

NAMA Toxicology Committee Report for 2007: Recent Mushroom Poisonings in North America

Michael W. Beug, Ph.D.
Chair NAMA Toxicology Committee

THE 2007 MUSHROOM season produced very few reports of mushroom poisoning, a marked relief after 2006, which saw numerous serious poisonings. There were 29 reports involving 45 people poisoned plus 10 reports involving 12 dogs poisoned. There was one human death questionably attributed to mushroom poisoning and three dog deaths attributed to unknown mushrooms. There were also numerous reports of ingestion of mushrooms by young children where there were no symptoms, but only one of those has been included as an example.

Marilyn Shaw continued her close work with the Rocky Mountain Poison Center and contributed over half of the total reports cited herein. Another significant group of reports came from Jan Lindgren and Judy Roger, who work with the Oregon Poison Center, and a group of volunteers, mostly from the Oregon Mycological Association. Even though the number of cases was small, there were some very interesting things to be learned.

Five cases involved intentional ingestion of psychoactive mushrooms that went badly. The mushrooms involved were either *Psilocybe cubensis* or *Amanita muscaria*, both of which can easily be purchased and can also easily have been adulterated. The most serious case involved a healthy 26-year-old man who consumed up to six or seven 3”–4” specimens of a “red mushroom with white spots,” obviously *Amanita muscaria*. Marilyn Shaw reports being told that two hours post ingestion he was sweating had flushed skin and slurred speech. He went to bed. Two hours later his girlfriend awakened him, but he was uncoordinated and could not walk. He went back to sleep. The next morning he was found dead. Less than 12 hours elapsed between ingestion and death. A post-mortem drug screen for 2,000 drugs turned up nortryptiline and, Marilyn believes, acetaminophen, but nothing else. No direct cause of death was found, so the coro-

ner attributed the cause of death to *Amanita muscaria*. In the very few deaths from *Amanita muscaria* over the past 100+ years that we have been able to uncover, death has been from indirect causes like hypothermia or aspiration of vomit while in a coma-like sleep and not from direct toxicity. With such a large ingestion it is possible that there was enough muscarine to be a contributing cause (muscarine was first discovered in *Amanita muscaria*, but it is a trace constituent). Both Marilyn Shaw and I have read extensively on *Amanita muscaria*, including the rare book *Mushrooms, Russia and History* by R. Gordon Wasson and Valentina Pavlona Wasson, and we agree with their observation that *Amanita muscaria* “inebriates, it does not kill.” However, unlike the high from psilocybin and psilocin in some mushrooms, the high from *Amanita muscaria* is one that few people would want to experience twice. *Amanita muscaria* is a dangerous and lousy recreational drug. Of the many users of mushrooms whom I have interviewed, only two thought that the experience was one they would ever repeat. There is a very narrow dose-response curve with *Amanita muscaria* (and *Amanita pantherina*), and it is quite easy to completely lose muscular coordination and possibly freeze to death if you are out in the cold, or vomit and aspirate your vomit with possibly lethal results. A deep coma-like sleep soon follows any meaningful ingestion. Expensive hospitalizations are the norm after use of either *Amanita muscaria* or *Amanita pantherina*.

Another serious case of mushroom poisoning involved ingestion of *Amanita smithiana* in a meal of three mushrooms that were mistaken for White Matsutake, *Tricholoma magnivelare*. Judy Roger identified part of a stipe base of *A. smithiana* and what appeared to be part of a *Tricholoma focale* from old trimmings left from the mushrooms. There is no evidence as to the identity of the third mushroom. The onset of symptoms began about five hours

after the meal, and the victim experienced acute renal failure with hepatic involvement. He was hospitalized for five days, and outpatient dialysis was required after he left the hospital. Toxicologists at Oregon Health Sciences University concluded that since the liver was involved, the victim must have eaten *Amanita phalloides*. This is highly unlikely as he wasn't in an area where *Amanita phalloides* grows, it was too early in the season for *A. phalloides*, and very few of this species were found this season. Confidentiality laws prevent us from getting complete details about the case, but the OPC staff plans to publish a report on it.

