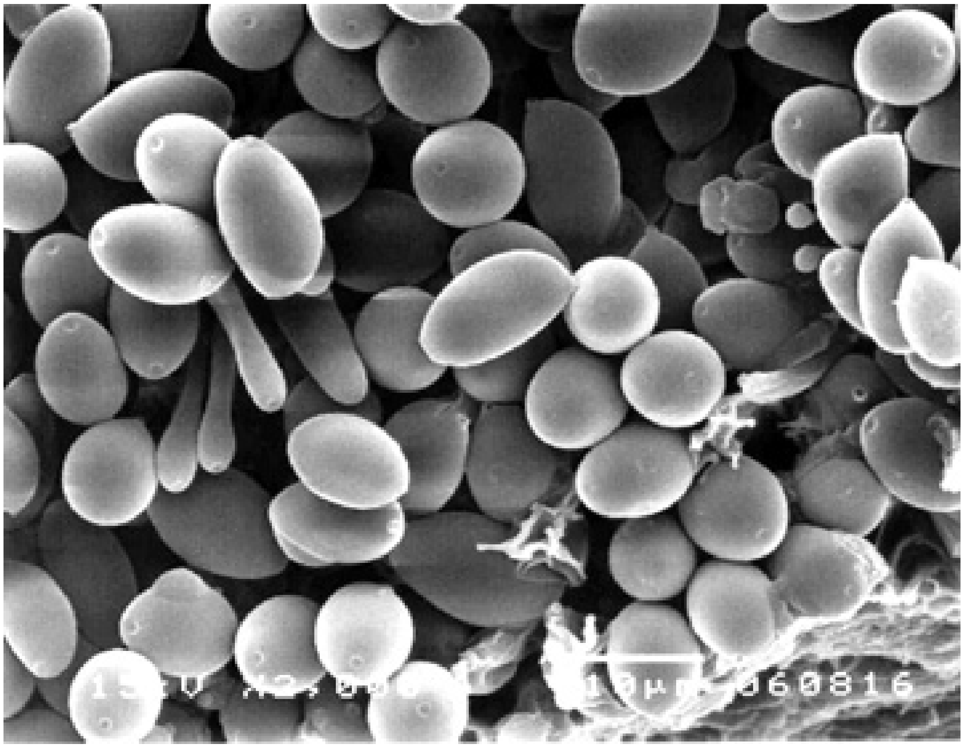


Fig. 146. Germination of *Hypholoma* basidiospores and some 2-basidiosporea attached to basidia and cheilocystidia.

Another New and Unusual Species of *Psilocybe*

This species is rather unique, in and of the fact that it slightly macroscopically resembles *Psilocybe cubensis* but differs in the texture of the pileus and also in the stem which is covered with filaments as seen in the image below.

Fig. 147. Observe the white filaments on the stipe and spore deposits on the fresh leatherly-like caps.

Fig. 148. This species occurs in Kwai dung at Ban Hua Thanon, Koh Samui.

Fig. 149. This species was discovered in only 2 heaps of Kwai (water buffalo) dung at Ban Hua Thanon, Koh Samui.

Fig. 150. Observe the leathery-like caps on the top right of image.

Fig. 151. Observe the somewhat wavy caps in the same collection.

Differences between the new species and *Psilocybe cubensis* are obvious by comparing the lone half specimen of *Psilocybe cubensis* with its incurve margin in the top left-center of the above image by comparing it to that of the other specimens in the collection basket featured in figure 152 below which shows no developed incurved margin in any of the specimens. Unfortunately, this collection was improperly stored in one of the offices of the university and geckos ate the mushrooms, which eventually caused the geckos to defecate the mushroom material into a fine powder. This new interesting and slightly bluing unidentified *Psilocybe* species was collected in the early fall of 2003.

Fig. 152. A single cap of *Psilocybe cubensis* differentiates and separates the two species from one another.

Finally in comparison to the *Psilocybe antioquensis*, *Psilocybe samuiensis* and *Psilocybe mexicana*, the authors also examined the spores of *Psilocybe semilanceata*. Specimens used in stubs to produce the SEM's were obtained from 2 small polyethylene tubes filled with identical powdered lyophilised mushroom material. The mushroom was collected in meadows situated at 1600m, at La Planiaz sur les Avant, Vaud, Suisse.

Fig. 153. In situ fruiting bodies of *Psilocybe semilanceata* from Europe.

SEM's of *Psilocybe semilanceata*.

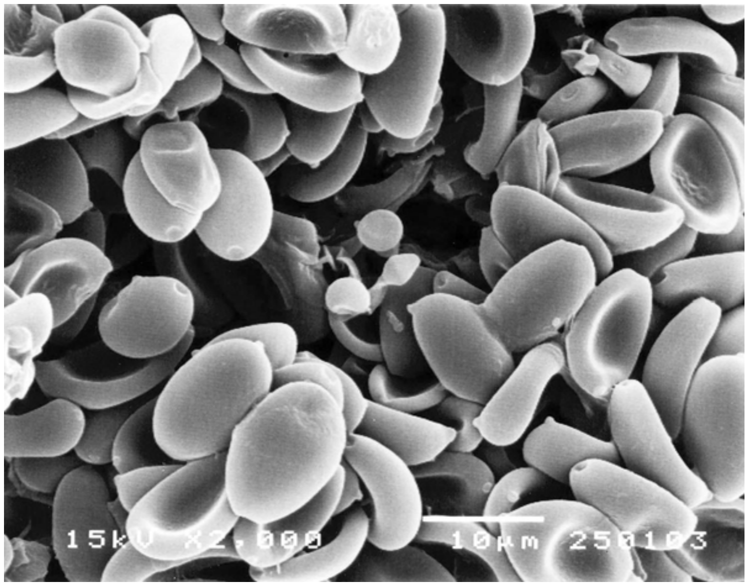


Fig. 154. SEM 1 of *Psilocybe semilanceata* basidiospores at various stages.

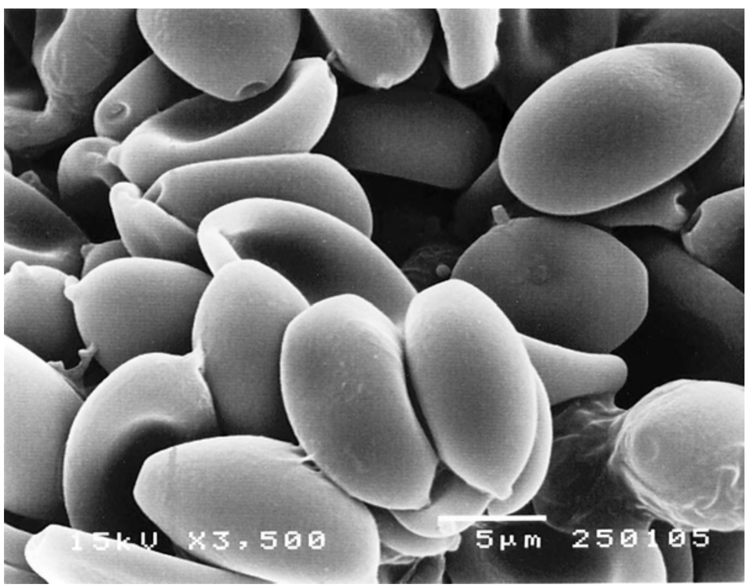


Fig. 155. SEM 2 of *Psilocybe semilanceata* basidiospores showing typical characteristic oval shape with germ pore and nipple at the end.

Another unidentified bluing *Psilocybe* from Koh Samui

In August of of 2006, the senior author of this study (JWA) found four specimens of a short 4-inches-high stemmed *Psilocybe* species. Upon handling, portions of the stem of this mushroom immediately began to oxidize to a dark blue color. The macroscopic appearance of this mushroom slightly resembled that of *Psilocybe cubensis*. However, the stipe retained no visible annulus or veil remnants, thus suggesting that it might be a new unidentified species. The four specimens were sun dried and placed on deposit at Chulalongkorn University for further study.

Fig. 156. A New unidentified bluing *Psilocybe* from Ban Taling Ngam, Koh Samui.

An Update on Magic Mushrooms in Some Third World Countries

Magic mushrooms are still a popular form of recreation at many resort areas in and around Southeast Asia. During the late summer and early fall months of 1998-2006, the senior author (JWA), led an additional 11 mushroom forays and cultural excursions into various locations throughout Thailand, Malaysia, Burma, and Cambodia in search of neurotropic fungi during his 23-year study of mushrooms from SE Asia. The results and studies of these excursions are described below.

Thailand

Between 1998 and 2000, fresh specimens of *Psilocybe cubensis* and/or *Psilocybe subcubensis* and some fresh specimens of *Copelandia cyanescens* were collected on both Koh Samui and Phuket Island and examined for botanical identification. These latter collections also consisted of three new unidentified specimens of *Psilocybe*.

During these three most recent expeditions, the author observed numerous new restaurants on the Thai Islands of Koh Pha-Ngan and Koh Tao that were now serving magic mushroom omelettes for the tourist industry.

Since the mushrooms were made illegal in 1989, it wasn't until 1992 that the listing of mushroom omelettes and mushroom smoothies, soups and pizzas disappeared from many of the menus in various restaurants which offered these exotic food items to their customers. However, restaurant waiters at many resorts can have the resort chefs prepare "hed kee kwai" omelettes, if requested. There appeared to be no new cases of emergency room treatment due to dysphoric reactions and accidental overdoses from the consumption of adulterated LSD laced-omelettes as the author had earlier reported in the late 1980s and early 1990s (see Allen & Merlin, 1992a, 1992b).

