Well Researched, Factual Information About Drugs

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Psilocybian Mushrooms*

by Jerome E. Beck and Dale V. Gordon
University of Oregon Drug Information Center

**The term "psilocybian" is used, since not all mushrooms containing psilocybin and/or psilocin belong to the Psilocybe genus.*

Among the numerous and diverse genera of fungi found in America, psilocybian mushrooms are highly valued by some individuals for their psychoactive properties. The chemical substance known as psilocybin is one of the naturally occurring hallucinogens found in over seventy-five species of mushrooms belonging to the genera *Psilocybe, Panaeolus* and *Conocybe.*[5] These mushrooms grow throughout much of the world, and at least fifteen species can be found in the Pacific Northwest alone. A heightened awareness of psilocybian habitats combined with indoor cultivation has dramatically increased the availability of the mushrooms in recent years.[11]

History

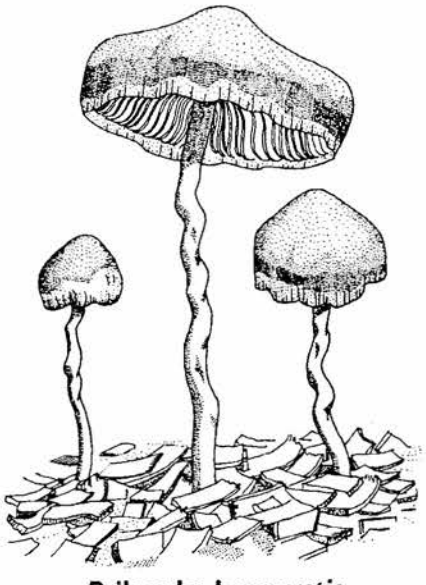
Psilocybian mushrooms have a long history of ritualistic use, particularly among the native populations of Mexico. The practice of incorporating a divine mushroom into religious ceremonies has been dated back to 1000 B.C., based on stone artifacts believed to represent mushrooms.[20] The mushroom was revered as a holy sacrament known as "teonanacatl" ("flesh of the gods") and regarded as a divine key to religious communication.

As the Spanish conquered Mexico, they attempted to abolish the use of psilocybian mushrooms, believing them to be a pagan ritual. However, use of the mushrooms continued in secret among the Native American populations. As late as 1915, it was conjectured that "magic mushrooms" were actually a myth, and that early Spanish priests had mistaken the Peyote cactus for mushrooms.[9]

It was not until 1955 that Westerners rediscovered the ancient ritual surrounding psilocybian use among the Oaxacan Indians of Mexico. R. Gordon Wasson, a renowned ethnomycologist (one who studies the cultural aspects of mushroom use), experimented with the mushrooms, which were subsequently identified as belonging to the genus *Psilocybe.*[11] A short time later, Albert Hofmann (the discoverer of LSD-25) and his colleagues at Sandoz Laboratories successfully isolated two active principles in the mushrooms, psilocybin and psilocin.[6]

Pharmacology and Physical Effects

Psilocybin (phosphorylated 4-hydroxydimethyltryptamine) is usually the major constituent found in the mushrooms. However, psilocin (4-hydroxydimethyltryptamine) is also often found in small amounts, and appears to possess about 1.4 times the strength of psilocybin. Research shows psilocybin to be relatively unstable and converted to psilocin upon ingestion by the enzyme, alkaline phosphatase. Therefore, it appears that psilocin is actually responsible for the drug effects attributed to psilocybin.[15]



Psilocybe baeocystis

Two additional tryptamine derivatives, baeocystin and norbaeocystin, have been found in at least some of the psilocybian species, most notably *Psilocybe baeocystis.* Although very similar in chemical structure to psilocybin and psilocin, research is lacking concerning the pharmacology of these substances.[8]

The precise mechanism by which psilocybin and psilocin produce their psychoactive effects is not well understood. They are classified as indole hallucinogens and possess chemical structures as well as effects similar to LSD. All of these drugs bear a close resemblence to serotonin (5-hydroxytryptamine). Serotonin is a neurotransmitter (chemical messenger) that plays a large role in the regulation of many central nervous system functions; including body temperature, sleep, sensory perception and information processing.[7]