There were two very different cases including *Amanita* species known as "Death Caps" and as "Destroying Angels." In the first case a victim in New York State consumed mushrooms in the *Amanita virosa* complex. Bill Bakaitis did the identification and performed the Meixner tests, the first of which was negative though additional testing revealed a weak positive result—much weaker than Bill had seen in previous work with this species. That may well account for the fact that the victim

experienced only GI distress and blood work that was "abnormal, not too bad." In the second case a California artist was making a 20" x 30" art piece composed of successive spore prints of *Amanita phalloides*. She was doing the spore prints indoors and after some time developed sensitivity to the spores, experiencing a sore throat and cold-like symptoms. She could feel the effects begin in her throat as she worked with the mushrooms. Her partner developed a similar sensitivity. It is not unheard of for people working with mushrooms in closed environments to experience adverse effects from inhaling spores, even when the species are edible.

Marilyn Shaw also reported a number of adverse reactions to *Leccinum* species, including *Leccinum insigne*. She has now seen enough of the cases to realize that this is another species with delayed onset of symptoms—typically about six hours. The symptoms are gastro intestinal distress which can be severe. In one incident, several individuals at a mushroom foray became ill after the formal mushroom-tasting event. One person at the

Table I. Principal Poisonous Mushrooms in 2007

Species	# cases	% cases	# people	% people	# dogs	% dogs
<i>Leccinum sp</i>	5	17%	11	24.4%	-	-
<i>Chlorophyllum molybdites</i>	4	13.8%	4	8.9%	-	-
<i>A muscaria</i> or <i>A pantherina</i>	3	10.3%	4	8.9%	3	25%
<i>Boletus "satanus"</i>	2	6.9%	6	13.3%	-	-
<i>Psilocybe sp</i>	2	6.9%	2	4.4%	-	-

Table II. Age Distribution of Human Poisonings in 2007

Age	Male	Female	Unknown sex	% all sexes
<14 years old	0	2	0	4.4%
15–29 years old ¹	9	1	-	22%
30–44 years old	4	0	-	8.9%
45–59 years old	3	3	-	13.3%
>60 years old	4	1	-	11.1%
Adult unknown	3	6	9	40%

1. Many of the individuals in the 15- to 29-year age class were experimenting with hallucinogenic mushrooms.

event initially though the culprit dish (of about 15 dishes served) was the *Russula xerampelina*, which may have had a toxic *Russula* mixed in that would cause significant gastric distress—but later agreed that the delayed onset pointed elsewhere. Another dish contained *Leccinum* species, and the timing of the onset of symptoms in the five known victims pointed Marilyn Shaw clearly in the direction of the dish with “Orange Aspen Boletes,” in short, *Leccinum*.

Reports of poisoning by Boletes with red tube mouths are quite rare. Some red-tubed species do have a nasty reputation, but it has never been clear which species are the problem. Unfortunately, even with two incidents this year involving a total of six people, we are no closer to an answer. In both incidents the culprit was identified as *Boletus satanus*, but neither incident involved positive identification of the mushrooms consumed; all we know for sure is that they were Boletes with red tube mouths growing in California and in one case the associated trees were oaks. In both cases the GI distress was exceptionally severe, putting five of the six in the hospital. One individual’s blood turned a striking bright red.

The pattern of increased interaction between mycologists and veterinarians has led to continued reports of dogs ingesting mushrooms. Clearly, some dogs will ingest mushrooms again and again, getting sick again and again. Mushrooms that are generally not lethal to humans, e.g. *Scleroderma* species and *Inocybe* species, can kill dogs. Dogs also consume the “Destroying Angel” mushrooms, with often lethal results. This year three dog deaths were reported from the Pacific Northwest. Unfortunately, there were no vomitus or fresh mushrooms available to identify the culprit. In two cases where the dog survived, Judy Roger was able to identify chunks of mushroom thrown up by the dogs; one case involved *Paxillus involutus*, and the other involved the *Scleroderma cepa* group.