The Thai Rath newspaper (Unsigned, 1998) from Bangkok presented a full-page report on the Full Moon drug festival held on Koh Pha-Ngan Island. It mentioned the availability of "het kee kwai" mushrooms. Dominating this article is the tragic story of an alleged German scientist who was caught at the airport with over 5000 doses of ecstasy, MDA, MMDA, 2cb (Nexus), 3 sheets of "magic paper" (LSD), and some other drugs. Although reluctant, the Thai authorities eventually released the dealer due to improprieties in the existing Thai laws. Ironically, it was reported that the German tourist complained that he was upset that the Thai military police that had arrested him would not return his drugs (see discussion for actual Thai translation of that news article in the notes at the end of this study).

In the year 2000, the senor author noticed that the majority of shops on Koh Samui, which initially sold hand-painted mushroom motif T-shirts in Ban Nathon, and other villages on the Island were mostly void of these items. The author did observe two shops in Ban Nathon that still displayed 'magic mushroom' T-shits, hankies and greeting cards. Two shops in Ban Nathon still offered tourists beautiful hand-painted mushroom motif batiks from Bali and one crafts shop at Big Buddha also displayed Bali Batiks with mushroom motifs on them. One artist in Bangkok still created hand-painted magic mushroom motif T-shirts. By 2001, no shops on Koh Samui were selling Bali batiks. However, some Thai artists on Koh Samui were now creating their own style Thai batiks for the tourist trade and a few of them were creating mushroom batiks. By the summer of 2004, there were now a few dozen batik shops in business on Koh Samui, yet not a single mushroom batik from Bali could be found for sale anywhere on Koh Samui Island.

Fig. 157. Batik-Poster by Adisron Junlawanno and John W. Allen. Designed by JWA.

Fig. 158. Batik-Poster art by Adisron Junlawanno and John W. Allen. Designed by J. W. A.

Fig. 159. Batik Poster Art by Adisron Junlawanno and John W. Allen. Designed by JWA.

Fig. 160. Batik by Adisron Junlawanno and designed by John W. Allen.

Fig. 161. Batik Poster by Adisron Junlawanno and John W. Allen. Graphics by JWA.

Fig. 162. Batik Poster Art by Adisron Junlawanno and John W. Allen. Designed by JWA.

Fig. l63. An Art Poster by Adisron Junlawanno and John W. Allen. Designed by JWA.

In Bangkok, the senior author (JWA) talked with numerous tourists in Banlumphu (Thailand's European District) who had attended the full-moon mushroom festival on Koh Pha-Ngan mentioned the names of some new bungalow resorts where they where able to purchase and consume magic mushrooms in various sources of food items. Two resorts, Pinks Bungalows and the Palm Beach Resort were among those mentioned. Unfortunately, the senior author (JWA), while waiting to attend the Full Moon Mushroom Festival, fell asleep and slept through the whole nights wild festivities, totally unaware and, oblivious to all the partying of more than six thousand revelers.

In 2001, *Psilocybe samuiensis* Guzman, Bandala and Allen, first reported by the senior author (JWA), was collected a 2nd time in 10 years in a 2nd location in rice paddies of Ban Hua Thanon, about 100 meters from the original 1991 collections. The latter species was unknown to the majority of local farmers as a psychoactive species and not known of to tourists but known only to a few adult cattle tenders with whom JWA was acquainted with and a few children who assisted JWA on his collection of the species in the rice paddie fields of the Village of Ban Hua Thanon. Taxonomic investigations by Guzmán, Bandala and Allen (1993) described the species as the first record of a bluing *Psilocybe* from Thailand and the first one found outside of the Americas belonging directly to the section *Mexicanae* Guzmán from Mesoamerica.

Since *Psilocybe samuiensis* appeared to be a rare mushroom, further collections seemed far and in between. However in 2002, 3 specimens were found at a 2nd location on Koh Samui in September and again in 2003, another 8 specimens were gathered in the rice paddies of Na Muang. Finally, in the summer of 2004, between the months of May-July, hundreds of fresh specimens were collected again in the rice paddies of Na Muang from two large flushings approximately 1 month apart. This changed the parameters of the fruiting season of *Psilocybe samuiensis* to May Through August during the monsoon rainy season. In 2005, three trips were made to Koh Samui for the collection of prints and specimens. In the same field at Na Muang, local farmers had converted numerous rice paddies into a sandy clay-like soil garden for the planting of corn. Due to the extreme heat of the open field, the corn shriveled up and dried.

Although, two specimens of *Psilocybe cubensis* were found in the remaining rice paddies at the Na Muang site in 2005, only one specimen of *Psilocybe samuiensis* was collected for herbarium deposit, but was lost in transfer to Bangkok.

A contributor to this study, Dr. Scott Leibler had communicated with the senior author while conducting orchid research in Ranong province for 6 years. During his tenure in Thailand with a University, Dr. Leibler had been studying orchid production for several years when he came upon a rice paddie where he observed and harvested some specimens of *Psilocybe samuiensis.* The collections where found near the provincial capital of Ranong, 500 km south of Bangkok and 300 km north of Phuket along the Andaman Sea facing India. The cultivation of *Psilocybe samuiensis* by Dr. Scott Leibler produced from mycelium, several fruiting bodies on agar (PDA). Spores were obtained from a print taken from a single specimen. Mild but intense bluing occurred in a petri dish as shown above in Figs. 199-121 in a single image posted on pages: 62-63.See 3rd image (Pers. Comm., 11-28-2006).

Fig. 164. *In situ, P. samuiensis* from Ranong Province. Photo: Scott Leibler.

Fig. 165. Freshly harvested carpophores of *Psilocybe samuiensis*. Photo: Scott Leibler.

Fig. 166. *Psilocybe samuiensis*. Ranong Province, Thailand. 2006. Photo: Scott Leibler.

Copelandia cyanescens in Ban Lamai, Koh Samui

Fig. 167. Deep azure bluing in *Copelandia cyanescens* at Ban Lamai, Koh Samui.

Fig. 168. A *Bufo* toad stands guard over crop of *Copelandia cyanescens* at Ban Lamai, Koh Samui.

Fig. 169. *Bufo* Toad and *Copelandia cyanescens* near Ban Lamai, Koh Samui.

Malaysia

In 1998, while in Alor Setar, Kuala Lumpur, Malaysia, the senior author collected specimens of both *Psilocybe cubensis* and *Copelandia cyanescens*.

Fig. 170. Two varieties of *Copelandia* spp., from Alor Setar, Kuala Lumphur, Malaysia. On the left are conical-shaped caps, on the right, bell-shaped caps.

The Malaysian collections were forwarded for herbarium deposit at the University of Leipzig, Germany and the Instituto de Ecologia, in Mexico. Since the author could not mail these specimens from Malaysia, they were dried and preserved and brought back to Bangkok where additional collections were deposited at the Department of Microbiology at Chulalongkorn University.

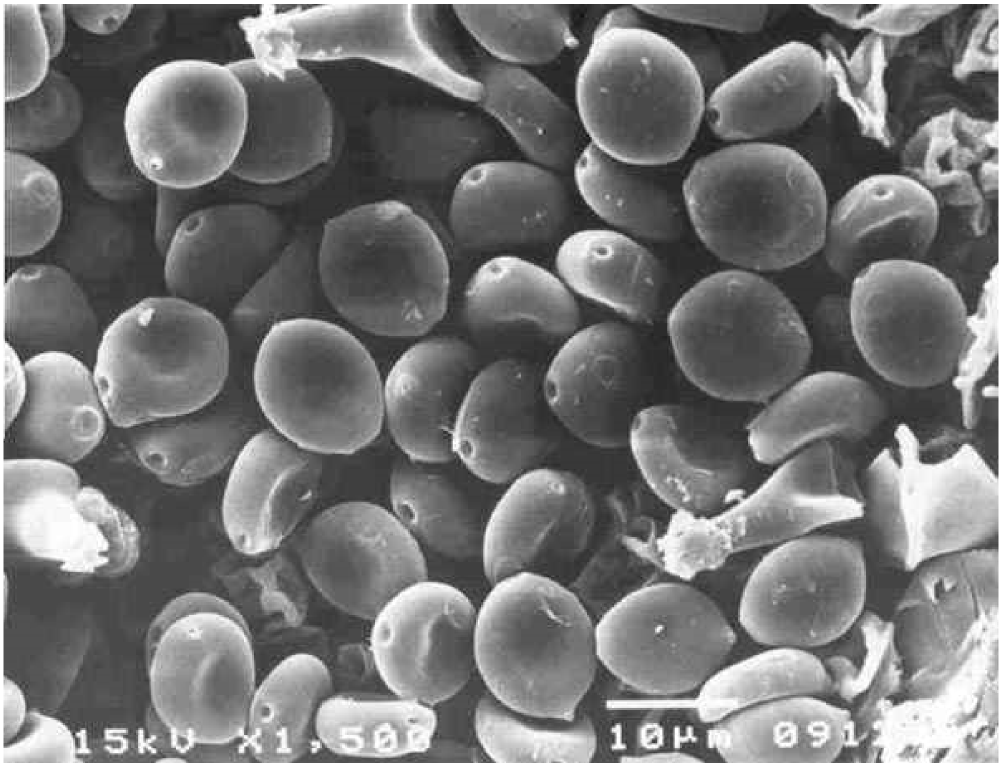


Fig. 171. SEM of *Copelandia cyanescens* from Alor Setar, Kuala Lumphur, Malaysia. These basidiospores also show both nipples and germ pores.

