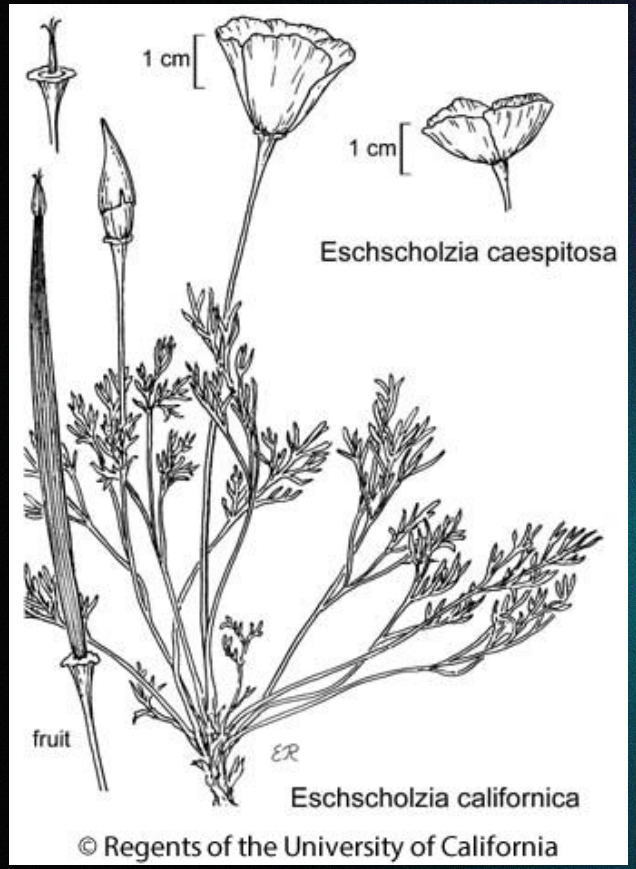


Introduction to Botany

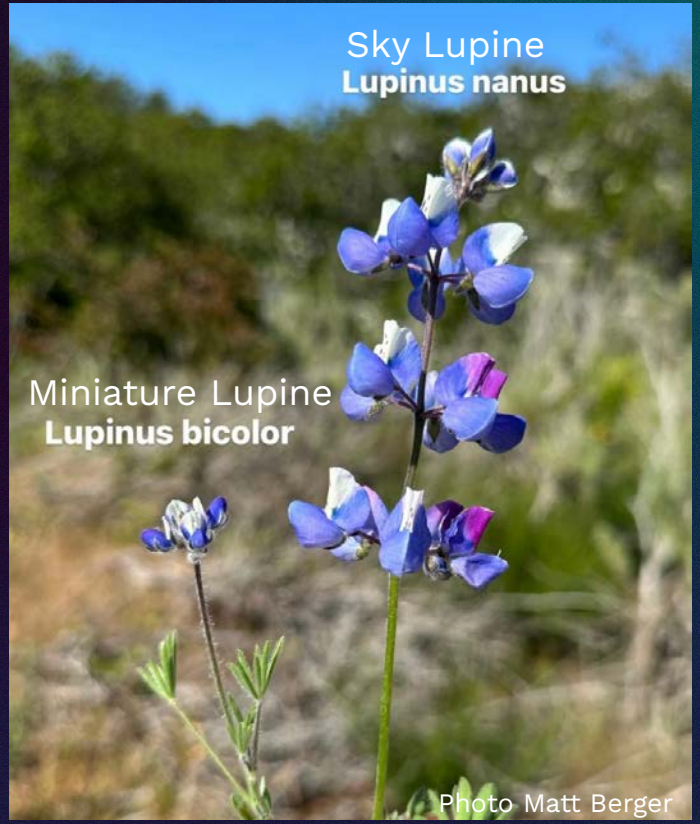
Oakhurst Tree School

04.05.25
CALIFORNIA TREE SCHOOL 2025
Oakhurst Session

PRESENTERS:
DAVID BENTEROU — UCANR Fire Network (UCCE Central Coast & Southern Sierra Nevada)
LAUREL BARD — RCD Santa Cruz County

Agenda:

- Introductions
- Some background on the world of plants
- Plant part terms, plant identification
- How to learn your local plants
  - Local familiar plants genuses
  - Research tools often used
- Field activity
- Break 10:30-11am



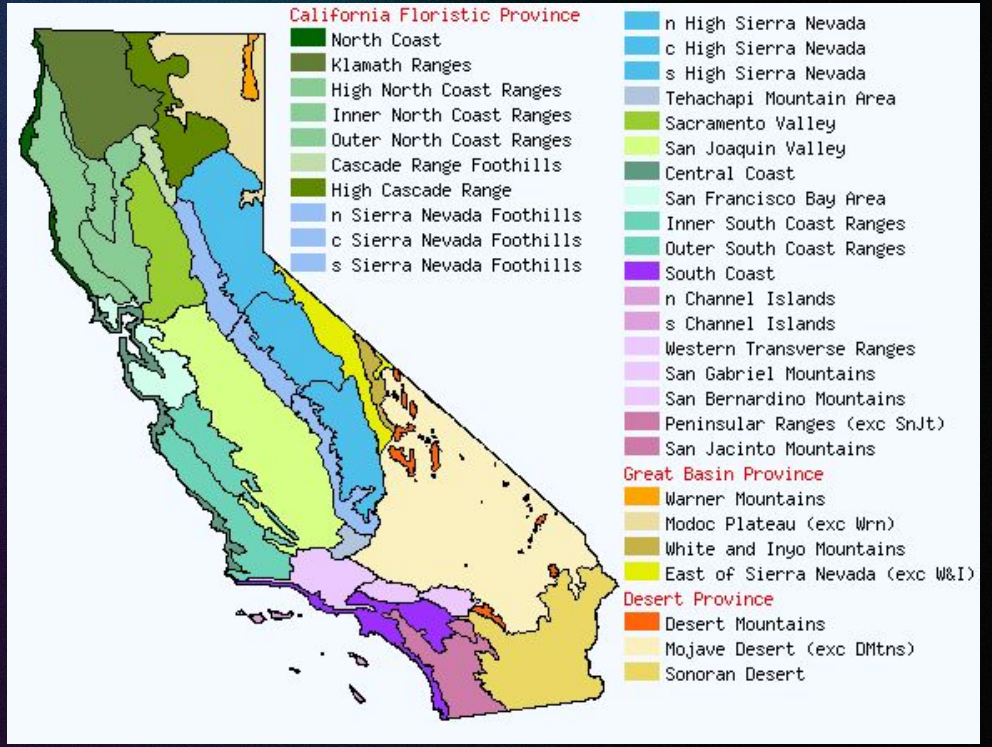
Why Learn plants?

