Plants Toxic to Livestock

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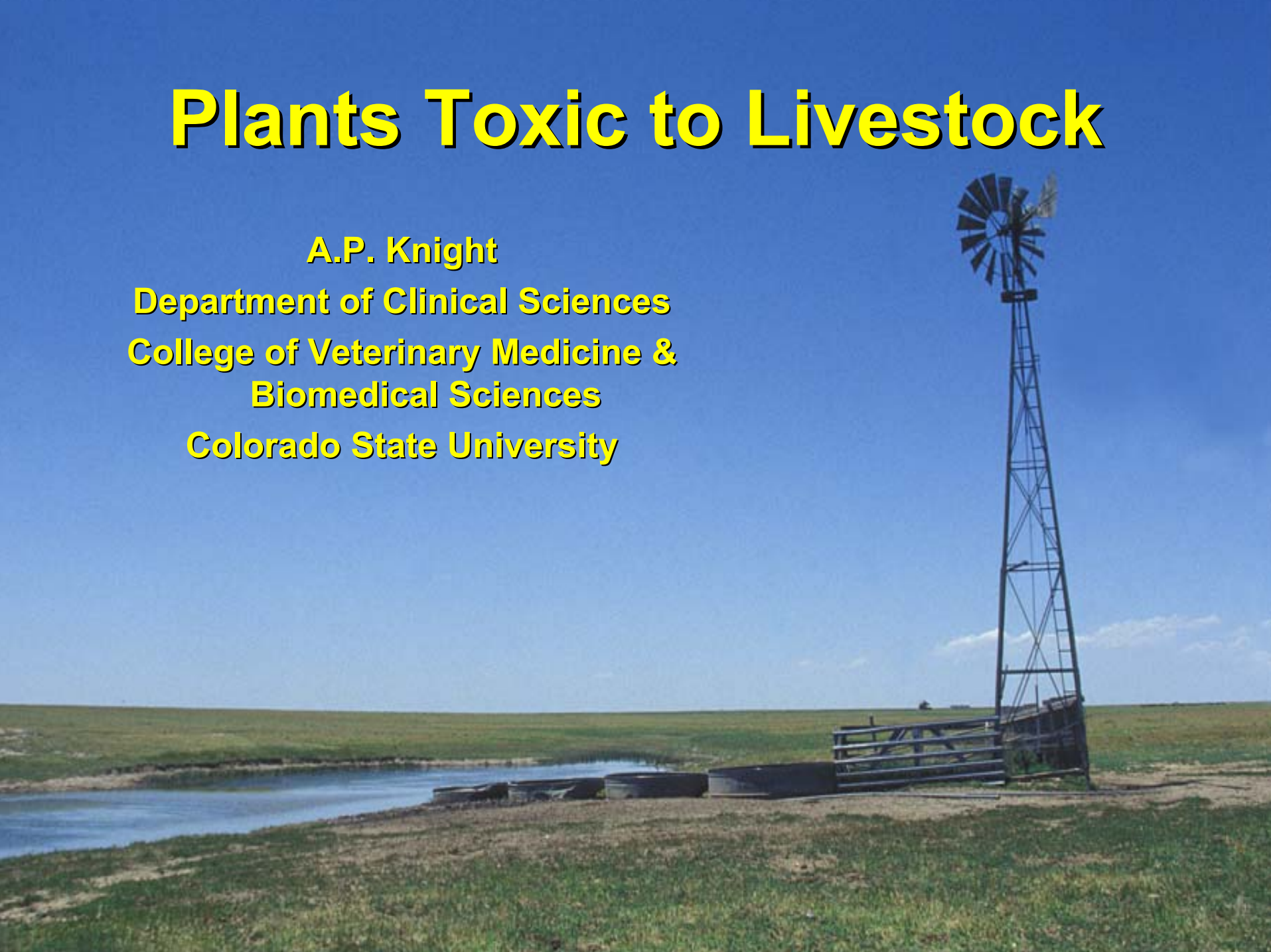