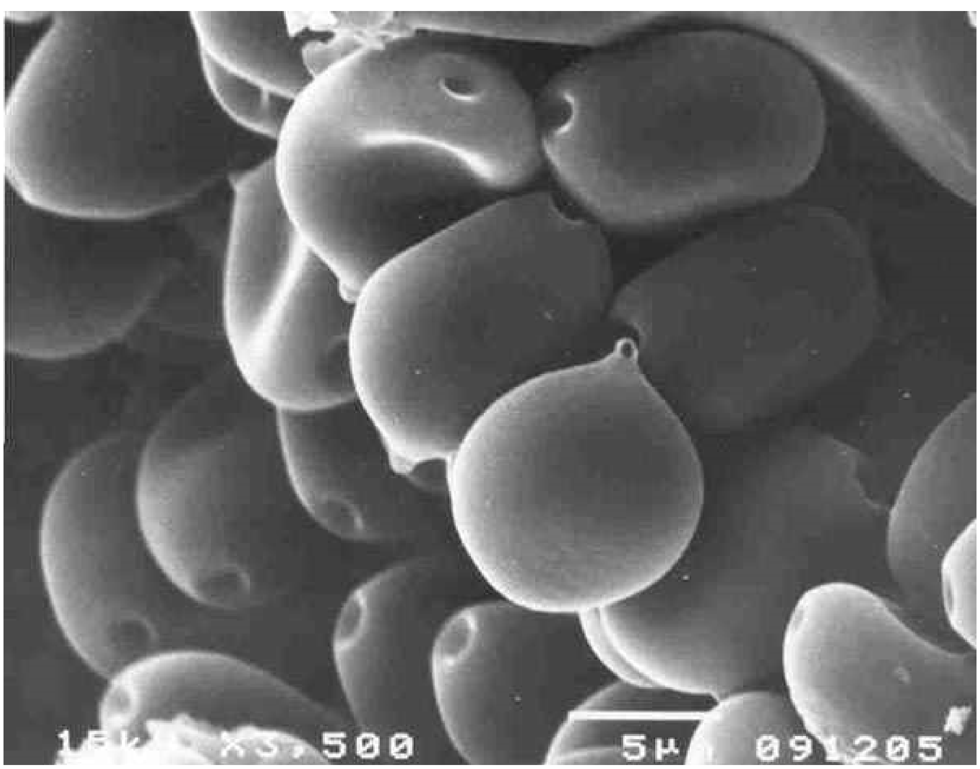


Fig. 172. SEM of *Copelandia cyanescens* from Alor Setar, Kuala Lumphur, Malaysia.

Fig. 173. ***Psilocybe cubensis*** **from Alor Setar, Kuala Lumphur, Malaysia.**

SEM of *Psilocybe cubensis* spores showing typical germ pore and edges of gill plates. Harvested at Alor Setar in Kuala Lumphur, Malaysia.

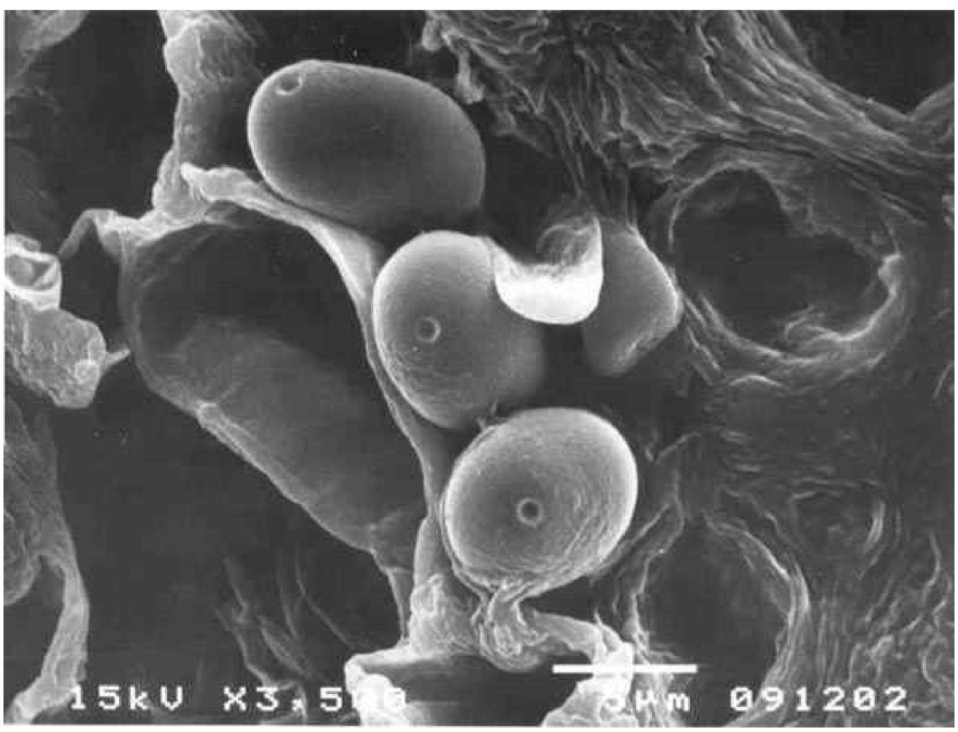


Fig. 174. SEM of *Psilocybe cubensis* from Alor Setar, Kuala Lumphur, Malaysia.

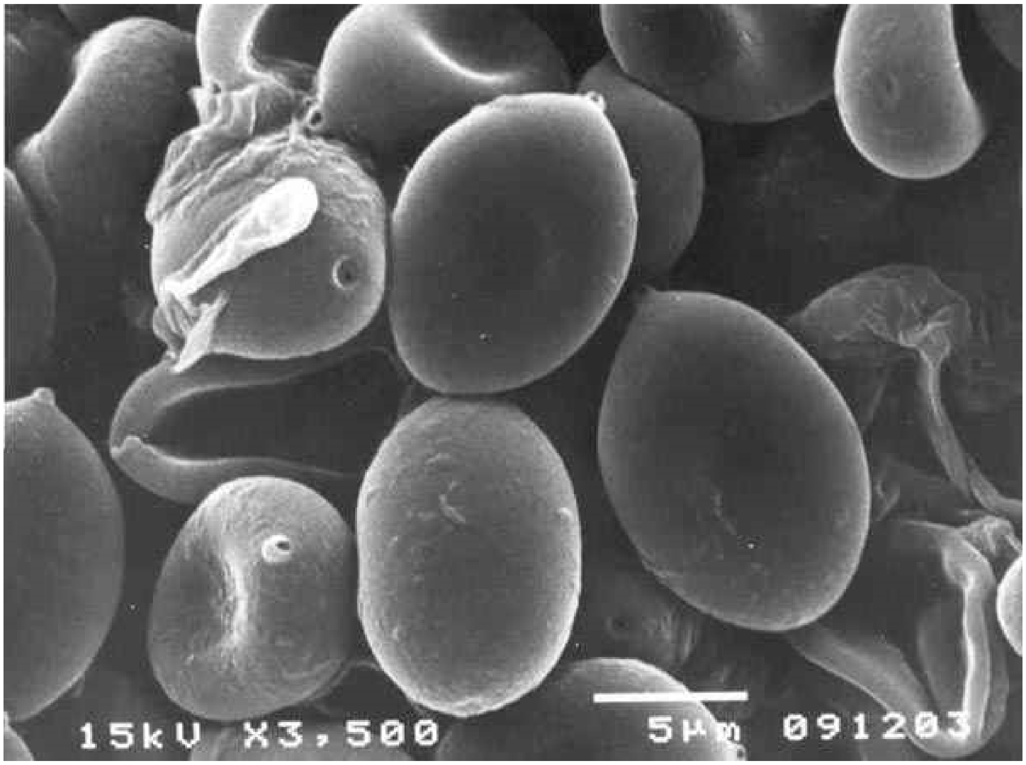


Fig. 175. SEM of *Psilocybe cubensis* from Alor Setar, Kuala Lumphur, Malaysia.

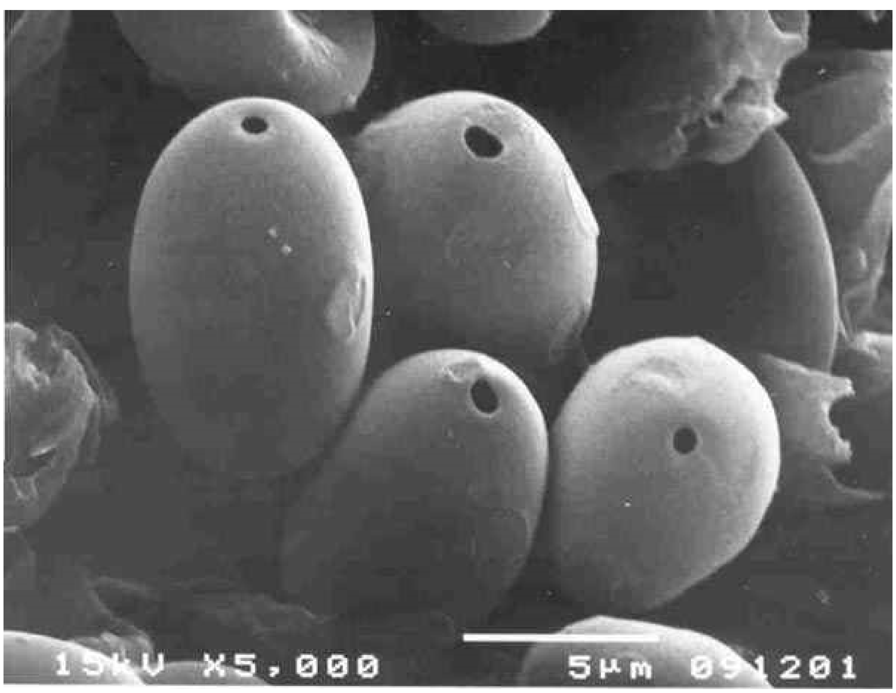


Fig. 176. SEM of *Psilocybe cubensis*, Alor Setar, Kuala Lumphur, Malaysia. Scanning electron micrograph of spores showing oval spore ornamentations with visible pores on the spores.

