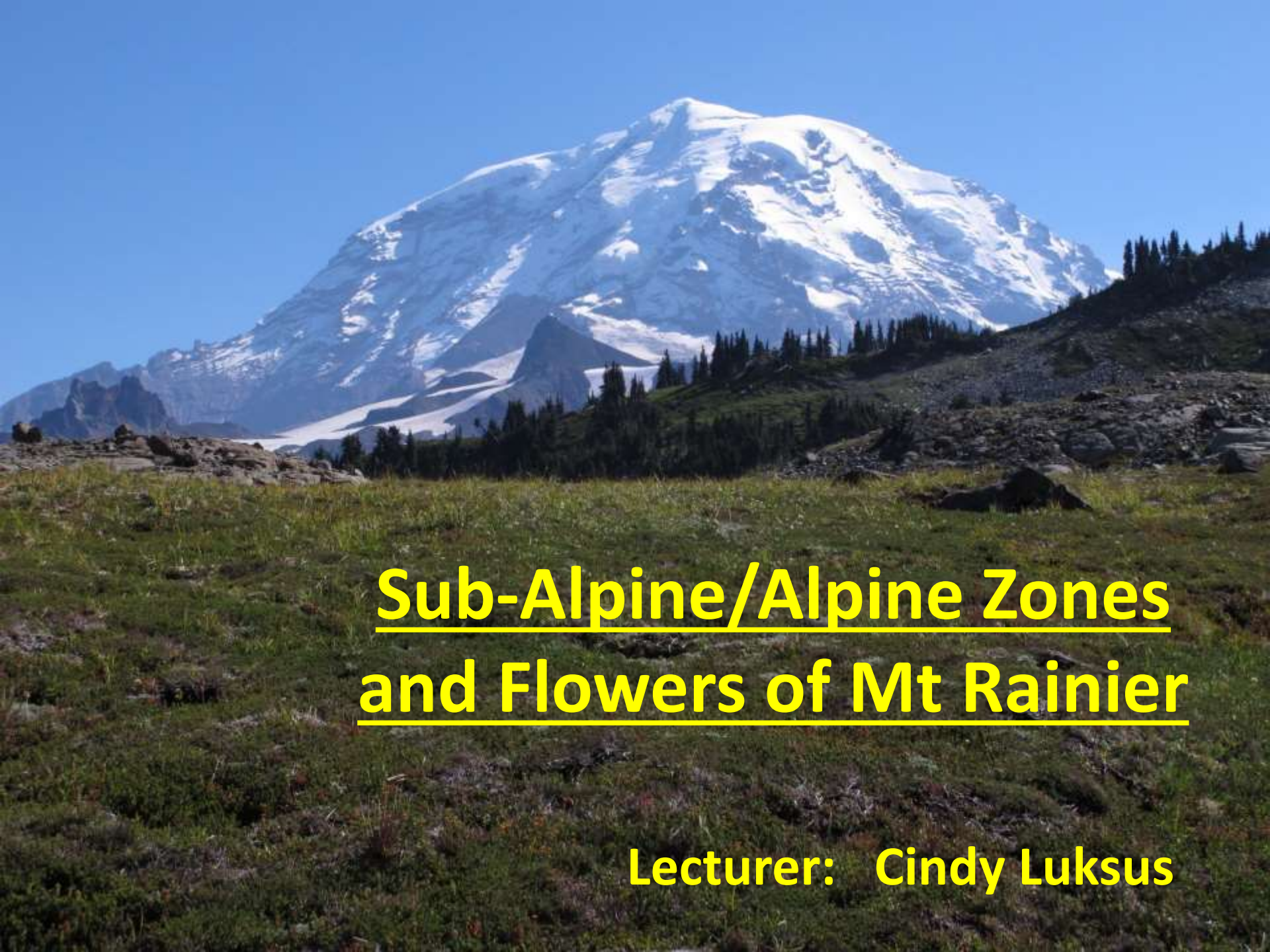


Sub-Alpine/Alpine Zones and Flowers of Mt Rainier

Lecturer: Cindy Luksus

What We Are Going To Cover

- Climate, Forest and Plant Communities of Mt Rainier
- Common Flowers, Shrubs and Trees in Sub-Alpine and Alpine Zones by Family
  1) Figwort Family
  2) Saxifrage Family
  3) Rose Family
  4) Heath Family
  5) Special mentions

- Suggested Readings and Concluding Statements

Climate of Mt Rainier

- The location of the Park is on the west side of the Cascade Divide, but because it is so massive it produces its own rain shadow.
- Most moisture is dropped on the south and west sides, while the northeast side can be comparatively dry.
- Special microclimates result from unique interactions of landforms and weather patterns.
- Knowing the amount of snow/rainfall and how the unique microclimates affect the vegetation will give you an idea of what will thrive in the area you visit.

Forest and Plant Communities of Mt Rainier

- The zones show regular patterns that result in “associations” of certain shrubs and herbs relating to the dominant, climax tree species.
- The nature of the understory vegetation is largely determined by the amount of moisture available and the microclimates that exist.

Forest Zones of Mt Rainier

- Western Hemlock Zone – below 3,000 ft
- Silver Fir Zone – between 2,500 and 4,700 ft
- Mountain Hemlock Zone – above 4,000 ft

Since most of the field trips will start above 4,000 ft we will only discuss plants found in the Mountain Hemlock Zone and above. This zone includes the Sub-Alpine and Alpine Plant communities.

Forest and Plant Communities of Mt Rainier

Subalpine Meadows of Mount Rainier

- An elevational zone just below timberline but above the reach of more or less continuous tree or shrub cover. Divided into 5 groups (J Henderson 1988):
  1) Heather-Bell-heather-Huckleberry Communities
  2) Sitka Valarian-Showy Sedge Communities
  3) Black Alpine Sedge Communities
  4) Low Herbaceous Communities
  5) Mountain Bunchgress Communities

Summerland

Alpine Plants

- Above the last outposts of trees someplace between 6,000 and 7,500 ft
- Plants grow in cushions or mats, leaves are often insulated and protected by hairs and roots dig deeply. Best growth on shallow slopes littered with small rocks.
- A very harsh environment with short growing season.

Phlox and Eriogonum pyrolifolium- Alpine buckwheat –Sunrise area

Subalpine Meadows of Mount Rainier

Heather-Bell-heather-Huckleberry Communities

- Attractive communities of low shrubs mainly located on the south and west sides of Mt Rainier. Important species include:
  1) **Heath Famiy** (Ericaceae)-Pink and Yellow Heathers (Phyllodoce empetriformis and P. glanduliflora); White Mountain Heather (Cassiope mertensiana); Cascade Blueberry (Vaccinium deliciosum)
  2) **Pea Family** (Fabaceae)-Sub-alpine Lupine (Lupinus arcticus)
  3) **Aster Family** (Asteraceae)-Woolly Pussytoes (Antennaria lanata)
  4) **Rose Family** (Rosaceae)- Partridgefoot (Luetkea pectinate)
  5) **Broomrape Family** (Oroganchaceae, formerly Scrophulariacae) Magenta Paintbrush (Castilleja parviflora); Bird's Beak Lousewort (Pedicularis ornithorhynchcha)
  6) **Buckwheat Family** (Polygonaceae)-American Bistort (Polygonum bistortoides)
  7) **Grass Family** (Poaceae)-Mountain Hairgrass (Vahlodea atropurpurea)