Onion Poisoning

Allium canadensis

Allium cepa

Onion Poisoning

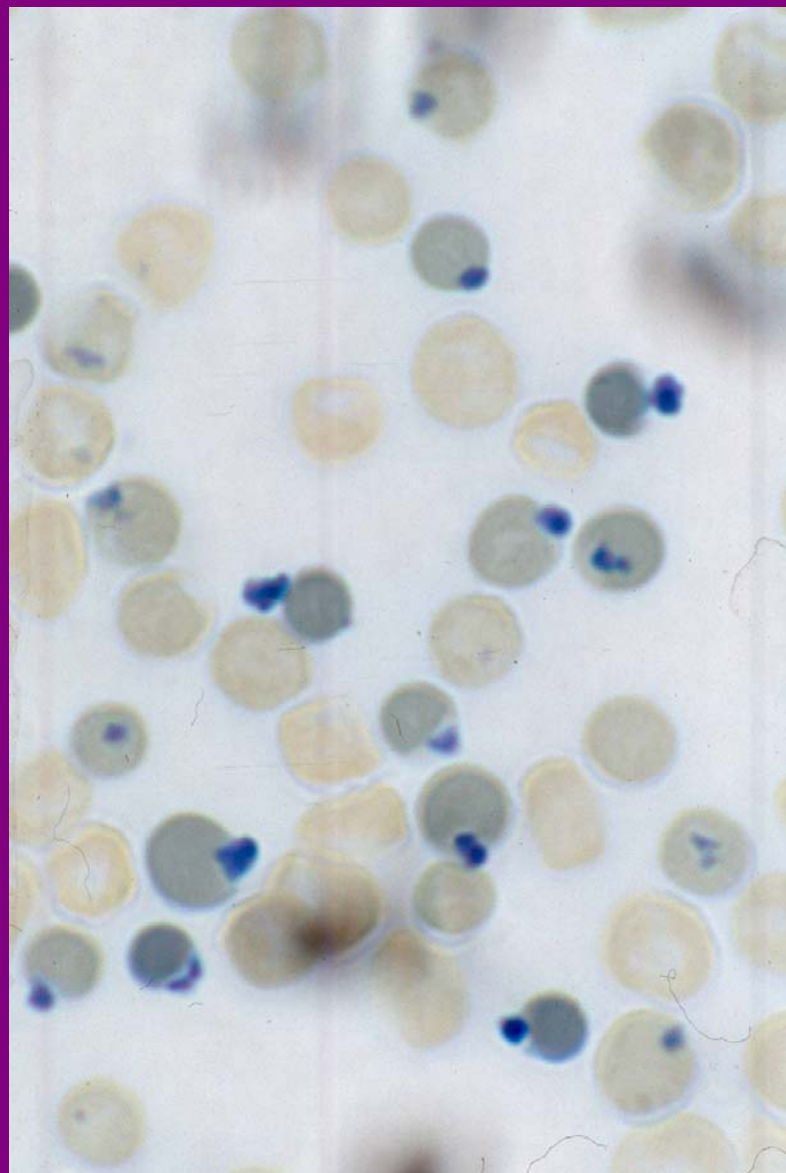
N-propyl disulphide

↓

Glucose-6-phosphate dehydrogenase

↓

Oxidant injury to RBC



Cats, cattle > horses, dogs > sheep, goats

Cooked onions remain toxic

Onion breath
Anemia
Hemoglobinuria

Meat / milk flavor?

Brassica Poisoning

- Kale, rape, cabbage
- Toxin – S-methyl-L-cysteine-sulfoxide

↓

Dimethyl disulphide

↙ ↘

Heinz bodies

Hemoglobinurea

Plants containing coumarin glycosides

- *Melilotus officinalis*
  - Sweet clover
- *Anthoxanthum odoratum*
  - Sweet vernal grass
- *Heirochloe odorata*
  - Holygrass
- *Aesculus spp.*
  - Buckeye, horse chestnut
- Daphne, Pinus spp., ferns

Yellow Sweet Clover
Melilotus officinalis

White Sweet Clover
Melilotus officinalis var.alba

Yellow Sweet Clover
Melilotus officinalis

Yellow Sweet Clover
Melilotus officinalis

Moldy Sweet Clover Poisoning

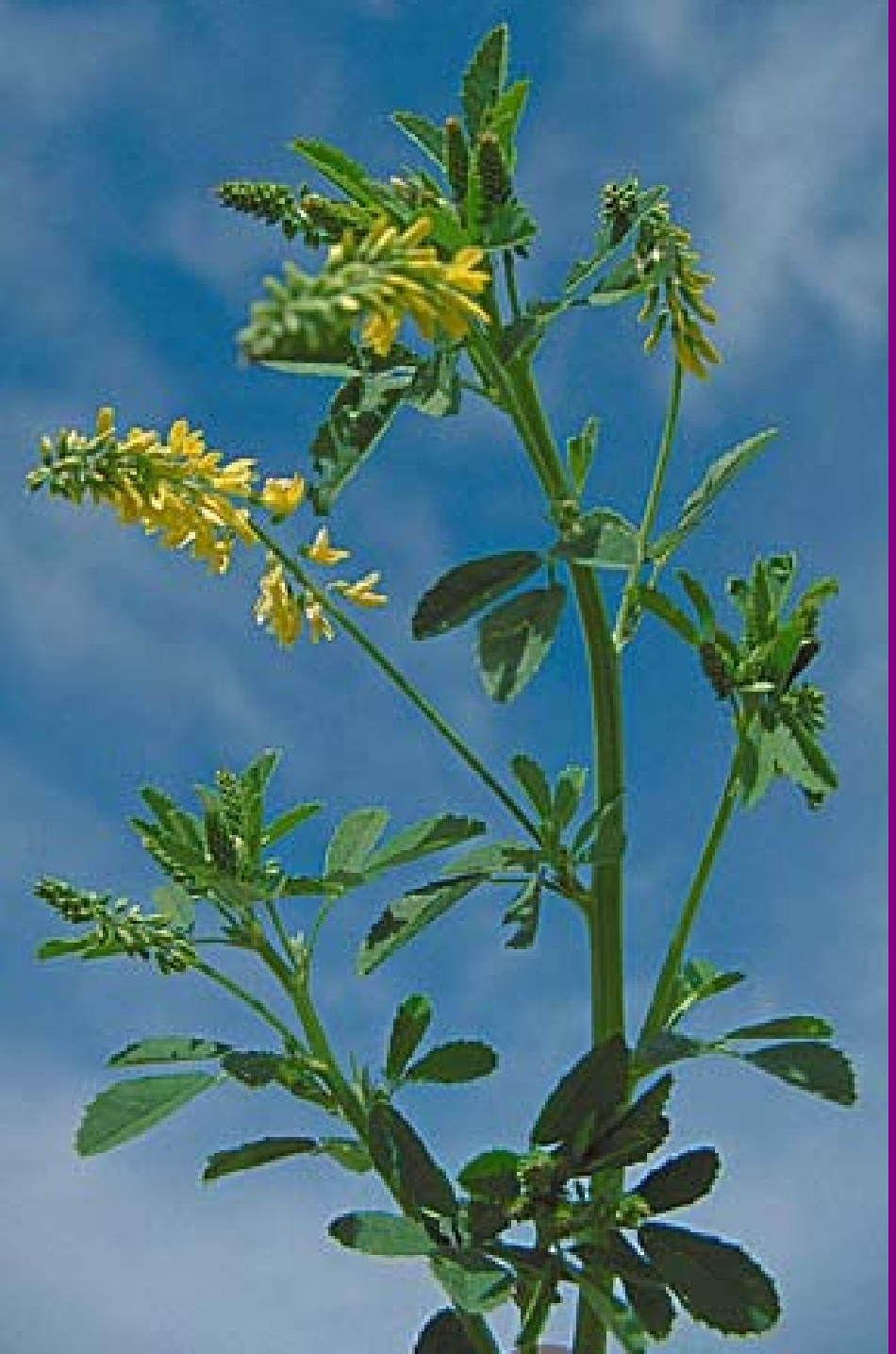
Penicillium, Aspergillus spp.

