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THE USE OF PSYCHOACTIVE MUSHROOMS IN THE PACIFIC NORTHWEST: AN ETHNOPHARMACOLOGIC REPORT

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I.

More than two centuries have passed since westerners first learned of a traditional Old World use of mushrooms to produce intoxication. In 1730, a Swedish army officer published an account of the cult of the fly agaric, *Amanita muscaria* (L. ex Fr.) Hooker, among primitive tribesmen of Siberia (1). Only forty years have passed since the rediscovery of the ceremonial use of hallucinogenic mushrooms in the Mexican state of Oaxaca (2). Today, ritual *Amanita*-eating in Siberia apparently is a thing of the past, and the mushroom ceremonies of Oaxaca are in great disarray as a result of the tremendous publicity accorded them.

Yet more people than ever may be eating mushrooms to bring on unusual states of consciousness. The bright red fly agaric is now in widespread use in the Rocky Mountains, California, and the Pacific Northwest. In Oregon and Washington, some people are using its close relative, the more potent, tan-capped panther fungus, *Amanita pantherina* (DC. ex Fr.) Krombh. Psilocybin-containing mushrooms, originally known from Oaxaca, are turning up in many localities and coming into more general use as people discover their properties. For example, *Stropharia cubensis* Earle, the "San Isidro" mushroom of Oaxaca, is now well known in Colombia, Costa Rica, Florida, along the entire Gulf Coast of the United States, in Texas, southeast Asia, and, probably, elsewhere (3).

To be sure, the use of psychoactive mushrooms outside of

Siberia and Mexico is not traditional. There is little doubt that most of it dates back only so far as the earliest modern publicity about mushroom rituals — that is, to the late 1950's. A great many articles about hallucinogenic mushrooms appeared in popular journals in that period (4). One result was an influx of thousands of young people from Europe and North America to the centers of mushroom use in Oaxaca (5). On leaving Mexico, these people, many of them members of subcultural groups valuing the alteration of consciousness by pharmacologic means, carried the search for suitable fungi to other lands; in many cases their diligence was rewarded.

Information about the recent use of psychoactive mushrooms outside of Mexico has been scanty. A few subjective reports have appeared (6), and several field guides in pamphlet form are best sellers in book stores near university campuses in the United States (7). These materials contain much misinformation and leave us mostly uninformed about the extent of use in different regions, the species in use, the methods of preparation and ingestion, and the nature of the effects.

The present paper attempts to clarify information about the use of psychoactive mushrooms in one area of North America: the Pacific Northwest, including western Oregon and Washington and British Columbia. The Pacific Northwest was selected for these investigations for several reasons. First, it is an outstanding area for the collection of many types of fungi. Even casual visitors in the fall fruiting season are struck by the exuberance of fungal growth from the crest of the Cascades to the sea. As one might expect, mushroom hunting is a popular activity in the area, and many residents involve themselves in the search for edible species. In this, they follow in the tradition of the native Americans who occupied the same territory. Moreover, because of its pioneer spirit and long tradition of tolerating individuality and independent life styles, the region has a strong counterculture and a large population of young people who experiment actively with natural methods of changing awareness. One example of the influence of this group is that in 1973, Oregon became the first state in the United States to decriminalize the possession of *Cannabis* for personal use. Many stories in circulation throughout the American subculture point to the Pacific Northwest as the source of several kinds of mushrooms that trigger high states of consciousness. Finally, laboratory analyses of mushroom samples sold on the

black market occasionally demonstrate the presence of psilocybin; Oregon, Washington, and British Columbia have been the sources of much of the material giving positive tests (8).

Between 1973 and 1976 I made a number of visits to the Pacific Northwest in order to find and identify psychoactive mushrooms and learn something of their use. I had the good fortune to find four species containing psilocybin and to meet and interview a number of users of these species. I also talked with users of species in the genus *Amanita*, commonly regarded as the most dangerous group of all mushrooms. In this paper, I shall report observations and experiences with these psychoactive fungi and their users (9).

II.