Subalpine Meadows of Mount Rainier

Sitka Valarian-Showy Sedge Communities

- The lushest stands of wildflowers are found on the south and west sides of the Park, Found around Mr Rainier on moderate to steep, well-drained slopes
- The growth of shrubs, including the heathers and huckleberries, and trees is thought to be suppressed by avalanches. Important species include:
  1) **Sedge Family** (Cyperaceae)-Showy Sedge (Carex spectablilis)
  2) **Pea Family** (Fabaceae)-Sub-alpine lupine (Lupinus arcticcs)
  3) **Buckwheat Family** (Polygonaceae)-American bistort (Polygonum bistortoides)
  4) **Valerian Family** (Valerianaceae)-Sitka valarian (Valariana sitchensis)
  5) **False Hellebore Family** (Melanthiaceae-formerly Lily Family)-Green false hellebore (Veratrum viride)
  6) **Lily Family** (Liliaceae)-Glacier lily (Erythronium grandiflorum); Avalanche lily (Erythronium montanum)
  7) **Buttercup Family** (Ranunculaceae)-Western pasqueflower (Anemone occidentalis)
  8) **Broomrape Family** (Orobanchaceae)-Magenta paintbrush (Castilleja parviflora)
  9) **Aster Family** (Asteraceae)-Subalpine daisy (Erigeron glacialis- formerly Erigeron peregrinus)
  10) **Parsley Family** (Apiaceae)-Cow parsnip (Heracleum lannatum); Gray's lovage (Ligusticum grayi)
  11) **Rose Family** (Rosaceae)-Fan-leaf cinquefoil (Potentilla flabellifolia)
- A special group of plants are found on low, wet ground along streams:
  1) **Sedge Family** (Cyperaceae)- Black alpine sedge (Carex nigricans)
  2) **Lopseed Family** (Phrymaceae)-Lewis's monkey-flower(Erythraanthe lewisii-formerly Mimulus lewisii); Large mountain monkey-flower (Erythranthe caespitosa-formerly Mimulus tilingii)
  3) **Saxifrage Family** (Saxifragaceae)-Fringed grass of parnassus (Parnassia fimbriata)
  4) **Parsley Family** (Apiaceae)- Sweet coltsfoot (Petasites frigidus)
  5) **Buttercup Family** (Ranunculaceae)- Marsh-Marigold (Caltha leptosepala)

Subalpine Meadows of Mount Rainier

Black Alpine Sedge Communities

- Snow cover persists late into the spring and growing season is short. Sometimes seen at the edges of meltwater ponds. Important species include:
  1) **Sedge Family** (Cyperaceae)- Black alpine sedge (Carex nigricans) and Showy sedge (Carex spectabilis)
  2) **Pea Family** (Fabaceae)-Sub-alpine lupine (Lupinus arcticus)
  3) **Aster Family** (Asteraceae)-Tundra aster (Oreostemma alpigenum)
  4) **Rose Family** (Rosaceae)-Fan-leaf cinqufoil (Potentilla flabellifolia), Partridgefoot (Luetkea pectinate)
  5) **Evening Primrose Family** (Onagraceae)-Alpine willow-herb (epilobium anagallidifolium)
  6) **Grass Family** (Poaceae)-Mountain hairgrass (Vahlodea atropurpurea)

Showy Sedge (Carex spectabilis)

)

Subalpine Meadows of Mount Rainier

Low Herbaceous Communities

- Dominated by mosses, in areas of disturbance or unstable soil. Vegetation grows in clumps, possibly with patches of bare ground visible. May eventually be succeeded by other community types. Important species include:
  1) **Sedge Family** (Cyperaceae)- Black alpine sedge (Carex nigricans)
  2) **Saxifrage Family** (Saxifragaceae)-Tolmie's saxifrage (Micrantehes tolmiei)
  3) **Aster Family** (Asteraceae)-Slender hawkweed (Hieracium gracile)
  4) **Rose Family** (Rosaceae)-Partridgefoot (Luetkea pectinate), Wooly pussytoes (Antennaria lanata)
  5) **Purslane Family** (Portulacaceae)-Pussypaws (Calyptridium umbellatum)
  6) **Valerian Family** (Valerianaceae)-Sitka valarian (Valariana sitchensis)
  7) **Grass Family** (Poaceae)-Mountain hairgrass (Vahlodea atropurpurea)

Sitka Valarian(Valariana sitchensis)

Subalpine Meadows of Mount Rainier

Mountain Brunchgrass Communities

- Where soils are dry and loose, and the prevailing wind has, over the centuries, favored the area with pumice and ash from eruptions (Sunrise timberline).
- OR where the wind removes snow as it falls, leaving locally drier conditions. Important species include:
  1) **Grass Family** (Poaceae)-Green mountain bunchgrass (Festuca viridula)
  2) **Sedge Family** (Cyperaceae)- Showy sedge (Carex spec)
  3) **Aster Family** (Asteraceae)-Cascade aster (Eucephalus ledophyllus)
  4) **Rose Family** (Rosaceae)- Fan-leaf cinqufoil (Potentilla flabellifolia)
  5) **Purslane Family** (Portulacaceae)-Western springbeauty (Claytonia lanceolata)
  6) **Parsley Family** (Apiaceae)-Gray's lovage (Ligusticum grayi)
  7) **Buttercup Family** (Ranunculaceae)-Western pasqueflower (Anemone occidentalis); Snow buttercup (Ranunculus eschscholtzii var suksdorfii)
  8) **Buckwheat Family** (Polygonaceae)-American bistort (Polygonum bistortoides
  9) **Plantain Family** (Plantaginaceae –formerly Scrophulariaceae)-Cusick's veronica (Veronica cusickii)

Alpine Meadows of Mount Rainier

- From treeline to the mountain summit. Type and location of vegetation is controlled by length of the growing season, slope, and exposure to the sun
- Permanent snow and ice covers about 50 percent of the zone. Alpine vegetation covers the remainder---divided into four broad vegetation types (Edwards 1980):
  1) **Fellfields**-areas where freeze-thaw cycles result in patterns of frost-wedged rocks, usually on a level or gently sloping surface stabilized by vegetation mats.
  2) **Talus Slopes and Ridgetops**-ecosystems that are relatively steep, unstable, usually below cliffs or bluffs or ridgelines. Among the first areas to be snow free so have a longer growing season.
  3) **Snow beds**-have the shortest growing season. Areas can have meadows with cold wet soil, streams and tarns.
  4) **Heather Communities**.

  Characteristic wildflowers include: Pussypaws (Cistanthe umbellate), Golden draba (Draba aureola), Golden daisy (Erigeron aureus), Elegant Jacob's Ladder (Polenonium elegans), Dwarf lupine (Lupinus lepidus), Tolmei's Saxifrage (Saxifraga tolmiei), Alpine buckwheat (Eriogonum pyirolifolium), Alpine willow-herb (Epilobium anagallidifolium), both species of Smelowskia, stonecrops---and of course the heathers.

  Now we will look a little closer at some of these wildflowers……


The Figwort* Family (Scrophulariaceae) includes some of the NW's most conspicuous family of irregular flowers. Mount Rainer is a great place to see all of the Figwort* species.

The Figwort* Family was recently split into 4 families as the result of genetic studies:

- Figworts (Scrophulariaceae)
  - Common Mullein
- Broomrape (Orobanchaceae)
  - Louseworts
  - Paintbrushes
- Lopseed (Phrymaceae)
  - Monkey-flowers
- Plaintain (Plantaginaceae)
  - Penstemons
  - Veronicas

Family: **Orobanchaceae (Formerly Figwort Family) The Broomrape family**
Charactorized by:

- The Orobanchaceae are annual or perennial herbs or shrubs.
- They are either fully (holoparasitic) or partly (hemiparasitic) parasitic on the roots of other.

- The traditional family included only genera lacking chlorophyll and fully parasitic, which are easy to recognize since the vegetation isn't green.

