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Recognizing Plant Families of the West

Field Guide

Carol Dawson and Phil Krening

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Cover Photo: Helianthella quinquenervis and Castilleja spp., Lake County, Colorado, Phil Krening

Recognizing Plant Families of the West

Field Guide

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"The urge to classify is a fundamental human instinct; like the predisposition to sin, it accompanies us into the world at birth and stays with us to the end."

- A. Tindell Hopwood (1897-1969)
Curator, Natural History Museum in London
British Paleontologist

Modoc County, California, Phil Krening

FOREWORD

I met Carol Dawson during the summer of 2013 while she was teaching her class "Flora of the West" at a weeklong workshop at the Chicago Botanic Garden. On paper, Carol's class looked grueling – a botanical blitz of the identifying characteristics of around fifty plant families delivered in approximately 90 minutes. Though, if you opted to skip it, you surely would have missed the most useful and engaging crash course in plant identification around. Carol's family-based approach to identifying plants brings the complexities and nuance of botanical wizardry into the realm, not only of the accessible, but the relatable.

Having worked closely with Carol over the last eight years, I have sat through her class a dozen or more times, and I still take away something new each time. Leading up to the 2020 field season, when so many in-person trainings were cancelled, there was a perceptible void in the transfer of knowledge to seasonal staff. Not just to botanical interns, but to weed control specialists, range managers, and vegetation monitoring crews. Many supervisors reached out for a copy of the Flora of the West presentation to share with their staff.

This first edition of *Recognizing Plant Families of the West* includes the identifying characteristics of 54 of the most common plant families in the arid western United States, depicted by over 1,000 carefully selected images. Much of the original content and spirit of "Flora of the West" has been included in text to provide broader context and a deeper understanding of these plants, their ecology, and their ethnographic and economic importance. I hope you find it equal parts education and enjoyment.

- Phil Krening

Dominguez-Escalante National Conservation Area, Colorado, Phil Krening

CONTENTS

INTRODUCTION

Background

The first step in the identification of any unknown plant is to recognize the family to which it belongs. For example, when you look at a daisy, blanket flower, sunflower, or coneflower, even a novice will undoubtably recognize that the flowers have features in common that make them recognizable as plants in the Sunflower Family (Asteraceae). In this way we are all born taxonomists—we unconsciously see the differences in characteristics of everyday objects. Without thinking, our mind runs through an analysis of its characters, a tendency that leads to classifying like-objects into groups. The entire natural world has been classified in this fashion. Arranged from a few broad associations all the way down to millions of distinct species. Therefore, familiarizing yourself with the patterns of even just a few common plant families, opens the door to the identification of thousands of individual plant species.

The goal of this field guide is to enable readers to identify 54 flowering plant families. The focus is on illustrating the field recognition characters with photographs. Take the plunge – learn the characteristics of the plant families presented here – and in short order you will be automatically classifying the plants you encounter.

About this Field Guide

In preparing this field guide I have used old and new textbooks on plant identification and classification, published floras of the western states, and lots of other reference material. A complete list of all the literature used can be found in the References section at the end of this guide. The plant families presented in this guide were chosen because they are commonly encountered in the western states. However, these characters apply to the same families found in the temperate regions throughout the world. A standardized format was followed, utilizing photographs to illustrate the identifying characters, followed by photographs of familiar western genera.

Patagonia Mountains, Arizona, Patrick Alexander

The family circumscriptions used in this guide follow Christenhusz et al., (2017), which include recent advances in DNA-based studies. Beginning in 1998, the Angiosperm Phylogeny Group (APG) began to create classifications based on analyzed data and informal consensus among researchers. Today, these classifications are well-established and followed by most researchers in the field.

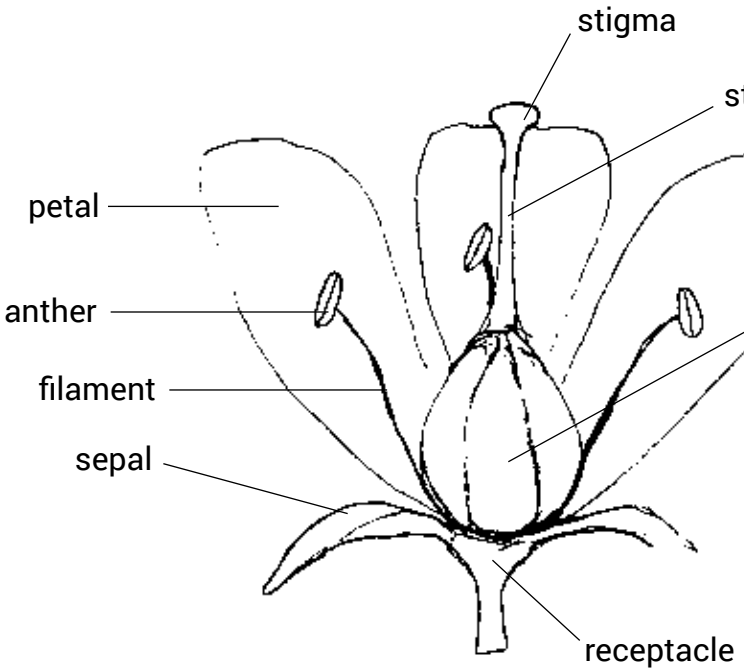
How to Use this Guide

The aim of this guide is to enable the reader to identify plants to the family level without using the family key in the flora of your region. You will need to use the proper flora to determine the genus and species. The first step in the identification process is to review the key to plant family groupings. The 54 plant families are arranged into 3 groups: grasses and grass-like plants, monocotyledons, and eudicotyledons. The key interprets the recognition characters as they would most likely be observed by a wide range of users. This allows the user to select potential plant families based on the overall appearance of the flowers. Plant families are arranged in alphabetical order. Each family page contains general information, identifying characters with photographs, followed by images of familiar species across the west.

Drawings are included as a refresher for terms used regarding flower structure. Use the glossary to make certain that you understand what you are looking at — small mistakes in interpretation can lead to the incorrect family and back to using the family key in your flora! The goal is to give you the tools to rapidly identify potential plant families without stress.

Throughout these pages you'll find references to traditional and ethnobotanical uses of many different plants species. It is not within the scope of this field guide to provide detailed information on the harvest and use of edible or medicinal plants. As with all wild harvesting, caution is required in the identification, processing, and use of any wild plant.

GENERAL FLOWER TERMINOLOGY

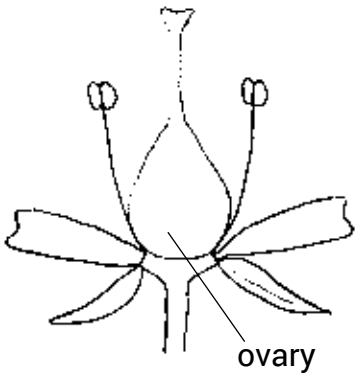


collectively sepals = calyx
collectively petals = corolla
calyx + corolla = perianth
stigma + style + ovary = pistil
anther + filament = stamen

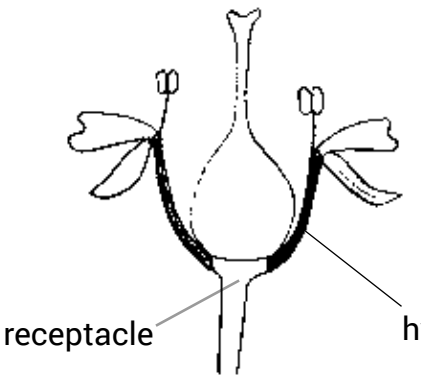
Ovary Position

All floral parts attach to the receptacle. The relative position of the ovary to the other flower parts is an important diagnostic feature - the ovary is either superior (perianth & stamens attach below) or inferior (perianth & stamens attach to the top of the ovary).

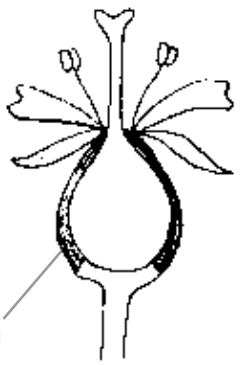
Superior Ovary
(hypogynous)



Superior Ovary
(perigynous)



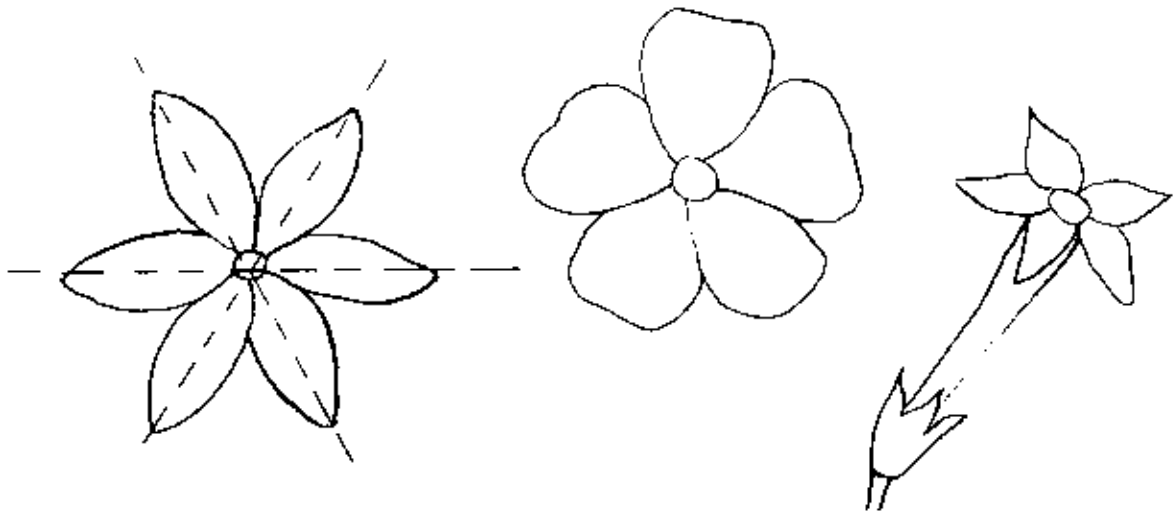
Inferior Ovary
(epigynous)



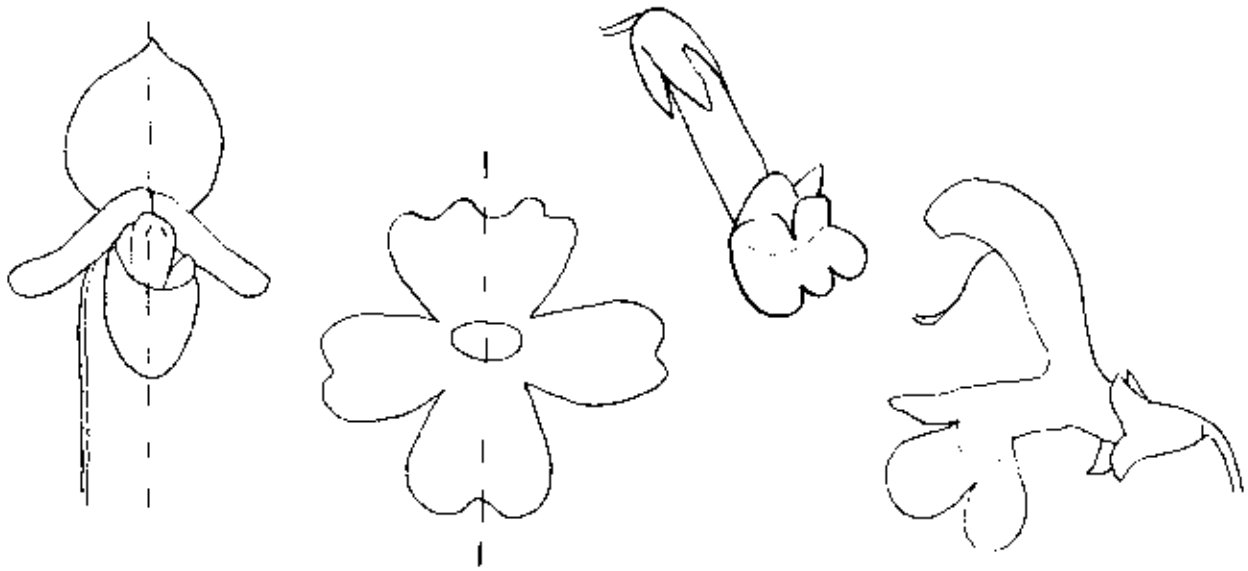
Flower Symmetry

Floral symmetry can be described as actinomorphic or zygomorphic. Flowers with actinomorphic symmetry can be cut through the center of the flower in any direction and have similar pieces. In zygomorphic flowers only a cut through a median plane yields two equal halves.

Radial (Actinomorphic, Regular)

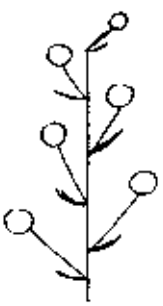


Bilateral (Zygomorphic, Irregular)



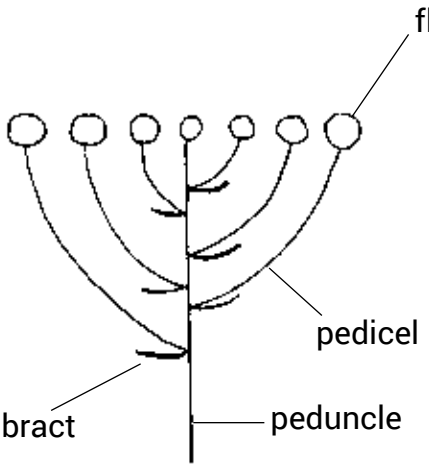
Inflorescence Types

Within an inflorescence the main stalk supporting a single flower is the pedicel. Bracts may occur at the base of each pedicel in the inflorescence. The stalk supporting an entire inflorescence is the peduncle. The central axis of an inflorescence is called a rachis. An inflorescence that has the oldest flower terminating the rachis with the blooming flower pattern being outward and downward is called a determinate type. If the youngest flower is central or terminal and the blooming pattern is progressively inward and upward the inflorescence is called indeterminate. There are exceptions to these blooming sequences.

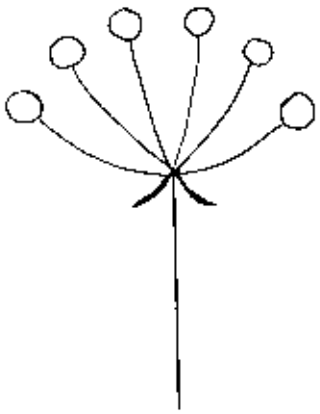


raceme

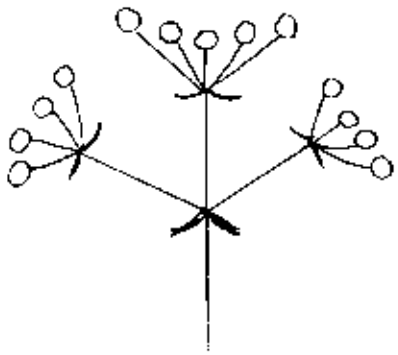
spike



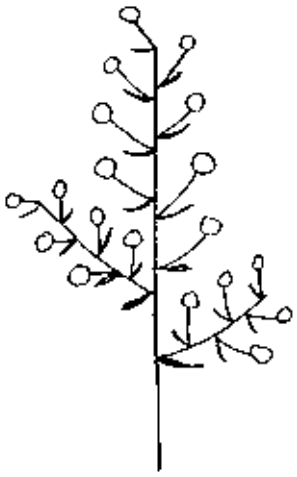
corymb



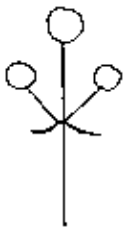
simple umbel



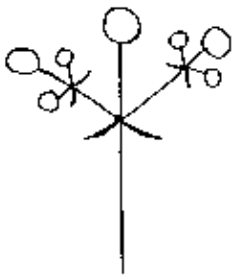
compound umbel



panicle



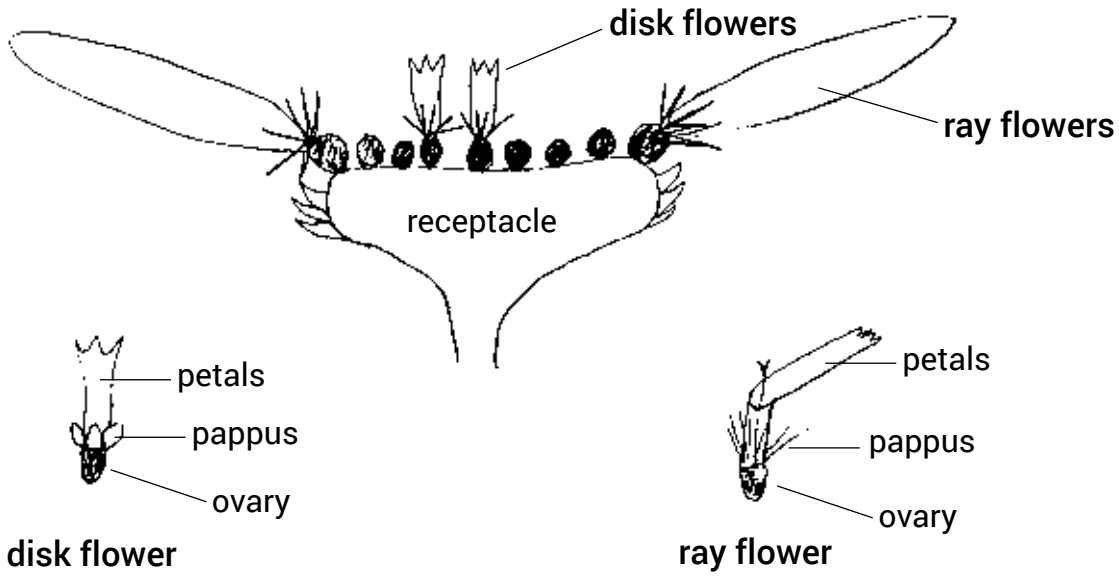
simple cyme



compound cyme

Asteraceae

The head is an inflorescence type in the Asteraceace consisting of a dense cluster of sessile flowers.



Park County, Colorado, Patrick Alexander

KEY TO PLANT FAMILY GROUPINGS

Monocotyledons
(grasses and grass-like plants)

Flowers lacking colorful petals, small, arranged in spikelets or enclosed by bracts, leaves parallel-veined

- Cyperaceae
- Juncaceae
- Poaceae

Monocotyledons
(excluding grasses and grass-like plants)

Flowers white or brightly colored; flower parts 3 or multiples of 3, perianth of tepals (i.e. no difference between sepals and petals); leaves with parallel venation, strap-shaped

Ovary Superior

- Agavaceae
- Alliaceae
- Amaryllidaceae
- Asparagaceae
- Liliaceae
- Themidaceae

Ovary Inferior

- Agavaceae
- Asparagaceae
- Liliaceae
- Orchidaceae

Alpine vegetation climate change monitoring, Colorado, Phil Krening

Eudicotyledons

Flower parts in 4's or 5's, or in multiples of 4 or 5; or with many parts arranged in a spiral; flowers with recognizable sepals and petals, major leaf veins reticulated

Flowers with petals or petal-like structures that appear to be separate from each other

Adoxaceae
Amaranthaceae
Anacardiaceae
Apiaceae
Apocynaceae*
Asteraceae*
Berberidaceae
Brassicaceae
Cactaceae
Caryophyllaceae
Cleomaceae
Fabaceae
Garryaceae
Gerianaceae
Loasaceae
Malvaceae
Montiaceae
Papaveraceae
Polygonaceae*
Ranunculaceae
Rosaceae
Saxifragaceae
Zygophyllaceae

Flowers with petals or petal-like structures clearly fused to each other into a long or short tube

Flowers are Actinomorphic

Apocynaceae*
Asteraceae
Boraginaceae
Campanulaceae
Caprifoliaceae
Convolulaceae
Curcurbitaceae
Ericaceae
Euphorbiaceae
Gentianaceae
Grossulariceae
Hydrangeaceae
Lythraceae
Nyctaginaceae
Oleaceae
Onagraceae
Polemoniaceae
Polygonaceae*
Primulaceae
Rhamnaceae
Sarcobataceae*
Scrophulariaceae
Solanaceae

Flowers are Zygomorphic

Campanulaceae
Caprifoliaceae
Lamiaceae
Orobanchaceae
Phyrmaceae
Plantaginaceae
Polemoniaceae
Scrophulariaceae
Verbenaceae

* Key interprets some characters as observed-not always botanically correct.

Adoxaceae | Moschatel or Elder Family

A

Familiar Western Genera *- Adoxa, Sambucus, Viburnum*

General Information

The Adoxaceae is a family of perennial herbs, shrubs, and small trees. Species in the genera *Sambucus* and *Viburnum* are well-known as garden ornamentals. Elderberry (*Sambucus canadensis*) has edible fruits that are used to make jams, jellies, sauces, juice, drinks, and wine. Legend maintains that it is wise to keep a bouquet of elder flowers picked in midsummer on hand in case a devil wanders by. At least, that is one of the stories found in Grimm's fairy tales relating to 'elder magic'. There are approximately 5 genera and 225 species in the Elder Family.

