ONTARIO COURT OF JUSTICE
(South West Region)

B E T W E E N:

HIS MAJESTY THE KING

Respondent

- and -

SAMER AKILA

Applicant

AFFIDAVIT OF DENNIS McKENNA

I, Dennis McKenna, of the City Abbottsford, in the Province of British Columbia, MAKE OATH AND SAY/AFFIRM:

1. I acknowledge that it is my duty to provide evidence in relation to this proceeding as follows:

   (a) to provide opinion evidence that is fair, objective and non-partisan;
   (b) to provide opinion evidence that is related only to matters that are within my area of expertise; and
   (c) to provide such additional assistance as the court may reasonably require, to determine a matter in issue.

2. I acknowledge that the duty referred to above prevails over any obligation which I may owe to any party by whom or on whose behalf I am engaged.

3. I am offering myself as an expert on the topics of historical psilocybin use, indigenous psilocybin use and psilocybin from an ethnopharmacology perspective.

Personal Qualifications

4. Attached hereto and marked as exhibit A is a true copy of my CV.

5. In 1984 I obtained my PhD from the University of British Columbia in Botanical Sciences with an emphasis on biochemistry and pharmacognosy. Pharmacognosy is concerned with medicinal plants or other natural sources.

6. I have extensively studied the historical and indigenous use of psilocybin. As an ethnopharmacologist, I am very familiar with the scientific literature and popular literature pertaining to the historical and indigenous use of psilocybin and psilocybin mushrooms. I have extensively studied the archaeological evidence and original sources concerning the historical and indigenous use of psilocybin mushrooms. I have consulted with and been consulted by experts on the historical and indigenous use of psilocybin.

7. From 2000 to 2006 and from 2008 to 2017 I was a Research Associate and Senior Lecturer at the University of Minnesota's Center for Spirituality & Healing, Academic Health Centre. I taught courses in Ethnopharmacology, Botanical Medicines, Culture Drugs and Society and Plants in Human Affairs.

8. I am a founding board member and director of ethnopharmacology at the Heffter Research Institute which has had a focus on psilocybin mushrooms.

9. I am the President and principal founder of the Mckenna Academy for Natural Philosophy incorporated as a 501(c)3 nonprofit in California in 2021. The McKenna Academy has as one of its major foci the education of scientists and the general public about the indigenous uses, origins, and therapeutic applications of psilocybin mushroom and other psychedelics.

10. In the 1970s, under a pseudonym, I wrote, along with Terrance McKenna, the Psilocybin: Magic Mushroom Grower's Guide: A Handbook for Psilocybin Enthusiasts. In addition to growing information, the book contains speculations about psilocybin's relationship to humankind.

11. I have studied, researched and lectured on the scientific foundations of the Stoned Ape hypothesis presented by my brother Terrance McKenna in his 1992 book the Stoned Ape.

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The Stoned Ape hypothesis proposes that the consumption of psilocybian fungi played a crucial role in the evolution of consciousness and the development of the human mind, self-reflection, language, and culture, catalyzing the rapid evolution of early hominid species into modern Homo sapiens over a relatively short evolutionary span of some two million years.

12. I am on the advisory board of several US startups in the psilocybin and psychedelic space: Cybin, Soltara and New Wave Holdings Corp. These are not paid positions and I do not own any part of the company. Soltara and New Wave Holdings Corp. are not specifically focused on psilocybin, their focus is mainly on developing therapeutic protocols; right now they are mostly focused on ketamine because that medicine is legal and available for clinical use. The exception may be Psygen which is Canadian (https://psygen.ca/). They are manufacturing pharmaceutical grade psychedelics including psilocybin for research in clinical studies, all legitimate and licensed by Health Canada. I am on the advisory board (unpaid) and have a modest amount of stock shares which are not worth much money.

MY OPINION

Is it reasonable to believe that psilocybin has been used historically by various indigenous persons and other cultural groups for spiritual, religious, and/ or thought-enhancing purposes? Please set these out.

Archeological Evidence:

13. The hallucinogenic indole alkaloid psilocybin and its active derivative psilocin have been identified in approximately 200 species of mushrooms. The distribution of these 'psilocybian' species is global in extent, but they are not all linked to cultural or indigenous traditions. The cultures that utilize psilocybian species for shamanic, ritual, or medicinal purposes are concentrated in Mexico and MesoAmerica. There is abundant historical, ethnographic, archeological and textual evidence that documents the indigenous uses of these mushrooms in this region for thousands of years. The genus Psilocybe contains by far the highest number of psilocybian species (116 species world wide) though the compounds are also found in the genera Gymnopilus, Panaeolus, Copelandia.

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Hypholoma, Pluteus, Inocybe, Conocybe, Paneolina, Agrocybe, and others. Forty-four species of Psilocybe (39% of the total) are endemic to Mexico and MesoAmerica and have documented ethnographic use.[1]

14. Archeological evidence attesting to the antiquity of the MesoAmerican cults of 'mycolatry' (mushroom worship) among the Mayan civilization of the Guatemalan highlands is related to the discovery of 'Mushroom Stones' in a Mayan cemetery, Kaminaljuyu, dating from the Miraflores phase of the Pre-Classic period, approximately 1000-500 BC. These stones are small mushroom-shaped statues that are interpreted as effigies of gods or shamans, depicting either the mushrooms themselves as deities, or a shaman in an ecstatic state elicited by the mushrooms in issue.[2] [3]

15. Further archeological evidence can be found in the Aztec diety **Xōchipilli**, the god of flowers, art, songs, dance, and games. While there are various depictions of this mythical Aztec deity, none is more striking than the statue In the National Museum of Anthropology in Mexico City.

16. This statue, dated to the 16th century, was unearthed on the side of the volcano Popocatépetl near the village of Tlalmanalco. The image has been interpreted to represent a shaman in a state of ecstasy induced by mushrooms or other sacred psychedelic medicines. Both the base of the image and the statue itself are covered in carvings depicting various sacred psychoactive organisms, including mushrooms (Psilocybe aztecorum, teonanacatl), tobacco (Nicotiana tabacum), ololiúqui (Turbina corymbosa), sinicuichi (Heimia salicifolia), and cacahuaxochitl (Quararibea funebris). The iconographies depicted on the statue have been interpreted and discussed at length in Chapter 3 of the Wondrous Mushroom: Mycolatry In Mesoamerica by ethnomycologist R. Gordon Wasson. Although Wasson is not the only investigator to document both the historical and contemporary uses of psilocybian mushrooms in Mexico and Central

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[1] Guzmán, Gastón & Allen, John & Gartz, Jochen. (1998). A Worldwide geographical distribution of the Neurotropic Fungi, an analysis and discussion. Ann Mus Civ Rovereto. 14.
[2] Borhegyi, Stephan. (1961). Miniature Mushroom Stones from Guatemala. American Antiquity. 26. 498. 10.2307/278737.
[3] Lowy, B. (1971). New Records of Mushroom Stones from Guatemala. Mycologia. 63. 983-93.

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America, his scholarly works are widely regarded as the definitive core literature in the discipline of ethnomycology, a field for which he is recognized as the founder. Information on his life and publications are available in Wikipedia. I shall be citing Wasson's work at various points in this review, since the work of Gordon Wasson and his wife Valentina Wasson constitute the primary source material documenting both the ancient and contemporary uses of psilocybian mushrooms. [4]

Textual documentation; Aztec/Mayan Codices etc:

17. In addition to archeological evidence, there are also various textual references to the use of mushrooms in both Mayan and Aztec religious traditions.

18. Textual references to mycolatrous practices fall mainly into two classes: Pre-Columbian codices, painted texts in picture writing similar to Medieval illuminated manuscripts. Although many of these were destroyed by the Spanish conquistadors in the 16th century as part of a relentless effort to erase all traces of Mayan and Aztec civilization, fragments of some were preserved.

19. The major codices in this category are the Codex Vindobonensis (Vienna Codex), Sahagan's Florentine Codex, and the Magliabechiano Codex. Additional references to mushrooms and their demonic worship can be found in the files of the Holy Office of the Inquisition held in the Archivos Generales de la Nacion (AGN) and referenced by Wasson (vide supra, pp. 209-212).

20. The Codex Vindobonensis, or Vienna Codex, was first described by MesoAmerican scholar Dr. Alfonso Caso, in a 1963 paper in Estudios de Cultura Náhuatl Vol. IV. Painted not in a Nahuatl but in a Mixtec scriptorium, this text is said to describe the mythological origins of things. It depicts a number of mythological figures, including the god Quetzalcóatl, holding clusters of mushrooms and engaged in various ritual activities that have been interpreted as a velada, a sacred nocturnal mushroom ritual. [5]

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[4] Wasson, Robert Gordon (1980). *The Wondrous Mushroom: Mycolatry in Mesoamerica*. McGraw-Hill. ISBN 978-0-07-068343-0.

[5] Wasson, ibid. Pp. 105ff

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21. The Florentine Codex: Fra Bernardino de Sahagen was a Spanish Friar who was the author of one of the most authoritative chronicles of the region known at the time as Nueva España. Written partially in Spanish and Nahuatl, in collaboration with Nahua elders and student informants, his book, written between 1545 until his death in 1590 under the title Historia general de las Cosas de Nueva España (General History of the Things of New Spain), represents the most complete ethnographic research study of MesoAmerica dating from this period. The best preserved manuscript, now known as the Florentine Codex, is preserved in the Laurentian Library in Florence, Italy. This massive, 13 volume opus, is now available in separate translations of the Spanish and Nahuatl texts. [6]

22. In his extensive review of the Florentine Codex, Wasson (vid.Infra) cites three instances that refer to the sacred mushrooms in the Spanish text, and three additional references in the Nahuatl text in English translation rendered by Anderson and Dribble (cf. Wasson, ibid., pp 237).

23. The longest passage referring to mushrooms in this translation (Florentine Codex, Bk 9, pp 38-39), describes a celebration of some prosperous merchants who are making a display of their wealth in their neighborhood. The English translation of the Nahuatl account is most instructive:

- At the very first, mushrooms had been served. They ate them at the time when, they said, the shell trumpets were blown. They ate no more food; they only drank chocolate during the night. And they ate the mushrooms with honey. When the mushrooms took effect on them, then they danced, then they wept. But some, while still in command of their senses, entered [and] sat there by the house on their seats; they danced no more, but only sat there nodding.

- One saw in vision that already he would die, [and] there continued weeping.

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[6] Spanish Text of the Florentine Codex, edited in 4 Vol. by Angel Maria Garibay K. Porrúa, Mexico D.F. 1956 Nahautl text of Florentine Codex as translated in English by Arthur J. O. Anderson and Charles Dibble, University of New Mexico and Utah.

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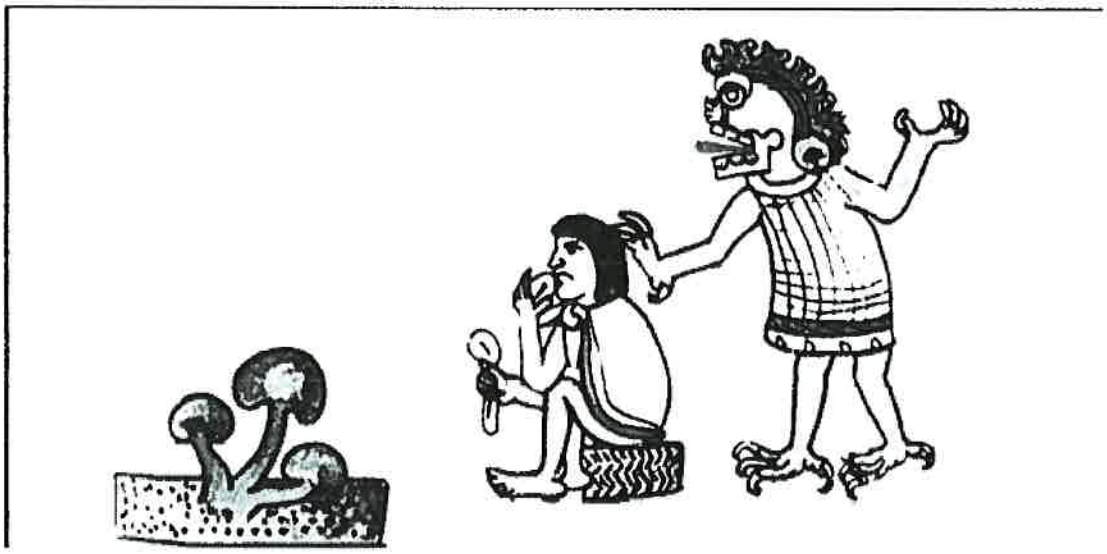
One saw in vision that he would die in battle; one saw in vision that he would be eaten by wild beasts; one saw in vision that he would take captives in war; one saw in vision that he would be rich, wealthy; one saw in vision that he would buy slaves - he would be a slave owner; one saw in vision that he would commit adultery - he would be struck by stones - he would be stoned; one saw in vision that he would steal - he would also be stoned; one saw in vision that his head would be crushed by stones - they would condemn him; one saw in vision that he would perish in the water; one saw in vision that he would live in peace, in tranquility, until he died; one saw in vision that he would fall from a roof-top - he would fall to his death. However, many things were to befall one, he then saw all in vision: even that he would be drowned.