↓

Coumarin → Dicoumarol

↓

Depletes Vitamin K dependent Prothrombin Factors VII, IX, X

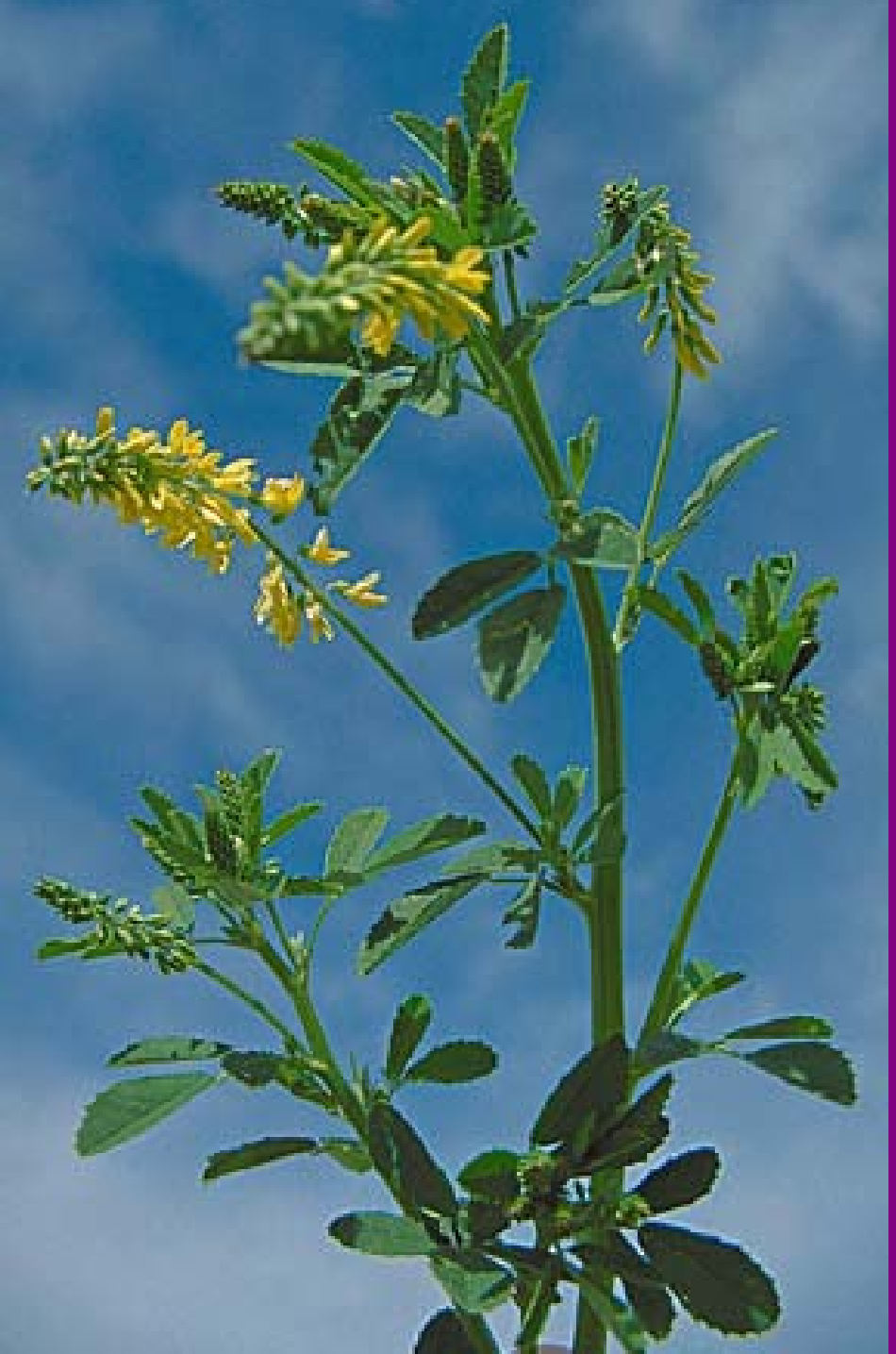


Cattle > horses >> sheep

Clinical Signs
Weakness, depression
Hematomas
Hematuria
Hemarthrosis
Hyphema
Abortion

“No blood clotting”

Prothrombin time > 40sec.
(normal 9-12 sec.)



Treatment

Whole blood transfusions

Vitamin K1
2-3mg/kg bw. IV or IM

Vitamin K3 not effective!
Toxic to horses

Escin – triterpenoid saponins
Frangula – anthraquinone
Coumarin glycosides

Bracken Fern
Pteridium aquilinum
Rock fern - *Cheilanthes sieberi*

Bracken Fern

All parts of the plant are toxic
Rhizomatous root most toxic
Toxic when dry

Toxin:
Ptaquiloside – cattle, sheep, humans
Thiaminase – horses, pigs ??