Psilocybin is a strong hallucinogen that occurs in species of *Psilocybe*, *Stropharia*, *Conocybe*, and *Panaeolus*, and, so far as known, nowhere else in the Plant Kingdom. It may occur in combination with psilocin, a closely related compound with equivalent effects. Psilocybin is the phosphate ester of psilocin and the only known natural indole with a phosphoric acid radical. Psilocin is 1.4 times as potent as psilocybin, and, presumably, when psilocybin is ingested, it is first converted to psilocin in the body. Many texts give the mean oral dose of psilocybin as 4 to 8 mg., equivalent to about 2 gm. of the dried mushroom *Psilocybe mexicana* Heim (10). I think this figure is low, since experienced users of hallucinogens report 10-20 mg. to be a moderate dose.

In doses of 10-20 mg., psilocybin produces a distinctive intoxication marked by visual hallucinations. In certain settings, with proper expectation, it may induce mystical or religious feelings (11). Its effects wear off in four to six hours, and even high doses commonly leave no after-effects.

In the North American drug subculture, psilocybin is held in high esteem. Its duration of action, only half as long as that of LSD and mescaline, recommends it for convenience. Its power to induce visions is great. It is gentler on the body than other hallucinogens. And it comes from mushrooms, which, for many persons, are fascinating symbols of the unconscious or "night" side of human experience (12). For all these reasons,

there is a great demand for psilocybin on the black market.

Psilocybin is much more expensive to synthesize than LSD, and nearly everything sold in the illicit trade as psilocybin turns out to be LSD mixed with filler and coloring or LSD combined with other drugs to modify its effects (13). In the past few years, various forms of alleged psilocybin mushrooms have also turned up on the black market; these often turn out to be ordinary cultivated mushrooms, *Agaricus bisporus* (Lange) Imbach, treated with LSD (14).

I had no difficulty locating some of these false psilocybin mushrooms in the university community of Eugene, Oregon, in the fall of 1973. The particular ones that I obtained were frozen, sold for \$15 an ounce, and were said to be cultivated in Washington. A teaspoonful of the coarsely chopped material was one dose. Of course, there is no way to identify mushrooms that are chopped and frozen, but the flavor and texture were consistent with canned *Agaricus bisporus*. On analysis (15), these mushrooms contained LSD and phencyclidine (PCP), a depressant drug that produces variable mental symptoms and a peculiar type of muscular incoordination. Apparently, PCP effectively disguises the actions of LSD; even experienced users of hallucinogens have refused to believe that these adulterated mushrooms could owe most of their properties to LSD. PCP is a clever choice as an additive, because real psilocybin-containing mushrooms sometimes cause motor restlessness or weakness, possibly on account of secondary constituents.

False psilocybin mushrooms turn up in many guises, from dried mushroom chips to brown powders, often selling for \$50 an ounce or more. In every instance that I have had them analyzed they have turned out to contain LSD or LSD mixed with PCP. An amusing variety, manufactured in Austin, Texas, is a light brown powder sold as "psilocybin mushroom spores." The spores are probably the least active parts of hallucinogenic mushrooms.

In the American South, where *Stropharia cubensis* is the principal active species, it is possible for people to collect sufficient quantities of this large, easily recognized, fleshy mushroom to enable them to sell it. But the active species of the Pacific Northwest are tiny and thin fleshed, gatherable only with some difficulty. Until the fall of 1975, I did not succeed in buying genuine psilocybin mushrooms here. The only real ones that I came across were those I collected myself in the field or obtained from other collectors.

In interviewing persons who have ingested hallucinogenic mushrooms, it is important, therefore, to determine the source of the material. Was it collected in the field or obtained from someone who collected it? If not, it may not contain psilocybin. A useful question to ask is how long the effects lasted. If symptoms were felt beyond six hours, the active compound was almost certainly LSD. If symptoms dissipated by six hours, psilocybin is a possibility, but low doses of LSD may also fade early, especially if the user expects the effects of mushrooms to be short. In studying psychoactive drugs, we see repeatedly that psychological expectation (set) may be the single most important factor determining individual reactions, even over-riding direct pharmacological action. (A spectacular example is variation in response to *Amanita pantherina*, to be discussed below). This fact may explain why many persons who ingest false psilocybin mushrooms feel that their experiences are qualitatively different from anything that they have felt on LSD.