Later, in a personal communication to JWA, Dr. Guzmán identified the Malaysian collections as *Psilocybe cubensis* and *Copelandia cyanescens*. Since previous chemical analyses of the Asian specimens of *Psilocybe cubensis* have all been similar, we decided that that there was no need to perform an analysis of the Malaysian collections.

Most residents in and around the village of Alor Setar, Kuala Lumpur, when shown the fresh mushroom specimens were not aware of the visionary properties of the collected mushrooms. One produce vendor of edible mushrooms in a public market told the senior author that these mushrooms made people act crazy. He said a relative of his had once eaten these mushrooms and lost his mind for several days. This was the only person who acknowledged that the mushrooms were probably of a neurotropic nature.

In Malaysia, the authors found no recreational use of these mushrooms amongst tourist interviewed while on these excursions. However we would like to point out that although the mushrooms are not illegal by law, Malaysia has some of the harshest draconian drug laws in the world and we suspect that some individuals have probably consumed entheogenic mushrooms in that country.

This is the first report of *Copelandia cyanescens* and *Psilocybe cubensis* from Malaysia.

Cambodia

In Cambodia, as in Thailand and India, there are no fences and cattle roam freely. Recently, some cattle tenders are building barb wired fences. Although water buffalo (Bubalus bubalis) are common in the region of Angkor Wat, Cambodia, it appears that cattle (Bos indicus and Bos Guarus) dominate the Angkor plateau.

On October 3, 1999 and again in September-October 2000, the senior author visited the temples at Angkor Wat, Angkor Thom and Angkor Bayon.

Mushroom specimens of both *Psilocybe cubensis* and unidentified specimens of *Copelandia species* were photographed, harvested and preserved for botanical identification and deposited with Dr. Gastón Guzmán. Later Dr. Guzmán identified the specimens as *Psilocybe cubensis* and *Copelandia cyanescens*. This is the first report of *Copelandia cyanescens* (= *Panaeolus cyanescens*) from Kampuchea.

Previously, Ola'h 1970) identified both *Panaeolus cambodgeniensis* (= *Copelandia cambodgeniensis* and *Panaeolus tropicalis* (=*Copelandia tropicalis*) from Cambodia and Heim and Hofmann (1958) also reported the presence of *Stropharia cubensis* from Cambodia and Thailand. At the time of their discoveries in SE Asia, they were unable to find any use of these mushrooms by the ancient Khmer Rouge or Mon cultures of past or present use of the mushrooms as a tool in healing and curing or any ritual use of the discovered species.

Talks with native children revealed that some tourist have collected both of the psilocybian species found in and around the Angkor temples, as well as edible mushrooms fruiting on the temple grounds.

In the summer of 2002 and fall of 2003, the senior author collected specimens of what appeared to be a new species of a bluing *Psilocybe.* Later investigation of this species by Guzmán, Allen and Sihanonth (2006), revealed it to be an already known species, *Psilocybe antioquensis*, originally identified from Antioquia, Colombia and from several locations in Mexico. In the summer of 2005 (July 1-3), the senior author collected what appeared to be *Psilocybe samuiensis* from a rice paddie field just south of Banteay Kdei, where previously two collections of *Psilocybe antioquensis* were harvested. Specimens were sent to Dr. Guzmán in Mexico who verified their identity as *Psilocybe samuiensis.* This is the first report for *Psilocybe samuiensis* in Cambodia and also noted is the presence of *Panaeolus antillarum.*

Fig. 177. Sketch of *Psilocybe antioquensis* by Wipaporn of Ban Nathon, Koh Samui.

Bali

In the summer of 1999, mushroom smoothies (milk shakes) were selling at resort restaurants for 80,000 Rupiahs (equivalency at the time was US$10), up from 50,000 Rupiahs the year before (1998). We found many restaurants that still cater mushroom food items to tourists on request. And for the most part, such use is limited to the younger crowd, particularly the surfers at or near Kuta Beach.

We were able to determine from street interviews with local European tourists who had vacationed at resorts in and around Kuta Beach that the elder folks on the beach are definitely opposed to the use of mushrooms, as well as some of the younger tourists, though not as many. A couple of young surfers reported, “only 'crazy' people went out in the water under the influence of mushrooms.' Other than that, even though drugs are illegal, an incredibly large variety of drugs are often offered to tourists who are just walking down the main street (at night).” Thai cost for mushrooms was $3.00a meal.

Mushrooms are also available on numerous islands along the surrounding coast of Bali and other regions of the Surabaya Coastline. One such Island is Gili Trawangan where many foreign-owned restaurants still openly display advertisement boards that magic mushrooms were available at their establishments.

Fig. 178. Restaurant on the Isle of Gili Trawangan, along tne Surabaya Coast near Bali.

Fig. 179. Restaurant on Gili Trawangan, off the Surabaya Coast near Bali.

Fig. 180. Restaurant on Gili Trawangan, off the Surabaya Coast near Bali.

North Viet Nam

In the summer of 2004, a three-day excursion to Hanoi was rewarded with several small collections of both *Psilocybe cubensis* and an unidentified species of *Copelandi*a; the former species was physiologically much sturdier than those collected in Thailand, Cambodia, and Malaysia.

Fig. 181. *Copelandia cyanescens*, north of Hanoi, Viet Nam.

Fig. 182. *Psilocybe cubensis* collected near Hanoi, Viet Nam.

Nepal

Schroeder and Guzman (1981) first reported the presence of *Psilocybe cubensis* and/or *Psilocybe subcubensis* from Pokhara, Nepal. Recently, *Psilocybe subcubensis* was identified as fruiting in manure. Collected specimens were examined and harvested from Nepal Royal Chitwan National Park, near Sauraha, south of Rapti River, in the tropical evergreen forest, gregarious, on rhinoceros dung and dark places inside the jungle (Guzmán and Kasuya, 2004).

DISCUSSION

Photographs, as well as SEM's, including newly collected (July, 2004) specimens of *Psilocybe samuiensis* (Collection A-2004) were examined for comparison to the newly reported species *Psilocybe antioquensis* (Collection D-2003). Mushrooms collected in 2003 at Banteay Kdei, Kampuchea (Cambodia) and then studied to show their relationship in comparison to *Psilocybe mexicana* Heim. Below, in Fig. 1-2, we show the basidiomes of *Psilocybe antioquensis* and Fig. 3 represents the ellipsoid and somewhat lemon-shape of those basidiospores.

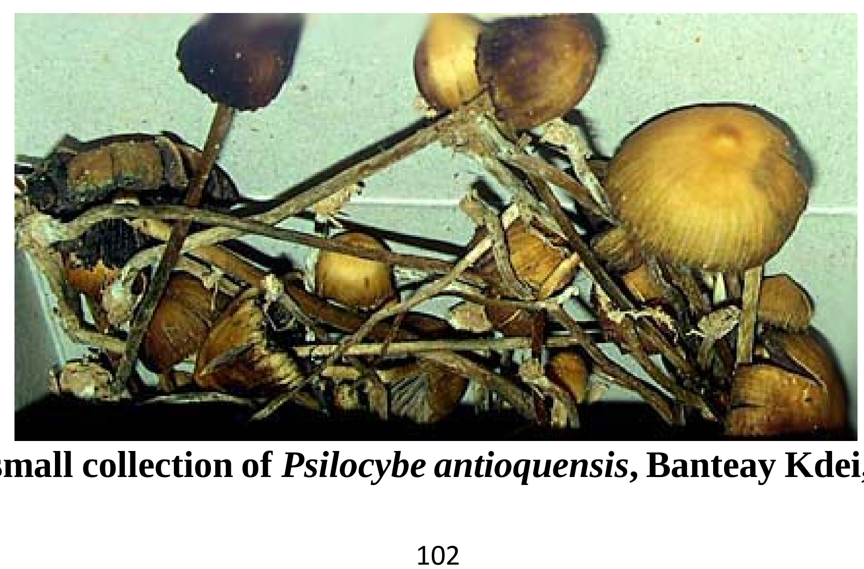


Fig. 133. A small collection of *Psilocybe antioquensis*, Banteay Kdei, Kampuchea.

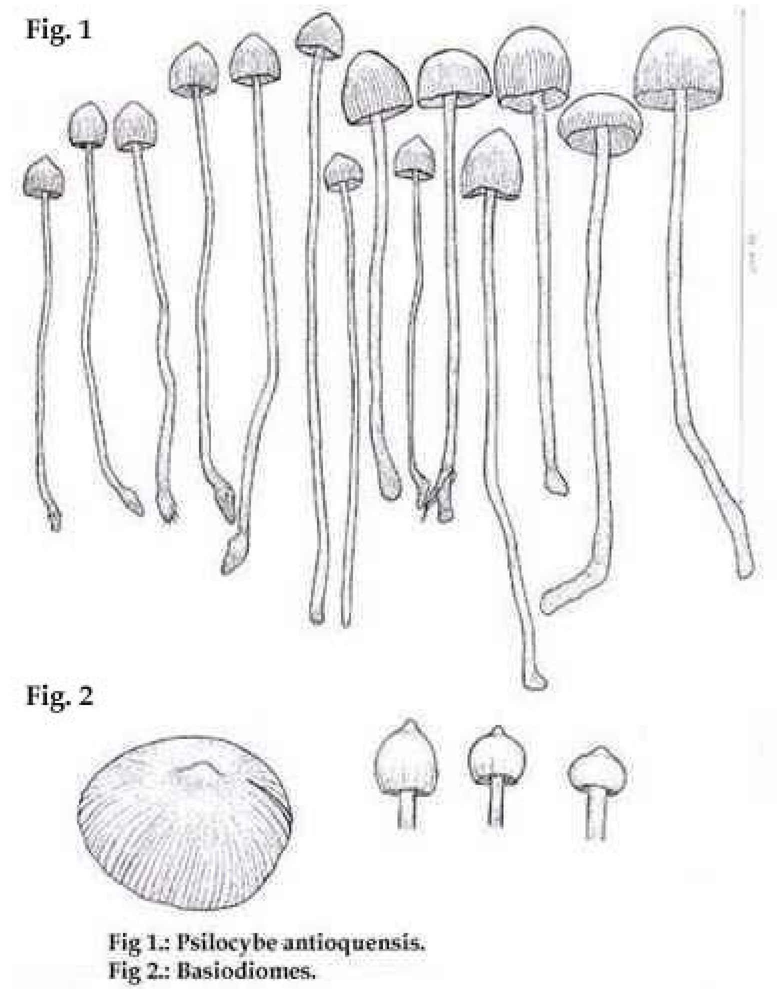


Fig. 184. *Psilocybe antioquensis* and the basidiomes of same.

