

2011 NAMA Toxicology Committee Report

North American Mushroom Poisonings

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Abstract

In 2011, for North America, the reports to NAMA included 117 people seriously sickened by mushrooms. Thirteen cases involved ingestion of either “Destroying Angel” or “Death Cap” mushrooms in the genus *Amanita*. There was one death and two people needed a liver transplant after ingestion of a “Destroying Angel”, presumably *Amanita bisporigera*. Three cases, including one death, involved amatoxins from a *Galerina*, presumably *Galerina marginata*. There was one case of kidney damage after consumption of *Amanita smithiana* and a second case of kidney damage involving two women who consumed an unknown mushroom. The year was noteworthy for the large number of reports of problems from consumption of morels with 22 cases (18.8% of the total). A number of problems were the result of people consuming morels raw – but everyone recovered within 24 hours. The eighteen *Chlorophyllum molybdites* cases (15% of the total) were sometimes quite severe and often required hospitalization. While *Gyromitra* cases numbered only nine (eight *Gyromitra esculenta* and one *Gyromitra montana*), four required long hospitalizations as a result of liver damage. In the Northeast, newspaper reports mention long hospitalizations from some of the mushrooms known to cause gastro- intestinal distress, but we have no information on those cases. Twenty seven reports of dogs ill after eating mushrooms included fourteen deaths of the dogs. The dog deaths were mostly attributed to ingestion of mushrooms containing α -amanitin, including probable *Amanita bisporigera*, *Amanita ocreata* and *Amanita phalloides*, though in at least one case the possibility of a deadly *Galerina* cannot be ruled out. There was one dog case involving liver damage from a deadly *Conocybe* but that outcome is unknown. *Inocybe* species led to five serious poisonings in dogs.

Partly as a result of a record mushroom season in eastern North America, the reports of poisonings due to mushrooms was up in 2011 We received reports involving 117 humans with two deaths and two transplants, 27 dogs with 13 deaths, and 3 rabbits intoxicated. However, we are concerned that increasingly our information is very sketchy, too often gleaned from newspaper reports after the fact, and the reports we are getting are just a small fraction of the total. For example, when I sent the first draft of this report out for review, I thought that there had been only five amatoxin cases and no deaths or transplants in 2011. Dr. Todd Mitchell responded that 2011 was a record breaker for amatoxin cases as well, with two deaths and two transplants. He reported that:

The amatoxin Open IND nationwide clinical trial [which includes use of injectable silibinin from Milk Thistle, known as Legalon-SIL] enrolled 14 new patients. Of the 14, one died at John Muir Hospital in October (from a *Galerina*) and another died in New Jersey (from an *Amanita*). There were at least two patients transplanted (New Jersey and Pennsylvania) who were not enrolled in our study. The John Muir patient developed early acute renal failure and then multi-system failure before starting IV Legalon-SIL and lasted less than 48 hours from ED presentation. The NJ patient was already in fulminant hepatic failure before starting IV Legalon-SIL at > 5 days post ingestion. We did not expect SIL to help in the last two cases.

I consulted on the Georgetown patients treated by Dr. Laurin (see below). Press reports to the contrary, they were not treated via Emergency INDs nor via compassionate use. We enrolled patients in Ohio; Chicago (*Galerina*); Windsor, Ontario; Pennsylvania, and California (the death in October and a related case were also *Galerina* intoxications).

I personally treated two cases in Santa Cruz; one in July (!) and a second in November. Both were *Amanita phalloides*, picked and consumed in La Selva Beach. The July patient consumed five large death caps. He underwent percutaneous cholecystostomy in addition to receiving aggressive hydration and IV Legalon-SIL. Both recovered rapidly.

Raymond LaSala, President of the Mycological Association of Washington, an amateur mycologist with over 30 years of experience with the cooperation of Marco Paez, a fourth year medical student at Georgetown University Hospital provided a detailed account of one of four “Destroying Angel” cases handled by Georgetown University Hospital last summer . The attending physician was Dr. Jacqueline Laurin:

“The patient was a 49 year-old male with no history of liver disease who was transferred to Georgetown University Hospital from an outside hospital on 9/15/11 for evaluation and possible liver transplantation. After the rainy weekend on 9/12/11, the patient noticed many new mushrooms in his backyard in northern Virginia. He picked approximately 15 mushrooms, enough to carry in both hands. He reported that there were several colored mushrooms, but most of them were white. That same morning he made a stir-fry mushroom broth. Two hours after consuming the mushrooms, he developed profuse watery non-bloody diarrhea. He had approximately 20 bowel movements that day. The next morning he continued to have diarrhea, and nausea. He had one episode of self-induced emesis where he noticed many mushrooms were still intact. He continued to have diarrhea throughout the day and was not consuming any food. On Wednesday he began to feel fatigued and lightheaded. He went to an outside hospital, where they performed basic lab tests. His liver enzymes were elevated (ALT 8000/ AST 750, normal is less than ALT60/AST40), and he was found to be in renal failure. The outside hospital started him on N-acetylcysteine and contacted the Transplant Hepatology team at Georgetown University Hospital.

Overnight the patient was transferred to Georgetown. The team there contacted the National Capital Poison Center and consulted with an expert physician on *Amanita phalloides* toxicity to help them with his treatment. They gave him aggressive fluid resuscitation, started him on IV Legalon-SIL, and kept him without eating. They also performed an Endoscopic retrograde cholangiopancreatography and placed a nasobiliary drain to prevent the toxin from recirculating into the hepatobiliary system... His liver enzymes and renal function steadily improved, and he was discharged on 9/19/2011 (ALT638, AST62).”

When Raymond LaSala first contacted me immediately after the patient was treated and released, he had only seen poor quality pictures of the suspect mushrooms and so was quite unsure of whether or not the patient had actually consumed a deadly *Amanita* species. Indeed, he speculated that since the recovery was so rapid, it was probably a *Tricholoma* or an *Inocybe* that was the culprit. Both Gary Lincoff and I examined the images but the only conclusion we were able to arrive at was that an *Inocybe* was not involved. However, later Raymond LaSala was able to examine the actual suspect mushrooms which were still in good condition. The species involved were *Suillus granulatus*, *Amanita rubescens*, and *Amanita bisporigera*. We do not know how much of the *Amanita bisporigera* was consumed.