In the Pacific Northwest, genuine psilocybin mushrooms are small and inconspicuous, typically growing in open, grassy places, such as lawns and fields, often in association with cow manure. A few woodland species also occur. These mushrooms do not call attention to themselves by their size, colors, or growth habits, and, as their caps are quite thin, they have never been pursued by hunters of edible mushrooms. The two genera in use are *Psilocybe* and *Panaeolus*. Until the discoveries in Oaxaca, no one cared much about these fungal groups, and, consequently, relatively little information is to be found on them in the scientific literature. And because they have been of so little interest to collectors, there is no good body of data on their field characteristics.

Many amateur mushroom hunters read descriptions of *Psilocybe* and *Panaeolus* in guide books, then attempt to find them in cow pastures. Anyone who has hunted in this way knows how frustrating it is to meet the bewildering array of little brown mushrooms that come up in pastures in the fall. It is quite possible that some of them are undescribed species, because, until recently, experts often ignored these groups of inconspicuous mushrooms.

Psilocybe, the genus with the greatest number of active species, has purple-brown spores and a number of characteristic anatomical features visible under the microscope. Not all species of *Psilocybe* contain psilocybin, but those that do seem

to make up a section of the genus called the *Caerulescentes* (from Latin, "becoming blue"), defined by the appearance of blue stains after injury or under certain conditions of growth (16). Many seekers of hallucinogenic mushrooms believe that any mushroom showing blue stains on bruising is a psilocybin-containing species, but blueing also occurs in genera unrelated to *Psilocybe*; consequently, it has nothing to do with the presence of the active principle. For example, some of the poisonous boletes stain blue on bruising. Moreover, blueing is not necessarily a reliable character within the genus. One of the most active Pacific Northwest species, to be described below, shows it only irregularly, even when treated with *p*-methylaminophenol sulfate (Metol), a chemical that is supposed to accelerate the color change (17).

Before describing the species in use, I must emphasize the difficulty of giving exact identifications. In general, the taxonomy of dark-spored agarics leaves much to be desired. In particular, the species of *Psilocybe* do not separate easily. Some work has been done on the genus, but little of it pertains to the species of the Pacific Northwest (18). In the absence of a definitive monograph for this region, all identifications should be regarded as tentative, including those stated with authority in some of the literature.

III.

One of the most desirable species in terms of hallucinogenic power and freedom from unwanted effects is a small *Psilocybe* that grows near the Pacific coast in the fall. Specimens which I collected in 1974 have been identified by Guzmán as *P. semilanceata* (Fr.) Kummer, which is possibly synonymous with *P. pelliculosa* (Smith) Sing. & Smith, *P. Cookei* Sing., and *P. semilanceata* var. *caerulescens* Cooke (19). *Psilocybe semilanceata* is a European species, known in England and Wales as the "Pixie Cap" or "Liberty Cap." Devotees in Oregon also call it the Liberty Cap. Several informants told me that the name indicates its resemblance to the Liberty Bell in Philadelphia, but, in fact, it derives from a French Revolutionary emblem, the Cap of Liberty, which, in turn, comes from an ancient symbol, the Phrygian bonnet. Especially after drying, the mushroom resembles this peaked, conical hat with its point bent over.

The Liberty Cap is distributed from southern Oregon north to British Columbia in the territory enclosed by the mountains of the Coast Range and the ocean. I have found it occasionally on the eastern side of the coastal mountains, and it may be moving into that region. It grows after rains in open, recently used cow pastures between the Autumn Equinox and Winter Solstice, sometimes fruiting into early January. In some locations, a second fruiting may occur in the spring. I have collected this mushroom as late as mid-June in the Oregon Coast Range.