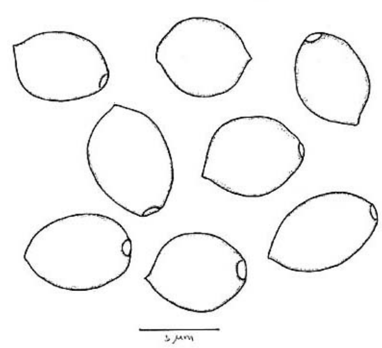


Fig. 3. Basidiospores.

Fig. 185. Basidiospores of *Psilocybe antioquensis.*

The A collections (A-2002, A-2004) includes SEMS imagery representing *Psilocybe samuiensis* collected in 2001 and 2004 from Ban Hua Thanon and Na Muang, Koh Samui, respectively.

The B collection of specimens (August 2002) and SEMS represents *Psilocybe antioquensis* (collection B-2002) collected at the Citadel of the Women (Banteay Srei), 40 km from the main temple of the Angkor Wat compound. An amateur mycologist from Los Angeles found a single specimen of the B collection at the left side of the temple doorway. 3 more specimens were found 15 kms away from Banteay Srei by JWA and a few other travelers.

The August 2002 collection (collection C-2002), was discovered by Grant Trowbridge, who noticed two specimens in the hard sandy soil near the walls of an old Cambodian prison. With the picking assistance of several Cambodian children, the authors subsequently gathered a total of 8 specimens. The location of these specimens ranged in the trailings of the manure left by *Bos Guarus* (wua in Thai for cow and Goh in Kampuchean for cow). They appreared fruiting in old manured soil from the east gate entrance alongside of an old Cambodian prison called the 'Citadel of the Cell,' and extended to the far corner of the wall. This location is quite large since the prison walls extend about 1200 meters by 1600 meters. The mushrooms were found alongside from the east gate of the prison compound to the corner wall.

In the latter part of 2003, JWA again returned to Angkor Wat, seeking new found specimens of *Copelandia* and *Psilocybe sp.,* but none were observed due to the failure of the appearance of what were late monsoon rains.

During this visit, JWA, along with the assistance of numerous poor Cambodian children, collected approximately 83 specimens; however, no spore prints were made due to the extreme heat and humidity; further compounded by the dirty hands of local children who at the time had been playing in muddy floods running along the area by the walls of Banteay Kdei. At that time JWA learned that the area of that east gate to the 'Citadel of the Cell' is referred to as, "Banteay Kdei." So "Banteay Kdei" is the location of the D collection of August 2003 (D-2003).

Some Further Notes

At the end of the left wing of the 2nd gate to Angkor Wat, one of the authors (JWA), along with a fellow amateur mycologist, observed and photographed an image of Shiva holding what appears to be a mushroom in the palm of his hand on one of the bas-reliefs on the 2nd inner wall of Angkor Wat. This new discovery of Shiva holding a mushroom may suggest the possible use of neurotropic fungi by primitive Mons, Khemrs or Buddhists in Cambodia during the 8th to 12th century at Angkor Wat. Milo, a 3-time participant in Exotic Forays expeditions to Southeast Asia brought this bas-relief to the attention of [JWA]. It is possible that Shiva could be holding a Lotus or a mushroom. No one in Cambodia has been able to confirm whether Shiva is actually holding what resembles a large-capped mushroom and at the same time, no one has been able to identify the sculpted object in Shiva's hand is a bas-relief of a lotus.

Fig. 186. A bas-relief of Shiva holding what appears to be a mushroom, circa 1200 a.d.

Shiva is sometimes called *Nilakantha*, that's to say "with a blue throat", in relation with the mythological episode in which Shiva drink the poison halahala that had threatened the universe. Being Shiva an ecstatic god, in this case the blue colour of the throat is significative, because of its relation with the bluification phenomenon of psilocybian mushrooms when they are handled or bruised, a phenomenon that is specific for such species. Moreover, Shiva was born after a thunderbolt, like mushrooms in general in many legends in the world (Samorini, 2001; Wasson, & Wasson, 1958).

In 2007, the senior author of this study [JWA, Pers. Comm., 7-20-07] received several emails from Cambodia with photographs that appeared to be mushroom representations taken in the Angkor compound. While we were unable to find anyone at Angkor to verify that the images in the photographs portrayed mushrooms, we recognized that they definitely did not appear to be photographs of the Lotus. We will report and discuss these images at the end of this study[4].

In reference to the coprophilic nature of *Psilocybe cubensis*, especially in what could very well be 'the cradle of civilization,' McKenna (1988) once questioned the origin of this neurotropic mushroom, wondering whether it is "exclusively a creature of the manure of *Bos indicus*, or can it occur in the manure of other cattle?" Although *Psilocybe cubensis* often occurs in association with the manure of *Bos indicus*, as well as buffalo, gaur, other bovine cattle and sheep, especially after heavy rainfalls and/or monsoons in tropical and subtropical climates, Schultes (1988, Pers. Comm.), indicated that this mushroom species, as well as certain other species of psilocybian fungi, can occur in the manure of other wild ruminants, including species of deer. Guzman (1983) and Watling (1989, Pers. Comm.) also reported that some species of psilocybian fungi have been found in association with Kangaroo feces, while Paul Stamets (1978, 1994), indicated the association of *Psilocybe cubensis* from elephant dung. This association has been confirmed by one of the authors (JWA) who photographed specimens of *Psilocybe cubensis* in dung of elephant found on the Thai island of Koh Samui in the summer of 2004, as also noted above in the cultivation of said specimens from elephant dung. And as previously noted, in rhinoceros manure in Nepal (Guzmán and Kasuya, 2004).

McKenna also suggested that the origin of *Psilocybe cubensis* could be traced to Kampuchea, but provided very little evidence to support this assertion. He based his assumption on an archaeological excavation in the Non Nak Tha region of northeastern Thailand where bones of *Bos indicus* had been unearthed in association with human graves dating from around 15,000 yr. BP (McKenna, 1988). McKenna was unaware of the occurrence of *Psilocybe antioquensis* while studying the Southeast Asian mycological data known at the time of his writings.

A similar representation suggesting a possible relationship between ancient Chao Samui people and neurotropic fungi species adorns the Magic Tarnim Gardens of Khao Pom, 450 meters near the top of the highest peak on Koh Samui Island. Here one finds a beautiful sculptured representation of a primitive Chao Samui man, appearing directly alongside of two giant sculpted mushroom stones. This representation of an ancient Neanderthal sculpted man standing alongside of these beautiful sculpted Psilocybe *cubensis* looking mushrooms also seems to suggest the possible use and association of the sacred mushrooms amongst some primitive Chao Samui Islanders in the Gulf of Thailand. There are actually two mushroom stones on the mountain; however, one cap was knocked to the ground by a fallen tree during an intense monsoon rainstorm. The shroom icons look representative of Macrolepiota; an edible species sought by Chao Samui people or *Psilocybe cubensis*, common on Samui wherever buffalo and cows roam.

Fig. 187. A Samui Neanderthal-like man, JWA and mushroom stone, Tarnim, Koh Samui. Altitude 400 meters.

Fig. 188. A tree fell here during a storm and collapsed a 2nd Shroom Stone.

We must not forget that from India to Malaysia, southern China and Africa, *Psilocybe cubensisis* are also common in elephant dung. Furthermore, an additional three specimens were collected at the Queen of Thailand's Palace Gardens where the rare white elephants of the King reside when the weather is not too hot for them.

Fig. 189. A Full Moon fantasy frenzied art poster by Adisron Junlawanno and John W. Allen. Designed by JWA.

Full Moon Party

Fig. 190. A billboard advertising the annual Full Moon Festival on Koh Phangan Island.

"Have you heard about 'Full Moon Party'?" asked the journalist in the Thai Rath newspaper. "It is about many foreign tourists who take drinks adulterated with drugs while at parties held during the full moon." Such action occurs on the tiny Thai Island of Koh Pha-Ngan, 11 kilometers north of Koh Samui. The effects from taking these drugs are definitely different than those of other drugs such as cigarettes or alcoholic drinks. This drug is a mushroom and those who use it call them "magic." Reports indicate that "Whoever uses these mushrooms will experience the same effects as one who smokes ganja (marijuana)." Currently, these mushrooms are illegal in Thailand, yet this has not deterred their use amongst certain segments of the tourist population. Over 300 meals a month are prepared.

Another drug described in this article is referred to as "Magic Paper." This latter is an obvious reference to LSD. The Thai newspaper describes this drug as looking like a stamp or a sticker. Effects occur from 'magic paper' after one puts the paper in his or her mouth. The newspaper reports that this 'magic paper' will make one intoxicated as if on alcohol. Another new kind of drug known as 'Nexus" was also confiscated just 3 weeks ago in Thailand by the Military Police. It was created chemically by a German scientist and is known to tourists as "NEXUS." [Nexus is another name for 2cb or 'Erox']. Finally, according to this article, The reporter stated that he feels that "since there are no laws in Thailand against the use of these drugs, the Thai people should not be blamed for the use of these drugs by tourists in Thailand since many of them are not illegal because there is nothing mentioned about these drugs in the Thai laws. However, the drugs mentioned in the Thai Rath Newspaper are illegal under current Thai law.