Alkaline pH activates carcinogenic dienone

Passed through the milk
Toxic when dried

Bracken Fern

Clinical Signs

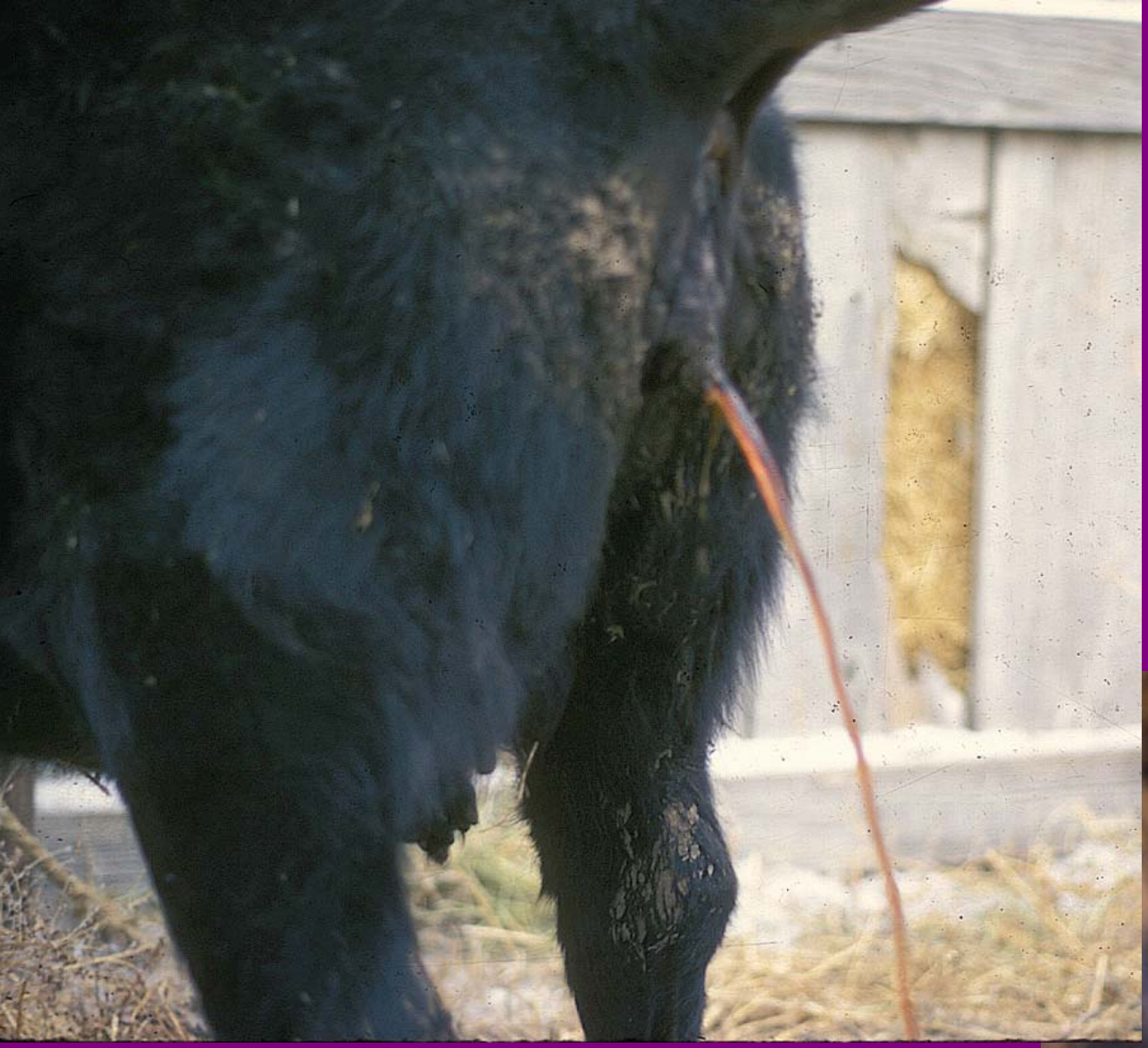
Cattle – thrombocytopenia
hematuria, anemia
Esophageal, rumen tumors
Enzootic hematuria
Bladder hemangioma

Sheep – retinal degeneration
mandibular fibrosarcoma
Horses – polioencephalomalacia
blindness, depression

Man – esophageal, stomach
cancer

Bracken Fern

Enzootic hematuria



Horse tail

Equisetum arvense

8 species

Toxin: thiaminase
silicates

<u>Clinical Signs</u>

Depression, blindness

Diarrhea

Sudden death

Water Hemlock (*Cicuta* species)

Indigenous to North America

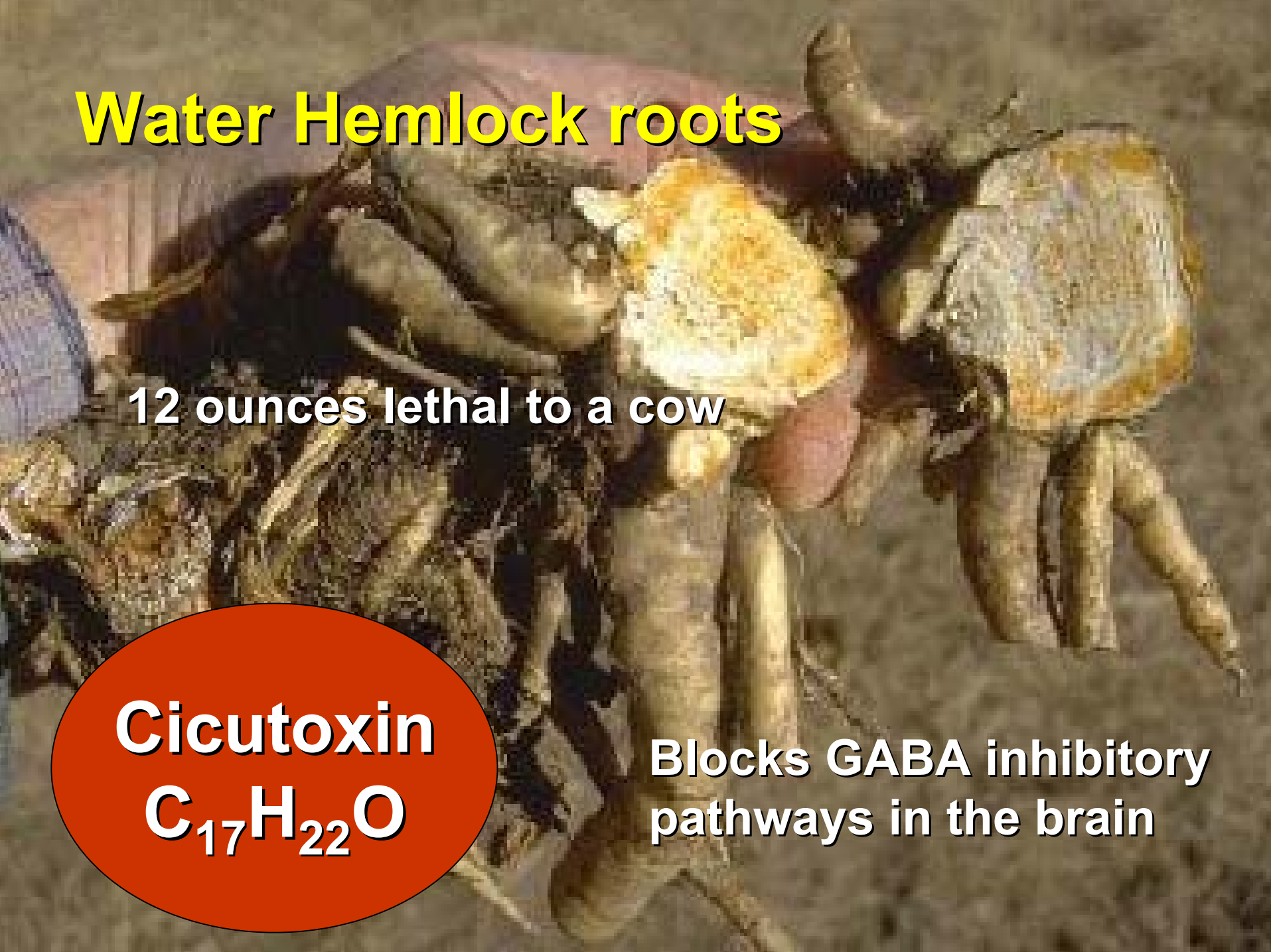
Marshy habitat

Root is the most toxic

Poisonous to all animals

Water Hemlock

Cicuta maculata
Cicuta douglasii
C. bulbifera
C. virosa


Water Hemlock roots
12 ounces lethal to a cow
Cicutoxin
$C_{17}H_{22}O$
Blocks GABA inhibitory pathways in the brain