Sambucus racemosa, Phil Krening

Adoxaceae

Identifying Characteristics

1. Leaves: opposite, (a) simple or (b) compound, generally toothed
2. Inflorescence: terminal panicles, pyramidal cymes, or terminal flat-topped cymes
3. Flowers: (a) perfect, actinomorphic; (b) Calyx: 5(2) teeth or lobes; Corolla: small, rotate, lobes (3-4) 5
4. Ovary: inferior
5. Fruit: fleshy drupes, can be berry-like

Viburnum opulus, Amadej Trnkoczy

Sambucus nigra subsp. canadensis, Chicago Botanic Garden

Viburnum edule, Gerald Carr

Sambucus racemosa var. melanocarpa, Gerald Carr

Viburnum rhytidophyllum, Gerald Carr

Sambucus nigra subsp. caerulea, Bryant Baker

A

Sambucus racemosa var. microbotrys, Patrick Alexander

Adoxa moschatellina, Amadej Trnkoczy

Viburnum dentatum, Mid-Atlantic seed bank

Sambucus racemosa, Matt Lavin

Amaranthaceae | Pigweed and Goosefoot Family

Familiar Western Genera - *Amaranthus, Atriplex, Chenopodium, Dysphania, Grayia, Halogeton, Kochia, Krascheninnikovia, Monolepis, Salicornia, Salsola, Suaeda, Tidestromia*

General Information

The classification of the Amaranthaceae (Pigweed Family) and the Chenopodiaceae (Goosefoot Family) share a complicated history. Some authors have always considered these two closely related families separate, while others believe these two should be combined into a single family. Both families are very similar in flower form, however recent molecular evidence suggests that the Chenopodiaceae should be nested within the Amaranthaceae.

The beet and the sugar beet are arguably the most important economic crop species in this family, along with spinach and swiss chard. The protein-rich seeds of quinoa (*Chenopodium quinoa*) are considered a trendy "superfood". Several species are popular ornamentals — cockscomb (*Celosia cristata*), globe amaranth (*Gomphrena globosa*), and love lies bleeding (*Amaranthus caudatus*). Saltbush (*Atriplex*) and winterfat (*Krascheninnikovia lanata*) are common in arid, saline, or alkaline environments in the West and are an important forage for wildlife. Currently, there are an estimated 170 genera and 2,040 species divided among three subfamilies.

Atriplex canescens, Ron Wolf

Amaranthoideae = Amaranthaceae

Identifying Characteristics

A

1. Leaves: alternate or opposite, without stipules
2. Inflorescence: axillary or terminal, in dense spikes, heads or panicles
3. Flowers: unisexual or bisexual, small, green, usually subtended by two bracts
4. Perianth: petals absent, (3) 5 free or basally fused sepals, often scarious; Stamens: 1-5, same number as perianth segments
5. Ovary: superior
6. Fruit: utricle, with persistent perianth or bracts

Amaranthus californicus, Matt Lavin

Amaranthus hybridus, Matt Lavin

Amaranthus californicus, Gerald Carr

Amaranthus palmeri, Patrick Alexander

Amaranthus californicus, Gerald Carr

Amaranthus hybridus, Matt Lavin

Chenopodioideae = Chenopodiaceae

Identifying Characteristics

1. Leaves: (a) generally alternate, without stipules; (b) leaf surfaces with simple, stellate or glandular hairs — scurfy leaf surface (covered with scale-like particles)
2. Stems: occasionally fleshy
3. Flowers: unisexual or bisexual, tiny, inconspicuous
4. Perianth: petals absent, (3) 5 free or basally fused sepals, often scarious; Stamens 1-5
5. Ovary: superior
6. Fruit: achene or utricle, enclosed by persistent sepals or bracts

Grayia spinosa, Matt Lavin

Atriplex powellii, Gerald Carr

Halogeton glomeratus, Matt Lavin

Atriplex canescens, Patrick Alexander

Salsola tragus, Ron Wolf

Atriplex hymenelytra, Ron Wolf

Atriplex subspicata, Matt Lavin

A

Krascheninnikovia lanata, BLM California

Amaranthus californicus, Matt Lavin

Atriplex saccaria, Patrick Alexander

Monolepis nuttalliana, Matt Lavin

Amaranthus fimbriatus, Patrick Alexander

Amaranthus torreyi, Patrick Alexander

Halogeton glomeratus, Ron Wolf

Atriplex confertifolia, Phil Krening

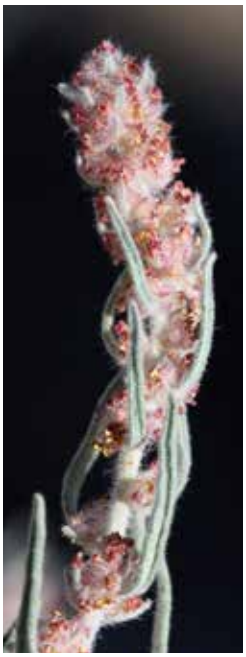
Chenopodium berlandieri, Matt Lavin

Atriplex hymenelytra, BLM California

Chenopodium capitatum, Patrick Alexander

Zuckia brandegeei, BLM Utah

Grayia spinosa, BLM Oregon



Krascheninnikovia lanata, Ron Wolf

Amaranthus fimbriatus, BLM California

Amaryllidaceae | Amaryllis Family

A

Familiar Western Genera *- Allium, Nothoscordum, Ipheion*

General Information

The Amaryllidaceae includes perennial herbs that have fleshy rhizomes or bulbs with membranous coats. Many genera in this family are familiar to gardeners as a part of the ornamental bulb trade. In fact, the genus *Allium* is not only desired as a showy garden plant but has been used widely as a vegetable or condiment since the Bronze Age. The Amaryllidaceae was formerly known as the Alliaceae, or Onion family. The Amaryllis Family includes 77 genera and approximately 2,140 species divided into three subfamilies.

Nothoscordum texanum, BLM Arizona

Allioideae = Alliaceae

Identifying Characteristics

1. Plants: perennial herbs with fleshy bulbs. The outer bulb coat is generally important in identification.
2. Leaves: basal, linear, filiform
3. Inflorescences: (a) are umbels, (b) subtended by 1 or 2 bracts, scapose
4. Flowers: perfect, usually with six tepals (sometimes 3 or 5)
5. Ovary: superior
6. Fruit: a loculicidal capsule

Allium spp., Phil Krening

Allium brandegeei, BLM Idaho

Allium cernuum, Patrick Alexander

Allium geyeri, Patrick Alexander

Allium bisceptrum, Ron Wolf

Allium christophii, Phil Krening

Allium campanulatum, Ron Wolf

A

Allium geyeri, Patrick Alexander

Allium rhizomatum, Patrick Alexander

Allium cernuum, Patrick Alexander

Allium tolmiei, BLM Oregon

Allium bolanderi var. bolanderi, Steve Matson

Familiar Western Genera - *Rhus, Cotinus, Toxicodendron*

General Information

The Anacardiaceae is an infamous family of plants consisting primarily of trees, shrubs, and vines. Prior to taking a walk in the woods, most children have heard the warning: "if the leaves are three, let it be." Not heeding this advice meant an opportunity to experience the allergenic properties of plants in this family. Poison ivy is perhaps the most familiar, however, eating cashews or mangoes can cause contact dermatitis in sensitive people. There are approximately 83 genera and 860 species in the Cashew Family, divided into two subfamilies.

Toxicodendron rydbergii, Phil Krening

Anacardioideae = Anacardiaceae

Identifying Characteristics

A

1. Plants: woody trees, shrubs, vines with resinous bark. Resin canals are present in most parts of the plants, with a clear to milky sap that may turn black when exposed to the air
2. Leaves: usually alternate, simple or pinnately or ternately compound
3. Inflorescence: axillary or terminal panicles or a thyrse
4. Flowers: perfect or imperfect; Calyx: sepals 5, bases fused; Corolla: petals 5
5. Ovary: superior; Fruit: usually a drupe

Toxicodendron rydbergii, Gerald Carr

Toxicodendron rydbergii, Phil Krening

Rhus trilobata, Phil Krening

Rhus integrifolia, Bryant Baker

Rhus trilobata, BLM Arizona

Rhus trilobata, BLM Colorado

Toxicodendron rydbergii, Michael Remke

Rhus glabra, Phillip Merritt

Apiaceae | Carrot or Parsley Family

A

Familiar Western Genera *- Angelica, Cymopterus, Eryngium, Heracleum, Lomatium, Perideridia, Sanicula*

General Information

The old name for the Apiaceae — Umbelliferae — literally means "bearer of umbels". The name plainly describes one of the most recognizable characteristics of this plant family – that most possess a compound umbel for their inflorescence. The Carrot Family includes well-known and widely cultivated root and leaf vegetables, herbs, spices, and ornamental plants. However, many plants in this family are quite toxic and some can be lethal if consumed. Socrates is thought to have had a dust-up with poison hemlock (*Conium maculatum*) that did not end well. The Carrot Family has a worldwide distribution, with roughly 443 genera and approximately 3,575 distinct species.

Angelica grayi, Phil Krening

Apiaceae

Identifying Characteristics

1. Plants: mostly annual, biennial, perennial herbs and shrubs
2. Leaves: alternate, finely dissected — usually pinnately or palmately compound
3. Petioles: sheathing at the base, clasping the stem
4. Stems: ribbed, hollow internodes
5. Inflorescence: simple or compound umbel
6. Flowers: 5-merous, small; Calyx: sepals 0 or 5 lobes; Corolla: petals 5, often incurved at tips
7. Ovary: inferior — composed of 2 fused carpels capped with 2 persistent styles fused at the base (stylopodium)
8. Fruit: schizocarps, splitting into 2 mericarps. Mericarps ribbed with oil tubes present

Heracleum maximum, Patrick Alexander

Lomatium utriculatum, BLM Oregon

Aegopodium podagraria, Phil Krening

Anethum graveolens, Phil Krening

Angelica lucida, BLM Alaska

Perideridia parishii, Thomas Stoughton

Heracleum maximum, Gerald Carr

Perideridia bolanderi, BLM Oregon

A

Conium maculatum, Patrick Alexander

Cicuta douglasii, BLM Oregon

Angelica hendersonii, Ron Wolf

Sphenosciadium capitellatum, Ron Wolf

Angelica ampla, Patrick Alexander

Cymopterus purpureus, Jeffrey Dawson

Scandix pecten-veneris, Ron Wolf

Cymopterus bulbosus, Patrick Alexander

Lomatium foeniculaceum, BLM Wyoming

Apocynaceae | Dogbane Family

A

Familiar Western Genera - *Amsonia, Apocynum, Asclepias, Cycladenia, Nerium, Sarcostemma (Funastrum), Vinca*

General Information

The Apocynaceae includes annual and perennial herbs, shrubs, trees, and vines. Plants in this family have unique flowers that are valued in the ornamental plant trade. Members such as waxflower (*Hoya*), oleander (*Nerium*), bluestar (*Amsonia*), and milkweed (*Asclepias*) are frequently found in ornamental gardens. *Asclepias* species are an important component of pollinator gardens, since they are the primary food source for the caterpillars of the monarch butterfly in North America. Other members of this family are important ethnobotanically. The fibrous stems of hemp dogbane (*Apocynum cannabinum*) are an important material for many Native American tribes, traditionally used to make bows, nets, and clothing.

The Dogbane Family is comprised of 322 genera and 4,300 species. Five subfamilies are now recognized as a result of detailed molecular studies. Two of the five subfamilies are Apocynoideae and Asclepiadoideae. In recently published floras you will find the recognition characters for these two subfamilies compiled in the Apocynaceae.

Asclepias speciosa, BLM Wyoming

Apocynaceae

Identifying Characteristics

1. Leaves: simple, opposite, whorled, or rarely alternate
2. Plants: sap a milky latex or watery
3. Inflorescence: generally umbel
4. Flowers: 5-merous
5. Petals: often overlapping, twisted in the bud
6. Sepals: fused at base, often reflexed
7. Stamens: and pistils free or fused together to form a filament column (gynostegium)
8. Corona: structures often present on the corolla or on the gynostegium
9. Pollen: packed into a mass (pollinia)
10. Fruit: (a)1-2 follicles; (b)seeds often comose (have plumes or tufts of silky hairs)

Apocynum cannabinum, Gerald Carr

Asclepias spp., Phil Krening

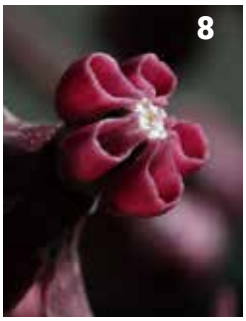
Asclepias spp., Peter Gordon

Apocynum androsaemifolium, Gerald Carr

Asclepias speciosa, Ron Wolf

Asclepias speciosa, Gerald Carr

Asclepias erosa, Ron Wolf



Asclepias cordifolia, Ron Wolf

Asclepias speciosa, Patrick Alexander

Asclepias speciosa, BLM Wyoming

A

Asclepias labriformis, Ron Wolf

Amsonia longiflora, Patrick Alexander

Funastrum cynanchoides, Patrick Alexander

Apocynum spp., BLM Colorado

Asclepias cryptoceras, Phil Krening

Asclepias latifolia, Jeffrey Dawson

Sarcostemma crispum, Patrick Alexander

Asclepias macrosperma, Jeffrey Dawson

Apocynum androsaemifolium, Ron Wolf

Asclepias asperula, Jeffrey Dawson

Asparagaceae | Hyacinth or Asparagus Family

A

Familiar Western Genera *- Agave, Yucca, Leucocrinum, Camassia, Hesperocallis, Androstephium, Brodiaea, Dichelostemma, Triteleia*

General Information

The Agaves and Brodiaeas now make their home as subfamilies of the Asparagaceae. In addition to being the source of spirits, including tequila and mezcal, this distinctive group of plants is relatively ubiquitous across the arid landscapes of western North America. The Asparagus Family is large and cosmopolitan, currently composed of 118 distinct genera comprising approximately 3,220 species which are divided into seven subfamilies. Some of the consolidation within the Asparagaceae has happened quite recently, many floras still include the Agavaceae and Themidaceae, presented here, as separate plant families.

Agave maximiliana, Phil Krening

Agavoideae = Agavaceae

Identifying Characteristics

1. Plants: perennial herbs, shrubs or trees
2. Leaves: simple, often forming basal rosettes, linear
3. Flowers: usually with six tepals, in two whorls, petal-like
4. Flowering stems: often scapose
5. Ovary: superior or inferior
6. Fruit: usually a loculicidal capsule or berry

Yucca brevifolia, BLM California

Agave spp., Phil Krening

Yucca glauca, Phil Krening

Camassia leichtlinii, BLM Oregon

Agave spp., Peter Gordon

Yucca spp., Olivia Kwong

Yucca angustissima var. kanabensis, BLM Utah

Brodiaeoideae = Themidaceae

Identifying Characteristics

A

1. Plants: perennial herbs from corms with a fibrous outer coating
2. Leaves: basal, linear to narrowly lanceolate
3. Flowers: with six tepals, free or fused below into a tube
4. Inflorescence: in umbels subtended by papery bracts
5. Ovary: superior
6. Fruit: a loculicidal capsule

Camassia cusickii, Gerald Carr

Androstephium breviflorum, Carol Dawson

Triteleia laxa, Ron Wolf

Triteleia ixioides, BLM California

Muilla lordsburgana, Patrick Alexander

Triteleia ixioides, BLM California

Leucocrinum montanum, Phil Krening

Brodiaea elegans, Ron Wolf

Muilla lordsburgana, Patrick Alexander

Yucca schidigera, BLM Nevada

Triteleia lilacina, Ron Wolf

Yucca baccata, Jeffrey Dawson

Triteleia ixioides subsp. ixioides, Ron Wolf

A

Familiar Western Genera - *Antennaria, Artemisia, Balsamorhiza, Chrysothamnus, Cirsium, Ericameria, Erigeron, Helianthus, Heterotheca, Packera, Senecio, Solidago*

General Information

The Asteraceae is one of the two largest families of flowering plants. Plants in this family run the gamut and include edibles such as lettuce and artichokes, medicines, herbs, alcoholic drinks, hallucinogens, sweeteners (*Stevia*), culinary oils (sunflowers), popular cut flowers, garden ornamentals, and invasive weeds. Salsify, cardoon, endive, Jerusalem artichokes, chicory, sunflower seeds and oil, tarragon, echinacea, chamomile, arnica, yarrow, and marigolds are just a few of plants that are used by people around the world. The 1990's saw the revival of the alcoholic drink absinthe that is flavored with wormwood, fennel, and anise. Wormwood (*Artemisia absinthium*) contains a compound known as thujone that has similar effects to cannabis. When popularized in the late 19th century, exaggerated rumors about hallucinations and wild behavior among the bohemian crowd led to a ban on absinthe in 1915. Sadly, those who danced with the "green fairy" probably never saw one.

In the West, woody species of sagebrush (*Artemisia*) are the signature plants of the intermountain basins. As one of the most widespread vegetation dominants, sagebrush steppe at one time occupied more area than any other North American semidesert vegetation type — sometimes called the 'sagebrush sea'. However, the introduction of livestock after European colonization became one of the major factors that altered the composition of sagebrush ecosystems. Aggressive weeds — such as cheatgrass (*Bromus tectorum*) — appeared with the livestock, changing this plant community forever.

Currently there are roughly 1,627 genera and about 24,700 species in the Sunflower Family divided into three subfamilies. Using a flora to key out these "DYCs" — or darn yellow composites — requires patience as the subfamilies are further broken down into 25 tribes in the contiguous United States.

Rudbeckia laciniata var. ampla, Phil Krening

Asteraceae

Identifying Characteristics

1. Leaves: basal and/or cauline, alternate, opposite, simple to compound or dissected
2. Inflorescence: (a) is a head (b) surrounded by involucral bracts (phyllaries). The (c) receptacle of the head is flat, conic or columnar, receptacle may have chaff (palea=scale-like bracts)
3. Flowers: 3 types: ray flowers, disk flowers, ligulate flowers. Heads consist of (a) ligulate (strap shaped) ray flowers only, (b) ray and disk flowers, or (c) disk flowers only
4. Corolla: (a) disk flowers actinomorphic, tubular with 5 (4) teeth or lobes, ray flowers zygomorphic, tubular — generally (0) 3-5 teeth or lobes; Calyx: (b) pappus (sepals) — capillary bristles, plumose bristles, awns, scales
5. Flowers: bisexual, unisexual or sterile; Stamens: generally 4-5, inserted on corolla tube, forming a cylinder around the style; Pistil: 1
6. Ovary: inferior; Fruit: achene (sometimes called cypsela)

Crepis acuminata, Ron Wolf

Helianthus spp., Phil Krening

Crepis runcinata, Phil Krening

Agoseris grandiflora, BLM Oregon

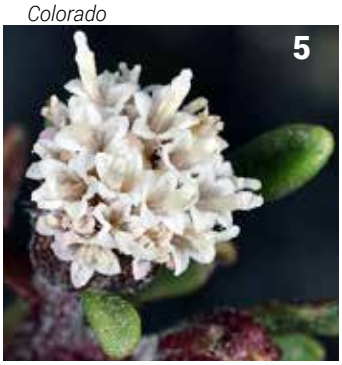
Atrichoseris platyphylla, Ron Wolf

Helianthus annuus, BLM Colorado

Cotula coronopifolia, Ron Wolf

Echinacea angustifolia, BLM Wyoming

Acroptilon repens, Gerald Carr



Chaenactis cusickii, Gerald Carr

Tragopogon spp., Phil Krening

A

Achillea siberica, BLM Alaska

Chaenactis xantiana, Ron Wolf

Machaeranthera bigelovii, BLM Arizona

Antennaria arcuata, BLM Idaho

Artemisia cana, Phil Krening

Artemisia cana, BLM Wyoming

Cirsium undulatum, Ron Wolf

Cirsium scopulorum, Phil Krening

Crepis acuminata, BLM Oregon

Ericameria discoidea, Ron Wolf

Liatris punctata, BLM Colorado

Lygodesmia doloresensis, Carol Dawson

Erigeron pumilis, BLM Oregon

Eriophyllum pringlei, BLM California

Oönopsis puebloensis, Carol Dawson

Xanthisma coloradoense, Phil Krening

Ericameria paniculata, BLM Nevada

A

Senecio bigelovii var. hallii, Phil Krening

Senecio crassulus, Phil Krening

Stephanomeria virgata, Ron Wolf

Psathyrotes ramosissima, Ron Wolf

Solidago elongata, Gerald Carr

Xylorhiza tortifolia, Ron Wolf

Senecio soldanella, Phil Krening

Pyrrocoma apargioides, Ron Wolf

Malacothrix glabrata, BLM California

Berberidaceae | Barberry Family

Familiar Western Genera - *Berberis*

General Information

The Berberidaceae is a relatively small family consisting primarily of herbs and shrubs. One species in particular — *Berberis repens* (syn. *Mahonia repens*) — is found across the West in dry, shady pine forests, oak woodlands, and chaparral. Because of its tolerance for aridity and its attractive densely yellow flowered racemes and blue-black berries, creeping Oregon-grape has become a popular plant in landscaping. Barberry (*Berberis*), barrenworts (*Epimedium*), and heavenly bamboo (*Nandina*) are popular plants in the horticultural trade. Molecular studies have separated the Barberry Family into three subfamilies with 14 genera and approximately 700 species.