- And when the effects of the mushrooms had left them, they consulted among themselves and told one another what they had seen in vision. And they saw in vision what would befall those who had eaten no mushrooms, and what they went about doing. Some were perhaps thieves, some perhaps committed adultery. Howsoever many things there were, all were told - that one would take captives, one would become a seasoned warrior, a leader of the youths, one would die in battle, become rich, buy slaves, provide banquets, ceremonially bathe slaves, commit adultery, be strangled, perish in the water, drown. Whatsoever was to befall one, they then saw all [in visions].
  [Florentine Codex, Dibble & Anderson, Bk 9 PP 38-39]
  Wasson, ibid., p 206.

24. The Magliabechiano Codex is a 16th Century pictorial Aztec Codex created in the early Spanish Colonial period. It is based on an earlier unknown codex, and is named after Antonio Magliabechi, a 17th Century Italian manuscript collector. It is primarily a religious document, depicting various Aztec deities, costumes, indigenous religious rites, and cosmological beliefs. Wasson draws attention to one of these images that show a cluster of three mushrooms, a seated man holding and eating mushrooms, and a supernatural figure with claw-like hands and feet, that scholars have equated to

Mictlantecuhtli, the Lord of the Underworld, also shown in other parts of the manuscript. Wasson compares this to a similar illustration in the Florentine Codex, the work of a Spanish artist depicting a clawed 'demon' apparently dancing on a cluster of five mushrooms. Wasson uses this comparison to highlight the difference between the indigenous Aztec, who views the mushroom with religious reverence, with the European view, in which the mushrooms are associated with a demonic figure displaying the conventional stigmata associated with demons or Satan in Gothic and Spanish traditions.

25. Below: man seated, consuming mushrooms while looking at a cluster of mushrooms. The Aztec Lord of the Underworld, Mictlantecuhtli, watches over the proceedings.



26. Below: Devil-like figure dancing on mushrooms from Bernardino de Sahagun, Florentine Codex.

27. The Holy Office of the Inquisition: Various passages in these files relate incidents involving mushrooms, which were regarded as idolatrous and roundly condemned by the Christian friars conducting their investigations under the authority of the Bishop of Mexico from approximately 1527 to 1629. Wasson makes clear in his review of this material that the Inquisitors were well aware of the uncomfortable – in their minds, blasphemous – parallels between the Christian Eucharist, in which supplicants consumed the transfigured body and blood of Christ, and the indigenous consumption of the 'flesh of God', the literal translation of the Aztec term *teonancácatl*. One may speculate that these parallels may have contributed to the particular brutality the clerics brought to bear on the suppression of these indigenous practices, which were considered as witchcraft. One episode from these files quoted by Wasson (vide supra, pp 211-212 is illustrative of this pejorative view:

- "Our third episode tells of a curandero who narrowly escaped the Holy Office. A seventeenth century cleric, Jacinto de la Serna, composed a guide for priests ministering to the Indians. His work was entitled Manuel de Ministros de Indios para el Conocimiento de sus Idolatrías y Extirpación de Ellas. He was a garrulous busybody, zealous in rooting out and extirpating all expressions of the Indians' old religion, and eager in his narrative to leave a record of his own zeal. Chapter IV of his work continues a recital of incidents that had happened to the author proving (as he says) that idolatry was still rampant among the Indians in his own time. In

Section 3 of this chapter he is discussing native physicians and midwives, especially the rôle of 'witchcraft' in their practices, and certain goings on in his own household that had aroused his liveliest suspicions. A certain Indian, master of the native lore, had lately arrived in the villages and had officiated at a religious rite in which the intoxicating mushrooms had been a central feature. The description of the religious ceremony reaches us through don Jacinto by hearsay only, as of course he was not present, but it carries a ring of authenticity:

> o And what happened was that there had come to the village an Indian, a native of the village of Tenango, great master of superstitions, and his name was Juan Chichitón, which means 'little dog', and he had brought the red-colored mushrooms that are gathered in the uplands, and with them he had committed a great idolatry, and before I tell of it, I wish to describe the property of said mushrooms, which are called in the Mexican language Quautlannamacatl, and having consulted the Licentiate Don Pedro Ponce de León, the great Minister and Master of Masters as I said in Chapter II, he told me that these mushrooms were small and golden, and to gather them it was the custom for the priests and old men deputized as ministers for this kind of humbuggery to go up into the mountain, and they remained almost the whole night in prayer and superstitious entreaties, and at dawn, when there sprang up a certain breeze that they knew, then they gathered the mushrooms, attributing divinity to them, possessing as they did the same effect as ololiuhqui [Turbina corymbosa (L.) Raf.] or peyotl [Lophophora Williamsii (Lem.) Coulter], because whether eaten or drunk, it intoxicates them and deprives them of their senses, and makes them believe a thousand foolish things. And so this Juan Chichitón, having gathered the

> mushrooms on a certain night, in the house where everyone had gathered on the occasion of a saint's feast, the saint was on the altar, and the mushrooms with pulque and a fire beneath the altar, the teoponastli [a percussion instrument peculiar to Mesoamerica] and singing going on the whole night through, after most of the night had passed, said Juan Chichitón, who was the priest for that solemn rite, to all those present at the fiesta gave the mushrooms to eat, after the manner of Communion, and gave them pulque to drink, and finished off the festivities with an abundance of pulque, so that what with the mushrooms on the one hand and the pulque the other, they all went out of their heads, a shame it was to see.

- De la Serna goes on to relate how he had made utmost efforts to ferret out and lay his hands on Chichitón. There was a hot chase but by the skin of his teeth the 'Little Dog' eluded his pursuer's clutches.

28. There exists a rather voluminous literature on the uses of psilocybian mushrooms in the context of MesoAmerican religions around the time of the Conquest. The contributions of R. Gordon Wasson constitute the bulk of this literature and cites passages in various Codices and other records of the time, such as the Files of the Holy Office of the Inquisition. It is not my intention, nor is it necessary, to provide a comprehensive review of this literature. My objective in discussing Wasson's review, drawing on the passages from older sources cited by Wasson, is to demonstrate that there is indeed evidence that psilocybian mushrooms were used in these cultures in indigenous religious practices. The evidence from textual sources is further bolstered by archaeological discoveries such as the statue of **Xōchipilli** from the 16th Century, and the much older 'mushroom stones' from the Guatemalan highlands. The date ranges determined for these earlier artifacts demonstrate that the practice of 'mycolatry' in MesoAmerica predates Christianity by at least 1000 years, making it one of the oldest documented entheogenic religions.

Is it reasonable to believe that psilocybin has been used in the last 75 years by various indigenous persons and other cultural groups for spiritual, religious, and/ or thought-enhancing purposes? Please set these out.

29. The contemporary indigenous use of psilocybian mushrooms for spiritual, religious and ethnomedical uses are documented in many sources and writings from ethnographers, anthropologists, ethnobotanists, travelers, and others. However, the earlier and primary references documenting 20th century uses in Mexico and MesoAmerica derive from two primary sources.

30. The first is a paper published by ethnobotanist R.E. Schultes in Harvard Botanical Museum Leaflets.[7] In this report, Schultes describes his collection and identification of various species of Panaeolus. Dr.Blas Pablo Reko, one of Schultes' informants in Oaxaca, sent him poorly preserved specimens of mushrooms that were purported to be utilized as 'narcotics' by the Otomi Indians of Puebla. (N.B.: in early 20th century ethnobotanical literature, indigenously utilized psychotropic plants are commonly characterized as 'narcotics'; it's a generic term, more properly they should be called 'psychoactive' as they are not narcotics in the sense that opium and its derivatives are narcotics.). Schultes identified the fragmentary specimens as most likely a species of Panaeolus. Following this report, Schultes obtained better preserved specimens from Oaxaca, which he identified as Panaeolus campanulatus var. sphinctrinus, and in this paper claimed that this species was the famous teonanacatl of the Aztecs. Other species of Panaeolus were also implicated, including Panaeolus campanulatus and P. papilionaceous. Unfortunately, Schultes' initial discovery may have been a bit of a red herring. While he was correct in asserting that teonanacatl was a mushroom (and not another name for the cactus, Peyote, has had long been incorrectly speculated by the botanist W. E. Safford[8]) the particular species of Panaeolus Schultes collected happens to be one that does not contain psilocybin, although other species in that genus do contain it. It's very likely that Schultes confused his collection with Psilocybe mexicana, which has an appearance similar to P. campanulatus

[7] Schultes R.E. (1939) Plantae Mexicanae II. The identification of teonanacatl, a narcotic Basidiomycete of the Aztecs. Harvard Botanical Museum Leaflets, No 7, 37-54 see: https://www.biodiversitylibrary.org/partpdf/295127

[8] Safford WE (1915). An Aztec narcotic. J. Hered., 6:291-311

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and is considered the archetypal Mexican magic mushroom. In his book The Botany and Chemistry of Hallucinogens,[9] Schultes discusses this misidentification and also notes that he collected another species, Stropharia cubensis (since renamed Psilocybe cubensis), which definitely does contain psilocybin and in fact has become the most widely cultivated of the psilocybian species. Oddly, Schultes does not mention this collection in his 1939 paper in Botanical Museum Leaflets although this collection was by far the more significant.

31. Later intensive field research in Mexico by Wasson and his colleague Roger Heim, a mycologist affiliated with the National Museum of Natural History in Paris, resulted in the collection and identification of numerous species of psilocybian mushrooms, many of which were new to science, that were utilized by the indigenous people of the region. Although Heim, Wasson, and other investigators published extensively on their discoveries the key reference is their massive compendium Les Champignons Hallucinogenes du Mexique. [10]

32. The genera documented in that reference as being utilized in indigenous rituals included Conocybe siligineoides, Panaeolus sphinctrinus, Psilobybe acutissima, P. aztecorum, P. caerulescens, P. caurulipes, P. cordispora, P. fagicola, P. hooghshagenii, P. isauri, P. mexicana, P. mixaeensis, P. semperviva, P. yugensis, P. zapotecorum, and P. cubensis. Thanks to subsequent work by other investigators, particularly the Mexican mycologist Gastón Guzmán[11], over 200 species of psilocybian mushrooms have now been identified in all parts of the world, although not all are used indigenously or recreationally. A partial list is provided here, although new psilocybian species continue to be discovered: https://www.erowid.org/plants/mushrooms/mushrooms_info12.shtml [12]

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[9] Schultes RE; Hofmann A. (1991) The Botany and Chemistry of Hallucinogens 2nd Edition. Charles C. Thomas, Publishers, Springfield Ill.

[10] Heim R. & Wasson R. G. (eds), (1958). Les champignons hallucinogènes du Mexique - Etudes ethnologiques, taxinomiques, biologiques, physiologiques et chimiques. *Archives du Muséum national d'Histoire naturelle, 7ème série* 6 (1): 1-445.

[11] Guzmán, G. The Genus Psilocybe: A Systematic Revision of the Known Species Including the History, Distribution and Chemistry of the Hallucinogenic Species. Beihefte zur Nova Hedwigia Heft 74. J. Cramer, Vaduz, Germany (1983) [now out of print].

[12] Guzmán, G; Allen JW; Gartz J (2000). A Worldwide Geographical Distribution of the Neurotropic Fungi, An Analysis and Discussion. Annali dei Museo civico - Rovereto, Italia. vol 14:1890280. (in English)

33. Following publication of Schultes' 1939 paper on the 'narcotic' Basidiomycetes, investigations languished for some 15 years. Wasson and his colleagues continued their fieldwork in Mexico and Central America, and shared their discoveries in 1957, not in a peer reviewed scientific journal, but in one of the most public mainstream publications in existence at the time: Life magazine. The article, 'Seeking the Magic Mushroom' by Wasson and his wife Valentina was published in the May 13th, 1957, issue of Life. [13] The article is listed on the cover as part 3 of Life's 'Great Adventure' series, with the rather lurid heading, "The Discovery of Mushrooms that Cause Strange Visions." In the article, Wasson describes his experience with ingesting the mushrooms at a *velada* hosted by the Mazatec curandera Maria Sabina, while on an expedition to Oaxaca in 1955. The article, written as a photo essay, included photographs of the ceremonies by one of his companions, photographer Allan Richardson, and reproductions of watercolor paintings of several Psiocybe species collected by mycologist Roger Heim. The entire article and images are reproduced on this website for Donlon Books:

https://donlonbooks.com/products/life-magazine

34. By the time this article was published, other investigators had followed up on some of Wasson's and Schultes' work, but their publications did not achieve the notoriety that the publication in Life received. Wasson was fond of publicity, and the publication of this article attracted widespread interest far beyond staid academic circles. It was the first documented report of participation in a mushroom ceremony by a non-indigenous person although it's likely that Schultes' original informant, Dr. Blas Pablo Reko, had ingested the mushrooms at some point, but this was never documented. It was the first time that the term 'magic mushroom' was used in print, and that term, of course, became the standard generic characterization of these mushrooms. The article had an impact, much of it adverse, as it motivated many Western adventurers to undertake their own mushroom quests. The fragile indigenous communities that had guarded the secrets of the mushrooms for more than 400 years suddenly found themselves inundated by foreigners seeking their own pathways to fungal enlightenment. While many of these were sincere seekers who