Poison Hemlock
(*Conium maculatum*)

Poison Hemlock (*Conium maculatum*)

- Piperidine alkaloids
  - 5 alkaloids – gamma-coniciene, coniine
  - Act the neuromuscular junction
    Stimulation followed by blockade

Clinical Signs
Muscle tremors, weakness,depression, respiratory failure, death

Teratogenic 40th-110th days of gestation
Crooked legs, cleft palate

Poison, Spotted Hemlock

Sudden Deaths
Teratogenic

Milkweeds
(*Asclepias spp.*)

Milkweed Poisoning

Narrow-leafed species most toxic

Neurotoxic

Cardiotoxic

1% b.w. of green plant

All animals including poultry affected

<u>Clinical Signs</u>

Colic, bloat, excess salivation

Incoordination, muscle tremors

Seizures

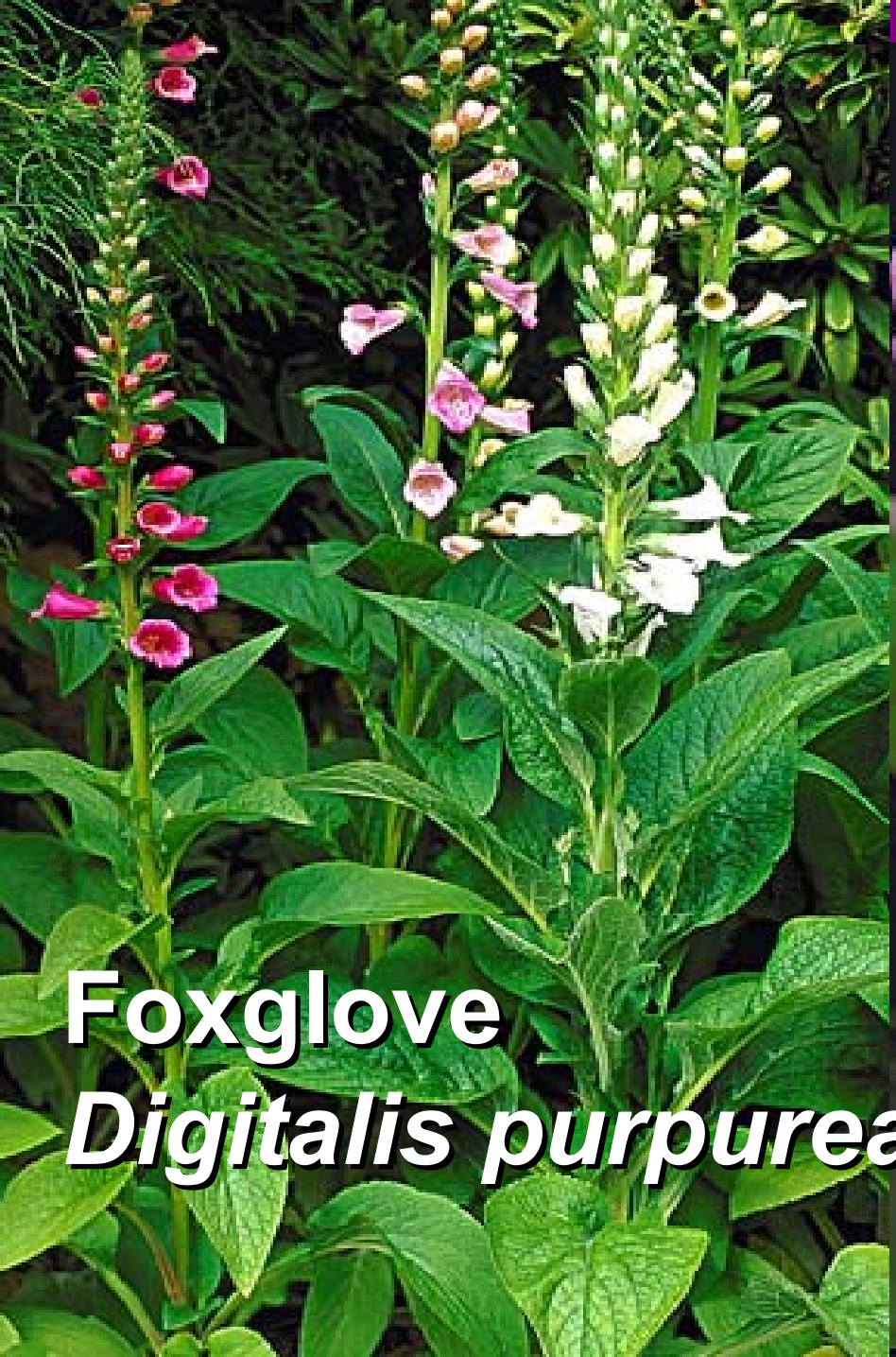
Respiratory failure

Death

Oleander

Nerium oleander

Yellow Oleander
Thevetia peruviana



Foxglove

Digitalis purpurea

Lily of the Valley
Convalaria majalis

Dogbane
Apocynum cannabinum

Death camas
Zigadenus spp.

Cevanine alkaloids (steroidal)
Neurotoxic – block Na^+ channels and delay repolarization

False hellebore
Veratrum spp.

Jervanine alkaloids (azasteroids)
Teratogenic

Death Camas

Zigadenus spp.

Death Camas
Zigadenus spp.

Steroidal alkaloids
Decreased heart rate
Arteriolar vasodilation
Hypotension

Sudden deaths in sheep, cattle, and people

Tx – atropine
avoid stress!

Japanese Yew
Taxus japonicus

Taxine
Cardiotoxic

Taxol
Chemotherapeutic

Rhododendrons, Azaleas
Rhodendron spp.