Table III. Summary of the Reports by Species

<i>Species</i>	When/ Where	ID ¹ / Prep	Sex/ Age	Onset (hrs)	Symptoms	Comments and Treatment
<i>Agaricus hondensis</i>	10/30/07 OR	G cook	Male adult	-	Consumed several and not ill	Mushroom considered poisonous
<i>Agaricus sp?</i>	1/14/07 HI	P/ raw	Male 34	1.5	Nausea, vomiting & diarrhea	Ate white mushroom from park
<i>Agaricus sp</i>	8/8/07 CO	Sp/ raw	Female 5	1	vomited	Ate piece of one mushroom
<i>Amanita muscaria</i>	9/7/07 WY	G/ Raw	Male 26	2	Sweating, flushed, slurred speech, sleep, DEATH	Consumed 6 to 7 3-4" specimens. Found dead AM. No clear cause of death
<i>Amanita muscaria</i> + <i>Leccinum sp</i>	8/13/07 CO	Sp/ cook	Female 43, Male 53	9.5 & 5	Male vomited 3x, next morning female vomited 3x and very queasy	Second couple ate much less and not ill. Long onset implies <i>Leccinum</i> culprit
<i>Amanita muscaria</i> + other species	10/25/07 CO	G/ Rehy- drated	Males 19, 35	1.5-2	Agitation, rapid eye movements, dilated pupils, muscle spasms, & vomiting	1 combative with irregular heartbeat. Found dried out mushrooms camping
<i>Amanita smithiana</i> + <i>Tricholoma focale</i>	10/10/07 OR	G cook	Male 55	5	Acute renal failure with hepatic involvement will need outpatient dialysis. OPC will publish case	Consumed 3 specimens he thought were Matsutake – 1 cap was <i>A.</i> <i>smithiana</i> , other(s) <i>T.</i> <i>focale</i>

<i>Amanita phalloides</i> spores, handle	11/24/07	G touch	Female + partner	-	Sensitive glands in throat (both), cold-like symptoms + sore throat	Doing art with <i>Amanita phalloides</i> spore-prints and becoming sensitive
<i>Amanita virosa</i> complex	8/29/07 NY	G -	Male 67	12+	GI distress "Blood work abnormal, not too bad"	Meixner test negative to weak positive -by expert
<i>Armillaria mellea</i>	10/12/07 WI	G raw	Adult	6-8	Chills, diarrhea, nausea, vomiting, weakness	Consumed 1 or 2 complete. Given iv fluids
"Porcini"	8/25/07 NY	Sp cook	Male 44	3	Diarrhea, cramps, vomiting, nausea	
<i>Boletus "satanus"</i>	9/2/07 CA	Sp -	Four people	-	All four very sick. One had strange bright red blood	
<i>Boletus "satanus"</i>	11/28/07 CA	Sp cook	Man + teen ♀	3.5+	Man + daughter vomiting 13x for 7+ hours, diarrhea	Red-pored boletes under oak for lunch + dinner then ill
<i>Chlorophyllum molybdites</i>	7/24/07 CO	G raw	Male 21	2	Nausea, vomiting, diarrhea and anxiety	Ate a small piece
<i>Chlorophyllum molybdites</i>	8/21/07 CO	G cook	Female adult	2	Severe nausea, vomiting, and diarrhea	Mushrooms in grass in park as "Shaggy Parasols"
<i>Chlorophyllum molybdites</i>	9/3/07 CA	G cook	Male 76	1.5	Chills, fever, diarrhea, cramps, nausea, weakness	Consumed 3-6 oz. Patient also has diabetes, heart prob.
<i>Chlorophyllum molybdites</i>	9/18/07 CA	G raw	Male 1	-	No symptoms	Consumed 1 bite if any at all
<i>Boletus edulis</i> + <i>Leccinum sp</i>	8/14/07 CO	Sp cook	Female 49	8+	Nausea, vomit, diarrhea for 3 hrs	Ate 2 cooked + couple slices raw
<i>Leccinum insigne</i>	7/11/07 CO	Sp raw	Males 63,55,29	2-3	Headaches, nausea, burping, 2 with diarrhea, no vomit	Lasted 6 hours Herbarium specimen Denver Botanic
<i>Leccinum sp</i> + other species	8/20/07 CO	Sp cook	Male 26	11	Diarrhea 6-10x, unable to eat, no vomiting	Given mixed bag including <i>Leccinums</i> . No alcohol
<i>Leccinum sp</i> + other species	8/21/07 CO	G cook	Male Adult + 4 others	6+	Vomiting & diarrhea 8 hr, cramps. One GI, 1 gas, 1diarrhea, 1 "felt sick"	15 dishes of mushrooms served at conference. Long onset = <i>Leccinum</i> dish
<i>Leccinum sp</i> + <i>Suillus brevipes</i>	8/7/07 CO	Sp raw	Female 5	0.5 or 4.5	Felt unwell at 0.5 hr, at 5 hr vomited 4x	Ate "quite a lot" of the <i>Leccinum</i> raw
<i>Morchella sp (Black)</i>	4/28/07 BC	Sp cook	Female 59	8	Nausea, tremor, GI upset, double vision. No alcohol	Some morels appeared to have bacterial contamination
<i>Omphalotus illudens</i>	~ 1990 NJ?	G cook	Female s (two)	0.5	Vomited ~ 16x over 8 hrs. Fine between vomiting	Mushrooms in butter + garlic—delicious!
<i>Pholiota squarrosa grp</i>	8?/07 OR	G cook	Female 78	1	Bloating and cramping followed in 1 hr by vomiting	
<i>Psilocybe cubensis</i>	6/24/07 ID	VL/ raw	Male 26	-	Dilated pupils & tachycardic "± anti-cholinergic"	
<i>Psilocybe sp</i>	6/2/07 CO	Sp/ raw	Male 21	-	3 weeks later hands still tingle & back pain	Terrified and cannot work
<i>Russula "decolorans"</i>	9/07 CO	VL cook	Male + Female	-	Gastric discomfort increased for both over several days	Mushrooms from 2 separate pristine locations

