Environmental Toxidromes: Rashes, Poisonings, and Envenomations

Robert Ayotte PA-C

St. Joseph Mercy Chelsea Community Hospital
Chelsea Michigan
Rayotte@epmg.com

Michigan Botanical Club
Huron Valley Chapter
MichBotClub.com
The Aster Family: Asteraceae

Common ragweed: *(Ambrosia artemesiifolia)*

Canada goldenrod: *(Solidago canadensis)*

Airborne Allergens
Giant Ragweed (Ambrosia trifida)

50% of Allergic rhinitis
Oral Allergy Syndrome
• Abn incr. IgE
• Burning/swelling of mouth
• Conjunctivitis/rhinitis
• N/V/D
• Asthma
• Anaphylaxis
The Cashew Family: Anacardiaceae

Poison Ivy: *Toxicodendron spp.*

Rashes

Forests
Urushiol: non-volatile oily resin
- Attaches to proteins in skin
- Hapten – delayed hypersensitivity reaction
- Reaction is almost immediate
- Very difficult to remove oil
“The woebegone sufferer who laughs with satisfaction as he watches poison ivy burn in a bonfire may not have the last laugh.”

J.M. Kingsbury 1964
Poison sumac: *(Toxicodendron vernix)*

Poison oak: *(Toxicodendron diversilobum)*
Staghorn sumac: (*Rhus typhina*)

Smooth sumac: (*Rhus glabra*)

Winged sumac: (*Rhus copallina*)

Fragrant sumac: (*Rhus aromatic*a*)

Open/Disturbed sites
The Hemp Family: Cannabaceae

Stinging nettles: (Urtica dioica)

- Histamine
- Acetylcholine
  - 5-hydroxytryptamine
- Formic acid

Swamp edges
Giant Hogweed (Heracleum mentegazzium)

The Parsley Family: Apiaceae

Furanocoumarins: activated by UV Rays bind with DNA inside skin cells
- Onset in 15 min
- Scars may last 6 years

Treatment:
- Topical/Systemic Steroids
- Avoid Sunlight for 48 hrs
Wild parsnip: *Pastinaca sativa*
The Arum Family: Araceae

Skunk-cabbage (*Symlocarpus foetidus*)

Jack-in-the-pulpit (*Arisaema triphyllum*)

Dieffenbachia: *Dieffenbachia* spp.

Philodendron: (*Philodendron* spp.)

Rhaphides: Calcium oxalate crystals
- Swelling: Glossitis, Gastritis
- Days to week or more
Rose Gardener’s Disease: Sporotrichosis

*Sporothrix schenkii*

Roses
Soil
Hay
Sphagnum moss
Cats

Painless lesions: Onset 1-2 weeks
Cutaneous: Itraconazole 3-6 mos.
Disseminated: Itraconazole + Amphotericin B
Pulmonary: Above + surgery

Fungi
A seven-year-old male presents to the ED (along with his father) with a chief complaint of vomiting and unresponsiveness one hour after eating wild carrots in a pasture. On examination, the child withdraws to painful stimuli and is noted to have small, reactive pupils with disconjugate gaze. The remainder of the child's physical examination is unremarkable. His father has brought some of the "wild carrot" plant with him. What plant did his son ingest?

A. Ackee
B. Deadly nightshade
C. Jequirity pea
D. Poison hemlock
Conium: Nicotinic alkaloid
- N/V/D
- Bradycardia
- meiosis
- Seizures
- Coma
- Respiratory paralysis
Water-hemlock (Cicuta maculata)

Bulbous-hemlock (Cicuta bulbifera)

Cicutoxin: GABA receptor antagonist
- 1 bite of root may kill an adult
- Onset within 15 minutes
- Violent convulsant
Barberry Family: Berberidaceae

Mayapple: \(\textit{Podophyllum peltatum}\)

Podophyllin: Antimitogenic
- N/V
- Tachypnea
- Catharsis
- Coma/Death
Aster Family: Asteraceae

White Snakeroot: (Ageratina altissima)

Tremetol: alcohol
- “Milk Sickness” or “Trembles”
- N/V
- Tremors
- Liver Failure
- Constipation
- Delirium
Pokeweed Family: Phytolaccaceae

Pokeweed/Inkberry: (*Phytolacca americana*)

Phytolaccatoxin: Alkaloid Saponins
- N/V/D: Severe Abd Pain
- Dyspnea
- Seizures
- Respiratory Paralysis
Apricot, bitter almond, peach, wild cherry: (*Prunus* spp.)