Shortly after this case, a retired farmer from Frederick and then two women were admitted to Georgetown and each in turn treated with IV Legalon-SIL by the same attending physician, Dr. Jacquelin Laurin, a liver specialist. I have no details on these other cases other than news reports that the outcome in all four cases was successful.

According to numerous news reports in late September of 2011, Dr. Laurin had read a research paper detailing the effectiveness of the drug which is approved for use in Europe. According to the news reports, her experience in these four cases has left her hoping that the FDA will approve silibinin soon. I have the same hope, but wish to emphasize that there is not enough information on any of these cases to allow one to evaluate the severity of the poisonings or the efficacy of IV Legalon-SIL. Roughly 90% of patients recover with aggressive fluid replacement alone. Dr. Denis Benjamin pointed out (personal communication) that the kidney failure may have been due to dehydration as the patient had severe diarrhea for many hours. In the most serious cases, blood clotting times soar and we have no information about this aspect of the poisoning. In light of this, judging the severity of the intoxication is problematic.

Prior to this year, I only knew of one confirmed death from ingestion of species of *Galerina*, though I had seen mention of other cases. This year three people suffered amatoxin poisoning from consumption of a *Galerina* and one of those people died. I wish that I had more details about these cases.

The Michigan Poison Control Center dealt with at least 19 cases of individuals sickened from eating either *Gyromitra* species or *Morchella* species (although all of the morels were self-identified and some people do not distinguish between *Morchella* and *Verpa*). Dr. Susan Smolinske, director of the Children's Hospital of Michigan Regional Poison Control Center in Detroit, in late May reported in the press that calls for 2011 had already reached 53, double the normal. She was kind enough to provide us with a spread sheet including 31 of the most serious cases handled by her center last year (she excluded hallucinogenic mushroom cases, presumably since those were not accidental). Those reports included 8 cases involving *Chlorophyllum molybdites*, 6 cases involving *Gyromitra* species and 13 cases involving "morels." In one case, a Michigan doctor provided a report of a man who had consumed 30 cooked *Gyromitra esculenta*, suffered liver failure and was considered for a liver transplant, but recovered and has given up mushroom hunting. Two other Michigan residents who also consumed *Gyromitra* species suffered serious liver damage, but recovered. A Washington State resident suffered liver failure after consuming "snow morels", presumably *Gyromitra montana*, but no other information was available. These very severe cases should give pause to those individuals who still consume *Gyromitra* species. A study is underway in California to study gyromitrin levels in mushrooms and try to see if the western mushrooms are safer than those of the upper mid-west. I have also heard talk of a possible study of *Gyromitra* species in Washington State. I personally quit consuming both *Gyromitra esculenta* and *Gyromitra montana* 30 years ago (and even back then I always thoroughly cooked them outside so that any gyromitrin would hopefully harmlessly evaporate and dissipate).

New Hampshire saw 18 people hospitalized in September alone and the total for the year was well over 30 (compared to 8 cases all year in 2009 and 11 cases in 2010). While there were no fatalities, the Northern New England Poison Control Center (New Hampshire, Maine and Vermont) had unprecedented numbers of cases with 97 cases in August and September. While most were gastrointestinal disorders, some were so severe that appendicitis was suspected at first. Some people were hospitalized for long periods of time, though none died. In Massachusetts and Rhode Island there were 45 calls in September 2011 compared to 5 calls in September 2010. Kathie Hodge was quoted in one newspaper as saying that this was the best wild mushroom season in a decade; others have said it was the best in a lifetime.

With the exception of the Rocky Mountain Poison and Drug Center, and now the Michigan Poison Control Center, the frequency of contact between toxicology identifiers and Poison Control has been steadily dropping. The factors are varied – there have been large budget cuts affecting the centers so that the centers focus more now on managing symptoms and less on identifying the mushrooms. Patient confidentiality concerns and liability issues further decrease interactions. In California, the Poison Centers have barred their consultants from filing reports, apparently over confidentiality concerns. In contrast Bill Bakaitis has been talking with staff at the Northern New England Poison Center to get closer cooperation between Poison Centers and volunteer toxicology identifiers and to develop a protocol for what information needs to be gathered about mushrooms suspected of causing a poisoning.

Even given these challenges, through extensive efforts of several committee members, we have great detail on a few of the cases from 2011. I want to thank the individuals on the toxicology committee for the time they took to field emergency phone calls at all hours, collect mushrooms (or sometimes stomach contents) for identification, do microscopy where possible, and sometimes even to provide

photographs including photo-micrographs. In one weird case a family consumed the normally poisonous *Omphalotus illudens* without getting sick.

In one interesting case of a non-poisoning, Molly Widmer followed up on a case involving a woman's nephew who picked "Chanterelles" and shared them with his Aunt, but the mushrooms appeared to actually be *Hebeloma crustuliniforme*, or Poison Pie. Why then did no one get sick? Then Molly noticed that the mushrooms had started to smell sweet, and did not smell radish-like as expected for *Hebeloma crustuliniforme*. She soon identified them as *Hebeloma sacchariolens*, a name that means becoming sweet. I am still not going to eat a *Hebeloma*!

In another case, Paul Kroeger, not only did microscopy of the soup the victim had made but sent samples to Innsbruck, Austria where Martin Kirchmer confirmed the suspected toxins of *Amanita smithiana* which had caused a case of kidney failure. Interestingly the toxins had suffused throughout the soup and into the vegetables and other mushrooms of the soup, meaning that picking out the offending *Amanita* chunks would not have made the soup edible. In another British Columbia case, a couple consumed what they initially thought was a Matsutake, but right after eating, looked in their mushroom book - the mushroom they had eaten appeared to match a picture labeled *Amanita solitaria*. They self-medicated with activated charcoal while exhibiting typical panic symptoms. Four of us were involved trying to get them to go to a doctor but they were on a Gulf Island, the seas were high and the ferry was not running. Communications and storms continued for a week, but adverse symptoms never occurred. Pictures they sent us were apparently of *Amanita smithiana* and we were very concerned about kidney damage due to the presence of allenic norleucine. They got lucky but were scared for a week and required a lot of attention. It would have been so much better had they looked the mushroom up before the meal rather than immediately afterwards.