Unknown hallucinogen	5/2/07 CO	U/ raw	Male 24	0.5	Sweating, anxiety, hallucinations	Possible ingestion other drugs
Unknown Hallucinogen	4/27/07 MT	U/ raw	Male 16	-	Confrontational, pulled knife, maced, coma 2 days	Partial recovery at 18 days but can't see. Consumed 2g
Unidentified species	9/12/07 CO	U/ raw	Male 42	1	Vomiting, diarrhea. Park used herbicide & pesticide	Ate stipe of white mushroom from park grass
Unknown	12/16/07 NY	U cook	Male 77	1	No alcohol. Hallucinations, disorient, part memory loss	Consumed "suspicious mushroom sauce"

1. G = confirmed; P = possible; Sp = confident of the genus; U = Unknown

Table IV. Summary of Reports by Species: Ingestion by Dogs

<i>Species</i>	When/ Where	ID¹	Sex/ Age	Onset (hrs)	Symptoms	Comments
<i>Amanita muscaria</i>	8/6/07 CO	P	5 mo	4	Nausea, vomit, ataxia, depression, collapse, spasms	Blood in urine. Recovered
<i>Amanita muscaria</i>	10/3/07 NY	G	20 mo	-	Salivation, vomiting, nausea, lethargy	charcoal & iv fluids, atropine, ampicillin, etc
<i>Amanita musc. or pantherina</i>	9/13/07 CO	P	-	-	Collapsed with ataxia and tremors, recovered	Rural wooded foothills with Amanitas common
<i>Coprinus atramentarius</i>	4/11/07 WA	G	17 week	-	tremors	
<i>Inocybe + other species</i>	11/6/07 OR	P	puppy	1	Salivating, vomiting, diarrhea. Did "fluid therapy + GI and liver protectants"	Puppy seen eating mushrooms several species in area suspect <i>Inocybe</i>
<i>Paxillus involutus</i>	10/4/07 OR	G	9 mo	0.5-0.8	2 hr intermittent vomiting, dehydrated, unsteady	Vomited mushrooms Responded to charcoal.
<i>Scleroderma cepa group</i>	10/5/07 OR	G	6 mo	2	Vomiting. Slightly dizzy/spacey, staggering	Vomit large chunks. Quick recovery/ fluids charcoal
<i>Tulostoma sp</i>	3/6/07 NV	Sp	Up to 13 yr	-	Three dogs with elevated liver enzymes (ALT 2300). Also happened in 2005	No chemicals used. Only mushrooms present. Five Greyhounds.
<i>Unknown</i>	6/17/07 OR	U	-	-	Two dogs died, elevated liver enzymes	Mowed lawn afterwards and nothing to see.
<i>Unknown</i>	11/06 WA	U	pup	-	Puppy died	Dug mushrooms from under snow and ate them

1. G = confirmed; P = possible; Sp = confident of the genus; U = Unknown