Cyanogenic glycosides: amygdalin
prunasin

Cherry red skin
N/V/Abd pain
Tachypnea/Tachycardia/V-arrhythmias
Confusion/Coma
Respiratory failure
The Yew Family: Taxaceae

Yews: *(Taxus spp.)*

Taxine:
- Na/Ca channel blocker (Cardiac)
- N/V/D
- Seizures/Coma
- Refractory A-Fib
A 22-year-old man presents with dry mouth, hyperthermia, dry skin, dilated pupils, decreased bowel sounds, lethargy, agitation, hallucinations, confusion, and waxing and waning level of consciousness. During intubation for airway protection, numerous dark brown foreign bodies are noted between his teeth. A bag containing similar dark brown "pellets" is found in his pocket. What medication might improve this patient's altered mental status?

A. Antidigoxin antibodies  
B. Flumazenil  
C. Naloxone  
D. Physostigmine  
E. Sodium bicarbonate

Calabar bean (*Physostigma venosum*)
Moonflower/Jimsonweed: *Datura stramonium*

Scopolamine/Atropine
- Anticholinergic Toxidrome

Tx: Physostigmine
- Acetylcholinesterase inhibitor
Mushroom Poisoning: Amatoxins

Deathcap: *(Amanita phalloides)*

Amatoxin: cyclic octapeptide
- Among the most lethal of poisons
- Heat stable and insoluble in water
- Binds to DNA-dependent RNA polymerase in type II
- Hepatotoxic and Nephrotoxic
- Minimum lethal does 0.1 mg/kg
Sns/Sxs (6-12 hrs)
- N/V/D
- Hypoglycemia
- DIC
- Encephalopathy
- Fluid shifts/multi-organ failure
- Death in 1-2 weeks

Treatment
- Intensive fluid resuscitation
- Correct electrolytes
- Activated Charcoal (MDAC)
- Biliary Drainage (N-J suction)
- Silibinum IV 20 mg/kg/QD

Destroying angel: Amanita bisporigera

Milk-thistle (Silybum marianum)
Mushroom look-alikes

False moral: (Gyrometra esculenta)

Morel: (Morchella esculenta)

Gyromtrin <hydrolysis> momomethylhydrazine

- Sxs 6-8 hrs
- N/V/cramps/Abd pain
- Watery/bloody D
- Hepatitis/Jaundice
- Seizures/
- Possibly death in 2-4 days
Shaggy mane (*Coprinus comatus*)

Inky cap (*Coprinus atramentarius*)

Coprine: cyclopropylglutamine – Blocks acetaldehyde dehydrogenase

Disulfiram Reaction

Flushing of the face

Extremity Paresthesia

HA/N

Agitation

Cardiac Arrhythmias (rarely)
Caterpillars

Hickory Tussock Moth

Gypsy moth
Bees and Wasps: Hymenoptera

European honey bee

Eastern yellow jacket

Paper wasp

White faced hornet

Envenomations
Hemiptera: True bugs

Water Boatman

Backswimmer
Spiders
All are venomous

Black widow spider (*Latrodectus* spp.)

Alpha-latrotoxin: neurologic and autonomic dysfunction

- Muscle pain
- Abd cramping
- HA
- Urinary retention

- HTN
- N/V
- Diaphoresis

Muscle pain  HTN
Abd cramping  N/V
HA  Diaphoresis
Urinary retention
Sphingomyelinase-D (Ribonuclease)

Necrosis (especially adipose tissue)

Hemolytic anemia
Arthralgias
Renal failure
Coma.

Rhabdomyolysis
DIC
Seizures
Yellow sac spider (*Cheiracanthium* spp.)

Painful bite
Rapid recovery typical
Case 3

26 y/o schizophrenic F, with a “hx of swallowing things” presents with CC: N/V. She told her mother she had swallowed a toad. Her mother called poison control and they told her to take her to the ED. VS = Pulse 55  BP 123/68

American Toad (*Anaxyrus americanus*)

Fowler’s toad (*Anaxyrus fowleri*)
Poison control called us and told us that toads can excrete digitalis like compounds and told us to check labs, and EKG (sinus bradycardia 54), and dig level (0.9)

Bufotenin: digoxin-like compounds
- arrhythmias of all kinds, seizures, and death

Tx: antiemetics, IV Fluids and admitted to telemetry; D/C the following morning

Cane toad  (*Rhinella marina*)