No current medical problems regarding mushroom overdoses or the mis-use of the mushrooms have been reported to the Thai authorities since 1992.

This includes both the various hospitals situated on Koh Samui and the police of Koh Samui and Koh Pha-Ngan (see report below of Thai parliament member who reported such activities to the authorities and their response to such allegations).

In Bangkok, the senior author (JWA) talked with numerous tourists in Banlumpoo (Thailand's European district). Many of those tourists interviewed by the senior author (JWA) mentioned having attended the full-moon mushroom festival held on Koh Pha-Ngan Island as well as mentioning the names of many new bungalow resorts where they where able to purchase and consume magic mushrooms. Two resorts, Pinks Bungalows and the Palm Beach Resort were mentioned. Furthermore, several resorts in Bo Phut Beach on Koh Samui and in Lamai, still offered its customers 'magic mushroom' omelettes when requested.

In late 1999, the senior author along with two friends, traveled from Koh Samui and Koh Pha-Ngan to the temples of Angkor Wat, Cambodia. There they collected two distinct variations of *Copelandia* and several small specimens of *Psilocybe cubensis* and/or *Psilocybe subcubensis* in and out side the temple walls. Cattle were observed on the temple grounds. Between the Thailand border and the temples of Angkor Wat, the senior author (JWA) and his traveling companions observed tens of thousands of rice fields, with water buffalo and cattle scattered along the roadway for a few hundred miles. On a particular excursion in September of 2005, several of the participants observed both Copelandia species and *Psilocybe cubensis* in manure heaps scattered along the roadway. In 2006, No psilocybian mushrooms were found at Angkor due to a lack of rain.

Collections:

A: *Psilocybe samuiensis*-Koh Samui-Sept-Oct 2001.
B: New? Unidentified *Psilocybe* sp.-Bantrey Srei, Xiem Riap, Kampuchea, 9-2002.
C: New? Same as B: Unidentified *Psilocybe* sp. Citadel of the Cell, Xiem Riap, Kampuchea, 9-2002.
D: Black Spored, Possibly *Copelandia*, Bantrey Srei, Kampuchea, 9-2002.
E: Unidentified *Psilocybe* possibly *Psilocybe violacea* (=*Psilocybe pseudobullacea*)-Suphanburi, Thailand, 10-6-2002.
F: Unidentified *Psilocybe violacea* (=*Psilocybe pegleriana*) 9-2002.
G: Unidentified *Copelandia* species-Suphanburi, Thailand, 10-6-2002.
H: *Copelandia* sp., Suphanburi, 10-6-2002.
I: *Copelandia* sp. (probably *Copelandia cyanescens*, Angkor Wat, Kampuchea, 9-2002.
J: *Copelandia* sp. Ban Taling Ngam, Koh Samui, 9-2002.
K: *Psilocybe cubensis* and or *Psilocybe subcubensis*, Ban Phang Ka, Koh Samui, 9-2002.
L: *Psilocybe cubensis*. Ban Hua Thanon, Koh Samui, 9-2002.
M: Possibly *Psilocybe cubensis* or *Psilocybe pseudobullacea*. Koh Samui, 9-25-2002.
N: *P. samuiensis* print
O: *Stropharia* species, unidentified.

(2001-2003) Collections:

Samuiensis A. (A-2001). From Ban Hua Thanon, Koh Samui. Samuiensis A (A-2003) Na Muang, Koh Samui, Thailand. At Instituto de Ecologia (XAL), and Bangkok (Chula).

Psilocybe antioquensis B (B-2002) from Banteay Srei, Xiem Riap, Cambodia. Chulalongkorn, Thailand.

Psilocybe antioquensis C (C-2002) from Citadel of the Cell, Banteay Kdei, Cambodia). Both collections B and C from 2002. Chulalongkorn, Thailand.

Psilocybe antioquensis D (D-2003) from Bantrey Kdei), Xiem Riap, Angkor Wat Compound, Cambodia. (XAL), BISH. Chulalongkorn, Thailand.

(Holotype (XAL). Isotypes in (BISH) and (CHULA).

In 2004, numerous collections of *Psilocybe cubensis*, *Psilocybe samuiensis*, and *Copelandia cyanescens*, as well as several collections of three, as yet unidentified, *Psilocybe* species were deposited with the department of Microbiology at Chulalongkorn University in Bangkok and are available for research.

In 2005, 5 large collections of *Copelandia cyanescens* were deposited at Chulalongkorn University in Bangkok. The collected specimens were obtained from two locations. The wua (cow) coconut grove north of Ban Lamai and the buffalo arena at Ban Saket, Koh Samui. *Psilocybe cubensis* specimens also were collected from three locations on Koh Samui but were pooled into one dried container. The *Psilocybe cubensis* were primarily from Ban Thurian, Ban Saket and Na Muang, Koh Samui.

A small collection of what appear to be *Psilocybe samuiensis* was collected in a single rice paddie near Banteay Kdei, Xiem Riap in the Angkor Wat Compound in July of 2005 and was later identified by Gastón Guzmán.

In the early fall of 2006 (Aug. 28-Sept. 2, 2006), several small collections of both *Copelandia* species and *Psilocybe cubensis* were harvested and dried for herbarium deposit. Four specimens of a new unidentified bluing *Psilocybe* were also collected and dried and preserved. A second collection of a possible new species was forwarded to a Jamaican researcher for cultivation and culture work. The Ranong specimens of *Psilocybe samuiensis* are stored at an unidentified lab in Thailand.

(2006) Collections:

Copelandia cyanescens: 8-30-2006-allen-2006-1; 9-1-2006-Allen-2006-2; 9-2-2006-allen-2006-3.

Psilocybe cubensis: 8-26-2006-allen-2006-4; 8-27-2006-Allen-2006-5; 8-27-2006-Allen-2006-6.

Unidentified *Psilocybe* sp. 9-2-2006-allen-2006-7.

NOTES

1: Full Moon Party Drugs

Regarding the Full Moon Party as noted above, the following report is an unedited version of the article that appeared in 1999 in the Thai Rath newspaper and reveals some of the Thai culture shock in its translation of the events printed in the article.

We have left this Thai to English translation intact to show how the Thai mind of the individual who interpreted the news report perceived the journalists concept regarding the recreational use of mushrooms and drugs in their culture.

Nexus, new drug for parties Thailand cannot blame them to stop it

"Have you heard about the "Full Moon Party"? It is about alias people made a party by using drug. It is not cigarette, or alcohol drink. It came from mushroom. And people call it "Magic Mushroom" Whoever uses it; they will feel the same as having marihuana. It is illegal now to use in Thailand. Next one will talk about "Magic Paper (LSD, blotter acid)." It looks like sticker. People use it by putting it in the mouth. It will make them getting drunk. New kind of drug that was just released last 3 weeks, it was made by Germany chemistry by using the name "NEXUS (2-CB) and Thailand still cannot blame people who used it because there is nothing mention about in the Thai laws." [Also confiscated were more than 5000 doses of MDMA, MDA and several other analogues, JWA].

In regards to the above translation, the confiscated drugs are illegal in Thailand, but since they are unknown to most Thai's and because they are not an Eastern subculture phenomena, the reporter lacked an understanding of the cultural use of those substances in other societies.

Ketamine was also mentioned as a new drug in Thailand, available over the counter at any Thai pharmacy. The Thai Rath reported that tourists have sex in many new positions, never before tried by those who use this drug. The Reporter seemed almost apologetic to this use or what he believed was the frivolous use of drugs by tourists in Thailand. He explained that the Thai people were sorry for the behavior of tourists in their country. Below is an excerpt concerning a loal Thai resident's translation and his interpretive attitude regarding the use of these drugs in Thailand?

2: Koh Pha-Ngan Slur

Negative comments made recently by a member of the upper house following an inspection visit to the full moon party have prompted an angry response from officials on Koh Samui and Koh Pha-Ngan. "Senate member Mrs. Rabiat Pongpanit complained that she saw batik Buddha images displayed next to bikinis on Samui and that during the full moon party she witnessed foreigners eating magic mushrooms and having sex in public on the beach.

Several high-ranking officials, including the Governor of Surat Thani, Mr. Vichit Vichaisam, have since criticized the senator's comments, and even suggested that Mrs. Rabiat may have been mistaken in what she saw.

Mr. Vichit stressed that security is now very tight at the full moon party, especially in terms of drug controls, and said that police very rarely find anyone taking illegal substances at the event, which suggests that there are not many drugs available [last months Community magazine reported the seizure of several thousands doses of Ecstasy].

He invited other members of parliament to visit the island and see for themselves, and added that careless criticism would not help the Surat Thani authorities that he claims are working extremely hard to clean up the image of the full moon party. Mr. Pornled Chakchai, the Chief of the Koh Pha-Ngan District Office was also angered by the comments, and said that not once [in] three years of inspections had he witnessed foreigners having sex on the beach. He admitted that the senator may have seen couples hugging and kissing, which he says is quite normal behavior for foreigners, but added that even this is not encouraged in public, and officials often ask party goers to refrain from too much 'heavy petting' on the beach. Mr. Chakchai said that his two priorities for Koh Pha-Ngan are to make it drug-free and pollution-free and those projects in both these areas are already proving very successful. The head of the Koh Pha-Ngan Tourism Association, Mr. Chanched Piriyasatit echoed these assertions, and added how impressed he and his colleagues were by the level of official presence at the monthly full moon party. Most tourists, he said, visit the island to relax surrounded by nature, not to take drugs and have sex, and he expressed concern that rumors would only encourage young Thai people to attend the party as spectators. Despite strong denials, Koh Pha- Ngan and particularly the full moon party continues to be thought of as a hotbed of debauchery and ill repute, and some would argue that such publicity is at least part of the reason for its lasting success. Whatever the attitude of the Government, economic concerns seem certain to guarantee that the party never ends (Unsigned A, 2005)."