The Liberty Cap grows out of the ground near cow manure, often in or near tall clumps of sedge, and its habit of growth is solitary or grouped. The cap is conical, 0.3-3.0 cm. in diameter, with a distinct umbo or "nipple" at the apex. As the mushroom ages, the nipple becomes more distinct due to settling of the cap on the stipe. The cap has a viscid pellicle when wet and is variable in color, ranging from a dingy gray-brown when fresh to deep golden brown and light yellow-tan when bleached by the sun. The margin of the cap is inrolled when young and shows faint striations. The flesh is very thin and translucent to light near the margin.

The gills are attached to the stipe, appearing light to chocolate brown when young, becoming dark purple-brown as the spores mature. The stipe is 2-13 cm. long, 1-3 mm. wide, with a characteristic elastic pliancy. It may show blueing at the base, especially at the point of junction with the underground mycelium. Otherwise, blueing is not an obvious field character.

Eaters of the Liberty Cap are not prone to divulge locations of favorite collecting grounds; in this habit, they resemble hunters of prized edible species, such as morels (*Morchella spp.*). If one knows where and how to look, large collections are possible. Good hunters may get a pound of Liberty Cap in an hour or ten pounds in a day — respectable quantities when one considers that a pound represents many hundreds of these delicate little mushrooms. In the fall of 1975, extremely heavy fruitings of this species in Oregon permitted collectors to gather enough mushrooms to sell them. In Eugene, Liberty Caps sold for \$75 to \$100 a pound, wet weight.

An average dose of this species is 20 whole mushrooms, often eaten just as they are picked. I have met persons who prefer the effects of two or three mushrooms and others who like to eat up to a hundred at a time. Several informants told me

that one good collection provides enough material to intoxicate at least a hundred people. Properly dried, Liberty Caps retain their potency for at least a year and may be brewed into a powerful tea.

Almost all of the users of Liberty Caps whom I met were young people who referred to themselves as “freaks” — mostly long-haired members of the Pacific Northwest counter-culture, many of whom lived communally in rural areas. All of them had extensive experience with *Cannabis* and hallucinogens, and most preferred natural drugs to synthetic ones. In almost every case, they had first learned of the activity of these mushrooms from university students with mycological training, usually from Oregon State University at Corvallis. I met two individuals who chanced upon the Liberty Cap by eating small brown mushrooms growing in cow fields without any special knowledge. There are persistent stories in western Oregon of older, local people who have used these mushrooms for more than 20 years. I have been unable to verify these tales. If true, they suggest an independent route to knowledge of local psilocybin-containing species, possibly going back to accidental discoveries of early settlers or even to Indians. Coastal tribes in the Pacific Northwest gathered mushrooms as food, but there is no evidence that they used any psychoactive fungi, unless, as in Mexico, they concealed such practices from most of the invading Europeans.

The next most prized species in Oregon is a much larger mushroom that grows throughout western Oregon and Washington in scattered locations through the fall. It grows often in groups on greenhouse mulch and on lawns. In Eugene, Oregon it fruits regularly on a bark mulch around rhododendron bushes in municipal parks and is avidly collected by local residents. The cap is dull brown, bluntly cone-shaped when young, expanding to convex or flat with age. It may be 4 cm. wide at greatest expansion. The mushroom has a viscid pellicle when fresh and wet; on drying, the color fades leaving an area of copper brown in the center. It shows blueing on injury more consistently than the Liberty Cap. The stipe is whitish, the spores purple-brown. Four carpophores make up an average dose.

Mycology students at Oregon State University call this mushroom *Psilocybe baeocystis* Smith, as do many users in Eugene. *Psilocybe baeocystis* has a reputation as an especially powerful

species, probably because it was implicated in the death of a 6-year-old child in Milwaukie, Oregon, near Portland, in 1960 (20). Two unusual alkaloids, baeocystin and *nor*-baeocystin, have been isolated from this species in addition to psilocybin and psilocin. They may occur in other *Psilocybe* species as well, and their pharmacology has not been studied.