There was also a mild allergic reaction to a self-medication for laryngitis using a "tea" made from a small piece of *Ganoderma applanatum* (or a very similar polypore). In an internet search using eHow, Marilyn Shaw discovered a list of a number of allergic reactions to these conks, several of which could be serious.

A very interesting mushroom reaction was reported in the February 18, 2011, New York Times. A woman came to her doctor after observing a red rash confined mostly to the back of her hands, but later that day it became redder and started to itch and become painful. Blisters formed overnight. She was treated for contact dermatitis but returned two days later. The little blisters had hardened, the red streaks were almost purple and raised, with welts streaked across her neck, back, legs and abdomen. Three days prior to the start of the rash she had sampled lightly cooked shiitake at her local grocery store. Her reaction was a toxic (not allergic) reaction to lentinan, a component of Shiitake that breaks down with heat and so is a condition only seen when mushrooms are eaten raw or partly cooked and affects only about 2% of the population. This is another example why mushrooms should never be consumed raw or only lightly cooked (Truffles are the exception). It is also important to remember, that some mushrooms have toxins that are not destroyed by heat. In a recent news article by CNN, George Hudler was being interviewed (along with Paul Stamets) and emphasized the importance of cooking all edible mushrooms prior to consumption. However, in the final published version the implication by the reporter was that the toxins in all mushrooms can be destroyed by heating. George and Paul are very concerned about how their information was incorrectly used. It is important to remember that amatoxins are neither destroyed nor volatilized on cooking and so remain a danger no matter how the mushroom has been prepared. It is also important to remember that in talking to the press, there is a strong possibility of being misquoted.

As has frequently been reported for morels in the past, several people learned the hard way that morels also must be thoroughly cooked prior to consumption. Raw, they can cause a serious bout of vomiting and diarrhea. Also, eating a lot of morels over the course of a week or so eventually can lead to sensitization. One individual got quite sick at a meal of morel mushrooms after eating a lot of them over the course of a week (something that I, myself, often do). Similarly, a woman reported that she had eaten morels for years, had a meal this past year where she got mildly sick and then consumed them one more time and had violent GI distress. My wife has eaten morels for years and dearly loves them but had a bloated and uncomfortable feeling after sharing a mushroom quiche with me. A month later we made another quiche from dried morels and she had the same reaction. Morels are now off of her list. Unfortunately, she now seems to get the same reaction from Chanterelles and so she has quit eating

mushrooms entirely, at least for the time being. Normally, a person does not become sensitized to multiple mushrooms, but that seems to have happened to my wife. A professional mycologist from Washington State also contacted me about his wife's adverse reaction to yellow Chanterelles (from Idaho) which she had eaten and enjoyed for years. An almost identical report for yellow Chanterelles came in from Southern Oregon as well. In another edible mushroom case gone bad an Oregon woman consumed "Honey Mushrooms," apparently *Armillaria solidipes*. Her comment to me was why aren't people warned that GI distress can mean symptoms so violent that you honestly believe that you are going to die. Be warned. My final choice edible mushroom tale involves my own family yet again. For a special New Years Eve dinner I made a huge salad topped with Italian cheese in truffle infused olive oil with about 6 paper-thin slices of the "Summer Truffle", *Tuber aestivum*. Each of us had been apportioned one thin slice of truffle. The instant that my grown son swallowed his piece, his throat constricted. He started to go into shock. He took an antihistamine and was quickly better, but will never touch another Truffle, though he has eaten and loved mushrooms for about 30 years.

One case demonstrates the risks that mushroom clubs face when they serve a mushroom sample plate at a show. The report was as follows:

...we handled some mushrooms on display and purchased the mushroom sample plate and soup. I also tasted samples of the delicioso and puff ball mushrooms. Within half an hour of eating the food, I developed a feeling of numbness in the left side of my throat and mouth. This spread to involve my left jaw, cheek and eye area. I had already left the... so I did not tell anyone at the time. I walked to the car to take a Benadryl® from my first aid kit in case it was an allergic reaction. (I have not had anything like this before and am not prone to allergic reactions). There was no immediate relief. Later in the day I also had some numbness in my left calf and left foot. The next day there was slight numbness in my left face and left foot and calf. Unfortunately I am still experiencing...

I was consulted and this certainly does not match up with mushroom symptoms. The individual was advised to seek medical advice since one-sided numbness or weakness is a classical sign of a possible stroke. The concern that he had been poisoned blinded the person to the need to seek a better explanation for his symptoms.

Poison Centers frequently issue alerts to never eat wild mushrooms and that "experts" are easily fooled. As an "expert" there are a few rules that I follow to help keep from poisoning myself. The first rule is not to eat an all-white mushroom. You risk death from mistakenly eating a deadly *Amanita*, or loss of kidney function from *Amanita smithiana* and some closely related amanitas. More than one person did eat deadly *Amanita* species this year, one died and two others required a liver transplant. One couple ate an all-white *Entoloma* in the *E. sinuatum* complex – they did not die but suffered 5 hours of violent, painful vomiting and 36 hours of diarrhea followed by 6 hours in the hospital connected to IVs. I do not eat pink-spored gilled mushrooms either – too many of them are poisonous. In their email to me (accompanied with a photograph), the couple who consumed the *Entoloma* were concerned that they may have poisoned themselves with α -amanitins (a real possibility from the top-down photo they sent in which I could glimpse white gills in the picture but could not see any part of the stalk). But alarm bells really went off when they were worried that it might have been a *Cortinarius* (rusty-brown spore-print) or a brown *Paxillus*. This brings me to a second rule: join a club and learn to mushroom with people who actually know how to identify mushrooms. Do not eat a mushroom you cannot positively identify and check your identification before eating the mushroom, not afterwards (see *Amanita smithiana* case above – another all-white mushroom, in this case correctly identified immediately after eating it)! In two separate incidents, individuals consumed *Chlorophyllum molybdites* thinking that they were eating "Shaggy Manes", *Coprinus comatus*. Both are shaggy and have free gills. But let's review the "subtle" differences. Shaggy Manes are tall and cylindrical (bullet-shaped) have soft non-bruising flesh, black spores, and quickly turn to black ink. *Chlorophyllum molybdites* is broad with a convex to plane cap, has a distinct ring on the stalk, firm flesh that bruises dingy reddish, initially white gills and white spores with both spores and gills turning olive-greenish at maturity, and does not turn to black ink. I can understand mistaking a "Shaggy Parasol" (*Macrolepiota procera*) for a *Chlorophyllum molybdites* (and that did happen last year) but mistaking a Shaggy Mane for *C. molybdites*

means that the person is not adequately observant to be picking wild mushrooms for the table. Another rule that one woman might not have been aware of (besides to never eat a mushroom you cannot positively identify), is never eat a bolete with red tube mouths. Sure, some of the red-tubed boletes are edible, but at least one causes sufficiently violent gastric distress that death can be the ultimate result. She merely suffered mild gastric distress.