Current theories suggest that the major actions of indole hallucinogens are mediated through stimulation of serotonin receptors in the raphe nuclei of the brain's reticular formation.[14] The reticular formation modulates incoming sensory information and outgoing motor impulses and regulates arousal and alertness in the individual. Researchers theorize that the raphe nuclei operate on a negative feedback loop whereby serotonin released during the raphe cell's firing inhibits their further activity.[1,3]

Because of their chemical similarity to serotonin, psilocin and other indole hallucinogens are suspected of mimicking the feedback effect of serotonin on raphe cells. The net effect of their action is to then decrease the modulation of sensory input and thereby increase the amount of information going to higher brain centers, including those responsible for vision and emotion.[4]

One worker in this area has compared the raphe system to a sensory filter, which limits the amount of information entering higher brain centers. The inhibition of this sensory filter would help to explain the "overwhelming" sensory experience often reported by users of these drugs.[14]

Despite the similarities between psilocin and LSD, there are also some major differences. In contrast to LSD, which hardly penetrates the brain, psilocin is distributed uniformly throughout the body. Activity in the tissues reaches a peak about half an hour after ingestion and then decreases gradually. Most of the metabolites are excreted within eight hours, although a small amount may still be present a week later.[16]

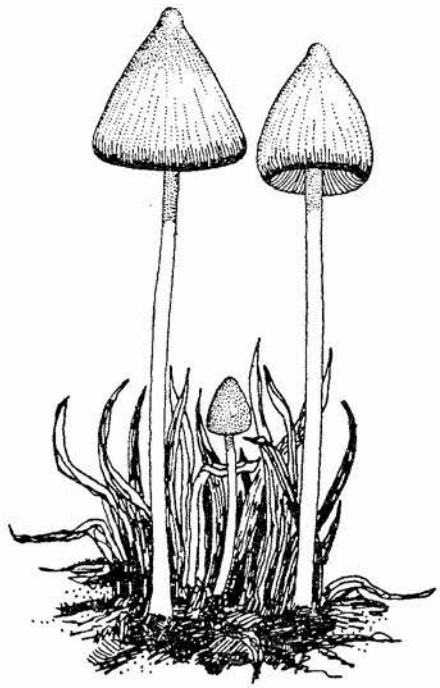
Pollock (1976), noted that "Hallucinogenic substances would reasonably be expected to have multiple sites and mechanisms of action."[13] Though its effect on serotonin appears to be the primary action of psilocin, research has shown other mechanisms to be important as well. Activation of the sympathetic nervous system explains such effects as pupil enlargement, as well as slight increases in body temperature, pulse rate and blood pressure.[15]

As with LSD, there are surprisingly few significant physiological effects from psilocybian use. In addition to the responses mentioned above, dryness of mouth and a prominent tendency towards laughter have also been noted. During the initial stages of the experience, individuals often report stomach queasiness, muscular weakness, frequent yawning and drowsiness.[16]

The toxicity of psilocybin is extremely low in comparison to the effective dose. Large doses have produced only slight decreases in respiration and heart efficiency. The LD_{50} (lethal dose for 50% of the subjects tested) for mice has been shown to be 280mg./kg. (milligrams of drug per kilogram of body weight).[15] This is over 2000 times the normally effective dose.

The only known human death associated with psilocybian use occurred in Oregon where a small child died after consuming a large quantity of *Psilocybe baeocystis* in combination with other unidentified mushrooms.[11] It is thought that children may be overly sensitive to the temperature increases induced by psilocybian mushrooms.[10]

Research has not demonstrated physical dependence with psilocybian use, although tolerance to the drug's effects develops rapidly when used continuously over a short period of time. In addition, psilocybin displays a cross-tolerance with LSD and mescaline.[15] This means that tolerance to any of these drugs will result in a lessened response to the others. Very limited research has demonstrated no apparent physiolgoical damage from the use of either psilocybin or psilocin.[4,12]



