

BPSC 031 “Spring Wildflowers”
Lab 5. Three-parted and four-parted families

I. The three-parted families

The main plant taxa with three-parted flowers in California are easily distinguishable by the presence of three sepals and three petals, mostly of the same color and form, and often indistinguishable from each other. Some botanists will also describe them as having six tepals (tepal is a generic name to designate sepals and petals that look similar and are indistinguishable).

Key to the three-parted families (six separate tepals, in two whorls of three)

- A. Flowers tiny, pinkish-white, grouped in dense clusters. Fruit an achene. Alternate, dicot-type leaves often with papery stipules called ochreas. Small annuals or perennial shrubs. **Polygonaceae**
- A'. Flowers usually showy, with six colored tepals. Fruit a dry capsule. Simple, paralleled veined (monocot) leaves arranged in basal rosettes **Liliaceae**

II. The Four-parted families

The four parted families in the wild flora of California are easily distinguishable by their 4 separate petals (apopetalous) and their capsule-like dry fruits. Three distinct and easily distinguishable plant families dominate with this flower morphology:

Key to the four-parted families (four separate tepals)

- A. Fruit a 2-carpelled silique, six “tetradynamous” stamens (2 short and 4 long) **Brassicaceae**
- A'. Fruit a capsule, stamens 4, 6, 8, or many (but never tetradynamous) B
- B. Ovary inferior, corolla spreading from a hypanthium, 4 or 8 stamens **Onagraceae**
- B. Ovary superior, 2 deciduous sepals, stamens 6 to many **Papaveraceae**

Take randomly one of the plants in the lab and, using the above keys, try to identify the family to which that species belongs. Then, according to the family you have identified, develop the following activities.

1. Polygonaceae (Buckwheat Family)

- a. With care, try to dissect the flower and observe flower parts. Can you distinguish sepals from petals? Count the number of tepals.
- b. Look at older flowers to see if you might find a ripening fruit. Can you see the one-seeded ovary developing into an achene?
- c. Look in detail at the distinctive characters of the leaves and the stem. Can you see an ochrea at the base of the leaf? Look at the leaf venation pattern. Is it reticular, like in dicots, or parallel, like in monocots?
- d. Make a sketch of the most distinctive traits you have observed.

2. **Liliaceae (Lily Family)**

- a. Look in detail at the flower. Can you distinguish sepals from petals? Count the number of tepals and stamens.
- b. Look at older flowers to see if you might find a ripening fruit, or, alternatively, dissect the ovary in the flower you have. Can you see the ovules? How many carpels form the ovary? Is the fruit a capsule? Describe it.
- c. Observe the leaves and, if available, the basal rosette. Look at the venation pattern. Is it parallel or reticular? Is the plant a monocot or a dicot?
- d. Make a sketch of the most distinctive traits you have observed in this plant.

3. **Brassicaceae (Mustard Family)**

- a. Dissect the flower and observe it. Does it have six stamens? Using the lecture notes as a guide, describe the configuration of the stamens.
- b. Look at older flowers to see if you might find a ripening fruit, or, alternatively, dissect the ovary in the flower you have. Can you see the ovules or the forming seeds? How many carpels form the ovary? Is the fruit a silique? Describe it.
- c. Make a sketch of the most distinctive traits you have observed in this plant.

4. **Onagraceae (Evening Primrose Family)**

- a. Look in detail at the flower. Where is the ovary? Is it inferior or superior?
- b. If indeed the plant is in the evening primrose family, it should have a hypanthium above the inferior ovary. Can you see the hypanthium? Describe it.
- c. Make a transversal cut across the ovary and look at its internal structure. Can you see the ovules? Describe the placentation type.
- d. Make a sketch of the most distinctive traits you have observed in this plant.