One week after this appeared in print, both the Bangkok Post (on two occasions, two days in a row, and the Bangkok Nation, both published articles claiming the Government was working to also make Koh Samui a drug free island (Unsigned B, 2005).

In one sense, this is a kind of a joke. It may be possible that the Surat Thani people and the leaders of this region do not want Bangkok in their business. A point of interest lies in the fact that even being under the influence of drugs is a crime in itself. Especially regarding the magic mushrooms known as 'het kee kwai' ("mushroom that appears after buffalo defecates)." To truly make the islands drug free, they would have to arrest and lock up all of the four-legged ruminants such as the kwai (buffalo), wua (cows) and elephants (Chung), since they too constantly eat the magic shrooms as they consume the grasses which grow over and above the hidden mushrooms.

3: *Copelandia cyanescens* in Europe

It is possible to find Asian tropical psilocybian species in Europe; their presence is made easy by the dung habitat, as a consequence of the importation of herbivorous quadrupeds from tropical regions.

As for the species here considered, in 1965 at Ménton (South France) there was an accidental collective intoxication after the ingestion of *Copelandia cyanescens* found on dung of horses imported from tropical regions for Ménton's racetrack (Heim, R., *et al.*, 1966). In 1972 the same species was located in the province of Turin (Piedmont, northern Italy) (Fiussello & Ceruti Scurti, 1972), while in the '80s it was gathered in the public gardens of Bolzano (Trentino-Alto Adige, northern Italy) (Festi, 1985).

At first, the presence of such a species in Europe seemed fortuitous but it is possible that its diffusion is sufficiently stable in the areas where the horses graze (Samorini, 1993); However, *Copelandia* species are more likely to be common in the manure of buffalo, cow and/or gaur, before being found in the manure of horses. Also included here, the authors must note the once-only appearance of an abundance of *Copelandia bispora* in Bern, Switzerland on a church lawn (Senn-Irlet, Beatrice; Adolph Nyffenegger, and Rudolph Brenneisen. 2000).

4: Mushroom symbolism at the Temples of Angkor Wat.

In the early summer of 2007, the senior author [JWA] received several emails from a young student of religion and philosophy, Kerry Colonna.

Five images were forwarded which showed possible Davatas and figures on bas-reliefs from various temples at the Angkor Wat Compound. Presented here for the first time (photographers unknown) are these images and some comments of their possible relationship to mushroom symbolism and ludible use by early Hindu, Mons, Khmers and Buddhists.

Fig. 191. A Graphic shroom visual by JWA from a Photo of Big Buddha, Koh Samui.

Fig. 192. Davatas holding what appears to be mushrooms.

Regarding the above photo of the Devatas with mushrooms

The above attached image was downloaded a couple of years ago from an Internet site promoting tourism in Cambodia. The investigator was hoping that the authors might be able to help with the identification of the objects held by the foreground figure in the Devatas above. Although, from this angle, they appear to clearly depict mushrooms, at the time we could not locate any other images from this archeological site that revealed such a convincing depiction. Please be advised that we are interested in any informed interpretations that come to our attention. With this in mind, we have hopes that this may seriously challenge author Andy Letcher's thesis on the lack of evidence that ancient cultures outside of Mexico did not use entheogenic mushrooms species in their cultures (Letcher, 2007; Allen, 2008).

In a 2nd personal communication [7-20-2007] to JWA, Kerry Colonna of Los Angeles wrote:

"Dear John,
The image you received had been sitting on my computer desktop for the last 3 years, as I was then fully absorbed in reviewing scientific literature that explored the role of tryptophan and tryptamine metabolites on immunological processes. I regret having changed the title of the Angkor image as the original document title could have yielded a most successful image search to its source. But I do recall that it came from a commercial site promoting tourism in Cambodia.

Recently, I was largely motivated by Andy Letcher's compelling challenge to the historical evidence of entheogenic mycology in Old World cultures ("*Shroom, A Cultural History of the Magic Mushroom*"), and I drew inspiration from the Devata image and spent a few weeks exploring the art and mythologies of Cambodia's Angkor Wat. I was fortunate to come upon a 1993 article by Rudiger Gaudes ("Kaundinya, Preah Thaong, the 'Nagi soma': Some Aspects of a Cambodian Legend," Asian Folklore Studies 52:333-358), which traces the mythologies and legends of the origins of the Cambodian kingdom. In these legends, Gaudes references ancient tales of an expelled prince from India known as Phra Thong (or from Burma, or Preah Thaong of Java) who fled to the coast of Cambodia and fell in love with a serpent lady, naga soma, whom frequented the land of Kamphuxa ("The Water Born") from her subterranean realms in order to sun bathe. Gaudes cites several variants of these legends from archeological, anthropological and scholastic research dating back to the 19th century, and he attributes these legends to the divine origin of the Angkor Wat and Angkor Thom civilization. He further explores the literature of the "Mahabharata" to uncover associations with the soma mythologies and the naga serpents as depicted in the form of the lingam and devaraja cults, and also as they related to the records of Zhou Daguan, the Chinese ambassador to Angkor during the 13th and 14th centuries. Gaudes summarizes Daguan's observations of the Angkorean king's life and power as dependent upon the goodwill of the water spirits as the proper and initial masters of the land.

Given such close associations with the naga-soma legends suggested by Gaudes it seems reasonable to question any literal interpretation of the Lotus (which may stand as a metaphor for the diverse variations of the "water-born serpent" depicted among the asparas and Devatas of the Angkorean complex).

When Sappho Marchal (daughter to the 1927 French conservator of Angkor Wat) published her drawings of ‘Khmer Costumes and Ornaments of the Devatas of Angkor Wat" (Orchid Press, 2005, p. 7) she referred to the objects held by the Devatas as remaining unidentified, citing George Groslier's speculations about sacred jewels or perhaps religious symbols ("Recherches sur les Cambodgiens," Paris: Augustin Challamel, 1921, p. 82). Considering the diversity of the objects depicted, it appears that many seem to be hybrids of different biological genera, including some bizarre stylized combinations of serpentes and fungi taxa. Certainly, many panels clearly depict the lotus or some stylized derivative thereof, yet certain panels seem to depict convincing representations of basidiomycete species.

Along with images of the asparas and Devatas, many murals depicting episodes from the Hindu "Puranas" are also evident; as I'm sure you're probably aware. These also hold great promise for their pictorial interpretations of mythological episodes involving soma. A 1976 interpretation of the "Vishnu Purana" from "Mahabharata" by Dr. E. Krishnamacharya details the Kusha myth originating from the land of the sacred grass (Prana) surrounded by divine waters where all devas offer their presence, including Udbhida (the sprouting one). In the massive collections of essays contained within the many volumes of the "History of Science, Philosophy and Culture in Indian Civilization," S. Sundara Rajan interprets Udbhida as a varga (group) of fungi that included five sub groups including Iksuja (on sugarcane), Karisa (on cow dung), Kshitija (on soil), Patala (on straw) and Venuja (on bamboos) taken from the Ayurvedic "Susruta samhita" (in *Medicine and Life Sciences in India* Vol. IV, Pt. 2, ed. B.V. Subbarayappa, Centre for Studies in Civilizations, 2001, p.

647). Of course, these are singularly isolated identifications among a plethora of Devas, Gandharvas, Yakshas and Kimpurushas inhabiting the kingdom of the Prana. It seems evident that the soma described in "RigVeda" and later "samhitas" could very well encompass many elements of entheogenic identity, and it may well be appropriate to consider that all previous interpretations could be correct.

I located an exhaustive, if still incomplete, Japanese website created by Hatano Naoki detailing many of the panel relief's of the asparas and Devatas of Angkor Wat, Angkor Thom, Bayon Temple, Ta Proehm and surrounding sites such as Banteay Srei with detailed maps of their specific locations within the complex (see attached link). While I was unable to locate the specific panel I sent to you, it stylistically appears to fall within the characteristics and patina of the panels from the Angkor Thom complex. Fair warning that you could easily loose several hours exploring the images of these fascinating monuments.

Sincerely,
Kerry Colonna"

After asking permission to use the above text, a third letter arrived which also dealt a little more light on this subject.

"Monday 23 July 2007

Hello John,

Yes, I wrote the text of my last email, but, at best, it merely covers second hand sources to what is clearly [a] complex, sacred subject matter occluded in antiquity. Perhaps the key to understanding why entheogens have been so marginalized throughout history is to understand how they held such powerful influences and were ultimately canonized under various Decknamen and metaphors such as naga- soma as a means to convey their mystery and symbolic significance. Your work in S/SE Asia is pioneering in laying the groundwork for presenting likely candidates as a source for these naga-soma mythologies, something unthinkable as little as 50 years ago. Serious progress in decoding the mythologies will most likely occur among open-minded scholars familiar with the ancient Sanskrit texts and fluent in Hindu and the Kampuchea dialects."

Kerry also asked if I, or any of my colleagues have been keeping track of the folk names or local nomenclature of the *Psilocybe* and *Copelandia* species we have identified in this paper. He suggests, as has Terence McKenna, that this area of the world seems to hold great promise for revealing many secrets of our earliest spiritual doctrines.

Fig. 193. A small mushroom appears in the hand on this Devata.

Fig. 194. A close-up of the above image showing a possible mushroom.