Berberis fremontii, Ron Wolf

Berberidoideae = Berberidaceae

Identifying Characteristics

1. Leaves: alternate, generally evergreen, simple or pinnately or ternately compound, margins generally spine-toothed
2. Stem: the inner bark and wood generally yellow in color
3. Flowers: (a) consist of several whorls; Calyx: 6-12 petal-like sepals in 2 or 3 whorls; Corolla: (b) 6 petals in 2 whorls of 3
4. Stamens: 6 to 12 — often in 2 whorls, anthers dehiscent by flap-like valves or slits
5. Ovary: superior
6. Fruit: a berry, capsule, or follicle

Berberis repens, Phil Krening

Berberis repens, Phil Krening

Berberis fremontii, Carol Dawson

Berberis pumila, Gerald Carr

Berberis aquifolium, Corey Raimond

Berberis trifoliata, Patrick Alexander

Berberis repens, Corey Raimond

Berberis repens, Ron Wolf

Berberis aquifolium, Corey Raimond

Vancouveria chrysantha, Gerald Carr

Berberis repens, BLM Nevada

Berberis fremontii, Ron Wolf

Berberis haematocarpa, Patrick Alexander

Boraginaceae | Borage or Waterleaf Family

Familiar Western Genera - *Cryptantha, Hydrophyllum, Lithospermum, Mertensia, Myosotis, Onosma, Phacelia*

B

General Information

The Boraginaceae is a diverse family of plants with nearly a global distribution. Previously, the Boraginaceae and the Hydrophyllaceae were kept as separate families, due to differences in fruit type, origin of the style, and false septa within the ovary. Molecular evidence now strongly suggests that the Hydrophyllaceae are embedded in the Boraginaceae. Members of this family can grow as shrubs and trees, but in the western United States tend to be rough, hairy annual and perennial herbs – picture miner's candle (*Cryptantha virgata*). Many plants in this family are popular ornamentals, and some species are used to produce colorful dyes. In fact, three species of puccoons (*Lithospermum*) were used by Native Americans as a face paint. Sand food (*Pholisma sonorae*) is a parasitic plant with a buried swollen tuber that was eaten by Native Americans. The Borage Family consists of 135 genera and roughly 2,535 species.

Oreocarya revealii, Phil Krening

Boraginaceae

Identifying Characteristics

1. Leaves: (a) simple or (b) pinnately divided, alternate or opposite
2. Leaves: rough hairy, hairs have a swollen base
3. Inflorescence: often a coiled cyme
4. Flowers: perfect, generally actinomorphic; Corolla: (a) petals campanulate to funnel-shaped, generally 5-lobed, appendages 5 (or 0) at top of throat; Stamens: (b) exserted from corolla in *Phacelia;* Calyx: sepals generally 5, often fused at base
5. Ovary: superior, entire to deeply 4-lobed with a terminal or gynobasic style
6. Fruit: nutlets or capsule. Ornamentation of the nutlets are key to the identification of some genera such as *Cryptantha*

Lithospermum latifolium, Patrick Alexander

Hydrophyllum fendleri, Gerald Carr

Phacelia heterophylla, Phil Krening

Amsinckia menziesii, BLM Arizona

Hackelia floribunda, Ron Wolf

Phacelia crenulata, Ron Wolf

Mertensia spp., Phil Krening

Amsinckia menziesii, BLM Oregon

Cynoglossum officinale, Ron Wolf

Cryptantha virgata, Peter Gordon

Nama demissum, Ron Wolf

Eritrichium nanum, Phil Krening

Heliotropium greggii, Patrick Alexander

Phacelia ciliata, BLM California

Phacelia sericea, Phil Krening

Mertensia spp., Michael Remke

Nemophila menziesii, BLM California

Phacelia heterophylla, BLM Colorado

Mertensia longiflora, BLM Idaho

Lithospermum ruderale, Ron Wolf

Brassicaceae | Mustard Family

Familiar Western Genera - *Arabis, Caulanthus, Draba, Lepidium, Physaria, Stanleya, Streptanthus*

General Information

B

Plants in the Brassicaceae are probably most famous for their economic importance as vegetables, condiments, and ornamentals. The ancestral cabbage (*Brassica oleracea*) has been cultivated since ancient times, and is popular today as kale, cabbage, Brussels sprouts, kohlrabi, broccoli, and cauliflower. Because they contain potent oils, mustard seeds are used to produce a wide variety of condiments from Dijon to wasabi. Mustards are popular ornamental plants as well — candytufts, wallflowers, dame's rocket, sweet alyssum, and honesty, just to name a few. In the arid western US, many are considered to be weeds and can be found wherever there is disturbed ground. Fun fact: *Arabidopsis thaliana*, a short-lived annual, was chosen as the first plant for genome sequencing. The 343 genera and 3,630 species that make up the Mustard Family are mostly annuals, biennials, perennial herbs, and shrubs.

Cardamine cordifolia, Phil Krening

Brassicaceae

Identifying Characteristics

1. Leaves: alternate, rarely opposite
2. Inflorescence: generally a raceme
3. Flowers: bisexual, actinomorphic
4. Corolla: 4 petals forming a cross, petals often clawed; Calyx: 4 sepals
5. Stamens: tetradynamous, generally 6 stamens in 2 whorls — 4 long (inner pair) and 2 short (outer pair)
6. Ovary: superior
7. Fruit: capsule, generally with a false septum (replum), a (a) silique or (b) silicle. Siliques are three times as long as wide and silicles are less than three times as long as wide

Cardamine cordifolia, Phil Krening

Cardamine cordifolia, Phil Krening

Hesperis matronalis, Phil Krening

Arabis oregana, Gerald Carr

Cardamine californica, Ron Wolf

Caulanthus lasiophyllus, Ron Wolf

Caulanthus crassicaulis, BLM Nevada

Lepidium densiflorum, Ron Wolf

Lepidium fremontii, Ron Wolf

Cardamine californica, Ron Wolf

Erysimum asperum, Ron Wolf

Boechera divaricarpa, Patrick Alexander

Caulanthus inflatus, Ron Wolf

Erysimum capitatum var. perenne, Ron Wolf

Boechera arcuata, Ron Wolf

Lepidium montanum, Ron Wolf

Noccaea fendleri, Phil Krening

Physaria bellii, Ron Wolf

Stanleya pinnata, BLM Utah

Streptanthus tortuosus, Ron Wolf

Cactaceae | Cactus Family

Familiar Western Genera *- Opuntia, Carnegiea, Coryphantha, Echinocereus, Pediocactus*

General Information

Without a doubt, the Cactaceae contains the most iconic plants of the arid landscapes of the Americas. Cacti have enormous appeal to specialist growers and collectors — so much so that widespread collection of these species has contributed to all cacti being included in Appendix 1 and 2 of the Convention on International Trade in Endangered Species (CITES). The fruits of many species are edible as well as the stems of *Opuntia ficus-indica* which are eaten as a vegetable "nopalitos", common in Southwestern and Mexican cuisine. Peyote (*Lophophora williamsii*) contains powerful hallucinogenic compounds and has been used by Native Americans of the Chihuahuan Desert and Mexico's Sierra Madre Occidental for thousands of years for its visionary properties. The Cactus Family includes perennials, trees, shrubs, and vines, consisting of approximately 94 genera and 1,150 species.

Sclerocactus dawsonii, Phil Krening

Cactaceae

Identifying Characteristics

1. Stems: thick and succulent
2. Shoots or segments: smooth or tuberculate. The tubercles distinct and nipple-shaped or ridge-like protuberances or fused into vertical ribs
3. Areoles: spines, flowers, and branches originate from the areoles
4. Areoles: glochids (tufts of short barbed hairs) present, leaves absent or deciduous
5. Flowers: with 5-50 tepals, numerous stamens spirally arranged
6. Ovary: inferior
7. Fruit: a berry

Opuntia spp., Phil Krening

Echinocereus triglochidiatus var. inermis, Carol Dawson

Echinocereus triglochidiatus, Phil Krening

Opuntia spp., Michael Remke

Opuntia spp., Phil Krening

Coryphantha macromeris, BLM New Mexico

Opuntia engelmanni, BLM Arizona

Coryphantha vivipara, Carol Dawson

Carnegiea gigantea, J. Johnson

Echinocereus triglochidiatus, Phil Krening

Echinocactus polycephalus, Ron Wolf

Sclerocactus whipplei, Jeffrey Dawson

Mammilaria spp., Michael Remke

Cylindropuntia acanthocarpa, Ron Wolf

Echinocereus engelmannii, Ron Wolf

Pediocactus simpsonii, Carol Dawson

Opuntia polycantha, Ron Wolf

Campanulaceae | Bellflower Family

Familiar Western Genera - *Campanula, Downingia, Lobelia, Nemocladus, Triodanis*

General Information

The Campanulaceae is made up primarily of annual and perennial herbs and a few shrubs and trees. Cultivars of *Campanula* and *Lobelia* are well-known garden plants. The rover bellflower (*Campanula rapunculoides*) is an escaped garden plant that is considered the scourge of many a gardener in the Rocky Mountains but is a heritage plant in formal gardens in Belgium. There are about 84 genera and 2,300 species in the Bellflower Family divided into three subfamilies.

Campanula rotundifolia, Ron Wolf

Campanulaceae

Identifying Characteristics

1. Leaves: alternate, often with basal rosettes
2. Flowers: are 5-merous, (a) actinomorphic or (b) zygomorphic, most species have a milky sap
3. Calyx: 5 elongate to acute sepals are fused to the ovary, forming a hypanthium; Corolla: 5 (4-10) petals fused to form a cup-shaped or bilabiate corolla
4. Ovary: inferior
5. Fruit: capsule or berry

Campanula spp., Phil Krening

Campanula rotundifolia, BLM Colorado

Downingia bacigalupii, BLM California

Campanula rotundifolia, BLM Alaska

Asyneuma prenanthoides, Gerald Carr

Campanula aurita, BLM Alaska

Asyneuma prenanthoides, Corey Raimond

Campanula rapunculoides, Phil Krening

Triodanis perfoliata, Patrick Alexander

Downingia bacigalupii, Ron Wolf

Asyneuma prenanthoides, Ron Wolf

Caprifoliaceae | Honeysuckle Family

Familiar Western Genera - *Dipsacus, Linnaea, Lonicera, Symphoricarpos, Valeriana*

General Information

The Caprifoliaceae is a family of shrubs, trees, vines, and herbaceous plants that are familiar components in temperate zones. Due to recent advances in molecular investigation the Caprifoliaceae now includes five subfamilies, two of which were formerly the Dipsacaceae (Teasel Family) and the Valerianaceae (Valerian Family). Many species are familiar plants on the landscape: honeysuckle, snowberry, twinflower, and teasel, just to name a few. The twin flower (*Linnaea borealis*) was a favorite of Linnaeus, so much so that he commissioned two china tea sets decorated with the twinflower. Valerian has been used as a sedative since ancient times. The Pied Piper of Hamlin is a medieval story published by the Brothers Grimm in which the Piper uses the rancid smell of the root of *V. officinalis* to lure rats, and then children, away from the city. There are approximately 28 genera and over 825 species in five subfamilies in the Honeysuckle Family.

Symphoricarpos rotundifolius var. purshii, Naomi Fraga

Caprifoliaceae

Identifying Characteristics

1. Leaves: opposite or in whorls along the stem, simple or compound, basal rosettes occur in the Valerianoideae; Stipules: in general do not occur
2. Flowers: Calyx: (a) tube fused to ovary, 5-lobed; Corolla: (b) radial or bilateral, (c) rotate to cylindric, 5-lobed
3. Ovary: inferior
4. Fruits: berry, drupe, capsule, achene

Symphoricarpos spp., Phil Krening

Symphoricarpos oreophilus, Gerald Carr

Symphoricarpos oreophilus var. utahensis, Gerald Carr

Lonicera ciliosa, BLM Oregon

Symphoricarpos occidentalis, Peter Gordon

Lonicera involucrata, Ron Wolf

Plectritis macrocera, Ron Wolf

Plectritis ciliosa, Ron Wolf

Linnaea borealis, Ron Wolf

Valeriana arizonica, Ron Wolf

Dipsacus fullonum, Corey Raimond

Lonicera involucrata, BLM Colorado

Lonicera arizonica, Patrick Alexander

Caryophyllaceae | Carnation or Pink Family

Familiar Western Genera *- Arenaria, Cerastium, Dianthus, Eremogone, Gypsophila, Minuartia, Silene*

General Information

C

The Caryophyllaceae is a large family of herbaceous plants that should be familiar to everyone because it includes many common ornamental plants. Your run-of-the-mill carnation, found in the grocery store, showcases the most recognizable features of this family — a "knobby-knee" at the node. The opposite leaves connected by a ridge of tissue at the node create a bump that is a dead giveaway for this family. Many species are used in floral arrangements, while others are used in soap-making, bridal bouquets or the cut-flower industry. Several have escaped cultivation to become troublesome garden weeds. A common identifier is the deeply cleft or ruffled margin of the corolla, resembling how the edge of fabric might be decoratively cut or "pinked" in order to prevent it from fraying — leading to the name "Pink Family". The Pink Family consists of 91 genera and 2,625 species.

Silene latifolia, Phil Krening

Caryophyllaceae

Identifying Characteristics

1. Stems: swollen at the nodes
2. Leaves: opposite (sometimes appearing whorled), simple, entire, connate at the base across the node
3. Flowers: regular, bisexual
4. Calyx: 5 sepals, free or fused into a tube
5. Corolla: 5 petals (4 or absent sometimes), free, fringed, deeply cleft, often clawed
6. Stamens: usually as many or twice as many as the sepals
7. Ovary: superior with free-central placentation or basal placentation
8. Fruit: capsule that opens by apical teeth (rarely a utricle)

Silene spp., Phil Krening

Silene spp., Phil Krening

Cerastium maximum, BLM Alaska

Silene bridgesii, Ron Wolf

Petrorhagia dubia, Ron Wolf

Eremogone kingii, Ron Wolf

Spergularia macrotheca, Ron Wolf

Dianthus armeria, Corey Raimond

Dianthus armeria, Corey Raimond

Minuartia obtusiloba, Ron Wolf

Saponaria officinalis, Ron Wolf

Silene sargentii, Ron Wolf

Arenaria hookeri, Dale Swenarton

Stellaria longipes, Ron Wolf

Silene acaulis, Phil Krening

Silene californica, Ron Wolf

Spergularia macrotheca, Ron Wolf

Arenaria hookeri, Dale Swenarton

Cleomaceae | Spiderflower Family

Familiar Western Genera - *Cleomella, Cleome, Peritoma, Polanisia*

General Information

C

Annual or perennial herbs and shrubs are found in the Cleomaceae, often with glandular hairs that give the plants a foul smell. This family is closely related to the Caper and Mustard families but recent molecular evidence indicates that these families should remain separate. Rocky Mountain beeplant (*Cleome serrulata*) is often used in restoration seed mixes here in the West to attract pollinators. There are 9 genera and 346 species in the Spiderflower Family, depending on which treatment you use.

Cleome serrulata, BLM Utah

Cleomaceae

Identifying Characteristics

1. Leaves: (a) simple or (b) palmately compound, alternate on the stem
2. Flowers: bisexual, actinomorphic or zygomorphic; Calyx: sepals 4, free or basally fused, generally persistant; Corolla: petals 4, free, often clawed
3. Stamens: generally 6 (to 27) but not tetradynamous, exserted
4. Ovary: superior, on a stalk-like receptacle (gynophore)
5. Fruit: capsules opening by 2 valves, or 2 nutlets

Peritoma platycarpa, Gerald Carr

Peritoma platycarpa, Gerald Carr

Cleome serrulata, Ron Wolf

Cleomella hillmanii, Gerald Carr

Peritoma arborea, Marlin Harms

Cleome serrulata, Humboldt-Toiyabe National Forest

Polanisia dodecandra, Patrick Alexander

Cleome serrulata, Carol Dawson

Peritoma platycarpa, Gerald Carr

Wislizenia refracta, Patrick Alexander

Cleome lutea, Colorado Plateau Native Plant Program

Convolvulaceae | Morning-Glory Family

Familiar Western Genera - *Calystegia, Convolulus, Cuscuta, Evolvulus, Ipomoea*

General Information

The Convolvulaceae is both loved and cursed because it contains commonly cultivated vegetables including the sweet potato (*Ipomoea batatas*), and pervasive weeds like field bindweed (*Convolulus arvensis*). Moonflowers and morning glories have been cultivated for centuries, but not only for the beautiful vines. Ancient Mesoamerican shamans used the seeds in rituals and ceremonies because of their hallucinogenic properties. The parasitic chlorophyll-less vine Dodder (*Cuscuta spp.*) is also included in this family. There are approximately 57 genera and 1,660 species in the Morning-Glory Family of twining and trailing herbs, vines, shrubs, and rarely trees.

Convolvulus spp., Phil Krening

Convolvulaceae

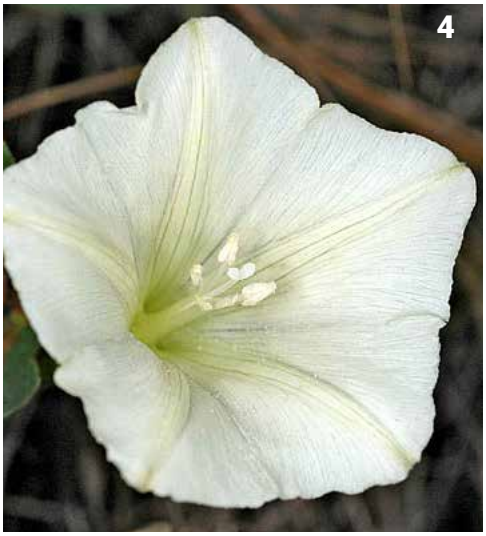
Identifying Characteristics

1. Flowers: radial, 5-merous with a tubular, plaited corolla
2. Calyx: (3) 5 sepals, free, persistent
3. Corolla: showy, 5-lobed, petals fused into a plicate funnel or cup-shaped corolla. Corolla often twisted in bud
4. Stamens: 5, epipetalous
5. Ovary: superior
6. Fruit: capsule

Convolvulus spp., Phil Krening

Convolvulus spp., Phil Krening

Convolvulus spp., Phil Krening



Calystegia occidentalis subsp. occidentalis, Gerald Carr

Cuscuta suksdorfii, Gerald Carr

Convolvulus sepium, Corey Raimond

Calystegia longipes, Ron Wolf

Convolvulus arvensis, Ron Wolf

Cuscuta denticulata, Ron Wolf

Calystegia soldanella, Marlin Harms

Ipomoea leptophylla, BLM Colorado

Cucurbitaceae | Cucumber Family

Familiar Western Genera *- Cucurbita, Echinocystis, Marah*

General Information

C

Members of the Cucurbitaceae are easily recognizable in the field – climbing, sprawling herbaceous plants, often with coarse hairy leaves. Major food crops from this family are cultivated all over the world. Well-loved produce including cucumbers, winter squash, summer squash, pumpkins, melons, and zucchini are all members of this family. The watermelon, native to Africa, may have been selected for cultivation about 4000 years ago. Gourds have been in use as containers and musical instruments in many cultures around the world. In the United States, pumpkin enthusiasts compete every year in giant pumpkin (*Cucurbita maxima*) growing contests.

The Cucumber Family is most diverse in the tropics and subtropics with about 97 genera and 990 species overall. Yet, a number of species are native to the West, including the distinctive yet unpalatable coyote melon (*Cucurbita palmata*), which is frequently spotted trailing along the roadside.