5. **Papaveraceae (Poppy Family)**

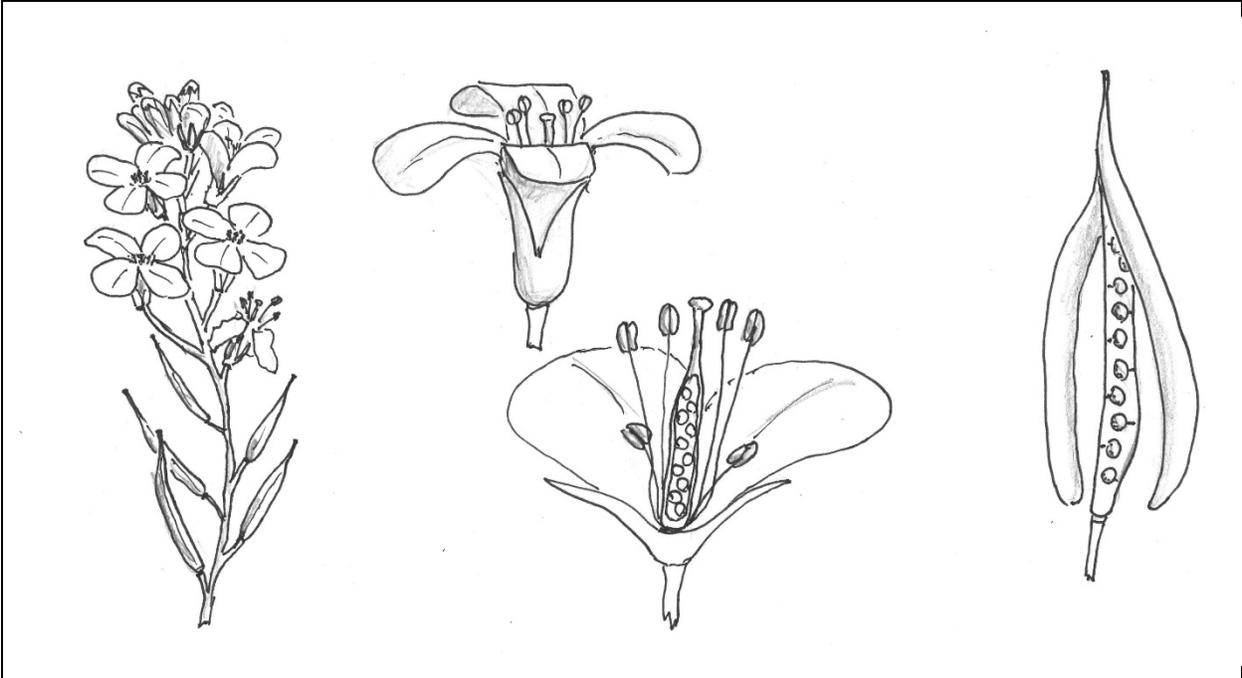
- a. Look in detail at an open flower. Can you see the sepals? Now look at an un-open floral bud. Can you see the sepals now?
- b. Describe the arrangement of the stamens. How many stamens does the plant have?
- c. Look at older flowers to see if you might find a ripening fruit, or, alternatively, dissect the ovary in the flower you have. Can you see the ovules? Is the fruit a capsule? Describe it.
- d. Make a sketch of the most distinctive traits you have observed in this plant.