Psilocybe semilanceata

Psychological Effects

The most notable action of the psilocybian mushrooms is the altered state of consciousness they produce. In addition to complex cognitive changes, most individuals report changes in their auditory, visual and touch senses. For example, colors appear brighter and there may be visual patterns, especially when the eyes are closed. Sounds are perceived more acutely, and synesthesia, a crossing of the senses (e.g., "seeing sounds") may also be experienced.[4]

With the exception of very large doses, these perceptual changes are almost always recognized by the user as being a part of the drug experience. The sensory distortions, therefore, are not true hallucinations as experienced by schizophrenics, but are more accurately termed illusions.[18]

The subjective experience produced by psilocybian mushrooms is largely determined by the individual's mental *set* and the environmental *setting*. The *set* includes the following: the personality of the user, his/her expectations, mood, and preparation (e.g., background reading). The *setting* involves the user's comfort with his/her surroundings. Important considerations here include friends, music, type of lighting, and whether the drug is used outside or indoors.[18]

The dangers of psilocybin are primarily psychological in nature. Anxiety, depression, disorientation and an inability to distinguish between fantasy and reality may occur. These reactions are most often seen when very large doses are ingested and/or the drugs are taken in a potentially negative environment (e.g., rock concert). Prolonged psychotic reactions are quite rare, however, and are usually seen in individuals already psychologically disturbed.[8, 12]

Treatment

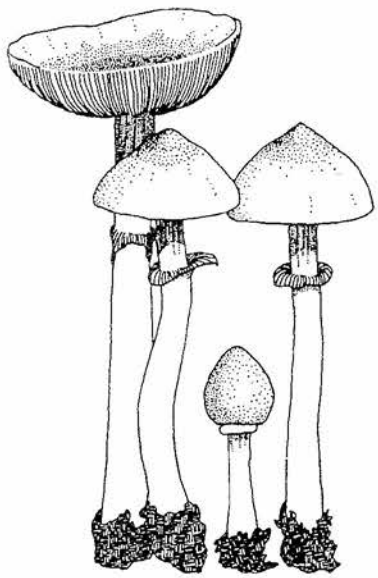
Treatment of adverse reactions should be symptomatic and supportive. The "talk-down" technique is most widely preferred, and involves giving personal support through a non-moralizing, comforting approach. Limiting external stimulation such as intense light or loud sounds and having the individual lie down and relax may also releive some of the unpleasant effects.[18]

Although tranquilizers are sometimes used, they should only be employed as a last resort (i.e., if "talking down" has failed). In serious cases, minor tranquilizers (e.g., Valium®, Librium®) have been used with some success. Gastric lavage (stomach pump) is not required when it is certain that only psilocybian mushrooms have been ingested.[8]

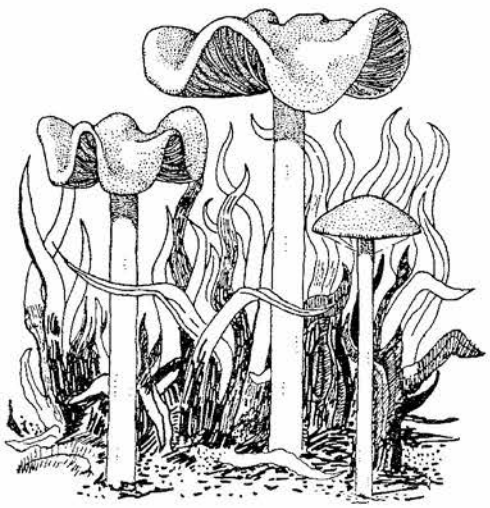
Other Considerations

Dosage is an extremely important consideration when dealing with powerful drugs such as LSD or psilocybin. Although the psychological effects of psilocybin are similar to those of LSD, it is far less potent and has a shorter duration of action. Various researchers have estimated the effective dosage of psilocybin to be from 4-10 milligrams, making it approximately 200 times less potent than LSD.[15, 16] At dosages in this range, the experience usually lasts between 3-8 hours. The exact dosage is difficult to ascertain since mushrooms may vary greatly in the amount of psilocybin or psilocin they contain. Synthetic psilocybin is virtually nonexistant on the illicit market, because of the high cost and complexity of manufacturing it.[16]