- Helps us understand what's common or rare
- Helps us understand interaction of life history and site history (or management)
- Plants are cool.
- Plants are our relatives on this planet, and by learning what lives around us, we better understand our relationship with the Earth.

Orange lupine, *Lupinus citrinus var. citrinus*, (*Fabaceae*)

California Floristic Province is a biodiversity hotspot

- Floristic provinces: sites of high species endemism
- CA-FP: 8000 species, ~35% are endemic
  - Native sp: >6700
  - Endemic sp: >2300
  - Nonnative/ naturalized sp: >1300
- Subdivided into regions
- Range: S. Oregon-N. Baja; borders Great Basin & S. Desert provinces
- Elevations 0 - 14,000+ ft. (4400+ m)

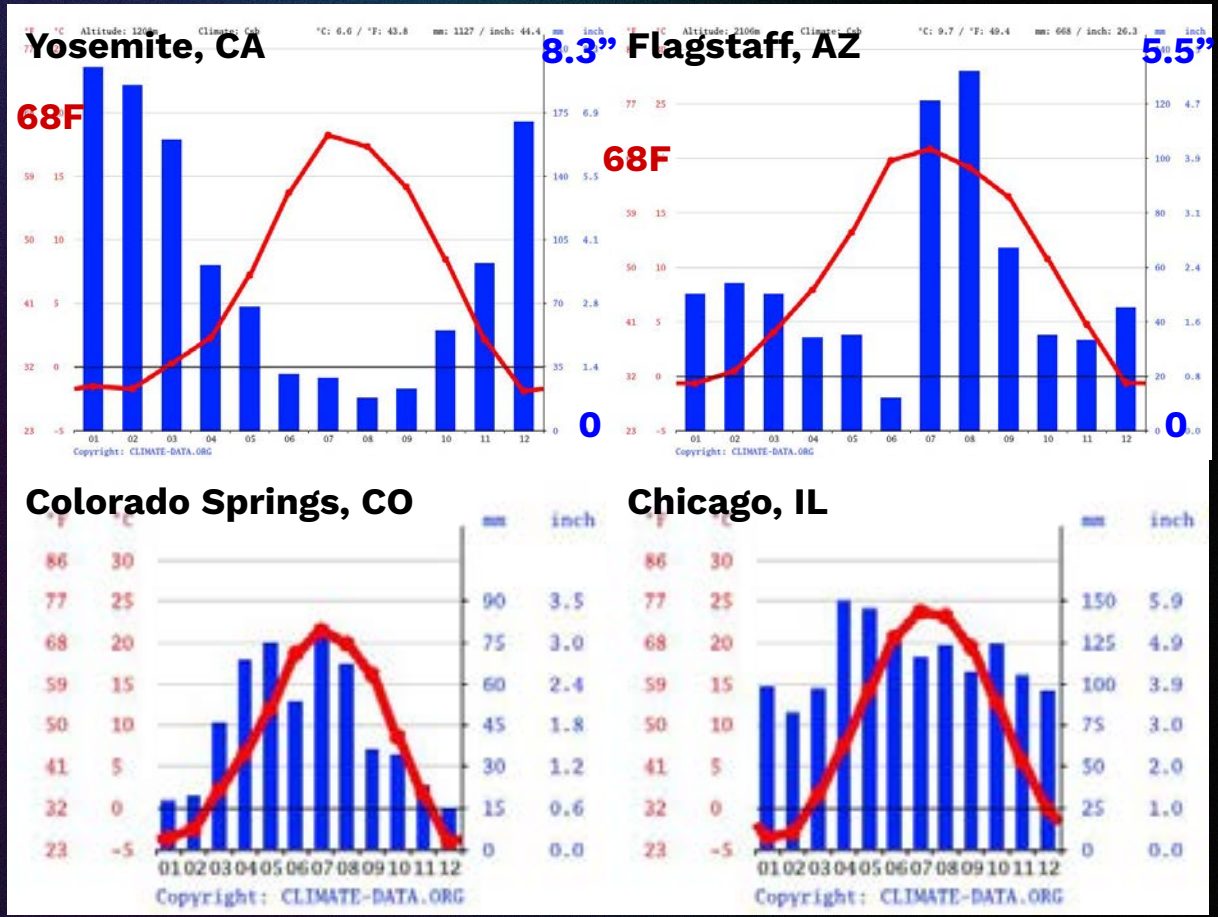


Why?

- **Climate**
- Geology
- Topography

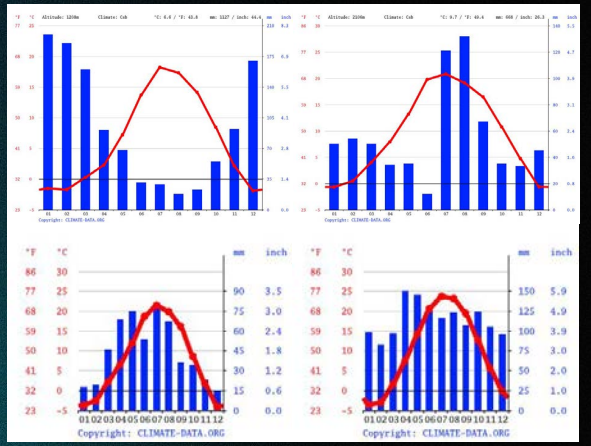
Plants growth requires:

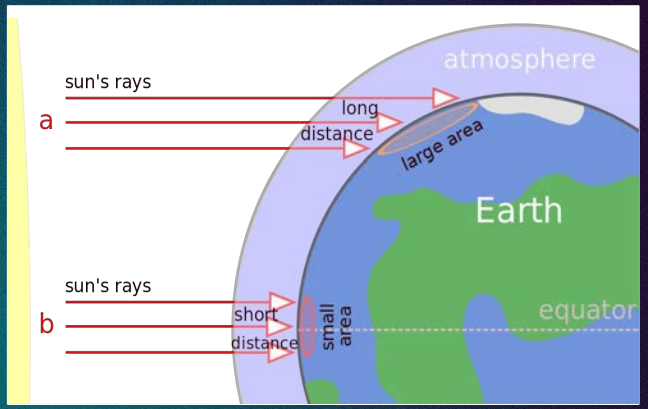
- Light
- Carbon
- Nutrients
- **Water**



Some ecological drivers of evolution:

- Climate (precipitation/drought, fire, heat/frost, elevation)
- Soil conditions (nutrient availability, soil drainage)
- Biotic Interactions (competition, canopy shade)
- Light availability (length of day, season, aspect, latitude)
- Disturbance regimes (consistent variation)
- Isolation
- Humans?






Frost on flannelbush leaves


BLM

Plants strategies for survival

- Similar resource needs, but unique ecological constraints.
- Result: develop unique survival strategies
- Natural selection of successful strategies & traits supports speciation
- Examples: growth habit, stress tolerance, mutualisms, disturbance response, photosynthesis strategy

Image: Ian Bornarth

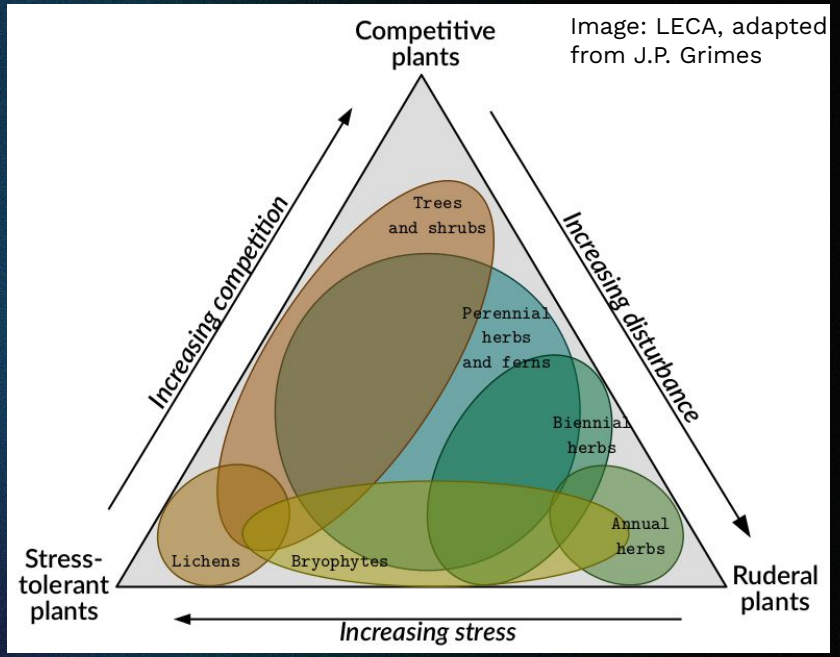
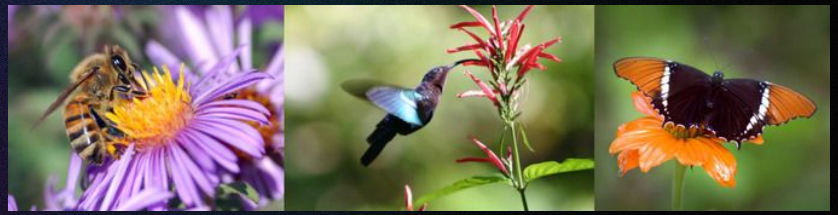


Image: LECA, adapted from J.P. Grimes



Yellow-lip pansy monkeyflower, *Diplacus pulchellus* (Phrymaceae). Photo Mike Russler

Mariposa Lupine, *Lupinus citrinus var. Deflexus* (*Fabaceae*). Photo Michael Osborne

Mariposa pussypaws, Calyptridium pulchellum (Montiaceae). Photo Chris Winchell

WHAT MAKES A PLANT “RARE”?

Endemism/limited dispersion, habitat loss, introduction of competitors, reliance on altered

CA Rare Plant Rank	Description
1A	Plants presumed extinct in California and rare/extinct elsewhere
1B.1	Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California
1B.2	Plants rare, threatened, or endangered in California and elsewhere; fairly threatened in California
1B.3	Plants rare, threatened, or endangered in California and elsewhere; not very threatened in California
2A	Plants presumed extirpated in California, but more common elsewhere
2B.1	Plants rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California
2B.2	Plants rare, threatened, or endangered in California, but more common elsewhere; fairly threatened in California
2B.3	Plants rare, threatened, or endangered in California, but more common elsewhere; not very threatened in California
3.1	Plants about which we need more information; seriously threatened in California
3.2	Plants about which we need more information; fairly threatened in California
3.3	Plants about which we need more information; not very threatened in California
4.1	Plants of limited distribution; seriously threatened in California
4.2	Plants of limited distribution; fairly threatened in California
4.3	Plants of limited distribution; not very threatened in California

CNPS rare plant inventory

Introduced ≠ Invasive

Spread easily, outcompete native plants, colonize large areas, impact native ecology, displace habitat for native animals.

Explanation of Cal-IPC ratings

High – These species have severe ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal and establishment. Most are widely distributed ecologically.

Moderate – These species have substantial and apparent-but generally not severe-ecological impacts on physical processes, plant and animal communities, and vegetation structure. Their reproductive biology and other attributes are conducive to moderate to high rates of dispersal, though establishment is generally dependent upon ecological disturbance. Ecological amplitude and distribution may range from limited to widespread.