- Taxonomists have expanded the family to include partially parasitic (hemiparasitic) genera, which were formerly included in the Figwort family. These plants have chlorophyll and produce their own energy through photosynthesis, so they are not wholly dependent on their host plants.

- Because broomrapes appear several meters away from their hosts, it is inadvisable to assume that the closest or most numerous plant species in the broomrape's vicinity are the hosts, particularly if the broomrapes in question are of a type that use more than one species of plant as hosts.

Naked broom-rape (Orobanche uniflora – a fully parasitic plant

Pedicularis or Louseworts is a genus of the Orobanchaceae or broomrape family (formerly in the snapdragon/figwort family (Scrophulariaceae) consisting of perhaps 500 *hemiparasitic* species that produce *haustorial* connections upon contact with roots of surrounding host plants. There is no known host specificity. With a few exceptions, species of lower latitudes are restricted to high elevations.

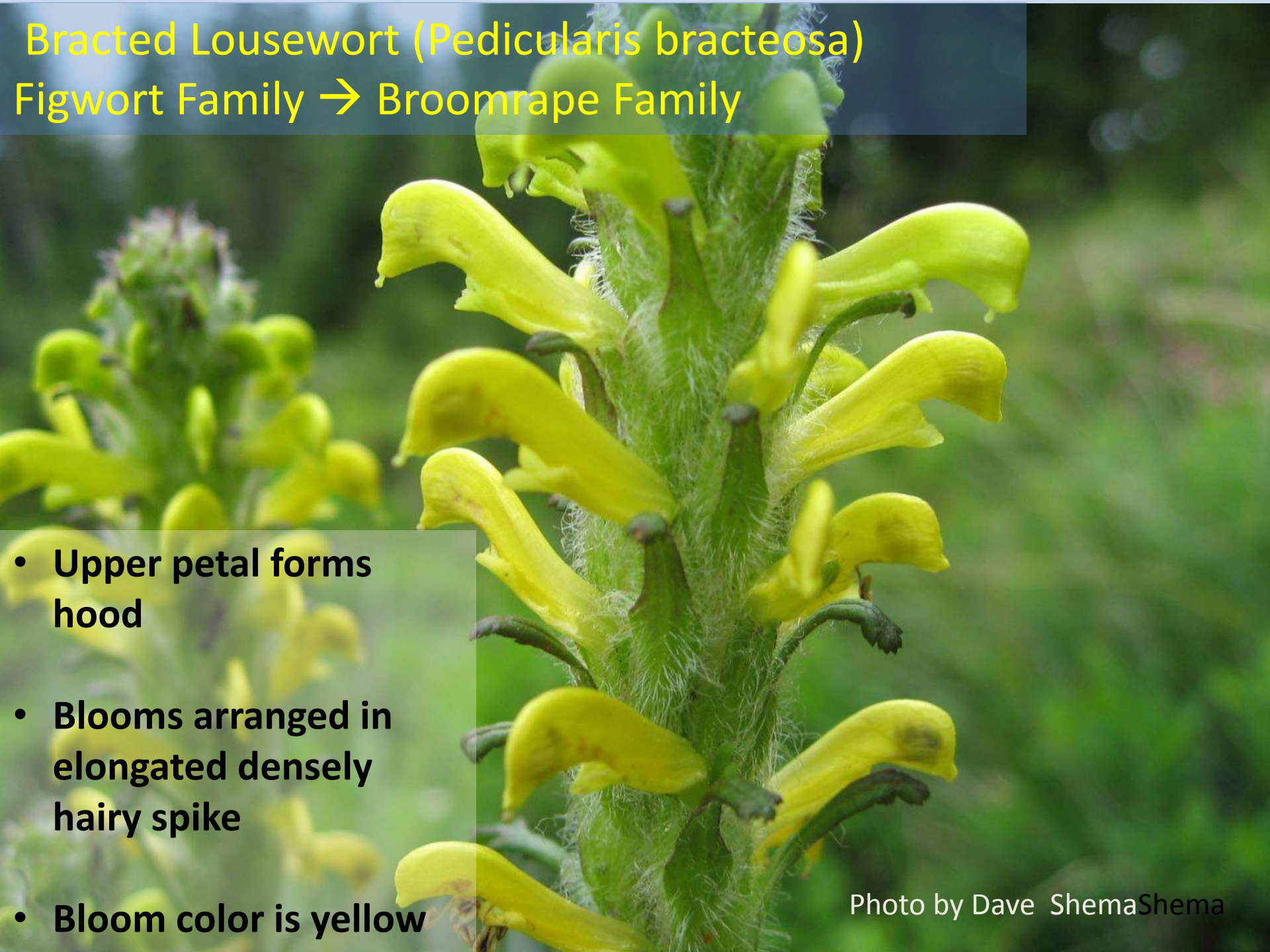
- Name comes from ancient superstition that cattle gets "lousy" (having lice) by eating louseworts.
- Each flower shape fits the anatomy of a particular species of insect pollinator and in a few instances, hummingbirds.
- Irregular tubular flowers The upper lip is 2-lobed, the lower lip is 3-lobed.
- There are two long and two short stamens on slender filaments, inserted below the middle, or at the base of the corolla tube, alternating with the lobes of the tube. A fifth stamen is either sterile or lacking completely.
- The ovary is superior.

Hemiparasitic – a green plant that obtains nutrients via parasitism, but also manufactures its own food through photosynthesis.

Haustorial---the portion of a parasitic plant or fungus that penetrates the host's tissue and derives nutrients from it.

Bracted Lousewort (Pedicularis bracteosa)