5-methoxy-N, N-dimethyltryptamine
- serotonin agonist
Pit Vipers: Viperidae

Eastern massasauga (*Sistrurus catenatus*)

Cytotoxic Proteins
Anti-coagulants
2 bites in 2018
25% dry bites
• Do not cut the skin or try to suck out the venom
• Don’t use a tourniquet or apply icy water
• Don’t raise the area above the level of the heart
• Stay as still as possible
• Remove tight clothing or jewelry
• Let the wound bleed
• Don’t wash the wound
• Place a clean bandage on the wound
• Remain calm
• Cro-Fab
   Adverse reactions are rare
   Mitigates against compartment syndrome
   Can give it late

Adverse reactions are rare
Mitigates against compartment syndrome
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Shrews: Insectivora

Northern short-tailed shrew (*Blarina brevicauda*)

**Trophic Terror**

**Super Snout:** With poor eyesight, this creature relies mostly on smell to locate prey. The shrew poking its long snout through plants, grasses, and rocks to sniff out a variety of victims from insects to lizards to mice.

**Tick Tock:** The shrew hardly ever sleeps. This feisty mammal has to eat almost non-stop to fuel its riveted-up body: its heart beats up to 20 times per second. Going just four hours without eating could be fatal for the shrew.

**Creature Features:**
- **Size:** Length up to 5 in. from head to tail. Weight up to 1 oz.
- **Habitat:** Forests and swamps in Canada and the eastern half of the United States.
- **Prey:** Insects, worms, rodents, and small mammals.
- **Lifespan:** About 2 years.

What the short-tailed shrew lacks in size it more than makes up for in viciousness. This tiny critter is always on the hunt and packs a surprisingly painful, poisonous bite. It chases prey furiously through forests and swamps, then paralyzes them with a snap of its jaws.
Night of the Living Dead Chipmunks
Environmental Threats: Rashes, Poisonings, and Envenomations

Robert Ayotte PA-C

St. Joseph Mercy Chelsea Community Hospital
Chelsea Michigan
Rayotte@epmg.com

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"How about them toad suckers? Ain't they clods? Sittin' there suckin' them green toady frogs. Suckin' them hop-toads, suckin' them chunkers, Suckin' them leapy types, suckin' them plunkers.

Look at them toad suckers; Ain't they snappy? Suckin' them bog-frogs sure makes 'em happy. Them huggermugger toad suckers, way down south, Stickin' them sucky toads in they mouth! How to be a toad sucker? No way to duck it. Gittchyseff a toad, rare back and suck it!"

- Them Poems

Colorado River Toad (*Incilius alvarius*)
Rhubarb: *Rheum spp.*

Rhubarb’s killer reputation apparently dates to World War I, when rhubarb leaves were recommended on the home front as an alternative food. At least one death was reported in the literature, an event that rhubarb has yet to live down.

Does Rhubarb Deserve Its Killer Reputation?

BY REBECCA RUPP

National Geographic: May 18, 2016
The Nightshades: Solanaceae

Woody nightshade: (Solanum dulcamara)

Potato: (Solanum tuberosum)

Tomato: (Solanum lycopersicum)

Solanine: Glycoalkaloid
- RBC lysis and disruption of mitochondria
- Apathy/Drowsiness
- Salivation
- Dyspnea
- Trembling
- Weakness/Paralysis/Syncope

Invasive/Forest & Swamp edges

Garden
Fly Agaric: *(Amanita muscaria)*

Muscimol: GABA-A agonist
- Sensual derangement
- Erratic behavior
- Deep sleep
- Delirium/hallucinations
- Death (15 caps)

*Entheogen*
July 15

19 y/o M who had been swimming for 2 hrs in eastern Lake Erie presents to the ED with CC: N/V, abdominal pain, and muscle weakness.