Cucurbita spp., Phil Krening

Curcurbitaceae

Identifying Characteristics

1. Plants: climbing and trailing vines, rarely shrubs
2. Leaves: simple, alternate, (a) generally palmately lobed, petiolate, (b) tendrils at the node
3. Leaves: generally coarsely hairy
4. Flowers: unisexual, radial, with a hypanthium; Calyx: 5-lobed; Corolla: cup to bell-shaped, 5-lobed
5. Stamens: 3-5, in male flowers stamens are united and twisted by their filaments
6. Ovary: inferior
7. Fruit: berry or a dry berry with a thick rind (pepo)

Cucurbita palmata, Ron Wolf

Cucurbita spp., Phil Krening

Cucurbita spp., Phil Krening

Cucurbita spp., Phil Krening

Cucurbita spp., Phil Krening

Cucurbita spp., Phil Krening

Cucurbita spp., Phil Krening

Cucurbita palmata, Ron Wolf

Marah spp., Bryant Baker

Cucurbita digitata, Patrick Alexander

Marah oreganus, Gerald Carr

Cyperaceae | Sedge Family

Familiar Western Genera - *Carex, Cyperus, Eleocharis, Eriophorum, Kobresia, Schoenoplectus, Scirpus*

General Information

A common refrain from childhood is “sedges have edges”, describing the triangular, solid stems of the grass-like herbs found in the Cyperaceae. Sedges are annual and perennial plants of wet ground and aquatic habitats. The perennial taxa usually have rhizomes and stolons that are important for identification. Sedges have a worldwide distribution, absent only from Antarctica. Perhaps the most well-known plant within this family is Papyrus or Paper Reed (*Cyperus papyrus*), used by the ancient Egyptians to make papyrus more than 5000 years ago. The stems of bulrushes (*Schoenoplectus spp.*) have been used for rafts and boats, water and sewage treatment, and for weaving mats and baskets. The genus *Carex* is not only an ornamental used in water garden plantings but along with other sedges plays an important role in filtering water in wetland ecosystems. The fruits are an important food for birds and other animals. To be successful in determining the species, be sure that you have the mature perigynium surrounding the fruit. There are approximately 100 genera and 5,500 species in the Sedge Family divided into two subfamilies.

Carex elynoides, Matt Lavin

Cyperaceae

Identifying Characteristics

1. Stems: triangular (sometimes terete)
2. Leaves: usually linear, basal, cauline, spirally arranged in 3 ranks
3. Leaves: usually with a closed sheathing base
4. Flowers: perfect or imperfect, without a perianth or with bristle-like scales
5. Floret: subtended by a chaffy bract and arranged in spikelets
6. Stamens: usually 3
7. Ovary: superior, sometimes enveloped by a membrane called a perigynium (e.g. *Carex* species)
8. Fruit: is an achene (2-3 sided)

Bolboschoenus maritimus, Phil Krening

Scirpus nevadensis, BLM Wyoming

Bolboschoenus maritimus, Phil Krening

Carex nudata, Robert Carr

Bolboschoenus maritimus, Phil Krening

Carex mertensii, Gerald Carr

Carex nebrascensis, Gerald Carr

Carex aboriginum, BLM Idaho

Carex aboriginum, BLM Idaho

Carex pachystachya, BLM Alaska

Carex geophila, Patrick Alexander

Carex hoodii, BLM Utah

Carex unilateralis, BLM Oregon

Cyperus eragrostis, BLM California

Schoenoplectus tabernaemontani, Chicago Botanic Garden

Carex saxatilis, BLM Alaska

Eriophorum scheuchzeri, BLM Alaska

Carex utriculata, BLM Alaska

Ericaceae | Heath Family

Familiar Western Genera - *Arctostaphylos, Chimaphila, Erica, Kalmia, Pterospora, Pyrola, Vaccinium*

General Information

The Ericaceae is found primarily in temperate and subtropical zones of the northern and southern hemispheres. Plants in this family include shrubs, small trees, and perennial herbs. Rhododendrons, with their showy flowers and glossy evergreen leaves, are top-sellers in the horticulture industry. Major fruit crops are blueberries and cranberries. Two of the seven subfamilies include herbaceous perennials with evergreen leaves (wintergreens) and parasites lacking chlorophyll. The signature species in western North America are the manzanitas (*Arctostaphylos spp.*). These shrubs and small trees are one of the dominant woody components of the California chaparral. Manzanitas are eye-catching with their red stems, waxy green foliage, and peeling bark. As a result of molecular data, the Heath Family has 126 genera and 4,250 species divided among seven subfamilies.

Kalmiopsis leachiana, Michael Kauffmann

Ericaceae

Identifying Characteristics

1. Plants: bark often peeling on stems
2. Leaves: simple and alternate, opposite or whorled
3. Leaves: (a) evergreen or deciduous, more or less leathery, (b) sometimes needle-like, (c) scale-like leaves without chlorophyll in the Beechdrops subfamily (Monotropoideae)
4. Flowers: regular, bisexual; Calyx: 4-5 sepals, fused at the base; Corolla: 4-5 petals, free or fused into a bell-shaped, cylindric, or urn-shaped corolla
5. Stamens: 8-10; anthers dehisce by pores or slits
6. Ovary: superior or inferior. Disk-like nectary present at ovary base
7. Fruit: capsule, drupe, or berry

Arctostaphylos glauca, Bryant Baker

Arctostaphylos patula, BLM Nevada

Arctostaphylos uva-ursi, BLM Colorado

Phyllodoce empetriformis, Matt Lavin

Pterospora andromedea, Phil Krening

Arctostaphylos uva-ursi, Corey Raimond

Chimaphila menziesii, Ron Wolf

Moneses uniflora, Corey Raimond

Arctostaphylos viscida, BLM California

Arctostaphylos manzanita, BLM California

Phyllodoce breweri, Ron Wolf

Kalmia microphylla, Jeffrey Dawson

Orthilia secunda, Ron Wolf

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Arctostaphylos uva-ursi, BLM Colorado

Chimaphila menziesii, Ron Wolf

Rhododendron occidentale, Ron Wolf

Pterospora andromedea, BLM Wyoming

Rhododendron columbianum, Ron Wolf

Vaccinium ovatum, BLM California

Cassiope mertensiana, Patrick Alexander

Sarcodes sanguinea, Ron Wolf

Euphorbiaceae | Spurge Family

Familiar Western Genera - *Chamaesyce, Croton, Euphorbia, Tragia*

General Information

The Euphorbiaceae is very large and diverse. Cosmopolitan in distribution, it can be found across the globe excluding only the cold regions in the Arctic and Antarctic. The herbs, shrubs, and trees in this family are often succulent and sometimes cactus-like, but all have a milky or colored latex. One of the most recognizable plants in this group is the poinsettia (*Euphorbia pulcherrima*) – traditionally grown as an ornamental at Christmas time. The seeds of castor beans (*Ricinus communis*) are pressed to make castor oil. Ricin is a poison that is made from castor beans famously used in 1978 in London by Bulgaria's secret police to assassinate a Bulgarian dissident with a special umbrella that injected the ricin pellet. Rubber comes from the juice of *Hevea*. Tapioca root, yuca or manioc comes from the root of *Manihot esculenta* – an important source of starch for people living in the tropics. Across the West, leafy spurge (*Euphorbia esula*), a native of Eurasia, has invaded large areas spreading by rhizomes. The Spurge Family is divided into four subfamilies with 210 genera and 6,252 species.

Euphorbia esula, Patrick Alexander

Euphorbiaceae

Identifying Characteristics

1. Leaves: generally simple, alternate or opposite with stipules
2. Plants: milky or colored latex, sometimes clear, watery sap
3. Flowers: unisexual, more or less actinomorphic; Perianth: often absent; Calyx: absent or (2-6 sepals), free or fused; Corolla: petals often 0
4. Inflorescence: in Euphorbia and related genera (subfamily Euphorbioideae) the inflorescence is composed of separate stamens and a single pistil enclosed by fused involucre bracts in a cup-like structure (cyathium). The cyathium may have petaloid appendages and nectar glands.
5. Ovary: superior, trilocular
6. Fruit: capsule

Euphorbia rayturneri, Patrick Alexander

Euphorbia spp., Phil Krening

Chamaesyce albomarginata, Ron Wolf

Euphorbia lathyris, Gerald Carr

Euphorbia rayturneri, Patrick Alexander

Euphorbia lathyris, Gerald Carr

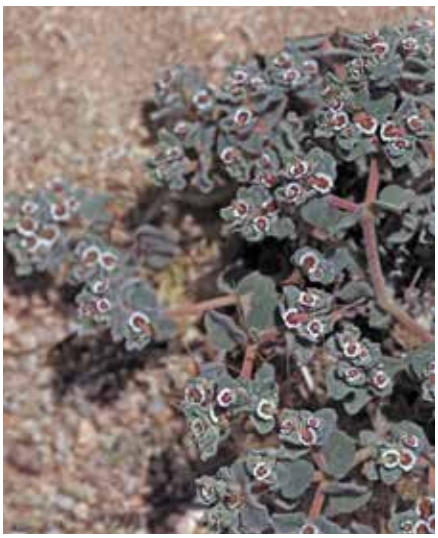
Euphorbia cuphosperma, Patrick Alexander

Euphorbia brachycera, Phil Krening

Euphorbia brachycera, Patrick Alexander

Euphorbia albomarginata, Ron Wolf

Chamaesyce missurica, Patrick Alexander



Euphorbia vallis-mortae, Ron Wolf

Chamaesyce golondrina, Patrick Alexander

Fabaceae | Pea Family

General Information

The Fabaceae is a family of major economic importance. Vegetable crops such as soybeans, peanuts, garden peas, fava beans, string beans, pinto beans, kidney beans, black beans, black-eyed peas, mung beans, lentils, and chickpeas are just a few crops that provide both protein and minerals to humans around the world. Several species are used as fodder, forage, and as a green manure to enrich nutrient-poor soils through nitrogen-fixing *Rhizobium* bacteria. Edible roots, spices and flavorings, teas, dyes, soaps, perfumes, brooms, beads, wood, garden ornamentals, shade trees, poisons, and hallucinogens are all products from plants in the fabulous Fabaceae.

Milkvetch (*Astragalus*) is perhaps the most interesting genus in the Fabaceae. It is similar to *Eriogonum* as it has adapted to arid habitats, with many edaphic endemics in the West. Rupert C. Barneby completed a comprehensive revision of the genus *Astragalus* in North America. On western rangelands some species of *Astragalus* and *Oxytropis* are toxic to livestock. Numerous *Astragalus* species are selenophytes – concentrating the element selenium in their tissues. Selenium is returned to the soil to be taken up by grasses and other herbs. Two diseases related to selenium poisoning are known as alkali disease and blind staggers.

Traditionally the Pea Family was divided into three families or subfamilies: Mimosoideae (Mimosa Family), Caesalpinioideae (Senna Family), and the Papilionoideae (Fabaceae). Based on the most current molecular evidence, the 745 genera and 16,020 species have been formally classified into six subfamilies. The three subfamilies that apply to the western US are described here.

Astragalus emoryanus, Patrick Alexander.

Identifying Characteristics

1. Plants: woody or herbaceous, often with root nodules containing nitrogen fixing bacteria
2. Leaves: usually alternate, sometimes opposite, mostly compound – (a) pinnate or bipinnate, (b) sometimes palmately compound or trifoliolate, leaves rarely simple, stipules present
3. Flowers: perfect, actinomorphic or zygomorphic; Calyx: (a) sepals generally 5, distinct or fused into a tube that is somewhat bilabiate; Corolla: (b) petals 5, distinct or connate to form a lobed tube or differentiated into a papilionaceous corolla. The papilionaceous corolla consists of 5 petals — the banner or standard (largest), 2 lateral petals (wings), and the 2 innermost petals forming a keel that encloses the stamens and pistil.
4. Stamens: most commonly 10 or many (sometimes 5), free or fused or 10 with 9 filaments fused and 1 filament free (9+1)
5. Ovary: superior, composed of a single carpel
6. Fruit: (a & b) legume or (c) loment — if breaking transversely in segments

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Subfamilies:

Mimosoideae - plants mainly woody, flowers with radial symmetry, calyx and corolla generally inconspicuous, stamens ten or many, often long-exserted, leaves mostly bipinnately compound, flowers hypogynous or slightly perigynous

Familiar western genera: *Acacia, Albizia, Calliandra, Desmanthus, Prosopis*

Caesalpinioideae - flowers generally bilateral (radial), leaves usually bipinnate to pinnately compound (simple in *Cercis*), filaments distinct

Familiar western genera: *Caesalpinia, Cercis, Gleditzia, Parkinsonia, Senna*

Papilionoideae - upper petal (banner) outside lateral ones (wings) in bud, stamens generally with all or 9 filaments fused around ovary (free in *Thermopsis*, *Pickeringia*, *Calia*)

Familiar western genera: *Amorpha, Astragalus, Dalea, Lupinus, Oxytropis, Psorothamnus, Trifolium*

Lupinus polyphyllus, BLM Alaska

Dalea urceolata, Patrick Alexander

Lupinus kingii, Patrick Alexander

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Astragalus conjunctus, Gerald Carr

Lathyrus latifolius, Ron Wolf

Hedysarum boreale, Gerald Carr

Lupinus brevicaulis, Gerald Carr

Astragalus lutosus, Phil Krening

Lupinus rivularis, BLM California

Hedysarum boreale, Peter Gordon

Hedysarum boreale, Carol Dawson

Astragalus lutosus, Jeffrey Dawson

Dalea ornata, BLM Idaho

Astragalus saurinus, Jeffrey Dawson

Astragalus naturitensis, Phil Krening

Caesalpinia gilliesii, Patrick Alexander

Calliandra eriophylla, Ron Wolf

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Acmispon grandiflorus, Bryant Baker

Prosopis pubescens, Peter Gordon

Lupinus rivularis, BLM California

Lupinus pusillus, Patrick Alexander

Trifolium parryi, Ron Wolf

Oxytropis multiceps, Loraine Yeatts

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Lathyrus graminifolius, Patrick Alexander

Psorothamnus polydenius, Ron Wolf

Senna wislizeni, Patrick Alexander

Trifolium andersonii subsp. beatleyae, Ron Wolf

Garryaceae | Silk Tassel Family

Familiar Western Genera - *Garrya*

General Information

The Garryaceae is a small family of evergreen dioecious shrubs and trees. The two genera that comprise this family are disjunct: *Garrya* is found in western North America while *Aucuba* only occurs in East Asia. *Garrya* is a component of the California chaparral but also occurs in pine-oak woodland, desert, dune, and montane forest habitats. There are 2 genera with 19 species in the Silk Tassel Family.

Garrya wrightii, Patrick Alexander

Garryaceae

Identifying Characteristics

1. Plants: unisexual trees and shrubs
2. Leaves: evergreen, opposite, leathery with the petioles connate at the base at the node
3. Inflorescence: catkin-like, pendulous, flowers occur in axils of opposite, basally fused bracts
4. Flowers: unisexual, actinomorphic; (a) Staminate flowers: single perianth of 4 tepals with 4 stamens that alternate with the tepals; (b) Pistillate flowers: perianth parts 0 or reduced to two small appendages
5. Ovary: inferior
6. Fruit: berry (a) green, fleshy that changes to (b) dark-blue, black, or white-gray at maturity

Garrya fremontii, Gerald Carr

Garrya elliptica, Gerald Carr

Garrya flavenscens, Carol Dawson

Garrya elliptica, Gerald Carr

Garrya veatchii, Bryant Baker

Garrya wrightii, Patrick Alexander

Garrya congdonii, BLM California

Garrya congdonii, BLM California

Garrya wrightii, Patrick Alexander

Garrya congdonii, BLM California

Garrya flavescens, BLM Nevada

Garrya ovata, Patrick Alexander

Garrya ovata subsp. goldmanii, Patrick Alexander

Gentianaceae | Gentian Family

Familiar Western Genera - *Frasera, Gentiana, Gentianella, Gentianopsis, Swertia, Zeltnera*

General Information

At one time, the Gentianaceae was thought to consist only of herbaceous plants and a few woody shrubs. As a result of recent molecular work, this family now includes a few tropical trees and woody vines. The iridescent blue flowers common in this family are a familiar sight in montane and temperate zones. The gentian *Eustoma grandiflorum* is used extensively in the cut flower industry and is called 'lisianthus' by your florist. A tall yellow flowered gentian (*Gentiana lutea*) is harvested for its root and is the source of the bitter flavoring in Angostura bitters. The same gentian root provides the bitter notes in Campari, Aperol, Cinzano vermouth, and other liqueurs used as staples in classic Negroni, Old-Fashioned, and Manhattan cocktails. In the West, the monument plant (*Frasera speciosa*) is one of the most conspicuous members of this family. In mast years, when conditions are favorable, hundreds of elongated inflorescences of this monocarpic perennial may be seen towering up to two meters out of the montane scrub. There are approximately 101 genera and 1,690 species in the Gentian Family all with opposite leaves and regular bisexual flowers.

Gentianella amarella, Ron Wolf

Gentianaceae

Identifying Characteristics

1. Leaves: opposite leaves (rarely whorled or alternate), without stipules
2. Leaves: basally connate (connected with a line across the node)
3. Flowers: (a) 4 or (b) 5-merous
4. Flowers: perfect, regular; Calyx: sepals fused; Corolla: petals fused into a bell-shaped, tubular or funnel-shaped corolla
5. Ovary: superior
6. Fruit: a capsule

Gentiana calycosa, Gerald Carr

Gentiana parryi, Phil Krening

Frasera speciosa, BLM Utah

Swertia perennis, Ron Wolf

Gentianella amarella, Ron Wolf

Frasera speciosa, BLM Wyoming

Gentiana andrewsii, Corey Raimond

Gentiana prostrata, Ron Wolf

Zeltnera arizonica, Patrick Alexander

Zeltnera venusta, Ron Wolf

Frasera speciosa, Michael Remke

Swertia perennis, Ron Wolf

Gentiana algida, Phil Krening

Geraniaceae | Geranium or Crane's-bill Family

Familiar Western Genera - *Erodium, Geranium, Pelargonium*

General Information

The Geraniaceae is a family of annual or perennial herbs and shrubs. Hybrids and cultivars of *Pelargonium* spring up in all manner of containers, hanging baskets, and gardens around May 31st as the flower of choice for the summer gardener. Geranium oil is used as a flavoring in the food industry, hybridizers have created scented pelargoniums that are used in simple syrups and infusions. Not all members of this family are highly sought-after though, *Erodium cicutarium*, commonly known as redstem filaree or storksbill, is a widespread weed in open, disturbed sites across the West. Due to their recognizable leaf pattern and unique method of seed dispersal, species belonging to the genus *Geranium* are easily identifiable. There are 5 genera and about 650 species in the Geranium Family.

Geranium richardsonii, Phil Krening

Geraniaceae

Identifying Characteristics

1. Leaves: alternate or opposite, generally palmately lobed or deeply divided
2. Leaves: more or less with simple or glandular hairs
3. Flowers: 5-merous, perfect, actinomorphic (sometimes zygomorphic); (a) Calyx: sepals 5; (b) Corolla: petals 5, can be clawed
4. Ovary: superior
5. Fruit: schizocarp, splitting into 5 mericarps that curl up on a central beak

Geranium caespitosum, Patrick Alexander

Geranium molle, Gerald Carr

Geranium richardsonii, Gerald Carr

Geranium viscosissimum, BLM Utah

Geranium viscossisimum, Gerald Carr

Geranium dodecatheoides, Patrick Alexander

Erodium cicutarium, Corey Raimond

Geranium lentum, Patrick Alexander

Erodium cicutarium, Ron Wolf

Geranium viscosissimum, BLM Montana

Geranium molle, Ron Wolf

Erodium cicutarium, Matt Lavin

Geranium dodecatheoides, Patrick Alexander

Geranium richardsonii, Peter Gordon

Geranium caespitosum, Patrick Alexander

Familiar Western Genera - *Ribes*

General Information

The Grossulariaceae is quite economically important, long cultivated for their delicious fruits: blackcurrants, redcurrants, golden currants, gooseberries are used in jams, syrups, juice, and as a source of pectin. The liqueur made from blackcurrants — crème de cassis — was mixed with white wine to create the drink known as the Kir for mayor Felix Kir of Dijon, France after WWII. A serious disease of white pines — white pine blister rust — is caused by the fungus *Cronartium ribicola* Fisch. The life cycle of this rust fungus requires alternation among white pines and currants and gooseberries in the genus *Ribes*. Several other rust fungi also infect *Ribes*. Shrubs of this family are found throughout montane pine woodlands, riparian areas, and the sub-alpine. The Gooseberry Family consists of about 150 species of shrubs all in the genus *Ribes*.

Ribes cereum, Patrick Alexander

Grossulariaceae

Identifying Characteristics

1. Plants: woody shrubs, often spiny
2. Leaves: alternate, lobed or palmately cleft, clustered on short lateral branchlets (fascicled)
3. Flowers: (a) perfect, radial with rotate to (b) tubular hypanthium; Calyx: sepals 5, petaloid; Corolla: petals 5, inserted near top of hypanthium
4. Ovary: inferior
5. Fruit: (a) a berry, (b) crowned by persistent perianth

Ribes spp., Phil Krening

Ribes divaricatum, Gerald Carr

Ribes leptanthum, Ron Wolf

Ribes pinetorum, Patrick Alexander

Ribes montigenum, Gerald Carr

Ribes malvaceum, Bryant Baker

Ribes sanguineum, BLM Oregon

Ribes cereum, BLM California

Ribes cereum, BLM California

Ribes mescalerium, Patrick Alexander

Ribes pinetorum, Patrick Alexander

Ribes speciosum, Ron Wolf

Ribes divaricatum, BLM Oregon

Ribes aureum, BLM Oregon

Hydrangeaceae | Hydrangea Family

Familiar Western Genera - *Fendlera, Fendlerella, Jamesia, Philadelphus, Whipplea*

General Information

The Hydrangeaceae includes herbaceous perennials, shrubs, and vines. Many of the species are valued garden ornamentals – hydrangeas are low maintenance shrubs with terminal cymes of colorful flowers that are also used in bouquets. Out West, mock oranges (*Philadelphus microphyllus*) have a jasmine scent and have been used in perfume. There are approximately 10 genera and 223 species in the Hydrangea Family, divided into two subfamilies; Hydrangeoideae and Jamesioideae.