Laurel
Kalmia spp.

Rhododendrons

Toxin: Grayanotoxins I, II
Leaves and nectar toxic
0.2% body weight leaves toxic

Clinical signs

Anorexia, vomiting, salivation, colic.

Cardiac dysrhythmias

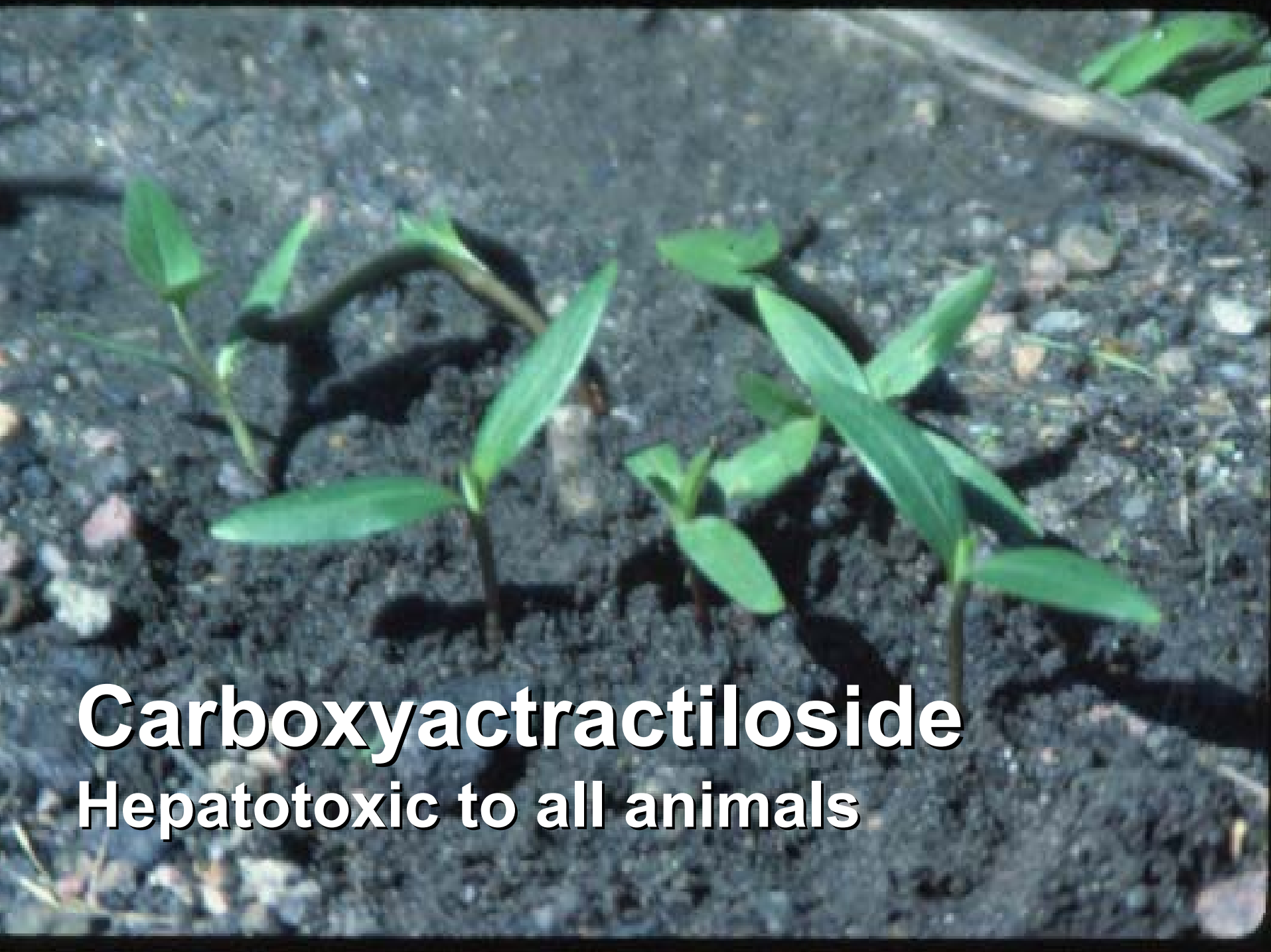
Abortion, mummification

Japanese Pieris

Pieris japonicus

Grayanotoxins

Cocklebur
(*Xanthium strumarium*)


Carboxyactractiloside
Hepatotoxic to all animals

Nightshade Family

- *Solanum* species (>1700)
  - *S. tuberosum* *Irish potato*
  - *S. nigrum* *Black nightshade*
  - *S. melongena* *Eggplant*
  - *S. chacoense* *wild potato*