Breathing mushroom spores over several days while closely painting *Amanita muscaria* caused a painter to experience dizziness, disorientation, nausea, headache and loss of balance. She reported that the specimen was 2 inches from her nose for 12 hours a day for 3 days. This incident serves as a caution about mushroom forays where the displays are indoors and individuals are working closely with the mushrooms. Problems from breathing spores are not commonly reported, but they do occur.

There was one case (9/17 in Pennsylvania) where two women suffered kidney failure after a mushroom meal, and although the poison center contacted me and tried hard to get me more information, I was unable to get anyone to send me a photograph of the mushrooms (which had been saved) or to tell me anything about the outcome.

In a California dog death mystery, the dog apparently ate mushrooms in the yard, became somewhat ill but soon recovered. Soon thereafter the dog apparently consumed mushrooms again and died of liver failure. The yard was full of *Lepista nuda*. No other mushrooms were found by the owners. For humans *Lepista nuda* is considered to be toxic if consumed raw, but we have no details on just how toxic it is. Could those mushrooms have killed the dog? In late March in central California where this incident occurred, deadly *Amanita ocreata* and *Amanita phalloides* are both likely to also be present. These two species kill many dogs each year in California and dog owners need to be alert since dogs seem to find the deadly *Amanita* species to be irresistible. The total number of reported dog deaths was 14, primarily from *Amanita bisporigera*, *Amanita phalloides* and *Amanita ocreata*. A couple of years ago, one elderly man reported that *Amanita ocreata* was the most delicious mushroom he had ever eaten – he died a couple of days later.

Table I: Human Poisoning Frequency by Species in 2011

Mushroom Species	# People	% of total Cases
<i>Morchella species</i> ¹	22	18.8%
<i>Chlorophyllum molybdites</i>	18	15.4%
<i>Amanita sp</i> (Destroying Angels)	10	8.5%
<i>Gyromitra esculenta</i> ²	8	6.8%
<i>Amanita phalloides</i>	3	2.6%
<i>Galerina sp</i>	3	2.6%

¹Since most of the Morel cases involved unconfirmed identification by the victim, we must consider that a few of the cases may have involved *Verpa bohemica*.

²Most of the *Gyromitra* identifications were by the victim, but time and location makes their identification likely to be correct.

Table II: Human Mushroom Poisoning Cases by Age and Sex

Age	Male	Female	Sex Not Reported	%Male	% Female	% not reported
<14	8	6	4	6.8	5.1	3.4
15-29	2	3	3	1.7	2.6	2.6
30-44	1	7	5	0.8	6.1	4.3
45-59	8	8	5	6.8	6.8	4.3
>60	10	4	8	8.5	3.4	6.8
Unknown	16	8	11	13.7	6.8	9.4
TOTAL	45	36	36	38.3	30.8	31.1

Table III: Human Cases involving Amatoxins

Mushroom Details and ID Confidence	When/Where	Sex/Age	Onset (hrs)	Symptoms and Comments
<i>Amanita bisporigera</i> + <i>Amanita rubescens</i> & <i>Suillus granulatus</i> solid ID	9/12/11 VA	M,F 49,?	2 hrs	Wife not hospitalized. Husband ALT 8,000/ AST 750, in renal failure. Treated with aggressive fluid IV, IV Legalon-SIL and nasobiliary drainage. Discharged 7 days after ingestion.
<i>Amanita bisporigera</i> presumed	9/11 MD	M 82	?	Treated as above using Amatoxin Open IND clinical trial (including IV Legalon-SIL). Released.
<i>Amanita bisporigera</i> presumed	9/11 MD, VA?	F	?	Treated as above using Amatoxin Open IND clinical trial (including IV Legalon-SIL). Released.
<i>Amanita bisporigera</i> presumed	9/11 MD, VA?	F	?	Treated as above using Amatoxin Open IND clinical trial (including IV Legalon-SIL). Released.
<i>Amanita bisporigera</i> presumed	Summer OH	? ?	?	Treated using Amatoxin Open IND clinical trial (including IV Legalon-SIL); survived.
<i>Amanita bisporigera</i> presumed	Summer PA	? ?	?	Treated using Amatoxin Open IND clinical trial (including IV Legalon-SIL); survived.
<i>Amanita bisporigera</i> presumed	Summer NJ	? ?	?	Treated using Amatoxin Open IND clinical trial (including IV Legalon-SIL); Patient already in fulminant hepatic failure before starting SIL @ > 5 days post ingestion. DEATH.
<i>Amanita bisporigera</i> presumed	Summer NJ	? ?	?	Not treated using Amatoxin Open IND clinical trial; transplanted
<i>Amanita bisporigera</i> presumed	Summer PA	? ?	?	Not treated using Amatoxin Open IND clinical trial; transplanted
<i>Amanita phalloides</i>	10-6-11 ON	? 86	> 6 hr.	Liver failure, INR 1.8; ALT >3,500; Amatoxin Open IND clinical trial (including IV Legalon-SIL); survived.
<i>Amanita phalloides</i>	7/11 CA	M ?	?	Patient consumed five large death caps; he underwent percutaneous cholecystostomy, aggressive hydration, IV Legalon-SIL; recovered.
<i>Amanita phalloides</i>	11/11 CA	M ?	11 hr.	Treatment unknown. Recovered rapidly.
<i>Galerina</i>	10-2011 CA	? ?	?	Acute renal failure and multi-system failure before starting IV Legalon-SIL. DEATH less than 48 hrs from ED presentation.
<i>Galerina</i>	10-2011 CA	? ?	?	Treated using Amatoxin Open IND clinical trial (including IV Legalon-SIL); survived.
<i>Galerina</i>	2011 IL	? ?	?	Treated using Amatoxin Open IND clinical trial (including IV Legalon-SIL); survived.