Figwort Family → Broomrape Family

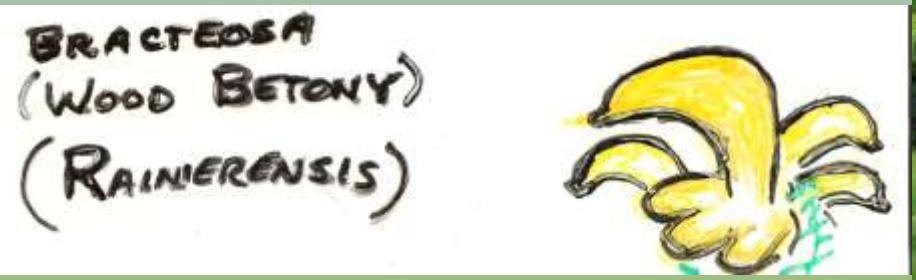


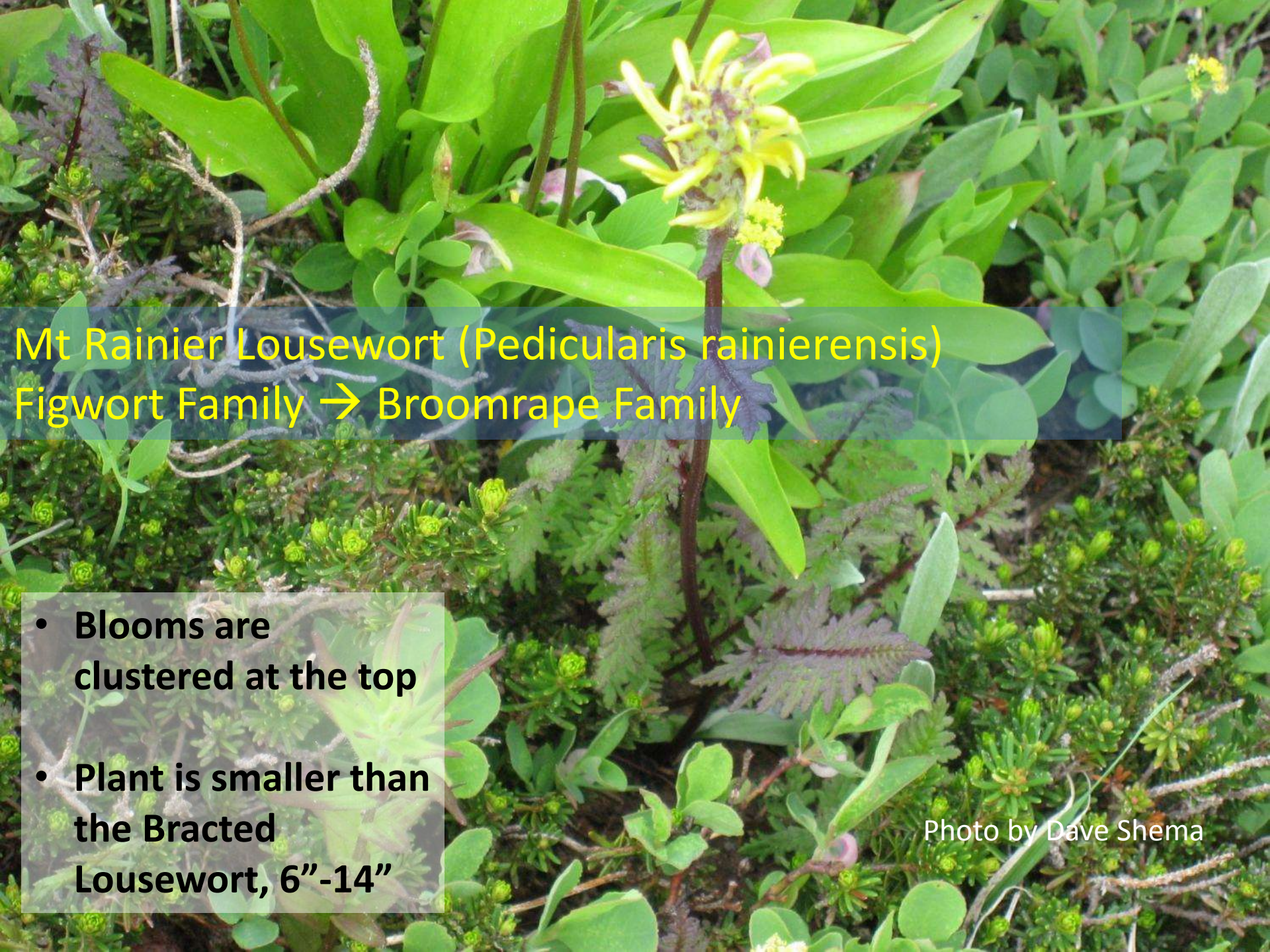
- **Upper petal forms hood**
- **Blooms arranged in elongated densely hairy spike**
- **Bloom color is yellow**

Photo by Dave ShemaShema

Bracted Lousewort (Pedicularis bracteosa)
Figwort Family → Lousewort Broomrape Family

- **Leaves alternate up stem and are ferny looking**
- **Plant grows to be the tallest lousewort in the NW, 1’-4’**





Mt Rainier Lousewort (Pedicularis rainierensis)
Figwort Family → Broomrape Family

- **Blooms are clustered at the top**
- **Plant is smaller than the Bracted Lousewort, 6”-14”**

Photo by Dave Shema

Mt Rainier Lousewort (Pedicularis rainierensis)
Figwort Family → Broomrape Family

- **Looks like a pinwheel from above**

Photo by Dave Shema

Coiled Beak Lousewort (Pedicularis contorta)
Figwort Family → Broomrape Family

- Top Petal forms downward twisted beak
- Flower mostly white with freckles

Coiled Beak Lousewort (Pedicularis contorta)
Figwort Family → Broomrape Family

- **Leaves are fern-like**

Note: Red color in louseworts' leaves is undistinctive. Usually just means plant has gotten more sun.

Photo by Dave Shema and Drawings by Ed Dominguez

Bird's Beak Lousewort (Pedicularis ornithoryncha)
Figwort Family → Broomrape Family

- **Top petal forms a downward bird beak shape**
- **Blooms in pink/purple color**

Beak Lousewort (Pedicularis ornithoryncha)
Fi Bird's gwort Family → Broomrape Family

- **Blooms near top of stem**
- **Leaves near base of plant**

Sickletop (or Rams Horn) Lousewort
Figwort Family → Broomrape Family

- **Flowers pinkish**
- **Top petal forms downward twist**

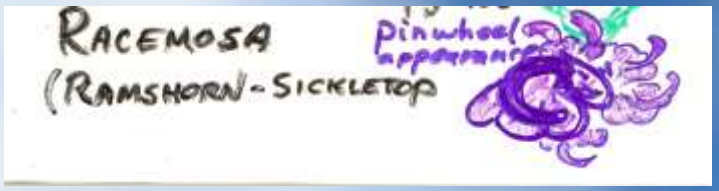


Photo by Dave Shema Drawing by Ed Dominguez

Sickletop (or Rams Horn) Lousewort
Figwort Family → Broomrape Family

- **Leaves are lance-shaped, unlike the Coiled Beak's fern-like leaf**

Photo by Dave Shema

Elephant's Head Lousewort (Pedicularis Groenlandica)
Figwort Family → Broomrape Family

- **Blooms pinkish-purple to reddish purple**
- **Top petal long and curling upward**

Elephant's Head Lousewort (Pedicularis groenlandica)
Figwort Family → Broomrape Family

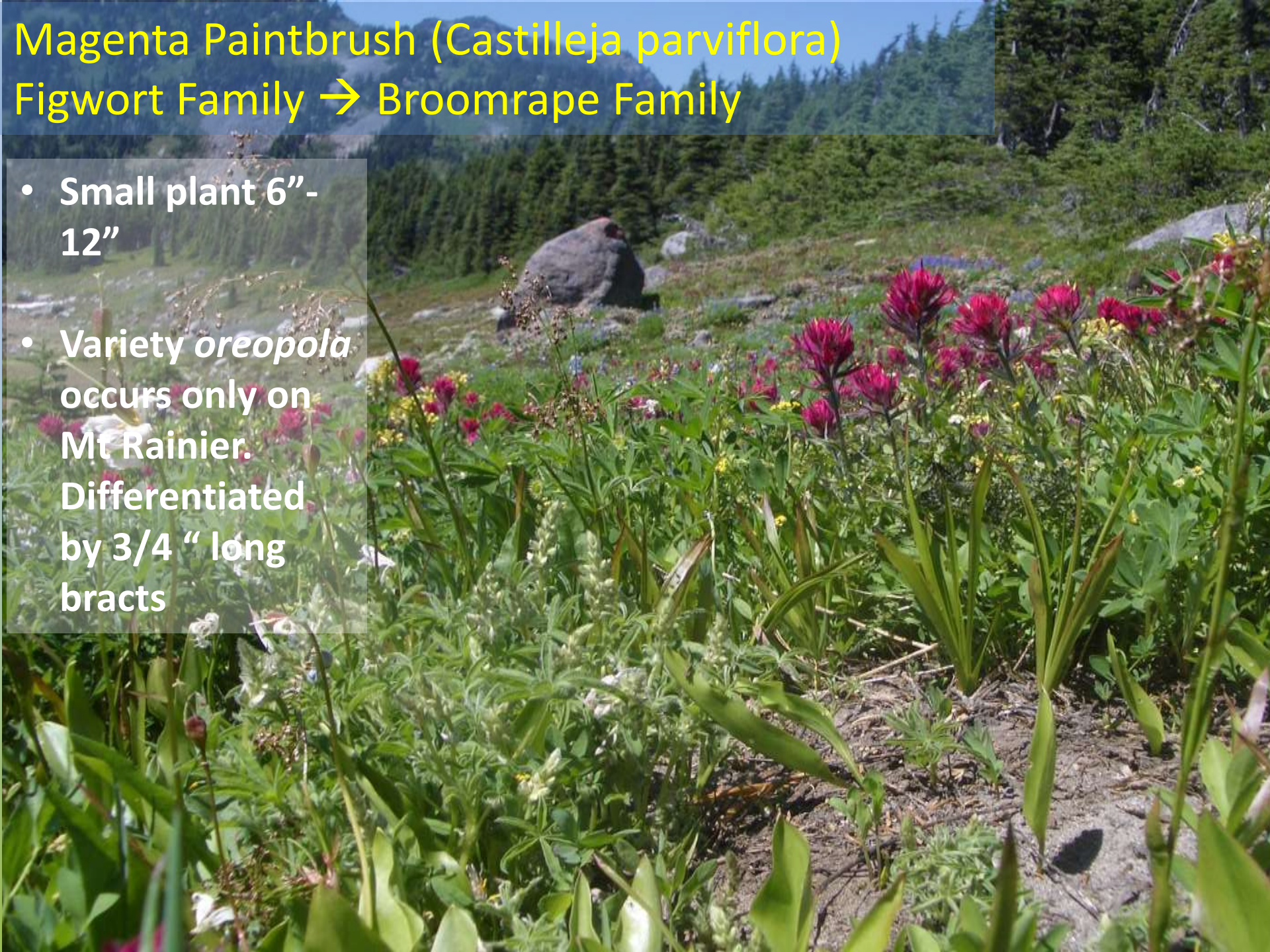
- **Flower arrangement is dense**
- **Basal leaves, lance shaped, pinnately divided into slender toothed lobes. Often reddish in color**