In Kampuja (Kampuchea, Cambodia) the common name for mushrooms edible or otherwise is supt (pronounced as "sa-up."

Fig. 195. Another Devata with a possible mushroom.

Fig. 196. In this image we can see what appear to be possible carvings of *Copelandia cyanescens* or a related synonym. Common in manure of 4-legged ruminants.

Appendix: Notes on compounds found in mushrooms other than the known psilocybian alkaloids

The beginning of the interest in the biochemistry of psychoactive mushrooms can be traced back to the discovery of the ritual use of mushrooms in Mexico by R.G. Wasson and the investigations carried out by A. Hofmann and ending in the identification of the active principles psilocybine and psilocine. But even if the chemo-taxonomical research is in constant and rapid developments, as the publications on the subject demonstrate, there hasn't been any true progress in the study of mushroom chemistry and in the identification of new active principles, accept those of Gartz and his colleagues in Europe (Stijve & Glutzenbaum, 1999).

Indeed, a certain attitude is common according to which some mushrooms species are considered trivial regarding their edibility, because of their reduced dimensions and/or rarity; but this fact often hides a scarce knowledge of either the biochemical or the toxicological aspects involved or quite a complete lack of precise investigations (Samorini, 1990).

On the other hand, it must be stressed that the [pandemic] diffusion of the ludible use of psychoactive mushrooms in the world has brought about, an increase in the number of new active species identified as such. But there are still some aspects to consider in order bringing about a better understanding in the study of the available data.

First of all, one has to take into account the bluification phenomenon generally valid for psilocybian mushrooms when they are handled; this is due to an enzymatic oxidation of psilocine forming a blue compound. Every gilled-mushroom that stains blue could be a good candidate for being a new psilocybian mushroom and this could be a general rule, but the association between bluification and presence of psilocybian alkaloids is not always valid, because some psilocybian mushrooms don't stain blue and the reverse, species that show bluification are not psilocybian (IBID., bluing toxic-*Boletus* species). Then, some species could be mistaken for others or be casually found among the active species during the recollection for the subsequent chemical analysis. In fact, the identification of small brownish mushrooms is generally difficult and there's also a specific expression (found in American texts) identifying all small and insignificant mushrooms species in general, that's to say "Little Brown Mushrooms" (LBM) (Stijve *et al.*, 1984; Gartz, 1996).

As for the chemical-analytical methodology, the problem with determinations carried out in the past was the low selectivity and sensibility of the methods, leading to false-positive identification of psilocybian alkaloids in some species. For example, serotonine and its precursor 5-hydroxytryptophan may have been mistaken for psilocybine during analyses on some species of *Panaeolus* (Stijve & Kuyper, 1985). In particular, problems arise due to the lack of confirmatory procedures, when exact quantitative results are not reported and when the concentrations detected are very close to the detection limit of the method (Stijve & Kuyper, 1988). Nowadays, with the development reached by modern analytical chemistry, chemical analyses are more reliable, but the errors of the past normally take some years to be corrected (Stijve & Glutzenbaum, 1999).

Other aspects are represented by the fact that sometimes these data are based on indirect, uncontrolled and poorly or not referenced reports and by the continuous and untiring research for new psychoactive mushrooms that leads to speculations. We have not to let apart the role of imagination and suggestion and the possibility of a hoax to exploit the gullibility of unwitting laypersons. So it is important to maintain reservations on sensational scientific discoveries in non-scientific literature.

Different important aspects (and limitations) are of taxonomical and chemical nature. In fact, some mushroom species present different number of biochemical races (due to a genetic variability), so that it is not simple to exactly identify the taxonomical characters and to carry out reliable chemical analyses. In general, the identification of new psychoactive compounds in mushrooms maybe a difficult and long analytical work that can discourage the researchers (IBID.).

The presence of some not precisely yet identified and not well studied compounds one could find in some species of mushrooms, if confirmed, could contribute to the total psychoactive action, modulating for example the main effects of the psilocybian alkaloids psilocybine, psilocine, baeocystine, nor-baeocystine and the newly detected aeruginascine; such compounds could act in a synergic way, the total effect being the sum or the product of the effects of the single compounds.

As for the genus *Psilocybe*, in the '90s, Stijve and De Meijer (1993) reported the presence of a possible new psilocybin analogue in *Psilocybe cubensis*, of which the chemical nature was under investigation in that period. Additionally, one of our colleagues at Chulalongkorn University (Sunisa Suwancharoen) also has found what she believes to be a new compound in a Thai collection of *Psilocybe cubensis*, grown *in vitro* in a lab at

Chulalongkorn University in Bangkok and two other compounds (sesquiterpenoids) in *Psilocybe samuiensis,* one of which is known as psilosamuiensin A (Pornpakakul, S. *et al.*, 2008). In *Psilocybe semilanceata*, Stijve (1984) found two not yet identified and not yet studied tryptamines that could contribute to the effect of the mushroom and in samples from the Pacific Northwest an indole compound with mobility slightly slower than psilocybine was put in evidence in TLC (Repke & Leslie, 1977). In another analysis, 8 new compounds were identified, some of them with a presumed steroidal structure (Calligaris, 1993-1994). In samples from Sweden, phenethylamine (PEA) was determined with a maximum concentration of 146 µg/g on fresh material (Beck *et al.*, 1998). This compound formed by decarboxylation of the ubiquitous amino acid phenylalanine was not identified in any other mushroom until reported in *Psilocybe semilanceata* [sic!].

The effect of PEA is amphetamine-like, principally inducing tachycardia and general adverse reactions one could note after ingestion of *Psilocybe semilanceata*; the differences in effects between synthetic psilocybine and the mushroom could be due to the presence of PEA in the latter. On the other hand, the concentration of PEA is highly variable in respect to that of psilocybine, so adverse reactions are evident only in some cases.

PEA is rapidly inactivated by MAO-B enzymes, forming phenyl acetic acid, while psilocybine is first dephosphorilated to psilocine, which in turn is inactivated by MAO enzymes, giving 4-hydroxyindolacetic acids. But for psilocine this seems the minor metabolic pathway in rats, so that psilocine is a poor substrate for MAO enzymes. It is not precisely known if psilocine is a substrate for MAO-A or MAO-B enzymes, but one could speculate if there is a metabolic interaction between PEA and psilocine through competitive inhibition of MAO enzymes.

Unknown indole compounds (in concentration over 0,10 % on dry weight) were put in evidence in *Psilocybe coprophila, Psilocybe eucalypta, Psilocybe inquilina,* and *Psilocybe montana* (Margot & Watling, 1981). *Psilocybe coprophila* is not active and occurs in Thailand and has a cosmopolitan distribution in much of the world.

As noted above, we recall the isolation and identification of aeruginascine from *Inocybe aeruginascens*; this new compound, closely related to psilocybine, will be the subject of a forthcoming paper, as reported in the text above. If possible, aeruginascine is responsible for the cheerful properties of *Inocybe aeruginascens and* it would seem a characteristic compound typical of this species (Gartz, 1989, 1995; Stijve & Glutzenbaum, 1999). However, similar effects of euphoria are also reported for *P. semilanceata* and other species of the genus *Psilocybe.*

As for the genus *Pluteus*, in samples of *Psilocybe ephebus* collected in the Netherlands and Switzerland psilocybin was not identified, but the test for tryptamines gave positive results; suggesting that it is suspected to have a presence of a psilocybin analogue (Stijve & Bonnard, 1986). *Psilocybe ephebus* and *Psilocybe xylophilus* contain some unidentified tryptophan metabolites (Stijve & Bonnard, 1986; Stijve & De Meijer, 1993).

Other not yet identified tryptamines are present in some species of *Psathyrella*, *Leucoagaricus* and in *Sarcodon atroviridis*. As for *Psathyrella* spp., two fluorescent tryptamines (named psathyrelline I and psathyrelline II), that are not present in species of *Panaeolus*, *Psilocybe* and *Stropharia*, were put in evidence (Stijve 1985, 2002-2003) and a tryptophan metabolite was found in *Psilocybe spadicea* (1-2 % on dry weight) (Stijve & De Meijer, 1993). In *Leucoagaricus* sp., the presence of 6- or 7- substituted tryptamines (tryptophanmetabolites) is supposed; apparently these compounds are neither hallucinogenic nor acutely toxic, as they are present in *Leucoagaricus pudicus*, an edible species (Stijve & De Meijer, 1993; Stijve 2002-2003). In general, little is known about tryptophan metabolites substituted in the positions of the indole nucleus other than 4- and 5- in biological material, still being considered as laboratory curiosities (Stijve, 2002-2003). In *Sarcodon atroviridis* there are not less than4-tryptamines and tryptamine (Stijve, 1995, 2002-2003; Toro, 2004).

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Fig. 197. *Amanita mira*. Photo: Courtesy of Tim Flegel, Mahidol University, Thailand.

Fig. 198. A Photo shopped poster by Adisron Junlawanno and John W. Allen. Designed by JWA.

Fig. 199. Sporulating *Psilocybe cubensis* at Na Muang, Koh Samui.

Feature below is a curious baby kwai (water buffalo) at the Eastern Seaboard area of Ban Phang Ka, Koh Samui. Here we found some beautiful *Copelandia* specimens and while JWA Photographing the fresh mushrooms, the baby kwai made his way right over to where the shrooms were growing.

Fig. 200. *Copelandia cambodgeniensis* in buffalo dung at Ban Phang Ka, Koh Samui, Thailand. Observe the color change from the heat of the sun.

Fig. 201. *Psilocybe cubensis*. On a farm in Ban Thurian fruiting in powdered buffalo manure scattered and later sold for fertilizer at local markets. These are very robust specimens.

Fig. 202. Ban Thurian, Koh Samui. Coconut Grove-kwai farm mushroom habitat.