Fendlera rupicola, Michael Remke

Hydrangeaceae

Identifying Characteristics

1. Stems: bark peeling or in narrow strips
2. Leaves: simple, opposite (rarely whorled or alternate). Opposite leaves are joined by a line across the stem formed by sheathing petiole bases, stipules absent
3. Flowers: bisexual, actinomorphic — sometimes flowers on inflorescence margin sterile and enlarged; Calyx: (a) sepals 4-5 (10), free or basally fused; Corolla: (b) petals 4-5 (10), basally or completely fused
4. Stamens: 4-numerous, usually 2x the number of petals
5. Ovary: wholly or partially inferior
6. Fruit: loculicidal or septicidal capsule, sometimes a berry

Jamesia americana, Phil Krening

Philadelphus microphyllus, Phil Krening

Philadelphus lewisii, Gerald Carr

Philadelphus lewisii, Gerald Carr

Jamesia americana, Phil Krening

Philadelphus microphyllus, Phil Krening

Philadelphus microphyllus, Phil Krening

Fendlera rupicola, Michael Remke

Philadelphus microphyllus, BLM Utah

Philadelphus lewisii, Cheryl Moorhead

Whipplea modesta, Gerald Carr

Jamesia americana, Mary Burns

Fendlera rupicola, Matt Lavin

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Juncaceae | Rush Family

Familiar Western Genera - *Juncus, Luzula*

General Information

The Juncaceae is a family of grass-like, terrestrial herbs with erect or creeping rhizomes and fibrous roots. Rushes are found primarily in wet or damp habitats. Plants in this family generally have very little economic value, though some species are used in basket-making and as fuel. The Rush Family consists of 7 genera and approximately 460 species.

Juncus arcticus, Phil Krening

Juncaceae

Identifying Characteristics

1. Stems: scapose, terete
2. Inflorescence: (a) generally consists of head-like clusters, with bracts subtending the inflorescence branches, (b) bractlets subtend each flower in the inflorescence
3. Leaves: generally basal, tufted, linear, sheath margins fused or overlapping
4. Flowers: generally bisexual, actinomorphic
5. Perianth: composed of 6 tepals, greenish, reddish-brown, to purple-black — often membranous or chaffy; Stamens: 3 or 6
6. Ovary: superior
7. Fruit: loculicidal capsule

Juncus arcticus, Phil Krening

Juncus castaneus, Phil Krening

Luzula campestris, Matt Lavin

Juncus mertensianus, Matt Lavin

Juncus balticus, Matt Lavin

Juncus longistylis, Matt Lavin

Juncus mertensianus, Gerald Carr

Juncus nevadensis, BLM Oregon

Luzula comosa, BLM California

Juncus ensifolius, Matt Lavin

Juncus parryi, Matt Lavin

Luzula spicata, Matt Lavin

Juncus drummondii, Patrick Alexander

Juncus baliticus, Matt Lavin

Lamiaceae | Mint Family

Familiar Western Genera - *Agastache, Lamium, Mentha, Monarda, Monardella, Poliomentha, Salvia, Scutellaria*

General Information

The Lamiaceae is a large cosmopolitan family of aromatic herbs, shrubs, and a few trees. Mints are important economically — valued for their fragrant oils. Herbaceous plants in this family include the kitchen herbs: basil, oregano, sage, thyme, rosemary, marjoram, peppermint, and spearmint. Lavender (*Lavendula angustifolia*) calms the body and was traditionally used in Roman baths. The perfume industry uses the oil from *Pogostemon cablin* to produce patchouli. Spearmint leaves are key ingredients in mojitos and mint juleps. Pollinators, including bees, butterflies, and hummingbirds are drawn to *Salvia* and *Agastache* and other popular garden ornamentals in this family. The wood from teak (*Tectona grandis*) is used for building boats, furniture, and flooring.

The Mint Family historically included herbs and shrubs, recognizable as plants with opposite leaves and a 4-lobed ovary with a gynobasic style. The inclusion of tropical tree species has altered these characters a bit. The Mint Family consists of approximately 241 genera and more than 6,800 species divided into five subfamilies. The field recognition characters apply to the plants in subfamily Lamioideae.

Stachys tenuifolia, Patrick Alexander

Lamioideae = Lamiaceae

Identifying Characteristics

1. Stems: 4-angled "square" in cross-section — especially young stems and branches
2. Leaves: generally opposite (sometimes whorled), gland-dotted or with glandular hairs
3. Flowers: generally bisexual, almost always zygomorphic and bilabiate
4. Calyx: 5-lobed sepals, often unequal in size, fused at base; Corolla: 5 petals fused into a 2-lipped corolla
5. Stamens: generally 4, with two longer (didynamous), epipetalous
6. Ovary: superior — generally 4-lobed, with a gynobasic style or a single style on top of an unlobed ovary
7. Fruit: capsule

Salvia spp., Phil Krening

Salvia spp., Phil Krening

Monarda fistulosa, BLM Colorado

Salvia greggii, Patrick Alexander

Physostegia parviflora, Gerald Carr

Dracocephalum parviflorum, Gerald Carr

Salvia farinacea, Patrick Alexander

Lamium amplexicaule, Patrick Alexander

Hedeoma nana, Patrick Alexander

Blephilia hirsuta, Patrick Alexander

Hedeoma drummondii, Patrick Alexander

Agastache urticifolia, BLM UCBG

Hedeoma todsenii, Patrick Alexander

Lycopus americanus, Patrick Alexander

Prunella vulgaris, Ron Wolf

Mentha arvensis, Chicago Botanic Garden

Monardella odoratissima, BLM Utah

Monardella villosa subsp. franciscana, BLM California

Salvia leucophylla, Bryant Baker

Salvia sonomensis, BLM California

Liliaceae | Lily Family

Familiar Western Genera - *Calochortus, Erythronium, Fritillaria, Lilium, Lloydia, Streptopus*

General Information

Dr. Arthur Cronquist circumscribed the Liliaceae very broadly, recognizing at least 30 segregate families. The Angiosperm Phylogeny Group has provided the molecular evidence to have the Liliaceae comprise a family of perennial herbs growing from underground bulbs and creeping rhizomes.

Today the Liliaceae are the bread and butter plants of the flower bulb industry of the Netherlands. In particular the tulip has been a highly coveted commodity since the first plants were stolen from the garden of Carolus Clusius in Leiden, Holland. 'Tulipomania' raged in Holland between 1634 and 1637, with tulips becoming the ultimate status symbol for those obsessed with the flowers. Just like the stock market, the market value of tulips continued to rise culminating in a spectacular crash. Imagine paying the equivalent of £80,000 for 12 bulbs of 'Semper Augustus'. After the tulip market crashed, artists produced cartoons depicting the madness of tulipomania. The most famous is Flora's Chariot of Fools, with Flora holding three of the most coveted tulips with her companions, Hoard-it-All and Vain Hope. Plants in the Lily Family are absent from the southern hemisphere and there are 15 genera with approximately 700 species.

Lilium columbianum, Phil Krening

Liliaceae

Identifying Characteristics

1. Plants: perennials from bulbs or rhizomes
2. Leaves: basal or cauline, (a) alternate, (b) sometimes appearing opposite or whorled
3. Flowers: bisexual, actinomorphic, with the perianth composed of 6 free tepals in two whorls
4. Stamens: 6 (rarely 3)
5. Ovary: superior (to partly inferior), usually trilocular
6. Fruit: capsule or berry

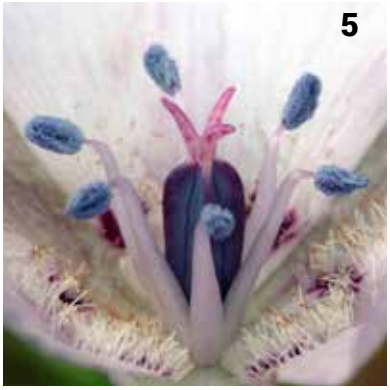
Erythronium montanum, Gerald Carr

Streptopus lanceolatus, Gerald Carr

Lilium kelleyanum, Patrick Alexander

Fritillaria recurva, Luke Wimmer

Fritillaria gentneri, Luke Wimmer



Calochortus umbellatus, Ron Wolf

Lilium spp., Phil Krening

Clintonia andrewsiana, Ron Wolf

Lilium superbum, Jeffrey Dawson

Calochortus nuttallii, Ron Wolf

Calochortus pulchellus, Ron Wolf

Calochortus uniflorus, Ron Wolf

Scoliopus bigelovii, Ron Wolf

L

Veratrum californicum, Ron Wolf

Calochortus flexuosus, Carol Dawson

Lloydia serotina, Matt Lavin

Fritillaria recurva, Luke Wimmer

Erythronium americanum, Patrick Alexander

Fritillaria camschatcensis, BLM Alaska

Loasaceae | Stickleaf or Blazingstar Family

Familiar Western Genera - *Eucnide, Mentzelia, Petalonyx*

General Information

The Loasaceae is a family of herbs or shrubs, often covered with needle-like, barbed, or stinging hairs. This plant family was one of the favorites of American botanist Dr. Arthur Cronquist. In fact, in 1992, he passed away from heart failure while studying herbarium specimens of *Mentzelia* at Brigham Young University in Utah. The Blazingstar Family is mostly found in the western parts of the New World and is quite common in the arid southwestern United States and Mexico, and includes about 20 genera and 308 species.

Mentzelia torreyi, Ron Wolf

Loasaceae

Identifying Characteristics

1. Leaves: (a) alternate (sometimes opposite), (b) more or less pinnately lobed
2. Plants: with "barbed" pagoda-like hairs, needle-like hairs, sometimes stinging hairs (*Mentzelia* lacks stinging hairs)
3. Flowers: are bisexual, actinomorphic; Calyx: (a) sepals generally 5 (4-8), persistent in fruit; Corolla: (b) petals generally 5 (as many as sepals), free or fused to each other
4. Stamens: (a) 5-10 to many, filaments of stamens thread-like to flat, staminodia common — modified to be filiform, petal-like
5. Ovary: inferior
6. Fruit: capsule with persistent sepals or achene

Mentzelia laevicaulis, BLM Idaho

Mentzelia adhaerens, Patrick Alexander

Eucnide bartonoides, Patrick Alexander

Mentzelia humilis var. humilis, Patrick Alexander

Mentzelia albicaulis, Gerald Carr

Mentzelia albicaulis, Ron Wolf

Mentzelia reflexa, Ron Wolf

Mentzelia decapetala, BLM Wyoming

Petalonyx thurberi, Ron Wolf

Mentzelia decapetala, Jeffrey Dawson

Mentzelia laevicaulis, BLM Utah

Mentzelia humilis, Patrick Alexander

Mentzelia multiflora, Ron Wolf

Mentzelia torreyi, Ron Wolf

Eucnide urens, Ron Wolf

Eucnide urens, Ron Wolf

L

Lythraceae | Loosestrife Family

Familiar Western Genera - *Ammannia, Lythrum, Punica, Rotala*

General Information

The Lythraceae consists of herbs, shrubs, and trees; including, a mix of important economic species, such as pomegranates, water chestnuts, and henna, bedding plants, and an aggressive Eurasian native that is a troublesome invasive along waterways in North America. The pomegranate (*Punica granatum*) has been cultivated in the Middle East and the Mediterranean since its origins in ancient Persia. Pomegranate juice has high levels of antioxidants and vitamins C and K, quite popular today as part of a healthy lifestyle. The syrup made from the fruit is the original source of grenadine, initially used as a sweetener for water before becoming an essential ingredient in cocktails. The hand-thrown grenade was actually named for its similarity to the pomegranate fruit; 'grenade' is an old French word for pomegranate. In North America, purple loosestrife (*Lythrum salicaria*) is an invasive species found along ponds and waterways. This species is atop many a noxious weed list, hopefully to be eradicated in the near future. There are 30 genera and approximately 600 species in the Loosestrife Family.

Lythrum salicaria, Jon Rikberg

Lythraceae

Identifying Characteristics

1. Stems: cylindric or 4-angled (on woody twigs)
2. Leaves: generally opposite, simple, entire (can be alternate, whorled)
3. Flowers: bisexual, generally actinomorphic, 4 or 6-merous with a tube-shaped hypanthium that is leathery or membranous
4. Calyx: (a) sepals occur as 4-6 (sometimes 8) lobes on the hypanthium, epicalyx lobes alternate sepals; Corolla: (b) petals 4-6 (rarely 0), inserted on inner rim of hypanthium, petals often crumpled in bud
5. Stamens: equal to or 2x the number of petals or sepals
6. Ovary: superior
7. Fruit: dry capsule or leathery berry

Lythrum tribracteatum, Gerald Carr

Ammannia robusta, Gerald Carr

Rotala ramosior, Corey Raimond

Lythrum salicaria, Corey Raimond

Lythrum hyssopifolium, Gerald Carr

Lythrum salicaria, Gerald Carr

Cuphea viscossisima, Patrick Alexander

Rotala ramosior, Corey Raimond

Rotala ramosior, Patrick Alexander

Lythrum salicaria, Gerald Carr

Lythrum californicum, Ron Wolf

Lythrum alatum, Corey Raimond

L

Lythrum californicum, Sue Carnahan

Lythrum salicaria, Corey Raimond

Malvaceae | Mallow Family

Familiar Western Genera - *Abutilon, Callirhoe, Fremontodendron, Malacothamnus, Malva, Sidalcea, Sphaeralcea*

General Information

The Malvaceae is a diverse family of annual and perennial herbs, shrubs, and trees. At first glance it is probably one of the easiest plant families to recognize due to the unique arrangement of the reproductive parts of the flower, familiar to anyone who has looked at a hibiscus. Cotton, jute, cacao, kola nuts, durian, roselle, kapok, balsa wood, linden trees, baobabs, and numerous ornamental species are now grouped together in the Mallow Family. The mucilaginous sap of *Althaea officinalis* was first used to make marshmallows. The durian, known as "the king of the fruits" is a large fruit with an unbelievably foul stench, that is a favorite food of elephants, tigers, Asian rhinos, orangutans, and sun bears. Familiar in West, the bright orange flowers of scarlet globemallow (*Spheralcea coccinea*) are sometimes known by the unusual common name "cowboy's delight" — thought to be an homage to the splash of color these flowers bring to an otherwise arid and austere landscape. There are approximately 244 genera and 4,225 species separated into nine subfamilies. Stellate or branched hairs, along with a mucilaginous sap, are common to the plants in all nine subfamilies in the Mallow Family.

Sphaeralcea coccinea, Ron Wolf

M

Malvaceae

Identifying Characteristics

1. Leaves: alternate, simple, or palmately-lobed or compound with petioles
2. Flowers: bisexual and actinomorphic, epicalyx often present below, subtending the flower
3. Calyx: (a) 5 sepals generally fused at the base; Corolla: (b) 5 petals free or fused at the base to filament column
4. Stamens: 5 to many, filaments fused for most of the length into a tube around the style (monadelphous)
5. Ovary: superior
6. Fruit: capsule or schizocarp that splits into mericarps (looks like a cheese-wheel)

Sphaeralcea pumila, Patrick Alexander

Hibiscus spp., Phil Krening

Malva moschata, Gerald Carr

Iliamna rivularis, Gerald Carr

Sphaeralcea angustifolia, BLM California

Anoda pentaschista, Patrick Alexander

Sphaeralcea ambigua, BLM Arizona

Fremontodendron californicum, Ron Wolf

Anoda cristata, Patrick Alexander

Eremalche rotundifolia, Ron Wolf

Eremalche parryi, Ron Wolf

Callirhoe involucrata, Phil Krening

Abutilon parvulum, Patrick Alexander

M

Hibiscus denudatus, Patrick Alexander

Sphaeralcea spp., Phil Krening

Sphaeralcea coccinea, Ron Wolf

Sidalcea neomexicana, Patrick Alexander

Sidalcea oregana, Ron Wolf

Malva neglecta, Gerald Carr

Montiaceae | Miner's Lettuce Family

Familiar Western Genera - *Calyptridium, Claytonia, Lewisia, Montia*

General Information

In western North America, plants in the Montiaceae are usually fleshy annual or perennial herbs. Bitterroot (*Lewisia rediviva*) is named in honor of Captain Meriwether Lewis of the Lewis & Clark Expedition. Members of the Shoshone tribe used the starchy roots of bitterroot as a staple food. Sometimes referred to as "miner's lettuce", the leaves of *Claytonia perfoliata* were also eaten as a salad by both Native Americans and the miners of California's gold rush. Lewisias' are popular plants for rock gardens and trough gardens. There are about 10 genera and 295 species in the Miner's Lettuce Family.

Lewisia longipetala, Phil Krening

M

Montiaceae

Identifying Characteristics

1. Leaves: alternate, opposite or basal though generally in a basal rosette
2. Flowers: perfect, actinomorphic
3. Calyx: sepals generally 2 (to 8), free; Corolla: petals (2) 4-19, free or basally fused, overlapping in bud
4. Stamens: as many as the petals and generally opposite them
5. Ovary: generally superior
6. Fruit: circumscissle or valvate capsule

Claytonia megarhiza, Phil Krening

Claytonia megarhiza, Ron Wolf

Lewisia cotyledon var. howellii, Gerald Carr

M

Montia chamissoi, Ron Wolf

Lewisia rediviva, Ron Wolf

Claytonia lanceolata, Gerald Carr

Phemeranthus brevicaulis, Patrick Alexander

Lewisia rediviva, Ron Wolf

Claytonia lanceolata, Patrick Alexander

Lewisia pygmaea, Ron Wolf

Lewisia kelloggii, Ron Wolf

Lewisia tweedyi, Corey Raimond

Calandrinia ciliata, Corey Raimond

Claytonia perfoliata, Ron Wolf

M

Nyctaginaceae | Four-o'clock Family

Familiar Western Genera - *Abronia, Allionia, Mirabilis, Tripterocalyx*

General Information

Plants in the Nyctaginaceae are annual or perennial herbs or shrubs. Well-known in warmer climates, brightly colored bougainvilleas are frequently used in landscaping as decorative hedges. The flowers of the popular garden ornamental *Mirabilis jalapa* open in the evening and are commonly known as "four-o'clocks". Out West, be on the look-out for sand-verbenas, windmills, four-o'clocks, and sandpuffs on the landscape. The Four-o'clock Family includes about 27 genera and 355 species.

Mirabilis alipes, Phil Krening

Nyctaginaceae

Identifying Characteristics

1. Stems: usually swollen at the nodes
2. Leaves: generally opposite, sessile or with petioles, pairs generally unequal in size
3. Bracts: can form a brightly colored calyx-like involucre in the inflorescence
4. Flowers: bisexual, generally actinomorphic (sometimes zygomorphic)
5. Perianth: consists of 1 whorl; Corolla: 0; Calyx: generally 5-lobed, petal-like, with 'tepals' fused into funnel, bell to trumpet shaped perianth. The lower part of the perianth tightly surrounds the developing ovary.
6. Fruits: (a) an accessory fruit known as an anthocarp (an achene or utricle enclosed in the hardened base of the perianth), (b) often ribbed or winged, glandular or not

Mirabilis multiflora, Phil Krening

Mirabilis jalapa, Phil Krening

Mirabilis multiflora, Phil Krening

Acleisanthes diffusa, Patrick Alexander

Mirabilis nyctaginea, Patrick Alexander

Acleisanthes lanceolata, Patrick Alexander

Tripterocalyx micranthus, Ron Wolf

Mirabilis alipes, Phil Krening

Tripterocalyx micranthus, BLM Utah

Abronia fragrens, Ron Wolf

Allionia choisyi, Patrick Alexander

Allionia choisyi, BLM New Mexico

Abronia elliptica, Ron Wolf

Mirabilis multiflora, Ron Wolf

Abronia villosa, Ron Wolf

Nyctaginia capitata, Patrick Alexander

N

Oleaceae | Olive Family

Familiar Western Genera - *Forestiera, Fraxinus, Ligustrum, Menodora*

General Information

Plants in the Oleaceae are mostly trees and shrubs with some woody vines, that typically have opposite leaves. Economically, the olive (*Olea europaea*) is the most important crop. However lilacs, forsythia, and jasmine are popular garden ornamentals. The wood of *Fraxinus excelsior* has been used for baseball bats, hockey sticks, polo mallets, and tennis racquets. The destructive emerald ash borer is a non-native, wood-boring beetle that is responsible for the death or decline of tens of millions of ash trees in North America. In the West, New Mexico olive (*Forestiera pubescens*) with its blue-black berries is commonly found along streambanks, canyons, and washes. Single-leaf ash (*Fraxinus anomala*) occurs in shrublands and pinyon/juniper woodlands. There are approximately 24 genera and 790 species in the Olive Family.