- *Lycopersicon esculentum* - *Tomato*
- *Physalis* spp. Ground cherry

Solanum species

- Glycoalkaloids (200+)
  - Solanine
  - Chaconine
  - Tomatine

  } Cholinesterase inhibitors

Humans>horses>ruminants

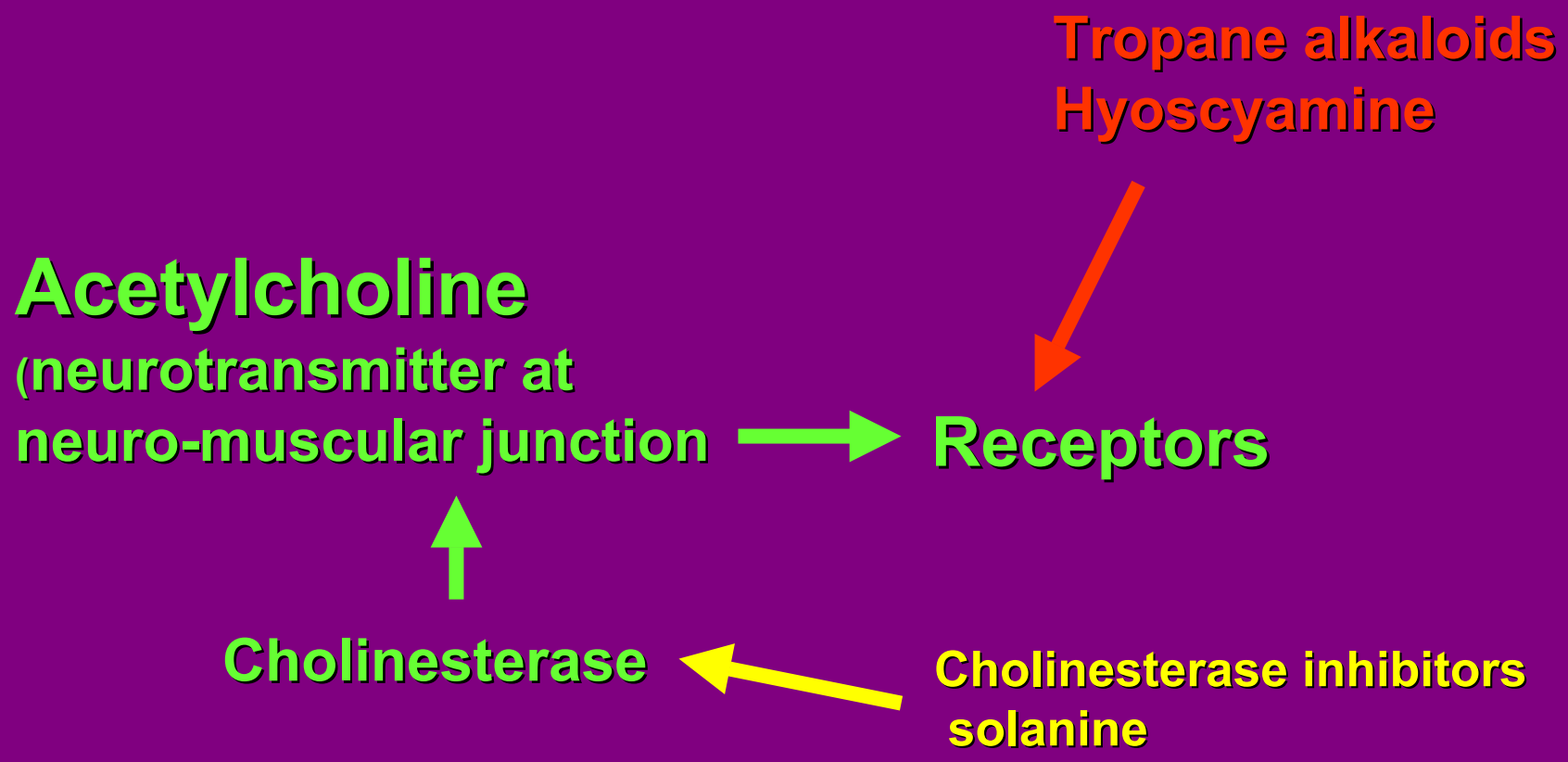
Gastrointestinal irritants

Teratogenic

Cerebellar degeneration – *S. dimidiatum*

- calestegin B

Cholinesterase Inhibitors



Nightshades

Solanum nigrum

Solanum sarrachoides

Solanaceae (Nightshades)

Potentiates the neurotoxic effects of ivermectin in horses

Ground cherry
Physalis spp.

Tropane alkaloids

Tropane alkaloids
Hyoscyamine

Acetylcholine
(neurotransmitter at
neuro-muscular junction → Receptors

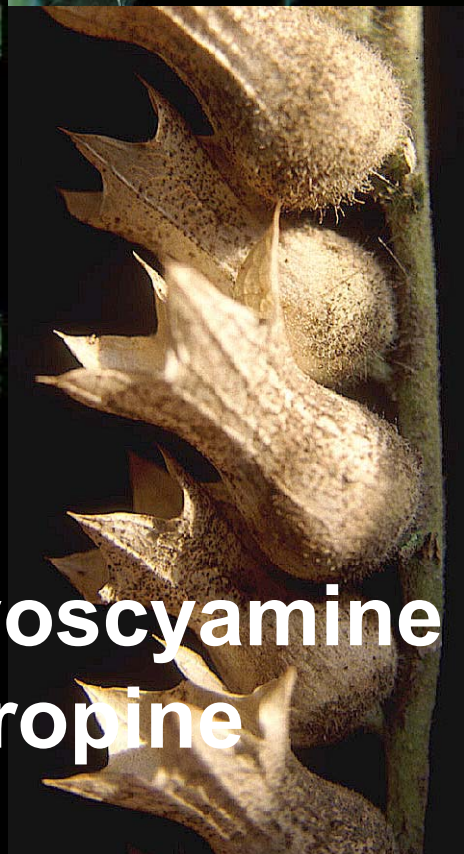
Cholinesterase ← Cholinesterase inhibitors
solanine

Sacred Datura
Datura meteloides

Principal toxin
Hyoscyamine, hyoscine

Jimson weed
Datura stramonium

Black Henbane
Hyoscyamus niger

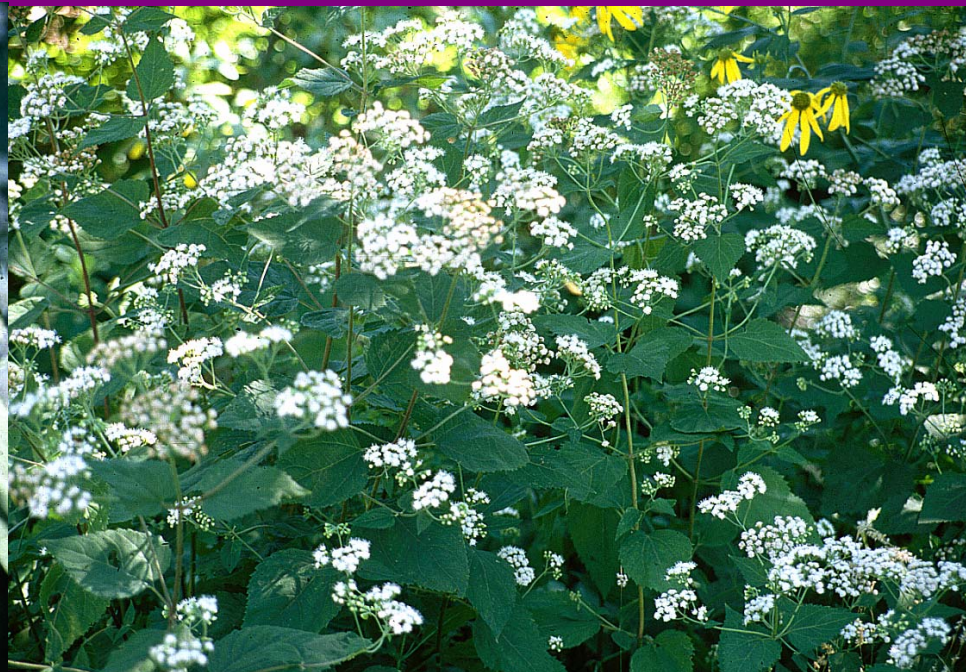


Hyoscyamine
Atropine

White Snakeroot
Eupatorium rugosum

- Tremetone (4 ketones) activated in the liver
- Humans, cattle, horses, dogs, cats, birds
- Toxin is excreted in the milk