Limited – These species are invasive but their ecological impacts are minor on a statewide level or there was not enough information to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but these species may be locally persistent and problematic.

Alert – An Alert is listed on species with High or Moderate impacts that have limited distribution in California, but may have the potential to spread much further.

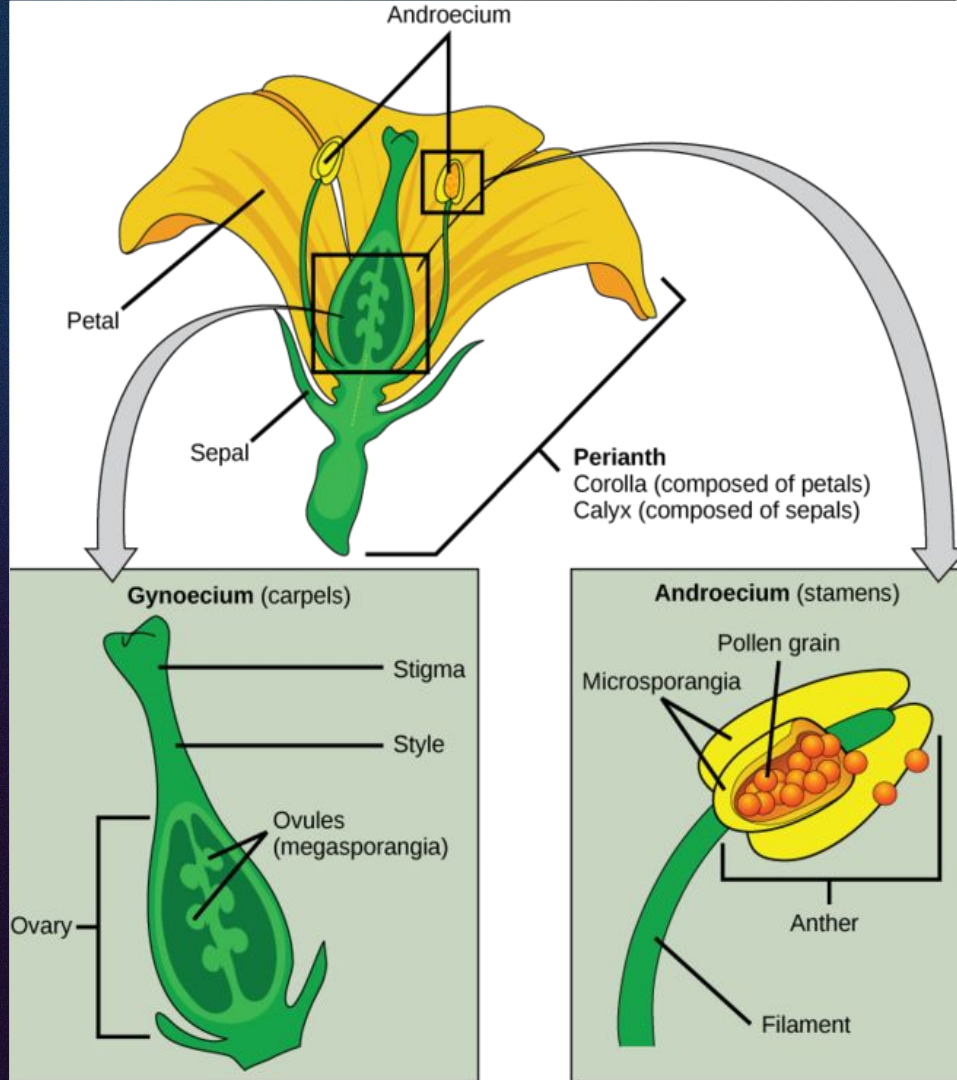
Watch – These species have been assessed as posing a high risk of becoming invasive in the future in California.

WHAT MAKES A PLANT “INVASIVE”?

Plant parts

- **Flowers:**
  - Structures
  - Color
  - Symmetry
  - Arrangement
  - Number of flowers,
  - location on plant

Giant wakerobin, (*Trillium chloropetalum*)