Table IV: General Human Poisoning Cases

Mushroom Details and ID Confidence	When/ Where	Sex/ Age	Onset (hrs)	Symptoms and Comments
<i>Agaricus xanthodermus</i>	8-13-11 CO	M 14 Mo	1 hr.?	Vomited 5-6 times. Recovered after 24 hrs in hospital (had other health issues).
<i>Agrocybe vernalis</i> group (expert ID)	4-23-11 CA	M 3	?	Intestinal cramps and severe abdominal pain. Consumed raw.
<i>Amanita cf gemmata</i> Possibly a light <i>Amanita pantherina</i>	6-17-11 OR	F 4	0.5 hr.	Salivation, muscle spasms, drowsiness, fixed and dilated pupils, unconscious and unresponsive.
<i>Amanita muscaria</i> SPORES	8/2011 WA	F 58	Over Days	Respondent had been painting the mushroom over a course of days and inhaled spores. Dizzy, disoriented, nausea, headache, loss of balance.
<i>Amanita pantherina</i> + <i>Cortinarius sp</i> + ?	11-6-11 OR	F 30-60	2 hr.	Vomited, ate more mushrooms, vomited more, incoherent, pickled mushrooms.
<i>Amanita pantherina</i>	10/2011 OR	M,F ?,?	?	Still vomiting 5 hours after consuming mushrooms. No other effects.
<i>Amanita smithiana</i> Chromatography revealed toxins also spread to vegetables in soup	10-28-11 BC	M ?	6 hrs	Nausea, vomiting, overwhelming fatigue. Day 2 ongoing vomiting, unwell, day 3 urine stopped, day 5? Hospitalized & transferred for dialysis. 3 wk. recovery.
<i>Armillaria solidipes</i> ID as <i>A. mellea</i>	10-31-11 OR	F, M 42, ?	2 hr.	Dizzy, sweating; violent vomiting and diarrhea for 10+ hrs, continuing lesser level 24 hrs, male briefly passed out
<i>Boletus edulis</i>	10-22-11 CA	M 13	4-5 hr.	Diarrhea and vomiting after 2-3 Tbsp., cooked; no previous reaction.
<i>Boletus cf regius</i> but under Douglas fir	11-3-11 OR	M 50?	soon	A small bite chewed to test for bitterness had raw potato taste, then lips swelled for ½ hour
<i>Boletus subvelutipes</i>	8-30-11 VT	F 42	6 hr.	Pain over pancreas and dizzy.
<i>Cantharellus formosus</i> Eaten before – no effect	9-11 ID	F ?	2 hr.	Intermittent stomach cramps lasting 5-6 hours; 3 mushrooms well cooked.
<i>Cantharellus formosus</i> Eaten before – no effect	11/25/11 OR	M ?	3 hr.	Severe abdominal pains, mildly elevated Creatinine, BUN; mushrooms undercooked.
<i>Chlorophyllum cf brunneum</i> (two caps consumed)	10-7-11 WA	M 60s	16 hr.	Vomiting and diarrhea, episodic diarrhea over a couple of days; normal liver function; fine at 80 hours post ingestion.
<i>Chlorophyllum molybdites</i> Definitive Identification	6-28-11 MI	? 6	1 hr.	Vomiting for 24 hours; given Ondansetron; consumed 1 bite raw.
<i>Chlorophyllum molybdites</i> Definitive Identification	8-7-11 MI	? 38	1 hr.	Vomiting, diarrhea, Creatinine 1.8; given IV fluids; 24 hr. recovery; Consumed cooked by 3 diners, 1 ill.

Mushroom Details and ID Confidence	When/Where	Sex/Age	Onset (hrs)	Symptoms and Comments
<i>Chlorophyllum molybdites</i>	8-8-11 MI	M 68	?	Nausea, vomiting plus hypotension and tachycardia after eating 1 cap raw.
<i>Chlorophyllum molybdites</i> (thought was "shaggy mane")	8-10-11 MI	M 72	2 hr.	Nausea, ataxia, trouble reading after consuming one cap cooked in omelet; IV fluids, ondansetron; resolved 24 hrs.
<i>Chlorophyllum molybdites</i>	8-13-11 CO	F 50s	1 hr.	Vomited after consuming 2/3 of a 3" cap sautéed and then in omelet, no alcohol.
<i>Chlorophyllum molybdites</i>	8-2010 TN	M 61	3 hr.	Diarrhea, sweating, vomiting, nausea, dry heaves every 30 seconds after 1 bite raw.
<i>Chlorophyllum molybdites</i>	8-16-11 NY	F 65	2 hr.	Diarrhea, intestinal cramps, vomiting after eating 4 cooked mushrooms.
<i>Chlorophyllum molybdites</i> (thought was "shaggy mane")	8-17-11 MI	M 63	1.5 hr.	Vomiting, diarrhea, blood in stool, tachycardia (150), creatinine 1.8, 4 mg/dl drop in hemoglobin; IV fluids, ondansetron; cooked plateful, no alcohol.
<i>Chlorophyllum molybdites</i> Definitive identification	8-19-11 MI	? 48	6 hr.	Diarrhea, creatinine 1.7; IV fluids; resolved in 24 hours; raw, 1 bite.
<i>Chlorophyllum molybdites</i> Definitive ID	8-22-11 MI	M 52	2-3 hr.	Vomiting, diarrhea, weak, creatinine 3.7, BUN 46; IV fluids; discharged day 2; consumed 2 finger-length pieces raw.
<i>Chlorophyllum molybdites</i> ID from Images Thought Shaggy Parasol	8-22-11 MN	F, ?,? 30+ ?,?	1.5 hr.	Three people consumed cooked mushrooms and suffered diarrhea, vomiting, nausea. Bloody diarrhea (1).
<i>Chlorophyllum molybdites</i> Definitive identification; 1 large, cooked, no alcohol.	8-24-11 MI	? 88	2 hr.	Vomiting, diarrhea, hemoglobin 9, pneumonitis; IV fluids, promethazine; discharged after 1 week.
<i>Chlorophyllum molybdites</i> 1.5 specimens (4-6", raw)	9-9-11 MI	M 41	2.5 hr.	Nausea, vomiting, pinpoint pupils, tachycardia, sweating, lethargy; profuse rectal bleeding (also on Coumadin); IV fluids, ventilator (2 days), promethazine.
<i>Chlorophyllum sp</i> <i>molybdites</i> or <i>rachodes</i>	12-19-11 HI	M 58	1 hr.	Consumed 6-7 raw mushrooms. Vomiting and diarrhea
<i>Chlorophyllum molybdites</i> (Presumed)	8-10-11 TX	F 55	1 hr.	Disorientation, vomiting, weakness, headache, dizziness, vaginal bleeding with passage of large blood clots – 8 days.
<i>Coprinus comatus</i> Ill effects 2 times weeks apart second occasion not aware mushrooms were in meal	? AB	M Adult	~2 hrs	Bloated feeling followed abdominal discomfort, diarrhea for ~2 hours. Second time symptoms bloating then both vomiting & diarrhea, immediately better.
<i>Entoloma cf sinuatum</i> All- white mushroom mistaken for very different species.	8-24-11 NF	M,F ?,?	?	Five hours of severe vomiting accompanied by 36 hours of diarrhea then 6 hours IV fluids at hospital; heads feel "stupefied", no hallucinations.
<i>Entoloma sp</i> likely or <i>Clitopilus sp</i>	9-10-11 CO	F 5	0.5 hr.	Vomiting and diarrhea. Mushroom photos and description not clear.