[13] Wasson, RG; Wasson, V (1957) Seeking the Magic Mushroom. Life Magazine May 1957

approached the mysteries with respect, many were not; and it was those less respectful individuals who attracted adverse attention and gave the mushrooms and their users a bad name. The Mazatec curandera, Maria Sabina, who generously shared her knowledge and mushrooms with Wasson, became possibly the most well-known curandera in the world. It did not redound to her benefit. [14] She was vilified by many in her community and was treated with jealousy and resentment. In the Wasson's famous book, Mushrooms, Russia and History, originally published in a limited edition of 512 copies, [15] Wasson revealed Sabina's identity and location, which violated her consent and abused her hospitality. This rather dismal episode has been described in one publication as 'a story of extraction, cultural appropriation, bioprospecting, and colonization.' [16] It is worth noting, perhaps, that in 1962, Wasson took Albert Hofmann, the Sandoz chemist who had isolated and synthesized psilocybin, which was called Indo-cybin, to meet Maria Sabina and participate in a velada. Hoffman gave her several pills of indocybin, each containing 5 mg of the drug. After she had consumed them in the velada, she declared that 'the spirit of the mushrooms is in the pill, that there was no difference between the synthetic and the mushrooms. [17]While Wasson went on to achieve fame and fortune through his many publications about the magic mushrooms, Maria Sabina died impoverished and suffering from malnutrition in 1985. [18]

35. The foundations of modern pharmacology are built on a history of biopiracy and cultural appropriation. Many of our most important medicines are either identical to or derived from medicinal plants, fungi and other organisms that had extensive pre-historical and historical uses in indigenous societies. Similar considerations apply to many of our most important food plants, that have now become global commodities that feed the world. The Incas, for example, were the first to domesticate the potato, tomatoes, chile peppers,

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[14] https://en.wikipedia.org/wiki/Mar%C3%ADa_Sabina#cite_note-3-8

[15] Valentina Pavlovna Wasson & Wasson RG (1957) Mushrooms, Russia and History. Pantheon Books (full text PDF)

[16] Gerber, Konstantin; Flores, Inti Garcia; Ruiz, Angela Christina; Ali, Ismail; Ginsberg, Natalie Lyla; Schenberg, Eduardo E. (2021-04-09). "Ethical Concerns about Psilocybin Intellectual Property". *ACS Pharmacology & Translational Science*. 4 (2): 573–577

[17] https://beezone.com/alberthofmann/maria_sabina.html

[18] Aridjis,C (30 March 2015) "On Maria Sabina, one of Mexico's greatest poets", *Voices Magazine. British Council*. (https://www.britishcouncil.org/voices-magazine/maria-sabina-one-of-mexicos-greatest-poets)

spiritual transmutation, and had little to do with transmutation of elements, other than on a symbolic level. [22]

[22] Jung CG (1953) Psychology and Alchemy. Bollingen Foundation, Pantheon Books.

quinoa and other grains, to name a few, while the ancestors of corn originated in Mexico (and may have been cultivated even earlier in Peru and traded north). Global societies have been slow to acknowledge their debts to the ethnomedical and ethnoagricultural practices of traditional societies, and yet it is thanks to their stewardship, their preservation of the genetics and biodiversity of economically important organisms, that we now enjoy a global system of trade and production in the plants and animals that sustain life.

36. The example of the magic mushrooms is a case in point. Following Wasson's investigations in Mexico and using spores from specimens collected by Roger Heim and brought to his laboratory at Sandoz in Basel, pharmaceutical chemist Albert Hofmann (already famous for his discovery of LSD in 1938) was able to cultivate specimens in his laboratory, and succeeded in isolating, and then synthesizing, the two major psychoactive alkaloids, psilocybin and psilocin. [19] Psilocybin is now being touted as the next revolution in mental health care. Research is actively investigating its potential applications in the treatment of a wide spectrum of mental disorders. Venture capital companies, seeing the opportunities for enormous profits, are underwriting much of this research. In such contexts, discussions of ethical issues related to the co-optation of indigenous intellectual property, reciprocity, and compensation to indigenous communities for the theft of their knowledge and resources, are rarely welcome conversations.

Evidence for traditional use of psilocybian mushrooms in indigenous cultures outside of MesoAmerica:

37. The documented use of psilocybian mushrooms in ritual or ethnomedical practices outside of MesoAmerica is less abundant, but there are indications. One intriguing discovery in this respect are the rock art murals from Selva Pasquala rock shelter near the Spanish municipality of Villar del Humo in the Central Spanish province of Cuenca. Discovered in 1918 by archeologist E. Heriández-Pacheco, the site is dated to approximately 6000 BCE. The mural depicts typical iconic elements, including two large bulls, and several human

[19] Hofmann A, Heim R, Brack A, Kobel H. (1958) Psilocybin, ein psychotroper Wirkstoff aus dem mexikanischen Rauschpilz Psilocybe mexicana Heim [Psilocybin, a psychotropic substance from

figures. In the lower right a row of mushroom-like silhouettes are depicted (see below). Various interpretations of these images have been proposed, such as anchors, or diminutive dancing human figures. But the suggestion that they depict mushrooms are based in part on their striking resemblance to Psilocybe hispanica, which is known to occur in the region and could well have been a component of the mycoflora around this site. [20]

38. In their book, The Psychedelic Gospels, [21] scholars Jerry & Julie Brown argue that fungoid images are a common element of Christian liturgical art from the Middle Ages and provide numerous examples from medieval church murals and cathedrals in European and Middle Eastern churches. Although such images do exist, they are not unambiguous, and it's been speculated that these representations are stylistic depictions of trees. The controversy continues; however in any event it is impossible to determine whether the fungoid images represent psilocybian mushrooms.

39. A much less ambiguous, though still unverified, image can be found in the Mylius Philosophia Reformata, an alchemical tract published in Frankfurt in 1622 by Johann Daniel Mylius (1583-1642). This woodcut depicts four maidens, thought to represent the four stages of alchemical transformation. Each of the maidens is wearing a headdress which appears similar to the capsule of the opium poppy. But the fungal element appears in the dresses of the maidens; the dresses appear to represent strikingly accurate representations of 'liberty cap' mushrooms, Psilocybe semilanceata, with long stems and conical caps. This species has a global distribution and would have been found in grassy meadows, where they occur commonly to this day. Perhaps the artist was sending an occult message alluding to the personal transformation catalyzed by the mushrooms, in analogy to the alchemical transmutation of base metal into gold. The psychologist C. G. Jung was a proponent of the notion that the real secret of alchemy described personal

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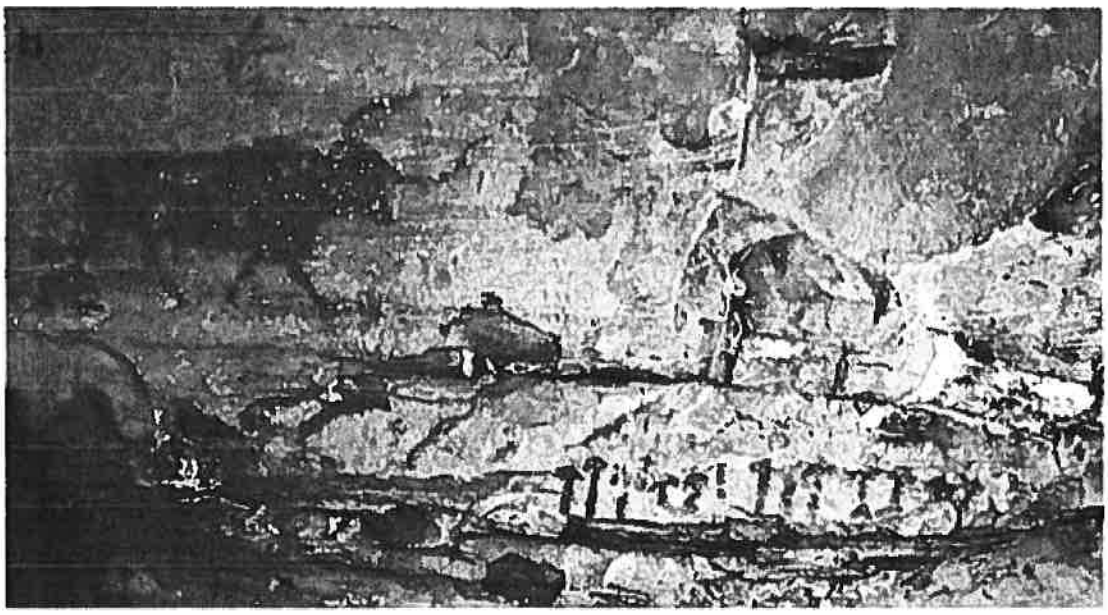
[20] Akers BP Ruiz JF Piper A Ruck, CAP (2011) A Prehistoric Mural in Spain Depicting Neurotropic Psilocybe. Economic Botany (XX)X pp 1-8

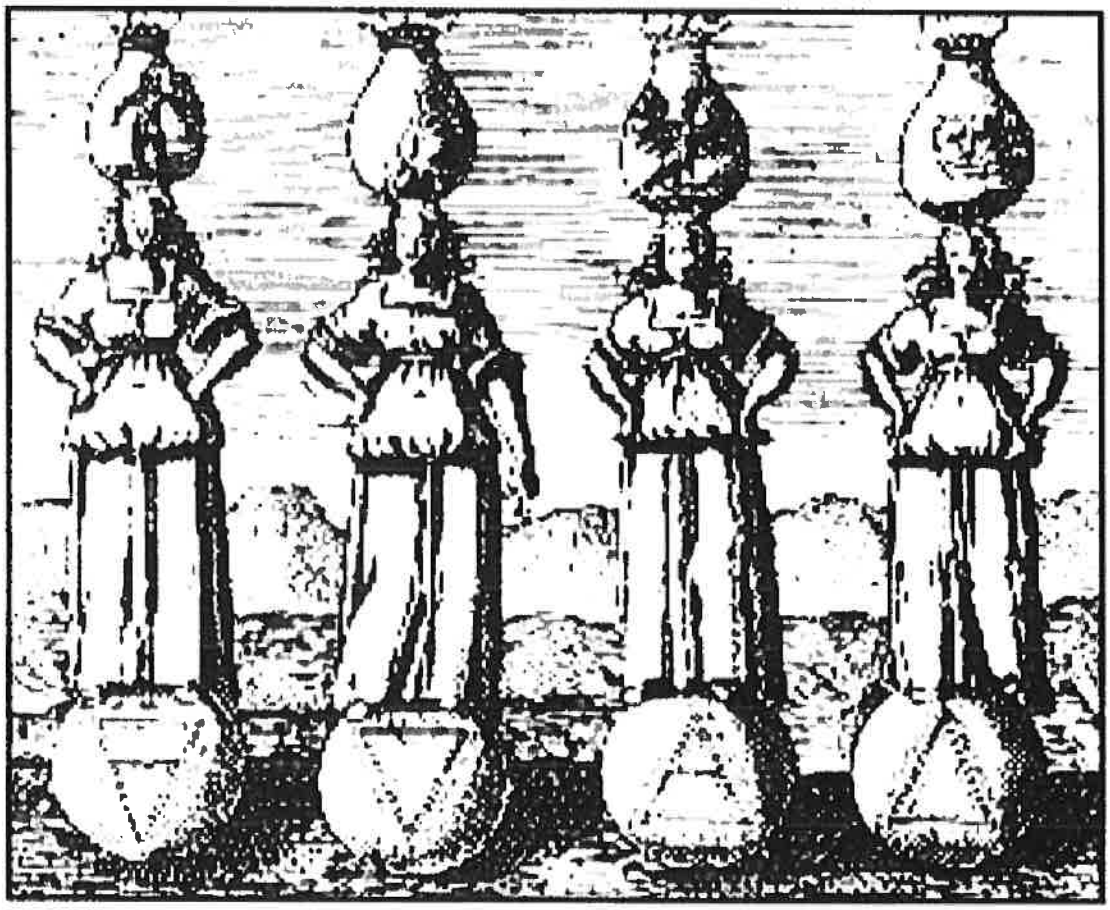
[21] Brown JB & Brown JM (2016) The Psychedelic Gospels: the Secret History of Hallucinogens in Christianity. Park Street Press

DJM 03

a



DJM 83



Is it reasonable to believe that psilocybin has impacted aspects of ancient human development? Please set these out.

40. The ethno-historical evidence for the ethnomedical and religious use of psilocybin mushrooms in the New World is clear. Archeological and textual evidence, some of which we have discussed, demonstrate that their use dates to well before the Christian era, at least to ca. 1000-1500 BCE.

41. But just how ancient is the symbiotic relationship between psilocybian mushrooms and the human species? Archaeological evidence for psilocybin mushroom use in the Old World is much more sparse, although there is suggestive evidence. The **Tassili n'Ajjer** plateau in the Sahara Desert of Northern Algeria is one of the largest collections of prehistoric rock art known. It contains more than 15,000 rock paintings and engravings, some dated as old as 12,000 years BCE, spread across some 72,000 sq. km. The **Tassili**

n'Ajjer site was designated as a UNESCO World Heritage site in 1972 and is now known as the Tassili n'Ajjer National Park. The Tassili n'Ajjer site rock art spans a period ranging from the early Holocene, about 12,000 BCE to the most recent paintings dated to about 50 CE. The rock art is classified into 5 distinct traditions: the Archaic Period (10,000 - 7500 BCE), the Round Head period (7550-5050 BCE), Bovidian or Pastoral Periods (4500-4000 BCE), Horse (2000 BCE - 50 CE), and Camel (50 CE and later). The rock art provides a picture of the emergence of pastoralism and animal husbandry in the Bovidian periods, as Neolithic populations transitioned from hunter-gathering to mobile pastoralism. Domesticated animals, such as sheep, cattle, goats, and dogs are depicted in the paintings from this era, and zooarchaeological evidence has confirmed the presence of fossil remains of these animals.