- Muscle tremors, ataxia, recumbency
- Myopathy, cardiomyopathy



Rayless Goldenrod

Haplopappus heterophyllus
(Isocoma wrightii)

Burrow weed
Haplopappus tenuisectus

Tremetone (4 ketones)
activated in the liver

Toxin is excreted in the milk

Muscle tremors, ataxia, recumbency

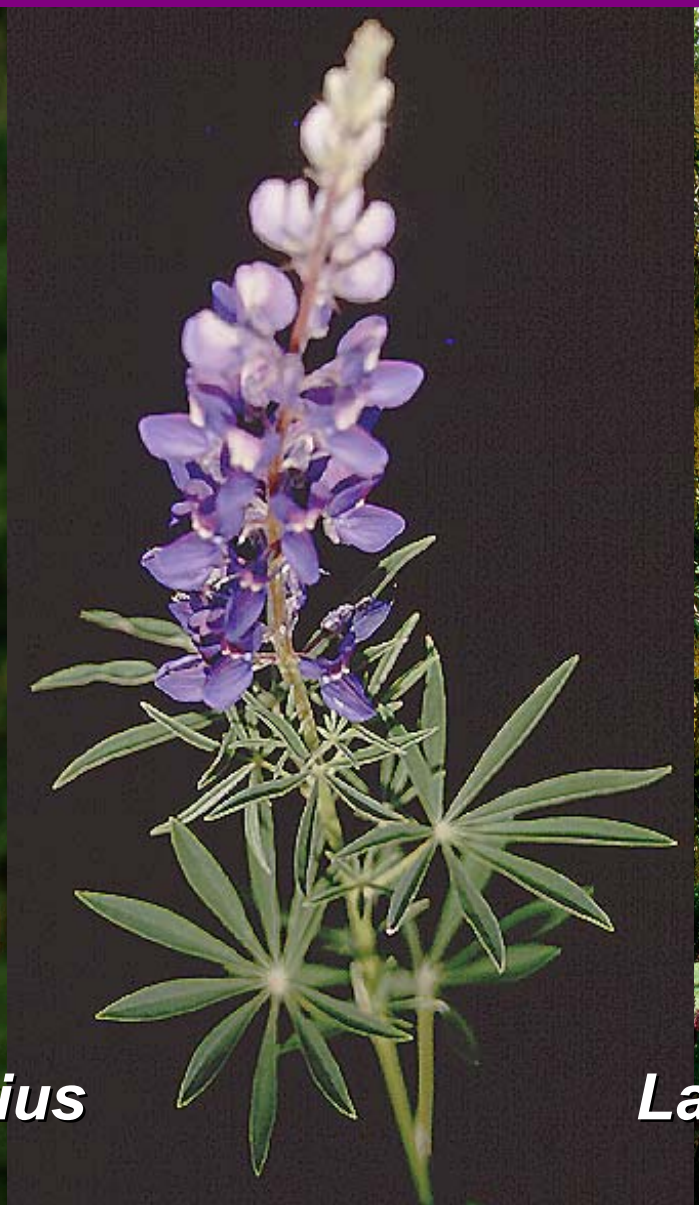
Myopathy, cardiomyopathy

Golden Banner, Yellow Pea
Thermopsis montana

- Quinolizidine alkaloids
  - thermopsine
- Myopathy
- Muscle weakness
  - stiff gait, tremors
  - recumbency and death

Quinolizidine alkaloids

Cytissus scoparius



Laburnum anagyroides

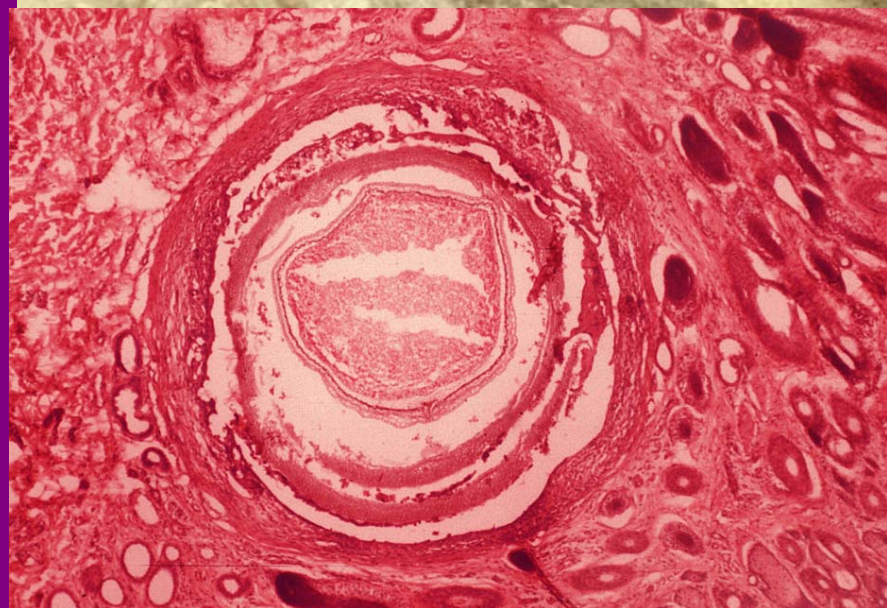
Avocado pear
Persea americana

Cardiomyopathy
Edema of the head and neck
Sterile mastitis

Cattle, horses, goats, birds

13-14th days of pregnancy?
Cyclopia
14-19th days of pregnancy?
Increased mortality
28-33rd days of pregnancy?
Tracheal agenisis

The original anodized, photosensitive aluminum... metalphoto



Needle & thread grass
Stipa spp.

Fox tail barley
Hordeum jubatum