Indian Paintbrush
Family: **Orobanchaceae**, the B**roomrape family (Formerly Figwort Family**
Genus: Castilleja
Partially parasitic on other plant roots---hemiparasitic.

What is commonly thought of as the flower are the showy and colorful bracts. The actual flower is crowded in the axils of the bract's and the flower's petals are greenish.

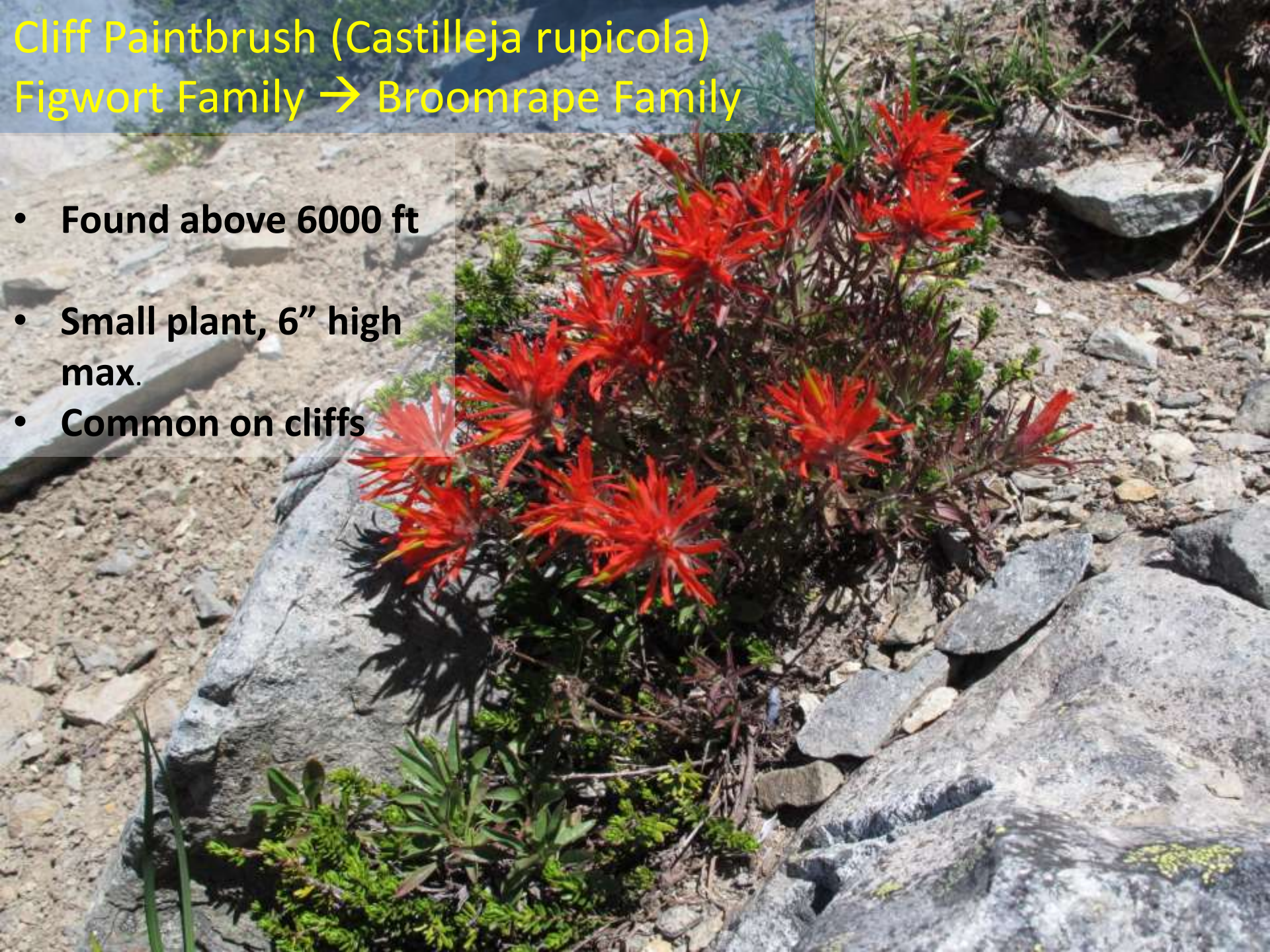
The flowers of Indian paintbrush are edible and sweet, and were consumed in moderation by various Native American tribes as a condiment with other fresh greens. However, these plants absorb and concentrate selenium in their tissues from the soils in which they grow, and can be potentially very toxic if the roots or green parts of the plant are consumed. So, you need to be confident of the actual edible part before eating.

Magenta Paintbrush (Castilleja parviflora)
Figwort Family → Broomrape Family



- **Small plant 6”-12”**
- **Variety *oreopola* occurs only on Mt Rainier. Differentiated by 3/4 “ long bracts**

Cliff Paintbrush (Castilleja rupicola)
Figwort Family → Broomrape Family



- **Found above 6000 ft**
- **Small plant, 6” high max.**
- **Common on cliffs**

Family: **Phrymaceae** , the Lopseed family
(formerly Figwort Family)