Forestiera pubescens, Patrick Alexander

Oleaceae

Identifying Characteristics

1. Leaves: generally opposite (rarely alternate), deciduous or evergreen, simple to odd-pinnately compound
2. Flowers: actinomorphic, (a) usually imperfect, (b) sometimes perfect
3. Calyx: sepals 4 (4-15 lobed), basally fused into a cup-shaped tube
4. Corolla: petals 4 (4-6 lobed), fused into tubular corolla or absent (0)
5. Stamens: usually 2 (rarely 4), fused to the corolla
6. Ovary: superior, 2 carpellate; Fruit: (a) loculicidal or circumscissle capsules, (b) samara, berry or drupe

Fraxinus latifolia, Corey Raimond

Forestiera pubescens, Patrick Alexander

Fraxinus latifolia, Corey Raimond

Menodora scabra, Patrick Alexander

Fraxinus cuspidata, Matt Lavin

Forestiera angustifolia, Patrick Alexander

Menodora longiflora, Patrick Alexander

Fraxinus anomala, Patrick Alexander

Forestiera angustifolia, Patrick Alexander

Fraxinus latifolia, Gerald Carr

Fraxinus dipetala, Bryant Baker

O

Onagraceae | Evening Primrose Family

Familiar Western Genera - *Camissonia, Chamerion, Clarkia, Epilobium, Gayophytum, Oenothera*

General Information

With flower parts in fours, a long hypanthium, and a many seeded inferior ovary, the Onagraceae is easily recognizable in the field. Just think of fireweed (*Epilobium*) flowers, found wherever a forest fire has raged in the West. The genus *Clarkia* was named in honor of William Clark, who shared the leadership of the Lewis & Clark Expedition with Meriwether Lewis. *Clarkia*, *Oenothera*, and *Fuchsia* are popular garden ornamentals. *Ludwigia* — initially grown as a pond plant — is now considered an invasive species when found growing in aquatic habitats outside its natural range. The Evening Primrose Family includes about 22 genera and 656 species.

Oenothera caespitosa, Ron Wolf

Onagraceae

Identifying Characteristics

1. Leaves: (a) simple, (b) basal, opposite or alternate (sometimes whorled), entire to toothed or pinnatifid
2. Flowers: perfect, actinomorphic (sometimes zygomorphic) with a hypanthium, flowers open at dawn or dusk
3. Calyx: sepals 4 (sometimes 2-5), fused to the hypanthium; Corolla: petals 4 (sometimes 2 or 5), often clawed, often fading darker
4. Stamens: 2x or equal to sepals in number
5. Ovary: inferior, stigma 4-lobed (or as many lobes as sepals)
6. Fruit: loculicidal capsule (sometimes berry or nutlets)

Oenothera howardii, Ron Wolf

Camissonia micrantha, Ron Wolf

Oenothera elata subsp. hirsutissima, Patrick Alexander

Chylismia scapoidea subsp. utahensis, Gerald Carr

Taraxia subacaulis, Gerald Carr

Epilobium obcordatum, Ron Wolf

Epilobium anagallidifolium, Phil Krening

O

Calylophus hartwegii, Patrick Alexander

Chylismia brevipes, Ron Wolf

Chamerion angustifolium, Ron Wolf

Chamerion latifolium, Phil Krening

Epilobium hornemannii, Patrick Alexander

O

Oenothera suffrutescens, Phil Krening

Camissonia walkeri subsp. tortilis, BLM Utah

Clarkia pulchella, BLM Oregon

Oenothera lavandulifolia, Carol Dawson

Camissonia claviformis, Ron Wolf

O

Familiar Western Genera - *Calypso, Corallorhiza, Cypripedium, Epipactis, Goodyera, Platanthera, Spiranthes*

General Information

The Orchidaceae is the largest family of flowering plants. Familiar to all, orchids are easily recognized by their attractive, strongly zygomorphic flowers, and the vast numbers of dust-like seeds contained in the fruits. More than any other cultivated plant, orchids have captured the passions of both growers and scientists, with enthusiasts risking it all to get their hands on the rarest ones. All orchids are covered under CITES and through history, more than one botanist has become an orchid thief in pursuit of specimens from wild populations. Today, orchids are the most valuable plants in the floriculture industry, with more than 100,000 cultivars (mostly hybrids) in the trade. Economically, the most important orchid-derived product is the vanilla bean, the unripened fruit of the orchid, *Vanilla planifolia*.

Terrestrial orchids in the wild can be extremely long-lived. This is due to a phenomenon known as prolonged dormancy where plants remain underground and are undetectable during the growing season. Orchids may exhibit prolonged dormancy due to environmental stress and is likely a key condition to maintaining high fitness for long-term survival. For example, *Cypripedium calceolus* has exhibited prolonged dormancy for twenty years.

Despite the incredible diversity in the Orchid Family recognition characters are quite simple. These monocots have 3 sepals and 3 petals, with one petal usually enlarged into a lip. There are 750 genera and about 26,460 species in the Orchidaceae, divided into five subfamilies.

Platanthera dilatata var. albiflora, Phil Krening

Orchidaceae

Identifying Characteristics

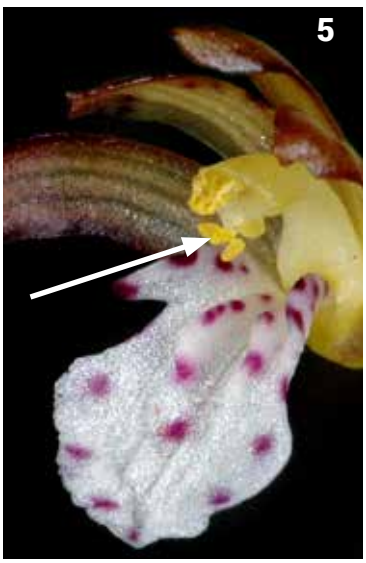
1. Plants: terrestrial, perennial – either lacking chlorophyll (non-green) or green
2. Flowers: bisexual, zygomorphic; Calyx: 3 sepals, free, generally petal-like; Corolla: 3 petals, unequal, one of the petals modified into a showy lip (labellum)
3. Stamens: generally 1 (to 3), more or less fused with the fleshy style and stigma into a column, stigma generally 3-lobed, underneath the rostellum on the column
4. Ovary: inferior, composed of 3 fused carpels
5. Pollen: aggregated into masses called pollinia
6. Fruit: capsule, opening by longitudinal slits, containing dust-like seeds

Corallorhiza maculata, Ron Wolf

Platanthera leucostachys, Ron Wolf

Paphiopedilum spp., Phil Krening

Corallorhiza trifida, Corey Raimond



Corallorhiza maculata, Gerald Carr

Epipactis helleborine, Corey Raimond

Cephalanthera austiniae, Ron Wolf

Epipactis gigantea, Jeffrey Dawson

Cypripedium californicum, Gerald Carr

Cypripedium montanum, Ron Wolf

Calypso bulbosa, Corey Raimond

Spiranthes romanzoffiana, Corey Raimond

Cypripedium parviflorum, Carol Dawson

O

Epipactis gigantea, Ron Wolf

Keckiella breviflora subsp. breviflora, Ron Wolf

Goodyera pubescens, Corey Raimond

Platanthera dilatata, Corey Raimond

O

Orobanchaceae | Broomrape Family

Familiar Western Genera - *Castilleja, Cordylanthus, Orobanche, Orthocarpus, Pedicularis*

General Information

The Orobanchaceae consists of the parasitic herbaceous plants, green or without chlorophyll, that were formerly found in the Figwort Family. The majority of these plants are root-parasites, obtaining nutrients from host plants via haustorial connections. The roots of newly germinated seeds make connections with the roots of host plants quickly, and can remain dormant in the soil for years if no host plants are present. There are about 104 genera and 1,960 species in the Broomrape Family.

Castilleja miniata, Ron Wolf

Orobanchaceae

Identifying Characteristics

1. Leaves: alternate to opposite, green, simple, blades may be entire, variously dissected or scale-like and not green in species without chlorophyll
2. Flowers: perfect, zygomorphic, bilabiate, with bracts
3. Calyx: (a) sepals (0) 2-5 lobed, fused; Corolla: (b) strongly bilabiate, petals 5-lobed, fused into a tube and the upper lip 2-lobed, lower lip 3-lobed
4. Stamens: epipetalous, generally 4 in two pairs (didynamous)
5. Ovary: superior
6. Fruit: capsule

Pedicularis bracteosa, Patrick Alexander

Orobanche uniflora, Ron Wolf

Rhinanthus minor, Gerald Carr

Castilleja exserta, Ron Wolf

Orobanche uniflora, Ron Wolf

Seymeria bipinnatisecta, Patrick Alexander

Castilleja sulphurea, BLM Utah

Conopholis alpina, Patrick Alexander

Pedicularis semibarbata, Ron Wolf

Castilleja applegatei subsp. martinii, Ron Wolf

Pedicularis dudleyi, Ron Wolf

Castilleja rhexifolia, Jeffrey Dawson

Castilleja haydenii, Jeffrey Dawson

Orobanche fasciculata, Ron Wolf

O

Pedicularis groenlandica, Ron Wolf

Orobanche uniflora, Ron Wolf

Pedicularis langsdorffii, BLM Alaska

Pedicularis centranthera, Ron Wolf

Pedicularis parryi, Ron Wolf

Orobanche californica, Ron Wolf

O

Papaveraceae | Poppy Family

Familiar Western Genera - *Arctomecon, Argemone, Corydalis, Dendromecon, Dicentra, Eschscholzia, Papaver*

General Information

The Papaveraceae consists of herbaceous annuals and perennials and a few woody genera. Plants in this family are widespread and most diverse in the temperate regions of the northern hemisphere. Plants in this family are characterized by a white, yellow or orange sap that exudes from latex cells when damaged. The white milky sap of the opium poppy (*Papaver somniferum*) is used to produce opiate drugs such as codeine and morphine. Opium poppies were cultivated in Mesopotamia before written history. Poppy seeds are most often used as traditional ingredients in breads, pastries, bagels, and other baked goods. Many familiar garden plants belong to this family; including, purple birds/golden smoke (*Corydalis*), bleeding hearts (*Dicentra*), bloodroot (*Sanguinaria*), Iceland poppy (*Papaver nudicaule*), and Oriental poppy (*P. orientalis*). In the West, California poppies (*Eschscholzia*) and prickly poppies (*Argemone*) are found in abundance in grassy open areas and flats. The Poppy Family contains about 45 genera and 775 species divided into two subfamilies: Fumarioideae and Papaveroideae.

Papaver heterophyllum, Ron Wolf

P

Papaveraceae

Identifying Characteristics

1. Plants: stems, leaves, and other parts produce yellow, orange, red, milky or watery sap
2. Leaves: generally alternate, simple, toothed, lobed or pinnately or ternately divided
3. Papaveroideae: flower buds often nodding
4. Flowers: bisexual, (a) actinomorphic or (b) zygomorphic
5. Calyx: sepals 2-3 sometimes fused into a cap, (a) shed after flowering; Corolla: petals 2-4 or 6, generally 2x sepals in number. (b) Sometimes 1 or 2 of the petals can be extended into a spur or pouch (Fumarioideae)
6. Stamens: generally many
7. Ovary: superior
8. Fruit: capsule, dehiscent by (a) pores or (b) valves

Argemone spp., Phil Krening

Dicentra cucullaria, Gerald Carr

Eschscholzia californica, Phil Krening

Eschscholzia californica subsp. mexicana, Patrick Alexander

Corydalis aurea, Patrick Alexander

Papaver somniferum, Phil Krening

Corydalis scouleri, Gerald Carr

Argemone squarrosa, BLM New Mexico

Papaver rhoeas, Gerald Carr

Papaver somniferum, Phil Krening

Argemone pleiacantha, Patrick Alexander

Dendromecon rigida, Ron Wolf

Dicentra formosa, Corey Raimond

Corydalis aurea, Carol Dawson

Eschscholzia californica subsp. mexicana, BLM New Mexico

Dicentra formosa subsp. formosa, Ron Wolf

Argemone munita, Ron Wolf

P

Familiar Western Genera - *Mimulus*

General Information

Plants in the Phrymaceae are rhizomatous or stoloniferous annual and perennial herbs. Monkey-flower (*Mimulus*), may be the flagship species in this family. *Mimulus* occurs mostly in North America and has the most diversity in the California Floristic Province. The California Floristic Province is located on the Pacific Coast of California, and includes a very distinctive flora of vascular plants, 60% of which are endemic species. In 1996, this province was designated as a biodiversity hot spot. *Mimulus*, along with 3 genera formerly in the "Scrophulariaceae" — *Collinsia* (Plantaginaceae), *Orthocarpus* (Orobanchaceae), and *Cordylanthus* (Orobanchaceae) — have the largest number of species in the California Floristic Province. *Mimulus* is grown widely as a garden ornamental. Recent genetic analysis has resulted in the vast majority of the species comprising *Mimulus* being transferred to the genus *Erythranthe*. There are approximately 13 genera and 187 species in the Lopseed Family.

Mimulus guttatus, Phil Krening

Phrymaceae

Identifying Characteristics

1. Leaves: opposite or basal, simple, entire or toothed
2. Flowers: perfect, zygomorphic (sometimes actinomorphic)
3. Calyx: sepals fused into a 5-lobed tube or bilabiate persistent calyx, tube long and generally ribbed; Corolla: petals fused into a tubular or bilabiate corolla, 5-lobed
4. Stamens: usually 4, didynamous, epipetalous
5. Ovary: superior
6. Fruit: capsule

Mimulus lewisii, Ron Wolf

Mimulus cusickii, Gerald Carr

Mimulus geyeri, Patrick Alexander

Diplacus kelloggii, Gerald Carr

Mimulus guttatus, BLM California

Mimulus tilingii, Patrick Alexander

Mimulus laciniatus, Ron Wolf

Mimulus lewisii, UC Botanical Garden

Mimulis cusickii, BLM Oregon

Mimulus mohavensis, Ron Wolf

Mimulus nanus, Ron Wolf

Mimulus cardinalis, Ron Wolf

Mimulus lewisii, Gerald Carr

P

Plantaginaceae | Plantain Family

Familiar Western Genera - *Besseya, Callitriche, Collinsia, Digitalis, Keckiella, Linaria, Penstemon, Plantago, Veronica*

General Information

The Plantaginaceae is composed of annual, biennial, and perennial herbaceous plants, as well as, shrubs, small trees, and some aquatics. In the West, beardtongue (*Penstemon*) is the flagship species on the landscape. *Penstemon* is the largest North American genus in the Plantaginaceae, with a geographical distribution from Alaska and Yukon Territory to Guatemala, but occurring primarily in the western US. Among flowering plants, *Penstemon* is the largest genus endemic to North America. The Plantain Family is home to 99 genera and approximately 1,900 species.

Penstemon harringtonii, Phil Krening

P

Plantaginaceae

Identifying Characteristics

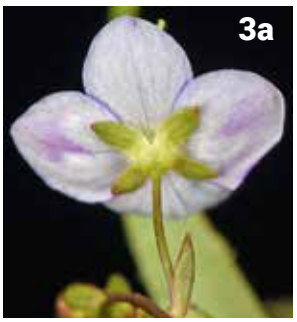
1. Leaves: (a) basal or (b) cauline, alternate or opposite, sometimes whorled
2. Flowers: unisexual or bisexual, (a) actinomorphic or (b) zygomorphic
3. Calyx: (a) sepals 4-5, generally fused at base, may appear as lobes, persistent; Corolla: (b) petals 4-5 lobed (sometimes absent), generally 2-lipped – upper lip usually 2-lobed, lower lip 3-lobed, nectar spur may be present
4. Stamens: 2 or 4 (didynamous), epipetalous, alternate with corolla lobes, 4 fertile and 1 sterile staminode in *Penstemon*
5. Ovary: superior (sometimes inferior)
6. Fruit: capsule

Plantago maritima, Gerald Carr

Penstemon fruticiformis, Patrick Alexander

Veronica cusickii, Ron Wolf

Penstemon fendleri, Patrick Alexander



Veronica scutellata, Gerald Carr

Penstemon unilateralis, Ron Wolf

Penstemon spectabilis, Ron Wolf

Maurandya antirrhiniflora, Patrick Alexander

Penstemon spp., Phil Krening

Veronica wormskjoldii, Patrick Alexander

Penstemon rydbergii, Ron Wolf

Keckiella breviflora subsp. glabrisepala, Ron Wolf

Besseya plantaginea, Patrick Alexander

Callitriche palustris, Gerald Carr

Penstemon grahamii, Phil Krening

Tonella tenella, Ron Wolf

Collinsia heterophylla, Ron Wolf

P

Digitalis purpurea, Michael Remke

Penstemon scariosus var. albifluvis, Phil Krening

Penstemon secundiflorus, Peter Gordon

Plantago ovata, Ron Wolf

Penstemon palmeri, Carol Dawson

Penstemon utahensis, Carol Dawson

Antirrhinum multiflorum, Bryant Baker

Linaria vulgaris, Ron Wolf

P

Poaceae | Grass Family

Familiar Western Genera - *Achnatherum, Agropyron, Bouteloua, Bromus, Elymus, Festuca, Hesperostipa, Poa, Sporobolus*

General Information

The Poaceae is without question the most economically important family of flowering plants. Wheat (*Triticum*) was one of the first grains to be domesticated, beginning in 9000 BCE. The domestication of wheat, durum wheat, rye, barley, rice, maize or corn, oats, sorghum, millet, and sugarcane allowed humans to become less nomadic, permitting the storage of food for adverse conditions, and became important fodder for domesticated animals. Grains were used to make alcohol in many cultures. Pottery fragments from the Godin Tepe site in western Iran have residue of barley beer dating from 3400 BCE to 3000 BCE.

Bamboos, familiar in Asian cuisine, are also used for construction materials, fishing rods, bicycles, furniture, basketry, musical instruments, and weaponry. The oils from citronella grass (*Cymbopogon nardus*) are used in candles as insect repellents.

Grasses are also used extensively in horticulture in lawns, golf courses, and as popular garden ornamentals. Unfortunately, escaped ornamentals and accidental introductions of exotic grasses have changed the relative abundance of native plant species and the composition of native plant communities. Exotic grasses have altered historic disturbance cycles, including fire and grazing. In the West, the introduction of the highly flammable *Bromus tectorum* has greatly increased fire frequencies, placing native species that did not evolve with frequent fires at risk. The Grass Family includes about 792 genera and 11,000 species divided into 13 subfamilies.

Phleum pratense, Phil Krening

Poaceae

Identifying Characteristics

1. Stems: generally round, hollow, nodes swollen, solid
2. Leaves: alternate, 2-ranked, generally linear, parallel-veined, (a) sheath generally open, (b) ligule usually present
3. Inflorescence: of spikelets, each spikelet having 1 or more florets — spikelets subtended by 2 glumes
4. Flowers: generally bisexual, (a) each floret subtended by 2 bracts (palea and lemma), perianth reduced to 2 (sometimes 3) lodicules, (b) stamens usually 3
5. Ovary: superior; Fruit: caryopsis

Zea mays, Phil Krening

Phalaris arundinacea, Phil Krening

Phalaris arundinacea, Patrick Alexander

Bouteloua barbata, Patrick Alexander

Avena sativa, Patrick Alexander

Bouteloua hirsuta, Patrick Alexander

Achnatherum hymenoides, Patrick Alexander

Agropyron cristatum, Patrick Alexander

Muhlenbergia sinuosa, Patrick Alexander

Festuca thurberi, Patrick Alexander

Muhlenbergia porteri, Patrick Alexander

Achnatherum hymenoides, Patrick Alexander

Bouteloua gracilis, Patrick Alexander

P

Bouteloua breviseta, Patrick Alexander

Setaria reverchonii, Patrick Alexander

Hesperostipa comata, Patrick Alexander

Festuca thurberi, Patrick Alexander

Dasyochloa pulchella, Patrick Alexander

Polemoniaceae | Phlox Family

Familiar Western Genera - *Aliciella, Collomia, Eriastrum, Gilia, Ipomopsis, Phlox, Polemonium*

General Information

The Polemoniaceae has its greatest diversity centered in western North America, and is made up of herbaceous annuals and perennials, shrubs and vines. Numerous plants in this family are popular garden ornamentals: phlox, scarlet trumpet, Jacob's ladder, and cup-and-saucer vine, to name a few.