I have been unable to send voucher specimens of the Eugene mushroom to Mexico City for formal identification, and, though I believe it to be *P. baeocystis*, I will report it here simply as *Psilocybe* sp. It has no common name. I will refer to it here as the "Eugene *Psilocybe*." Because it grows inland in scattered locations, not many Liberty Cap eaters have tried it. I have talked with only a few persons who have ingested both species. They report that the two mushrooms are roughly equivalent in psychoactive power but that the Liberty Cap produces more prominent visual displays, whereas the "Eugene *Psilocybe*" causes more physical changes in the body.

A third *Psilocybe* is known to many collectors in western Washington. Commonly called the "Washington Blue Veil," it is distinguished from the other species by the persistence of an annulus on the stipe, an unusual character in this genus. The mushroom blues quite readily, even without injury, and the annulus appears often as a thin ring of bluish or bluish black tissue, hence the common name. The mushroom has a fleshy cap up to 5 cm. wide, of an even chestnut brown color with striate margin and viscid pellicle. The veil is white and fleshy when young. Stipes are up to 5 mm. wide and 8 cm. long; they are fleshy, often convoluted, and often showing blue at the base. Habit of growth is grouped to cespitose, often with five or six carpophores in a cluster, and the mushroom is abundant on manured lawns and bark mulch in the fall after rains.

Originally thought to be a variety of *Psilocybe caerulescens* Murrill, a species known from Oaxaca, this mushroom first appeared on the campus of the University of Washington in Seattle in the fall of 1973. It seemed to spread by way of a bark mulch in use by the university grounds crew, and enquiring graduate students quickly discovered its psychoactivity. It is strongly hallucinogenic, producing a typical psilocybin-psilocin intoxication in doses of about 20 carpophores. Specimens collected in 1974 near Olympia, Washington, and sent to Mexico City have now been shown not to be *P. caerulescens*.

The Washington Blue Veil is now considered a new species, hitherto undescribed, and has recently been named *P. Stuntzii* Guzmán and Ott (21).

The Washington Blue Veil fruited heavily in the region around Olympia in the fall of 1974. Again, greenhouse bark mulches seemed responsible for transmitting it to new locations. College students in the area use it frequently. As yet, the mushroom is not reported from Oregon, but it has been collected in Vancouver, British Columbia (22). On a weight basis the Washington Blue Veil is less potent than the Eugene *Psilocybe*. Washington collectors who have tried both it and the Liberty Cap rate those two species as equally desirable.

One more psilocybin-containing species is in widespread use in the Pacific Northwest. It is in the genus *Panaeolus*, a black-spored group of coprophilic mushrooms. Hallucinogenic species of *Panaeolus* have been reported in such diverse places as Oaxaca, Maine, Hawaii, (23), and Colombia (24), but there is considerable taxonomic uncertainty about their identity. A number of inactive members of the genus also grow throughout North America.

The active *Panaeolus* of the Pacific Northwest has a cap 0.5 to 4.0 cm. broad, hemispherical when young, becoming broadly expanded with characteristic cracks. It is tan to reddish brown, often with a distinctive dark zone around the margin. A veil is absent. The gills are reddish brown or reddish gray when young, becoming mottled with gray or black, eventually black. The stipe is 1-5 mm. thick, hollow, stringy, vertically grooved at the top, covered with a whitish deposit when young. This mushroom occurs in groups or clusters in open grassy places with cow manure, on compost, and on rotting hay. It is found throughout the Willamette Valley in western Oregon and in western Washington from early spring through fall, after rains. I have never seen this species exhibit blueing, but experienced collectors say that one in a hundred specimens may show blue at the base of the stipe; this coloration is not a response to injury. Specimens which I collected near Albany, Oregon in April of 1974 have been identified by Ola'h as *Panaeolus subalteatus* Berk. & Br. (25).

