Poisonous Mushrooms

Poisonous mushrooms are famous or infamous, just as edible ones are.
- Used in assassination of Claudius, Emperor of Rome
- Cast of characters:
  - Claudius: Became emperor in 41 A.D., following assassination of Caligula.
  - Agrippina: Wife and niece of Claudius, one of first women to have political power.

Poisonous Mushrooms

Poisonous mushrooms are famous or infamous, just as edible ones are.
- Used in assassination assassination of Claudius, Emperor of Rome
- Cast of characters (continued):
  - Nero: Son of Agrippina and adopted son of Claudius.
  - Britannicus: Son of Claudius and step son of Agrippina.
Poisonous Mushrooms

Poisonous mushrooms are famous or infamous, just as edible ones are.
- Used in assassination of Claudius, Emperor of Rome
- Cast of characters (continued):
  - **Locusta**: Trusted servant of Claudius.
  - **Xenophon**: Physician to Claudius.

Poisonous Mushrooms

Poisonous mushrooms are famous or infamous, just as edible ones are.
- Used even in modern times for murdering victims
- Case in France, in early 1900s.
  - Girard with his wife and mistress as accomplices.
  - Insured couples that they made friends with.

Poisonous Mushrooms

Poisonous mushrooms are famous or infamous, just as edible ones are.
- Used even in modern times for murdering victims
- Case in France, in early 1900s.
  - Poisoned them with *Amanita phalloides*.
  - All three convicted of murder, 1918.

Mushroom Toxins

Poisonous mushrooms are classified according to the toxins they produce:
- **Class I**: Cyclopeptides, e.g., *Amanitoxins*
- **Class II**: Gyromitrin, e.g., Monomethylhydrazine (MMH)
- **Class III**: Orellanine
- **Class IV**: Muscarine
- **Class V**: Ibotenic Acid, Muscimol

Mushroom Toxins

Poisonous mushrooms are classified according to the toxins they produce:
- **Class VI**: Coprine
- **Class VII**: Psilocybin, Psilocin
- **Class VIII**: Gastrointestinal irritants
Mushroom Toxins

Class I: Cyclopeptides
- Amanitoxins and phallotoxin
- Some mushrooms known to have toxin:
  - Species in genus Amanita, Section: Phalloideae. Includes A. phalloides and A. marmorata, a species common in Hawai‘i.
  - Other species include Galerina autumnalis and Conocybe filaris.

Class I: Cyclopeptides
- Symptoms do not begin until 6-24 hours after consumption. These include:
  - Severe abdominal pains, vomiting, diarrhea, which persist for about 6-9 hours.
  - "Honeymoon phase" where victim feels better for about 24 hours.
  - During symptomless period, internal organs, especially liver is acted upon by toxins.

Class I: Cyclopeptides
- Symptoms do not begin until 6-24 hours after consumption. These include:
  - Followed by gastrointestinal bleeding, coma, and kidney failure. Death usually occur in 7 days.
  - If victim survives will require regular dialysis or kidney transplant.

Class I: Cyclopeptides
- Treatment:
  - If treated within an hour or two of consumption, empty stomach.
  - If symptoms have already occurred:
    - Haemoperfusion
    - Increase toxin excretion

Class I: Cyclopeptides
- Treatment:
  - If symptoms have already occurred:
    - Supportive measures: Monitor fluids, electrolytes, kidney and liver functions
    - Bastien Treatment: Successful in France since 1957

Class I: Cyclopeptides
- Amanita phalloides (Death Cap):
Class I: Cyclopeptides

- Individuals collecting *A. calytroderma* for 20 years or more have mistaken *A. phalloides* for *A. calytroderma*.
- Is deceptive in that it has a pleasant taste.

Class I: Cyclopeptides

*Conocybe filaris*

*Amanita virosa* (Destroying Angel)

Class II: Gyromitrin

- Symptoms do not begin until 6-8 hours after consumption. These include:
  - Vomiting, Nausea, stomach cramps, etc.
  - Bloated feeling, faintness, loss of muscular control and fever
  - Most instances, victim makes full recovery.
  - In rare instances can cause death (2-4% of mushroom poisoning fatalities). Victim consumes large amounts.

Mushroom Toxins

- Class II: Gyromitrin, e.g., Monomethylhydrazine (MMH).
  - Some mushrooms known to have toxin:
    - Toxin typically found in species of Ascomycota.
    - Known to occur in *Gyromitra, Helvella* and *Paxina*.
    - Water soluble, can be boiled away.
    - Extremely volatile. Fume toxicity.