42. The possible connection between the art and rituals of the Tassilli populations and the use of psychedelic mushrooms derives from the work of the Italian ethnomycologist Giorgio Samorini. He writes of scenes at the Tin-Tazarift rock art site, dating from the Round Head period, in which mushroom-like objects are depicted in various motifs. Samorini discusses this connection in his 1992 paper in Arte Prehistorica: [23]

    - One of the most important scenes is to be found in the Tin-Tazarift rock art site, at Tassili, in which we find a series of masked figures in line and hieratically dressed or dressed as dancers surrounded by long and lively festoons of geometrical designs of different kinds... Each dancer holds a mushroom-like object in the right hand and, even more surprising, two parallel lines come out of this object to reach the central part of the head of the dancer, the area of the roots of the two horns. This double line could signify an indirect association or non-material fluid passing from the object held in the right hand and the mind. This interpretation would coincide with the mushroom interpretation if we bear in mind the universal mental value induced by hallucinogenic mushrooms and vegetables, which is often of a mystical and spiritual nature (Dobkin de Rios, 1984:194). It would seem that these lines - in themselves an ideogram that

[23] **Giorgio Samorini**, The oldest representations of hallucinogenic mushrooms in the world, *Artepreistorica.com*, December 2009 (first published in 1992)

represents something non-material in ancient art – represent the effect that the mushroom has on the human mind... In the various scenes presented, a series of figurative constants lead us to imagine an accompanying conceptual structure associated with the ethno-mycological cult described here.

- Evident examples of such constants are the two remarkable southern Tassili figures (sites: Aouanrhat and Matalem-Amazar), Both are approximately 0.8 meters tall, they wear the typical mask of this pictorial phase and a typical gait (legs bent inwards and arms bent downwards). Another common feature is the presence of mushroom symbols starting from the fore-arms and thighs; others are hand held. In the case of the Matalem-Amazar figure, these objects are scattered over the entire area surrounding the body.

Matalem-Amazar Mushroom Shaman

DJM '81

Dancing figures holding mushrooms from Tin-Tazarift rock art site

43. The form which most closely corresponds to this cult-object is that of a mushroom, most probably of a psychotropic kind, the sacramental and socialized use of which is represented in gathering and offering scenes and in the expressive ritual dances, in phosphenic geometrical patterns and in Tassili visionary works.

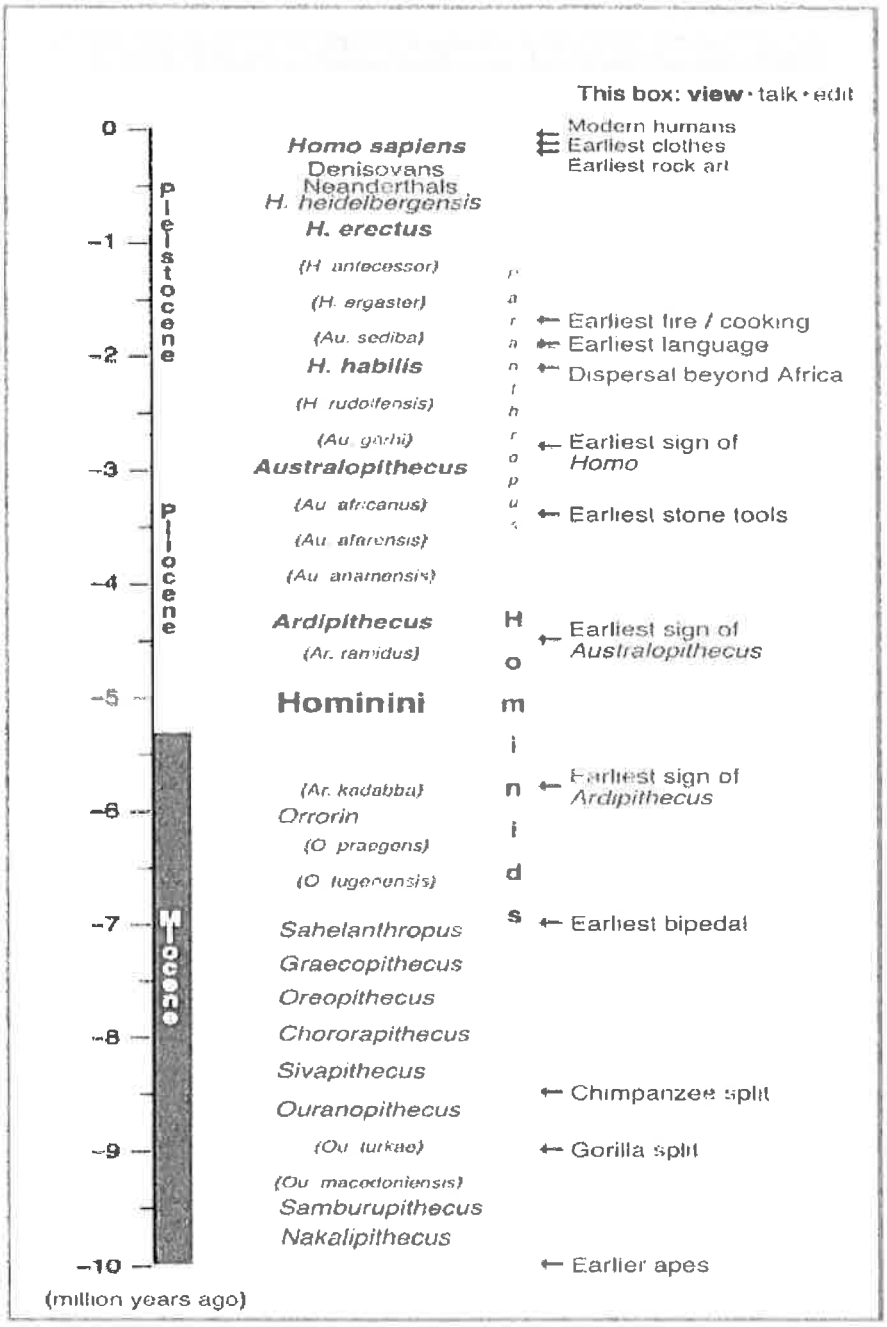
44. If the mushrooms in question are those which grow in dung, the association between these mushrooms and the rear of the figure may not be purely casual. It is known that many psychotropic mushrooms (above all, Psilocybe and Panaeolus genera) live in the dung of certain quadrupeds and in particular bovines, cervides and equines. **This specific ecological phenomenon cannot but have been taken into account with regard to the sacramental use of psychotropic mushrooms, leading to the creation of mystico-religious relations between the mushroom and the animal which produces its natural habitat (emphasis mine).** Furthermore, the dung left by herds of quadrupeds were important clues for prehistoric hunters on the lookout for game, and the deepening of such scatological knowledge probably goes back to the paleolithic period (the long period of the hunter of large game). **Thus we have a further argument in favour of the version of events that would have it that there have been mythical associations, with religious interpretations, on different occasions, between the (sacred) animal and the hallucinogenic mushroom (emphasis mine).** The sacred deer in the Mesoamerican cultures and the cow in Indian Hindu culture (the dung of which provides a habitat for

Psilocybe cubensis, a powerful hallucinogen still used today) could be interpreted in this zoo scatological manner (Wasson, 1 986:44; Furst, 1974; Samorini, 1988).

45. These archeological findings form much of the basis of Terence McKenna's speculations, in his 1992 book Food of the Gods, [24] which hypothesized that psilocybian mushrooms may have had a role in emergence of consciousness, self-reflection, and religious sensibilities in early humans, possibly dating significantly earlier than the early Holocene epoch which began about 12,000 years ago following the last glacial retreat. The preceding epoch, the Pleistocene, lasted from about 3 million years ago (MYA) to the beginning of the Holocene, and represents the most important period in the evolution of the human species. During the early Pleistocene, starting about 2.7 MYA, the major lineages of the genus Homo split off from their ancestors (the Australopithecines), with Homo habilis appearing at about 2.1 MYA and H. erectus appearing at about 0.8 MYA. Image: https://en.wikipedia.org/wiki/Template:Human_timeline

46. The immediate precursors to 'modern' humans, H. neanderthalensis, and the closely related Denisovans, are our nearest ancestors; H. sapiens, modern humans, did not appear in the fossil record until about 300,000 years ago. These species were essentially 'neurologically modern'; their cranial capacity was about 1500 cubic centimeters, and presumably this reflects a corresponding complexity in neural architecture (synaptic density and connectivity). This resulted from what might be termed an 'explosive' increase in brain size and neural complexity over a 'mere' 2 million years; the cranial size of the earliest hominins, Homo habilis, was ⅓ the size, approximately 500 cubic centimeters. In evolutionary terms, 2 million years is a blink of an eye. What could have triggered this rapid expansion?

[24] McKenna T (1992). Food of the Gods: The Search for the Original Tree of Knowledge. Bantum Books.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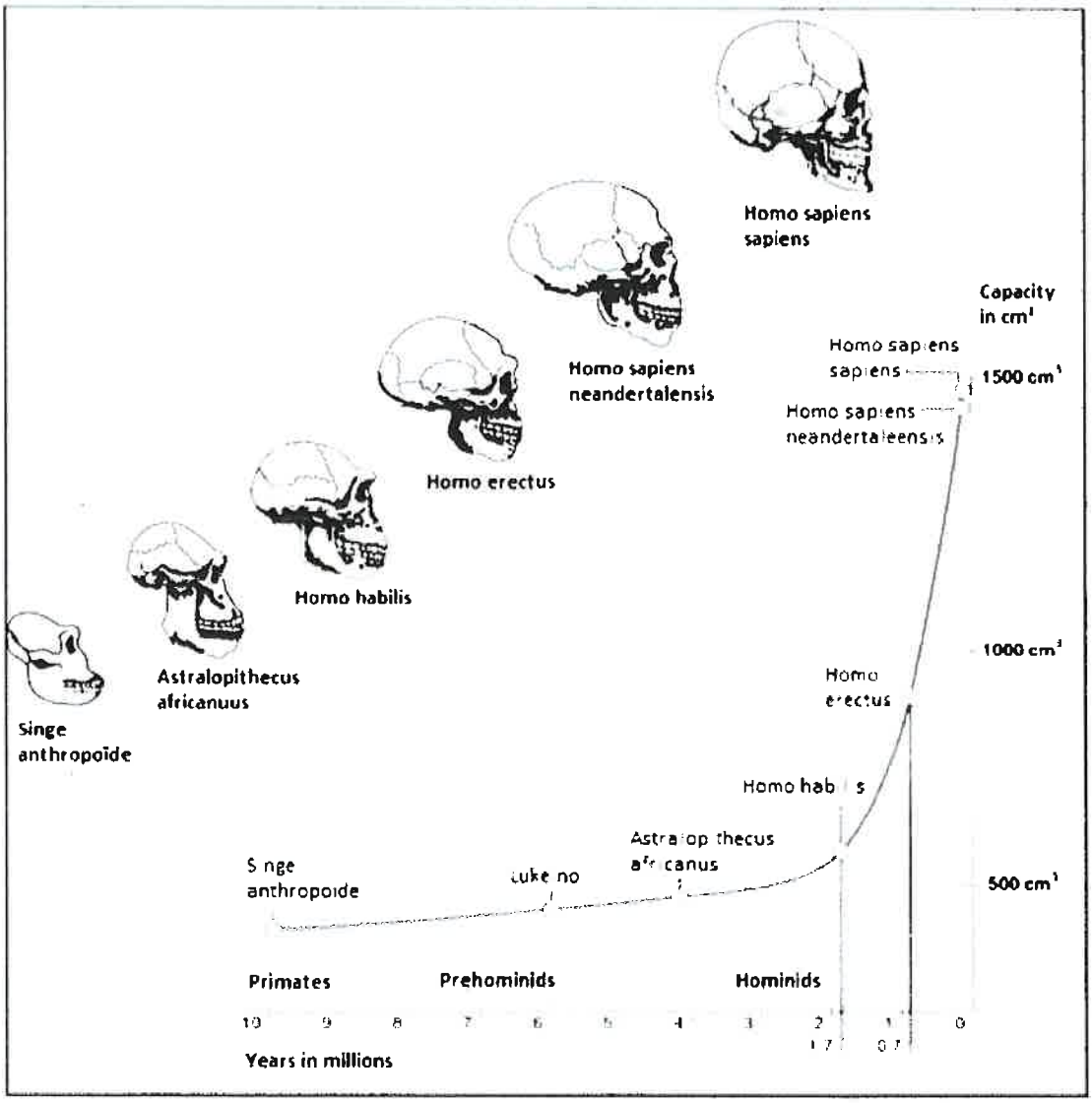
Pleistocene
Pliocene
Miocene
Homo sapiens
Denisovans
Neanderthals
H. heidelbergensis
H. erectus
(H. antecessor)
(H. ergaster)
(Au. sediba)
H. habilis
(H. rudolfensis)
(Au. garhi)
Australopithecus
(Au. africanus)
(Au. afarensis)
(Au. anamensis)
Ardipithecus
(Ar. ramidus)
Hominini
(Ar. kadabba)
Orrorin
(O. praegens)
(O. tugenensis)
Sahelanthropus
Graecopithecus
Oreopithecus
Chororapithecus
Sivapithecus
Ouranopithecus
(Ou. turkae)
(Ou. macedoniensis)
Samburupithecus
Nakalipithecus
Modern humans
Earliest clothes
Earliest rock art
Earliest fire / cooking
Earliest language
Dispersal beyond Africa
Earliest sign of Homo
Earliest stone tools
Earliest sign of Australopithecus
Earliest sign of Ardipithecus
Earliest bipedal
Chimpanzee split
Gorilla split
Earlier apes
Panhominids
Hominini
(million years ago)

Timeline of Neural evolution



47. Clearly something remarkable was going on over those two million years. The rapid increases in the size and complexity of the human brain had to reflect adaptive responses to numerous environmental variables: climate change, migratory patterns, transition from arboreal to savannah environments, dietary adaptations as new food sources became available (due in part to the application of fire and the invention of cooking), probably also competition between hominid tribes; all of these factors had to have influenced the development of the brain over these million year time spans. During this period, hominids

developed the controlled use of fire, which had an immense impact on hominids' expansion into new territories and access to novel and more nutritionally rich sources of food. During this period, hominids developed language; they developed hunting technologies in the form of arrows, hand axes, and spears; Along with the emergence of language, they may also have achieved the capacity for self-reflection, and perhaps even a sense of a transcendent supernatural realm, reflected in ritual and belief systems, and other expressions of religious sensibilities.

