Andromedotoxin (Grayanotoxin) - Containing Plants (Heath, Ericaceae Plant Family)  
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Chapter Sections
Rhododendron
Kalmia - Laurels
Pieris - Japanese Pieris

Rhododendron
Rhododendron albiflorum - Rhododendron
R. occidentalis - Western azalea, white laurel
R. californicum - Rhododendron, California rose bay
R. catawbiense - Rose bay
R. maximum - Great laurel

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<tr>
<th>Major Species</th>
<th>Usual Time of Onset</th>
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Family - Ericaceae (Heath family)

Images
- Rhododendron albiflorum - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Western azalea, white laurel, Rhododendron occidentalis - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Rhododendron, California rose bay, Rhododendron californicum - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Rose bay, Rhododendron catawbiense - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Great laurel, Rhododendron maximum - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org . -

Description
- R. albiflorum.
  - Plant - Erect, deciduous shrub, 3 - 6 feet tall.
  - Stem - Woody.
  - Leaves - Thin, elliptical, 1 1/2 - 3 inches long.
  - Flowers - Axillary, creamy white, in groups of 1 - 3
  - Fruit - Capsule.
- R. occidentalis.
  - Plant - Deciduous, shrub 3 - 9 feet tall.
Stem - Slender.
Leaves - Thin, alternate, elliptical, entire, 2 - 3 1/2 inches long.
Flowers - Terminal, white with yellow or pink markings.
Fruit - Capsule, oblong, 3/4 - 1 inch long.

*R. californicum.*
- Plant - Evergreen shrub or small tree, 3 - 15 feet tall.
- Stem - Coarse, branched.
- Leaves - Alternate, elliptical, entire, 4 - 11 inches long.
- Flowers - Terminal, dense, show, rose-white, 1 1/2 inches across.
- Fruit - Capsule, subcylindrical, 1/2 inch long.

*R. maximum.*
- Plant - Large, evergreen, shrub or open tree, 35 feet tall.
- Leaves - Alternate, oblong, 4 - 10 inches long, acute at both ends.
- Flowers - Dense, showy, rose to pink or white or mixed.

**Habitat**
- *R. occidentalis*: California.
- *R. catawbiense*: Allegheny Mountains, Virginia to Georgia.
- General.
  - Found mostly in moist/wet soils.

**Toxic Principle**
The glycoside, andromedotoxin. Now commonly referred to as grayanotoxin.

**Mechanism of Action**
Grayanotoxin stabilizes voltage-sensitive sodium channels in the open position. Because of the influx of sodium, effects on the heart may resemble those of digitalis (which inhibits Na-K ATPase).

**Susceptible Species**
Cattle, sheep, goats, rarely horses, people, etc.

**Toxicity**
- Leaves are tough, and sometimes regarded as bitter and unpalatable.
- All parts of the plant, but especially the foliage, contain the poison.
- Two or 3 leaves may produce severe toxicosis.
- Sucking flowers free of nectar may produce serious illness.
- Most toxicoses occur in the winter and early spring, when other forage is unavailable. Rhododendrons are more likely to retain green leaves year round than are most other plants.
- Approximately 0.2% of the BW is a toxic dose.

**Signs**
- Clinical signs generally appear within 6 hours of ingestion.
- Acute digestive upset, salivation, nasal discharge, epiphora.
- Anorexia, depression, nausea, projectile vomiting, frequent defecation, repeated attempts to swallow.
- Weakness, incoordination, paralysis of the limbs, stupor, depression of the heart and central nervous system.
- Aspiration of vomitus is common in ruminants and results in dyspnea and often death.
- Pupillary reflexes may be absent.
- Coma precedes death.
- Animals may remain sick for more than 2 days and gradually recover.

**Lesions**
- Gastrointestinal irritation with some hemorrhage.
- Renal tubular damage.
- Mild liver degeneration is sometimes present.
- Aspiration pneumonia.

**Diagnosis**
Identification of *Rhododendron*, evidence of consumption and appropriate clinical signs and lesions.
Treatment

- Prevent absorption.
  - Emesis for appropriate species if not contraindicated.
  - Activated charcoal and a saline or sorbitol cathartic. Repeat activated charcoal as a dilute slurry at 2, 5, 8, and 12 hours.
- Atropine as needed for bradycardia.
- Intravenous fluid therapy.
- Antiarrhythmics may be warranted in seriously affected animals that do not respond with the therapy given above.

Rhododendron and Azalea

Colorful flowers and attractive leaves characterize these beautiful ornamental shrubs.
**Kalmia - Laurels**

*Kalmia angustifolia* - Lambkill, sheepkill, calfkill, dwarf laurel, wicky

*K. latifolia* - Mountain laurel, calico bush, ivy bush

*K. polifolia var. microphylla* - Pale laurel, bog laurel

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| Mechanism of Action | See *Rhodendron* and *Pieris* sections. |

**Family** - Ericaceae or heath family

**Images**

- Mountain Laurel, *Kalmia latifolia* - U.S. G.S. Northern Prairie Wildlife Research Center. - To view this image in full size go to the IVIS website at www.ivis.org . -
- Sheep Laurel, *Kalmia angustifolia* - U.S. G.S. Northern Prairie Wildlife Research Center. - To view this image in full size go to the IVIS website at www.ivis.org . -
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**Description**

- *K. angustifolia.*
  - Plant - Open woody shrub, rarely 3.5 feet tall.
  - Stem - Branches are strongly ascending.
  - Leaves - Opposite or in threes, pale green and glabrate underneath, bright green above, narrowly oblong, obtuse, petioled, leathery, 2 - 5 cm long, persist through the winter.
  - Flowers - Many, showy, crimson or rose, rarely 1 cm across; calyx is glandular; inflorescence is corymbose and produced laterally on the stem, perfect, regular, slightly glandular.
  - Fruit - Pod depressed, nearly smooth, 5 cavitied, many seeded capsule.