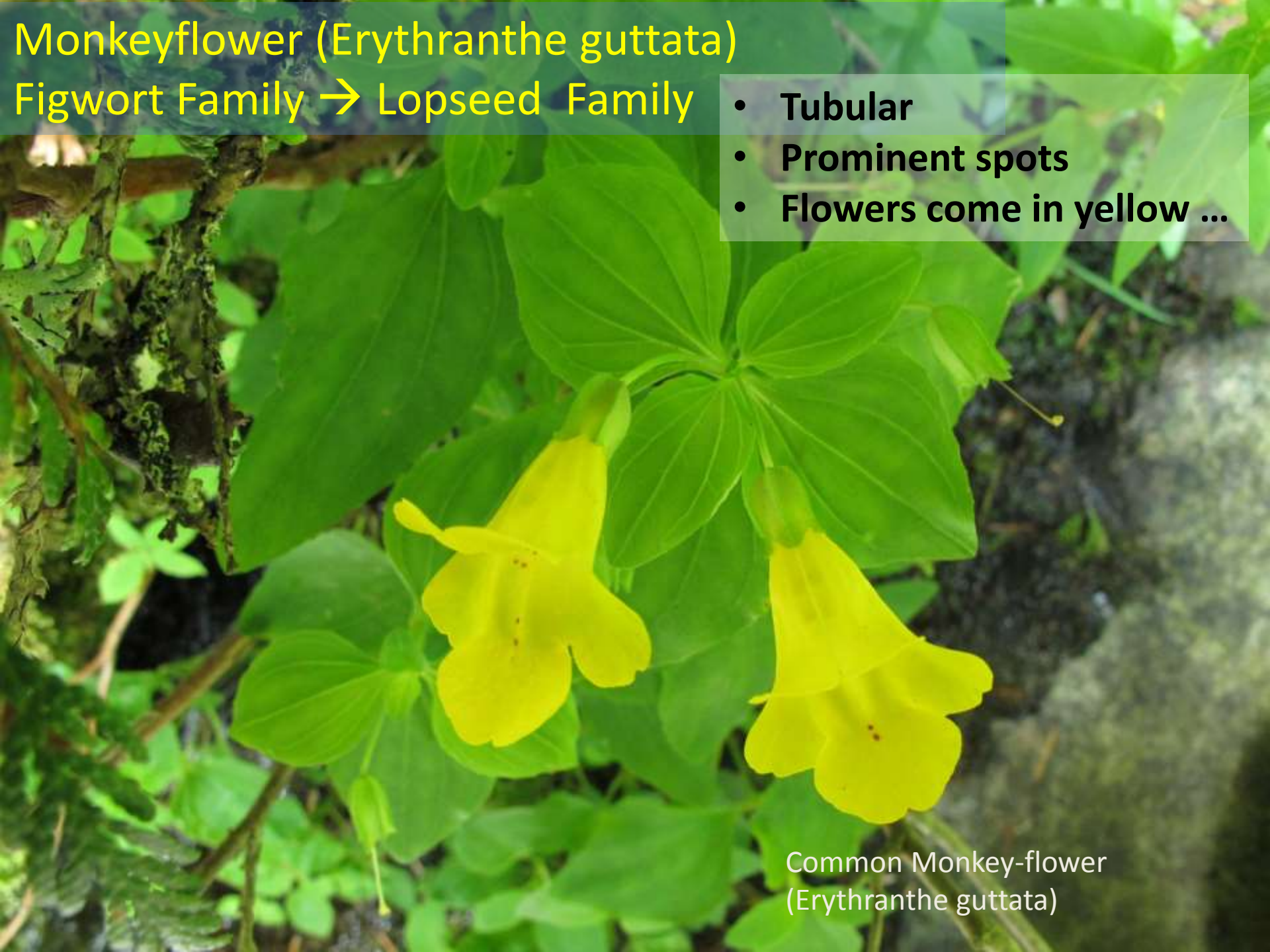
A small family, concentrated in two centers of diversity, one in Australia, the other in western North America.

- Members of this family occur in diverse habitats including deserts, river banks and mountains.
- Bearing tubular, bilaterally symmetric flowers---2 upper 3 lower
- Mating systems which may be sexual or asexual, and may involve outcrossing, self-fertilization, or mixed mating. Some are pollinated by insects, others by hummingbirds

Monkeyflower (Erythranthe guttata)

Figwort Family → Lopseed Family

- **Tubular**
- **Prominent spots**
- **Flowers come in yellow …**



Common Monkey-flower
(Erythranthe guttata)

Monkeyflower (Erythranthe lewisii)
Figwort Family → Lopseed Family

… and pink

There are two upper flower lobes, and three lower

Leaves are opposite and simple

Lewis's monkey-flower-Erythranthe lewisii)

Penstemon

Family: **Plantaginaceae**, the **plantain family (Formerly Figwort Family)**

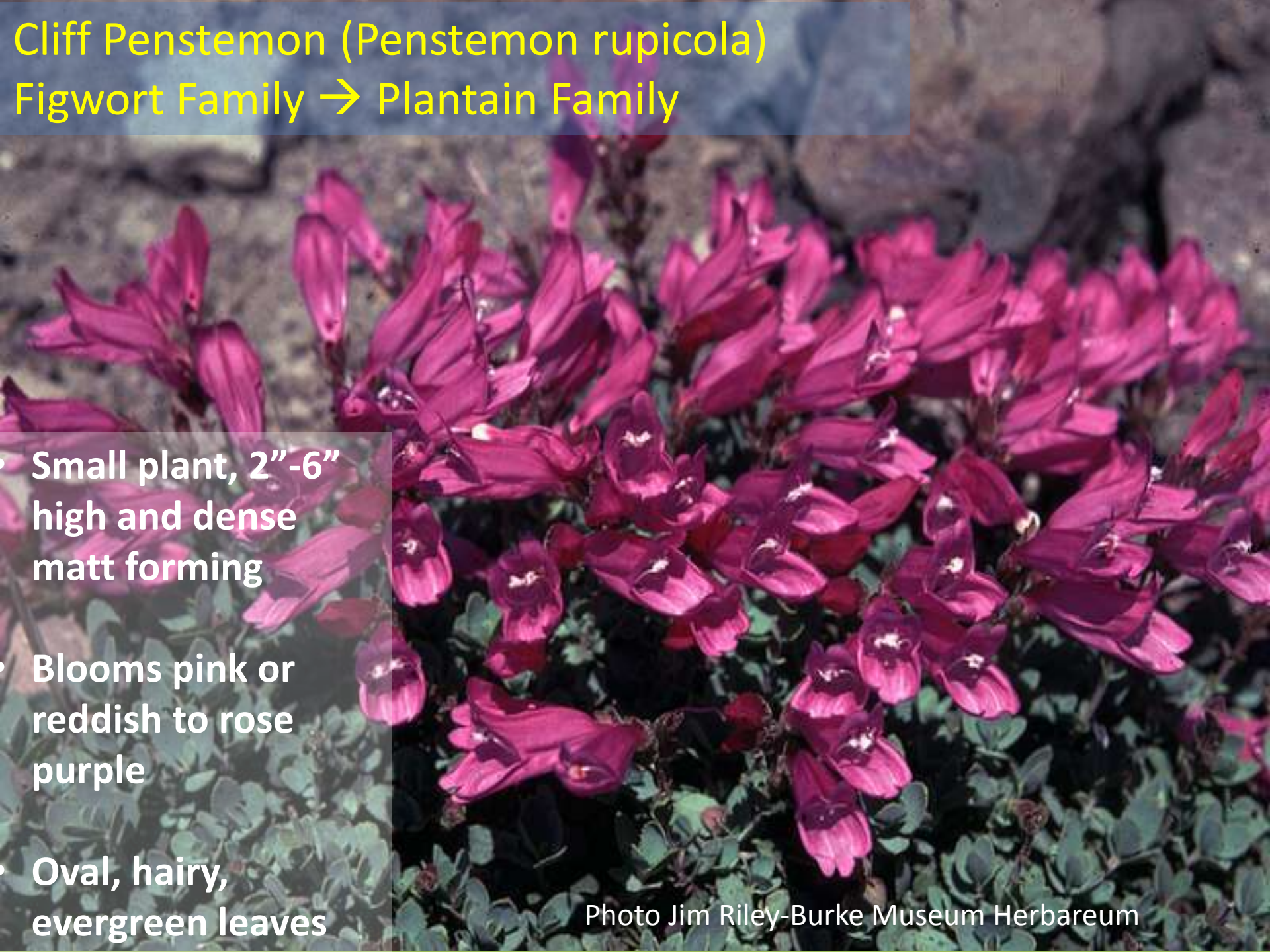
Genus: Penstemon

- 250 species in North America-They are difficult to identify, because the most distinctive feature of the genus is the prominent staminode---an infertile stamen. The staminode takes a variety of forms in the different species.
- They have opposite leaves, partly tube-shaped, two-lipped flowers and seed capsules.
- Native Americans used penstemon roots to relieve toothache.