48. Did a co-evolutionary symbiosis with psilocybian mushrooms, spanning hundreds of thousands of years, play some role in this rapid neural evolution? I believe it's possible to make reasonable inferences that it may have. Of course, a hypothesis such as this can never be definitively proven; but a circumstantial case can be made. Here's what we know:

    - Archaeological evidence from the Tassili n'Ajjer rock art site in the Northeastern Sahara shows that there were highly sophisticated cultures inhabiting the area at least since the end of the Ice Age 13,000 years ago, and probably much earlier. 1988).

    - These cultures had religious sensibilities reflected in ritualistic practices. Abundant iconic evidence depicting mushrooms, or mushroom-like objects, being utilized in ritual contexts strongly suggests that mushrooms were used in these rituals.

    - The rock art also depicts large animals, such as cattle, sheep, goats and dogs, which demonstrate that inhabitants practiced a form of animal husbandry. They undoubtedly depended on these animals for food, and probably also other resources such as clothing. Psilocybian species, particularly Psilocybe cubensis and Panaeolus species, grow on the dung of ungulates, so there is a high probability that these mushrooms were present in the environment. If present, they would surely have been consumed. Species such as Psilocybe cubensis are large, robust, and brightly colored; they would not be overlooked.

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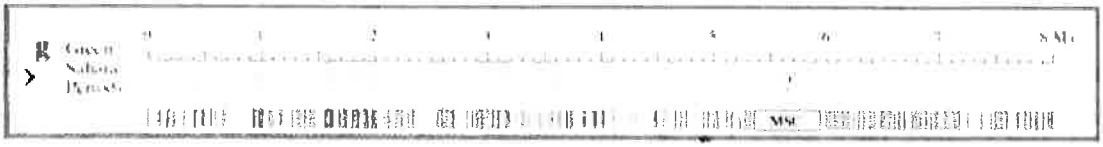
- Similar ecological situations exist even to this day. P. cubensis is pan-tropical. It can be found in almost any pasture where cattle are present during the rainy season in the warm, wet tropics.

- Paleoclimatological evidence indicates that the Northern Saharan Tassili cultures flourished during the most recent of the periodic African Humid Periods (AHP). These cycles show periodic occurrences of more humid, semitropical conditions alternating with arid periods ranging from the present time to more than 8 MYA. These cyclical occurrences were related to solar precessional cycles. The region was characterized by alternating periods of humid climates, abundant vegetation and wide distribution of deep water lakes and shallower alkaline lakes and drier more arid periods in which the environment was more savanna-like. [25]



- Paleoanthropological evidence, in the form of fossils, demonstrates that hominids emerged in the regions starting about 2.8 MYA, while fossil evidence also indicates that ungulate species occurred in the same region over approximately the same time span. Fossil finds of the likely ancestors of modern cattle are scarce, but they do exist. The ancestral species, known as Aurochs, were part of the Pleistocene mega-fauna that largely became extinct following the end of the last glacial period. The oldest fossil evidence for the aurochs in Africa, Bos primigenius, was found in a middle Pleistocene strata in Tunisia dated to 0.78 MYA. Aurochs are known to have been widely distributed throughout Northern

[25] C. Larrasoaña, Juan; P. Roberts, Andrew; J. Rohling, Eelco (2015). Saharan climate and hominin occupation 8 Ma to present. PLOS ONE. Figure. https://doi.org/10.1371/journal.pone.0076514.g005

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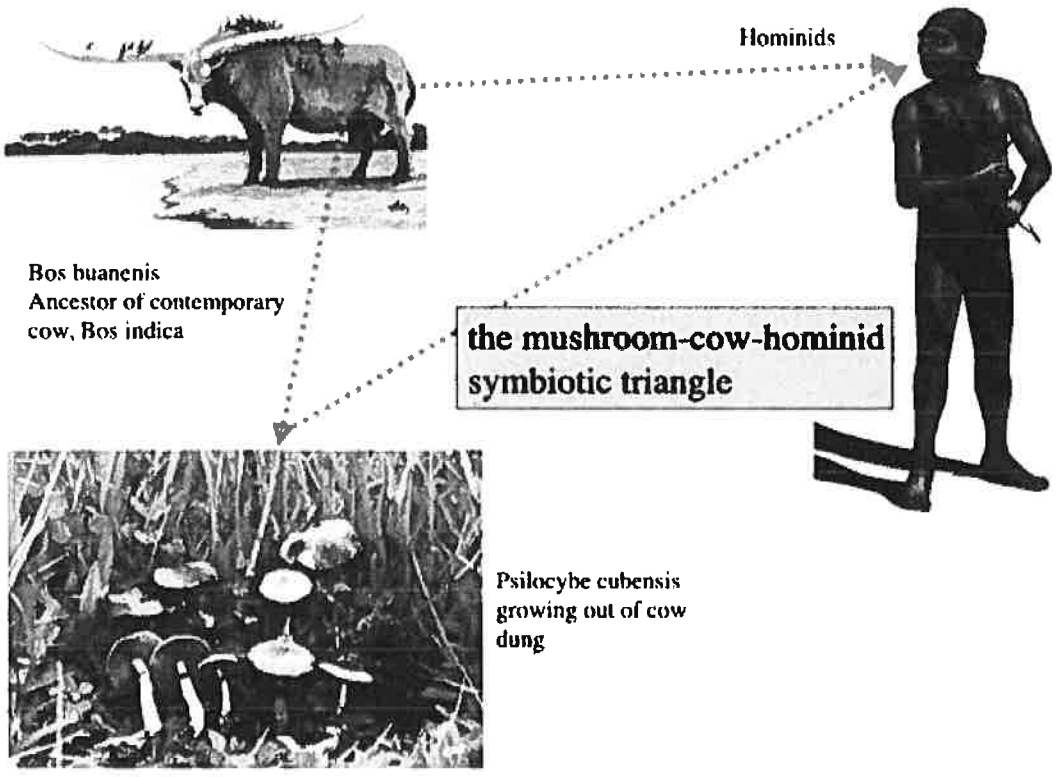
Africa and throughout Europe to the proto-Caspian steppes, Siberia and west to Finland. [26]

- So, the evidence, while not definitive, is compelling. All the components of the 'symbiotic triangle' were present in the Pleistocene from about 2 MYA ago: Cattle and dung, hominids, and mushrooms.

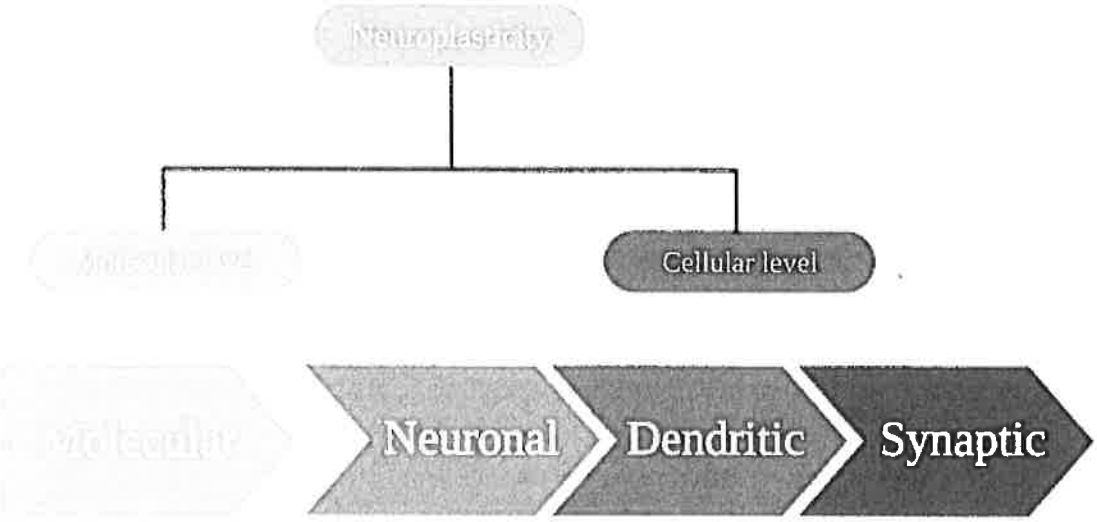


49. Granting, for the moment, that this symbiotic relationship existed in the humid, Northern Saharan lake-country since the early Pleistocene, 2.8 MYA, and that these foraging, hungry hominids, always on the lookout for a delicious meal, were regularly consuming psilocybian mushrooms, what might have been the impact on human neural evolution, this remarkable 'explosion' in the size and complexity of the human brain that took place over this period? For a possible answer to this question, we have to turn to neuroscience.

[26] C. Larrasoaña, Juan; P. Roberts, Andrew; J. Rohling, Eelco (2015). Saharan climate and hominin occupation 8 Ma to present.. PLOS ONE. Figure. https://doi.org/10.1371/journal.pone.0076514.g005

- Psilocybin and other classical psychedelics stimulate neuroplasticity. An accumulating body of evidence is emerging that indicates that the therapeutic benefits of psychedelics are not limited to their experiential effects. They also modulate brain processes that can have long-term benefits in terms of reorganizing neural architecture and connectivity. Psychedelics can initiate changes at the molecular level that are expressed at the cellular level. These include neuronal changes, such as neurogenesis (the proliferation, differentiation, survival, and maturation of neurons), dendritogenesis (changes in dendritic spine morphology and dendritic spine density), and synaptogenesis (changes in synaptic functions related to learning and memory, either decreasing long term potentiation (LTD) or potentiating it (LTP). Synaptic plasticity alters the neuron's structure and functional properties, and is primarily regulated by BDNF, brain-derived neurotrophic growth factor. [27]

[27] de Vos CMH, Mason NL, Kuypers KPC. Psychedelics and Neuroplasticity: A Systematic Review Unraveling the Biological Underpinnings of Psychedelics. Front Psychiatry. 2021 Sep 10;12:724606



	Neurogenesis	Dendritogenesis	Synaptogenesis
Signaling pathways Gene transcription Protein synthesis	Proliferation Differentiation Survival Migration Maturation	Dendritic spine morphology Dendritic spine density	LTP LTD
	Structural plasticity	*Structural plasticity*	*Functional plasticity*

50. Interestingly, these long term neuroplastic changes (stimulation of neurogenesis, increases in dendritic density, and increases in synaptic connectivity and modulation of learning/memory related functions) correspond rather closely to the types of neuroplastic changes that must have occurred in the evolution of the hominid brain over millennial time spans. Could it have been due to regular dietary exposure to psilocybian mushrooms in the diet of foraging hominids? The possibility cannot be dismissed out of hand.

- Another mechanism, not known to science when Food of the Gods was published in 1992, has attracted much attention lately and may provide an explanation of how these neural structures could have been incorporated into the human genome over millennia. This is **epigenetics**, the modulation of gene expression independently of changes to the genome. These changes can be both heritable and multigenerational, and thus is a second key mechanism that explains the

persistence of neuroplastic adaptations in hominid populations over millennial timespans.

- Epigenetics (also sometimes called epigenomics) is a field of study focused on changes in DNA that do not involve alterations to the underlying sequence. The DNA letters and the proteins that interact with DNA can have chemical modifications that change the degrees to which genes are turned on and off. Certain epigenetic modifications may be passed on from parent cell to daughter cell during cell division or from one generation to the next. The collection of all epigenetic changes in a genome is called an epigenome. [28]

- The term also refers to the changes themselves: functionally relevant changes to the genome that do not involve a change in the nucleotide sequence. Examples of mechanisms that produce such changes are DNA methylation and histone modification, each of which alters how genes are expressed without altering the underlying DNA sequence. Gene expression can be controlled through the action of repressor proteins that attach to silencer regions of the DNA. These epigenetic changes may last through cell divisions for the duration of the cell's life, and **may also last for multiple generations, even though they do not involve changes in the underlying DNA sequence of the organism; (emphasis mine).** [1] instead, non-genetic factors cause the organism's genes to behave (or "express themselves") differently. [29]

51. These two key mechanisms: long-term neuroplasticity, leading to the complexification of the neural architecture, and epigenetics, which explains how these phenotypic changes could be propagated across multiple generations, together provide a plausible, or more than likely, explanation for how the symbiotic co-evolution of the human species with their mushroom allies engendered the emergence of consciousness and the origins of the imagination.

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[28] https://www.genome.gov/genetics-glossary/Epigenetics
[29] https://en.wikipedia.org/wiki/Epigenetics

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52. Psilocybin and psilocin are ancient molecules. Recently published investigations utilizing molecular dating[30] suggest that the psilocybin biosynthetic cluster arose in the Basidiomycetes around 67 MYA (interestingly, concurrent with the K-Pg mass extinction event) and became diversified around 56 MYA. This was long before there were complex mammalian nervous systems long before there were neuroscientists or therapists to puzzle over its potential uses. It seems most likely that it evolved as a molecular mediator in fungal/insect interactions, but this can never be known for sure.[31]

53. At any rate, psilocybin may have played a significant role in helping humans evolve into the 'problematic primates' that we are.