VS: Normal
Tx: IV Zofran, Toradol, IV Fluids, with mild improvement
Dx: Exhaustion
July 19

Respiratory Distress/Hypoxemia PO2 40 mmHg
Infiltrates on CXR 2V
Creatinine 2.4
Leukocytosis 15,000 Platelets 40,000
AST 280 ALT 300 GT 280
All Cultures Negative

Broad Spectrum Abx
Demonstrated improvement after 72 hrs
July 27

Mechanical Ventilation removed and all parameters normalized p 20 days
No permanent damage

What was his toxic exposure?
Toxic “Algal” Blooms: Cyanobacteria

*Microcystis aeruginosa*

- Nausea/Vomiting
- Abd Pain
- Tremors
- Dyspnea
- Paralysis
- Convulsions
- Death

- Neurotoxins BMAA
  - ALS
  - Parkinson’s
  - Alzheimer’s

- Hepatotoxins
- Cytotoxins
- Endotoxins
Lake Erie Basin

620 sq. miles by August of 2019
Warm sunny weather
Ample nutrients (P)
Gentle constant wind
Zebra and quagga mussels
Toxins Bio-accumulate
May persist after bloom clears
Drinking Water Quality Dashboard

Toledo water professionals test and monitor drinking water quality 24 hours a day, every day of the year. This dashboard is updated by staff at the Collins Park Water Treatment Plant to provide the public with an accurate drinking water quality status.

SAFE – Toledo tap water meets or exceeds all water quality standards.
The Dogbane Family: Apocynaceae

Milkweed: (*Asclepias* spp.)

Latex: Cardiac Glycoside
Oleander: (*Nerium oleander*)

**Oleandrin/Nerioside: Glycosides**
- Similar to Digitalis glycosides

**Treatment:** antidigoxins
Case 4

24 F, in a running outfit, presents with abdominal distension, mild to moderate crampy abdominal pain and very gassy loose stools ongoing for 3 wks.

VS NI
Swimmer’s Itch: Cercarial Dermatitis

Pruritic raised papules: onset 1-2 days
- Cercaria die in the skin immediately
- Each papule corresponds to the penetration site of a single parasite.
- May last 2-3 wks
- Reactions may get worse with repeated exposures
- Tx: Antihistamines
Elderberry: (*Sambucus spp.*)

- Common elderberry (*Sambucus canadensis*)
- Red elderberry (*Sambucus pubens*)

Swamp edges

Cyogenic Glycosides
- cathartic

Forest Canopy Gaps
Bloodroot: \textit{(Sanguinaria canadensis)}

**Poppy Family: Papaveraceae**

Sanguinarine: Alkaloid

- CNS Depression
- Diarrhea
- Syncope
- Shock and Coma
The Heath Family: Ericaceae

Bog Lurel: (*Kalmia polifolia*)

Azalea: (*Azalea* spp.)

Rhododendron: (*Rhododendron* spp.)

Bog-rosemary: (*Andromeda glaucophylla*)

Grayanotoxins: bind Na Channels
- Salivation/burning of mouth
- N/V/D Abd Pain
- Brady/HOTN
- Seizures/Paralysis/Death
A 57-year-old man calls 911 from his hotel room with a complaint of respiratory distress. In the emergency department, he is unable to provide further history due to respiratory distress and requires endotracheal intubation for respiratory failure. He continues to have ventilator-dependent respiratory failure of unknown etiology for 2 weeks, when a family member picking up his belongings from the hotel room discovers an "anarchist-type textbook," the pictured seeds, and vials containing an unknown powder. Toxicity is likely due to exposure to what genus of plant?

Aconitum
Blighia
Ricinus
Urtica
Veratrum
A 77-year-old man presents with hypotension and bradycardia after the intentional ingestion of 5 g of the crushed roots of this plant.
The Buttercup Family: Ranunculaceae

Monkshood: (*Aconitum napellus*)

**Acontine: Diterpinoid Alkaloid**
- Binds Na Channels in open position
- Diarrhea
- Seizures
- Bradycardia/HOTN
- Ventricular Arrhythmias
- 1 mg can poison
- Lethal within 15 minutes

**Treatment**
- Atropine
- Antiarrhythmics
- ECMO
Plantain family: Plantaginaceae

Foxglove: *Digitalis spp.*

Digitoxin/Digitonin: Na Channels
- N/V/Anorexia
- Abdominal Pain
- Dizziness
- Meiosis
- Dizziness/Delirium
- Cardiac Arrhythmias
- Confusion/Hallucinations:

Treatment
- Digoxin-specific antibody (FAB) fragments

Comfrey: *Symphytum spp.*

Garden
Larkspur: \((Delphinium \text{ spp.})\)

Delphinine: Cardiac glycoside
Shanghai Prairie-Fen

Great blue Lobelia (*Lobelia siphilitica*)

Prairie dock (*Silphium terebinthinaceum*)

Ladies tresses: (*Spiranthes cernua*)
Centipedes

Bark Centipede

House Centipede