Woodland Beardtongue (Nothochelone nemorosa)
Figwort Family → Plantain Family

- **Flowers several on long stalks along upper stem**
- **Flowers distinctly 2 lipped with lower lip longer**
- **Flowers pinkish, purple**
- **Height 12”-40”**

Cliff Penstemon (Penstemon rupicola)
Figwort Family → Plantain Family



- Small plant, 2”-6” high and dense matt forming
- Blooms pink or reddish to rose purple
- Oval, hairy, evergreen leaves

Photo Jim Riley-Burke Museum Herbareum

Shrubby Penstemon (Penstamon fruticosus)
Figwort Family → Plantain Family

- **Spreading semi-evergreen shrub up to 16 in tall, mats to 36 in across**
- **Blooms pink, lavender, or purple**
- **Leaves lance-shaped with pointed tips.**

Cusik's speedwell (Veronica cusikii)
Figwort Family → Plantain Family

- **Flowers few to several atop stem in a bracted cluster**
- **Blooms violet purple to light blue with cream centre**
- **Irregularly 4-lobed**
- **Found in moist meadows, seepage areas, streambanks and heathlands**

Family: **Saxifragaceae**

The Latin word *Saxifraga* means literally "stone-breaker", from Latin *saxum* "rock" or "stone" + *frangere* "to break".

- The flowers of the Saxifrage family are typically small, often less than 1/4 inch in diameter, with a few eye-catching individuals approaching 1/2 an inch.
- Small plants with usually small flowers, parts in fives, plus an oblong pistil with 2 styles.
- The ovary matures as a capsule with a few or numerous seeds per carpel.

Rusty Saxifrage (Micranthes ferruginea)
Saxifrage Family

- **Anthers have rusty/orange tips**
- **Petals have 2 yellow spots**
- **Flowers irregular---3 upper petals and 2 lower.**
- **Plant grows up to 2’ high**

Note: Saxifrage family generally has long stemmed flowers with leaves at base of plant

Tolmie's Saxifrage (Micranthes tolmiei)
Saxifrage Family

- White flower with firm green mound (ovary) at center
- Mat-forming plant with short branches crowded with leaves

Leatherleaf Saxifrage (Leptarrhena pyrolifolia)
Saxifrage Family

- **Tough evergreen leaves that form rosette at base of plant**
- **Stems are reddish**
- **Whitish petals overshadowed by reddish sepals**
- **Fruits are purplish red**
- **Found in streambanks, flushes, seepage areas**

Fringed Grass of Parnassus (Parnassia fimbriata)
Saxifrage Family

- Hairless plants with broad, kidney-shaped untoothed leaves
- Single flower on stalk with 5 white petals, 5 fertile stamens, 5 sterile staminodia

Nelson's Brook Saxifrage (Micranthes nelsoniana)
Saxifrage Family

- **Flowers in open clusters**
- **Flowers white with 2 yellow spots at base**
- **Leaves round to kidney-shaped coarsely toothed all around**

Family: Rosaceae-Rose Family

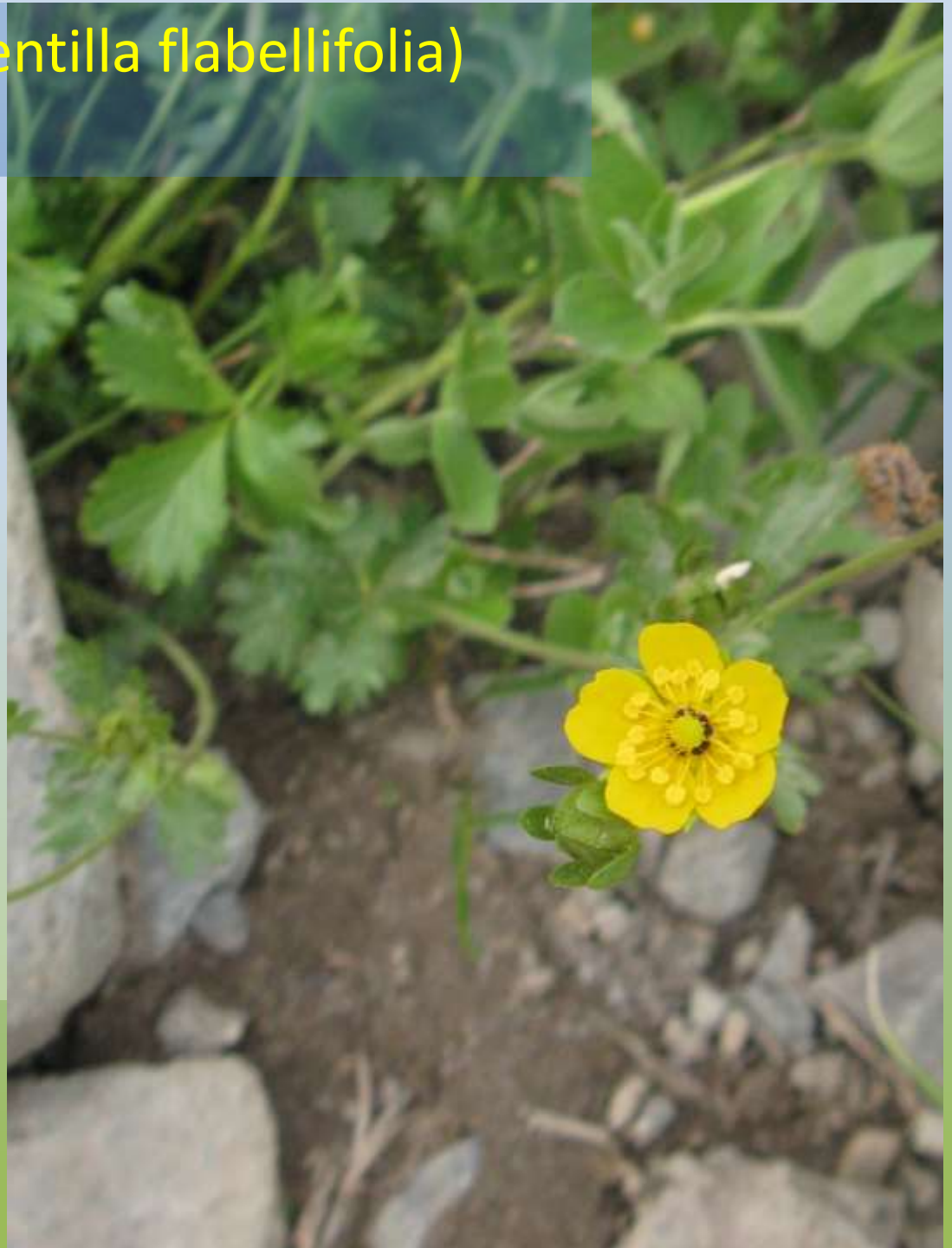
We have already discussed the Rose Family in past classes. Our intent here is to introduce you to some of the genus' that are unique to the alpine and sub-alpine areas.