Scarlet gilia or skyrocket (*Ipomopsis aggregata*) has showy bright red trumpet-shaped flowers studied in the West by numerous botanists as a classic example of introgressive hybridization. Introgressive hybridization is the incorporation of genes from one species into another related species. The eye-catching cream to pink to red skyrocket populations along roadsides in the Rocky Mountains are the end product of this process. There are about 18 genera and approximately 350 species in the Phlox Family.

Phlox diffusa, Ron Wolf

P

Polemoniaceae

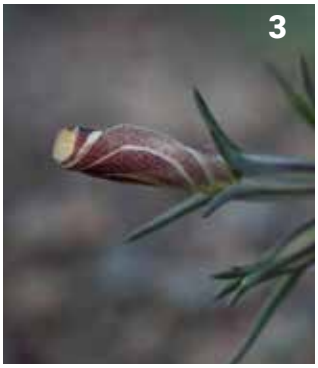
Identifying Characteristics

1. Leaves: (a) simple or compound, alternate or opposite, or (b) mostly basal
2. Flowers: bisexual, actinomorphic or zygomorphic
3. In bud, corolla lobes folded and overlapping each other — appearing 'twisted'
4. Calyx: (a) usually 5 sepals, lobed, fused at base, with a translucent membrane connecting lobes, persistent in fruit; Corolla: (b) usually 5 fused petal lobes, salverform to bell-shaped, with well-defined throat
5. Stamens: usually 5, epipetalous
6. Ovary: (a) superior with 3 locules, style 1, generally with (b) 3 stigmas
7. Fruit: loculicidal capsule

Polemonium carneum, Gerald Carr

Gilia stenothyrsa, Phil Krening

Polemonium pulcherrimum, Ron Wolf



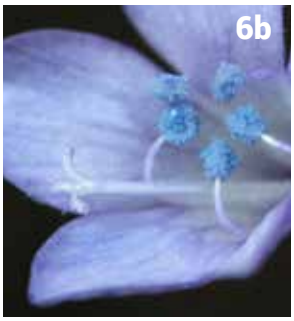
Linanthus dichotomus, Ron Wolf

Leptosiphon liniflorus, Gerald Carr

Ipomopsis tenuituba, Ron Wolf

Ipomopsis aggregata, Gerald Carr

Phlox nana, Patrick Alexander



Gilia achilleifolia, Ron Wolf

Collomia renacta, Gerald Carr

Ipomopsis tenuituba, Ron Wolf

Linanthus californicus, Ron Wolf

Gilia achilleifolia, Ron Wolf

Gilia stenothyrsa, Phil Krening

Phlox longifolia, Ron Wolf

Collomia grandiflora, Ron Wolf

Ipomopsis aggregata, Ron Wolf

P

Langloisia setosissima, Ron Wolf

Phlox diffusa, Ron Wolf

Eriastrum sparsiflorum, Ron Wolf

Polemonium viscosum, Ron Wolf

Gilia latiflora, Ron Wolf

Gilia caespitosa, Carol Dawson

Navarretia tagetina, Ron Wolf

Linanthus bicolor, Ron Wolf

P

Polygonaceae | Buckwheat Family

Familiar Western Genera - *Bistorta, Chorizanthe, Eriogonum, Persicaria, Polygonum, Rumex*

General Information

Plants in the Polygonaceae are annual and perennial herbs, shrubs, and trees. If you have ever eaten soba noodles, Breton crepes, or rhubarb pie you are already familiar with a few of the tasty food crops in this family. Many species of this family are weedy, found in disturbed places and along roadsides. Curly dock (*Rumex crispus*) is an introduced species that is common along roadsides in urban areas. Japanese knotweed (*Fallopia japonica*), another introduced ornamental, is now spreading aggressively in temperate zones.

Arguably, the most interesting group of plants in this family belong to the genus *Eriogonum*, or wild buckwheat. Based primarily on the work of botanist Dr. James L. Reveal, it is understood that the center of diversity for this genus is in temperate North America. Roughly half of the species assigned to this genus are found in California, with most of the remaining species found across the Intermountain West. Dr. Reveal noted that Native Americans have a long history of using plants in this genus. There are about 50 genera and 1,200 species divided into 3 subfamilies in the Buckwheat Family.

Eriogonum brandegeei, Phil Krening

P

Polygonaceae

Identifying Characteristics

1. Leaves: (a) simple, generally alternate, (b) stems swollen at the leaf nodes (or not)
2. Stipules: united into a papery, onion-skin like sheath around the stem (ocreae). Ocreae present except in genus *Eriognonum*
3. Flower: clusters within the inflorescence generally subtended by bracts; each flower may be subtended by 2 bracteoles
4. Flowers: small, actinomorphic, bisexual. Perianth parts 2-6, generally in 2 whorls (tepals), free or basally fused — often petal-like, stamens 6-9 in 2 whorls
5. Ovary: superior, styles 1-3
6. Fruits: (a) generally 3-angled with (b) wings or not, sometimes lens-shaped

Rumex venosus, Gerald Carr

Persicaria wallichii, Gerald Carr

Rumex spp., Phil Krening

Bistorta bistortoides, Gerald Carr

Eriogonum corymbosum, Ron Wolf

Rumex salicifolius, Gerald Carr

Rumex densiflorus, Patrick Alexander

Rumex hymenosepalus, Patrick Alexander

P

Oxyria digyna, Ron Wolf

Eriogonum ovalifolium var. purpureum, Ron Wolf

Rumex occidentalis, Phil Krenig

Eriogonum shockleyi, BLM Idaho

Eriogonum fasciculatum, Ron Wolf

Polygonum vivipara, Ron Wolf

Eriogonum ovalifolium var. nivale, Ron Wolf

Eriogonum flavum, Ron Wolf

Eriogonum inflatum, Ron Wolf

P

Primulaceae | Primrose Family

Familiar Western Genera *- Androsace, Dodecatheon, Primula*

General Information

The Primulaceae is most familiar to us as scapose herbs with showy, tubular, bright pink flowers at higher elevations. Numerous genera in this family are popular garden ornamentals, such as; Cyclamen, shooting star (*Dodecatheon*), yellow loosestrife (*Lysimachia*), and Primula. Rock-jasmines (*Androsace*) can be found in sagebrush communities if you look hard enough. Primulas and shooting stars are frequently seen on rocky alpine slopes and moist meadows and fens. There are about 53 genera and 2,790 species within 4 subfamilies in the Primrose Family.

Dodecatheon jeffreyi, Ron Wolf

P

Primulaceae

Identifying Characteristics

1. Plants: annual and perennial scapose herbs
2. Leaves: alternate, opposite or whorled, often in basal rosettes
3. Flowers: perfect, actinomorphic, generally 4 or 5-merous
4. Calyx: (a) deeply lobed, persistent; Corolla: (b) (4) to 5 lobed, commonly fused into short tube, or lobes nearly free
5. Stamens: epipetalous (4) to 5, opposite corolla lobes
6. Ovary: superior, placenta free-central
7. Fruit: capsule, usually opening with apical teeth

Primula parryi, Phil Krening

Dodecatheon conjugens, Gerald Carr

Lysimachia latifolia, Ron Wolf

Primula parryi, Phil Krening

Primula parryi, Ron Wolf

Lysimachia arvensis, Gerald Carr

Androsace septentrionalis, Ron Wolf

Samolus ebracteatus, Patrick Alexander

Androsace septentrionalis, Ron Wolf

Samolus ebracteatus, Patrick Alexander

Androsace septentrionalis, Gerald Carr

Primula angustifolia, Phil Krening

Douglasia laevigata, Gerald Carr

Androsace chamaejasme, Patrick Alexander

Lysimachia europea, Gerald Carr

Dodecatheon jeffreyi, Ron Wolf

Primula parryi, Phil Krening

Dodecatheon redolens, Ron Wolf

P

Ranunculaceae | Buttercup Family

Familiar Western Genera *- Aconitum, Anemone, Aquilegia, Caltha, Delphinium, Ranunculus, Thalictrum*

General Information

The Ranunculaceae is a large family composed of herbaceous annuals and perennials (occasionally aquatic), woody vines, and shrubs — many of which are quite different in appearance. However, all plants in this family share two characters: (1) flower parts are separate from each other and (2) stamens are of an indefinite number. Most of these species are familiar to us as showy garden ornamentals - *Clematis*, *Helleborus*, *Anemone*, *Delphinium*, and *Thalictrum*. Love-in-a-mist (*Nigella sativa*) or 'onion seeds' is also a spice used in baking. Many species are poisonous, especially monkshood (*Aconitum*), the cause of many an accidental or intentional death during Victorian times. The Columbine (*Aquilegia coerulea*), was adopted as the official state flower of Colorado on April 4, 1899 by an act of the General Assembly. In 1925, to further protect the columbine a law was enacted that "prohibits digging or uprooting the flower on public lands and limits the gatherings of buds, blossoms, and stems to 25 in one day". It is also unlawful to pick the columbine on private land without the consent of the land owner. The Buttercup Family contains about 43 genera and 2,346 species divided into five subfamilies.

Aquilegia pubescens, Ron Wolf

R

Ranunculaceae

Identifying Characteristics

1. Leaves: basal and cauline, alternate or opposite, simple or (a) compound, (b) sheathing petioles may be present
2. Flowers: bisexual, (a) actinomorphic or (b) zygomorphic
3. Perianth: rarely a true calyx and corolla present (the exception is genus *Ranunculus)*. The perianth consists of petal-like parts or 'tepals'; Calyx: sepals are free, 3-6 (20), distinct, petal-like, sometimes spurred; Corolla: petals free, 3-26 or 0, distinct
4. Stamens: 5-many, free; Pistils: 1-many, free
5. Ovary: superior
6. Fruit: (a) achenes, (b) follicles, (c) berries

Thalictrum spp., Phil Krening

Aquilegia spp., Phil Krening

Anemone spp., Phil Krening

Delphinum spp., Phil Krening

Aquilegia formosa, Phil Krening

Pulsatilla patens, Ron Wolf

Ranunculus hystriculus, Ron Wolf

Clematis lesiantha, Bryant Baker

Aquilegia desertorum, Patrick Alexander

Actaea rubra, Gerald Carr

R

Clematis hirsutissima, Peter Gordon

Aquilegia coerulea, Ron Wolf

Aconitum columbianum, Ron Wolf

Pulsatilla patens, Ron Wolf

Caltha leptosepala, Carol Dawson

Ranunculus adoneus, Phil Krening

Thalictrum fendleri, Patrick Alexander

Clematis columbiana, Michael Remke

Pulsatilla vulgaris, Carol Dawson

Trollius laxus, Ron Wolf

R

Rhamnaceae | Buckthorn Family

Familiar Western Genera - *Ceanothus, Frangula, Rhamnus, Ziziphus*

General Information

The Rhamnaceae is large and consists of temperate and tropical trees and shrubs. The commercial jujube candy that was popular in movie theaters originally was made using the juice of *Ziziphus jujuba*. In some parts of the world the candied dried fruits are readily available as a snack food. In the West, the California or wild lilac (*Ceanothus spp.*) is one of the dominant woody genera in the chaparral. Many of the species in the Ceanothus chaparral produce deeply dormant seeds that require fire for germination. Seedling germination is generally confined to the first postfire year. *Ceanothus* species are also important butterfly host plants for various species of blues, hairstreaks, dusky wings, and skipper butterflies. There are about 55 genera and 1,040 species in the Buckthorn Family.

Ceanothus oliganthus, Bryant Baker

R

Rhamnaceae

Identifying Characteristics

1. Plants: mostly shrubs and trees, often thorny
2. Leaves: alternate (less often opposite), simple, pinnately veined or with 3 main veins from the base. Stipules generally present, may be modified into spines
3. Flowers: unisexual or bisexual, actinomorphic, small, hypanthium usually present
4. Calyx: sepals (4) to 5, triangular, fused to hypanthium rim; Corolla: petals (4) to 5, sometimes 0, generally clawed, inserted in mouth of hypanthium, more or less concave or hooded
5. Stamens: 4-5, opposite the petals, alternate with sepals, attached to rim of hypanthium
6. Ovary: superior to inferior
7. Fruit: drupe, sometimes a capsule or schizocarp

Ceanothus velutinus, Phil Krening

Ceanothus velutinus, Phil Krening

Ceanotus cordulatus, Gerald Carr

Ceanothus pumilus, Gerald Carr

Ceanothus velutinus, Gerald Carr

Ceanothus greggii, Patrick Alexander

Rhamnus purshiana, Gerald Carr

Frangula californica subsp. tomentella, BLM California

Ceanothus thyrsiflorus, BLM California

Ceanothus velutinus, BLM Utah

Ziziphus obtusifolia, Patrick Alexander

Ceanothus incanus, BLM California

Ceanothus jepsonii, BLM California

Rhamnus betuifolia, Patrick Alexander

Frangula californica subsp. tomentella, Patrick Alexander

R

Rosaceae | Rose Family

Familiar Western Genera - Shrubs: *Amelanchier, Cercocarpus, Coleogyne, Fallugia, Holodiscus, Physocarpus, Prunus, Purshia, Rosa.* Herbaceous plants: *Drymocallis, Geum, Horkelia, Ivesia, Potentilla, Sibbaldia*

General Information

The Rosaceae is a large family of shrubs and trees valued for both fruits and popular cultivated genera. The most important species economically belong to the genera *Malus* and *Prunus*. Food crops produced from these genera include: apples, almonds, apricots, peaches, nectarines, cherries, and plums to name a few. Raspberries, blackberries, pears, and strawberries round out the mix of favorite summer fruits. Many genera within this family are popular garden plants, with the rose (*Rosa*), hands down, the most popular and widely cultivated garden flower in the world.

In the central Rocky Mountains, the Petran Chaparral is a transition zone from montane coniferous forest to treeless plains and plateaus. This is mostly a zone of winter-deciduous shrubs between 2000-3000 meters. The vegetation here is somewhat similar to evergreen chaparral in height and its thicket-like appearance. *Quercus gambelii* is the dominant species, however *Cercocarpus* species are often locally abundant. This type of chaparral can also be found mixed in with pinyon-juniper woodlands in both the Great Basin and Colorado Plateau.The Rose Family include up to 90 genera and 2,950 species, divided into three subfamilies.

Physocarpus monogynus, Phil Krening

Rosaceae

Identifying Characteristics

1. Leaves: simple to (a) palmately or (b) pinnately compound, usually alternate, stipules usually present — often fused to the petiole
2. Flowers: perfect, actinomorphic, with a hypanthium; epicalyx or bractlets often present
3. Calyx: (a) sepals generally 5 (3-10), often appear as lobes of the hypanthium; Corolla: (b) petals generally 5 (3-10), can be absent
4. Stamens: (0 or 1) 5-many, attached at or near rim of hypanthium; Pistils: 1-many
5. Ovary: superior to inferior
6. Fruits: (a & b) achenes, follicles, (c) drupe or pome

Potentilla villosa, BLM Alaska

Potentilla crinita, Patrick Alexander

Prunus subcordata, Gerald Carr

Rosa gymnocarpa, Gerald Carr

Potentilla anserina, Gerald Carr

Prunus emarginata, Gerald Carr

Rosa rubiginosa, Gerald Carr

Cercocarpus montanus, BLM Colorado

Geum triflorum, Dale Swenarton

Rubus deliciosus, Patrick Alexander

Amelanchier alnifolia, Phil Krening

Rosa woodsii, Ron Wolf

Coleogyne ramosissima, BLM Nevada

Spiraea splendens, Ron Wolf

Geum triflorum, Loraine Yeatts

R

Fragaria chiloensis subsp. pacifica, BLM Alaska

Potentilla fruticosa, Phil Krening

Purshia mexicana, Ron Wolf

Prunus andersonii, Ron Wolf

Potentilla concinna, Loraine Yeatts

Fallugia paradoxa, Ron Wolf

R

Familiar Western Genera - *Sarcobatus*

General Information

Endemic to the arid interior of western North America, the Sarcobataceae was formerly included in the Chenopodiaceae and consists entirely of two closely related species; *Sarcobatus vermiculatus* and *Sarcobatus baileyi*. Greasewood is a hygrohalophyte, found growing in alkaline soils where underground moisture is present at the surface, usually remaining about 1 meter below. It is an important winter browse plant for big game, but can cause poisoning, especially in sheep, due to a high concentration of oxalates.

Sarcobatus vermiculatus, Phil Krening

Sarcobataceae

Identifying Characteristics

1. Plants: monoecious, spiny shrubs, stems branched, spine-tipped
2. Leaves: simple, alternate, subterete, succulent
3. Inflorescence: pistillate flowers and staminate spikes on long, lateral branches
4. Flowers: (a) staminate flowers in terminal spikes, "catkin-like", apetalous, stamens 1-4 covered by peltate bracts, (b) pistillate flowers solitary, with a cup-like, sometimes shallowly lobed calyx — lower half of calyx fused to ovary with the upper half expanded into a winged border
5. Fruit: turbinate utricle

Sarcobatus vermiculatus, Matt Lavin

Sarcobatus vermiculatus, Matt Lavin

Sarcobatus vermiculatus, Phil Krening

Sarcobatus vermiculatus, Phil Krening

Sarcobatus vermiculatus, Phil Krening

Sarcobatus vermiculatus, Patrick Alexander

S

Saxifragaceae | Saxifrage Family

Familiar Western Genera - *Chrysosplenium, Heuchera, Lithophragma, Micranthes, Saxifraga, Telesonix*

General Information

The Latin name Saxifragaceae means “rock-breaker” and indeed these are the mat-forming or cespitose plants found growing in rock crevices in the alpine. Saxifrages excel at higher elevations in the temperate regions of North America. Whiplash saxifrage is a colonizer of bare ground — found in alpine meadows and scree slopes. Several genera: *Astilbe*, *Heuchera*, *Bergenia*, and *Tiarella* are highly valued ornamentals for both gardeners and rock garden enthusiasts. The Saxifrage Family includes about 35 genera and 640 species.

Heuchera rubescens, Patrick Alexander

S

Saxifragaceae

Identifying Characteristics

1. Plants: usually perennial herbs, some annuals
2. Leaves: generally alternate, usually forming basal rosettes
3. Flowers: bisexual, generally actinomorphic, with a hypanthium, inflorescence often scapose
4. Calyx: sepals usually 5 (3-10), commonly appearing as lobes of the hypanthium; Corolla: petals usually 5 (3-10 or 0), clawed, free
5. Stamens: as many or 2x the number of petals
6. Ovary: superior to inferior, carpels fused at base to form a compound lobed ovary with each lobe extending into a stylar beak — curved styles that look like horns
7. Fruit: capsules or follicles

Bolandra californica, Ron Wolf

Saxifraga mertensiana, Gerald Carr

Saxifraga tolmiei, Ron Wolf

Darmera peltata, Ron Wolf

Saxifraga californica, Ron Wolf

Saxifraga chrysantha, Phil Krening

Heuchera parviflora, Phil Krening

Saxifraga rivularis, Phil Krening

Telesonix jamesii, Ron Wolf

Saxifraga bronchialis var. austromontana, Phil Krening

Tiarella trifoliata, Ron Wolf

Heuchera micrantha subsp. erubescens, Ron Wolf

Mitella pentandra, Ron Wolf

Heuchera sanguinea, Patrick Alexander

Lithophragma parviflorum, Ron Wolf

Saxifraga hirculus, Ron Wolf

Saxifraga caespitosa, Phil Krening

S

Scrophulariaceae | Figwort Family

Familiar Western Genera *- Buddleja, Limosella, Scrophularia, Verbascum*

General Information

The Scrophulariaceae is of major importance in horticulture. Many plants in this family are garden ornamentals such as butterfly bush (*Buddleja*), figwort (*Scrophularia*), and mullein (*Verbascum*). In fact, *Verbascum thapsus* is one of the most common roadside weeds in the West, with soft, densely tomentose leaves — it's a campers friend in an emergency. With some exceptions, the corolla of plants in this family are strongly zygomorphic and two-lipped, the upper lip 2-lobed and the lower lip 3-lobed.

Based on molecular evidence, the traditional Scrophulariaceae was divided into several separate plant families. Current circumscription placed *Penstemon* and *Digitalis* in the Plantaginaceae, *Pedicularis* in the Orobanchaceae, *Mimulus* in the Phrymaceae, with *Scrophularia* and *Verbascum* remaining in the Scrophulariaceae. Even after numerous genera in the traditional Figwort Family have been moved, there are still roughly 59 genera and 1,830 species.