Many Oregonians have tried *Panaeolus subalteatus* because this mushroom grows plentifully in the most populated areas of the state, especially in the vicinity of Oregon State University at Corvallis, and because it grows throughout more of the year

than any of the *Psilocybe* species. It is collected in large quantities for use during spring and summer, when other varieties are not available, although it is distinctly less potent and more toxic than the others. In doses of about 20 carpophores, it produces an intoxication of rapid onset, marked by initial restlessness and possible nausea, prostration, and various physical symptoms, succeeded by dreamy feelings and visual hallucinations. On a weight basis, *Panaeolus subalteatus* is about half as potent as *Psilocybe semilanceata*.

The toxicity of this *Panaeolus* does not deter people from frequently eating it. Possibly, the physical symptoms are due to unidentified compounds other than psilocybin and psilocin. These symptoms are more pronounced after ingestion of fresh mushrooms, less after ingestion of dried ones. Many users like to brew a tea from the dried mushrooms. Screening of this species for other alkaloids would be a profitable line of chemical investigation.

The above four species are the psilocybin-containing mushrooms in widespread use in the Pacific Northwest. A number of other species are reported here, including *Psilocybe stric-tipes* Sing. & Smith (18) and several unnamed *Psilocybe* species, but definitive identifications are lacking, and they are used only by rare individuals, usually those with some mycological expertise.

IV.

Use of *Amanita* mushrooms as recreational drugs in North America dates back only to the recent identification of the ancient Aryan intoxicant *soma* with the fly agaric (26) and to numerous popular accounts of the psychoactivity of this species (27). Not long ago, many books called this famous mushroom deadly, and standard toxicological works listed its active principle as muscarine. (The alkaloid muscarine was named for *A. muscaria*, when it was first isolated in the mid-19th Century.) We now know that very few people die from eating the fly agaric and that it usually contains clinically insignificant amounts of muscarine (28).

The psychoactive principles in *Amanita muscaria* are ibotenic acid and its decarboxylation product, muscimol, which is five to ten times more potent. Muscimol is a structural

analog of GABA (gamma-aminobutyric acid), and like GABA inhibits neurotransmission in the central nervous system (29). These compounds also occur in *Amanita pantherina* (30), *A. cothurnata* Atkinson (31), as well as in hybrids of *A. gemmata* (Fr.) Gill and *A. pantherina*.

Amanita cothurnata, which does not occur in the Pacific Northwest, is not used as a recreational intoxicant, but both the fly and panther Amanitas are so used. In North America, the panther fungus contains higher concentrations of ibotenic acid and muscimol than the fly agaric (30) and is preferred by users in the Pacific Northwest who have tried both species. Many mushroom books still call *A. pantherina* a deadly species, and most mycologists are horrified to hear of people eating it deliberately for enjoyment. *Amanita gemmata*, with a yellow cap, is an inactive species but is said to hybridize readily with *A. pantherina*, producing mushrooms of intermediate color and activity. Doubtless many persons who have learned to eat the panther fungus unknowingly collect and eat these hybrids as well, which may account for some of the variation of response to ingestion of this mushroom.

Little sophistication is necessary to recognize fly agarics. They are striking mushrooms of the Pacific Northwest in the fall, often one of the largest and brightest colored species in conifer forests. Truly giant forms occur in southwestern Oregon near the coast, in Coos and Curry Counties. The ease of collecting fly agarics is in sharp contrast to the difficulty of learning to recognize the unspectacular psilocybin-containing species in this region of North America. Consequently, many users of *Amarita muscaria* are unfamiliar with *Psilocybe* and *Panaeolus* and have never tried them. In fact, none of the *Amanita* eaters whom I interviewed in Oregon and Washington in 1973 had ever eaten local psilocybin mushrooms.

Psilocybin mushroom hunters, on the other hand, are often familiar with the fly and panther Amanitas but tend to regard them as toxic and dangerous. This belief may reflect the fact that psilocybin mushroom hunters in the Pacific Northwest have usually learned to collect from mycologically trained persons, such as university graduate students, and these people tend to be biased against experimentation with Amanitas. In any case, I have noted repeatedly that *Amanita* eaters are a distinct group from psilocybin eaters. For example, they are often older and less directly affiliated with the coun-

terculture. Curiously enough, the *Amanita* eaters tend to be more knowledgeable about food mushrooms than psilocybin eaters. I have met many collectors of Liberty Caps, for instance, who have never eaten a meadow mushroom (*Agaricus campestris* L. ex Fr.), even though meadow mushrooms often grow in different parts of the same fields.