Mushroom Details and ID Confidence	When/Where	Sex/Age	Onset (hrs)	Symptoms and Comments
<i>Ganoderma applanatum</i> or similar	7-25-11 CO	F 28	3 hr.	Made tea from a small piece to sooth laryngitis – had tingling around mouth
<i>Gyromitra esculenta</i> (presumed), “beefsteak mushrooms”	5-2011 MI	M Adult	?	Fried ±30 mushrooms with flour and butter; developed nausea and vomiting; next day he was yellow; liver failure, transferred for possible liver transplant.
<i>Gyromitra sp</i> “beefsteak” <i>G. esculenta</i> presumed	5-8-11 MI	? 17	2	Vomiting, ALT 52; given IV fluids zofran; lasted 7 hours, unknown amount cooked.
<i>Gyromitra sp</i> “beefsteak” <i>G. esculenta</i> presumed	5-10-11 MI	? 78	±12 hr.	Vomiting, bilirubin 4, AST 139, ALT 161; in ICU 3 days, LFTs resolving at discharge. Unknown amount cooked + alcohol.
<i>Gyromitra sp</i> presumed <i>G. esculenta</i>	5-17-11 MI	? 37	5	Abdominal pain nausea; given antiemetic; amount eaten and preparation unknown.
<i>Gyromitra sp</i> <i>G. esculenta</i> presumed	5-25-11 MI	? 70	>6 hr.	Abdominal pain, vomiting, AST 64, ALT 52, bilirubin 32; antiemetic; lasted 4 days; preparation and amount eaten unknown.
<i>Gyromitra sp</i> <i>G. esculenta</i> presumed	5-25-11 MI	? 73	>6 hr	Vomiting, bilirubin 6.3, AST 81, ALT 97; treated with antiemetic; lasted 4 days; preparation and amount eaten unknown.
<i>Gyromitra sp</i> <i>G. esculenta</i> presumed	6-7-11 MI	? 50	1 hr.	Vomiting; soon resolved; consumed 50 cent size piece raw.
<i>Gyromitra esculenta</i> (thought they were morels, but later looked in book).	7-12-11 MT	M 26	4-5 hr. twice	Consumed ½ cup cooked misidentified “morels”, twitchy stomach. Later another ½ cup, twitching stomach muscles again.
<i>Gyromitra montana</i> suspected	5-9-11 WA	? ?	?	Patient consumed “snow morels” and was hospitalized with GI distress. Elevated liver enzymes (1,000).
<i>Hypholoma fasciculare</i>	11-28-11 WA	M 17 Mo	6 hr.	Child seen spitting out mushroom and Poison Center says not to worry. Then diarrhea, second huge episode burns the skin, some more diarrhea for 24 hrs.
<i>Inocybe sp</i> + <i>Russula sp</i> + <i>Suillus, etc.</i> Unclear what was consumed	11-27-11 WA	F ?	?	SE Asian does not speak English, appeared to be hallucinating, bradycardia.
<i>Laetiporus sulphureus</i> + <i>Grifola frondosa</i>	9-2011 ME	F 25	10 hrs	Severe diarrhea persisting for 10 days; intestinal cramps. Ongoing issues imply some non-mushroom problems.
<i>Leccinum fibrillosum</i> ID by family member. Eaten regularly by family, no previous problem.	3-5-11 CO	M 45	3 hr.	Chills, diarrhea, intestinal cramps, vomiting, nausea, weakness, cool clammy. Dried, added to cooked meal, alcohol consumed.
<i>Lentinula edodes</i>	2-2011 ?	F 56	3 days	Shiitake dermatitis – a severe rash from consuming undercooked Shiitake.