It is almost impossible to know exactly how much psilocybin and/or psilocin is contained in any particular mushroom. There is great variation in potency between the different species of psilocybian mushrooms, as well as significant differences between mushrooms of the same species. For example, the usual oral dose of *Psilocybe semilanceata* ("Liberty Caps") may range from ten to forty mushrooms, while the dose for *Psilocybe cyanescens* may only be two to seven mushrooms.[9] Thus the species must be accurately identified to even begin to determine an approximate dosage.



Psilocybe cubensis



Psilocybe cyanescens

Because of the popularity of psilocybian mushrooms, the numbers of people collecting the fungi has increased dramatically over the last few years. Unfortunately, this has led to problems with local property owners who do not appreciate "crazed hippies" trampling their fences and scaring livestock in search of the mind-altering mushrooms. A large number of "shroomers" have been prosecuted for trespassing in the last few years, both in the Pacific Northwest and the southeastern United States. Users should also be aware that possession of psilocybin or psilocin (classified as a controlled substance under Federal legal statutes) makes the individual liable for felony prosecution.[19] Up to this time, however, most individuals have been prosecuted for trespassing only. [21]

Another hazard of mushroom foraging is that of poisoning through mistaken identification. It is estimated that other toxic species outnumber psilocybian species by at least ten to one.[17] Many mushroom hunters do not realize that there are some extremely poisonous species which

superficially resemble psilocybian mushrooms. Individuals can reduce the possibility of a hazardous experience by becoming thoroughly familiar with the hallucinogenic and poisonous species using an accurate field guide on the subject. However, many experts are critical of what they consider to be oversimplifications and inaccuracies in most "field guides."[11,17] Two reliable sources of information are Menser's *Hallucinogenic and Poisonous Mushroom Field Guide* and Stamet's *Psilocybe Mushrooms and Their Allies.* [10,17] Both books describe the necessary process of "keying-out" a mushroom according to its spore print, fruiting cycle, range, habitat and general structure. Unless one is an experienced mycologist, however, the possibility of misidentification is always there.

Although many psilocybian mushrooms will bruise blue when fresh, and some are located on dung; it cannot be emphasized enough that no *single* criterion should be trusted to provide positive identification. Several characteristics need to be considered in making even a tentative identification. The only *sure* way of knowing whether one has the desired mushrooms is by having them identified by an experienced mycologist. An individual can also submit mushrooms for chemical analysis through a laboratory such as PharmChem. However, chemical analysis will only tell if the mushrooms contain psilocybin or psilocin, and cannot identify what species they are or whether they contain other toxins.

Recently there has been an increase in the cultivation of certain psilocybian species. The most commonly grown species is *Psilocybe cubensis* (a.k.a. *Stropharia cubensis*), which usually grows in the Gulf Coast states and southern Mexico. Spores of *Psilocybe cubensis* complete with growing kits and instructions are openly sold through magazines and are available in head shops in some states. This new dimension has significantly increased the availability of psilocybian mushrooms to almost anywhere.[2,21]

The lack of definitive answers to many of our questions about mushrooms can at least be partially attributed to the current uncertainties and conflicting opinions within the complex science of mycology. Authors disagree about classifications, particular characteristics, and even names of individual mushrooms. However, the situation has been improving in the last few years and a comprehensive body of well-supported knowledge is being formed. Unfortunately the problems have only just begun concerning the psychoactive constituents found in many of the fungi. The increasing popularity and availaility of psilocybian mushrooms poses a difficult legal predicament with few easy answers.

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Editors Note:
The illustrations accompanying this article are from **Hallucinogenic and Poisonous Mushrooms: A Field Guide** *by Gary P. Menser, Berkeley: And/Or Press, 1977 and are used withhis permission. The illustrations are included here for descriptive rather than identification purposes.*