Scrophularia californica, Ron Wolf

S

Scrophulariaceae

Identifying Characteristics

1. Leaves: (a) simple, (b) alternate or opposite, more or less entire, exstipulate
2. Flowers: generally bisexual, usually (a) zygomorphic or (b) actinomorphic
3. Calyx: sepals generally 4-5 lobed, may be unequal in size; Corolla: petals-bilateral to radial, 4-5 lobed
4. Stamens: 4-5 (didynamous if 4), or 5 equal stamens in *Scrophularia*, epipetalous
5. Ovary: superior
6. Fruit: capsule

Scrophularia macrantha, Patrick Alexander

Scrophularia montana, Patrick Alexander

Scrophularia californica, Ron Wolf

Verbascum spp., Phil Krening

Scrophularia lanceolata, Gerald Carr

Scrophularia californica, Gerald Carr

Scrophularia macrantha, Phil Krening

Scrophularia montana, Patrick Alexander

Limosella aquatica, BLM Alaska

Verbascum thapsus, Ron Wolf

Buddleja davidii, Gerald Carr

Scrophularia macrantha, Patrick Alexander

Verbascum thapsus, Patrick Alexander

S

Solanaceae | Potato or Nightshade Family

Familiar Western Genera *- Datura, Lycium, Nicotiana, Physalis, Solanum*

General Information

The Solanaceae has it all: vegetables — such as the potato and tomato, narcotic plants, deadly plants, and highly prized ornamentals. Economically, the most important crop is the potato (*Solanum tuberosum*), originating in the Andes Mountains. Tomatoes are perhaps the second most important, followed by eggplants, peppers, and tomatillos. Tobacco (*Nicotiana tabacum*) contains high levels of the addictive chemical nicotine and has been used around the world for smoking, chewing, and snuff making. Highly toxic plants in this family include deadly nightshade (*Atropa belladonna*), thorn-apple (*Datura spp.*), and black henbane (*Hyoscyamus niger*).

Many plants in this family contain alkaloids that are used to create intense hallucinations and intoxication. Ornamental species with showy flowers or fruits include: petunias, tobacco plants (*Nicotiana*), angel's trumpets (*Brugsmansia spp.*), chili peppers (*Capsicum*), and red lantern plants (*Physalis alkekengi*). Worldwide the Nightshade Family consists of herbaceous annuals and perennials, shrubs, trees and vines composing about 100 genera and 2,600 species.

Solanum jamesii, Patrick Alexander

S

Solanaceae

Identifying Characteristics

1. Stems: may be prickly or thorny, or covered with hairs
2. Leaves: simple to pinnately compound, generally alternate
3. Flowers: perfect, generally actinomorphic
4. Calyx: (a) sepals generally 5-lobed; Corolla: (b) petals generally 5-lobed, fused into a cup, funnel or tube-shaped corolla
5. Stamens: 5, inserted on corolla tube, alternating with corolla lobes
6. Ovary: superior
7. Fruit: (a) berry, (b) loculicidal or septicidal capsule

Solanum physalifolium var. nitidibaccatum, Gerald Carr

Solanum jamesii, Patrick Alexander

Solanum xanti, Ron Wolf

Solanum spp., Phil Krening

Nicotiana obtusifolia, Ron Wolf

Nicotiana attenuata, Ron Wolf

Nicotiana rustica, Phil Krening

Solanum xanti, Patrick Alexander

Datura stramonium, Gerald Carr

Datura wrightii, Ron Wolf

Nicotiana obtusifolia, Ron Wolf

Nicotiana attenuata, Ron Wolf

Physalis crassifolia, Ron Wolf

Chamaesaracha pallida, Patrick Alexander

Solanum ptychanthum, Ron Wolf

Solanum umbelliferum, Ron Wolf

S

Verbenaceae | Vervain Family

Familiar Western Genera - *Glandularia, Phyla, Verbena*

General Information

The Verbenaceae is a cosmopolitan family of annual and perennial herbs, shrubs, and small trees. It is well-known for ornamental herbs and shrubs (*Lantana spp.*) and as a source of essential oils for the perfume industry. Fog fruit (*Phyla nodulifera*) is grown as a ground cover, and lemon verbena (*Aloysia triphylla*) is used both as an herb to flavor liquor and in air-fresheners. Plants in this family have some recognition characters shared with those in the Lamiaceae, such as 4-angled stems, opposite leaves, and a 4-lobed ovary. There are roughly 32 genera and 1,000 species in the Vervain Family.

Verbena hastata, Phil Krening

Verbenaceae

Identifying Characteristics

1. Stems: square in cross-section, generally hairy
2. Leaves: usually opposite, with the petiole bases fused by thin tissue across the node, generally toothed, simple or compound, often strongly scented due to extrafloral nectaries
3. Flowers: perfect, usually zygomorphic, often in spikes or heads
4. Calyx: 4 or 5 sepals fused into cup-shaped persistent calyx; Corolla: 4 or 5-lobed, salverform to 2-lipped or nearly regular
5. Stamens: generally 4-5, didynamous if 4, epipetalous
6. Ovary: superior, 2-4-lobed (due to false septa), ovary has a single terminal style
7. Fruit: 2-4 nutlets, drupe-like, or capsule

Verbena hastata, Phil Krening

Verbena plicata, Patrick Alexander

Verbena hastata, Phil Krening

Verbena hastata, Patrick Alexander

Phyla nodiflora, Ron Wolf

Verbena hastata, Gerald Carr

Verbena hastata, New England Wildflower Society

Phyla nodiflora, BLM California

Verbena bonariensis, Corey Raimond

Verbena bracteata, Matt Lavin

Glandularia wrightii, Patrick Alexander

Verbena neomexicana, Patrick Alexander

V

Zygophyllaceae | Caltrop Family

Familiar Western Genera - *Fagonia, Kallstroemia, Larrea, Tribulus, Zygophyllum*

General Information

Herbs and shrubs make up the Zygophyllaceae, which is sometimes referred to as the Creosote Bush Family because the dominance of the species. Creosote bush (*Larrea tridentata*) is a warm desert shrub, found in the western US in the Mojave, Sonoran, and Chihuahuan Deserts. Desert scrub habitats have high-calcium, gravelly soils with a deep caliche layer, a requirement of creosote bush that strongly influences the distribution of this species in these southwestern deserts. Bicyclists and golden retrievers are no doubt familiar with the fruits of puncture vine (*Tribulus terrestris*) otherwise known as "goats heads". There are approximately 23 genera and 220 species in the Caltrop Family.

Larrea tridentata, Patrick Alexander

Zygophyllaceae

Identifying Characteristics

1. Stems: jointed branches with swollen nodes that may have axillary or stipular thorns
2. Leaves: opposite (rarely alternate), with stipules that are well-developed at the node, pinnately compound, or 2-foliolate to 3-foliolate
3. Flowers: perfect, actinomorphic, 5-merous
4. Calyx: sepals 4-5, free, basally fused; Corolla: petals 4-5, free, imbricate, twisted
5. Stamens: 10-15, often glandular or with an appendage
6. Ovary: superior
7. Fruit: capsule or a schizocarp splitting into 5-10 mericarps (=nutlets)

Tribulus terrestris, Gerald Carr

Kallstroemia parviflora, Patrick Alexander

Kallstroemia grandiflora, BLM New Mexico

Larrea tridentata, Ron Wolf

Tribulus terrestris, Gerald Carr

Kallstroemia grandiflora, Patrick Alexander

Larrea tridentata, BLM Arizona

Larrea tridentata, Ron Wolf

Guaiacum angustifolium, Patrick Alexander

Kallstroemia grandiflora, Patrick Alexander

Larrea tridentata, BLM California

Tribulus terrestris, Patrick Alexander

Larrea tridentata, Patrick Alexander

GLOSSARY

The definitions in this glossary are derived from the Floras and the taxonomy books cited in the References.

A

Achene = dry, indehiscent, 1-seeded fruit; pericarp and seed coat separate except at a single point

Actinomorphic = radially symmetrical

Alternate = leaf arrangement characterized by a single leaf per node

Anther = pollen-bearing part of a stamen

Anthocarp = fruiting structure in which the fruit is surrounded by bracts, the lower portion of the perianth, or tissue from the receptacle. In the Nyctaginaceae, the base of the calyx acts like a parachute to disperse the fruit.

Apetalous = a flower without petals or any trace of petals

Areole = area on a cactus stem from which spines and other structures are produced

Awn = stiff, elongate bristle; in Poaceae, a stiff, needle-like pappus element

Axile placentation = in compound ovaries, a placentation type characterized by the placentae attached at the center of the ovary

Axillary = positioned in or arising in an axil

B

Banner = largest, upper petal of a flower in the Fabaceae

Basal placentation = placentation found in which one or more seeds or ovules are attached at the bottom of the ovary

Berry = multi-seeded, fleshy indehiscent fruit as in a blueberry or tomato

Bilabiate = 2-lipped, as in the corolla or calyx of many plants in the Lamiaceae

Bisexual = both male and female parts occur in the same flower

Blade = flattened, expanded portion of a leaf or petal

Bract = a much-reduced leaf subtending an inflorescence, sessile flower or pedicel

Bulb = short underground stem and the fleshy overlapping leaves attached to it, as in an onion

C

Calyx = collective term for sepals, the outermost whorl of the floral series

Campanulate = bell-shaped

Capsule = dry, dehiscent fruit composed of two or more united carpels

Carpel = a simple pistil; can be fused into a compound pistil; often, the number of carpels is equal to the number of stigma branches, styles or chambers of the ovary

Caryopsis = dry, one-seeded indehiscent fruit with the seed coat completely fused to the pericarp; fruit type of the Grass Family (Poaceae)

Catkin = pendant, cylindrical raceme or spike composed of dense, sessile, apetalous flowers

Cauline = pertaining to the stem, cauline leaves are attached to the stem

Chaff = thin, dry scale-like structures subtending the florets on the receptacle of plants in the Asteraceae

Circumscissile = a type of dehiscence in a dry fruit-opening by a slit running around the circumference with the upper part coming off as a lid

Claw = the stalk or constricted basal portion of a petal or sepal

Column = a structure in an orchid flower formed by the fusion of stamens to the style and stigma

Comose = bearing a tuft of hairs (e.g., seeds of milkweeds)

Compound leaf = a leaf composed of two or more segments

Connate = united; the fusion of similar structures to one another

Corm = dense, underground vertical stem with dry, papery leaf bases

Corolla = collective term for the petals of a flower

Corolla lobes = separate petal-tips of a sympetalous corolla

Corolla tube = cylindrical portion of a sympetalous corolla

Corona = series of appendages inserted on the corolla; a crown

Corymb = short more or less flat-topped or rounded indeterminate inflorescence with pedicels of different lengths

Culm = stem of grasses, sedges, and rushes

Cyathium = inflorescence of some plants in the Euphorbiaceae, consisting of a single pistil and several male flowers surrounded by a cup-like involucre

Cylindric = cylinder shaped, elongate and round in cross-section

Cyme = a branched, determinate inflorescence in which the flowers bloom from the center outward or from the apex downward

Cypsela = an achene with a pappus attached as in the Asteraceae

D

Deciduous = falling off

Dentate = coarsely toothed along the margin, with teeth pointing outward

Diadelphous = stamens occurring in two sets; a stamen arrangement characteristic of flowers in subfamily Papilionoideae (Fabaceae) in which nine stamens are connate by their filaments and the tenth is separate

Dicots = flowering plant in which the embryos have 2 seed leaves, flower parts in 4's or 5's or multiples

Didynamous = with four stamens in two pairs of unequal length

Dioecious = having staminate and pistillate flowers on separate plants of a species

Disk flower = tubular, usually actinomorphic and usually perfect flowers of some Asteraceae

Distinct = separate

Drupe = fleshy, usually 1-seeded indehiscent fruit having its seed enclosed in a stony endocarp; stone fruit as in cherries, dates

E

Entire = a featureless leaf margin

Epicalyx = an involucel of bractlets that immediately subtend the calyx of an individual flower (e.g., Malvaceae, Rosaceae)

Epipetalous = inserted upon the petals or corolla, often applied to stamens

Eudicots = one of the major clades of flowering plants composed of the majority of the classical dicots

Evergreen = remaining green throughout the year; not losing all the leaves at one time

Exserted = sticking out; projecting from the corolla

F

Fascicle = a tight cluster or bundle

Filiform = threadlike; filamentous

Filament = the stalk of a stamen that bears an anther

Floral tube = elongated tubular portion of the perianth

Floret = in the Poaceae, the unit composed of a single flower and its immediately subtending bracts (lemma and palea)

Follicle = dry dehiscent fruit derived from a single carpel, splitting on one side, along a single suture

Free = neither fused to nor adherent to other parts; distinct, separate

Free-central placentation = with ovules attached to a central free-standing column within a unilocular ovary

Fruit = ripened ovary and its contents along with any other structures which matured along with it

G

Glandular = bearing glands

Glochid = in Cactaceae, a reduced, barbed bristle-like spine

Glume = in the Poaceae, either of the two basal bracts of a grass spikelet that do not directly subtend individual florets

Gynobasic style = a style that appears to arise directly from the receptacle or ovary base rather than from the apex of the ovary; associated with the 4-lobed ovary in the Boraginaceae and Lamiaceae

Gynophore = an elongated stalk bearing the pistil in some flowers

Gynostegium = a structure found in the Apocynaceae formed from the fusion of the stamens to the stigma

H

Head = an inflorescence type characterized by an aggregation of more or less sessile flowers on a common receptacle; also referred to as a capitulum; the inflorescence type in the Asteraceae

Hypanthium = structure formed by the fusion of the bases of the sepals, petals and stamens; the shape varies from disc-like to cup-shaped, or long-tubular

Hypogynous = sepals, petals and stamens inserted on the receptacle "underneath" the base of the superior ovary; no hypanthium is present

I

Imbricate = overlapping

Imperfect = flower lacking either stamens or pistils; unisexual

Incomplete = flower with one or more floral series missing

Indehiscent = not splitting open at maturity

Inferior ovary = sepals, petals, stamens inserted above the ovary; thus, the ovary is below the point of attachment; ovary is fused to a hypanthium

Inflorescence = the flowering part of a plant; all of the flowers and associated parts arranged on a floral axis

Involucre = one or more whorls of bracts immediately subtending a flower or inflorescence

Irregular = flower that is bilaterally symmetric; zygomorphic

K

Keel = two lower petals of a papilionoid flower (subfamily Papilionidae, Fabaceae) that form a unit resembling the prow of a boat

L

Labellum = a lip; applied to the enlarged and often elaborate lower petal of the orchid flower

Legume = dry dehiscent fruit derived from a single carpel that dehisces along two sutures

Lemma = in grass spikelets the lower of two bracts that together enclose the flower

Ligule = strap-shaped structure. In Asteraceae the strap-shaped limb of a ray corolla or ligulate corolla. In Poaceae, the membranous appendage arising from the inner surface of the leaf at the junction with the leaf sheath

Limb = the expanded portion or border of a sympetalous corolla

Locule = cavity or chamber on the inside of an ovary

Loculicidal capsule = capsule that dehisces by means of openings into the locules

Lodicule = minute scales at the base of the ovary in the grass flowers

Loment = indehiscent dry fruit derived from a simple carpel that breaks transversely into one-seeded segments

M

Mericarp = one of the one-seeded segments that breaks away from the schizocarp

Monocots (monocotyledon) = flowering plant in which the embryos have one seed leaf, generally flower parts in 3s and parallel veins

Monadelphous = stamens with filaments fused into a tube surrounding the ovary and style (e.g., Malvaceae)

Monoecious = having staminate and pistillate flowers on the same plant

N

Node = point of attachment of a leaf to the stem

Nutlet = one of the one-seeded segments of the ovary of a member of the Boraginaceae or Lamiaceae; small nut

O

Ocrea = nodal sheath formed by fusion of two stipules (characteristic of some Polygonaceae)

Opposite = two leaves per node, across the stem from each other

Ovary = the ovule-bearing portion of the pistil

Ovule = immature seed

P

Palea = in a grass spikelet the upper of the two bracts that enclose the flower (lower bract is the lemma)

Palmate = radiating from a common point of origin; used for the leaflets in a compound leaf that point to the apex of the petiole

Panicle = indeterminate branching raceme; many-branched inflorescence

Pappus = modified calyx consisting of scales, bristles or awns in the Poaceae

Parietal placentation = in a compound ovary without septa (i.e. one locule) the placentae are attached to the side walls of the ovary

Pedicel = the stalk of an individual flower in an inflorescence

Peduncle = stalk that supports an inflorescence including, including the stalk that supports a solitary flower

Pepo = large berry derived from an inferior ovary, characterized by a thick rind (restricted to the Cucurbitaceae)

Perfect = a flower with both stamens and pistils; bisexual

Perianth = collective term for the outer parts of the flower, the calyx and corolla

Perigynium = sac-like hollow bract that encloses a pistillate flower in genus Carex

Petiole = the leaf stalk

Petal = one unit of the inner whorl of the perianth

Phyllary = one of the involucral bracts of the head of a plant is the Asteraceae

Pinnate = with leaflets arranged on both sides of a common axis

Pistil = female reproductive part of the flower, composed of stigma, style and ovary

Placenta (placentae) = the point or region where ovules are attached to the ovary wall

Placentation = the arrangement of placentae within the ovary

Pollinium (pollinia) = mass of adherent pollen grains shed as a unit in Asclepias and the Orchidaceae

Pome = fleshy accessory fruit of inferior-ovaried members of the Rosaceae derived from the fusion of the hypanthium to the ovary wall

Poricidal capsule = capsule that opens by means of a pore or series of pores

R

Raceme = unbranched indeterminate inflorescence with a rachis and pedicellate flowers

Ray flower = a type of pistillate or sterile flower in the Asteraceae with a flat, strap- or fan-shaped often 3-lobed outer portion of the corolla

Receptacle = in an individual flower, the structure to which flower parts are attached

Regular = actinomorphic; perianth parts have 2 or more lines of symmetry

Replum = the septum in a silique or silicle

Rhizome = elongate underground horizontal stem which bears reduced scaly leaves, axillary buds

Rosette = tight cluster of leaves radiating from a central area of attachment; generally basal

Rostellum = hollow cap borne at the end of the column, covering the pollinia in the Orchidaceae

Rotate = wheel-shaped; a corolla with a very short tube and a flat, circular limb

S

Salverform = describes a corolla with a slender tube and an abruptly expanded flat limb (e.g. Ipomopsis or Phlox flower)

Samara = indehiscent winged fruit

Scape (scapose) = leafless peduncle arising from the ground level

Scarious = with a dry membranous texture, often translucent

Schizocarp = fruit derived from a compound ovary that breaks apart into one-carpellate units (mericarps), each of which contains one or more seeds

Scorpioid = circinately coiled determinate inflorescence; helicoid cyme

Scurfy = covered with scales

Sepal = one unit of the outer whorl of the perianth, usually greenish

Sheath = in the Poaceae (and elsewhere) the base of a leaf that enwraps the steam

Septicidal capsule = capsule that dehisces along or within the septum

Septum (septa) = a partition within an ovary

Silicle = in the Brassicaceae, a short silique

Silique = in the Brassicaceae, a dry dehiscent fruit that has two locules separated by a membranous septum (replum); long and skinny fruit

Simple leaf = a leaf which is not divided into discrete leaflets

Spike = unbranched elongated inflorescence with sessile flowers attached directly to the rachis

Spikelet = in the Poaceae the portion of the inflorescence consisting of the glumes and enclosed florets

Spur = sac-like or tubular projection from a petal or sepal

Stamen = pollen-producing part of a flower, composed of anther and a filament

Staminode (staminodia) = sterile stamen that does not produce pollen

Stolon = above-ground horizontal stem which roots at the nodes and produces new plants, often at its tip

Stellate = in some hairs, radiating like the points of a star

Stigma = pollen-receptive portion of the pistil

Stipule = pair of appendages at the base of a petiole

Style = more-or-less elongated portion of the pistil between the ovary and the stigma

Stylopodium = in some Apiaceae flowers, a disc-like to long-tapering enlargement borne atop the ovary at the base of the styles

Succulent = thick and fleshy, juicy

Superior ovary = ovary that has the other floral parts (sepals, petals, stamens) inserted on the receptacle below it

Sympetalous = with united petals

T

Tendril = thread-like twining structure by which a plant supports itself

Tepal = segment of the perianth that is not clearly differentiated into sepals and petals

Terete = cylindrical, round in cross-section

Terminal = at the tip or apex

Ternate = divided into threes

Tetradynamous = having four long stamens and two short ones, as in the Brassicaceae

Thyrse = a compact cylindrical, pyramidal panicle or ovate panicle with an indeterminate main axis and cymose sub-axes

Trifoliolate = a compound leaf with three leaflets

Tubercle = small, wart-like projections

U

Umbel = indeterminate inflorescence with pedicels arising from a common central point of attachment

Utricle = bladdery achene with the pericarp loose and fragile

V

Valvate = opening by valves, as in many dehiscent fruits; meeting without overlapping when referring to petals or sepals

W

Whorl (whorled) = circular arrangement with three or more leaves or flowers at a node

Wing = either of the two lateral petals in a papilionaceous flower (subfamiliy Papilionoideae, Fabaceae)

Z

Zygomorphic = bilaterally symmetric, divisible into equal halves along only one plane

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Delta County, Colorado, Phil Krening