54. Are there poisonous mushrooms in Canada and is it safe for individuals uniformed about psilocybin mushrooms to pick, for human consumption, psilocybin mushrooms in the wild?

55. There are poisonous mushrooms in Canada and individuals uninformed about psilocybin should not pick and consume mushrooms they pick in the wild.

30

31 Bradshaw AJ, Ramírez-Cruz V, Awan AR, Furci G, Guzmán-Dávalos L, Dentinger BTM. Phylogenomics of the psychoactive mushroom genus *Psilocybe* and evolution of the psilocybin biosynthetic gene cluster. Proc Natl Acad Sci U S A. 2024 Jan 16;121(3):e2311245121

Do psilocybin mushrooms in Canada vary in strength?

56. Yes. There is a great deal of variation in psilocybin content, even within the same species. It depends on numerous factors including the stage of development and the substrate they are growing on. Psilocybe cubensis, the most frequently cultivated mushroom is around 0.63 % or less psilocybin. More potent species, such as P. cyanescens, are around 0.85%. Other species, e.g. Paneolus cyanescens, can contain as much as 5% psilocybin.

Sworn remotely via video conference)

by Dennis McKenna in the city of)

Abbotsford, BC and the commissioner)

Joanna Shaw in the City of Toronto, ON)

this 29th day of April 2024.)

Dennis J. McKenna

Dennis McKenna

Commissioner for taking affidavits

Joanna Shaw

JOANNA KATHLEEN SHAW,
a Commissioner, etc., Province of Ontario,
for LEWIN & SAGARA LLP,
BARRISTERS AND SOLICITORS.
Expires October 16, 2026.

DJM

This is Exhibit ....A..... referred to in the
affidavit of ...Dennis McKenna.....
sworn before me, this ...29th.....
day of .....April..... 2024....

.....
A Commissioner, etc

Sworn remotely by Dennis McKenna in the city of Abbotsford, British Columbia with commissioner Joanna Shaw in the city of Toronto, Ontario.

JOANNA KATHLEEN SHAW,
a Commissioner, etc., Province of Ontario,
for LEWIN & SAGARA LLP,
BARRISTERS AND SOLICITORS.
Expires October 16, 2026.

DJM

CURRICULUM VITAE

Updated: April 26, 2024

Dennis J(on) McKenna, Ph.D.

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Abbotsford, B.C. V2S 7E9
CANADA
email: djmckenna@mac.com

Academic Address:
Assistant Professor and Research Associate
Center for Spirituality and Healing
Academic Health Center MMC 505
University of Minnesota
420 Delaware St. Minneapolis MN 55455
NOTE: I retired from teaching at the Center for Spirituality and Healing in 2017. Inquiries should be directed to the email address above.

Education:

Ph.D., University of British Columbia, 1979-1984.
Botanical Sciences with emphasis on biochemistry and pharmacognosy.
M.Sc., University of Hawaii, 1976-1979.
Degree in Botany with emphasis on biochemistry.
B. A., University of Colorado, 1969-1973.
Distributed studies in Biology (major), Anthropology, Philosophy of Science (minors)

Fellowships:

1986-1988
PRAT (Pharmacology Research Associate Traineeship) fellowship, National Institute of Mental Health
1981-1983
University of British Columbia Graduate Fellowship
1979-81
University of British Columbia Graduate Fellowship

Research Support:

6/01/2010 – 6/01/2013
Botanical Dimensions/UNAP Digital Herbarium project
Three-year grant from Promega Corporation to Botanical Dimensions (a non-profit 501 C3 education and research organization) ($100,000 per year, initiated June 2010). A three-year project to scan and digitize the 100,000+ specimens in the AMAZ Herbarium at the Universidada Nacional de la Amazonia Peruana (UNAP) in Iquitos Peru. Role: secured funding for the project and collaborated as co-PI with the Project Director of Botanical Dimensions, and Juan Ruiz Macedo, Curator of the AMAZ Herbarium.

8/1/04 – 6/30/09
Stanley Medical Research Institute – SMRI ID number 04T-505
Application of Ethnopharmacology and receptor binding technologies in the identification of novel natural products for the treatment of cognitive deficits in schizophrenia
Total budget: $454,216.00. This grant provides part-time support for the PI and co-investigators over three years, to support the collection, screening, and bioassay-directed fractionation of Amazonian ethnomedical plants potentially useful in the treatment of schizophrenia.
Role: Principle Investigator (0.60 FTE Year 1-3)

12/01/06-11/30/07
Michael Smith Foundation for Health Research – Team Planning Grant
This grant supports strategic planning for the formation of a neurobiology research team in Natural Health Products.
Role: Team Leader

9/28/2000-7/31/2005
NIH R25 99
CAM Curriculum Project
This R-25 grant supports CAM curricular integration within the schools of Medicine, Nursing and Pharmacy at the University of Minnesota.
Role: Consultant

9/1/2002-8/31/2004
NIH – NCCAM R21
CUFS number. 1697-649-6042
The Effect of Mushroom Extracts on Prostate Cancer
This grant supports the investigation of a standardized extract of a medicinal mushroom, Ganoderma lucidum, on the expression of matrix metalloproteinases in androgen-resistant and chemo-resistant prostate cell lines, and in tumor-bearing athymic nude mice infected with the cell lines
Role: Co-investigator (0.05 FTE)

9/30/04 – 8/31/07
NIH-NCCAM Center Grant
CUFs number U19-AT-001998-01A1
Trametes versicolor induced immunopotentiation
Total budget: $2,294,806. This grant provides part-time support for the PI and co-investigators over three years, to support pre-clinical and clinical investigations of the immune-potentiating properties of Trametes versicolor, a medicinal mushroom used in Chinese Traditional Medicine
Role: Co-Investigator (0.25 FTE Year 1-3)

1/1/2002-7/1/2002
University of Minnesota Task Force on Civic Engagement
Hmong Medicinal Herbs: Identification, Traditional Use and Known Pharmacologic Properties
This study, in partnership with the Bell Museum of Natural History, will define the Latin binomial for 140 plant species currently grown and used by the Hmong community in Minnesota. Traditional uses will be described. Known pharmacologic properties will be defined and potential pharmaceutical drug interactions described.
Role: Co-investigator (0.014 FTE)

1993-1999
Hoasca Project, an interdisciplinary biomedical/psychiatric investigation of the human psychopharmacology and psychodynamics of Hoasca, a psychoactive tea used in a ritual context by a Brasilian religious group, the União do Vegetal. The study was a collaborative interdisciplinary investigation between American and Brasilian pharmacologists, psychiatrists, and physicians. Support was obtained through Botanical Dimensions and the Heffter Research Institute, non-profit 501 (c) 3 research organizations.
Role: co-investigator

Professional Employment Experience:

September 2006 – July 2008
Senior Research Scientist
Natural Health Products Research Group
Technology Centre
British Columbia Institute of Technology
Burnaby, BC Canada
(note: visiting faculty member)

January 2000 – September 2006; September 2008-2017

Research Associate and Senior Lecturer
Center for Spirituality & Healing
Academic Health Center
University of Minnesota
(note: I returned to the Academic Health Center in September 2008)

Courses taught:

CSpH 5401: People, Plants and Drugs: An Introduction to Ethnopharmacology (Fall Semester)
CSpH 5421: Botanical Medicines in Complementary Health Care (Fall Semester)
CSpH 5000 sec 001: Culture, Drugs and Society (Spring Semester)
CSpH 5405: Plants in Human Affairs (co-taught with Kathleen Harrison). Kohala Center and University of Minnesota in Hawaii, January Intersessions.

Albany College of Pharmacy and Health Sciences June/July 2012,

Ethnopharmacognosy in the Amazon (co-taught with Kathleen Harrison and Dr. William Milllington, Professor of Pharmacy at Albany College of Pharmacy and Health Sciences). Three week 'intensive' field course for 18 graduate pharmacy students. Iquitos, Peru.

University of Missouri KC Pharmacy program - July 2010, 2011

Ethnopharmacognosy in the Amazon (co-taught with Kathleen Harrison and Dr. Frank Caliguiri, Professor of Pharmacy at UMKC). Three week 'intensive' field course for 14 graduate pharmacy students. Iquitos, Peru.

July 2008 & June & July 2009 Arizona State University Field Studies Program –

Ethnobotany in the Amazon (co-taught with Kathleen Harrison). Six week 'intensive' field course in Ecuador.

August 2004 – August 2006

Adjunct Associate Professor, Dept. of Clinical and Experimental Pharmacology, College of Pharmacy, University of Minnesota

October 1998 - Present

Founder and Executive Director, Institute for Natural Products Research.

January 1997 - Present

Independent Research Consultant to Phytomedicine and Nutraceutical Industry. Clients have included Affymax, Pharmanex, Inc., NuSkin, Inc., Nutraceutix, Inc., Intelligent Nutrients, Inc., Ancile Pharmaceuticals, Shaklee, Inc., Nutritional Labs International, Inc., US Nutraceuticals Inc., Primal Essence Inc. and others.

May 1995 – June 1998

Director of Natural Products Research, Nutraceutix, Inc., Redmond, WA
development and oversight of Natural Products research and development program for human nutritional, medical, cosmetic, and pharmaceutical applications.

January 1993-May 1995

Senior Research Pharmacognosist, Aveda Corporation, Minneapolis, MN
Development of pharmacognosy research program for novel herbal, nutritional, and cosmetic products.

February 1990-January 1993

Director of Ethnopharmacology, Shaman Pharmaceuticals, Inc., So. San Francisco, CA.
Development and supervision of screening program for plants of ethnopharmacological interest.

June 1988-February 1990

Postdoctoral Research Associate, Department of Neurology, Stanford University Medical Center, Stanford, CA.
Molecular pharmacology of serotonin receptors

September 1989 - February 1990

Consultant, Ethnopharmacology and Molecular Pharmacology, Shaman Pharmaceutical Co., San Carlos, CA.

July 1989 - February 1990

Consultant, Molecular Pharmacology and Autoradiography, Research Medicine Group, Lawrence Berkeley Laboratory, Berkeley, CA.

August 1988 - November 1989

Consultant, Natural Products and Ethnopharmacology, Affymax Research Institute, Palo Alto, CA.

June 1986-June 1988

P.R.A.T. (Pharmacology Research Associate Trainee) Fellow, Section on Clinical Pharmacology, National Institute of Mental Health, Bethesda, MD.
Quantitative autoradiography of neuroreceptors

July 1984-April 1986

Postdoctoral Research Associate, Helicon Foundation, San Diego, CA.
Mutagenic/antimutagenic effects of selenium in yeast.

September 1976-June 1979

Research Assistant, Department of Botany, University of Hawaii.
Chemotaxonomy of Hawaiian Acacia spp.

Scientific & Honorary Societies:

Phi Beta Kappa, University of Colorado, 1973
American Society of Pharmacognosy, 1983-present
Society for Economic Botany, 1985-present
Society for Neuroscience, 1988-1994.
Fellow, Linnean Society of London, 1990-present

Professional Activities:

June 2017

Conference Organizer & Chairman: Ethnopharmacologic Search for Psychoactive Drugs, 50th Anniversary Symposium, presented at Tyringham Hall, UK and live-streamed on Facebook. A collector's edition Symposium Volume has been published by Synergetic Press.

April 2010

Invited speaker, Biopharmaceutical Technology Center Institute, 9th Annual Bioethics Forum: Taking the Measure of the Magic Mirror: Toward a Science of Consciousness. Topic: The Impact of Entheogens on Human History, Culture, and Evolution. Madison, WI.

March 2010

Invited speaker, Albany College of Pharmacy and Health Sciences, Albany, NY. Topic: Biodiversity and Drug Discovery.

July 2008

Invited speaker, symposium on Amazonian biodiversity and drug discovery, Faculdade de Bioquimica y Farmacía, Universidade Nacional de la Amazonía Peruana (UNAP), Iquitos, Peru.

July 2008

Invited speaker, Convergence Conference, Espiritu de Anaconda Retreat Center, Iquitos, Peru.

July 2008

Invited keynote speaker, 4th International Conference on Shamanism, Iquitos, Peru.

June 2008

Invited instructor, Ethnobotany Intensive Workshop, Arizona State University Andes and Amazon Field Studies Program, Tena, Ecuador.

May 2008

Invited speaker (via teleconference) UDV Biomedical Conference, Brasilia, Brasil. Topic: The Hoasca Project: Past and Future"

March 2008

Invited Speaker, World Psychedelic Forum, Basel, Switzerland. Topics: "Healing Journey: Psychedelics in Neuroscience and Medicine" and "Bitter Brews and Other Abominations: The Potential Uses of Some Little-Known Psychoactive Drugs."

December 2007

Invited Keynote Speaker, Entheogenesis Australis Conference, Melbourne, Australia. Topics: "Neuroscience & Spirituality" and "Plant/Human Co-evolution"

Invited Speaker, Phoenix Institute, Melbourne, Australia. Topic: "Psychedelics as Medicine"

May, 2007

Session co-chair, Symposium on Natural Health Products in Neurobiology and Mental Health. Annual Conference Natural Health Products Research Society of Canada: Tradition to Technology. Saskatoon, Saskatchewan.