- *K. latifolia.*
  - Plant - Evergreen shrub-tree, dense, woody, round-topped, 3 - 10 feet tall.
  - Leaves - Alternate, both sides are bright green, ovate-lanceolate or oblong, acute at each end, petioled, coriaceous, evergreen, entire, 2 - 5 inches long.
  - Flowers - Many, showy, clammy-pubescent, pink or white, inflorescence corymbose, produced at stem tips, rose-white with purple markings, 0.6 - 1 inch across.
  - Fruit - Pod depressed, glandular, many seeded.

**Habitat**

- *K. angustifolia.*
  - Northeastern USA (Appalachian Mountains), rocky hillside woodlands, acid soils, nonfertile soils, abandoned pastures, meadows.

- *K. latifolia.*
  - Eastern USA. Rocky wooded areas, clearings, rocky slopes, gardens.

- *K. polifolia.*
  - California to Alaska. Wet meadows and bogs, Rocky Mountains.
Susceptible Species
Sheep, cattle, horses, goats, people, etc.

Toxicity

- General.
  - Leaves are tough and leathery, animals often avoid; most cases of poisoning occur in winter or early spring when *Kalmia* spp. are the only conspicuously green plants available.
- *K. latifolia*.
  - Minimum toxic doses: Cattle - 0.4% of BW, goats 0.4%, sheep, 0.35% (similar doses in various species of ruminants).
  - The poisonous principle is present in all parts, foliage is especially hazardous.
  - Honey made from these plants may be poisonous.
  - Children have been poisoned by chewing leaves or sucking juice from blossoms or by making "tea".
  - Deer may tolerate ingestion of *K. latifolia*.
  - Grouse have been known to feed on *K. latifolia* fruit in winter and were not apparently affected.
  - It has been suggested that poisoning may result from the eating of flesh from animals that had eaten *Kalmia*.

Signs

- General.
  - Signs appear within 3 - 14 hours of ingestion.
  - Weakness, nausea, intense abdominal pain, repeated swallowing.
  - Salivation, epiphora, runny nose, vomiting.
  - Dyspnea may occur; heart rate slows.
  - Depression, prostration.
  - Convulsions, paralysis of limbs, coma.
  - Possible death within 12 - 14 hours.
  - May live several days and die from foreign body pneumonia or recover.
- Cattle.
  - Soft, liquid feces, diarrhea.
  - Partial loss of control over hind limbs.
  - Muscular incoordination.
  - Pulse becomes weak, expiration forced, respiration shallow.
- Goat.
  - Regurgitation, nausea.
  - Weak pulse, irregular respiration, groaning on expiration.
- Sheep.
  - Forced, short, shallow respiration.
  - Grating of the teeth.
  - Depression, salivation, regurgitation.
  - Inability to stand, unsteady gait.
  - Head drooped and extended. Animals may present in lateral recumbency and exhibit paddling.
  - Watery, foul-smelling feces.
- Cat.
  - Epiphora, salivation, nasal discharge.
  - Slight fever (102.5).
  - Involuntary paddling of the limbs.
  - Intermittent running "fits".
  - Arching of the back; paralysis of the limbs.
  - Death.
  - Also see *Kalmia* and *Pieris* sections.

Lesions

- Fragments of glossy, leathery leaves in the gastrointestinal tract.
- Congestion of the gastric (abomasal) mucosa, duodenum, ileum, kidneys.
- Pneumonia if aspiration has occurred.

Diagnosis

Identification of *Kalmia*, evidence of consumption, and appropriate clinical signs and lesions.

Treatment

See *Rhododendron* section.
**Pieris - Japanese Pieris**

*Pieris japonica* - Japanese pieris

*P. floribunda*

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**Family** - Ericaceae (Heath family)

**Images**

- Japanese pieris (*Pieris japonica*). Source: Cornell University, Poisonous Plants Informational Database (www.ansci.cornell.edu/plants/index.html). - To view this image in full size go to the IVIS website at www.ivis.org.
- *Pieris japonica* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org.
- *P. floribunda* - Google Image Search. - To view this image in full size go to the IVIS website at www.ivis.org.

**Description**

- Plant - Woody shrub or small tree; 30 feet tall when mature.
- Leaves - Alternate, obovate-lanceolate, 1 1/2 - 3 inches long, margins finely toothed.
- Flowers - Small, 1/4 inch across, white, terminal on stem; inflorescence paniculate; 10 stamens.
- Fruit - Capsule.

**Habitat**

- *P. japonica*.
- *P. floribunda*.
  - Virginia to Georgia.

**Toxic Principle**

Andromedotoxin (grayanotoxin).

**Mechanism of Action**

See *Rhododendron* section.

**Signs, Lesions, Diagnosis, Treatment**

- See *Rhododendron* and *Kalmia* sections.
- Also donkeys exhibited tachycardia, dyspnea, green froth around the mouth, minimal gut activity, paralysis, and inability to open their jaws. Paralysis subsided after four days.

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**References**

**Rhododendron**


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