It is extremely difficult to sort out the clinical pharmacology of the fly and panther Amanitas. Some persons eat these mushrooms and experience no effects whatever. Others become very sick for a number of hours, and others have ecstatic experiences. A variety of factors may contribute to this inconsistency, among them: individual idiosyncrasy in response to the active compounds; geographic and seasonal variation in the chemistry of the mushrooms; differences in ways of preparing the mushrooms for use; and, finally, differences in set or expectation of the results of ingestion.

Individual differences in susceptibility to mushroom toxins is well known to all collectors. Species considered choice edibles by some may be poisonous to others. The few deaths reported following ingestion of fly and panther Amanitas by persons other than children or the elderly may be due to allergic or other idiosyncratic reactions. Some of those who get very sick after eating these mushrooms may also be especially sensitive to ibotenic acid and muscimol.

In addition, the activity of the mushrooms probably varies from location to location and from time to time in the same location. European species of *Amanita* may be more toxic than American ones, but the American species may contain more muscarine than the European ones. *Amanita muscaria* in eastern North America is yellow-capped and frequently inactive. *Amanita pantherina* may be less potent in the early spring in the Pacific Northwest than in the late spring. We know little about these natural variations in the activity of Amanitas except that they occur. Persons who wish to try these mushrooms cannot assume that they are the same from place to place and time to time.

I have recorded many different methods of preparing *Amanita*. Some people eat whole, fresh mushrooms. Some eat only the colored peel, discarding the rest of the mushroom. Some discard the peel. Some dry the peel and smoke it. Some dry the whole mushroom and smoke it. Some dry the mushroom and make tea of it. Some steep the mushroom in milk

and drink the milk. Some boil the mushroom. Some steep it in warm water acidulated with lemon juice. Some saute the mushroom in oil. No doubt, these different methods result in preparations of different compositions and strengths. We know that the greatest concentration of active compounds occurs in and just under the colored peel. I have smoked the dried peel of *A. muscaria* and found it mildly psychoactive, akin to *Cannabis*. Infusions of the mushroom produce more powerful effects.

Expectation plays a major role in shaping responses to all psychoactive drugs. Differences in response to the panther *Amanita* illustrate this principle well. Persons who eat this fungus accidentally while collecting food mushrooms often become violently ill and sometimes require hospitalization. Typically, they recover in 24 hours. Quite frequently, these victims receive incorrect medical treatment, because most emergency medical manuals and poison information centers continue to recommend injections of atropine as the antidote for poisoning by *A. muscaria* and *A. pantherina* in the erroneous belief that the toxin is muscarine. (Atropine and muscarine are classical pharmacologic antagonists.) In fact, atropine may potentiate the effects of ibotenic acid and muscimol and is contraindicated in these cases. Correct treatment includes gastric lavage, if there is a possibility of removing any ingested material, observation, reassurance, and general supportive measures, with mild sedation if necessary. After recovery, victims of accidental panther fungus poisoning cannot imagine why anyone would deliberately eat the mushroom.

By contrast, persons who eat *Amanita pantherina* for the purpose of changing their consciousness usually do not experience sickness and often have positive experiences, which they like to repeat. In a recent survey in the Olympia, Washington area, nine victims of accidental poisoning were interviewed along with nine deliberate users. The accident cases typically had no experience with psychoactive drugs other than alcohol, tobacco, and coffee and interpreted the symptoms as the onset of poisoning and, possibly, imminent death; some of them lost consciousness. The deliberate users all had extensive drug experience and welcomed the physical symptoms as the onset of a high. They did not lose consciousness, even though they ingested larger doses than the victims of accidental intoxication. The deliberate users had eaten *Amanita* an average of 30 times each (32).