Mushroom Details and ID Confidence	When/Where	Sex/Age	Onset (hrs)	Symptoms and Comments
<i>Marasmius nigrodiscus</i> ID possible, not confirmed	7-2-11 PA	M Adult	1/3 hr.	Consumed a small test sample cooked in butter. Taste slightly bitter but flavorful. Nausea comes and goes.
<i>Marasmius oreades</i> No evidence it was eaten	7-21-11 BC	Unk. 1	?	Presented at hospital with seizures, suspected mushrooms but no reason
<i>Marasmius oreades</i> (from photo dried material)	10/2011 OR	F ?	?	Vomited 3x within 5-6 hours after eating "fairy ring mushrooms"; vomiting continued several days.
<i>Megacollybia platyphylla</i> professionally confirmed	6-5-2011 VT	M 16	0.5 hr.	Vomiting followed by diarrhea and vomiting for 6 hours. Consumed raw.
<i>Morchella sp</i> self or family ID	5-10-11 MI	? 26	1 hr.	vomiting; resolved after 16 hours; consumed raw.
<i>Morchella sp</i> self or family ID	5-13-11 MI	? 68	3 hr.	vomiting; resolved after 4 hours; consumed cooked in omelet
<i>Morchella sp</i> self or family ID	5-13-11 MI	? 49	4 hr.	vomiting, abdominal pain, diarrhea; resolved after 12 hours; cooked, 1 of 6 diners ill.
<i>Morchella sp</i> self or family ID	5-15-11 MI	? 3	0.3 hr.	Vomiting for 4 hrs; consumed raw.
<i>Morchella sp</i> self or family ID	5-17-11 MI	? 55	2.5 hr.	Vomiting for 12 hours, abdominal pain; oral hydration; consumed cooked + beer.
<i>Morchella sp</i> self or family ID	5-19-11 MI	? 40	0.5 hr.	Diarrhea, lips, face numb; cooked.
<i>Morchella sp</i> self or family ID	5-19-11 MI	? 66	7 hrs.	Diarrhea, vomiting; given Imodium; sick for 3 days; cooked; 1 ill of many diners.
<i>Morchella sp</i> self or family ID	5-22-11 MI	? 8	12 hr.	Agitation, vomiting; given lorazepam; resolved; prep. & amount unknown; rest of family not affected.
<i>Morchella sp</i> self or family ID	5-26-11 MI	? 42	3.5 hr.	Diarrhea, vomiting; CT scan, discharged; cooked, no alcohol.
<i>Morchella sp</i> self or family ID	5-27-11 MI	? 25	< 1 day	Diarrhea, abdominal pain, vomiting; IV fluids; cooked, no alcohol; 1 other not ill.
<i>Morchella sp</i> self or family ID	6-2-11 MI	? 64	15 hrs.	Vomiting; resolved in 1 day; cooked, wine consumed, 1 ill out of 2 diners.
<i>Morchella sp</i> self or family ID	6-13-11 MI	? 56	2 hr.	Diarrhea, vomiting; given oral fluids; cooked, 1 out of 4 diners ill.
<i>Morchella sp</i> and <i>Gyromitra sp</i> mixed	5-20-11 ID	M 60s	12+ hours	Vomited 7 times and felt ill for 24+ hours after large meal with alcohol. 2 day previous lighter meal - no ill effects.
<i>Morchella sp</i> eaten without ill effect for years, one mildly bad time, and then "whamo."	4-11 MO	F 56	1 hr. or so	Cooked morels consumed by 4, one ill. Chills, diarrhea, intestinal cramps, sweating, vomiting, nausea, weak.

Mushroom Details and ID Confidence	When/ Where	Sex/ Age	Onset (hrs)	Symptoms and Comments
<i>Morchella sp</i> "black morels"	6-16-11 ID	2F,M Adult, 11, 13	0.5 hr.	Consumed raw then nausea (daughter), vomiting (mother and son). Did not know morels had to be well cooked to be safe.
<i>Morchella sp</i> "pales plus grays"	6-5-11 ID	M Adult	2 hr.	Consumed morels for a week. Cooked another batch for 2 hours and then tasted them – vomited 6-8x, no alcohol.
<i>Morchella sp</i> Restaurant Meal	? MO	M ?	2 hr.	Severe diarrhea, nausea, and abdominal pain. Not clear if a reaction to morels or a food poisoning case.
<i>Omphalotus illudens</i> ID from photos	8-20-11 MN	M,M Adult, 13	1 hr.	Vomiting and nausea in the son, vomiting only in the father. Claims to have eaten this species before without effect.
<i>Pleurotus cf populinus</i>	6-13-11 UT	F 30	4	Nausea, diarrhea, vomiting after 1 cup of well-cooked oyster mushrooms from a cottonwood. 1 of 2 ill. No alcohol.
<i>Psathyrella gracilis</i>	6-23-11 MI	M 2	1-2 hr.	Consumed 2-3 g – hallucinations, salivation
<i>Psilocybe cf semilanceata</i> Photos of a <i>Psilocybe</i>	11-16-11 AK	F 28	?	Hallucinations. Fungi supposedly forced on her by someone else.
<i>Ramariopsis asterella</i> ID by Ramaria expert Imagine orange <i>R. concolor</i>	10-3-11 ME	M 49	5 hr.	Cooked for dinner. Awoke at 2 Am with intense upper GI distress, developed violent pain, cold sweat and turned pale.
<i>Russula cf emetica</i> ID by friend of victim	8-26-11 MI	F 52	4.5 hr.	Vomiting (11x), diarrhea (4x); oral fluids; resolved 1 day; cooked, no alcohol
<i>Russula sp</i> probable from poor photo	9-17-11 ID	F 4	2-3 hr.?	Eyes red and puffy, no other symptoms. Mushroom fractured when dropped.
<i>Scleroderma cepa</i> + 5 kinds native plants	7-13-11 OR	M,M Adults	soon	Vomiting
<i>Scleroderma cf citrinum</i>	9-24-11 OR	F 3	1 hr.	Vomiting 2x over 3 hours, fully recovered after 6 hours
<i>Tricholoma myomyces</i>	10-10-11 ON	M 61	4 hr.	Diarrhea after 30 pieces raw with egg and toast.
Unknown – all white, free gills, no ring or volva.	6-6-11 MI	M Adult	5 min.	Shortness of breath and became very agitated. Calm, well on arrival at hospital.
Unknown	10-5-11 IN	M 54	5 hr.	Chills, diarrhea, dizziness, intestinal cramps, disorientation, muscle spasms, nausea, weakness – lasting 6 days.
Unknown slimy mushrooms or more likely the flu?	9-11-11 CA	F,M Adults	8 hrs	Diarrhea, intestinal cramps, vomiting, nausea, headache lasting 2 weeks
Unknown white mushroom with dark gills (<i>Agaricus?</i>)	9-29-11 OR	F 2	?	Vomited twice over two hour period then fine.
Unknown small, delicate nondescript mushroom with no ring.	12-31-11 HI	M 4	2 hr.	Vomited multiple times; reduced consciousness, nystagmus, tachycardia, normal reactive pupils, fell down stairs.
Unknown Repeated attempts to discuss case went unanswered by MD	9/17/11 PA	F,F 41,77	24	Nausea, first increased then decreased urination. Presented to ER with kidney failure after 6 days. Ongoing dialysis.