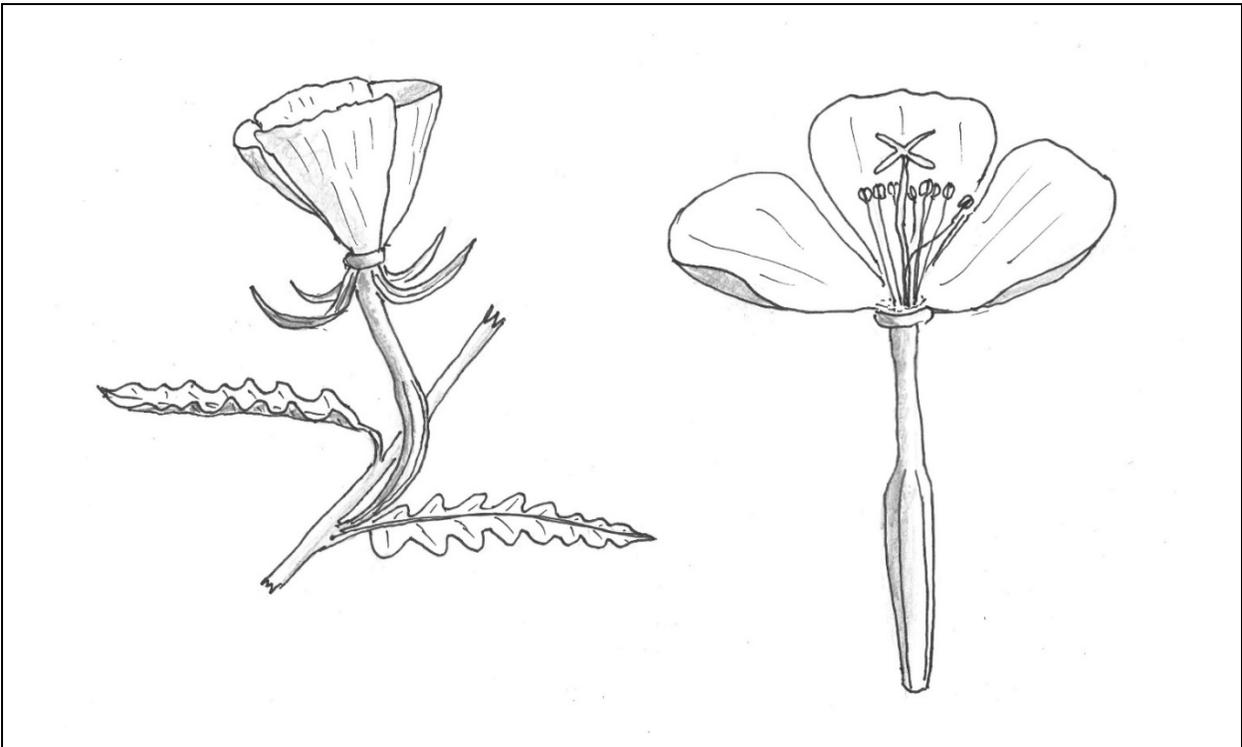
The Polygonaceae at a glance: Tiny, chiefly pinkish-white flowers, clustered in dense inflorescences sometimes inside cup-shaped bracts called involucre. The perianth is composed of 6 (sometimes 4) tepals (sepals and petals similar in size and color), 3 to 9 stamens and a single pistil with a superior, 3-carpelled ovary bearing a single fruit. The fruits are small, hard, usually 3-sided achenes (Illustration: *Eriogonum fasciculatum*, "California buckwheat").



The Liliaceae at a glance: Mostly herbaceous, short-lived plants with parallel-veined leaves arranged in basal rosettes before reproductive elongation of the stem. Actinomorphic, often showy, flowers with six colored tepals (three sepals and three petals of similar color and shape); single pistil with a 3-chambered ovary formed by three connate carpels. The fruits are normally dry capsules that dehisce along the carpel sutures, gradually releasing the seed as the dry (Illustration: *Dichelostemma capitatum*, "blue dicks").



The Brassicaceae at a glance: Sharp mustardy flavor, distinct cross-like petal arrangement, six tetradynamous stamens (four long, two short), superior 2-carpelled ovary with parietal placentation, fruit an elongated silique or a rounded silicle with a papery central partition (Illustration: *Brassica nigra*, "black mustard").



The Onagraceae at a glance: Herbaceous plants with 4-petalled actinomorphic corollas spreading from a tubular hypanthium, 4 or 8 stamens, and a 4-carpelled inferior ovary. Fruit a many-seeded capsule that opens gradually releasing seeds to the ground (Illustration: *Oenothera californica*, "California evening primrose").



The Papaveraceae at a glance: Herbaceous plants or woody shrubs with 4-petaled actinomorphic corollas, six-to-numerous stamens, a many-carpelled superior ovary, and only 2 sepals, which are fused and form a green "hat" (calyptra) that covers the flower bud and is shed as the petals unfold. Fruit a many-seeded capsule (Illustration: *Eschscholzia californica*, "California poppy").