In experienced users, *Amanita muscaria* and *Amanita pantherina* taken orally produce physical symptoms of rapid onset, usually in less than 30 minutes. These may include, nausea, drowsiness, muscle spasms and weakness, loss of balance and coordination, and a laxative effect, although some users report no unpleasant symptoms. As the intoxication progresses, a state of great relaxation and dreamy stupor develops, akin to hypnotic trance. Dream images may be prominent. Some users liken this state to the combined effects of psilocybin and opium. The pull in the direction of sleep is distinct from psilocybin intoxication, and although *Amanita* eaters sometimes report visual hallucinations they seem to mean enhanced mental imagery rather than the visual changes induced by psilocybin and other indole hallucinogens. Effects of *Amanita* may last from four to 12 or more hours, depending on dose and individual sensitivity.

The popularity of *Amanita*, especially the panther fungus, is definitely on the increase in the Pacific Northwest, and there is much active experimentation to find out how best to prepare and use these mushrooms.

V.

The consequences of the explosion of use of psychoactive mushrooms in the Pacific Northwest and other parts of North America remain to be seen. Mycologists express great concern about the possibility of epidemics of mushroom poisoning with so many untrained persons combing the fields and forests in search of new highs, but it may be that mycologists tend to be overcautious. Certainly there are dangers in eating wild mushrooms, chiefly from the deadly species of *Amanita*, such as *A. verna* (Bull. ex Fr.) Pers. ex Vitt. and *A. phalloides* (Vaill. ex Fr.) Secr., and from several small mushrooms in the genus *Galerina* that contain the same toxins as the deadly Amanitas.

It is unfortunate that some mycologists continue to call the panther fungus a deadly species: this misinformation may encourage some panther eaters to sample the really deadly ones. So far this has not happened. Species of *Galerina* present some danger to people looking for psilocybin mushrooms in woods, because they are inconspicuous, brown mushrooms that grow on wood or buried wood. People who confine their collecting of

psilocybin mushrooms to open fields do not seem to run great risks of encountering really dangerous fungi, except, possibly, some poisonous *Inocybe* species around the edges of fields. These mushrooms contain toxic amounts of muscarine, but cases of poisoning by them are rare in the Pacific Northwest, although thousands of people are picking small mushrooms. So far, the psychoactive mushroom craze has not resulted in any great increase in the incidence of mushroom poisoning.

The legal status of psychoactive mushrooms is unclear. Although United States Federal law controls any "material" containing psilocybin, mushrooms are not specifically mentioned. The laws of most states are similar to the Federal law in this respect. No laws, Federal or state, apply to *Amanita*. In the American South, where large numbers of young people hunt the conspicuous psilocybin mushroom, *Stropharia cubensis*, prosecutions for trespassing have occurred but not for possession of mushrooms. In 1976, two young hunters of *S. cubensis* were shot to death by a policeman in a Florida field; the policeman was subsequently indicted by a grand jury (33). In the Pacific Northwest, law enforcement officers do not pay much attention to collectors of psychoactive mushrooms. This situation will change if the number of hunters increases greatly, if newspapers publicize the use of the mushrooms, or if the behavior of users draws attention. Large numbers of Oregonians went after Liberty Caps in the fall of 1976, with much attendant publicity, and increasing complaints from property owners.

Use of psychoactive mushrooms in the Pacific Northwest and elsewhere will almost certainly continue to grow. Psychoactivity appears to be distributed more widely in the fungal kingdom than anyone has imagined. Consequently, more species may come into use, including others previously considered poisonous. There is little chance that these mushrooms will disappear or lend themselves to eradication by zealous opponents of psychoactive drugs. If anything, the mushrooms are swiftly invading new territories, as in the case of the Washington Blue Veil that seemed to appear out of nowhere on the University of Washington campus. Doubtless human involvement with these species is one factor helping to spread them. We need much more information on psychoactive mushrooms, on their taxonomy, chemistry, pharmacology, and potential usefulness. Growing awareness of them in

rich collecting grounds such as the Pacific Northwest will possibly inspire the necessary research.

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