Table V: Animal Poisoning Cases

Mushroom Details and ID Confidence	When/ Where	Animal sex, age	On-set	Symptoms and Comments
<i>Amanita bisporigera</i> Professional ID	9-15-10 VT	Dog F, 9 Mo	±2 hr	Two large mushrooms vomited, then lethargy, elevated liver enzymes, elevated blood clotting time; Given IV fluids; DEATH after 2 days.
<i>Amanita muscaria</i>	10-26-11 PA	Dog ?,?	1 hr.	Vomiting and diarrhea followed by seizures and difficulty breathing, pupils constricted, drooling and tearing excessively.
<i>Amanita muscaria</i>	12-4-11 PA	2 Dogs ?,?	?	Dog 1: vomiting only. Dog 2 pancreatic failure and seizures.
<i>Amanita ocreata</i> present in area at time	2-6-11 CA	Dog F, 4	?	Diarrhea, dizzy, muscle spasms, vomiting, nausea, weakness, blood not clotting. Given fluids, anti-emetic, etc. DIED day 3.
<i>Amanita ocreata</i> Poisoned a 65 pound Lab retriever/German shorthair	5-8-11 CA	Dog F, 10	7.5 hr.	Vomiting starts 7.5 hr.; ceased eating at 14 hr.; by 23 hrs decreased liver function; confusion at 34.5 hours, evacuation of bowels and violent convulsions; death at 35 hours post ingestion.
<i>Amanita phalloides</i> , possibly <i>A. ocreata</i>	6-10-11 CA	Dog F, 8 Mo		Vomiting, lethargic. Given IV drip, antibiotics, and steroids. Died. Photos of <i>A. phalloides</i>
<i>Amanita phalloides</i>	8-6-11 CA	Dog M, 14 wk.	11.5 hr.	fever, diarrhea, vomiting, bleeding from nose and mouth. Given blood transfusion, fluids, flushing. Died after 24 hrs.
<i>Amanita phalloides</i>	8-10-11 CA	Dog Pup	?	Death
<i>Amanita pantherina</i> (stomach contents an <i>Amanita</i>). Note: atropine heavily used but contraindicated	5-10-11 WA	Dog 8 Mo	few hrs	Chihuahua unresponsive, hypothermic, bradycardic; given IV fluids, atropine, became comatose, fixed pupils, severe bradycardia/apnea; given more atropine at second clinic, ephedrine, arrested and died in minutes
<i>Amanita sp</i> + other mushrooms or antifreeze???	8-1-11 NY?	Dog 5 Mo	?	Puppy seemed interested in mushrooms in yard including some <i>Amanita sp</i> . High temperature, malaise, renal failure, death.
<i>Chlorophyllum molybdites</i>	8-27-11 CA	Dog F, 2	?	Diarrhea, malaise, loss of appetite
<i>Conocybe sp</i>	8-22-11 CA	Dog ?	?	Dog ill and at vet, liver damage mentioned but severity and outcome not known

Mushroom Details and ID Confidence	When/Where	Animal sex, age	On-set	Symptoms and Comments
<i>Nolanea sp</i> (now part of <i>Entoloma</i>)	12-9-11 GA	Dog ?,?	?	Dog presented at Vet with sudden onset hepato-renal dysfunction.
<i>Inocybe mixtilis</i> Photos & Microscopy	5-23-11 BC	Dog 2	?	Chihuahua found dead in yard. Had previously been observed eating the mushrooms
<i>Inocybe mixtilis</i> Definitive ID	11-2011 WA	Dog ?,?	few hrs	Dog violently threw up the mushrooms; days later dog ate the mushrooms again and was sick again.
<i>Inocybe sp</i> Microscopy clearly showed <i>Inocybe</i>	6-18-11 NH	Dog Pup	?	Diarrhea and vomiting. Given charcoal and hydrated, recovered next day. Vet treats many animals for mushroom poisoning, rarely reports.
<i>Inocybe sp</i> or rat poison?	8-23-11 NY?	Dog adult	?	Dog started yapping loudly and fell ill. Vet found liver damage, low platelet count. Dog died of profound internal bleeding
<i>Inocybe sp</i>	8-7-11 NY	Dog M, 4 Mo	~1 hr.	Vomiting and diarrhea, then into a coma. No final outcome known. <i>Inocybe</i> ID from stomach contents.
<i>Lepista nuda</i> Was a deadly <i>Amanita</i> also eaten?	3-39-11 CA	Dog	?	Dog fell ill after eating mushrooms. Recovered, then later consumed more mushrooms and died of liver failure. <i>Lepista nuda</i> was abundant in yard.
<i>Leucoagaricus rubrotinctus</i>	6-24-11 PA	Dog	?	Three dogs thought to eat the mushroom. One vomited.
<i>Panaeolus foenisecii</i> suspected	7-13-11 CO	Rabbits	?	Three pet rabbits found to be lethargic, ataxic, cannot walk. Probable <i>P. foenisecii</i> in grass.
Unknown	8-16-11 CA	Dog	?	Bits of mushroom obtained from dog unidentifiable. Dog euthanized, no other details
Unknown mixed including probable <i>Amanita</i> , <i>Inocybe</i>	10-3-11 AL	D M,4	4-8 hr.	Blood in vomit, excessive salivation. Died after 48 hr. Alt off the charts, after several dilutions ALT still 11,000, GLU 50, kidney normal.
Unknown	11-17-11 FL	Dog	?	Elevated liver enzymes. Amatoxins suspected. No mushrooms seen.
Unknown	10-2011 CA	Dog pup	?	Liver enzymes way past 500 (though way past 11,000 would be truly high). Given plasma and milk thistle, survived. Not clearly fungal cause.
Unknown, rotten old mushroom	12-26-11 MT	Dog	?	Vomited.
Unknown presumed deadly <i>Amanita</i>	~11/2010 CA	Dog	?	Died of liver failure. Expert notified 6 months after the event, so no way of knowing.