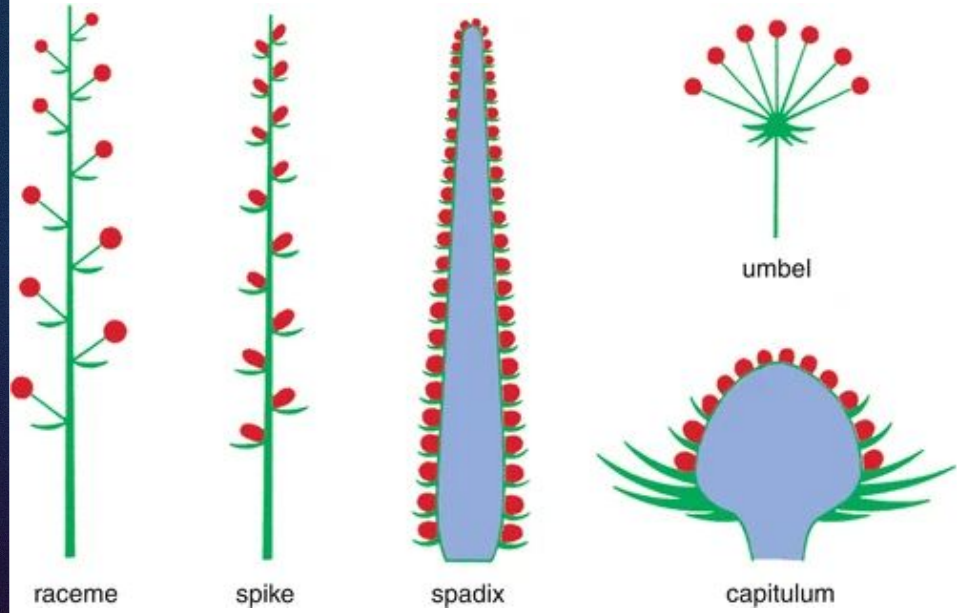


Plant parts

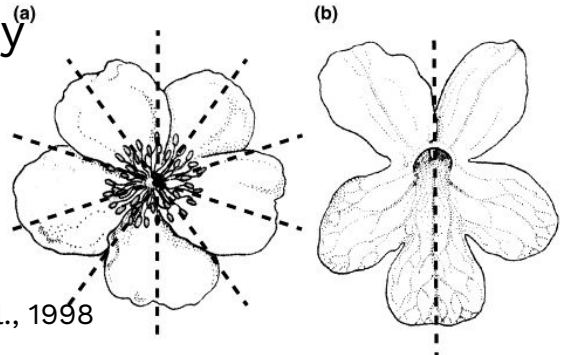
- **Flowers**: (symmetry, arrangement, number of flowers, location on plant)
- Growth habit: (woody, herby, liana/vine, fern, non-vascular)
- Structure: (canopy, sub-canopy, understory)
- Seasonality: (phenology/ bloom time, annual/ perennial, Dormancy)
- Population: (where is it growing, how many are growing together)
- Vegetative structures & morphological traits Roots, stems, Leaves, flowers, fruits, seeds
- Gestalt (vibes, plant whispering, black magic, “you can tell by the way it is”)

Plant identification: a seasonal sport!

Inflorescence



Symmetry



Donoghue et al., 1998

Plant parts

- Flowers: (symmetry, arrangement, number of flowers, location on plant)
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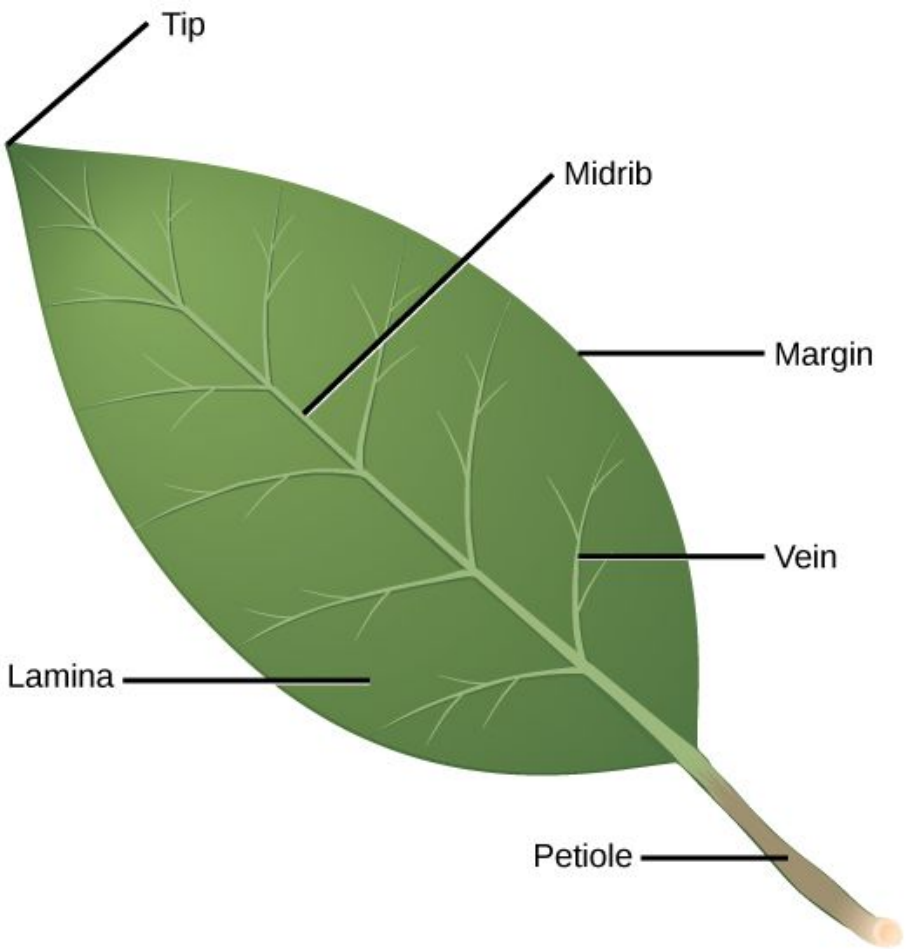
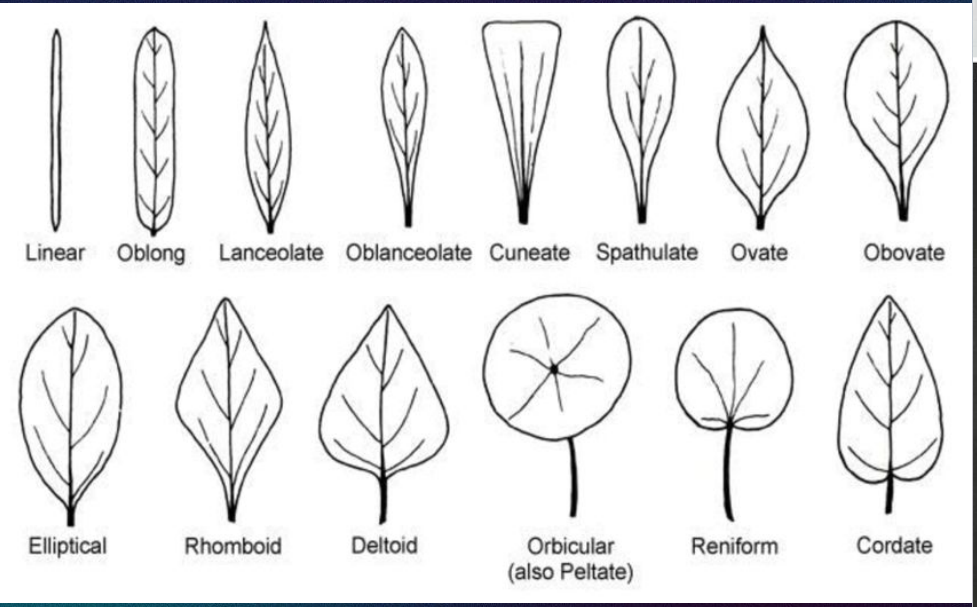
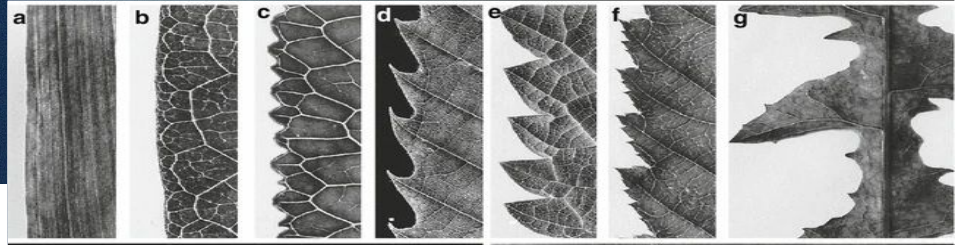
Plant identification: a seasonal sport!