July, 2006

DJM

Invited Speaker, 2nd International Conference on Shamanism, Iquitos, Peru. Topic: "Neuroscience & Spirituality." and "Ethnopharmacology Meets the Receptorome: Bioprospecting for Psychotherapeutic Drugs in the Amazon Rainforest"

February-March 2006

Phase II of collection fieldwork in Peruvian Amazon in connection with SMRI grant to investigate Amazonian medicinal plants for potential treatment of schizophrenia.

January 12, 2006

Invited Speaker, Kohala Center Public Lecture: The Truth About Herbs: Who Gets it Right? Keauhou Beach Resort, Kona.

July, 2005

Invited Speaker, 1st International Conference on Shamanism, Iquitos, Peru. Topic:
"Ayahuasca & Human Destiny." and "Dimethyltryptamine & its Place in Nature."

January 6, 2005

Invited Speaker, Kohala Center Public Lecture: Botanicals to Treat Mental Illness: Bioprospecting for Psychotherapeutic Drugs in the Amazon Rainforest. Keauhou Beach Resort, Kona.

November-December, 2004

Conducted field work in Peruvian Amazon in connection with SMRI grant to investigate Amazonian medicinal plants for potential treatment of schizophrenia.

May, 2004

Invited speaker, Altered States and Spiritual Awakening Conference, San Francisco, CA. Topic: Neuroscience and Spiritualtiy.

January 8, 2004

Invited Speaker, Kohala Center Public Lecture: Medicinal Crops: Challenges and Opportunities for Hawaiian Agriculture. Keauhou Beach Resort, Kona. **June 2003**

Inviteded appointment to Basic Science Application review committee to review grants submitted to NCCAM pertinent to botanical medicines, ethnobotany, and ethnopharmacology

November, 2002

Invited Speaker, International Conference on Globalization of Oriental Medicine. Kyongsan University, Daegu, S. Korea. Topic: "Regulation of Botanical Medicines and Dietary Supplements in the U.S."

December, 2002

Invited speaker, Center for Plants and Human Health, University of Minnesota. Topic: "An overview of botanical medicines: quality, Safety, and Efficacy"

January, 2001

Appointed to Editorial Advisory Board, Journal of Cannabis Therapeutics

December 2001 – November 2007.

Served as Editor in Chief, Haworth Herbal Press. Position terminated when Haworth Press was sold to another company, Taylor and Francis.

May 2001
Invited speaker, "The Hoasca Study: Potential Application of an Amazonian Hallucinogen for the Treatment of Alcoholism and Substance Abuse". Lunchtime seminar, Center for Addition and Alternative Medicine Research (CAAMR), Hennepin County Medical Center, Minneapolis, MN
March, 2000
Invited speaker, "The UDV-Hoasca Biomedical Research Project: A Personal History," International Conference on Ayahausca, Shamanism, Science and Spirituality, sponsored by the California Institute of Integral Studies, San Francisco, CA.
April, 1999
Invited speaker, "Dimethytryptamine and Its Place in Nature," International Conference on Science and Consciousness, Santa Fe, New Mexico.
November, 1998
Invited speaker, "Ethnobotany and the Search for New Psychotherapeutic Drugs," Annual "Friends of Warner Nature Center" Lecture Series. Warner Nature Center, Marine on St. Croix, MN.
October, 1998
Founded the Institute for Natural Products Research. INPR is a non-profit organization dedicated to education and research in the field of botanical medicines and natural products.
June, 1998
Invited speaker, "Kava: An Ancient Herbal Beverage, A Modern Natural Anxiolytic" Symposium on Herbal Medicines in Psychiatry, American Psychiatric Association Annual Meeting, Toronto, Canada.
August, 1997
Invited speaker, "Psychedelics in the New Millenium," Association for Transpersonal Psychology Satellite Symposium, Asilomar, California
1996
Appointed to Editorial Advisory Board of Herbalgram, quarterly publication of American Botanical Council, a non-profit educational organization
1995
Member of Review Committee, American Herbal Pharmacopoeia
August, 1994
Invited speaker, "Hallucinogenic Plants: Springboards for Psychotherapeutic Drug Discovery," Symposium on Clinical and Pre-clinical Studies of Hallucinogens, 3rd IUPHAR Satellite Meeting on Serotonin, Chicago, Ill.
August, 1993
Appointed to Editorial Advisory Board of Phytomedicine, International Journal of Phytotherapy and Phytopharmacology
September, 1993
Founding Board Member and Vice-president, Heffter Research Institute. The Heffter Research Institute is a non-profit organization founded by a group of physicians, pharmacologists, and psychiatrists to foster the scientific study of psychedelic/hallucinogenic substances and their potential therapeutic applications. (see www.heffter.org)

DJM

June-July 1993
Co-Investigator on the Hoasca Project, an interdisciplinary biomedical/psychiatric investigation of the human psychopharmacology and psychodynamics of Hoasca, a psychoactive tea used in a ritual context by the União do Vegetal, a Brasilian religious organization. The study was a collaborative interdisciplinary investigation between American and Brasilian pharmacologists, psychiatrists, and physicians. The field study took place in Manaus, Brasil in June and July, 1993.

June-July 1993
Conducted field studies in Brasilian Amazon and other regions of Brasil as part of fact-finding trip for Aveda Corporation. Activities included collecting samples of plants used as cosmetics and medicines for in-house evaluation by Aveda's R&D department, and establishing professional liasons for future sourcing operations in Brasil.

March 1993
Invited participant, WHO Symposium on the Utilization of Medicinal Plants, sponsored by the Morris Arboretum, University of Pennsylvania

September 1992
Invited Speaker, "Plant Chemical Messengers and Human/Plant Co-evolution" Fourth Annual Seeds of Change Conference, Santa Fe, NM

April 1992
Invited Participant, "Natural Products & Psychotherapeutic Drug Discovery," NIMH Workshop, Rockville, MD.

May 1991
Invited speaker, "Biochemistry and Pharmacology of Ayahuasca," 1st Congresso em Saúde, União do Vegetal, São Paulo, Brazil

June 1991
Appointed to Editorial Advisory Board of Shaman's Drum, a journal of experiential shamanism.

May 1988
Member, Board of Directors Botanical Dimensions Foundation, Occidental, CA. Botanical Dimensions is a non-profit organization dedicated to the preservation of ethnomedically significant plants and traditional knowledge about their uses.

May 1990
Invited speaker, "New Drugs from Ancient Sources: Ethnopharmacology and Drug Discovery", American Medical Writers Association, Western Regional Conference.

May 1989
Invited speaker, "Psychedelics and the Brain", Academic Lecture Series, Department of Psychiatry and Human Behavior, University of California Irvine Medical Center.

May 1989, May 1990, May 1991
Guest lecturer, "Hallucinogens," for Psychology 174, the American Drinking and Drug Culture, Stanford University.

February 1989
Invited speaker, "Further Characterization of a high-affinity recognition site for ^{125}I-DOI, a new psychotomimetic radioligand", Lawrence Berkeley Laboratory, University of California, Berkeley.

August 1987
Invited speaker, "Characterization of Hallucinogen Receptors with Quantitative Autoradiography", Lawrence Berkeley Laboratory, University of California, Berkeley.

March 1986
Guest Lecturer, "Plants & Human Sexuality," Human Sexuality course, University of California, San Diego.

February 1986
Organized and presented a one-day conference on "Hallucinogens in Ethnomedicine" in collaboration with colleagues in the psychiatric and anthropological communities. Santa Monica, CA.

June-July 1985
Conducted further field studies in Peruvian Amazon financed by private contributions solicited through Helicon Foundation. Collected living specimens of over 150 species of plants used in Amazonian ethnomedicine. These were returned to the U.S. for propagation & study and are under cultivation at Botanical Dimensions ethnomedical plant reserve in Kona, Hawaii..

July 1985
Invited speaker, Symposium on Banisteriopsis in Amazonian Ethnomedicine, 45th International Congress of the Americanists, University of the Andes, Bogota, Colombia .

April 1984
Invited speaker, 7th Annual Ethnobiology Conference, University of Washington, Seattle, WA. Topic: Chemistry and Pharmacology of Oo-koo-he, an orally-active tryptamine hallucinogen from the Amazon.

July 1983
Invited speaker, American Society of Pharmacognosy, 24th Annual Meeting, University of Mississippi, Oxford, MI. Topic: Monamine Oxidase Inhibitors in S. American Hallucinogenic Plants. Phytochemical and Pharmacological Investigations.

January - May 1981
Conducted ethnobotanical fieldwork in Peruvian Amazon as part of dissertation research. Activities included documentation of indigenous ethnomedical practices, collection of botanical voucher specimens for identification and phytochemical investigation, and collection of live specimens for propagation.

Laboratory & Research experience:

Quantitative autoradiography and radioligand binding techniques. Use of receptor screening methodologies for high-throughput screening of natural products. Characterization of natural products in extracts of plants and other organisms using chromatography and spectroscopic methodologies. Evaluation of biological activities of natural products and drugs using in vitro and in vivo bioassays.

Publications:

Peer-reviewed scientific articles and reviews:
(Roughly sorted with most recent first)

Dennis McKenna and Jordi Riba 2018. "New World Tryptamine Hallucinogens and the Neuroscience of Ayahuasca." IN: Adam L. Halberstadt, Franz X. Vollenweider, David E. Nichols (Eds.). Behavioral Neurobiology of Psychedelic Drugs. Springer Nature.

Coe MA, McKenna DJ. 2017. Therapeutic Potential of Ayahuasca. Chapter 7 IN: Evidence-based herbal and nutritional treatments for anxiety disorders. David A. Camfield, Erica McIntyre, Jerome Sarris (Eds). Springer Publishing Co.

Frecksa E, Szabo A, Winkelman MJ, Luna LE, McKenna DJ. 2013. A possibly sigma-1 receptor mediated role of dimethyltryptamine in tissue protection, regeneration and immunity. Journal of Neurotransmission. 26 April 2013 (epub ahead of print)

Anderson BT, Labate BC, Meyer M, Tupper KW, Barbosa Paulo CR, Grob CS, Dawson A, McKenna D. 2012. Editorial: "Statement on Ayahuasca" *International Journal of Drug Policy*. 23:173-175.

Mishor Z, McKenna DJ, Callaway JC. 2011. "DMT and Human Consciousness." In: *Altering Consciousness: Multidisciplinary Perspectives Vol. 2: Biological and Psychological Perspectives.* Edited by Cardeña E. and Winkelman M. Praeger Publishers.

McKenna DJ, Ruiz JM, Hoye TR, Roth BR, Shoemaker AP. 2011. "Receptor screening technologies in the evaluation of Amazonian ethnomedicines with potential applications to cognitive deficits." *Journal of Ethnopharmacology*. 134:475-492.

McKenna DJ, Plotnikoff G. "Goldenseal (Hydrastis canadensis)." In: *Encyclopedia of Dietary Supplements Second Edition*. Edited by Paul M. Coates. Informa Healthcare USA.

McKenna DJ. 2007. "The Healing Vine: Ayahuasca as Medicine in the 21st Century." In: *Psychedelic Medicine: New Evidence for Hallucinogenic Substances as Treatments.* Edited by Winkleman MJ. Roberts TB. Praeger Publishers.

Donelson R, Ostroff G, McKenna D, Slaton J. 2006. "Quantitative Determination of Beta-Glucan Constituents in *Trametes Versicolor* (L.:Fries)Pilát." Poster presented at the 47th Annual Meeting of the American Society of Pharmacognosy. Crystal City, VA, August 5-9.

Callaway JC, Grob CS, Nichols DE, Shulgin A, McKenna DJ. 2006. "A demand for clarity regarding a case report on the ingestion of 5-methoxy-N,N-dimethyltryptamine (5MeO-DMT) in an ayahuasca preparation." Letter to Editor. *Journal of Analytical Toxicology*. 30:406-407.

McKenna DJ, Kingston R, Harris I. 2006. "Introduction to Botanical Medicines." Peer-reviewed online learning module offered by the Association of American Medical Colleges (AAMC). URL: http://services.aamc.org/jsp/mededportal/searchUserInfo.do Note: this URL is no longer active. Use the Alternate URL: http://www.csh.umn.edu/modules/index.html.

McKenna DJ. 2005. "Ayahuasca and Human Destiny." *Journal of Psychoactive Drugs*. 37:231-234. Special issue of JPD devoted to Ayahuasca Use in Cross-cultural Perspective.

McKenna DJ. 2004. "Clinical investigations of the therapeutic potential of Ayahuasca: Rationale and regulatory challenges." *Pharmacology and Therapeutics.* 102:111-129.

Hughes K, Jones K, McKenna DJ, Mischley L. 2004. "Co-enzyme Q10 and cardiovascular health." *Alternative Therapies in Health and Medicine.* 10:22-30.

McKenna DJ. 2003. "Kava in the treatment of anxiety." *Natural Pharmacy* .7:16-17.

McKenna DJ, Hughes K, Jones K. 2002. "Astragalus" *Alternative Therapies in Health and Medicine.* 8:34-40.

McKenna DJ, Hughes K, Jones K. 2002. "Co-enzyme Q-10: Efficacy, Safety, and Use" *Alternative Therapies in Health and Medicine.* 8:42-55.

McKenna DJ, Hughes K, Jones K. 2001. "Efficacy, safety, and use of Ginkgo biloba in clinical and preclinical applications." *Alternative Therapies in Health and Medicine.* 7:70-86, 88-90.

McKenna DJ, Hughes K, Humphrey S, Jones K. 2001. "Black Cohosh: Efficacy, safety, and use in clinical and preclinical applications." *Alternative Therapies in Health and Medicine.* 7:93-100.