Class II: Gyromitrin

*Gyromitra californica*

*Helvella lacunosa*
Class II: Gyromitrin

Class III: Orellanine

Symptoms do not begin until about 12 hours to 3 days after consumption (10-17 days in mild cases). These include:
- Nausea, vomiting and stomach cramps.
- Intense burning thirst, frequent urination-stopped, dry mouth.
- Followed by gastrointestinal disturbances, headache, pain in the limbs, spasm and loss of consciousness.

Class III: Orellanine

- Some mushrooms known to have toxin:
  - Some species of *Cortinarius*, *C. orellanus*, *C. rubellus*, *C. splendens* and numerous other species in this genus.
  - Recently discovered toxin, 1950s.

Class III: Orellanine

- *Cortinarius rubellus*
- *Cortinarius clelandii* occurs in Hawai‘i, but not known to produce orellaine. Related to above species.

Class III: Orellanine

- Symptoms do not begin until about 12 hours to 3 days after consumption (10-17 days in mild cases). These include:
  - Death in severe cases may occur due to kidney failure.

Class IV: Muscarine

- Some mushrooms known to have toxin:
  - Known to occur in "little white or brown mushrooms". *Inocybe* and *Clitocybe* are two common genera in which toxin may occur.
  - Also known to occur in *Omphalotus* species.
**Class IV: Muscarine**

- Symptoms begin about 30 minutes – 2 hours after ingestion. These include:
  - Excessive sweating, salivation and tears (PSL syndrome).
  - Other symptoms include nausea, vomiting and diarrhea, burred vision and urge to urinate.
  - Full recovery 2 hours after ingestion.
  - Treat with atropine injections.

*Omphalotus olivascens*, a species containing muscarine has gills that glow in the dark.

**Class IV: Muscarine**

*Inocybe sororia*, another species containing muscarine

**Class IV: Muscarine**

**Mushroom Toxins**

- Class V: Ibotenic acid, Muscimol
- Some mushrooms known to have toxin:
  - Various species of *Amanita*, *A. gemmata*, *A. pantherina* and *A. muscaria*. Also in *Panaeolus campanulatus*.

**Class V: Ibotenic acid, Muscimol**

- Symptoms begin about 30-120 minutes after ingestion. These include:
  - Dizziness, and muscle spasm.
  - Vomiting may also occur.
  - Followed by deep sleep. During which euphoria and/or hallucination may occur.
  - Victim usually wakes up with little after-effects. Restraints may be required while under influence of toxins.

*Amanita muscaria* (Fly Agaric) *Amanita pantherina*
**Mushroom Toxins**

- **Class VI: Coprine**
  - Mushroom known to have toxin:
    - Mostly *Coprinus atramentarius*.
    - Other species include *C. insignis, C. quadrifidus* and *C. variegatus*.

**Class VI: Coprine**

- Symptoms may occur within 30-60 minutes after consumption of mushroom, *IF* alcoholic beverages have been consumed. Causes anabuse-like reaction:
  - Nausea, vomiting and cramps.
  - Hot flushes on face and neck, metallic taste, numbness in hand.
  - Symptoms continue as long as alcohol is still in system. Toxin may last up to 72 hours.

**Class VII: Psilocybin, Psilocin**

- Symptoms may occur within 10-30 minutes after consumption of mushroom. These include:
  - Inebriation or hallucination, without sleep, uncontrollable laughter, euphoria and disembodied experience.
  - Complete recovery within 5-10 hours after consumption.

**Class VII: Psilocybin, Psilocin**

- Species of mushrooms known to have toxin:
  - Many species from four genera: *Conocybe, Gymnopilus, Panaeolus* and *Psilocybe*.

Copelandia cyanescens

Panaeolus subalpeatus
Mushroom Toxins

- Class VIII: Gastrointestinal irritants. Composed of a number of unrelated compounds.
- Large number of species classified with this type of toxin.
- Some common examples illustrated.

Class VIII: Gastrointestinal Irritants

- Symptoms may occur within 30 minutes to 2 hours after consumption of mushroom. These include:
  - Vomiting, nausea, diarrhea, stomach cramps and sweating.
  - Usually complete recovery in 3-4 days.
- Treat by emptying stomach.

Examples of Mushrooms:
- Agaricus californicus
- Hypholoma fasciculare
- Scleroderma cepa
- Chlorophyllum molybdites