Plant parts


Linear
Oblong
Lanceolate
Oblanceolate
Cuneate
Spathulate
Ovate
Obovate
Elliptical
Rhomboid
Deltoid
Orbicular
(also Peltate)
Reniform
Cordate


a
b
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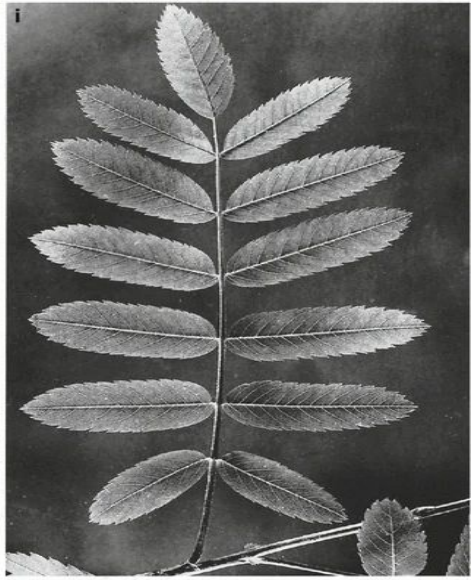
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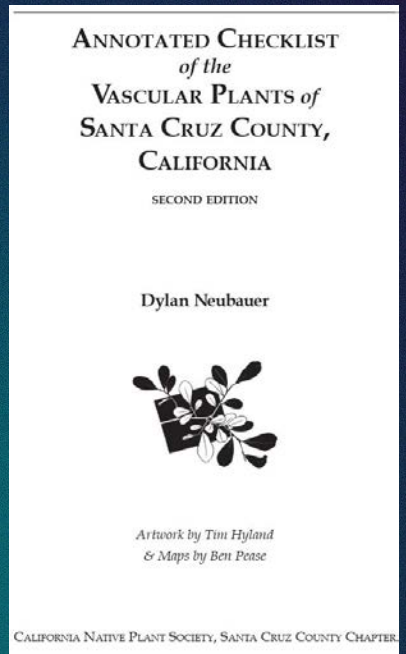
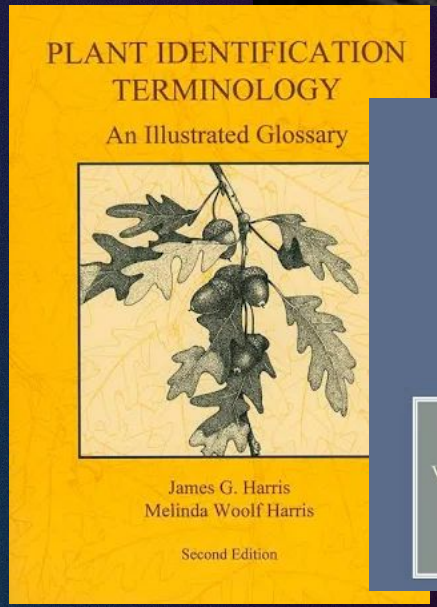
Plant parts terminology

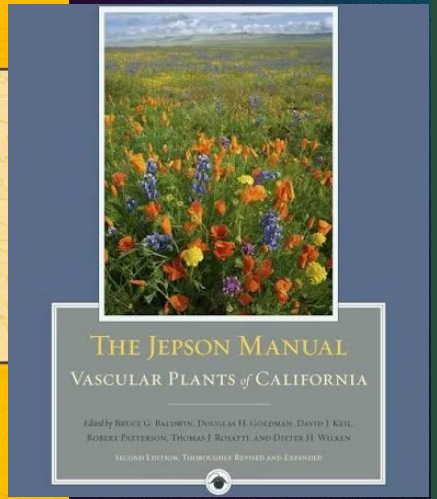
Patience is progress!

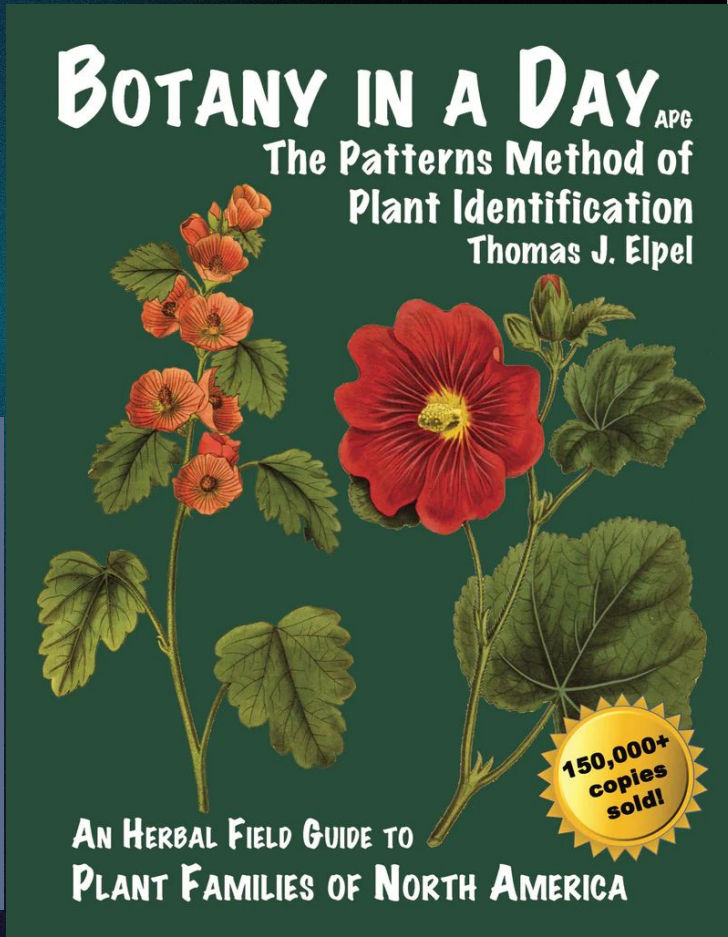
Common Resources:

- Guidebooks
- Keys
- AI Apps
- People









Resources for Plant ID

Seek

- App uses AI to guess species based on photo
- Pros: easy, instant results
- Cons: often inaccurate

iNaturalist

- App lets you upload photos for citizen scientists to ID
- Pros: easy, contributing to citizen science,
- Cons: can take time for ID to be confirmed

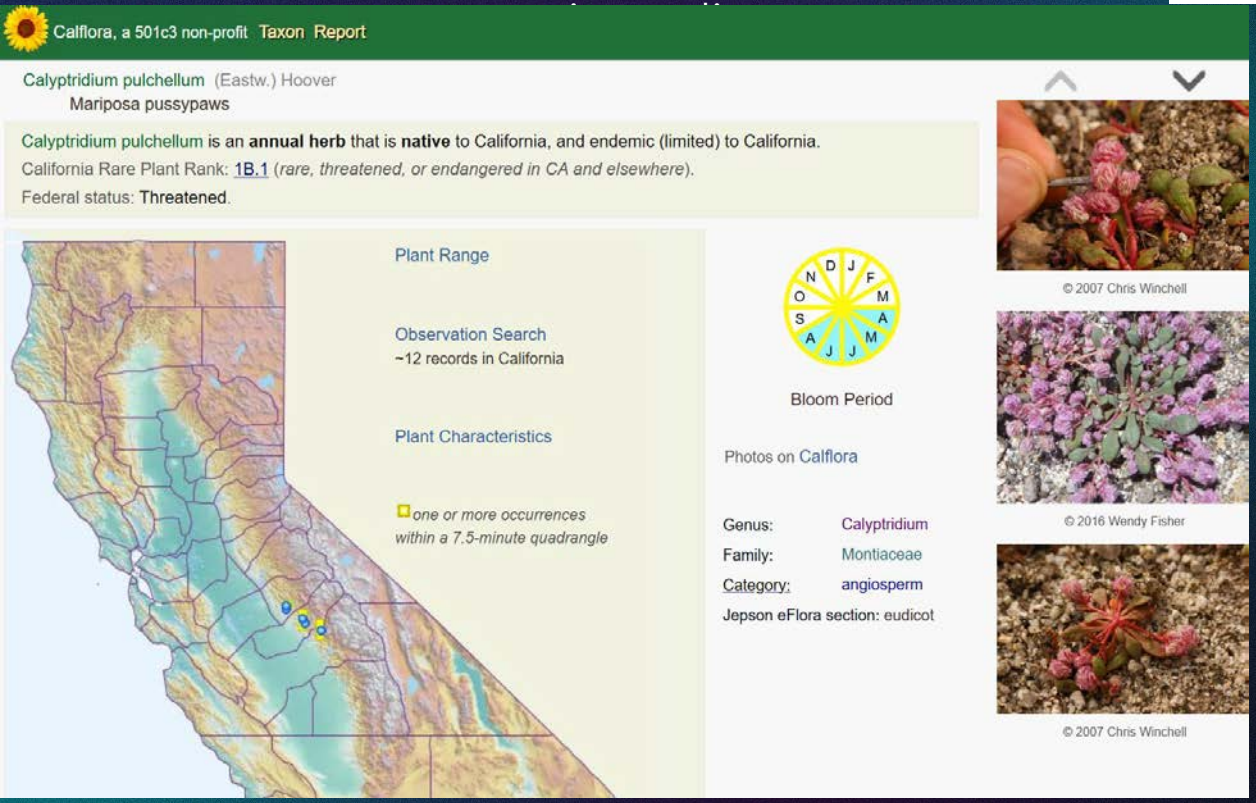
CalFlora: What Grows Here

- Pros: pictures of species that may be found in an area. Also shows blooming season. Your name is associated with your observations!
- Cons: often incomplete.

Jepson Key

- Online dichotomous key
- Very helpful with technical skill but can be hard for beginners
- Tip: print a shortened version of the key for just one genus or a few species

Resources for Plant ID



CalFlora What Grows Here

Make a list with pictures of species that may be found in an area. Also shows blooming season. However, often incomplete.

Jepson Key

- Online dichotomous key
- Very helpful with technical skill but can be hard for beginners
- Tip: print a shortened version of the key for just one genus or a few species

Beginner Guiding Questions for Plant Identification

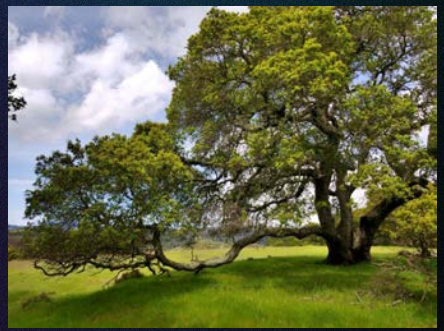
- Overall: What form does the plant take? Is it a vine? A tree? A bush?
- Leaves: What shape are they? Star-shaped, blade-like, lobed? Are they hairy or smooth?
- Flowers: What shape are they? Are they clustered together or alone? What time of year is it?
- Fruit: What size are they? Are they fleshy or nut-like? What time of year is it?