McKenna DJ, Hughes K, Jones K. 2000. "Green Tea Monograph." *Alternative Therapies in Health and Medicine.* 6:61-84.

Lebot V, Johnston E, Zheng QY, McKern D, McKenna DJ. 1999. "Morphological, Phytochemical, and Genetic Variation in Hawaiian Cultivars of 'Awa (Kava, *Piper methysticum* Forster F., Piperaceae)." *Economic Botany.* 53:407-418.

Callaway JC, McKenna DJ, Grob CS, Brito GS, Raymon LP, Poland RE, Andrade EN, Andrade EO, Mash DC. 1999 "Pharmacokinetics of Hoasca alkaloids in healthy humans." *Journal of Ethnopharmacology.* 65:243-256.

McKenna DJ, Callaway JC, Grob CS. 1999. "The scientific investigation of ayahuasca: A review of past and current research." *Heffter Review of Psychedelic Research.* 1:65-76.

Callaway JC, McKenna DJ. 1998. "Neurochemistry of psychedelic drugs." Chapter 6.6 in *Drug Abuse Handbook.* Edited by Stephen B. Karch. Boca Raton, FL: CRC Press.

Callaway JC, Raymon LP, Hearn WL, McKenna DJ, Grob CS, Brito GS, Mash DC. 1996. "Quantitation of N,N-dimethyltryptamine and harmala alkaloids in human plasma after oral dosing with Ayahuasca." *Journal of Analytical Toxicology.* 20:492-497.

McKenna, DJ. 1996. "Plant hallucinogens: Springboards for psychotherapeutic drug discovery." *Behavioural Brain Research.* 73:109-116.

Grob CS, McKenna DJ, Callaway JC, Brito GS, Neves ES, Oberlender G, Saide OL, Labigalini E, Tacla C, Miranda T, Strassman RJ, Boone KB. 1996. "Human pharmacology of hoasca, a plant hallucinogen used in ritual context in Brasil." *Journal of Nervous & Mental Disease.* 184:86-94.

Callaway JC, Airaksinen MM, McKenna DJ, Brito GS, Grob CS. 1994. "Platelet serotonin uptake sites increased in drinkers of ayahuasca." *Psychopharmacology.* 116:385-387.

McKenna DJ, Luna LE, Towers GHN. 1995. "Biodynamic constituents in Ayahuasca admixture plants: an uninvestigated folk pharmacopoeia." In: *Ethnobotany: Evolution of a Discipline.* Edited by S. von Reis and R. E. Schultes. Portland: Dioscorides Press.

Torres CM, Repke DB, Chan K, Mckenna DJ, Llagostera A, Schultes RE. 1992. "Botanical, chemical, and contextual analysis of archaeological snuff powders from San Pedro de Atacama, Northern Chile." *Current Anthropology.* 32:640-649.

Mathis CA, Gerdes JM, Enas JD, Whitney JM, Taylor SE, Zhang Y, McKenna DJ, Havlik S, Peroutka SJ. 1992. "Binding potency of paroxetine analogues for the serotonin uptake complex." *Journal of Pharmacy and Pharmacology.* 44:801-805.

McKenna DJ, Guan X-M, Shulgin AT, 1991. "3,4-methylenedioxyamphetamine (MDA) analogues exhibit differential effects on synaptosomal release of ^{3}H-dopamine and ^{3}H-5-hydroxytryptamine." *Pharmacology, Biochemistry, and Behavior.* 38:505-512.

Nicholes DE, Oberlender R, McKenna DJ. 1991. "Stereochemical Aspects of Hallucinogenesis". Chapter 1, pp. 1-39 in *Biochemistry and Physiology of Substance Abuse, Vol. III.* Edited by R. R. Watson. CRC Press, Boca Raton, FL.

McKenna DJ, Peroutka SJ, 1990. "Serotonin neurotoxins: Focus on MDMA (3,4-methylenedioxymethamphetamine, "Ecstasy")" pp. 127-148 In *Serotonin Receptor Subtypes: Basic and Clinical Aspects*, edited by S. J. Peroutka. New York: Alan R. Liss Publishers,

McKenna DJ, Repke DB, Lo L, Peroutka SJ. 1990. "Differential interactions of indolealkylamines with 5-hydroxytryptamine receptor subtypes." *Neuropharmacology.* 29:193-198

McKenna DJ, Peroutka SJ. 1990. "The neurochemistry and neurotoxicity of 3,4-methylenedioxymethamphetamine (MDMA, "Ecstasy")". *Journal of Neurochemistry.* 54:14-22.

Hekmatpanah CR, McKenna DJ, Peroutka SJ. 1989. "Reserpine does not prevent 3,4-methylenedioxymethamphetamine-induced neurotoxicity." *Neuroscience Letters.* 104:178-182.

McKenna DJ, Repke DB, Peroutka SJ. 1989. "Hallucinogenic indolealkylamines are selective for $5HT_{2A}$ binding sites." *Neuroscience Abstracts.* 15:485.

McKenna DJ, Peroutka SJ. 1989. "Differentiation of 5-hydroxytryptamine$_2$ receptor subtypes using ^{125}I-R-(-)-2,5,-dimethoxyphenylisopropylamine (^{125}I-R-(-)-DOI) and ^{3}H-ketanserin." *Journal of Neuroscience.* 9:3482-3490.

McKenna DJ, Nazarali AJ, Hoffman AJ, Nichols DE, Mathis CA, Saavedra JM. 1989. "Common receptors for hallucinogens in rat brain: a comparative autoradiographic study using [^{125}I]-LSD and [^{125}I]-DOI, a new psychotomimetic radioligand." *Brain Research.* 476:45-56.

McKenna DJ, Nazarali AJ, Himeno A, Saavedra JM. 1989. "Chronic treatment with (±)DOI, a psychotomimetic $5HT_2$ agonist, downregulates $5HT_2$ receptors in rat brain." *Neuropsychopharmacology.* 2:81-87.

Nazarali AJ, McKenna DJ, Saavedra JM. 1989. "Autoradiographic localization of $5HT_2$ receptors in rat brain using [^{125}I]-DOI, a selective psychotomimetic radioligand." *Progress in Neuropsychopharmacology and Biological Psychiatry.* 13:573-581.

McKenna DJ, Mathis CA, Peroutka SJ. 1988. "Characterization of ^{125}I-DOI binding sites in rat brain." *Neuroscience Abstracts.* 14:No. 247.12.

Himeno A, McKenna DJ, Nazarali AJ, Saavedra JM. 1988. "(±)DOI, a hallucinogenic phenylalkylamine, downregulates $5HT_2$ receptors in rat brain." *Neuroscience Abstracts.* 14:No. 229.2.

McKenna DJ, Saavedra JM. 1987. "Autoradiography of LSD and 2,5-dimethoxyphenylisopropylamine psychotomimetics demonstrates regional, specific cross-displacement in the rat brain." *European. Journal of Pharmacology.* 142:313-315.

McKenna DJ, Mathis CA, Shulgin AT, Saavedra JM. 1987. "Hallucinogens bind to common receptors in the rat forebrain: a comparative study using ^{125}I-LSD and ^{125}I-DOI, a new psychotomimetic radioligand." *Neuroscience Abstracts.* 13:No. 311.14.

McKenna DJ, Mathis CA, Shulgin AT, Sargent Thornton III, Saavedra JM. 1987. "Autoradiographic localization of binding sites for ^{125}I-(-)DOI, a new psychotomimetic radioligand, in the rat brain." *European Journal of Pharmacology.* 137:289-290.

DJM

McKenna DJ, Luna LE, Towers GHN. 1986. "Ingredientes biodinamicos en las plantas que se meszclan al ayahausca. Una farmacopea tradicional no investigada." *America Indigena.* 46:73-101. (Spanish with English abstract).

McKenna DJ, Towers GHN. 1985. "On the comparative ethnopharmacology of the Malpighiaceous and Myristicaceous hallucinogens." *Journal of Psychoactive Drugs.* 17:35-39.

McKenna DJ, Towers GHN. 1984. "Biochemistry and pharmacology of tryptamine and ß-carboline derivatives: A minireview." *Journal of Psychoactive Drugs.* 16:347-358.

McKenna DJ, Towers GHN, Abbott FS. 1984. "Monoamine oxidase inhibitors in South American hallucinogenic plants: Tryptamine and ß-carboline constituents of Ayahuasca " *Journal of Ethnopharmacology.* 10:195-223.

McKenna DJ, Towers GHN, Abbott FS, 1984. "Monoamine oxidase inhibitors in South American hallucinogenic plants Pt. II: Constituents of orally active Myristicaceous hallucinogens." *Journal of Ethnopharmacology.* 12:179-211.

McKenna DJ, Towers GHN. 1981. "Ultra-violet mediated cytotoxic activity of ß-carboline alkaloids." *Phytochemistry.* 20:1001-1004.

Books:

Dennis J. McKenna, Prof. Ghillian Prance, Wade Davis, Ben De Loenen (Eds) 2018. Ethnopharmacologic Search for Psychoactive Drugs: 50 Years of Research (1967-2017). Santa Fe: Synergetic Press.

Dennis J. McKenna . 2012. *The Brotherhood of the Screaming Abyss: My Life with Terence McKenna.* St. Cloud MN: North Star Press.

Dennis J. McKenna . 2023. *The Brotherhood of the Screaming Abyss: My Life with Terence McKenna.* (2nd Edition). Synergetic Press, Santa Fe.

Dennis J. McKenna, Kerry Hughes, Kenneth Jones, Sheila Humphrey (coauthors & editors). 2002. *Botanical Medicines: The Desk Reference for Major Herbal Supplements.* Binghamton, NY: Haworth Herbal Press.

Dennis J. McKenna, Kerry Hughes, Kenneth Jones (coauthors & editors). 2000. *Natural Dietary Supplements Pocket Reference: Pocket Reference Guide to Botanical and Dietary Supplements.* Institute for Natural Products Research (INPR).

Terence K. McKenna and Dennis J. McKenna. 1993. *The invisible landscape: Mind, hallucinogens, and the I Ching.* San Francisco: Harper San Francisco.

Terence K. McKenna and Dennis J. McKenna. 1975. *The invisible landscape: Mind, hallucinogens, and the I Ching.* New York: Seabury Press, 1st edition.

Dennis J. McKenna & Terence K. McKenna (published under pseudonyms, O.N, Oeric & O.T. Oss) (1976) Psilocybin: Magic Mushrooms Grower's Guide. And/Or Press. Berkeley.

Book Reviews Book Chapters, and & Popular Articles

Dennis J. McKenna 2021. Plants for the People: the Future of Psychedelic Therapies in the Age of Biomedicine. IN: Charles S. Grob and Jim Grigsby (Eds.) Handbook of Medical Hallucinogens. The Guilford Press, New York and London

Dennis J. McKenna. 2018. Is DMT a ChemicalMessenger from an Extraterrestrial Civilization? IN: David Luke, Rory Spoweers (Eds.) DMT Dialogues: Encounters with the Spirit Molecule. Rochester VT. Park Street Press.

Dennis J. McKenna. 2015. "Reflections in a Rear-view Mirror: Speculations on Novelty Theory and the End Times." IN: Graham Hancock (Ed.) The Divine Spark: Psychedelics, Consciousness, and the Birth of Civilization. San Francisco: Disinformation Press

Dennis J. McKenna. 1989. "It's a Jungle Out There: Biochemical Conflict and Co-operation in the Ecosphere." *Whole Earth Review* 64:40-47.

Dennis J. McKenna. 1989. "Plant Wisdom Resources." *Whole Earth Review* 64:48-49.

Dennis J. McKenna. 1992. "DMT: Nature's Ubiquitous Hallucinogen." *Interdependances* Fall 1992 issue.

Dennis J. McKenna. 1992. "Tryptamine Hallucinogens of the New World: An Ethnopharmacological Survey." *Interdependances* Fall 1992 issue.

Review: *The Healing Forest: Medicinal & Toxic Plants of the Northwest Amazonia* by R. E. Schultes & R.F. Raffauf. Reviewed in *Shaman's Drum* Spring, 1991 and *Planta Medica* 1991. 57:509

Review: *The Sacred Mushroom Seeker: Essays for R. Gordon Wasson*. Thomas J. Reidlinger, Editor. Reviewed in *Shaman's Drum* Winter 1990-91 and *Whole Earth Review* Spring 1991.

Review: *Ayahuasca Visions: The Religious Iconography of a Peruvian Shaman* by Luis Eduardo Luna & Pablo Amaringo. Reviewed in *Shaman's Drum* Spring 1992.

Review *PIHKAL: A Chemical Love Story* by Alexander T. Shulgin & Ann Shulgin. Reviewed in *Gnosis* Spring 1992.

Dennis J. McKenna. 1995. "Bitter brews and other abominations. The uses and abuses of some little-known hallucinogenic plants." *Integration, Journal of Mind-moving Plants and Culture* 5:99-104.

Dennis J. McKenna. 1999. "Ayahuasca: an ethnopharmacologic history." In: *Ayahuasca: Hallucinogens, Consciousness, and the Spirit of Nature*. Edited by R. Metzner. New York. Thunder's Mouth Press.

McKenna DJ. 2000. "An unusual experience with Hoasca: A lesson from the Teacher." In: *Ayahuasca Reader: Encounters with the Amazon's Sacred Vine* White SF and Luna LE. (editors). Santa Fe: Synergetic Press.

Dennis J. McKenna. 2006. "Mescaline: A Molecular History." *Fate Magazine* January 2006