Partidgefoot (Leutkea pectinate)
Rose Family

- **Mats with rooting runners creating new plants thick with evergreen leaves**
- **Upright stems**
- **Flowers small 5 white petals in dense spikes**
- **Found where snow persists**

Fan-leafed Cinquefoil (Potentilla flabellifolia)
Rose Family

- **Low, clustered perennial**
- **Flowers bright yellow. Two to five flowers at the tip of erect stems**
- **Leaves mainly basal and look a little like a strawberry leaf---three leaflets roundish and deeply toothed.**
- **Found in subalpine meadows, stream banks and seeps**



Rosy Spirea (Spiraea denisflora)
Rose Family

- **A deciduous shrub that can reach 1-4 ft in height**
- **Flowers are rose-pink in showy flat-topped clusters**
- **Alternate leaves elliptical to oval**

Sitka Mountain Ash (Sorbus sitchensis)
Rose Family

- Erect to spreading shrub growing 3-10 ft
- 7-11 blue-green leaflets with rounded tips---broader near tips
- Inflourescence 2-4 in in round-topped cluster of small white flowers
- Beautiful bright orange berries in the fall

Cascade Mountain Ash (Sorbus scopulina)
Rose Family

- **Large deciduous shrub. Can grow to 16 ft tall**
- **Leaves deciduous, alternate---9-17 leaflets that are toothed along the full length and sharp pointed.**
- **Inflorescence 2-4 in round-topped cluster. Flowers white, small, petals nearly round.**
- **Also has red-orange berries in the fall**

Family: Ericaceae-Heath Family

We have already discussed the Heath Family in past classes. Our intent here is to introduce you to some of the genus' that are unique to the alpine and sub-alpine areas.

White-flowered Rhododendron (Rhododendron albiflorum) Heath Family (Ericaceae)

Without the flowers these two can look very similar.

- The Rhododendron leaf is pointed at both ends; wavy-margined to minutely saw-toothed, shiny green on top, paler beneath with fine rusty hairs.
- The False Azalea leaf is egg-shaped, light green to blue-green, pointy-tipped (mid-vein protrudes beyond leaf tip). Hairy both surfaces.

False Azalea or Fools Huckleberry (Menziesia ferruginea)

Huckleberry, Blueberry (Vaccinium Sp)
Heath Family (Ericaceae)

- **Tasty fruit!!!!**
- **Range from low and matted to tall and strongly branched Flowers are urn or bell-shaped. White to pinkish**
- **Fruits are red to blue-black**

And a few special mentions……


Mountain Bog Gentian (Gentiana calycosa)
Gentian Family

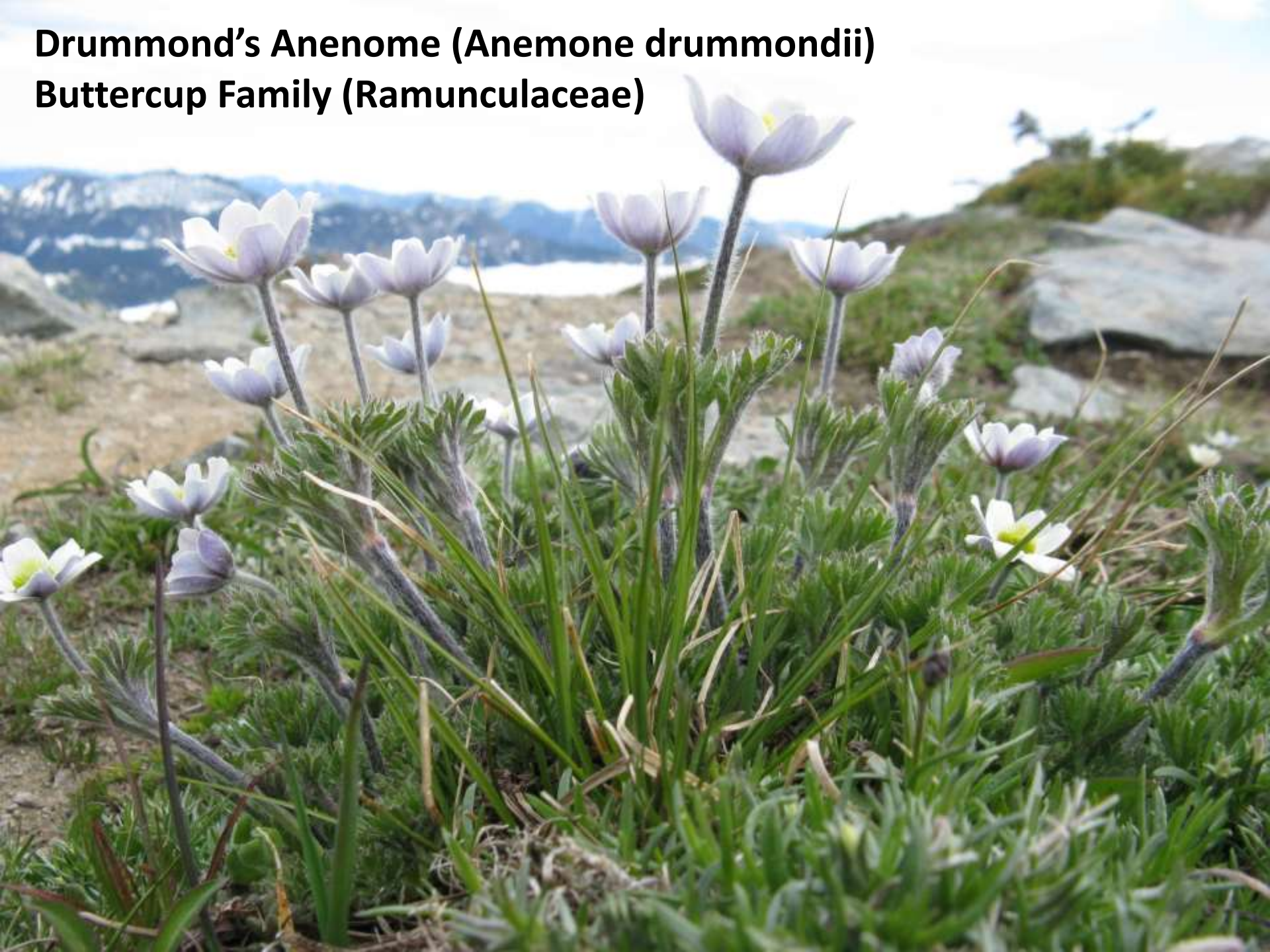
Tongue-Leaf Rainiera (Rainier stricta) Aster Family

Found only at Mt Rainer

Disc flowers only

Western Pasqueflower or Old Man of the Mountain
(Anemone occidentalis)
Buttercup Family (Ranunculaceae)

Drummond's Anenome (Anemone drummondii)
Buttercup Family (Ramunculaceae)



Marsh Marigold (Caltha leptosepala)
Buttercup Family (Ranunculaceae)

Sitka Valerian (Valeriana sitchensis)
Valerian Family (Valerianaceae)

- Tall plant
- White to pinkish small flowers in clusters
- Compound leaves, basal, opposite---leaves coarsely toothed

McCullough's Forester on Sitka Valerian

Suggested Readings

1) Biek, David, Flora of Mount Rainier National Park
2) Pojar & MacKinnon, Alpine Plants of the Northwest-Wyoming to Alaska
3) Taylor, Ronald J. & Douglas, George W., Mountain Plants of the Pacific Northwest
4) Turner, Mark & Gustafson, Phyllis, Wildflowers of the Pacific Northwest

Websites

Mount Rainier National Park website –
http://www.nps.gov/mora/learn/nature/plants.htm


The End
Enjoy the
flowers!!!!!