QUERCUS Genus and Coast Live Oak (*Quercus agrifolia*)

- *Quercus* are usually trees but they can resprout so they can be shrubby
- Wide variety of leaf shape and texture throughout genus
- All produce acorns One species makes acorns and is NOT Quercus: tanoak!
- Staple food for indigenous people across California

Identifying Coast Live Oak:

- Form: Tree Many-branched, rounded canopies at maturity. Shrubbier depending on conditions.
- Leaves: Hard, cupped, toothed margin, “hairy armpits”
- Fruit: Long acorn
- Flowers: Not showy. Green/ brown and clustered. Feb-April.



ARCTOSTAPHYLOS Genus (Manzanita)

- Form: Many-branching shrub with red and/or grey bark.
- Leaves: Generally rounded to oblong. May be hairy or smooth. Green to grey-green to silver-green.
- Flowers: Bell-shaped, white to pink, color may vary even on the same individual plant. Some species are winter-flowering.
- Fruit: Small, round green to red fruit that look like “little apples”. They are edible but usually somewhat powdery.
- Edible + used medicinally by indigenous groups across California.


Photo Neal Kramer


Photo Barry Breckling


Photo Mike Russler

Arctostaphylos viscida subsp. mariposa

MARIPOSA MANZANITA

Higher Taxonomy

Family: Ericaceae	**View Description**	**Dichotomous Key**
Genus: Arctostaphylos	**View Description**	**Dichotomous Key**
Species: Arctostaphylos viscida	**View Description**	

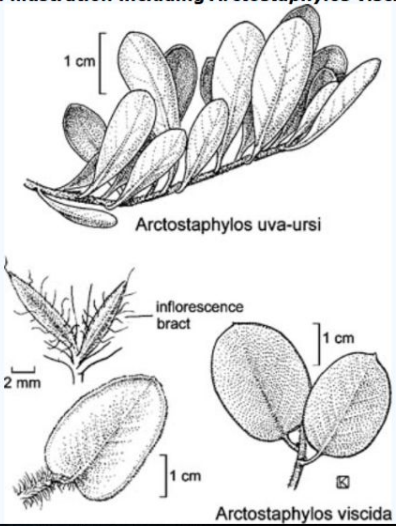
***Arctostaphylos viscida* Parry subsp. *mariposa* (Dudley) P.V. Wells**
NATIVE
Stem: twig densely glandular-hairy. **Leaf:** sparsely short-glandular-hairy, ciliate, papillate, scabrous. **Flower:** ovary (and fruit) glandular-bristly.
Ecology: Openings in chaparral, forest; **Elevation:** 400--2200 m. **Bioregional Distribution:** SN. **Flowering Time:** Feb--Apr
Synonyms: Arctostaphylos mariposa Dudley
Jepson eFlora Author: V. Thomas Parker, Michael C. Vasey & Jon E. Keeley
Reference: Keeley 1997 Madroño 44:109--111; Parker et al. 2007 Madroño 54:148--155
Index of California Plant Names (ICPN; linked via the Jepson Online Interchange)

List of species: click here

Previous taxon: Arctostaphylos viscida
Next taxon: Arctostaphylos viscida subsp. pulchella

Name Search: Submit Name

Botanical illustration including *Arctostaphylos viscida subsp.*



40' Plant generally erect, occasionally mounded to erect, (0.1)0.3–8 m

48. Nascent inflorescence bracts either fleshy, scoop-shaped or generally scale-like, deltate to awl-shaped, keeled or not

49. Inflorescence generally ± raceme, occasionally 1–2-branched

50. Old stem bark persistent, shredding, gray – s CCo, s SCoRO (Nipomo, Burton mesas, Point Sal; sw San Luis Obispo, nw Santa Barbara cos.) ..... A. rudis (2)

50' Old stem bark smooth, dark red with ± gray or ± glaucous patches or ± red

51. Twig glandular-hairy; plants short, often mounded; old stems dark red with ± gray or ± glaucous patches; n SNF (Amador, Calaveras cos.) ..... A. myrtifolia

51' Twig sparsely short-nonglandular-hairy; plants mounded to generally erect; old stems ± red, without ± gray or ± glaucous patches; n CCo, s SnFrB (s Santa Cruz Mountains), SCoR, SnBr, PR, e DMtns

52. Nascent inflorescence spheric, cup-like, axis 0.3–1 cm, crook-necked, bracts ± spreading; fruit 3–8 mm wide; n CCo, s SnFrB (s Santa Cruz Mountains) ..... A. hookeri subsp. hookeri

52' Nascent inflorescence club-like, axis 0.5–1.5 cm, not crook-necked, bracts recurved; fruit 8–14 mm wide; SCoR, SnBr, PR, e DMtns ..... A. pungens

49' Inflorescence panicle, (1)3–8-branched

53. Leaf blade ± white, white-glaucous, gray-green, gray-glaucous

54. Fruit (10)12–16 mm wide, spheric or ± spheric

55. Stones free, occasionally fused; nascent inflorescence bracts appressed; fruit glabrous; s CaRF, CaRH (near Paradise), n SNF ..... A. mewukka subsp. truei

55' Stones markedly fused; nascent inflorescence bracts spreading; fruit glabrous or sticky; SnFrB, SCoR, TR, PR, sw DMtns (Little San Bernardino Mountains)

56. Petiole 1–4 mm; leaf glabrous or generally short-nonglandular-hairy, base lobed; ovary, fruit glabrous, not sticky; n SCoRI (n&c Gabilan Range, San Benito, Monterey cos.) ..... A. gabilanensis

56' Petiole 7–15 mm; leaf glabrous, base rounded, truncate, or ± lobed; ovary, fruit glandular-sticky; Teh, SnFrB, SCoR, SCo, TR, PR, sw DMtns (Little San Bernardino Mountains) ..... A. glauca

54' Fruit 6–12 mm wide, depressed-spheric

57. Nascent inflorescence bracts nonglandular; KR, NCoR, CaRF, SN ..... A. viscida

58. Twig densely glandular-hairy; leaf sparsely short-glandular-hairy, ciliate, papillate, scabrous; SN ..... subsp. mariposa

58' Twig glabrous to sparsely short-nonglandular-hairy; leaf glabrous

Thank you!

Questions?